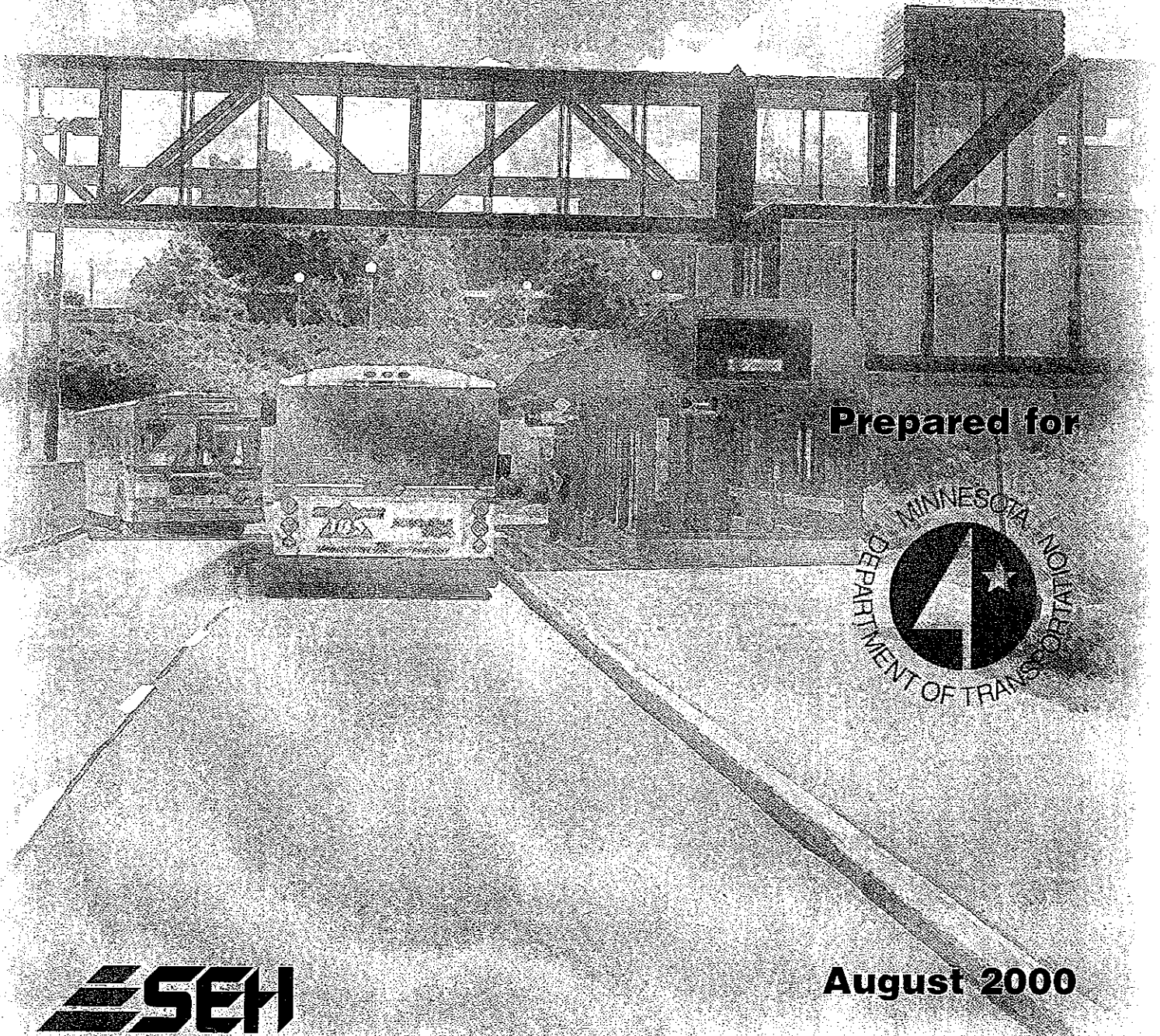




Technical Report

# Twin Cities Exclusive Busway Study



Prepared for



August 2000

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# Twin Cities Exclusive Busway Study

## Technical Report

Prepared for Minnesota Department of Transportation

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The information presented in this report is organized into four sections; executive summary of findings, a summary of the key study elements, study element details, conclusions, and next steps.

