COMPREHENSIVE LRT SYSTEM PLAN FOR HENNEPIN COUNTY

Prepared for

HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY
2307-A Government Center
Minneapolis, Minnesota 55487

Prepared by:

BRW, Inc.
700 Third Street South
Minneapolis, Minnesota 55415

Subcontractors:

BECHTEL CIVIL, INC.
LTK ENGINEERING SERVICES
MILLER & SCHROEDER FINANCIAL
CNA CONSULTING ENGINEERS

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I. SUMMARY

The Comprehensive Light Rail Transit System Plan has been prepared by the Hennepin County Regional Railroad Authority (HCRRA) in response to a mandate by the Minnesota State Legislature in its 1987 session. In the preparation of the System Plan, the HCRRA considered:

- LRT Design and Service Standards and Policies
- System Definition
  - Location of LRT Service within Hennepin County
  - Patronage Forecast
  - Capital and Operating Costs
- System Financing
- Potential Public Benefits of LRT
- LRT and Corridor Land Use Relationship
- Implementation Methodology Alternatives
- System Operator

Major points are summarized below.

LRT DESIGN AND SERVICE STANDARDS AND POLICIES

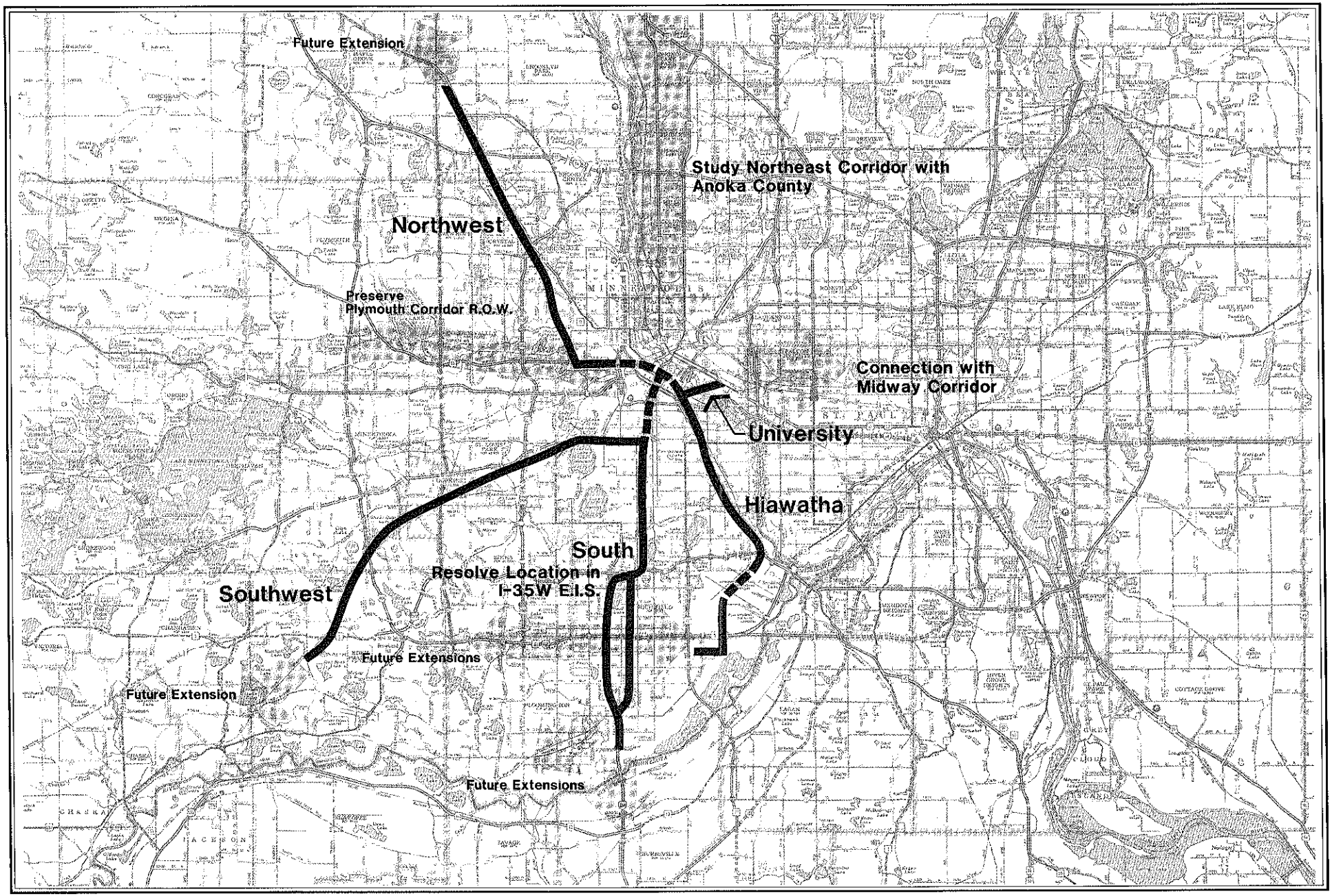
The recommended system is a conventional light rail system, using a steel-wheeled vehicle riding on a steel rail, electrical power drawn from an overhead wire, and exclusive (though not necessarily grade-separated) right-of-way.

The analysis of system standards also determined hours of service, maximum headways, passenger loading standards, fare collection method, and other standards and policies regarding system construction and operation.

One remaining issue which has been deferred to the preliminary engineering phase of project development is the means by which elderly and handicapped accessibility will be provided. The options include high platform stations, low platform stations with various means of bringing the mobility-impaired to the car floor height, and low floor cars which would allow level loading from a 14- to 18-inch high platform.

SYSTEM DEFINITION

The recommended Twenty-Year Plan and the Stage I Plan are shown on Figure 1 and Figure 2. The Twenty-Year Plan represents the long-range view of how light rail will serve Hennepin County and reflects the expected growth in population and employment concentrations. The Twenty-Year Plan includes service in five corridors and a downtown segment located underground; service in a sixth corridor is recommended for study with Anoka County. The Stage I Plan is proposed to be implemented over an eight-year period. The Stage I Plan includes the University Connector and initial segments of the four other corridors contained in the Twenty-Year Plan. The proposed Yards and Shop facility will be located in the Hiawatha Corridor near I-94 and Cedar Avenue. The potential for trails will be investigated in preliminary engineering for all LRT corridors.



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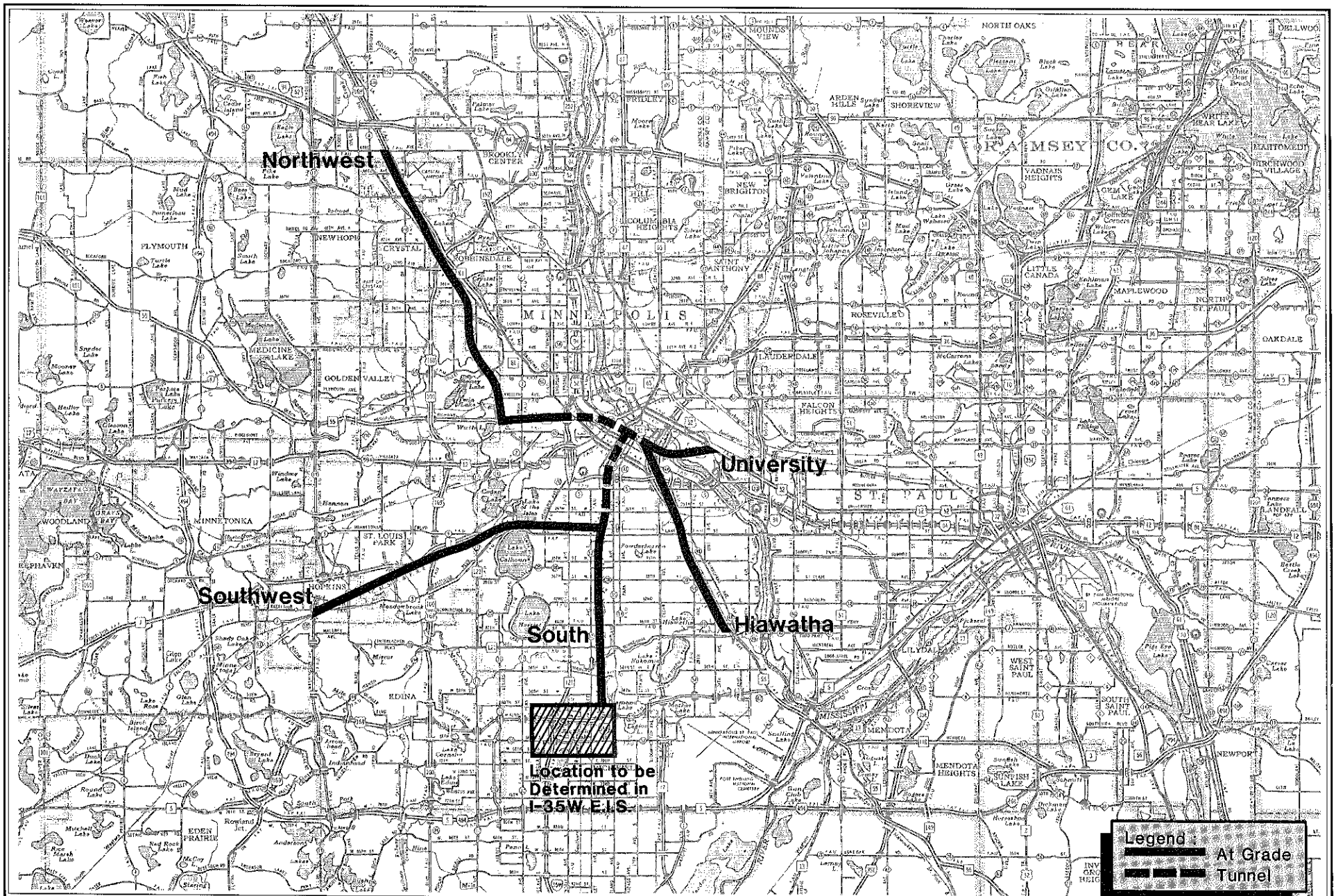
0 1 2 Miles North

FIGURE 1

20 Year Comprehensive LRT System Plan



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0 3/4 1 1/2 Miles North

FIGURE 2

Stage I Plan

The characteristics of the Twenty-Year Plan and the Stage I Plan are presented on Table 1. The characteristics include corridor length, capital cost, and ridership.

SYSTEM FINANCING

The above described Stage I Plan is estimated to cost $497 million (1988 dollars). The revenue used to retire the bonds to pay for this system are expected to come from federal, state, local, and private sources. At this time the following three revenue sources have been adopted by the HCRRA:

- Property Tax levy of up to 1 mill for Hennepin County
- Tax increment financing through agreements between the HCRRA and cities
- Motor vehicle excise tax (MVET) as directed by the Legislature

Other revenue sources that are candidates to be used to retire the bonds include:

- Hiawatha Special Funding
- I-35W Reconstruction Funds
- Urban Mass Transportation Administration Capital Grant
- Private Sector Development Related Payments
- Other private-sector contributions

The first three revenue sources identified above would cover approximately 64 percent of the required revenue to pay for the 29-mile Stage I system. During preliminary engineering, the financial plan and Stage I system plan will be finalized.

TABLE 1
CHARACTERISTICS OF RECOMMENDED TWENTY-YEAR AND STAGE I PLANS

	TWENTY-YEAR PLAN			STAGE I PLAN		
SEGMENT	Length (Miles)	Capital Cost (1988 $ Million)	Daily Ridership Range Year 2010	Length (Miles)	Capital Cost (1988 $ Million)	Daily Ridership Range Year 2010
Downtown (Tunnel to 29th Street)	3.4	$138	--	3.4	$138	--
Northwest Corridor	12.0	139	19,600 - 25,500	9.0	114	18,000 - 23,500
Southwest Corridor	13.5	127	16,600 - 22,000	6.9	71	14,500 - 18,800
South Corridor	10.4	216	24,500 - 32,000	4.4	80	15,300 - 20,000
Hiawatha Corridor	10.0	145	17,300 - 22,500	3.9	34	13,000 - 17,000
University Connector	1.5	40	9,200 - 12,000	1.5	40	9,200 - 12,000
Yards and Shops	--	20	--	--	20	--
TOTAL	50.8	$825	87,200 -114,000	29.1	$497	70,000 - 91,300

NOTE: The capital costs and patronage forecasts will be refined in Preliminary Engineering. The ridership forecasts are based on work reported in the Metropolitan Council report dated December 1986, "A Study of Potential Transit Capital Investments in Twin Cities Corridors" and the results of the Patronage Forecasting Peer Review Committee work.

BENEFITS OF LRT

Implementation of a light rail transit system in Hennepin County will have beneficial effects in several areas:

- Enhanced transit service in corridors where LRT is constructed
- Increased transit patronage
- More economical use of transit resources
- Reduced auto trips on regional highway system
- Improved air quality in the region
- Reduced bus traffic in downtown Minneapolis
- Reduced auto traffic in downtown Minneapolis
- Reduced need for parking in downtown Minneapolis
- Increased development potential near stations
- Increased development potential in downtown Minneapolis

LRT AND CORRIDOR LAND USE RELATIONSHIP

Each community along proposed LRT alignments will be responsible for making appropriate changes in its comprehensive plan and zoning ordinance. The recommendation is that land use decisions along the LRT alignments should remain the sole responsibility of local units of government. The HCRRA will request the opportunity to review proposals for development along the LRT alignments. Local communities will be asked to examine the potential for funding of develop-

ment-related LRT construction under an agreement with the HCRRA through the appropriate local taxing authority.

IMPLEMENTATION METHODOLOGY ALTERNATIVES

Four alternative implementation methodologies were defined and analyzed; the preferred approach will be selected in preliminary engineering.

Traditional

The Project Manager/Engineer prepares detailed plans and specifications for all system components. Contracts are bid and awarded to low, responsible bidders.

Upon completion, an operations contractor or a public agency operates the system. Traditional contracting provides maximum control to the project owner, but limits the likelihood of obtaining contractor financial participation.

Design/Build

The Project Manager/Engineer advances the design to approximately the thirty percent level. Contracts are awarded to contractors who design, furnish, and install each component. Upon completion, an operations contractor or a public agency operates the system; the operations decision is made independent of the design and construction. Design/Build sacrifices a modest degree of owner control, but enables suppliers to tailor final design to their products rather than having to "re-engineer" to the owner's exact specifications.

Turnkey

The Project Manager/Engineer advances the design as would be done in the Design/Build category, but the performance specifications and thirty percent design are issued for competition as one package. The winning Turnkey contractor completes the design in all areas and fabricates and furnishes the equipment at an agreed-upon price. The Turnkey Contractor also manages the operation of the system, at an agreed-upon price, for a prescribed period to ensure reliability. A minimum period of five years is usually suggested as a reasonable time period for problems to develop.

Super Turnkey

This is the same as the Turnkey approach except that, in addition, the Super Turnkey contractor is made responsible for partial or total system financing and may be involved in the related land development. This approach allows the private sector to prepare "innovative" financing methods. The Super Turnkey approach is likely to require that public agencies cede substantial control over the precise details of the technical/physical solution to the Super Turnkey contractor.

SYSTEM OPERATOR

It is recommended that the LRT system be operated by the Metropolitan Transit Commission. The potential for private sector management of the system would exist.

II. INTRODUCTION

BACKGROUND

Planning for a variety of fixed guideway transit systems has proceeded almost continuously in the Twin Cities since the late 1960s. Some of the major events in that history include:

- MTC sponsored analyses of various technologies, early 1970s
- MTC - Small Vehicle Study, 1974
- Minnesota Legislature prohibition of fixed rail planning, 1975
- University of Minnesota Transitway, 1976
- St. Paul Downtown People Mover, 1976-1980
- Minnesota Legislature lifts prohibition of fixed rail planning, 1980
- Light Rail Transit Feasibility Study, 1981
- Hiawatha Avenue Location and Design Study - EIS, 1979-1984
- I-394 High Occupancy Vehicle Roadway, 1982
- University/Southwest Alternatives Analysis, 1985 (draft)
- Metropolitan Council/RTB identify LRT as preferred mode in University, Southwest and Hiawatha Corridors; University is the priority corridor

- LRT Implementation Planning Program, April 1985
- Minnesota Legislature prohibition of fixed guideway planning, 1985
- Transit Service Needs Assessment, Regional Transit Board, 1986
- A Study of Potential Transit Capital Investments in Twin Cities Corridors - Long-Range Transit Analysis, Metropolitan Council, December 1986
- Minnesota Legislature lifts prohibition of fixed guideway planning, 1987
- Comprehensive LRT System Planning for Hennepin County, 1988

1987 LEGISLATION

In lifting the ban on fixed guideway transit planning, the Minnesota Legislature directed Hennepin County to prepare a Comprehensive LRT System Plan for Hennepin County prior to implementation of any light rail transit system. The Plan is to be submitted to the legislature by July 1, 1988. The legislation states:

By July 1, 1988, the Hennepin county regional rail authority must develop a comprehensive plan for the development of a light rail transit system in Hennepin county. In developing the comprehensive plan, the authority must consider at least three primary corridors, including the southwest corridor, a northern corridor, and a southern corridor. In evaluating the corridors, the authority must consider the ridership potential of each corridor, the cost of developing each corridor, and the public benefit to be derived from each corridor. During this evaluation, the authority may acquire right-of-way so that all corridors have, to the extent practicable, an equal opportunity for development based on the guidelines contained in the comprehensive plan. This section does not prohibit the authority from proceeding with the preparation of engineering plans for any corridor before July 1, 1988.

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OVERVIEW OF REPORT

In addition to the Summary and Introduction, this report contains sections which address:

- Metropolitan Policy Framework
- LRT System Planning Process
- System Standards and Philosophy
- Comprehensive LRT System Plan
- Appendices

III. METROPOLITAN TRANSPORTATION POLICY FRAMEWORK

Establishment of overall transportation policy for the Minneapolis-St. Paul metropolitan area is the responsibility of the Metropolitan Council. The most recent edition of the TRANSPORTATION DEVELOPMENT GUIDE/POLICY PLAN was released in draft form in February 1988. As a chapter in the METROPOLITAN DEVELOPMENT GUIDE, the Transportation section describes goals, policies, and plans regarding transportation which support overall goals for metropolitan area development.

In the Transportation Guide Chapter, the Metropolitan Council identifies transportation needs, describes transportation policies and strategies, and proposes a "Transit System Plan" which includes a light rail transit component. Following is a summary of the draft Transportation Guide Chapter as it applies to development of the Comprehensive LRT System Plan for Hennepin County.

TRANSPORTATION NEEDS

The Metropolitan Council expects travel in the region to increase by 63 percent (as measured by vehicle miles of travel) during the 1980 to 2010 period as a result of a 25 percent increase in population, a 37 percent increase in the number of households, and a 41 percent increase in the number of jobs in the region during that period.

During that period, the Metropolitan Council expects that improvements to the region's transportation system will not keep pace with the growth in travel, and that accessibility in the region will be negatively affected.

There are several reasons for the lagging of transportation improvements behind transportation needs. The major federal funding program for the Interstate Highway System is ending. At the same time, state and local funds which have been used to construct those portions of the transportation system which complement the Interstate system are now required to maintain and rebuild the inplace system.

The ability to fund transit system improvements has also decreased. While transit ridership has declined and the cost of providing the service has increased, federal programs for funding of transit system capital and operating costs are being reduced significantly.

So, while transportation demand increases by 63 percent, the ability to serve that need will not change significantly. The Metropolitan Council's forecast is that the Twin Cities area, which has traditionally enjoyed a very high level of accessibility, will see a reduction in that accessibility evidenced by lower travel speeds, higher travel times, more congested peak periods and longer periods of congestion.

The Metropolitan Council recognizes the importance of high levels of accessibility to continued economic development in the region. However, the Council also recognizes the difficulty in maintaining existing levels of accessibility in the face of travel demand increases because of the financial, social and environmental cost of building and maintaining additional transportation capacity.

DRAFT TRANSIT POLICY PLAN

In response to the transportation needs identified above, the Metropolitan Council has developed the draft Policy Plan. The transit component of the Policy Plan is composed of a series of policies, the Transit System Plan and specific guidelines for the Regional Transit Board's planning documents. Relevant portions of those policies and plans are summarized below.

Draft Transit Policies

Policy 1: The transportation system should contain strong and effective transit components.

Policy 2: Investments in services and facilities should enhance the competitiveness of transit with single-occupant automobiles, particularly for commuters.

Policy 3: Transit (among other methods) should be used to reduce the demand for roadway capacity during peak hours.

Policy 4: Transit resources should be allocated to areas which have demonstrated or identifiable demand.

Policy 5: Many different types of transit are appropriate within the Metropolitan area (light rail transit is specifically mentioned).

Policy 6: All transit services and all other transportation services should be part of an integrated transportation system (all planned transportation services should be consistent with the TRANSPORTATION DEVELOPMENT GUIDE).

Policy 7: Transit services should be supplied by both public sector and private sector providers, depending on which can do so most economically.

Policy 8: Transit fares should be set to maintain competitiveness with private automobiles, while reflecting the cost of providing the service, and in consideration of the resources of low-income populations.

Policy 9: Short-range decisions regarding transit should reflect long-term strategies, goals and resources.

Policy 14: Comprehensive plans for metro center cities should recognize the role of all transportation modes in serving the metro center and minimizing the investment required in transportation systems.

Policy 15: Planning for regional business concentrations should recognize the role of all transportation modes in serving that concentration and minimizing the investment required in transportation systems.

Policy 18: Public participation in formulation of transportation policy and implementation decisions is encouraged.

Draft Transit System Plan

The Plan identifies light rail transit as a potential component of the system serving selected central city corridors, or providing express and limited-stop service in fully developed suburbs and metro centers.

IMPLICATIONS OF DRAFT TRANSIT POLICY PLAN ON HENNEPIN COUNTY LRT SYSTEM PLAN

The draft Transit Policy Plan clearly points toward goals of reduction of peak hour transportation demand and more efficient use of transportation resources. Further, the six corridors identified as potential light rail transit service corridors include the five corridors under active consideration in the Hennepin County LRT System Plan. The sixth corridor is the Minneapolis Northeast Corridor, which is recommended in this plan for analysis by Hennepin County and Anoka County in the near future. The two plans are also consistent in terms of timing; the Transit Policy Plan states that the 1990 to 2010 time schedule suggested for the six-corridor plan could be adjusted based on the availability of project funding.

The conclusion is that the implementation of LRT within Hennepin County is consistent with the draft regional transportation policy plan.

IV. LRT SYSTEM PLANNING PROCESS

The HCRRA established a planning process that directed the technical analysis of a potential LRT system in Hennepin County to be developed concurrently with public input from transportation planning entities, and municipalities and neighborhoods potentially affected.

PARTICIPATION/COMMUNICATION PROGRAM

Overview

The community participation and communication process was designed to ensure that affected governmental agencies and the public had ample opportunity for input. The specific techniques included a bi-weekly newsletter; informational presentations to city councils, community groups and local business associations; and a structured network of advisory committees. The communication/participation process is illustrated on Figure 3. HCRRA representatives presented LRT information at over 150 meetings between September 1987 and April 1988. A list of these meetings is presented in Appendix A.

Advisory Committees

For each of the five corridors under study plus downtown Minneapolis, a Corridor Advisory Committee was appointed to analyze the LRT issues in the corridor. For the Southwest Corridor, both suburban and city Advisory Committees were formed. Members represented residents and busi-

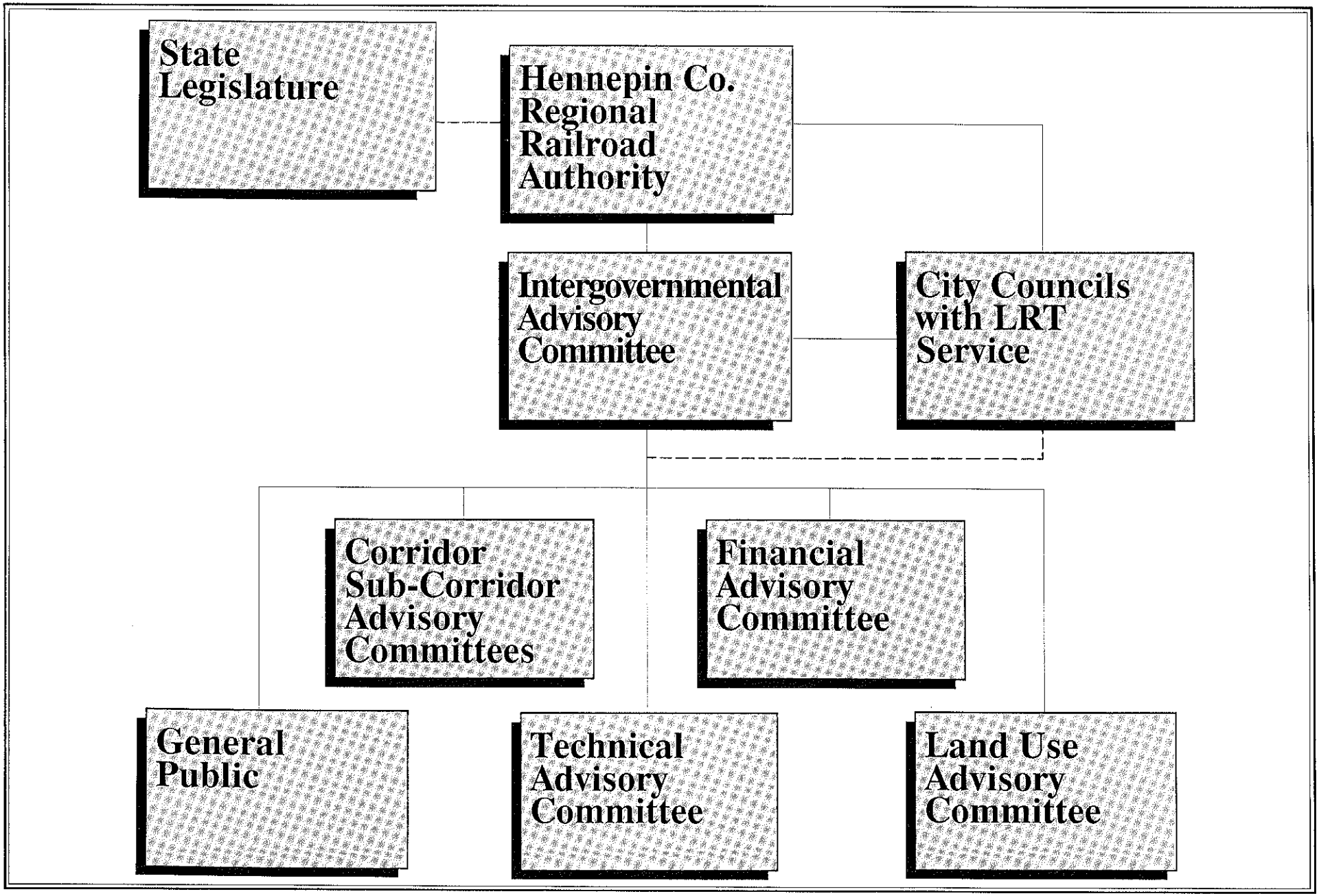

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FIGURE 3

Participation Process

nesses in the study area, and were appointed by each city along the corridor. In addition, technical staff from each city served on the Technical Advisory Committee, and elected officials served on the Intergovernmental Advisory Committee. Key metropolitan agencies with transportation planning authority were represented on both the IAC and TAC. Two additional committees examined land use and development issues and system financing options.

Each Corridor Advisory Committee was charged with identifying a preferred alignment and recommended station locations for its corridor only. The TAC and IAC were charged with resolving the inconsistencies between CAC recommendations and arriving at a consistent, comprehensive network for the entire system.

Public Review

In addition to Advisory Committee meetings, all of which were advertised in the Newsletter and open to the public, the HCRRA held five public meetings in corridors under study. Over 1,000 people attended the hearings during March 1988. A sixth hearing was televised over the metropolitan public access cable television channel in April. Hennepin County residents watching the program were invited to call in questions for immediate response by Commissioners.

Midway through the committee process, one of the Corridor Advisory Committees also held a public hearing to solicit local input before finalizing its recommendations to the IAC and the HCRRA.

The HCRRA also sponsored a series of breakfast meetings for state legislators, keeping them abreast of the project.

TECHNICAL WORK PROGRAM

The technical work program for the Comprehensive LRT System Plan involved analysis in five key areas:

- System Standards and Policies
- Corridor Service Evaluation
- Downtown Minneapolis Alignment
- System Financing Options
- System Implementation Options

An overview of work tasks in each work program area are described below and illustrated on Figure 4.

System Standards and Policies

Baseline LRT facility and equipment characteristics, operating and maintenance requirements were developed based on the accumulated experience of successful North American LRT systems. The information was developed at a conceptual design level of detail, to be expanded during the preliminary engineering phase to provide the level of detail required for actual system design. Specific work tasks included identification of the following:

- System Operating Standards: Hours of service, service frequencies, maximum train length, vehicular capacity, speeds, track configuration, train control, connections with other transportation modes

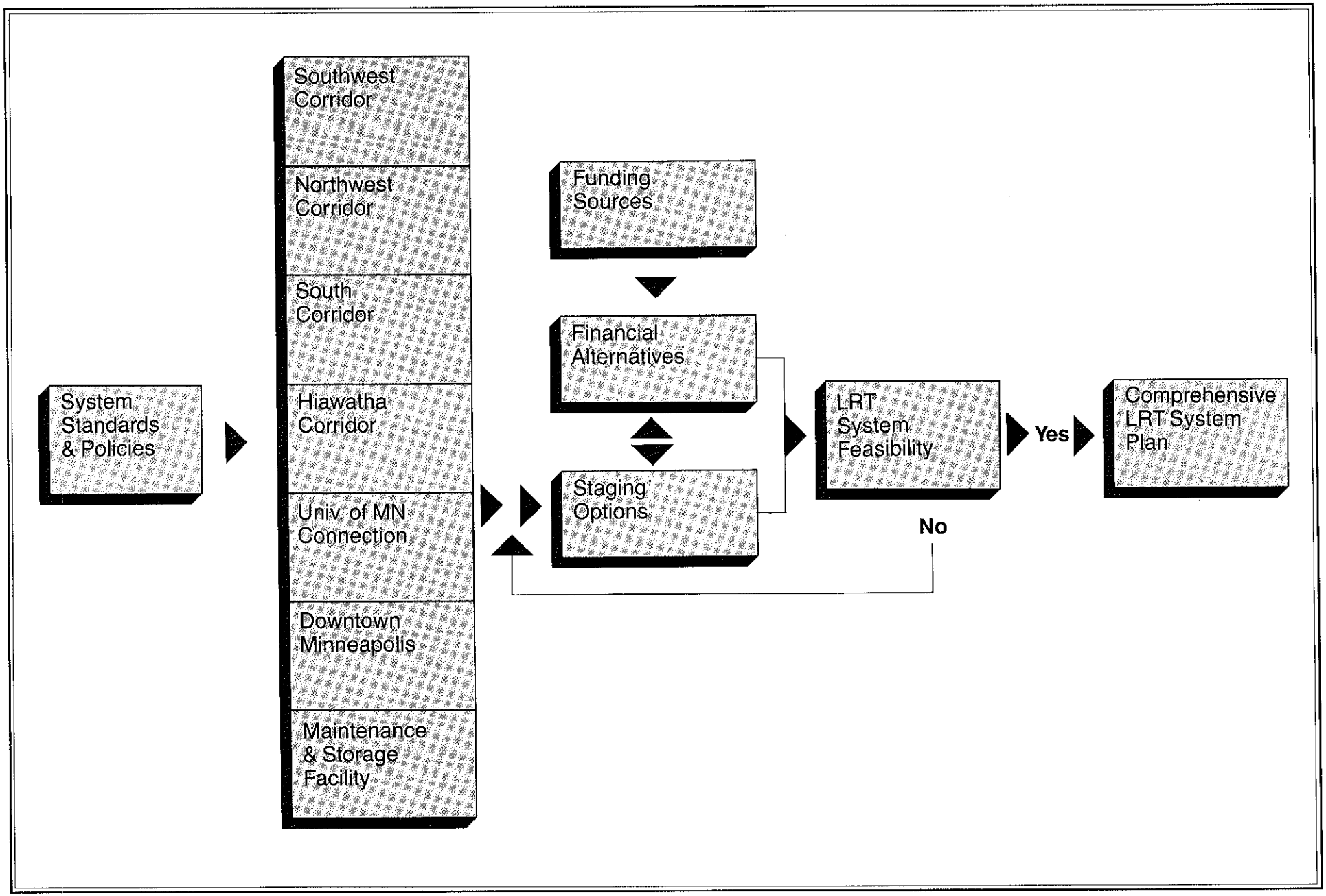

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FIGURE 4

Overview of Work Tasks

- System Policies: Safety, security, vehicle and platform heights/ accessibility, fare collection
- Facility and Equipment Characteristics: Vehicles, track and roadbed, traction power, signals, communications, stations, maintainance yards/shops, support equipment
- Operation and Maintenance Staffing: Types and availability of skills, train crew size

The system standards proposed for the Hennepin County LRT System are summarized in Section V of this report and fully detailed in a Technical Memorandum.

Corridor Service Evaluation

Each Corridor Advisory Committee began its analysis with a set of basic criteria designed to identify and evaluate alignment alternatives and potential station locations. Although each committee focused its criteria to address issues of particular relevance to the corridor, the technical corridor analyses generally used the following evaluation criteria:

- Ridership/Patronage: Population and employment, access, service to commuters, host communities and the transit-dependent
- Availability of Right-of-Way: railroad, street, freeway
- Land Use Conflicts: Comprehensive plan, zoning, development potential
- Impact on Street Operations: Traffic capacity, parking, turning movements, delays, compatibility with buses
- Compatibility with Downtown Alignment: at-grade, tunnel
- Station Location Opportunities: Pedestrian access, short- and long-term parking, feeder bus service

- Travel Time
- Environmental Impacts: Noise, air quality, visual impacts, lighting, park and historic property impacts
- Capital Cost

Each Corridor Advisory Committee submitted a report summarizing its recommendations; the reports are included in Appendix C. The planning and evaluation process continued with study by the Technical and Intergovernmental Advisory Committees and the HCRRA. Both the TAC and the IAC reviewed individual corridor recommendations, integrating the separate recommendations into a comprehensive plan to meet system-wide service and compatibility goals. Minutes of all meetings and copies of technical material distributed at each meeting are on file in the HCRRA's office.

Downtown Minneapolis Alignment

A Downtown Advisory Committee, composed of representatives of downtown businesses and planners, focused on the specific issues of hubbing the LRT system in the central city. The Downtown Committee evaluated the following:

- At-Grade or Tunnel: Deep or shallow tunnel construction
- Location and Orientation: On or off Nicollet Mall, centered in the retail, office or entertainment district, north/south or east/west orientation
- Surface Street Operational Impact
- Through-Routing Multiple Corridors
- Station Locations

- Retail Activity
- Office Activity
- Rider Comfort and Travel Time
- Development Impacts
- Aesthetic Impacts
- Safety and Personal Security
- Capital and Operating Costs

The Downtown Advisory Committee's recommendations were submitted to the TAC and IAC for review and integration into the Comprehensive System Plan.

System Financing Options

The Financial Advisory Committee examined the possible LRT revenue sources related to property taxes, transportation, and benefit assessment districts, and made a recommendation on funding for a Stage I system.

System Implementation Options

Potential methods of implementing an LRT system were analyzed by studying options used by other cities, through input from experienced LRT system designers at a public forum and through continuing contact with engineering experts.

V. LRT SYSTEM STANDARDS AND PHILOSOPHY

Preparation of the Comprehensive LRT System Plan required definition of the characteristics of the light rail system expected to be built. This was required for two reasons:

- To establish how the system will look and operate so that system planners and the public have common expectations regarding the system.
- To identify system characteristics in sufficient detail to allow reliable and consistent capital cost and operating cost estimates.

The system standards adopted for preparation of the Comprehensive System Plan focused on five areas:

- Facilities and Equipment
- Operating Standards
- Policies
- Accessibility
- Service Philosophy

FACILITIES AND EQUIPMENT

The light rail system to be built by Hennepin County will utilize conventional LRT technology. A conventional LRT system is one which uses a steel-wheeled vehicle riding on a steel rail, electrical power drawn from an overhead wire, and predominently exclusive (though not necessarily grade-separated) right-of-way. Reliance on this proven and readily available technology enhances the reliability and cost effectiveness of the system.

Key components include:

- Vehicles
  - Length: 80 to 90 feet, articulated
  - Width: 8'-9" to 9'-3"
  - Height: 12'-6"
  - Double-ended (bi-directional)
  - Four double doors on each side
  - Maximum service speed: 55 miles per hour
  - Seated capacity: 64 to 72
  - Seated and standing capacity: 144 to 162
  - Maximum vehicles/train: 3
- Traction power
  - 750 volts DC
  - Substations: 750 to 1,000 kw at one mile intervals

- Track
  - 115 lbs/yard rail
  - Turnouts: #20 mainline (high speed)
    #8 mainline (low speed)
    #4 yard
- Signals: As required
- Communications: Two-way radio
- Security
  - Emergency telephones at each platform
  - Observation by system employees
  - Security patrols if determined to be needed
  - T.V. monitors
- Stations
  - Platform length: 330 feet
  - Platform width: 10 feet (side); 16 feet (center)
  - Platform height: See section on accessibility
  - Equipment includes small radiantly-heated shelter, ticket vending machines, transit information area, benches
  - Construction: attractive, durable, graffiti-resistant, low maintenance
  - Bus transfer facilities as required
  - Park-and-ride facilities as required
- Yards and Shop

OPERATING STANDARDS

Operating standards define the way in which the LRT system will be operated. Key issues include:

- Hours of Service
  - Weekday: 5:30 a.m. to 1:30 a.m.
  - Weekday peak periods: 6:30 a.m. to 9:00 a.m. 3:30 p.m. to 6:00 p.m.
  - Weekend: 7:00 a.m. to 12:00 midnight
- Headway
  - Weekday (daytime): 15-minute maximum
  - Weekday (nighttime), weekends, holidays: 30-minute maximum
  - Shorter headway if demand exceeds capacity of maximum length train operating at 15-minute headway
- Maximum Train Length: 320 feet
- Speed Limits
  - Private ROW: 55 miles per hour
  - Reserved median: Street speed limit
  - Reserved paved lane: up to 35 miles per hour
- Track Configuration
  - Double-tracked
  - Crossovers at 1 to 1.5-mile intervals
  - Pocket tracks at five-mile intervals
- Train Control: Manual

POLICIES

The System Plan has been developed assuming that the following policies are adopted by the system operator:

- Fare Collection: Self-service, proof-of-payment
- LRT/Street Intersection
  - LRT on private ROW: Railroad-style flashers and gates
  - LRT on street ROW: Traffic signal controlled, with full or partial preemption or prioritization

ACCESSIBILITY

One remaining issue which has been deferred to the preliminary engineering phase of project development is the means by which handicapped accessibility will be provided. The options include:

- High platform stations: Loading platforms are constructed at the same elevation as the floor in a standard LRT vehicle. The vehicle is accessible at all doors. Mobility-impaired people reach the platform via ramps or lifts.
- Low platform stations: Loading platforms are constructed at curb height. People with mobility impairments access the vehicle from a special short high platform section which serves one door of the vehicle. Mobility-impaired people reach the short high platform section via ramps or lifts.
- Low floor cars: Vehicle manufacturers are beginning to develop light rail vehicles with floor heights in the 14 to 16-inch range. If reliable and economical low floor vehicles

are available, they will be considered during the preliminary design process. Although raised platforms are still needed to provide level loading of vehicles, the lower height makes them less obtrusive.

SERVICE PHILOSOPHY

The preparation of the System Plan was guided by two basic principles:

- The light rail transit service must be competitive with private automobiles.
- The light rail transit service must efficiently serve trips between corridors.

The primary market segment of interest is trips between a point located in one of the corridors and the downtown Minneapolis/University of Minnesota area. Secondary markets include trips with both ends in one or two corridors.

To be competitive with trips via private automobiles in the target market segment means that door-to-door travel times and travel cost must be competitive. This principle led to consideration of alignments which offerred relatively fast travel speeds to the CBD/University area, good access from suburban areas to convenient and adequately sized park-and-ride or bus transfer facilities, and fewer stations and stops at longer spacing.

Provision of reasonably efficient service between corridors requires, in addition to the elements described above, relatively fast travel through the core area of Minneapolis. If the system focused solely on the downtown area, slowing the LRT to distribute passengers would be of less concern. To provide competitive service between corridors, the LRT must maintain higher travel speeds through downtown.

VI. COMPREHENSIVE LRT SYSTEM PLAN

The Hennepin County Comprehensive Light Rail Transit System Plan outlines the proposed LRT services within Hennepin County over the next twenty years, and discusses potential extensions of LRT into adjacent counties during that period. Specifically, the Comprehensive LRT System Plan includes:

- Twenty-Year Service Plan
- Stage I System Plan
- Feeder Bus and Park-Ride Plan
- Patronage Forecasts
- Land Use Guidelines
- Stage I Financial Plan
- Stage I Operating Plan
- Residential Property Owner Impact Mitigation
- Implementation Methodology
- Benefits of LRT

TWENTY-YEAR SYSTEM PLAN

Over the next twenty years, light rail transit service is recommended in at least six corridors (Figure 5). These corridors are:

- Northwest Corridor to 85th Avenue North, with possible future extensions
- Northeast Corridor serving northeast Minneapolis with extension to the north to be coordinated with the Anoka County Regional Railroad Authority
- University Corridor serving the University of Minnesota with extension to the east to be coordinated with the Ramsey County Regional Railroad Authority
- Hiawatha Corridor through the Minneapolis-St. Paul International Airport to the Mall of America site in Bloomington
- South Corridor through Richfield and into Bloomington, with extension to the south to be coordinated with the Scott and Dakota County Regional Railroad Authorities, and with possible extensions along the I-494 corridor.
- Southwest Corridor through Hopkins to Eden Prairie and with an extension to Chaska to be coordinated with the Carver County Regional Railroad Authority

These corridors were determined to be technically feasible by the Metropolitan Council in their analysis of the potential for transit capital investment because each corridor met one or more of the following criteria:

- Significant relief of traffic congestion
- Potential transit patronage
- Service to transit dependents

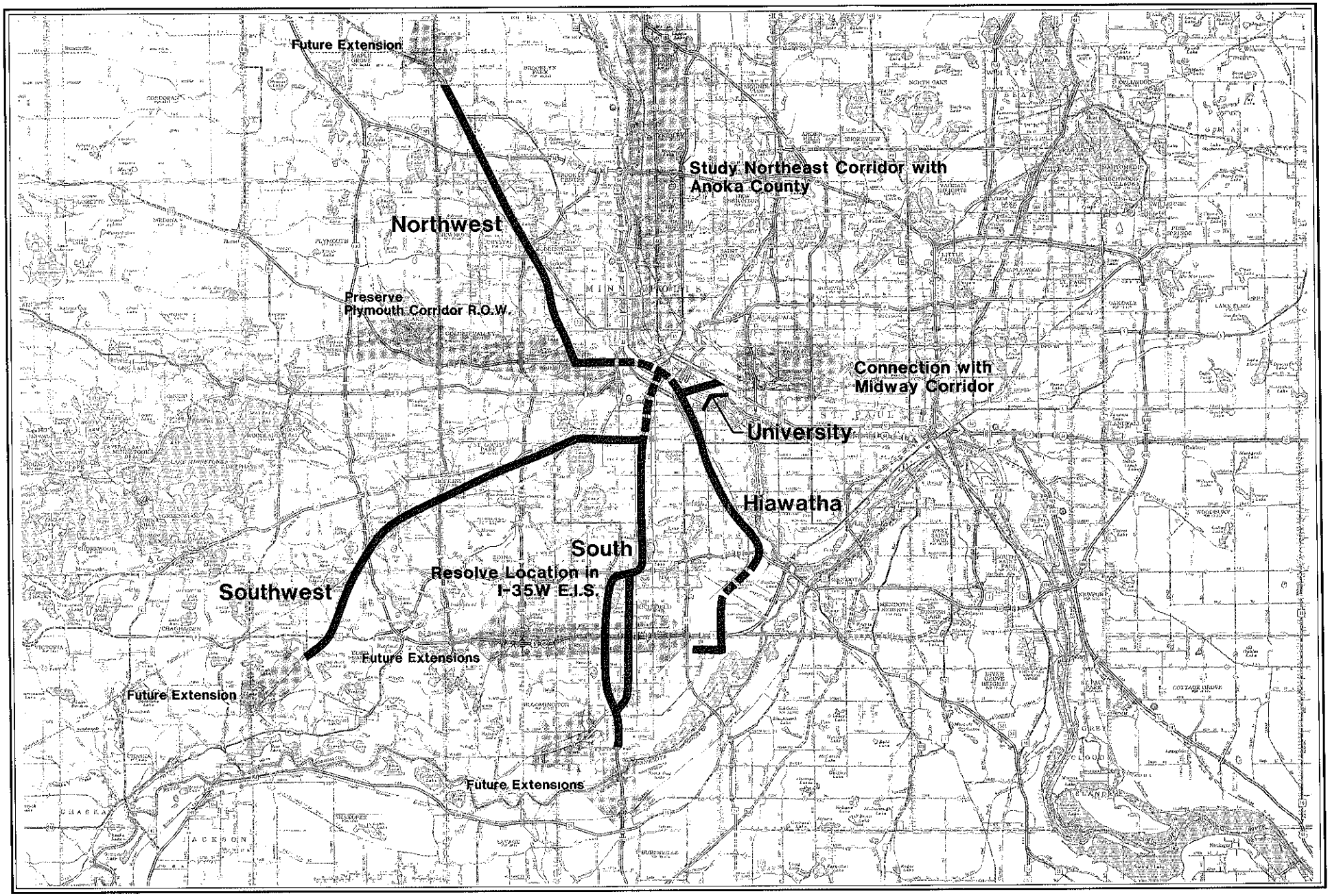

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FIGURE 5

20 Year Comprehensive LRT System Plan

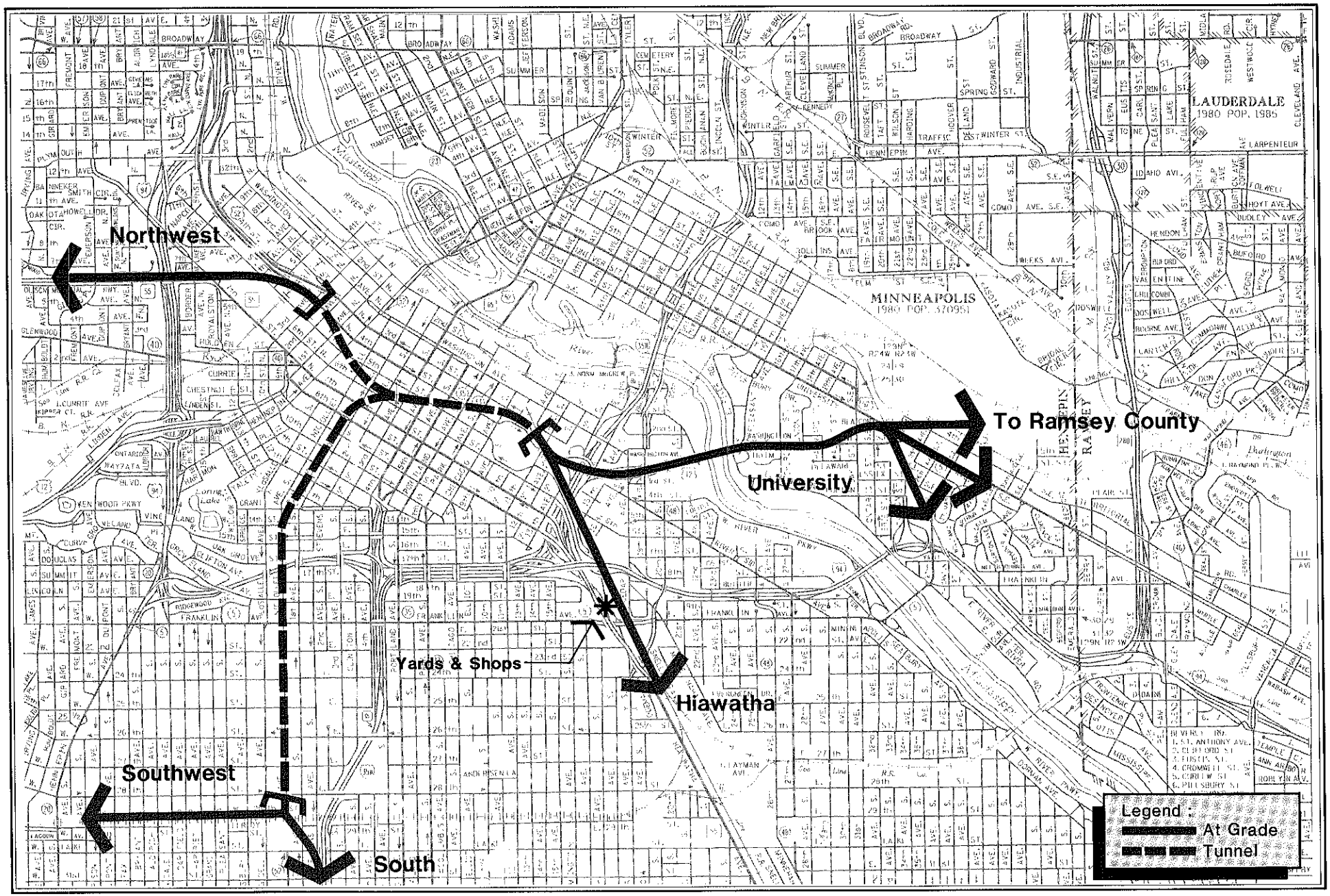
- Cost effectiveness

The proposed corridors come together in downtown Minneapolis. The downtown segment of the system is proposed to be underground. The underground segment, as shown in Figure 6, begins at 29th Street on the south and goes through the CBD to a portal near the HHH Metrodome. Another underground segment begins near I-94 and 3rd Street and ties into the system near 7th and Marquette. The major advantages of the tunnel alignment compared to at-grade service include:

- Reduced travel times for patrons going through downtown
- Lack of conflict with street-level activities and traffic operations
- Enchanced passenger comfort while waiting for vehicles
- Better elderly and handicapped access
- Increased capital cost is partially offset by lower operating costs and vehicle requirment
- Presents opportunities to direct pedestrians from underground stations to specific surface-level locations

The LRT maintenance facility will be located at the Coach Yard site, along the Hiawatha Corridor between I-94 and Franklin Avenue (Figure 6). The site has an area of about 13 acres, and will accommodate maintenance, repairs, storage and administrative functions for an LRT fleet of about 60 light rail vehicles.