### 1.0 Executive Summary

#### 1.1 Study Purpose

The Commissioner of Transportation has directed the Minnesota Department of Transportation (Mn/DOT) Metro Division staff to prepare this study. The purpose of this study is to determine the cost of constructing and operating an exclusive busway system by the Year 2020. The source of information used to identify corridors for inclusion in this study was the Metropolitan Council's Transit 2020 Master Plan (Transit 2020)

#### 1.2 Findings

This study identifies three exclusive busway corridors — **Minneapolis Southwest Corridor, St. Paul Northeast Corridor, and Minneapolis Northwest Corridor** — that are recommended for Tier I (by the year 2010) implementation. A Study Steering Committee initially identified two corridors — Minneapolis Southwest and St. Paul Northeast corridors as Tier I corridors. A third corridor — Minneapolis Northwest Corridor — was included late in the study process at the request of the Metropolitan Council and consistent with Transit 2020. This study identifies major design elements and estimated costs needed to construct the three identified Tier I exclusive busway corridors.

The development of findings are based on the following key study elements:

1. System Characteristics (i.e., the development of preferred alignments, an evaluation/recommendation of design features and a review of physical barriers to implementation).
2. Feasible Corridors (i.e., which corridors make sense for the construction of busways by the year 2010).
3. Construction and Operating Costs

Major findings of this study reveal the following characteristics and cost implications for each of the Tier I corridors:

	<b>Minneapolis Southwest</b>	<b>St. Paul Northeast</b>	<b>Minneapolis Northwest</b>
Length	14.9 miles	9.8 miles	13.9 miles
Start	Downtown Minneapolis	Downtown St. Paul	Downtown Minneapolis
End	Near TH 212 & CR 4 in Eden Prairie	Near Whitaker Street in White Bear Lake	New TH 610 near CR 121 in Maple Grove
Costs	\$124 Million Construction	\$87.5 Million Construction	\$152 Million Construction
	\$6 Million Operating	\$6 Million Operating	\$6 Million Operating

A concept level estimate of total construction cost for all three corridors is \$363.5 million. Construction costs per mile are \$8.4 million for the Minneapolis Southwest Corridor, \$8.9 million for the St. Paul Northeast Corridor, and \$10.9 million for the Minneapolis Northwest Corridor. Total annual operating and maintenance costs for all three corridors combined are approximately \$18 million.

As a conceptual beginning that will lead to future refinements, this study does not include a detailed cost benefit analysis. However, this study does begin to assemble some of the critical information to develop such an analysis.

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## 2.0 Key Study Elements Summary

### 2.1 Background

Initiated by Mn/DOT in collaboration with the Metropolitan Council and Metro Transit, this Exclusive Busway Study determines the cost of constructing and operating an exclusive busway system in the Twin Cities Metropolitan Area.

This study provides an analysis beyond the Metropolitan Council's Regional Master Plan for Transit (Transit 2020) in identifying the major design elements and estimated costs needed to construct exclusive busways in three representative busway corridors by the year 2010.

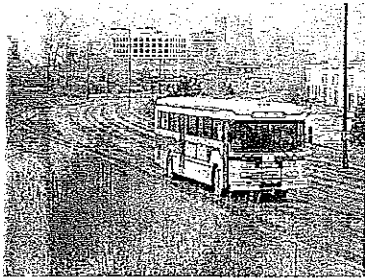
This study has been conducted in close coordination with the Hennepin County's 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study<sup>2</sup>, which examines the feasibility of a busway for a segment of one of the corridors assessed in this study (Minneapolis Southwest Corridor). Appendix E provides a copy of the Executive Summary from this study.

A Study Review Team consisting of staff from Mn/DOT, the Metropolitan Council, and Metro Transit, provided timely input and guidance to the study process. Short Elliott Hendrickson Inc (SEH) provided technical consultant assistance to this study team.

The Metropolitan Council identified seven corridors as potential candidates for exclusive busway construction as part of Transit 2020. These corridors have been ranked based on right-of-way availability, potential ridership/ability to serve growth, and compatibility with other elements of the overall transportation system plan. A preliminary assessment has been conducted to identify those corridors with the highest potential for implementation by the year 2010 (designated as Tier I). The remaining corridors (designated as Tier II) have not been eliminated from consideration as potential candidates, but are either currently under study for a variety of transit modes or have significant barriers to early implementation.