The Coach yard site was selected after consideration of seven yards and shops site alternatives. Considered in addition to the Coach Yard site were:



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0 1/8 1/4 Mile North

FIGURE 6

LRT Corridor Connections with Downtown Minneapolis in Tunnel

- University Site - Burlington Northern yards
- Hennepin County Department of Transportation site - Hopkins
- Lyndale Junction site - TH 12, I-94, Fremont Avenue area
- South Halifax site - Burlington Northern Railroad, Robinsdale
- Brooklyn Boulevard site - Soo Line Railroad near Humboldt Avenue
- Cedar Lake site - TH 12 near Kenwood

Analysis of the seven sites found that the Coach Yard site was available, more centrally located, and allowed for more efficient operation of the light rail system.

The potential to locate recreational trails adjacent to LRT service will be investigated in each corridor during preliminary engineering. Joint use of the corridor would provide a unique opportunity to greatly expand trails within Hennepin County. The analysis in preliminary engineering will focus on right-of-way availability, safety, security, and trail functions to be provided.

The HCRRA has also expressed an interest in the post-twenty-year development of LRT and the potential for locating additional LRT services in railroad right-of-way which may become available in the future. Corridors that have potential for service beyond the time horizon of the Comprehensive System Plan include:

- South Corridor with extensions to Dakota and/or Scott County
- South Corridor west of I-35W along the Soo Line Railroad
- Southwest Corridor to Chaska
- I-494 Corridor between the Airport and TH 100

- Northwest Corridor beyond 85th Avenue
- Circumferential service in the I-494/I-694 corridor

These service concepts have not been evaluated as to technical or financial feasibility.

The Plymouth corridor (Figure 5) is an example of a potential future alignment. Preliminary analysis of the Plymouth corridor indicated that if the right-of-way did become available at some point, a detailed feasibility analysis should be conducted.

A study of the feasibility of extending the tunnel along the South Corridor 29th/Nicollet to 58th Street was also completed. The analysis found that the tunnel would cost approximately $50 million per mile (1988 dollars) because sandstone and limestone geology which allows inexpensive tunneling in the downtown area is not present in the 29th to 58th Street area. It was concluded that this tunnel extension was not feasible. If the cost estimate of LRT service in the I-35W right-of-way increases from the present estimate of $25 million per mile to a level approaching $50 million per mile, the issue should be reconsidered. If the section of tunnel north of 29th Street is constructed prior to service south of 29th Street along I-35W, it would be prudent to design the tunnel to allow a future extension to the south.

The recommendation of the Advisory Committees in selected cases were conflicting and/or narrowly passed. These situations are discussed below:

- The recommendations on at-grade versus tunnel construction in downtown Minneapolis were conflicting and had split votes.
- The recommendation for an alignment in the South Corridor south of County Road 62 had a split vote. Some favored the I-35W right-of-way, fewer favored the Soo Line and a majority wanted the issue to be resolved in the I-35W EIS process.

- The comprehensive system plan recommends service on the University Connector at-grade, with replacement roadway capacity provided in the railroad corridor to the north. The Corridor Advisory Committee recommended service in a subway on the East Bank if the financial resources are available.

STAGE I SYSTEM PLAN

From the Twenty-Year Plan described above, a Stage I System Plan with the following characteristics is recommended for implementation:

- Viable LRT project
- Meets one or more significant travel needs
- Demonstrates the benefits of LRT
- Within the financial capability of the HCRRA
- Buildable within a six- to eight-year time frame

The Technical Advisory Committee and the Intergovernmental Advisory Committee screened over fifteen distinct Stage I scenarios. All scenarios included the system core which is the downtown Minneapolis section, the yards and shops facility, and the University Connector. In addition, each scenario included all or parts of one or more corridors. Scenarios were evaluated and compared on criteria such as:

- Daily patrons per route mile
- Patrons per vehicle mile
- Capital cost per route mile

- Capital cost per annual patron
- Annual capital cost per annual patron
- O & M cost per patron
- Total annual cost per annual patron

The Committees concluded that the scenarios which included parts of several corridors (rather than all of one corridor) generated more patronage and were generally more productive.

The Technical Advisory Committee recommended a Stage I scenario which included parts of all five corridors, with the downtown Minneapolis segment at-grade (Scenario K, Figure 7). The estimated construction cost of this project is $481 million (1988 dollars).

The Intergovernmental Advisory Committee reviewed all the scenarios and recommended a Stage I scenario which included the same alignments and lengths as the TAC recommendation. The IAC recommended, however, that the downtown Minneapolis segment be constructed in a tunnel which extends from the HHH Metrodome to the area of 29th and Nicollet on the South and Southwest Corridors, and to near I-94 on the Northwest Corridor (Scenario Q, Figure 8). The estimated construction cost of this project is $532 million (1988 dollars).

After review of all the scenarios, the recommendation of the TAC (Figure 7) and the recommendation of the IAC (Figure 8), the preferred alternative is Scenario R (Figure 9). The difference between Scenario Q and R is that the Northwest Corridor length was reduced slightly; this is consistent with building the most productive (patrons/route mile) components of the system in Stage I.

The recommended Stage I System Plan has a multi-leg concept which was supported by all advisory committees, and allows trips which do not begin or end in downtown Minneapolis to make

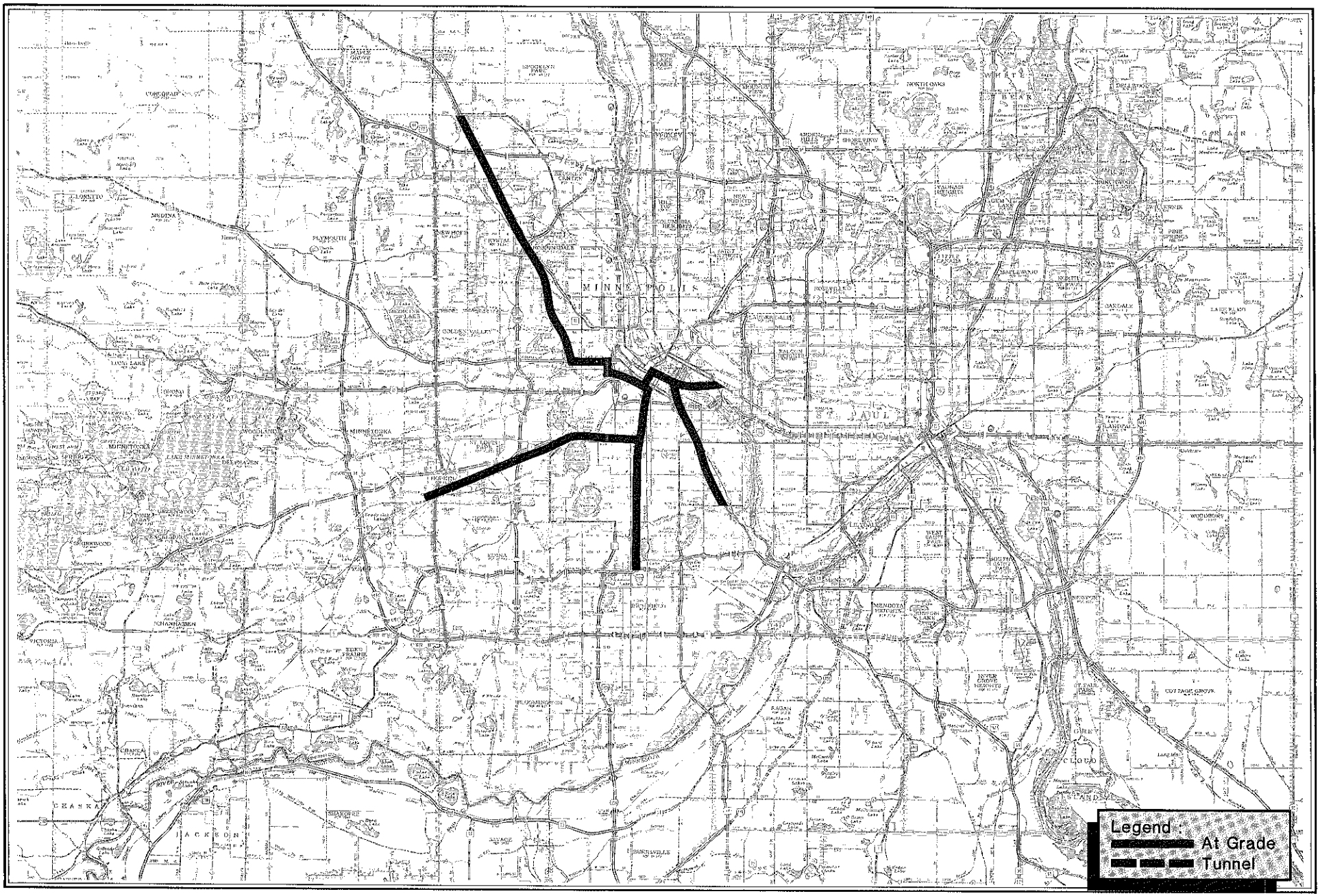

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FIGURE 7

Stage I Scenario K

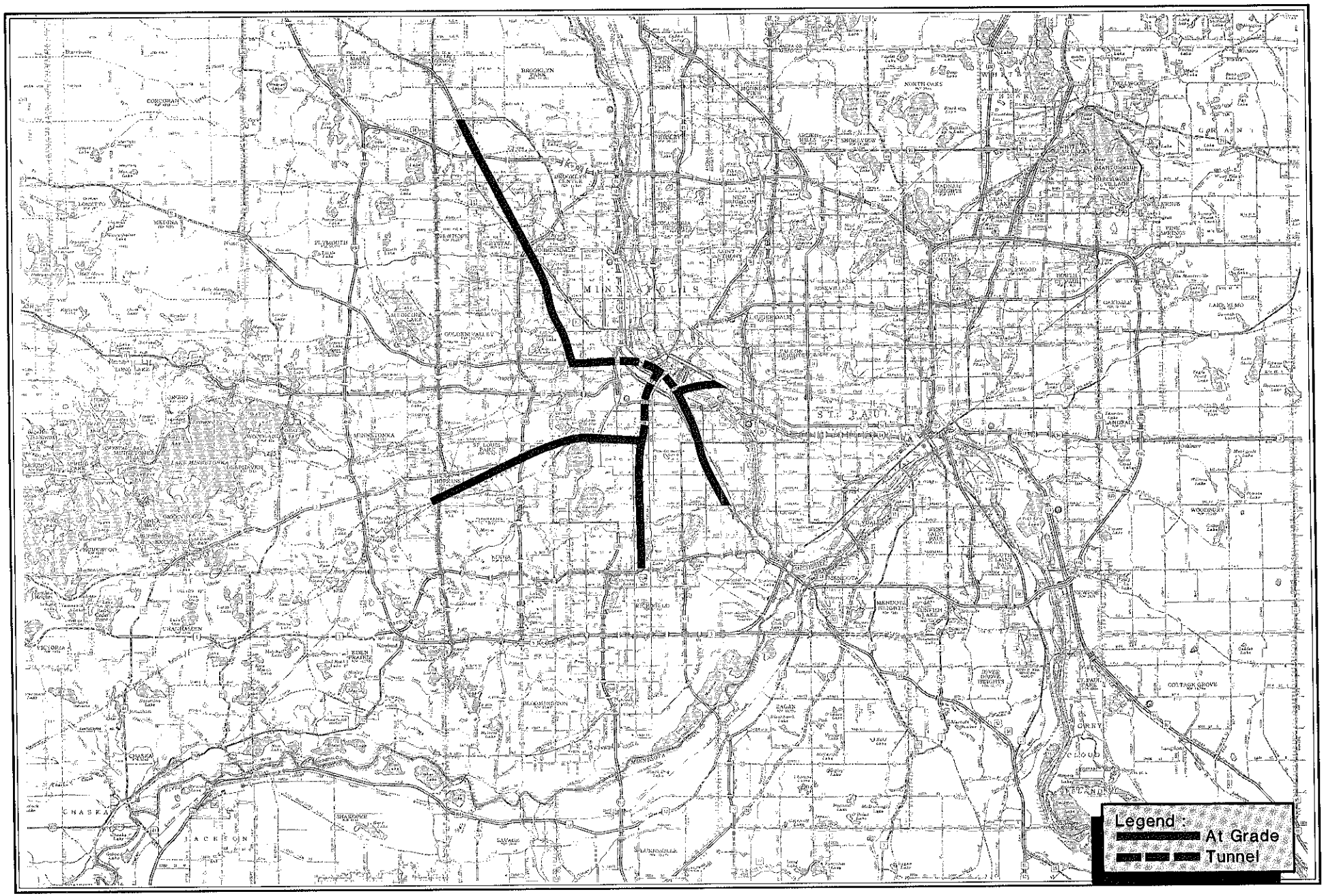

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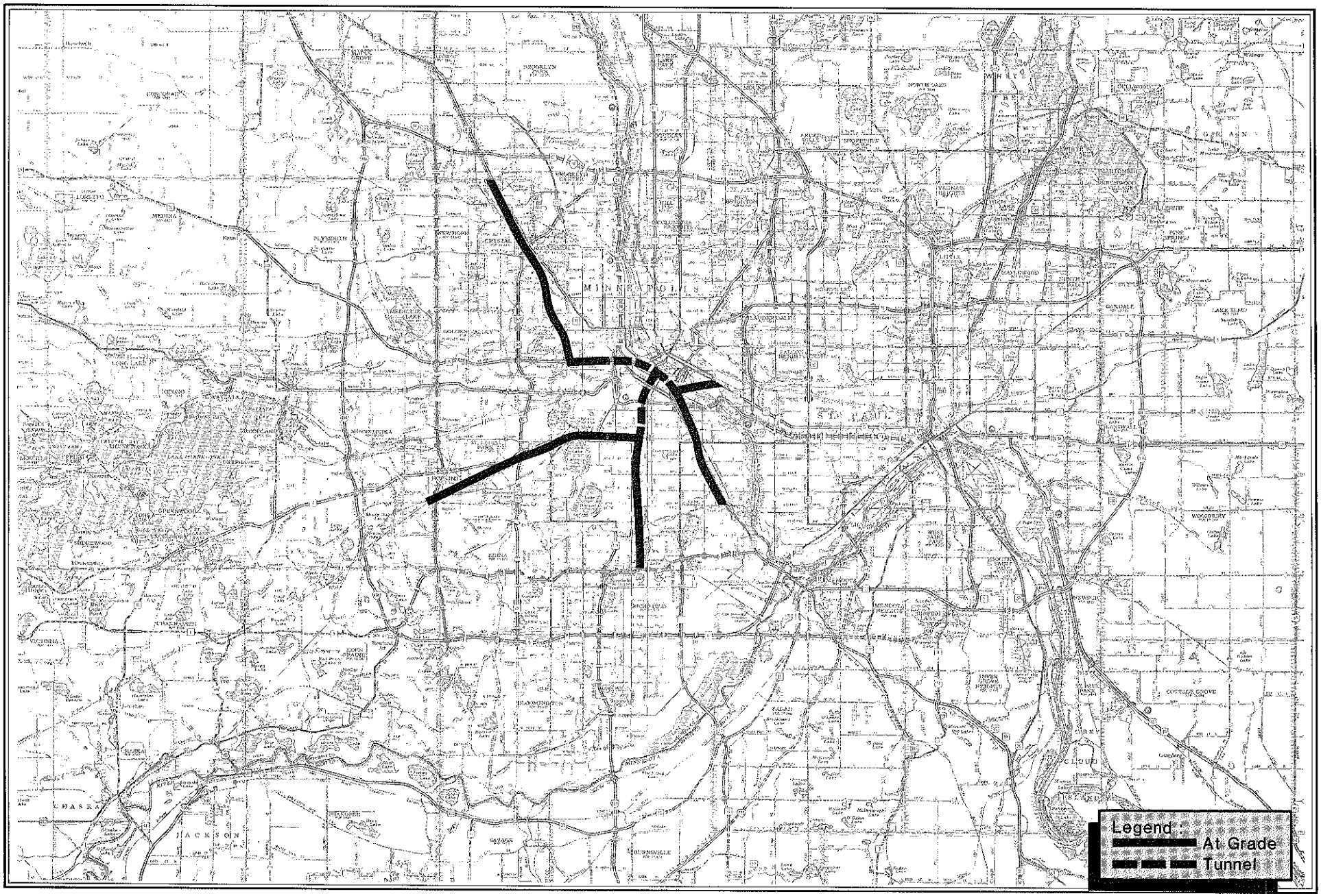
FIGURE 8

Stage I Scenario Q



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0 1 2 Miles North

FIGURE 9

Stage I Scenario R

use of the system. It provides for maximum utilization of the most expensive part of the system, the downtown segment. It makes light rail accessible to the greatest number of people in all parts of Hennepin County. Table 2 lists the key characteristics of both the Stage I and the Twenty-Year Plan. The development of the patronage values is explained in a later section.

FEEDER BUS AND PARK-RIDE PLAN

The Metropolitan Transit Commission developed feeder bus plans for each of the corridors studied in the development of the Comprehensive Plan, except the South Corridor. The plans identified the following:

- Parallel bus service to be eliminated
- Feeder bus service to be provided
- Net savings in vehicles and miles of service

These plans are available from the HCRRA. Table 3 shows the level of savings in buses and bus miles expected as a result of implementation of LRT.

Park-and-ride facilities will be located at stops along each LRT alignment in order to provide system access to people who are not able to walk or ride a bus to an LRT stop. Large park-and-ride facilities will be located at an end-of-the-line station or at a station with good access to the regional highway system. Small park-and-ride stations will be located, as space allows, at other stations where parking is needed to serve local demand.

Capital cost estimates prepared for the Stage I Plan include an allowance for 5,000 parking spaces in park-and-ride lots. In the Stage I System, major park-and-ride facililties will be located in the vicinity of downtown Hopkins on the Southwest Corridor, at the end of the South Corridor align-

TABLE 2
CHARACTERISTICS OF RECOMMENDED TWENTY-YEAR AND STAGE I PLANS

	TWENTY-YEAR PLAN			STAGE I PLAN		
SEGMENT	Length (Miles)	Capital Cost (1988 $ Million)	Daily Ridership Range Year 2010	Length (Miles)	Capital Cost (1988 $ Million)	Daily Ridership Range Year 2010
Downtown (Tunnel to 29th Street)	3.4	$138	--	3.4	$138	--
Northwest Corridor	12.0	139	19,600 - 25,500	9.0	114	18,000 - 23,500
Southwest Corridor	13.5	127	16,600 - 22,000	6.9	71	14,500 - 18,800
South Corridor	10.4	216	24,500 - 32,000	4.4	80	15,300 - 20,000
Hiawatha Corridor	10.0	145	17,300 - 22,500	3.9	34	13,000 - 17,000
University Connector	1.5	40	9,200 - 12,000	1.5	40	9,200 - 12,000
Yards and Shops	--	20	--	--	20	--
TOTAL	50.8	$825	87,200 -114,000	29.1	$497	70,000 - 91,300

NOTE: The capital costs and patronage forecasts will be refined in Preliminary Engineering. The ridership forecasts are based on work reported in the Metropolitan Council report dated December 1986, "A Study of Potential Transit Capital Investments in Twin Cities Corridors" and the results of the Patronage Forecasting Peer Review Committee work.

TABLE 3
BUS SERVICE CHARACTERISTICS WITHOUT AND WITH LRT

	Daily Bus Miles			Peak-Bus Requirement		
Corridor	Fall 1987	With LRT	Change	Fall 1987	With LRT	Change
Hiawatha	8,163	5,792	-29%	74	54	-27%
Southwest	7,018	5,736	-18%	78	56	-28%
University Connector	3,361	2,644	-21%	24	21	-12%
Northwest	4,926	4,107	-17%	50	44	-12%
TOTAL	23,468	18,279	-22%	226	175	-23%

ment, and near I-694 on the Northwest Corridor. It is not expected that a large park-and-ride lot will be built in the Hiawatha Corridor in Stage I because of the lack of right-of-way for that purpose. Smaller park-and-ride lots may be constructed at other locations in the corridors in response to specific need and opportunity.

The preparation of the Twenty-Year Plan included provision for about 8,000 park-and-ride spaces (including spaces built in Stage I). These spaces would be constructed near ends of the LRT lines.

PATRONAGE FORECASTS

Estimates of future LRT patronage were drawn from A Study of Potential Transit Capital Investments in Twin Cities Corridors - Long-Range Transit Analysis (the LRTA report), published by the Metropolitan Council in December 1986. As a part of this study, patronage forecasts were prepared for many metropolitan area corridors.

The patronage estimates were prepared using the "pivot point" methodology. In this procedure, existing transit ridership for the service under consideration is taken as a starting point, and is then adjusted to account for two factors expected to cause changes in transit ridership. These factors are:

- Changes in corridor and downtown population and employment
- Travel time advantage by right-of-way type and geographic sector

Table 4 presents the factors used for each of the corridors examined in the Comprehensive LRT System Plan.

TABLE 4
PATRONAGE FORECAST FACTORS (YEAR 2010)

Corridor	Sector	Population/ Employment Factor	ROW Type	ROW Type Sector Factor
Northwest	1	1.22	Railroad	1.26
	2	1.22	Railroad	1.22
	3	1.22	Railroad	1.18
University	1	1.00	Arterial	1.00
Hiawatha	1	0.965	Arterial	1.28
	2	0.965	Arterial	1.24
South	1	1.34	Freeway	1.20
	2	1.34	Freeway	1.16
	3	1.34	Freeway	1.12
Southwest	1	1.10	Railroad	1.26
	2	1.10	Railroad	1.22
	3	1.10	Railroad	1.18

For the Comprehensive LRT System Plan, the Metropolitan Council forecasts were used directly where possible. Refinements were made to reflect different route lengths in some cases, and to eliminate one case of corridor overlap.

LRT system patronage was forecast for three key times:

- **Year 2010 Patronage Forecasts.** These forecasts represent patronage expected on the LRT system described as the Twenty-Year Plan.

- **Stage I Patronage Forecasts.** In most cases, the length of corridor which is included in the Stage I System is less than total corridor length. Adjustments to patronage forecasts were necessary in these cases. The adjustments were made by considering first, the sector-by-sector forecasts prepared for the LRTA report. Further adjustment was made if the corridor length did not coincide with the sector boundaries.

  Generally, patronage is not proportional to corridor length, nor do people ride LRT only when a station or stop is very near their trip origin. It has been observed that people are willing to drive relatively long distances to a park-and-ride facility provided that the park-and-ride facility is conveniently accessible and that LRT service to their destination is efficient and convenient. What this means is that when a line is extended, many of the patrons using stops along the extension were already LRT patrons using the stop that had previously been on the end of the line.

- **Opening Day Patronage Forecasts.** As previously stated, patronage forecasts were prepared for the forecast year of 2010. Those forecasts were prepared by applying factors reflecting improved transit service and corridor growth. Patronage after two years of operation is estimated by eliminating the factors related to corridor growth. On a weighted basis, corridor growth accounts for approximately ten percent of the Year 2010 forecast LRT patronage. An estimate of patronage in the first year of operation

is 65 percent of the 2010 value, with growth to 90 percent of the 2010 value by the second year.

In May 1988, a one-day peer review of the patronage forecasts was held. Mr. Richard Pratt of R.H. Pratt & Associates, Mr. James Ryan of COMSIS, and Mr. Gordon Schultz of Barton-Aschman conducted the review. A summary of the major points of the review included:

- The basic approach of starting with existing bus riders and factoring for changes in population/employment and travel times is sound.
- It is better to understate versus overstate the ridership projections.
- If the base ridership forecast in Year 2010 is in the low 90,000 riders/day, the panel concluded that the range between 70,000 and 90,000 riders/day is a better forecast.
- The major variables that influence transit ridership include the following:
  - downtown employment
  - price and availability of gasoline
  - feeder bus service
  - corridor bus service reorientation
  - park-and-ride spaces
  - downtown parking cost
- Future work activity should analyze in detail the relationships among the LRT service, the feeder bus service, and other corridor bus service. This work will define the relative service levels and provide a better understanding of the following system variables:
  - number of light rail vehicles required
  - size of yards and shop facility
  - escalator design

- system revenue
- LRT route interlining
- sizing of station access facilities

Future studies should also analyze the relative travel to/from downtown, travel beginning and ending in a corridor, and travel among corridors.

- A budget of between $200,000 and $300,000 should be established for transit planning and ridership forecasts in preliminary engineering.
- Service in multiple corridors will give better system productivity performance than a single long corridor of the same length.
- From a patronage standpoint, housing is the best land use for development around outlying stations.

On the basis of the forecasts prepared in the Metropolitan Council study of the potential for transit capital investment and the Patronage Forecasting Peer Review Committee work, the range of forecasts presented in Table 5 were developed.

Of the riders forecasted to use the system after two years of operation it is estimated that approximately 80 percent of the riders would be former bus transit users and 20 percent would be former auto users. As ridership grows because of new development, the percent of former bus users drops.

TABLE 5
DAILY TRANSIT RIDERSHIP FORECASTS

Connector	Full System Year 2010 Forecast	Stage I Forecast Year 2010	Stage I Forecast After Two Years of Operation
Hiawatha	17,300 - 22,500	13,000 - 17,000	13,000 - 17,000
South	24,500 - 32,000	15,300 - 20,000	11,400 - 14,900
Southwest	16,600 - 22,000	14,500 - 18,800	13,100 - 17,100
Northwest	19,600 - 25,500	18,000 - 23,500	14,800 - 19,300
University Connector	9,200 - 12,000	9,200 - 12,000	9,200 - 12,000
Total	87,200 -114,000	70,000 - 91,300	61,500 - 80,300

Note: The ridership forecasts are based on work reported in the Metropolitan Council report dated December 1986, "A Study of Potential Transit Capital Investments in Twin Cities Corridors," and the results of the Patronage Forecasting Peer Review Committee work.

LAND USE GUIDELINES

Recognizing that implementation of a light rail transit system has the potential to influence land use, the HCRRA solicited input from local and regional planning officials. As a result of that input, the following guidelines are recommended:

- Each planning jurisdiction should revise its comprehensive plan to reflect the adopted LRT system plan. Revisions should include identification of LRT alignments; adjustments, as desired, to land use plans; adjustments to transportation plans needed to support LRT; changes needed, if any, to zoning ordinances and official maps. Jurisdictions are encouraged to review other programs which may have the potential to support or encourage LRT implementation.
- County, regional and state agencies should recognize the future construction of LRT in carrying out their functions.
- Local government units are encouraged to request review and comment by the HCRRA on development proposals located within one-fourth mile of a proposed LRT alignment, or those which may affect implementation of the LRT System Plan.
- LRT station/stop area planning should be carried out jointly by the HCRRA and the local government unit.
- Local government units, through cooperative agreements with the HCRRA, should finance LRT station/stop area construction through tax increment financing, benefit assessment or other methods.

STAGE I FINANCIAL PLAN

Fourteen different sources of LRT construction funds were examined during preparation of the Comprehensive Plan:

- Property Tax: Hennepin County
- Property Tax: Metro Transit Taxing District
- General Sales Tax: Hennepin County
- Payroll Tax: Hennepin County
- Hotel/Motel/Liquor Tax: Hennepin County
- Drivers License Fee: Hennepin County
- Motor Vehicle Registration Fee/Wheelage Tax: Hennepin County
- State Motor Vehicle Excise Tax
- Cigarette Tax: State of Minnesota
- Sales Tax on Parking: Minneapolis
- Tax Increment
- Gasoline Tax: Hennepin County
- Head Tax: Hennepin County
- Benefit Assessment District

Each source was evaluated by the Finance Committee. The Finance Committee developed a preliminary financing package which included four revenue sources: property tax, motor vehicle

registration tax surcharge, state motor vehicle excise tax, and tax increment (see Appendix C). The revenue from these four sources would provide cash flow to support $375 million of bonds issued over a six-year period. This work was completed prior to the development of specific Stage I plans. The purpose of the effort was to set general limits on funding capability for LRT in Hennepin County. The Finance Committee also stated that to the extent that additional funding sources can be identified, or current funding sources can be enhanced, or the construction period can be extended, the project budget could be increased.

The Technical Advisory Committee and the Intergovernmental Advisory Committee recommended Stage I Plans, which were described above, which were estimated to cost $481 million and $532 million (1988 dollars), respectively. The Stage I Plan recommended for approval is expected to cost $497 million (1988 dollars).

The recommended financing plan is shown in Table 6. Three identified sources of revenue (property tax, motor vehicle excise tax and tax increment financing) will provide approximately 64 percent of the funds needed to construct the Stage I system. Other sources which may be used to provide the remaining capital funding include:

- Hiawatha Special Funding
- I-35W Reconstruction Funds
- Urban Mass Transportation Administration Capital Grant
- Private Sector Development Related Payments
- Other Private Sector Contributions

TABLE 6
RECOMMENDED LRT FINANCING PACKAGE

Revenue Source	Rate	Assumptions	Yield Between 1989 - 2016 in Inflated Dollars (millions)	Bond Issue(s) Supported by Revenue Source (millions)	Estimated Percent of Capital Cost Coverage
Property Tax	1 mill	4% inflation	$480	$218	38%
Motor Vehicle Excise Tax	6%	30% of MVET to MnDOT 30% of Metro Share 2% inflation	$155	$70	14%
Tax Increment Financing		Value of property covered grows from $5-$75 million	$71	$32	6%
Other Sources	NA	4% inflation	$390	$177	36%
TOTAL			$1,096	$497	100%

NOTE: The total yield is $1,096 million which allows the payment of the principal and interest on $497 million bonds issued over an eight-year period with an eight percent average coupon.

STAGE I OPERATING PLAN

A preliminary operating plan (Table 7) was developed for the purposes of estimating operating cost and estimating the number of light rail vehicles required. Under that plan, the five corridors constructed would be operated as three lines.

TABLE 7
STAGE I OPERATING PLAN

Line	Estimated Peak Period Headway with 3-Car Trains
Southwest - Hiawatha Line	12 minutes
Northwest - South Line	10 minutes
University Connector	15 minutes (3-car trains)
	10 minutes (2-car trains)

It is estimated that the LRT operating and maintenance cost of the proposed system will be $28 million per year (1988 dollars). The estimated annual farebox revenue is $20 million per year (1988 dollars with Year 2010 patronage forecasts).

It is recommended that the LRT system built by Hennepin County be operated and maintained by the region's existing major transit service provider, the Metropolitan Transit Commission (MTC). Operation by the MTC achieves the following:

- Presents an integrated transit system to the public under one management and one decision-making process
- Insures the maximum coordination of feeder buses and the LRT
- Provides an environment to maximize the positive aspects of the remaining surface bus system and the line-haul capabilities of the LRT
- Places the responsibility for removing competitive surface bus routes with the agency operating the LRT system
- Minimizes any potential confusion relative to transfers between the buses and the LRT
- Single agency responsibility for budgets and approval of transit operating assistance

The MTC will be required to establish a new LRT Division, to be headed by a senior-level manager and administered under rules and procedures (to be developed) appropriate to the needs of a rail system and separate from the existing bus operation. This requirement will assist in providing the most cost-effective transit system for the region. This approach to operations does not preclude the possibility of a system supplier or the private sector managing the operation of the LRT system.

The projected operating deficit of the LRT is proposed to be funded through the existing MTC/RTB programs and process. The above discussion of feeder bus plans indicates a significant savings in bus operating costs; these savings will off-set a major portion of the LRT operating deficit.

RESIDENTIAL PROPERTY OWNER IMPACT MITIGATION

The HCRRA will develop a plan to ensure compensation of contiguous residential property owners found to be adversely affected by the noise, open space, appearance, traffic, property value, or any similar impact caused by light rail transit implementation.

IMPLEMENTATION METHODOLOGY

The implementation methodology defines the contractual relationship between HCRRA and the suppliers of the LRT system, the responsibility for system operation and maintenance, the relationship between associated land development and the LRT system, and the financial plan for the system. The reason for investigating alternative implementation methods is that much interest exists in involving the private sector to the maximum extent consistent with the public interest.

LRT system implementation will include not only the construction and procurement of system facilities and equipment, but also the financing of this work. In addition, options may be available to involve construction/procurement contractors in the operation and/or maintenance of the system after it is built. Recent years have also seen great interest in coordinating land development with rail transit construction. In some instances, developers of adjacent land have participated in the financing of transit stations.

LRT Project Components

Figure 10 illustrates the major LRT system implementation components.

- **LRT Design and Construction** consists of the activities necessary to put the project's physical components in place: civil construction, procurement and installation of

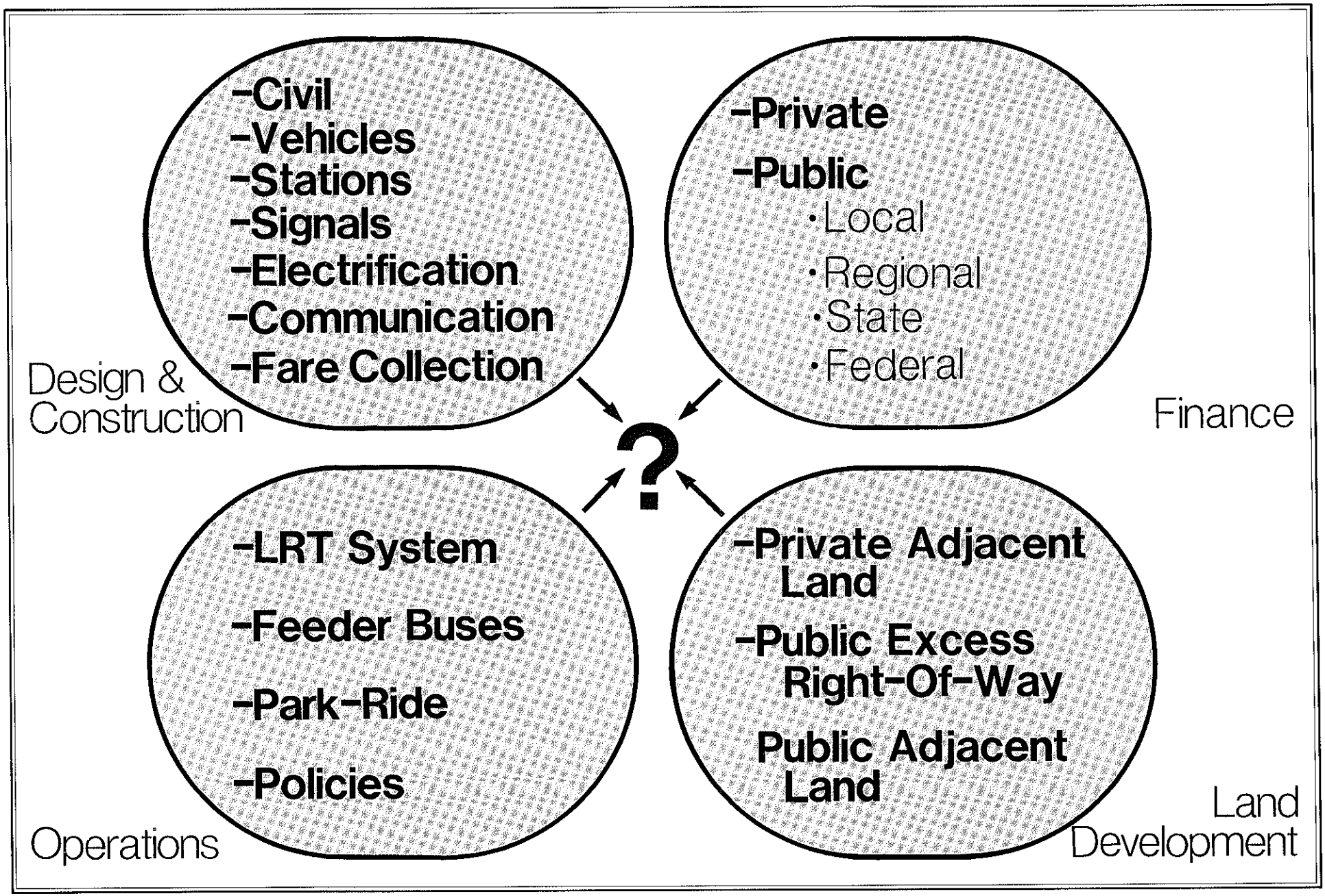

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FIGURE 10

LRT Project Components

vehicles and their support systems, and construction of stations. The components include:

- **Civil** - The basic infrastructure of the system. For the purpose of simplification, this element involves preparation of the roadbed; all work below the sub-ballast of the trackway, electrical subsystem foundations, underground conduit banks, drainage, subsurface treatment and grading; bridge structures; street work; station footprints; and in the case of a subway section, tunnel construction.
- **Systems** - This element includes all facilities and equipment that are common throughout the system: light rail vehicles, track installation, electrification (power substations and overhead wires), signals, communication, fare collection, support equipment, and the central operations and maintenance facility.
- **Stations** - This involves station furnishings over and above the basic station footprint including: platforms and surface treatment finish work; lighting; furniture and amenities; electric power; shelters; heat; connections to roadways, public sidewalks and buildings; park-ride lots; elevators and escalators for any subway construction; and handicapped access.

- **Operations** will commence upon the completion of Design and Construction. Prior to this event, public policy decisions (who will run the system and how) must be made, an LRT operating structure defined and staff trained, and bus feeder services planned to coordinate service to the public. LRT operation will require that an organization be established, either within the structure of the existing transit agency or by a new operator, with rules and procedures appropriate to rail operations as distinct from the requirement of the present all-bus system. Personnel with specialized skills will be needed: transportation supervisory staff and train operators, security staff, vehicle maintenance personnel, and facilities maintainers.

- **Financing** must be arranged through some combination of public and private sources to fund design, construction and ongoing operations.
- **Related Land Development** is likely to occur in the public right-of-way used by LRT as well as on adjacent private lands. Mechanisms can be implemented to capture a portion of the revenue these new developments will create for LRT system use.

The issue is how the above-defined LRT components should be related during system implementation and operation.

Alternative LRT Implementation Methods

Alternative methods of dividing the implementation work are discussed below. There are variations and hybrids of the methods shown, but those outlined represent the basic alternatives.

Traditional. The Project Manager/Engineer specifies the system elements (vehicles, electrification, signals, communications, fare collection, etc.) or components of the system elements (e.g., substation equipment, catenary network, track material, etc.) and issues separate detailed specifications for bid. At the same time, the civil design is advanced to 100 percent drawings. Contracts are awarded for the system elements and components, and the contractors fabricate and furnish the equipment. The civil contract drawings are also issued for bid and awarded to low, responsible bidders; the contractors construct the LRT infrastructure. These construction contractors (or other contractors) could also install the electrification, signals, communication equipment, and fare collection. Upon completion, an operations contractor or a public agency operates the system. Traditional contracting places maximum control, risk, and responsibility with the project owner.

Design/Build. The Project Manager/Engineer advances the design to the performance specification level in the case of the systems elements and to thirty percent in the case of the civil design.

The system elements each are awarded to contractors who design, furnish, and install the equipment. The thirty percent civil designs are issued for bid as design/build sections. Upon completion, an operations contractor or a public agency operates the system; the operations decision is made independent of the design and construction.

Design/Build sacrifices a modest degree of owner control, but enables suppliers to tailor final design to their products rather than having to "re-engineer" to the owner's exact specifications. Unless properly specified and managed, this approach can have the effect of limiting competition; thus affording an advantage in subsequent extensions to those firms successful in the initial stage.

Turnkey. The Project Manager/Engineer advances the design as would be done in the Design/Build category, but the performance specifications and thirty percent design are issued for competition as one package. Having the Project Manager/ Engineer advance the design to thirty percent establishes the basic system parameters, allows for definitive cost estimation, and keeps the contingency margin reasonable.

The winning Turnkey contractor completes the design in all areas and fabricates and furnishes the equipment at an agreed-upon price. The Turnkey Contractor also operates the system, at an agreed-upon price, for a prescribed period to ensure reliability. A minimum period of five years is usually suggested as a reasonable time period during which potential problems would develop.

Turnkey further lessens owner control, but transfers responsibility and risk for successful system operation to the Turnkey Contractor. Properly specified and managed, this approach focuses responsibility for cost/schedule performance, quality, and achievement of performance standards in a single entity. This removes many external interface related claims.

Super Turnkey. This is the same as the Turnkey approach except that in addition the Super Turnkey contractor is made responsible for partial or total system financing and is involved in the related land development. Financing might take the form of loans (e.g., vendor financing) or

lease/buy-backs. There could also be a potential for funding portions of the system, particularly at or around stations, through joint development.

The Super Turnkey approach makes the contractor responsible for financial and land development arrangements, but is likely to require that public agencies cede substantial control over the precise details of the technical/physical solution to the Super Turnkey contractor.

Evaluation of Alternative Implementation Methods

The evaluation of the applicability of the alternative implementation methods centers around the following criteria:

- Contractual, Construction, and Performance Risk
- Time Schedule
- Responsibility/Accountability
- Budget Control/Cost
- Quality

A discussion of the above criteria relative to civil, systems, stations, and related land development follows.

Civil. This element carries the greatest number of unknowns (e.g., soil condition variances), involves numerous third parties (utilities, railroads, and other public jurisdictions), and also involves property acquisition. If a subway or tunnel is part of the LRT, the risks are even greater. With a thirty percent level of design completed by the owner, all potential contractors either have to complete a significant amount of additional engineering or include a significant contingency in any fixed price bid.

The failure to make right-of-way available or to gain agreements with railroads has been a historic problem and a cause of many delays on fixed guideway projects. The delays have also resulted in increased costs caused by inflation. The owner will have to take this risk and establish a firm schedule for availability of right-of-way and clearance of all utilities with a turnkey or super turnkey approach. It does not appear feasible to use a turnkey or super turnkey approach for all portions of the civil component of a LRT system.

The traditional method affords the highest degree of control. Civil design can be paced and adjusted in accordance with system-wide design development, third party negotiations, and the overall project schedule. The Owner or the Owner's Project Manager/Engineer can fast-track certain long lead sections (e.g., bridges) and adjust implementation schedules on other sections as the need arises.

Systems. Systems procurement for furnish/install contracts for several North American LRT projects (e.g., Portland, Sacramento, San Jose) has successfully been implemented using the Design/Build approach. Some foreign projects (Istanbul, Tunis, Manila) are using Turnkey.

An important consideration is the integration of the various Systems components with each other and with the Civil components. Most integration problems encountered will fall into two categories: Systems/Civil coordination, and the securing of approvals and permits from regulatory bodies. The owner's Project Manager/Engineer must possess the requisite skills to ensure this coordination. The Systems integration function is crucial to assuring that an operable project is built. Under the Design/Build option, the owner, through its Project Manager/Engineer, could perform the coordination between Civil and Systems and can perform the coordination among the systems components (vehicles, signals, et al) as well. This will allow tighter control by the Owner.

Regarding the Turnkey approach, no single manufacturer can provide all of the systems components. Thus, a Turnkey approach will require several companies to cooperate, organized either as a joint venture or as a prime contractor with subcontractors.

Some suppliers have expressed an interest in the Turnkey approach based on experience with projects outside the U.S. The "price" of some loss of control by the Owner may be worth considering if the Turnkey contractor is prepared to accept some of the cost and schedule risks, and if he is made responsible for operations management of the system for an extended period of time beyond the normal two-year warranty time (say at least five years overall).

There is some thought among transit engineers that the contractual link between the major components of building the system and operating it may bring additional benefits. By holding the contractor responsible for management of operations (local forces already in place will perform actual works under the turnkey contractor's management), there is a financial incentive not to allow operating costs to exceed initial projections. The contractor may be more careful to design equipment to reduce operating and maintenance costs, because equipment failures will reduce his profit. Conversely, reliable, maintainable equipment will reduce costs, hence increasing profit.

In conclusion, a Design/Build approach for Systems components will apply contracting methods successfully used on other recent North American LRT projects and allow tighter Owner control. A Turnkey approach, however, may offer additional benefits regarding risk transfer and operating responsibility, albeit at the price of reduced County control.

Stations. The most appropriate implementation method for stations depends upon whether or not adjacent development opportunities exist.

Traditional contracts are most appropriate to construct those stations where no developer involvement will occur. This will ensure maximum County control and coordination with other stations.

Super Turnkey contracts are suggested where stations can be provided (i.e., built and paid for) by developers as part of adjacent building projects. Such contracts must be drawn to ensure compliance with LRT functional requirements (e.g., platform dimensions, weather protection for waiting passengers, station utilities, etc.); but some latitude may be given to allow developers to coordinate station architectural appearance with their projects.

Related Land Development. Counties in the State of Minnesota have no control over local land use decisions. They do not zone property and they do not approve building and site plans. Therefore, Hennepin County needs to establish interjurisdictional agreements with the various municipalities in which LRT service is proposed. With this completed, the County (as LRT developer) and municipalities can proceed together to solicit land developer/property owner interest and coordinate the development of stations integrated with adjacent real estate projects as discussed above and other developments on private land adjacent to the LRT right-of-way.

Conclusions

Consideration of these alternatives will continue during preliminary engineering. Decisions will be made based on conditions as they develop during the process.