This study does not assess the relative merits of exclusive busway technology application compared to other transit modes for each corridor travel shed (e.g., commuter rail, light rail transit, bus shoulders). This work was done by the Metropolitan Council as part of Transit 2020 or is currently ongoing as part of corridor specific studies.





U of M Transitway – Existing limited application of an exclusive busway

### *What is an exclusive busway?*

For the purposes of this study, the exclusive busway is assumed to be a two-lane facility (one-lane per direction) on exclusive right-of-way dedicated for buses only. Grade separation at high volume cross streets and gate crossing arms at low volume crossings are assumed.

### *Why consider exclusive busways for the Twin Cities Area?*

To answer this question, decision-makers need to understand the relative advantages of an exclusive busway in providing for balanced transportation choices. Given appropriate level design features identified in this study, exclusive busways can provide the following benefits:

1. Bus separation from general traffic is the most effective way of achieving speed (efficient travel time) comparable to that of an automobile. The **high running speed** of buses **free from congestion** allows compensation for the additional dwell time at bus stops compared to automobile travel.
2. Exclusive bus facilities allow **faster, more reliable and safer operations** compared with commuter automobile travel.
3. Separate rights-of-way, stations, priority movement devices, and other infrastructure give the bus service a **distinct-positive image**, attracting users much more than buses mixed in general traffic. Busways also provide a **character of permanence** for the system, can contribute to the shaping of land uses, and can be a **key component of “smart” growth** policies in built-up, as well as developing areas.
4. Busways provide a **high frequency of direct service** to a high proportion of trips in suburban areas.
5. Busways provide **flexible implementation and operational characteristics**. Segments of a busway can be implemented over time while service along the full extent of the corridor can be implemented early (buses use the existing street system for segments of the busway not yet implemented). Operationally, busways can accommodate line haul express service, limited stop service, and local routes that use a portion of the busway. Buses can also use the busway for a portion of their routes combined with a circulator function to critical areas adjacent to the busway.
6. Busways have the potential to convert to LRT as the corridor matures and ridership warrants this level of transit service. Although this has never been done before, Hennepin County is currently studying the feasibility of including elements in an

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exclusive busway design that may ensure smooth transition from busway to LRT

## 2.2 Study Approach

A two step approach has been taken to efficiently select Tier I corridors and to develop critical design/operational characteristics:

Step 1 – A preliminary assessment of a range of potential exclusive busway corridors initially identified by Metropolitan Council has been conducted based on a list of comparative evaluation criteria, including construction feasibility, freight use/adjacent roadway compatibility, and transit system compatibility. This assessment identifies the exclusive busway corridors that have the greatest potential for early implementation (before the year 2010). These early implementation corridors have been identified in this study as Tier I corridors.

Step 2 – Design concepts for the Tier I exclusive busway corridors have been developed to a level necessary to identify major design elements, develop preliminary construction cost estimates, and to identify major impacts. This information has been used to further assess the viability of busway implementation.

This study identifies two corridors that are recommended for implementation as exclusive busways by the year 2010. A third corridor has been added at the request of the Metropolitan Council.

## 2.3 Technology Review

Two areas of technology have been developed during the 1990's by the Federal Transit Administration (FTA)<sup>3</sup> that could enhance the operating characteristics of Twin Cities exclusive busways. These areas are bus vehicle technology (being investigated in detail by the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study) and advanced vehicle control systems (AVCS).

### ATTB Technology

The FTA is currently developing prototypes of the Advanced Technology Transit Bus (ATTB). The ATTB will integrate its light weight, low floor, ultra low/zero emissions, and user friendly features and benefits into a single vehicle.

### AVCS Technology

Bus guidance systems enable high-speed, high-volume, level boarding operations typically associated with rail systems and permits a narrower right-of-way than is required for manually steered buses. Although this technology is currently in the research and development stage, electronically automated guidance has promising application for

---

exclusive busways and should be considered during design development.

For more information, refer to the Key Study Element Details of the report.

#### **2.4 Exclusive Busway Design Assumptions**

For the purposes of this study, the exclusive busway is assumed to be a two-lane facility (one-lane per direction) on exclusive right-of-way dedicated for buses only. Grade separation at high volume cross streets and gate crossing arms at low volume crossings are assumed. These assumptions will provide a conservative assessment of right-of-way impacts, construction costs, and allow maximum flexibility in bus vehicle characteristics (the busway could accommodate a typical bus from the existing fleet as well as the ATTB's discussed previously).