BENEFITS OF LRT

Implementation of a light rail transit system in Hennepin County will have beneficial effects in several areas:

- Enhanced transit service in corridors where LRT is constructed
- Increased transit patronage
- More economical use of transit resources

- Reduced auto trips on regional highway system
- Improved air quality in the region
- Reduced bus traffic in downtown Minneapolis
- Reduced auto traffic in downtown Minneapolis
- Reduced need for parking in downtown Minneapolis
- Increased development potential near stations
- Increased development potential in downtown Minneapolis

VII. APPENDICES

A. List of Meetings

B. Committee Membership Lists

Intergovernmental Advisory Committee
Technical Advisory Committee
Financial Advisory Committee
Land Use Advisory Committee
Downtown Advisory Committee
Northwest Corridor Advisory Committee
Southwest Surburban Corridor Advisory Committee
Southwest Minneapolis Corridor Advisory Committee
South/I-35W Corridor Advisory Committee
Hiawatha Corridor Advisory Committee
University Connection Advisory Committee

C. Advisory Committee Summary Reports

APPENDIX A

List of Meetings

DATE	MEETING
09-15-87	Intergovernmental Advisory Committee
09-15-87	Southwest Suburban Corridor Advisory Committee
09-17-87	South (I-35W) Corridor Advisory Committee
09-22-87	Southwest Minneapolis Corridor Advisory Committee
09-30-87	Southwest Suburban Corridor Advisory Committee
09-30-87	Technical Advisory Committee
10-01-87	Legislative Breakfast
10-01-87	University Connection Advisory Committee
10-06-87	Intergovernmental Advisory Committee
10-07-87	Hiawatha Corridor Advisory Committee
10-08-87	Northwest Corridor Advisory Committee
10-13-87	Downtown Advisory Committee
10-14-87	Southwest Minneapolis Corridor Advisory Committee
10-20-87	Forum -- LRT Implementation
10-21-87	Southwest Suburban Corridor Advisory Committee
10-22-87	University Connection Advisory Committee
10-28-87	Southwest Minneapolis Corridor Advisory Committee
10-29-87	Northwest Corridor Advisory Committee
10-30-87	Technical Advisory Committee
11-03-87	Downtown Advisory Committee
11-03-87	Intergovernmental Advisory Committee
11-05-87	Hiawatha Corridor Advisory Committee
11-11-87	Southwest Minneapolis Corridor Advisory Committee
11-12-87	Southwest Suburban Corridor Advisory Committee
11-17-87	Downtown Advisory Committee
11-17-87	Land Use Advisory Committee
11-18-87	Financial Advisory Committee
11-18-87	University Connection Advisory Committee
11-19-87	Northwest Corridor Advisory Committee
11-24-87	Downtown Advisory Committee
11-24-87	Intergovernmental Advisory Committee
11-24-87	Southwest Suburban Corridor Advisory Committee

DATE	MEETING
12-01-87	Land Use Advisory Committee
12-02-87	Financial Advisory Committee
12-02-87	Southwest Minneapolis Corridor Advisory Committee
12-03-87	Hiawatha Corridor Advisory Committee
12-03-87	Technical Advisory Committee
12-08-87	Land Use Advisory Committee
12-09-87	Intergovernmental Advisory Committee
12-09-87	South (I-35W) Corridor Advisory Committee
12-09-87	Southwest Suburban Corridor Advisory Committee
12-10-87	Legislative Breakfast
12-10-87	Northwest Corridor Advisory Committee
12-14-87	Forum, Public -- Southwest Suburban Corr. Adv. Committee
12-14-87	Southwest Suburban Corridor Advisory Committee
12-14-87	University Connection Advisory Committee
12-16-87	Financial Advisory Committee
12-17-87	Southwest Minneapolis Corridor Advisory Committee
12-17-87	Technical Advisory Committee
12-18-87	Downtown Advisory Committee
12-18-87	Intergovernmental Advisory Committee
12-23-87	Financial Advisory Committee
12-24-87	Intergovernmental Advisory Committee
12-29-87	Downtown Advisory Committee
01-05-88	South (I-35W) Corridor Advisory Committee
01-06-88	Downtown Advisory Committee
01-07-88	Technical Advisory Committee
01-12-88	Intergovernmental Advisory Committee
01-13-88	Southwest Minneapolis Corridor Advisory Committee
01-14-88	Northwest Corridor Advisory Committee
01-15-88	Downtown Advisory Committee
01-20-88	Downtown Advisory Committee
01-20-88	South (I-35W) Corridor Advisory Committee
01-21-88	Southwest Minneapolis Corridor Advisory Committee
01-21-88	Technical Advisory Committee
01-25-88	Financial Advisory Committee
01-29-88	Downtown Advisory Committee

DATE	MEETING
02-03-88	South (I-35W) Corridor Advisory Committee
02-04-88	Southwest Minneapolis Corridor Advisory Committee
02-04-88	Technical Advisory Committee
02-11-88	Technical Advisory Committee
02-13-88	Forum, Public -- South (I-35W) Corr. Adv. Committee
02-13-88	South (I-35W) Corridor Advisory Committee
02-17-88	Southwest Minneapolis Corridor Advisory Committee
02-17-88	Technical Advisory Committee
02-19-88	Intergovernmental Advisory Committee
02-25-88	Legislative Breakfast
02-25-88	Technical Advisory Committee
02-26-88	Intergovernmental Advisory Committee
03-03-88	Technical Advisory Committee
03-04-88	Intergovernmental Advisory Committee
03-11-88	Intergovernmental Advisory Committee
03-14-88	Hiawatha, University & Downtown Public Forum
03-16-88	South Public Forum
03-18-88	Intergovernmental Advisory Committee
03-18-88	Northwest Suburban Public Forum
03-21-88	Southwest Suburban Public Forum
03-23-88	Southwest Minneapolis Public Forum
03-25-88	Intergovernmental Advisory Committee
04-05-88	Elected Officials Meeting On I-35W
04-08-88	Intergovernmental Advisory Committee
04-11-88	Public Hearing - Public Television: Channel 6
04-15-88	Intergovernmental Advisory Committee
04-22-88	Intergovernmental Advisory Committee
04-29-88	Intergovernmental Advisory Committee

APPENDIX B

Committee Membership Lists

INTERGOVERNMENTAL ADVISORY COMMITTEE

Co-Chairs: John Derus, Steve Keefe

Appointing Authority	Appointee	Phone
Hennepin County	John E. Derus, HCRRA Chair	348-3086
	Jeff Spartz	348-3085
	Randy Johnson	348-3088
	John Keefe	348-3087
	E. F. Robb, Jr.	348-3084
	Sam S. Sivanich	348-3082
	Mark Andrew	348-3080
City of Bloomington	Mayor Kurt Laughinghouse	881-5811
	(alt. Larry Lee)	881-5811
City of Brooklyn Center	Council Member Gene Lhotka	561-2850 (370-5914)
City of Brooklyn Park	Mayor James Krautkremer	424-8000 (560-8022)
City of Chaska	Council Member Daniel Ress	448-2854
City of Crystal	Mayor Thomas Aaker	537-8421
City of Eden Prairie	Mayor Gary Peterson	937-2262
City of Edina	Mayor Wayne Courtney	927-8861
City of Excelsior	Mayor Jim Olds	474-5233 (474-4139)
	(alt. Lucille Crow)	474-5233
City of Golden Valley	Mayor Mary Anderson	593-8000

INTERGOVERNMENTAL ADVISORY COMMITTEE (CONTINUED)

Appointing Authority	Appointee	Phone
City of Hopkins	Mayor Don Milbert (alt. Jim Shirley)	935-8474 330-3233
City of Minneapolis	Council Member Brian Coyle Council Member Kathy O'Brien Council Member Steve Cramer	348-2206 348-2202 348-2211
City of Minneapolis (Mayor)	Bill Barnhart	348-6534
City of Minnetonka	Mayor Larry Donlin (alt. Bob DeGhetto)	933-2511 (474-8396) 933-2511 (935-1951)
Citizens League	Paul Gilje	338-0791
City of Richfield	Mayor Steve Quam	339-5908
City of Robbinsdale	Mayor Raymond Mattson Dave Hagen	537-4534 (537-2829) 537-4534 (588-3995)
City of St. Louis Park	Mayor Lyle Hanks	924-2500 (925-4300)
Regional Transit Board	Ruth Franklin	755-2880
Metropolitan Transit Commission	Frank Snowden	733-4404
Metropolitan Council	Steve Keefe, Chair	374-3822 (291-6453)

INTERGOVERNMENTAL ADVISORY COMMITTEE (CONTINUED)

Appointing Authority	Appointee	Phone
Minnesota Department of Transportation	Darryl Durgin (alt. Randy Halvorson)	296-8532 296-1615
Metropolitan Airports Commission	Harold Greenwood	726-5108
Minnesota Assoc. of Urban Counties	Bruce Nawrocki	788-9221
MTC	Glenn Olson (alt. Frank Snowden)	
University of Minnesota	Clint Hewitt Richard P. Braun	625-7355 626-1077
Downtown Council of Minneapolis	David Sanders	333-2293
Greater Minneapolis Chamber of Commerce	Andrew Selden	339-0661
Minnesota State Senate	Doug Elsass	296-8869
Minnesota House of Representatives	Representative Ken Nelson Representative Phil Carruthers Representative Peter McLaughlin	296-4244 296-3709 296-7152
Park Reserve District	Mona Moede	348-4621
CTAC	Alison Fuhr	920-1566
Ex-Officio Members		
Anoka County	Commissioner Paul McCarron	
Metropolitan Council	Natalio Diaz	

TECHNICAL ADVISORY COMMITTEE

Chair: Natalio Diaz

Appointing Authority	Appointee	Phone
Metropolitan Council	Natalio Diaz	291-6341
University of Minnesota	Larry Anderson	624-5758
Citizens Transit Action Committee	George Isaacs (alt. Dottie Reitow)	484-7512 545-5848
Amalgamated Transit Union Local 1005	Arnie J. Entzel	379-2914
City of Brooklyn Park	Ron West	424-8000
Metropolitan Transit Commission	Beverly J. Auld (alt. Bob La Shomb)	349-7400 349-7400
City of Crystal	William Monk	537-5233
City of Excelsior	Christopher A. Gears	474-5233
Downtown Council of Minneapolis	Tom W. Duffee	338-3807
Greater Minneapolis Chamber of Commerce	Dick Granchalek	370-9132
Regional Transit Board	Judy Hollander	292-8789
City of Minnetonka	Ann Perry	933-2511
City of Hopkins	Craig Rapp (alt. Steve Mielke)	935-8474 935-8474

TECHNICAL ADVISORY COMMITTEE (CONTINUED)

Appointing Authority	Appointee	Phone
Minnesota Department of Transportation	William Crawford (alt. Jim Povich)	593-8403 593-8405
City of Eden Prairie	Rod Rue (alt. Al Grey)	937-2262 937-2262
City of Richfield	Byron Wallace (alt. Rick Jopke)	869-7521 869-7521
Handicapped Community	Michael Ehrlichmann	
City of Chaska	Kevin Maaf	
Metropolitan Airports Commission	Nigel Finney	726-1892
City of Bloomington	Lyle Berg	881-5811
City of St. Louis Park	Jim Grube Bill Thibault	924-2555 924-2575
City of Brooklyn Center	Gerald Splinter	561-5440
Hennepin County	Vern Genzlinger	348-4306
City of Minneapolis	Robert S. Morgan Jim Daire Perry Smith	348-6588 348-6963 348-2443
City of Edina	Ceil Smith	927-8861
City of Robbinsdale	David Hagen (alt. Walter Fehst)	537-4534 537-4534

TECHNICAL ADVISORY COMMITTEE (CONTINUED)

Appointing Authority	Appointee	Phone
City of Golden Valley	Mark Grimes	593-8097
Carver County	Roger Gustafson	448-3435

FINANCIAL ADVISORY COMMITTEE

Chair: Commissioner Jeff Spartz

Name	Representing	Phone
Greg Andrews	Regional Transit Board	292-8818
Jerry Choromanski	The Bank North, Crystal	533-1511 ext. 130
Representative Phil Carruthers	Minnesota House of Representatives	338-1931
Stanley Cowle	Piper, Jaffray, Hopwood	342-6069
Mayor Larry Donlin	City of Minnetonka	933-2511
Michael Dougherty	Dougherty, Dawkins	341-6000
Pat Downey	BCE	372-1675
Harlan Engelmann	BCE	372-1693
Ruth Franklin	Regional Transit Board	755-2880
Bruce Gilmore	Marquette Bank Minneapolis	338-3888
Richard Joseph	Norwest Investment Services	
Mark Kaplan	Norwest Investment Services	372-9504
Steve Keefe	Metropolitan Council	374-3822
Doug Elsass	Minnesota State Senate	296-4302

FINANCIAL ADVISORY COMMITTEE (CONTINUED)

Name	Representing	Phone
Mark Labovitz	Dain Bosworth	371-7794
Senator William P. Luther	Minnesota State Senate	296-8869
Dave McElroy	The Bank North, Crystal	533-1511 ext. 153
Ralph McGinley	Dougherty, Dawkins	341-6020
Representative Peter McLaughlin	Minnesota House or Representatives	296-7152
Richard Miller	Dain Bosworth	371-7820
Representative Ken Nelson	Minnesota House of Representatives	296-4244
Representative Sally Olsen	Minnesota House of Representatives	296-3964
Vance Opperman	Opperman and Paquin	339-6900
Carl Pohlad	Marquette Bank Minneapolis	341-5600
Alice Rainville	Minneapolis City Council	348-2204
Walter Rasmussen	Northeast State Bank	379-8811

LAND USE ADVISORY COMMITTEE

Chair: Councilmember Tony Scallon

Name	Representing	Phone
James L. Brimeyer	City of St. Louis Park	924-2500
Oliver Byrum	Minneapolis Planning Department	348-6315
Walter R. Fehst	City of Robbinsdale	537-4534
Richard H. Henneberger	City of Brooklyn Park	
James F. Miller	City of Minnetonka	933-2511
John Olson	City of Crystal	537-8421
Ann Perry	City of Minnetonka	933-2511
John G. Pidgeon	City of Bloomington	881-5811
Craig R. Rapp	City of Hopkins	935-8474
Tony Scallon	City of Minneapolis	348-2209
Lyall A. Schwarzkopf	City of Minneapolis	348-2032
Perry Thorvig	Minneapolis Planning Department	348-6521

DOWNTOWN ADVISORY COMMITTEE

Chair: Bob King

Appointing Authority	Appointee	Phone
City of Minneapolis	Council Member Tony Scallon	348-2209
	Council Member Barbara Carlson	348-2207
	Council Member Van White	348-2205
	Council Member Joan Niemiec	348-2210
	(alt. Perry Smith)	348-2443
	(alt. Ollie Byrum)	348-2032
	(alt. Lyall Schwarzkopf)	348-2032
	(alt. Robert Randle)	
Greater Minneapolis Chamber of Commerce	Tom Madison	377-6717
	Lowell Anderson	347-6506
	Donald Benson	339-8853
	Thomas Dale	371-2952
	(alt. John Bergford)	
	(alt. Brooks Clark)	
Downtown Council of Minneapolis	Robert Dayton	332-3052
	Patrick Downey	372-1675
	Tad Piper	342-6060
	Stephen Watson	375-3120
	(alt. Bob King)	
Metropolitan Transit Commission	Dennis Tollefsbol	349-7770

NORTHWEST CORRIDOR ADVISORY COMMITTEE

Chair: Charles Darth

Appointing Authority	Appointee	Phone
City of Brooklyn Center	Jayne Kuhar	333-3225
	Todd Paulson	227-8266
	Bob Elingson	332-2561
	Gayland Halter	537-3146
City of Brooklyn Park	Charles Darth	424-8000
	Rick Engh	537-6876
	Delos Webster	561-0619
	Bill Dix	425-4131
City of Crystal	Art Cunningham	544-6020
	Adrian Rygg	537-5725
	Betty Herbes	537-8891
City of Minneapolis	Edward Gearty	521-3503
	Alfred Babington-Johnson	521-4422
	Barbara Johnson	522-7873
	Pedro Ramos	
City of Robbinsdale	Mike Holtz	
	Bill Blonigan	
	Jim Pilon	
	David Hagen	537-4534
Golden Valley	Kevin McAleese	545-2763

SOUTHWEST SUBURBAN CORRIDOR ADVISORY COMMITTEE MEMBER LIST

Chair: Doug Ewald
Vice Chair: James Brimeyer

Appointing Authority	Appointee	Phone
City of Chaska	_____	
	_____	
	_____	
City of Eden Prairie	Douglas Fell	829-5347
	Dr. Jean Harris	853-4334
	Beverly Miller	
City of Edina	Alison Fuhr	920-1566
	Sue Covnick	920-0340
	John McLean	933-1640
City of Excelsior	Marty McGlassen	474-5900
	Dan Ryerson	831-5793
	Michael Krause	473-0890
City of Hopkins	Howard Sundby	935-1278
	Ellen Lavin	935-1440
	Virginia Moll	938-2878
	(alt. Harry Smith, O.D.)	
City of Minnetonka	Doug Ewald	934-3508
	David Olson	540-0234
	Fred Hanus	935-4094
	(alt. Timothy Bergstedt)	938-8533
	(alt. Lee A. Hanson)	935-9245

SOUTHWEST SUBURBAN CORRIDOR ADVISORY COMMITTEE MEMBER LIST (CONTINUED)

Appointing Authority	Appointee	Phone
City of St. Louis Park	Andrew Selden	291-1215
	James Brimeyer	934-2500
	Allen Friedman	929-1768
City of Deephaven	Charles Watson	370-2575
City of Greenwood	Clark Connell	474-7528
City of Shorewood	Jan Haugen	474-9141

SOUTHWEST MINNEAPOLIS CORRIDOR ADVISORY COMMITTEE

Appointing Authority	Appointee	Phone
City of Minneapolis	Ed Bell	623-0224
	John Herman	
	Will Craig	377-8888
	Sue Kline	374-5559
	Greg Scott	
	Fred Glazer	872-9117
	John Meegan	824-2800
	John Carmody	624-1351
	Clorasteen Wilson	824-2367
	Maurice Dorton	374-4969
	Mary Louise Poquette	377-6691
	(alt. Kit Bottkol)	227-0655
	(alt. Kathleen Nye)	347-9372
	(alt. Linda Wejcman)	827-6917
	(alt. Kim Carlson)	544-0333
	(alt. Jane Pejsa)	374-3337

SOUTH (I-35) CORRIDOR ADVISORY COMMITTEE

Appointing Authority	Appointee	Phone
City of Minneapolis	Don Laufenburger	825-5076
	(alt. Rick Polanski)	822-9849
	Mike Colloton	333-1288
	(alt. Mary Peterson)	861-1802
	John Doyle	372-9000
	(alt. Tom Duffee)	338-3807
	Carol Johnson	348-2213
City of Richfield	George Karnas	869-3486
	Don Anderson	869-5374
	Vern Luettinger	869-0888
	Robert Meyer	
City of Bloomington	Ken Miyamoto	
	Jim Printup	337-4475
	Lyle Berg	
	Ray Vodovnik	831-4140
City of Edina	Lucy Hahn	922-4717
	Lynn Odland	344-0444 (w)
		931-1194 (h)

HIAWATHA CORRIDOR ADVISORY COMMITTEE

Appointing Authority	Appointee	Phone
City of Bloomington	Donn Hayes	885-4406
	Paul Hufnagle	831-7939
	Larry Lee	887-9635
	Robert Darr	853-7563
City of Minneapolis	Dan Quillan	721-4927
	Jim Tennessen	729-0515
	Gary Lewison	729-3670
	Kathy Mackdanz	722-2392
	Nicholas Pu Zak	874-0416
	Adaline Kappra	724-8350
	Bill Lester	332-0386
	Larry Mitchell	338-6161
	(alt. Laura Spartz)	
	(alt. Caroline Sawyer)	
	(alt. Roger Dymoke)	
	(alt. Ellen Rang)	
Metropolitan Airports Commission	Jan Del Calzo	827-4240
	Wilbert Viitala	870-2214
City of Richfield	Kermit Randall	869-6620
	Barbara Kritzman	332-0331
Metropolitan Sports Facilities Commission	Carrolyn Anderson	371-5300

UNIVERSITY CONNECTION ADVISORY COMMITTEE

Appointing Authority	Appointee	Phone
City of Minneapolis	Pat Miller	924-6615
	John Jamieson	339-1126
	Ralph Cannata	
	Dale Podvin	
	David Katzung	623-9214
	John Hotvet	
	(alt. Helen Kretzhmar)	
	(alt. Steve Antenucci)	333-4132
	(alt. Floyd Case)	
University of Minnesota	Vilis Vikmanis	625-5444
	Charles Lawrence	624-2994
	Cynthia Beard	333-8411

APPENDIX C

Advisory Committee Summary Reports

Appendix C contains the reports of the Downtown, Hiawatha, University Connection, Finance and Land Use Advisory Committees to the IAC and the TAC. Also included are summary reports of other Corridor Advisory Committees (Northwest, Southwest Suburban, Southwest Minneapolis, and South/I-35W). The complete reports of the latter committees are bound under separate cover.

February 2, 1988

Report of the Downtown Advisory Committee for the Hennepin County Comprehensive LRT System Plan

To: Intergovernmental Advisory Committee

From: Chair Bob King, For the Committee
(Membership List Attached)

Re: Recommendation on LRT Service in Downtown Minneapolis

SUMMARY

After consideration of numerous alternatives, the Downtown Advisory Committee recommends to the Intergovernmental Advisory Committee that the light rail transit (LRT) line in downtown Minneapolis have the following characteristics:

- At-grade construction.
- North-south orientation.
- Serve the area between 2nd Street and 11th/12th Streets.
- Contra-flow on adjacent one-way streets.
- Utilize Marquette Avenue.
- Address accessibility issues of elderly and handicapped.
- Include measures to mitigate operations and aesthetic impacts.

The Committee prefers the system defined above because it most succesfully:

- Maximizes street-level activity.
- Reinforces the compact-core development concept.
- Serves the Mills District and Convention Center areas.
- Minimizes perceived personal security problems.
- Minimizes capital cost.

To facilitate advancement of the LRT planning process, the Downtown Advisory Committee further recommends that:

- Detailed planning of the recommended alternative begin immediately in order to more precisely identify its components, impacts, and required mitigation measures.
- Concurrently, a plan should be developed for the underground alternative which ensures that right-of-way for the tunnel and access may be acquired.
- These recommendations be transmitted to the Minneapolis City Council for review as soon as possible.

The Downtown Advisory Committee directed that these recommendations be transmitted to the Intergovernmental Advisory Committee.

February 2, 1988

DOWNTOWN ADVISORY COMMITTEE RECOMMENDATION ON LRT SERVICE DOWNTOWN

The Downtown Advisory Committee for the Comprehensive Light Rail Transit System Plan for Hennepin County was charged with developing a preferred plan for serving downtown Minneapolis with LRT service. The committee met ten times over a five-month period. Three basic alternatives were defined, each had location and station options:

- Sandstone Tunnel - a tunnel located in St. Peter Sandstone approximately ninety feet underground. Options included tunnels between the Metrodome on the east and near the Third Avenue Distributor on the west and an alternative between the Metrodome and 29th/ Nicollet.

- Shallow Tunnel - This tunnel would be located approximately 45 feet underground and most likely be constructed as a bored tunnel, with "cut-and-cover" stations. An east-west option along 7th Street and a north-south option along Marquette were analyzed. These tunnels would be approximately ten to twelve blocks or one-mile in length.

- o At-Grade - the surface alternatives included routes with east-west as well as north-south orientation. Full transit malls, semi-transit malls, and contra-flow operation were evaluated. Routes between Hennepin and Third Avenue and between 2nd Street and 12th Street were defined.

Initially, alternatives on Nicollet Mall were not considered because the Nicollet Mall Implementation Board voted not to have LRT service at-grade on the mall.

The evaluation criteria included service to users (including proximity to employment and retail, travel times, elderly and handicapped service, and connections to radial corridors), impact on traffic and curb use, relationship to surface buses, impact on street level retail and pedestrian activity, personal security, capital cost, operating and maintenance cost, and consistency with city plans for downtown.

Based on the analysis, the committee concluded:

- o At-grade service is preferred to underground service primarily because it will strengthen street-level activity, lower capital costs, and minimize perceived personal security problems

- o The at-grade service should have a north-south orientation to reinforce the compact core development concept for downtown

- The three location and service alternatives are:

  - Contra-flow operation on Second/Marquette
  - Contra-flow operation on Marquette/Nicollet
  - Two-way semi-mall on Marquette

  It is the sense of the Downtown Advisory Committee that the preferable LRT alignment in downtown Minneapolis is contra-flow on a pair of adjacent streets including Marquette Avenue.

- The service should enter from the north via Second Street; this location will provide service to the riverfront

- The service should extend to the south to 11th/12th Streets; further extension to the west or south will depend upon LRT location decisions made in the Southwest Corridor and the I-35W Corridor

- The at-grade LRT service will require special design treatment to fit with the existing downtown streetscape. This treatment could include, but should not be limited to, surface treatments, shelters, lighting, landscaping, signage, barriers, etc.

- Special attention is required to provide adequate access for the elderly and handicapped

- A shuttle transit service on Nicollet Mall, connected to north and south downtown transit terminals, is required to replace bus service removed from Second/Marquette to make room for LRT service.

- The at-grade alternative will require a series of mitigation measures to address impacts on street operation, curb use, street curb-cut access, downtown traffic signal system, bus operations, street capacity, and utility impacts

The committee further recommends the following:

- Detailed planning for the at-grade alternative should begin immediately to further refine the plan and define the required mitigation measures

- Concurrently, a plan should be developed for the underground alternative which ensures that right-of-way for the tunnel and access may be acquired.

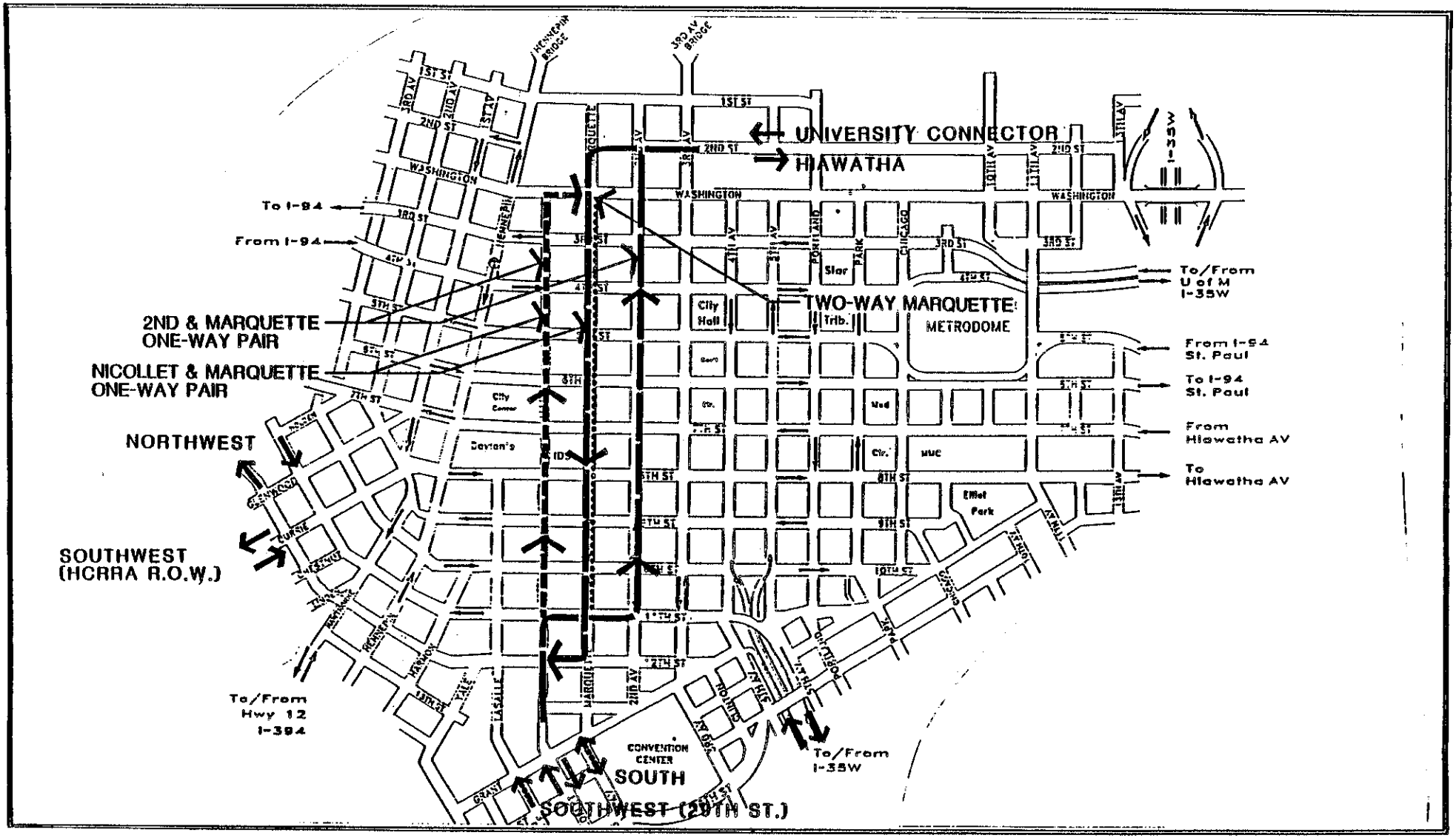
- The conclusions of the Downtown CAC should be sent to the Intergovernmental Advisory Committee and the Minneapolis City Council as soon as possible

January 15, 1988

DOWNTOWN ADVISORY COMMITTEE

Chair
Bob King

Appointing Authority	Appointee	Phone
City of Minneapolis	Council Member Tony Scallon	348-2209
	Council Member Barbara Carlson	348-2207
	Council Member Van White	348-2205
	Council Member Joan Niemiec	348-2210
	(alt. Perry Smith)	348-2443
	(alt. Ollie Byrum)	348-2032
	(alt. Lyall Schwarzkopf)	348-2032
	(alt. Robert Randle)	
Greater Minneapolis Chamber of Commerce	Tom Madison	377-6717
	Lowell Anderson	347-6506
	Donald Benson	339-8853
	Thomas Dale	371-2952
	(alt. John Bergford)	
	(alt. Brooks Clark)	
Downtown Council of Minneapolis	Robert Dayton	332-3052
	Patrick Downey	372-1675
	Tad Piper	342-6060
	Stephen Watson	375-3120
	(alt. Bob King)	
Metropolitan Transit Commission	Dennis Tollefsbol	349-7770



HCRRA
Comprehensive
LRT System Plan

March 4, 1988

NORTHWEST CORRIDOR ADVISORY COMMITTEE
Report to the HCRRA

I. SUMMARY

The Northwest Corridor Advisory Committee (NWCAC) was formed to provide citizen input in the development of a Light Rail Transit (LRT) system serving the Northwest Corridor. The geographic limits of the corridor study area generally follow the Mississippi River to the East and extend approximately two miles beyond the Burlington Northern (BN) Osseo Line to the west. Downtown Minneapolis is the southern boundary and 85th Avenue is the northern limit.

The NWCAC was composed of representatives from Brooklyn Center, Brooklyn Park, Crystal, Golden Valley, North Minneapolis, and Robbinsdale. A listing of the representatives attending meetings is attached.

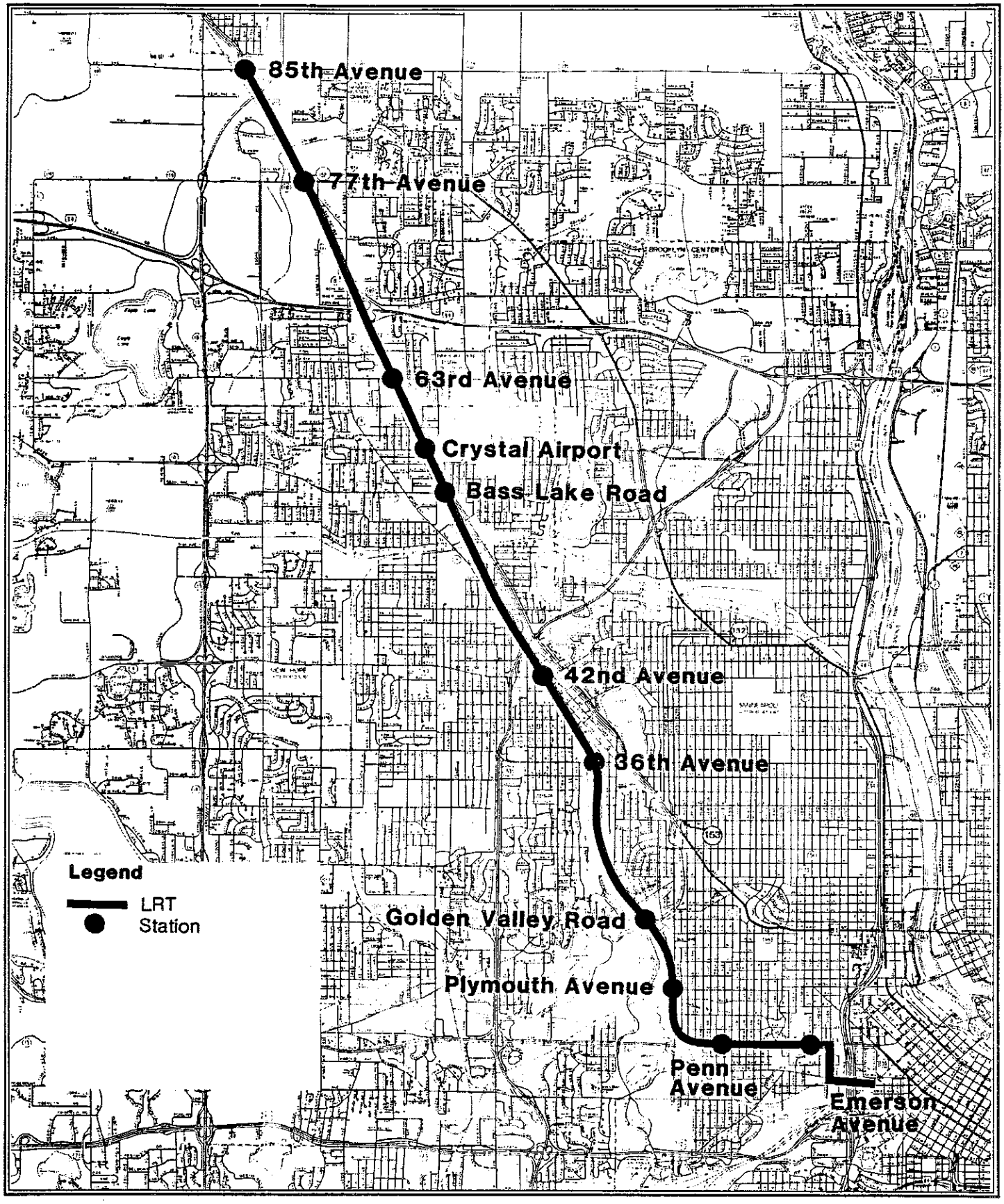
The primary responsibility of the Committee was to select a preferred LRT alignment to serve the corridor. The task required formulation of a transit service philosophy, identification of preferred station sites and recommendation of types of access at the various stations. These activities were completed by the Committee in a series of seven meetings held between October 14, 1987, and February 11, 1988.

The Committee selected a preferred alignment in their meeting of January 14, 1988. This alignment (Figure 1) follows the median of Olson Memorial Highway west to the Burlington Northern Railroad right-of-way, which it follows north to 85th Avenue. Stations are recommended at the following locations:

- o Emerson
- o Penn
- o Plymouth
- o Golden Valley Road
- o 36th
- o 42nd
- o Bass Lake Road
- o Crystal Airport
- o 63rd
- o 77th
- o 85th

The Crystal airport location would only be included if the airport site were redeveloped as a more intensive land use.

In addition to selecting a preferred Northwest alignment, the Committee also passed a resolution supporting future consideration of an LRT branch line to the Brookdale/Brooklyn Center area. This spur would extend from the BN route east along TH 100 to Brooklyn Boulevard.



HCRRA
Hennepin County Regional Railroad Authority

Comprehensive LRT System Plan

BRW

0' 3,000' North

Northwest Corridor

Recommended LRT Route

Figure 1

BRW, Inc.
2/5/88

SOUTHWEST MINNEAPOLIS CORRIDOR ADVISORY COMMITTEE RECOMMENDATIONS

Approved by the Committee at its February 4, 1988, meeting.

The Committee recommends an east/west alignment running parallel to 29th Street along the Soo Line rail corridor from the western city limits to Nicollet Avenue. At Nicollet, the recommended alignment turns north in a tunnel to enter downtown Minneapolis.

Stations should be located as follows:

- in the vicinity of Lake Street
- just east of Hennepin Avenue
- just east of Lyndale Avenue
- Nicollet in the vicinity of 28th Street
- Nicollet in the vicinity of Franklin
- at the Convention Center (assumed to be a downtown station)

The Committee's recommendation is based on the following assumptions:

Primary Assumptions

1. One major function of the southwest LRT corridor through Minneapolis is to efficiently bring commuters and shoppers from the western suburbs and the city to downtown Minneapolis and back. The 29th Street/Nicollet tunnel alignment uses exclusive rail right-of-way, allowing higher speed and better travel time than other alignments using street right-of-way, without significant impacts on the neighborhoods and local street system of south Minneapolis.

2. Another major function of the line is to bring suburban residents and downtown workers to the smaller commercial nodes and activity areas within the southwest area of the city. A 29th Street alignment offers convenient access to the Hennepin/Lake, Lyndale/Lake, and Nicollet/Lake nodes.

Secondary Assumptions

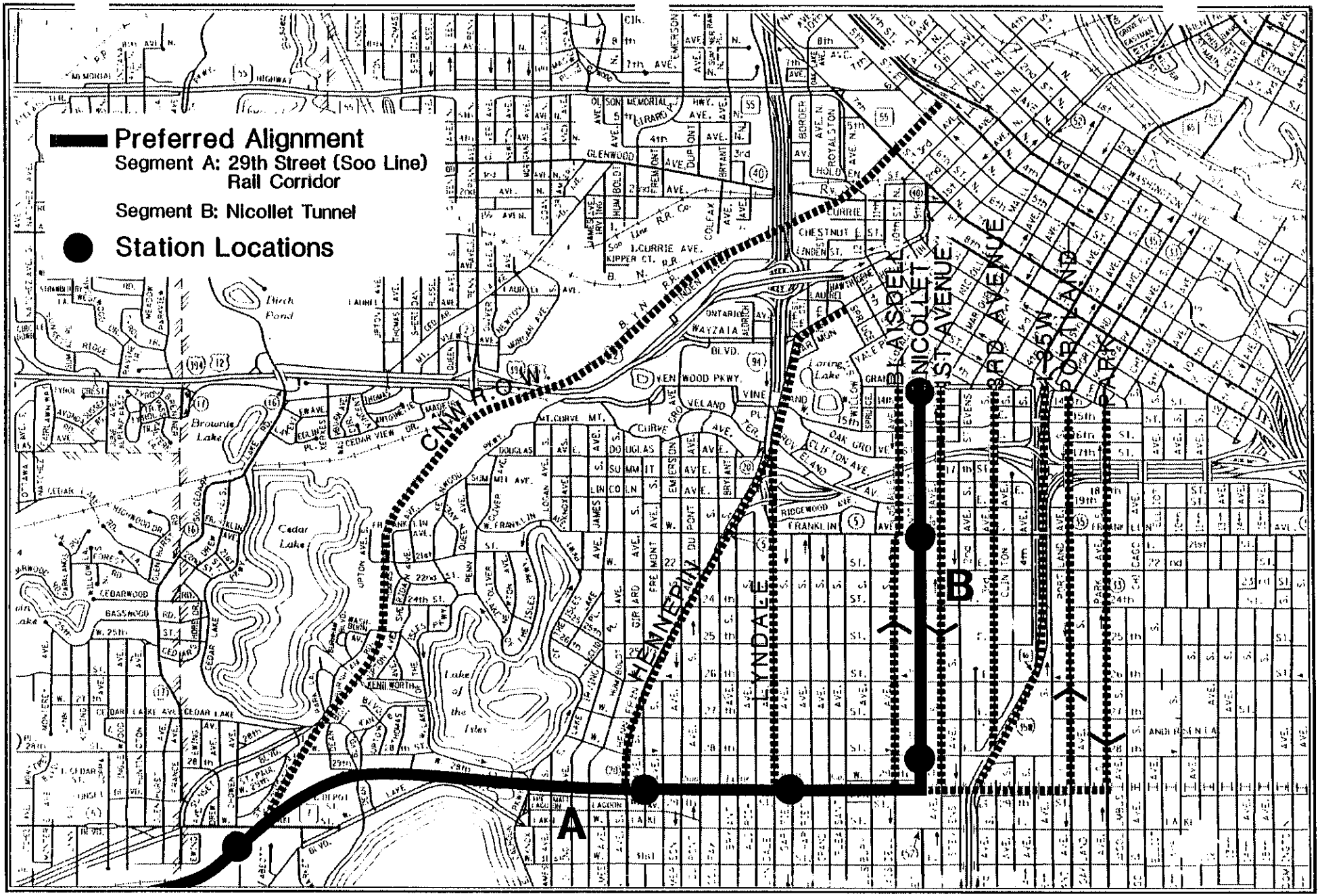
3. A secondary function of the corridor is to efficiently bring city residents to employment and activity centers in the suburbs. A 29th Street alignment provides access to LRT for more Minneapolis residents than the Chicago Northwestern alignment along the western edge of the city.

4. Another function of the southwest corridor is to efficiently bring suburban and city residents to downtown Minneapolis, where they will transfer to other lines of a regional LRT system to access other major employment and activity centers such as downtown St. Paul, the

University of Minnesota, and the airport. By using exclusive rail right-of-way, the 29th Street/Nicollet tunnel alternative allows higher speeds and better travel time for riders travelling longer distances, without significantly impacting Minneapolis neighborhoods and streets.

The Southwest Minneapolis Committee is cognizant of the higher capital cost of a tunnel alternative, but believes the issue of cost should be thoroughly analyzed to take into account the following factors:

- Reduced capital costs as evidenced by previous local tunnelling projects (MWCC sewers)
- Capability of a Nicollet tunnel to accommodate both southwest and south (I-35W) corridors
- Need for fewer trains underground
- Reduced operating costs underground
- Possible need for more expensive (low platform) cars above ground
- Possible eventual need for an underground system downtown



HCRRA
Hennepin County Regional Railroad Authority

Comprehensive LRT System Plan

BRW

Southwest Corridor
Minneapolis Segment

C-13

Alternative Alignments

HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY
COMPREHENSIVE LRT SYSTEM PLAN

SOUTHWEST SUBURBAN CORRIDOR ADVISORY COMMITTEE RECOMMENDATIONS

Approved by the Committee at its December 14, 1987, meeting.

- The Committee recommends the northerly alignment from downtown Minneapolis to Excelsior. The south alignment should also be included in the Southwest Corridor LRT System at least as far as Baker Road/I-494 at the earliest opportunity.

- The extension of any line through a residential area should be done with the utmost regard for the legitimate concerns of people whose property is affected.

- The Committee recommends the following for inclusion in the inventory of potential LRT station sites (see maps attached):

  Minneapolis City Limits to 9th Avenue (Hopkins)

  1. Beltline Boulevard/Ottawa Avenue, St. Louis Park
  2. Wooddale Avenue, St. Louis Park
  3. Louisiana Avenue, St. Louis Park
  4. Tyler Street at Excelsior Boulevard, Hopkins
  6. Excelsior Boulevard at 9th Avenue, Hopkins
  7. 9th Avenue, south of Main Street, Hopkins

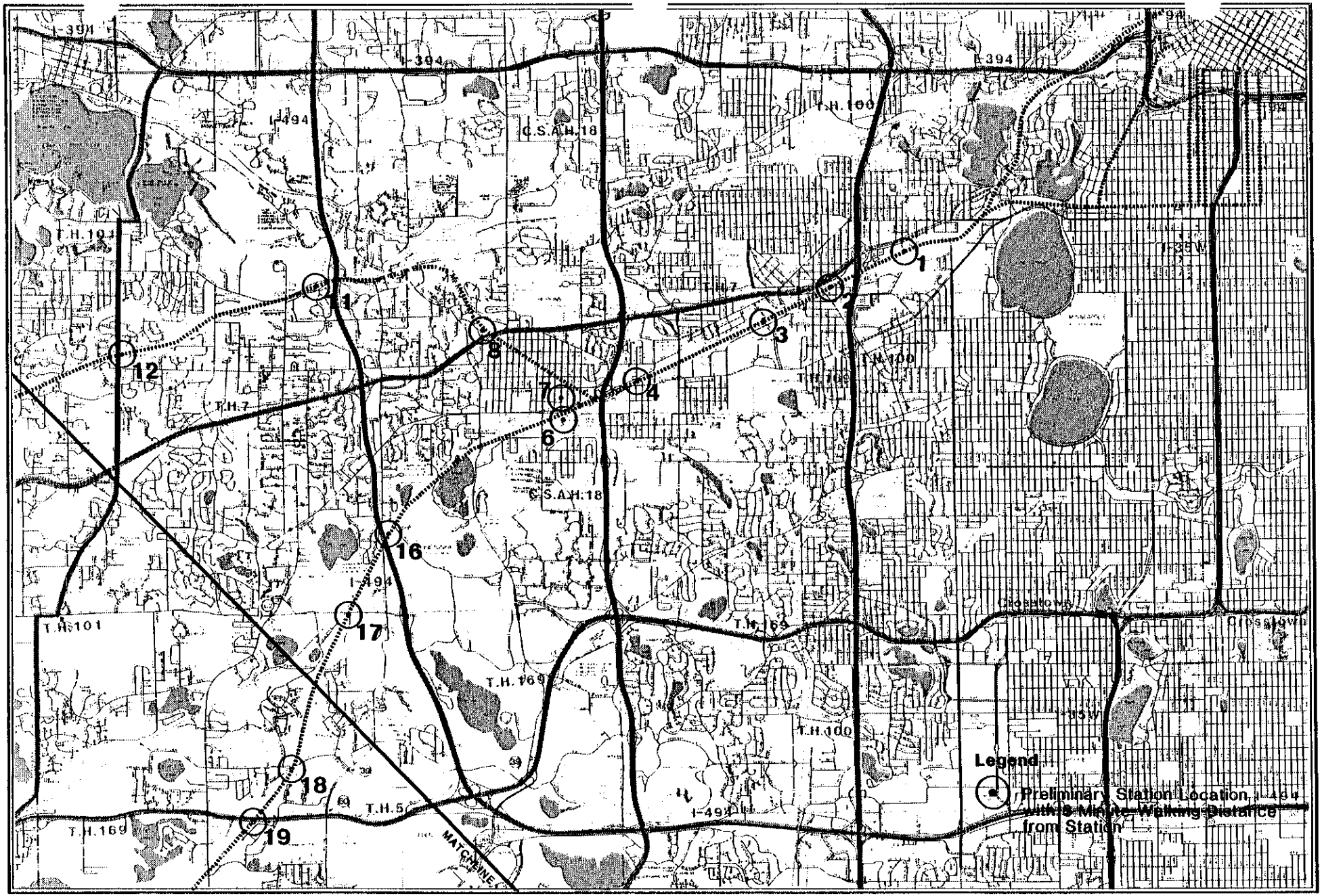
  North Alignment - 9th Avenue (Hopkins) to Excelsior

  8. Country Village Shopping Center, Minnetonka
  11. Williston Road, Minnetonka
  12 Highway 101, Minnetonka
  13. Deephaven City Hall, Deephaven
  14. Highway 7, south of Excelsior Boulevard, Excelsior
  15. Water Street, Excelsior

  South Alignment - 9th Avenue (Hopkins) to Eden Prairie

  16. Baker Road at I-494, Minnetonka
  17. County Road 62, Minnetonka/Eden Prairie
  18. Valley View Road, Eden Prairie
  19. Highway 5, Eden Prairie
  20. County Road 4 at proposed Highway 212, Eden Prairie

- The Southwest Suburban Committee encourages the Southwest Minneapolis Committee and the Hennepin County Regional Railroad Authority to recommend the most efficient and timely route through Minneapolis to Downtown.



HCRRA
Hennepin County Regional Railroad Authority

Comprehensive
LRT System Plan

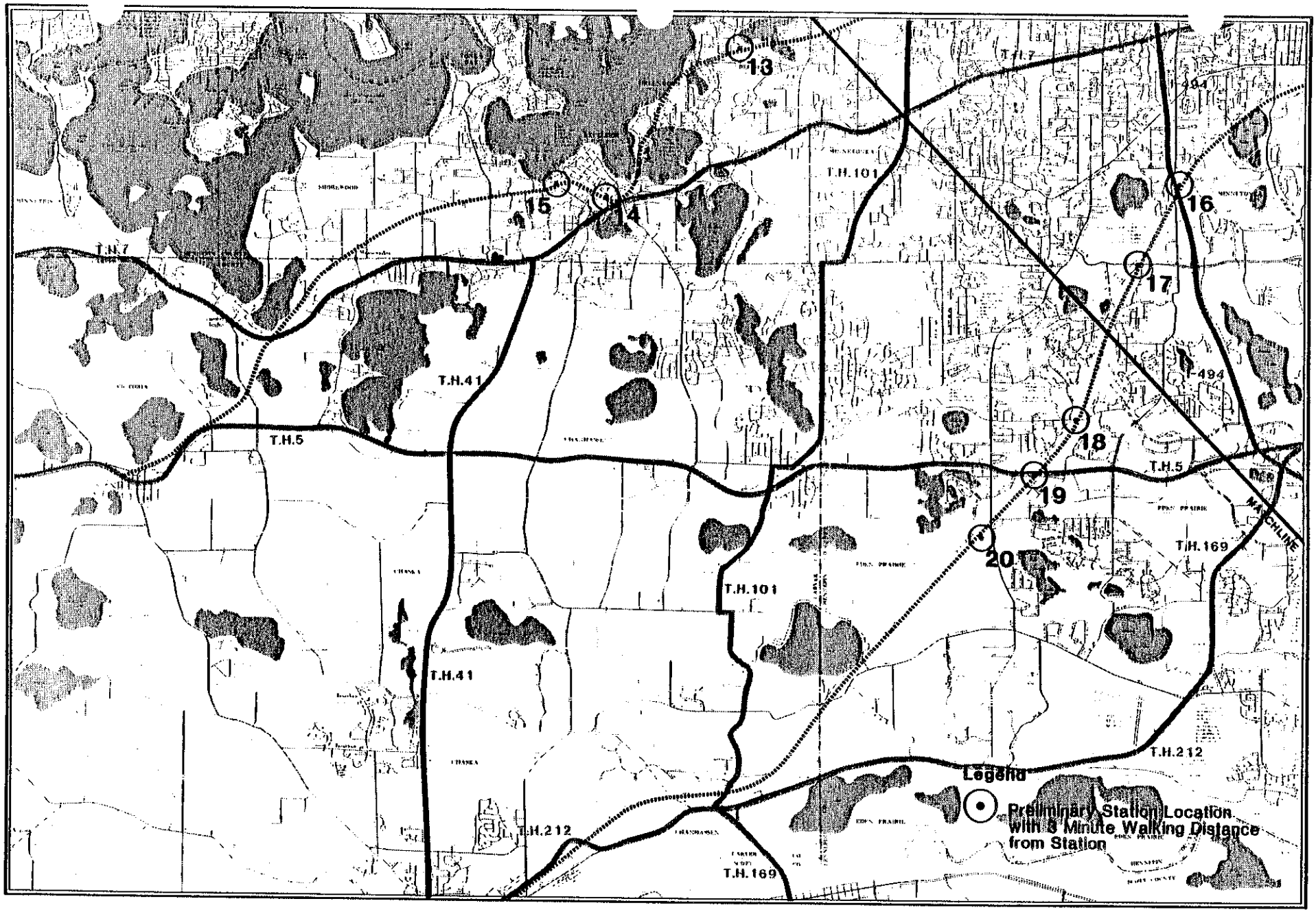
BRW

0 3,000 North

Southwest Corridor
East Suburban Segment

C-15

Preliminary Site Locations



HCRRA
Hennepin County Regional Railroad Authority

Comprehensive
LRT System Plan

HBRW

0 3,000 North

Southwest Corridor
West Suburban Segment
C-16

Preliminary Site Locations

February 16, 1988

HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY

SOUTH CORRIDOR ALIGNMENT

Process

The South Corridor Advisory Committee (SCAC) began meeting September 17, 1987. The SCAC is comprised of four representatives from Minneapolis, Richfield, and Bloomington respectively, and two representatives from Edina.

In October, the Hennepin County Regional Railroad Authority (HCRRA) decided to postpone the work of the SCAC. HCRRA wished to examine the results of a Minnesota Department of Transportation study of I-35W which was concurrently being conducted, prior to analysis of LRT in this corridor. However, upon further consideration, HCRRA felt it was critical to the integrity of the LRT Comprehensive Plan that the South Corridor be included in the proposals the county was to consider.

Therefore, on December 9, the SCAC reconvened to begin (almost) bi-weekly meetings, including a public meeting on Saturday, February 13. Its final corridor meeting was also on February 13, after the public meeting.

Work Program

The universe of alternatives the SCAC evaluated included:

- First-Blaisdell (to Crosstown)
- Nicollet Avenue
- Third Avenue (to 29th Street)
- I-35W
- Park-Portland (to Crosstown)
- Soo Railroad (south of Crosstown)

The South Corridor Advisory Committee voted on the relative importance they associated with each alignment evaluation criteria. For example: the SCAC clearly expressed a guiding principle to their evaluation by unanimously adopting a commuter transit philosophy. In addition, they were also concerned with, for example, the impact of LRT alternative alignments on street-traffic operations, congestion of I-35W, and adequacy of available right-of-way.

The work on this corridor required substantial coordination with the work being conducted on I-35W. This included sharing information and mutual understanding of assumptions, findings, and decisions to date.

Recommendations

At its final meeting on February 13, the SCAC voted on its South Corridor recommendations to Hennepin County. These included:

Preferred Alignment

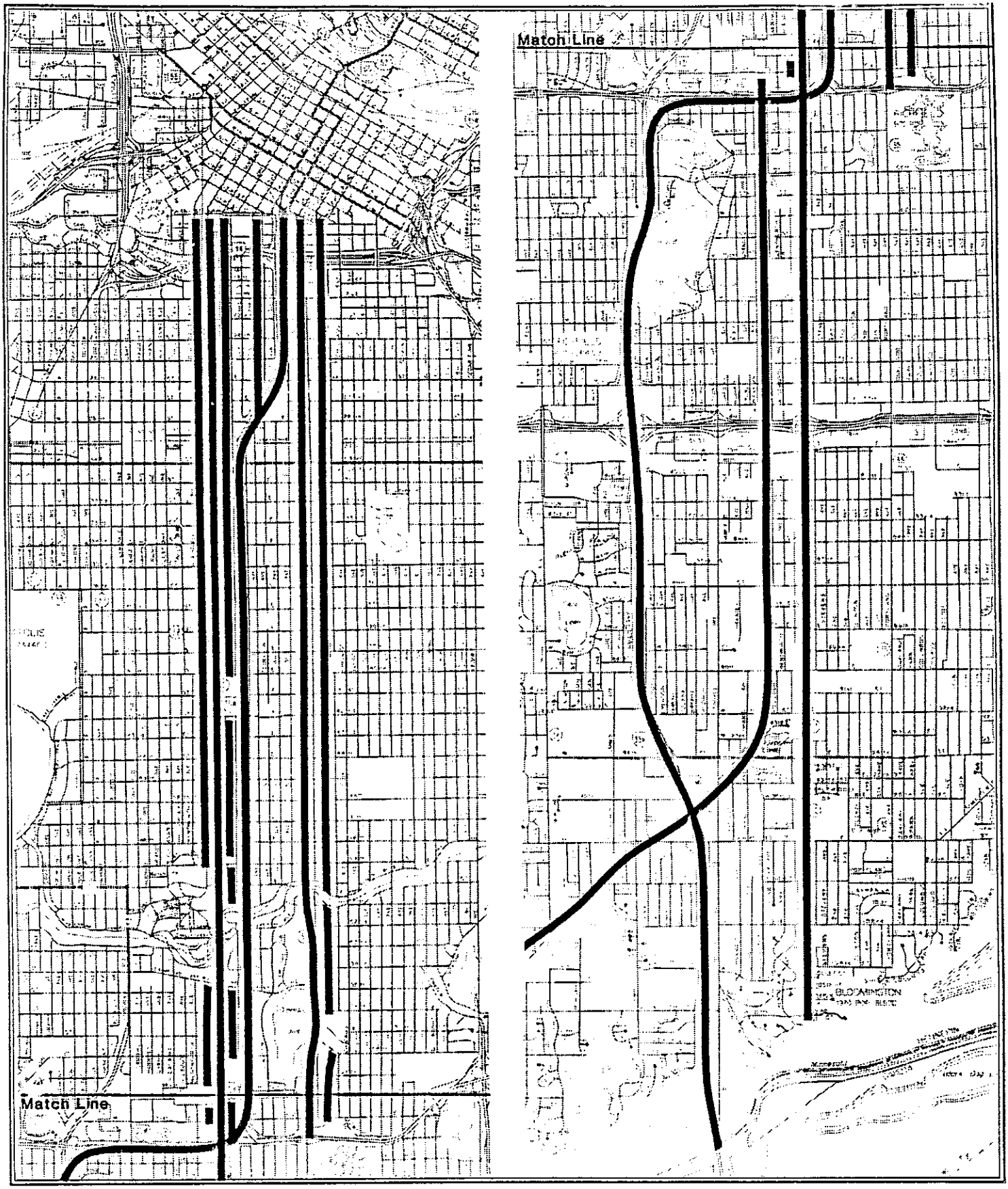
- o I-35W right-of-way (Side slope or median)
- o Terminus at 106th Street

Second Choice Alignment

- o I-35W right-of-way (to Crosstown area)/Soo Railroad (south of Crosstown)
- o Terminus at 110th/Normandale

The South Corridor Advisory Committee voted to adopt a station philosophy that supports the corridor's transit philosophy of "'high speed' but provides the greatest potential to promote ridership to relieve traffic congestion on I-35W, while minimizing interference with other transportation systems". The Committee passed a motion that this philosophy must be coupled with station location criteria such as access, available land, minimizing environmental impacts, and development opportunities.

The Committee chose not to identify specific station locations because of the unknown future nature of interchanges, right-of-way, and adjacent land uses along the I-35W corridor due to MnDOT's current study. The SCAC felt it would be unwise at this time to identify station locations based on desirable conditions that, in the future, may actually be significantly different.



HCRRA

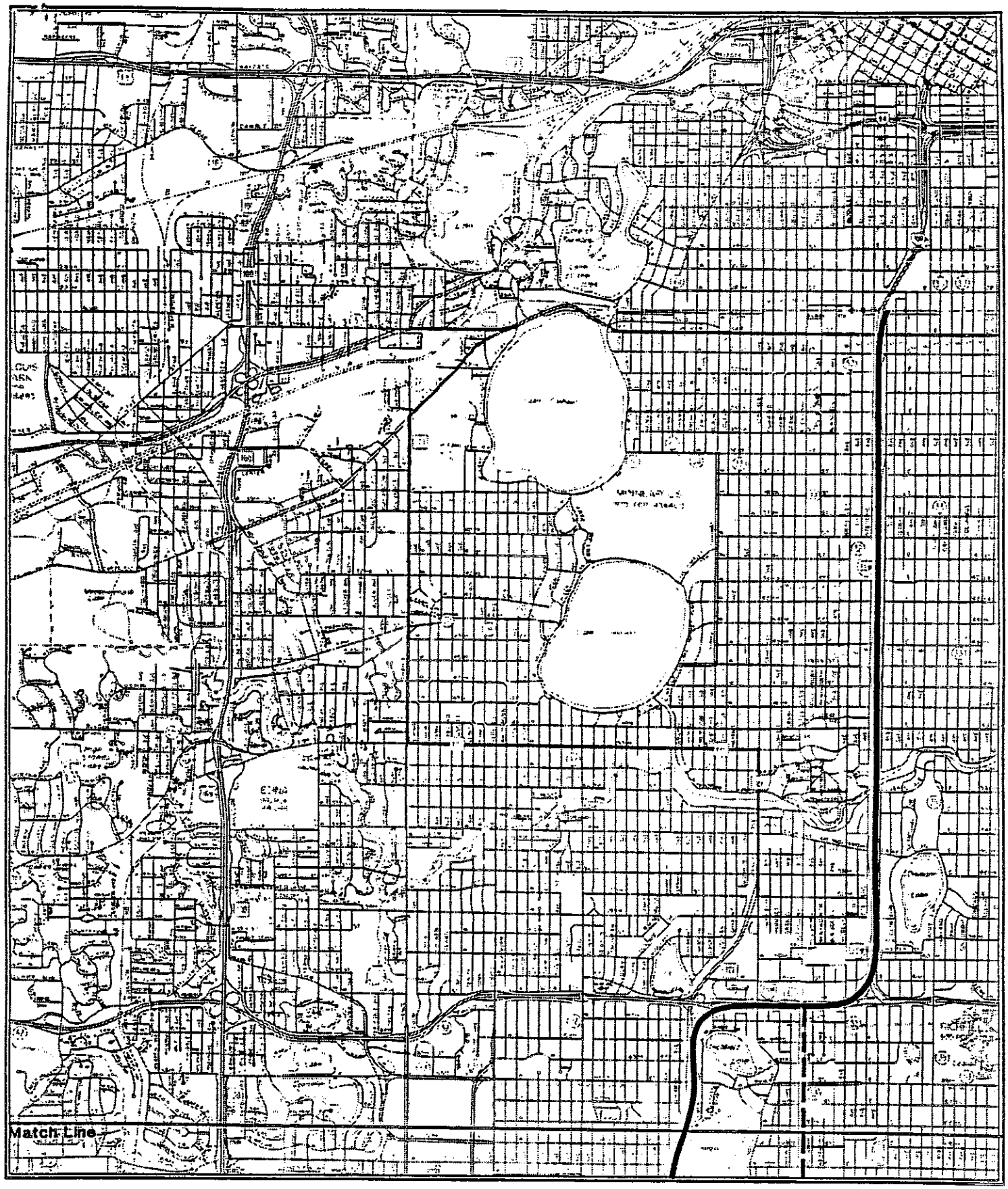
Comprehensive
LRT System Plan

BRW

0 2,000' North

South Corridor

Alternative
Alignments



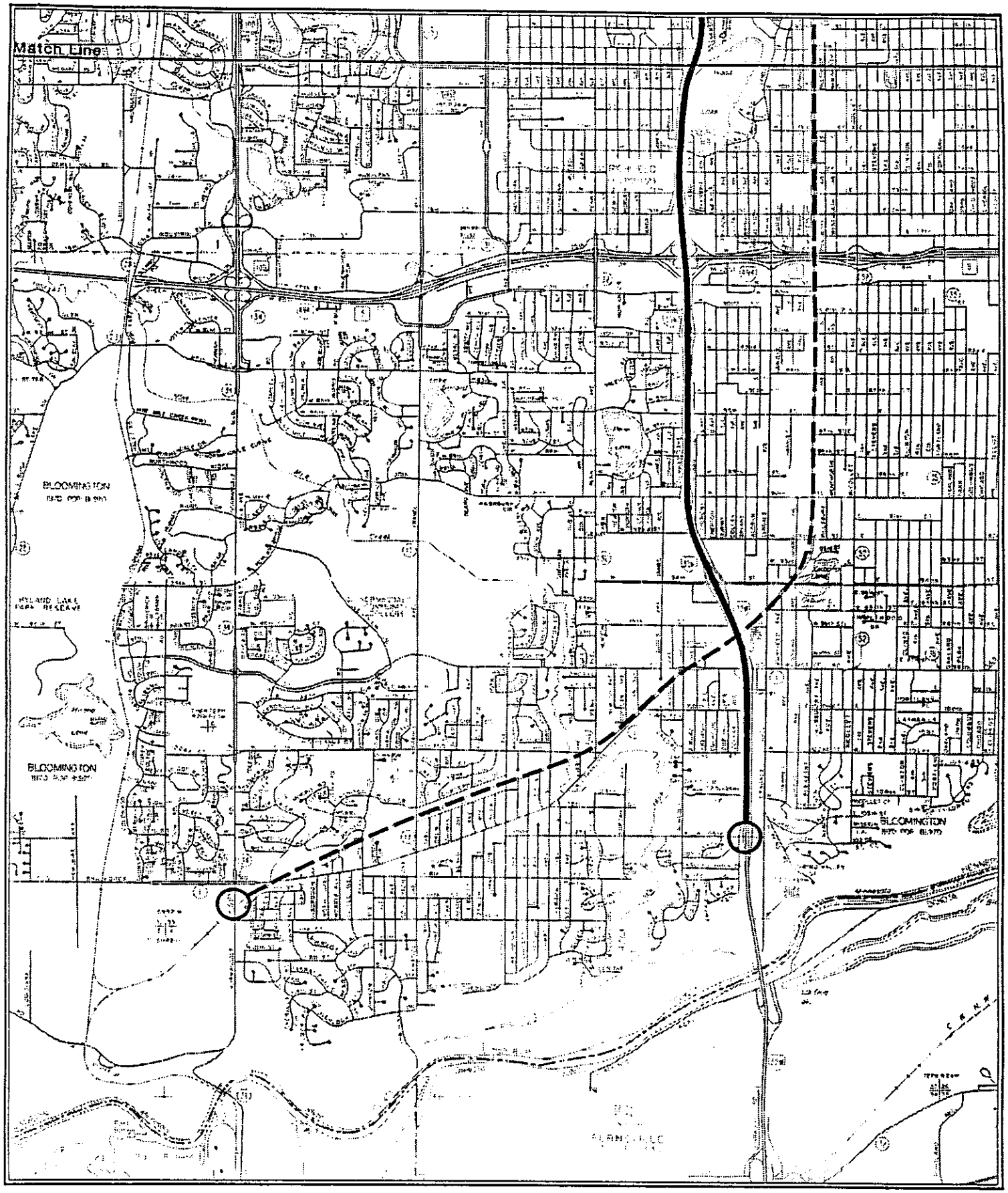
HCRRA

Comprehensive
LRT System Plan

BRW

South Corridor
North Segment

LRT Options



HCRRA

Comprehensive
LRT System Plan

BRW

0 2 000 North

South Corridor
South Segment

LRT Options

December 8, 1987

Hennepin County Regional Railroad Authority
Comprehensive Light Rail Transit System Plan

Report to the Hennepin County Regional Railroad Authority
by the Hiawatha Avenue Corridor Advisory Committee

BACKGROUND

The Hiawatha Avenue Corridor Advisory Committee is composed of residents and representatives of the City of Minneapolis, the City of Bloomington, the City of Richfield, the Metropolitan Sports Facilities Commission and the Metropolitan Airports Commission (membership list attached).

The Committee was charged with the task of making a recommendation to the Hennepin County Regional Railroad authority regarding the location and characteristics of the light rail transit line in the Hiawatha Avenue corridor.

PROCESS

The Committee met three times to review information prepared for this and previous studies of the Hiawatha Avenue corridor relative to light rail transit.

Representatives from each of the three geographic areas in the corridor were asked to state their preferences regarding alignment and other location issues.

Votes were taken regarding the contents of this recommendation. All votes were unanimous.

RECOMMENDATION

Alignment

The Hiawatha Avenue Corridor Advisory Committee recommends that the light rail transit line in the Hiawatha corridor be located:

- East side of Hiawatha Avenue, downtown Minneapolis to Lake Street
- West side of Hiawatha Avenue, Lake Street to 52nd Street
- Minnehaha Avenue, 52nd Street to GSA Building
- Through Airport via tunnel under runways, 70th Street and 34th Avenue
- Into Bloomington via 34th Avenue, 80th Street and 24th Avenue (Figure 1)

LRT Stops

Stops should be located at approximately one-half mile intervals as shown (Figure 1).

Park and Ride Lots

Major park and ride lots in the corridor should be located at or south of County Road 62 (Crosstown Highway).

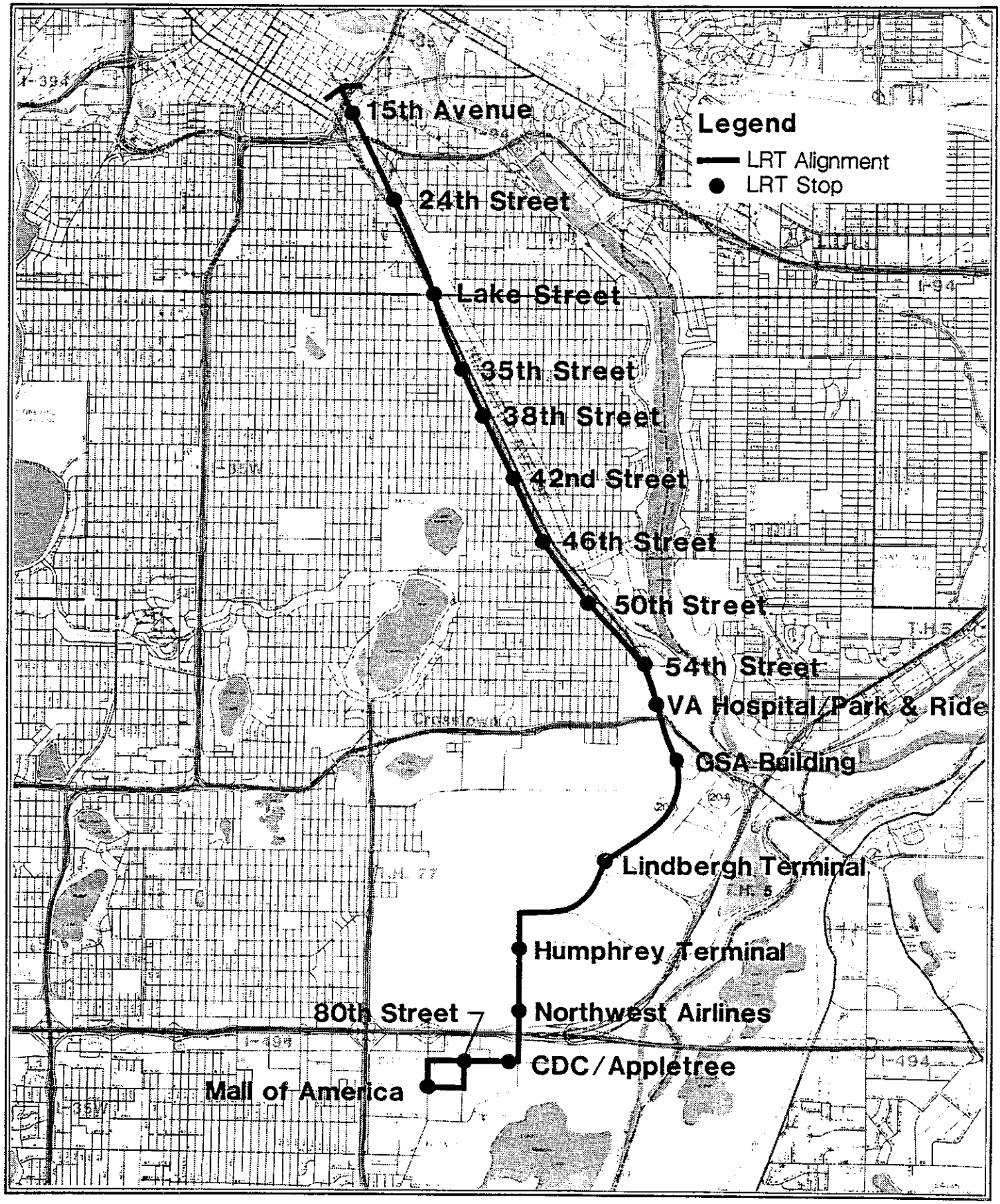
Feeder Bus Service

Feeder bus service should be provided. Feeder bus service in the area north of County Road 62 should serve the area between Cedar Avenue and the Mississippi River with a maximum walk distance of one-fourth mile. The area south of County Road 62 should have feeder bus service to a station or stations near the south end of the LRT line.

Development Potential and Patronage Forecasts

The Hiawatha Avenue Corridor Advisory Committee feels strongly that the patronage forecast prepared for the Hiawatha Avenue LRT line in the Metropolitan Council's Long Range Transit Analysis (LRTA) (December, 1986) does not reflect the true patronage potential in the Hiawatha corridor. The Committee feels that the LRTA forecasts need significant adjustment in three areas:

- LRT patronage generated by airport employees and air passengers.
- LRT patronage generated by development induced in the corridor by LRT. Analysis prepared for the Hiawatha Avenue Location and Design Study suggests that induced development would generate an additional 6,000 daily LRT trips in the corridor.
- LRT patronage generated in the Bloomington area of the corridor by development beyond that assumed in any of the patronage forecasts prepared to date. The principle modification of development forecasts relates to the Metropolitan Stadium site, which is proposed to include million square feet of retail space, one million square feet of amusement space and 700 thousand square feet of office space.



HCRRA

Hennepin County Regional Railroad Authority

Comprehensive LRT System Plan

Hiawatha Corridor

Corridor Advisory Committee Recomendation

January 5, 1988

RECOMMENDATION OF THE UNIVERSITY CONNECTOR ADVISORY COMMITTEE

The University Connector Advisory Committee recommends that the University Connector LRT line be located in the vicinity of the Washington Avenue alignment and extend to Oak Street. The committee has a strong preference for an underground alignment, where practical, that would maintain the existing capacity of Washington Avenue for general traffic and minimize conflicts with pedestrians, bicycles and other transit vehicles.

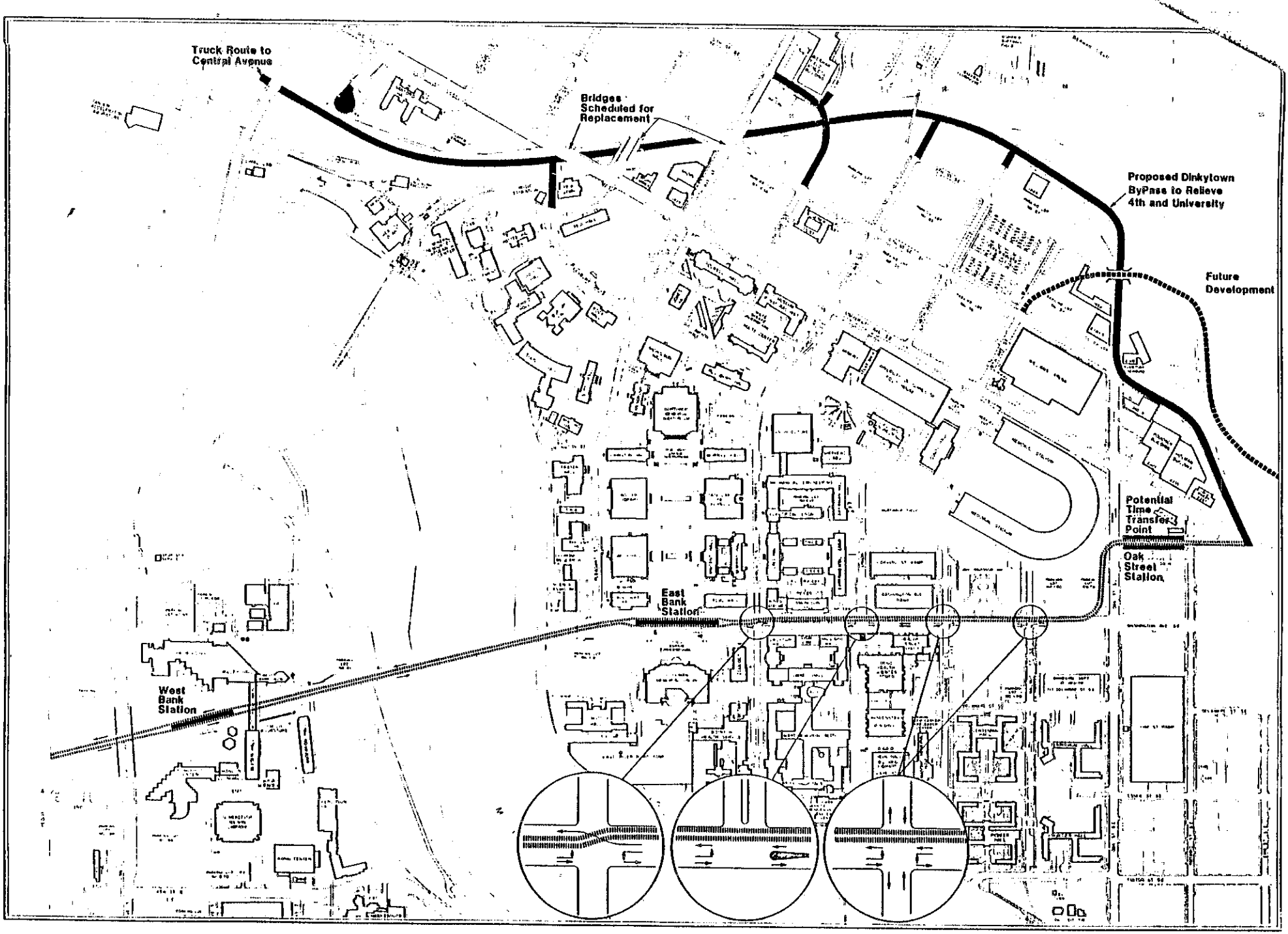
A subway which would maintain the existing capacity of Washington Avenue is recommended to avoid the traffic impacts on the nearby Marcy-Holmes and Motley-Prospect Park neighborhoods and on the Stadium Village businesses. It is expected that if the capacity of Washington Avenue is reduced to accommodate an at-grade LRT line, traffic will be diverted from Washington Avenue onto streets that were either not designed to carry more traffic, such as East River Road, Fulton Avenue, and Franklin Avenue, or do not have sufficient capacity to handle more traffic, such as 4th and University.

The committee would accept an at-grade alignment on Washington Avenue but strongly believes that a plan to divert traffic off Washington Avenue should be part of the implementation of this alignment. A suggested bypass route would involve construction of the Motley bypass to University Avenue, and a northern traffic bypass roughly following rail tracks north of campus, through Dinkytown and along 2nd Street SE, diverting traffic off 4th and University. The Marcy-Holmes neighborhood fully supports the need to minimize traffic on 4th Street and University Avenue, but is uncertain of the suggested bypass until more specific information is available. Pending further information, Marcy Holmes still prefers the northern LRT alignment through Dinkytown and across Bridge #9. The remaining neighborhoods believe that the at-grade LRT on Washington Avenue should be contingent upon construction of the bypass. The University strongly supports the bypass but would not make the LRT contingent upon its construction.

Stations are recommended on the University of Minnesota West Bank campus near 19th Avenue, on the University of Minnesota East Bank campus near Church Street, and at Oak Street. The committee recommends that a good feeder bus service incorporating a bus to LRT and bus-to-bus time transfer at the Oak Street station be implemented with the implementation of a University LRT connector.

An LRT alignment in the vicinity of the Washington Avenue alignment is recommended because it provides the most direct service to the centroids of activity on the Minneapolis West Bank and East Bank campuses of the University of Minnesota and to the University of Minnesota Hospital. The centroid of students, faculty and visitors on the West Bank campus is located near Blegen Hall, and on the East Bank campus is located in the northeast corner of the Washington Avenue and Church Street intersection.

It is recommended that the line extend to Oak Street and a good feeder bus service with a time transfer station at Oak Street be implemented in order to better demonstrate the benefits of light rail service. Terminating the eastern end of the line at Oak Street permits the extension of the line to St. Paul along University Avenue or along any of the railroad corridors being considered by Ramsey County.



HCRRA

Comprehensive BRW

University Connector

C-26

Final Draft

LAND USE GUIDELINES FOR LIGHT RAIL TRANSIT

1. Overall Planning Guidelines

- The LRT Plan is designed to provide transit cervice in various corridor areas within the Metropolitan area for the next 20 years. As such, local comprehensive plans that were prepared under the Land Planning Act will need to be amended to reflect the location and timing of LRT improvements.

- All local comprehensive plans should depict planned and potential LRT routes. However, it shall be the discretion of the local jurisdiction to amend the land use element of comprehensive plans for properties adjacent to planned or potential LRT routes.

- Local jurisdictions should assess the potential of the LRT routes to impact local transportation policies of comprehensive plans. At a minimum, local jurisdictions should review their ability to encourage utilization of the LRT routes through the development review process.

- Local government units should review their ordinance and official maps to ensure consistency with the LRT locations.

- Local government units should review their regulatory authority to plan private and public improvements that encourage the use of LRT.

2. LRT Coordination

- All local government units and counties affected by LRT should submit amendments to comprehensive plans reflecting LRT for Metropolitan Council review and approval. The Metropolitan Council should ultimately be responsible for coordinating overall LRT planning throughout the region.

- Other regional and state transportation agencies such as the Minnesota Department of Transportation, the Regional Transit Board and the Metropolitan Transit Commission should reflect the provision of LRT in future planning, where appropriate.

- Development proposals which have the potential to impact the LRT corridor and/or station and located adjacent to a line or within 1/4 mile of station should be submitted to the LRT Railroad Authority for review. However, local government units shall have the final authority to approve or disapprove development plans.

- Planning for the station and stop locations shall be jointly reviewed by the railroad authority and local government unit.

3. Land Use Related Financing

- The basic LRT system including standard stations should be paid for out of broader, area wide revenues. Properties that may be construed to be benefitted by a station should not be assessed for any part of the basic system.

- Local governments may finance architectural and site planning enhancements to stations through local land use controls and revenues. These techniques may include tax increment financing or benefit assessment as determined by the local government.

- The local governments should plan for preservation of right of way for LRT and station development for Phase I or that for which financing has been approved by the Railroad Authority, County or State.

RECOMMENDATIONS BY THE FINANCE ADVISORY COMMITTEE

I. Assuming the variables contained in the attached Exhibit, and assuming that approximately $375.0 million is needed for the initial phase, the Committee makes the following recommendations:

A. That the Authority levy and collect a property tax of 1 mill.

B. That the term of any debt not exceed 25 years.

C. That the following four revenues be used first to pay for the system.

1. Property Tax
2. Tax Increment
3. A Surtax on Motor Vehicle Registration Fees
4. Motor Vehicle Excise Taxes

D. That the following four revenues be made available for the first or additional phases of the system.

1. A share of Hennepin County's contribution to Fiscal Disparities.
2. A share of Gasoline Taxes.
3. Assessments paid by the property owner based on added benefits.
4. A Transit Impact Fee for new development only.

II. If the Authority issues the debt, it should secure the highest possible bond rating. If it is necessary to pledge additional millage to secure this rating, the Authority should seek Legislative approval to allow such a pledge.

LIGHT RAIL TRANSIT
REVENUE/DEBT ANALYSIS
PROPERTY TAX AT 1.0 MILL
10.0% REGISTRATION SURTAX
MVET: 30% OF METRO - 30% TO DOT
TAX INCREMENT FINANCING/5.0 M - 75.0 M

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
			MVET			33,047,465	47,381,254	75,728,495	102,516,299	67,438,647	48,586,840	TOTAL
	PROP. TAX	REGISTRATION	30% METRO	T.I.F.	AVAILABLE	DEBT OF	DEBT OF	DEBT OF	DEBT OF	DEBT OF	DEBT OF	DEBT
DATE	1 MILL	SURTAX	30% DOT	5.0M-75.0M	REVENUE	1989	1990	1991	1992	1993	1994	SERVICE
1989	9,611,030	4,900,000	4,177,800	0	18,688,830	18,688,830						18,688,830
1990	9,995,471	4,998,000	4,261,356	0	19,254,827	962,741	18,292,086					19,254,827
1991	10,395,290	5,097,960	4,346,583	0	19,839,833	991,992	1,983,983	16,863,858				19,839,833
1992	10,811,102	5,199,919	4,433,515	0	20,444,536	1,022,227	2,044,454	4,088,907	13,288,948			20,444,536
1993	11,243,546	5,303,918	4,522,185	230,050	21,299,698	1,064,985	2,129,970	4,259,940	6,389,910	7,454,894		21,299,698
1994	11,693,288	5,409,996	4,612,629	469,302	22,185,214	1,109,261	2,218,521	4,437,043	6,655,564	4,437,043	3,327,782	22,185,214
1995	12,161,019	5,518,196	4,704,881	708,922	23,093,018	1,154,651	2,309,302	4,618,604	6,927,905	4,618,604	3,463,953	23,093,018
1996	12,647,460	5,628,560	4,798,979	948,557	24,023,556	1,201,178	2,402,356	4,804,711	7,207,067	4,804,711	3,603,533	24,023,556
1997	13,153,358	5,741,131	4,894,959	1,188,192	24,977,640	1,248,882	2,497,764	4,995,528	7,493,292	4,995,528	3,746,646	24,977,640
1998	13,679,493	5,855,954	4,992,858	1,542,853	26,071,157	1,303,558	2,607,116	5,214,231	7,821,347	5,214,231	3,910,674	26,071,157
1999	14,226,672	5,973,073	5,092,715	1,902,114	27,194,574	1,359,729	2,719,457	5,438,915	8,158,372	5,438,915	4,079,186	27,194,574
2000	14,795,739	6,092,534	5,194,569	2,261,560	28,344,402	1,417,220	2,834,440	5,668,880	8,503,321	5,668,880	4,251,660	28,344,402
2001	15,387,569	6,214,385	5,298,461	2,621,012	29,521,426	1,476,071	2,952,143	5,904,285	8,856,428	5,904,285	4,428,214	29,521,426
2002	16,003,071	6,338,672	5,404,430	2,980,465	30,726,639	1,536,332	3,072,664	6,145,328	9,217,992	6,145,328	4,608,996	30,726,639
2003	16,643,194	6,465,446	5,512,518	3,109,869	31,731,028	1,586,551	3,173,103	6,346,206	9,519,308	6,346,206	4,759,654	31,731,028
2004	17,308,922	6,594,755	5,622,769	3,230,070	32,756,516	1,637,826	3,275,652	6,551,303	9,826,955	6,551,303	4,913,477	32,756,516
2005	18,001,279	6,726,650	5,735,224	3,349,903	33,813,056	1,690,653	3,381,306	6,762,611	10,143,917	6,762,611	5,071,958	33,813,056
2006	18,721,330	6,861,183	5,849,929	3,469,721	34,902,163	1,745,108	3,490,216	6,980,433	10,470,649	6,980,433	5,235,324	34,902,163
2007	19,470,183	6,998,407	5,966,927	3,589,539	36,025,056	1,801,253	3,602,506	7,205,011	10,807,517	7,205,011	5,403,758	36,025,056
2008	20,248,991	7,138,375	6,086,266	3,733,120	37,206,751	1,860,338	3,720,675	7,441,350	11,162,025	7,441,350	5,581,013	37,206,751
2009	21,058,950	7,281,142	6,207,991	3,882,445	38,430,529	1,921,526	3,843,053	7,686,106	11,529,159	7,686,106	5,764,579	38,430,529
2010	21,901,308	7,426,765	6,332,151	4,037,743	39,697,967	1,984,898	3,969,797	7,939,593	11,909,390	7,939,593	5,954,695	39,697,967
2011	22,777,361	7,575,300	6,458,794	4,199,253	41,010,708	2,050,535	4,101,071	8,202,142	12,303,212	8,202,142	6,151,606	41,010,708
2012	23,688,455	7,726,806	6,587,970	4,367,223	42,370,454	2,118,523	4,237,045	8,474,091	12,711,136	8,474,091	6,355,568	42,370,454
2013	24,635,993	7,881,343	6,719,729	4,541,912	43,778,977	2,188,949	4,377,898	8,755,795	13,133,693	8,755,795	6,566,847	43,778,977
2014	25,621,433	8,038,969	6,854,124	4,723,588	45,238,114	2,261,906	4,523,811	9,047,623	13,571,434	9,047,623	6,785,717	45,238,114
	425,881,507	164,987,438	140,670,310	61,087,413	792,626,668	57,385,722	93,760,387	163,832,494	227,608,541	146,074,683	103,964,842	792,626,668

Debt = 374,698,999
Coupon = 8.0%
Property Tax Inflation = 4.0%
Registration Surtax = 700,000 Vehicles @ $70 Each
Registration Surtax Inflation = 2.0%
MVET Estimate = $232,100,000
MVET Inflation = 2.0%
Tax Increment Estimated Annual Market Value
1989-92 0.0 M
1993-97 5.0 M
1998-02 7.5 M
2003-12 2.0 M
Total 75.0 M
Tax Increment Inflation = 4.0%

Prepared By Miller & Schroeder: 1-24-88
(pvdebt3)

EXHIBIT I

TAXABLE ASSESSED VALUATIONS

HISTORICAL & CURRENT

Tax Year Payable	Hennepin County Taxable Assessed Value *	Amount Raised By 1 Mill Levy	Annual Percentage Increase
1976	3,926,649,099	3,926,649	
1977	4,231,476,914	4,231,477	7.76%
1978	4,311,609,345	4,311,609	1.89%
1979	4,543,027,684	4,543,028	5.37%
1980	5,002,342,430	5,002,342	10.11%
1981	5,986,796,000	5,986,796	19.68%
1982	6,745,391,395	6,745,391	12.67%
1983	7,499,378,285	7,499,378	11.18%
1984	7,643,276,213	7,643,276	1.92%
1985	8,044,844,074	8,044,844	5.25%
1986	8,393,903,850	8,393,904	4.34%
1987	8,828,563,103	8,828,563	5.18%
1988	9,241,375,000	9,241,375	4.68%

Average Annual Percentage Increase: 7.50%

* Adjusted for fiscal disparities and captured tax increment values.

Prepared by Miller & Schroeder
(avl)

EXHIBIT II

TAXABLE ASSESSED VALUATIONS

SCENARIO A			SCENARIO B			SCENARIO C			SCENARIO D		
Projected @ 4.0% Average Annual Increase			Projected @ 2.5% Average Annual Increase			Projected @ 5.0% Average Annual Increase			Projected @ 7.5% Average Annual Increase		
Tax Year Payable	Taxable Assessed Value	Raised By 1 Mill	Tax Year Payable	Taxable Assessed Value	Raised By 1 Mill	Tax Year Payable	Taxable Assessed Value	Raised By 1 Mill	Tax Year Payable	Taxable Assessed Value	Raised By 1 Mill
1989	9,611,030,000	9,611,030	1989	9,472,409,375	9,472,409	1989	9,703,443,750	9,703,444	1989	9,934,478,125	9,934,478
1990	9,995,471,200	9,995,471	1990	9,709,219,609	9,709,220	1990	10,188,615,937	10,188,616	1990	10,679,563,984	10,679,564
1991	10,395,290,048	10,395,290	1991	9,951,950,100	9,951,950	1991	10,698,046,734	10,698,047	1991	11,480,531,283	11,480,531
1992	10,811,101,650	10,811,102	1992	10,200,748,852	10,200,749	1992	11,232,949,071	11,232,949	1992	12,341,571,129	12,341,571
1993	11,243,545,716	11,243,546	1993	10,455,767,573	10,455,768	1993	11,794,596,525	11,794,597	1993	13,267,188,964	13,267,189
1994	11,693,287,545	11,693,288	1994	10,717,161,763	10,717,162	1994	12,384,326,351	12,384,326	1994	14,262,228,136	14,262,228
1995	12,161,019,046	12,161,019	1995	10,985,090,807	10,985,091	1995	13,003,542,668	13,003,543	1995	15,331,895,247	15,331,895
1996	12,647,459,808	12,647,460	1996	11,259,718,077	11,259,718	1996	13,653,719,802	13,653,720	1996	16,481,787,390	16,481,787
1997	13,153,358,201	13,153,358	1997	11,541,211,029	11,541,211	1997	14,336,405,792	14,336,406	1997	17,717,921,444	17,717,921
1998	13,679,492,529	13,679,493	1998	11,829,741,305	11,829,741	1998	15,053,226,082	15,053,226	1998	19,046,765,553	19,046,766
1999	14,226,672,230	14,226,672	1999	12,125,484,837	12,125,485	1999	15,805,887,386	15,805,887	1999	20,475,272,969	20,475,273
2000	14,795,739,119	14,795,739	2000	12,428,621,958	12,428,622	2000	16,596,181,755	16,596,182	2000	22,010,918,442	22,010,918
2001	15,387,568,684	15,387,569	2001	12,739,337,507	12,739,338	2001	17,425,990,843	17,425,991	2001	23,661,737,325	23,661,737
2002	16,003,071,431	16,003,071	2002	13,057,820,945	13,057,821	2002	18,297,290,385	18,297,290	2002	25,436,367,624	25,436,368
2003	16,643,194,288	16,643,194	2003	13,384,266,468	13,384,266	2003	19,212,154,904	19,212,155	2003	27,344,095,196	27,344,095
2004	17,308,922,060	17,308,922	2004	13,718,873,130	13,718,873	2004	20,172,762,649	20,172,763	2004	29,394,902,336	29,394,902
2005	18,001,278,942	18,001,279	2005	14,061,844,958	14,061,845	2005	21,181,400,782	21,181,401	2005	31,599,520,011	31,599,520
2006	18,721,330,100	18,721,330	2006	14,413,391,082	14,413,391	2006	22,240,470,821	22,240,471	2006	33,969,484,012	33,969,484
2007	19,470,183,304	19,470,183	2007	14,773,725,859	14,773,726	2007	23,352,494,362	23,352,494	2007	36,517,195,313	36,517,195
2008	20,248,990,636	20,248,991	2008	15,143,069,006	15,143,069	2008	24,520,119,080	24,520,119	2008	39,255,984,961	39,255,985
2009	21,058,950,261	21,058,950	2009	15,521,645,731	15,521,646	2009	25,746,125,034	25,746,125	2009	42,200,183,834	42,200,184
2010	21,901,308,272	21,901,308	2010	15,909,686,874	15,909,687	2010	27,033,431,286	27,033,431	2010	45,365,197,621	45,365,198
2011	22,777,360,603	22,777,361	2011	16,307,429,046	16,307,429	2011	28,385,102,850	28,385,103	2011	48,767,587,443	48,767,587
2012	23,688,455,027	23,688,455	2012	16,715,114,772	16,715,115	2012	29,804,357,992	29,804,358	2012	52,425,156,501	52,425,157
2013	24,635,993,228	24,635,993	2013	17,132,992,642	17,132,993	2013	31,294,575,892	31,294,576	2013	56,357,043,238	56,357,043
2014	25,621,432,957	25,621,433	2014	17,561,317,458	17,561,317	2014	32,859,304,687	32,859,305	2014	60,583,821,481	60,583,821
Total:	425,881,506,882	425,881,507	Total:	341,117,640,765	341,117,641	Total:	495,976,523,418	495,976,523	Total:	735,908,399,566	735,908,400

Prepared by Miller & Schroeder
(av2)

EXHIBIT III

TAX INCREMENT FINANCING

DATE	SCENARIO A 5.0 M-75.0 M	SCENARIO B 10.0 M-150.0 M
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	230,050	460,100
1994	469,302	938,604
1995	708,922	1,417,844
1996	948,557	1,897,114
1997	1,188,192	2,376,385
1998	1,542,853	3,085,705
1999	1,902,114	3,804,228
2000	2,261,560	4,523,119
2001	2,621,012	5,242,025
2002	2,980,465	5,960,931
2003	3,109,869	6,219,737
2004	3,230,070	6,460,139
2005	3,349,903	6,699,806
2006	3,469,721	6,939,442
2007	3,589,539	7,179,078
2008	3,733,120	7,466,241
2009	3,882,445	7,764,890
2010	4,037,743	8,075,486
2011	4,199,253	8,398,505
2012	4,367,223	8,734,446
2013	4,541,912	9,083,824
2014	4,723,588	9,447,176
	61,087,413	122,174,826

Inflated 4.0% annually
107.0 mill rate
Added market value annually

1989-92	0.0 M	0.0 M
1993-97	5.0 M	10.0 M
1998-02	7.5 M	15.0 M
2003-12	2.5 M	5.0 M
2013-14	0.0 M	0.0 M
Total:	75.0 M	150.0 M

Prepared by Miller & Schroeder
(tif)

EXHIBIT IV

MOTOR VEHICLE REGISTRATION SURTAX

DATE	SCENARIO A 5.0%	SCENARIO B 10.0%	SCENARIO C 15.0%
1989	2,450,000	4,900,000	7,350,000
1990	2,499,000	4,998,000	7,497,000
1991	2,548,980	5,097,960	7,646,940
1992	2,599,960	5,199,919	7,799,879
1993	2,651,959	5,303,918	7,955,876
1994	2,704,998	5,409,996	8,114,994
1995	2,759,098	5,518,196	8,277,294
1996	2,814,280	5,628,560	8,442,840
1997	2,870,565	5,741,131	8,611,696
1998	2,927,977	5,855,954	8,783,930
1999	2,986,536	5,973,073	8,959,609
2000	3,046,267	6,092,534	9,138,801
2001	3,107,192	6,214,385	9,321,577
2002	3,169,336	6,338,672	9,508,009
2003	3,232,723	6,465,446	9,698,169
2004	3,297,377	6,594,755	9,892,132
2005	3,363,325	6,726,650	10,089,975
2006	3,430,591	6,861,183	10,291,774
2007	3,499,203	6,998,407	10,497,610
2008	3,569,187	7,138,375	10,707,562
2009	3,640,571	7,281,142	10,921,713
2010	3,713,383	7,426,765	11,140,148
2011	3,787,650	7,575,300	11,362,951
2012	3,863,403	7,726,806	11,590,210
2013	3,940,671	7,881,343	11,822,014
2014	4,019,485	8,038,969	12,058,454
	82,493,719	164,987,438	247,481,157

Inflated 2.0% annually
700,000 vehicles @ $70

Prepared by Miller & Schroeder
(surtax)

EXHIBIT V

MOTOR VEHICLE EXCISE TAX
30% OF METRO SHARE

DATE	SCENARIO A 30% to DOT	SCENARIO B 40% to DOT	SCENARIO C 50% to DOT
1989	4,177,800	5,570,400	6,963,000
1990	4,261,356	5,681,808	7,102,260
1991	4,346,583	5,795,444	7,244,305
1992	4,433,515	5,911,353	7,389,191
1993	4,522,185	6,029,580	7,536,975
1994	4,612,629	6,150,172	7,687,715
1995	4,704,881	6,273,175	7,841,469
1996	4,798,979	6,398,639	7,998,298
1997	4,894,959	6,526,611	8,158,264
1998	4,992,858	6,657,144	8,321,430
1999	5,092,715	6,790,287	8,487,858
2000	5,194,569	6,926,092	8,657,615
2001	5,298,461	7,064,614	8,830,768
2002	5,404,430	7,205,906	9,007,383
2003	5,512,518	7,350,025	9,187,531
2004	5,622,769	7,497,025	9,371,281
2005	5,735,224	7,646,965	9,558,707
2006	5,849,929	7,799,905	9,749,881
2007	5,966,927	7,955,903	9,944,879
2008	6,086,266	8,115,021	10,143,776
2009	6,207,991	8,277,321	10,346,652
2010	6,332,151	8,442,868	10,553,585
2011	6,458,794	8,611,725	10,764,656
2012	6,587,970	8,783,960	10,979,950
2013	6,719,729	8,959,639	11,199,549
2014	6,854,124	9,138,832	11,423,540
	140,670,310	187,560,413	234,450,517

Inflated 2.0% annually
1988 Estimate - $232,100,000

Prepared by Miller & Schroeder
(mvet)

Proposed use of M.V.E.T. for HCRRA LRT