As discussed in Section 1.3, automated guidance technology permits operational benefits and a narrower right-of-way than manually steered buses.

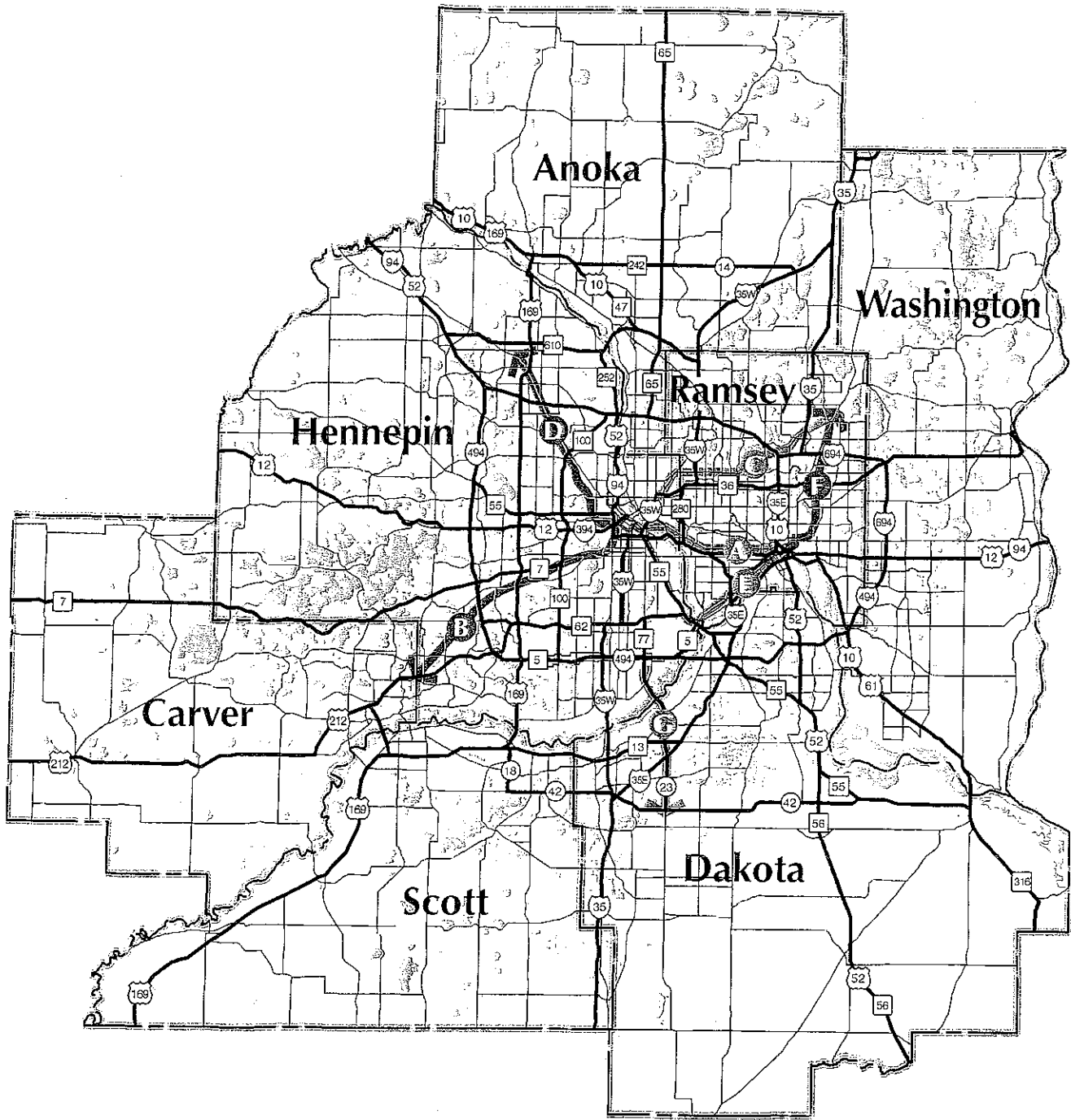
It is difficult to identify the vehicle fleet needed to operate the proposed busways at this level of study. Again, a detailed definition of the transit-operating plan is necessary. In order to provide a conservative assessment of vehicle needs, the cost estimates include a number of new ATTB vehicles in correlation with Hennepin County's 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study.

#### **2.5 Preliminary Assessment**

As discussed previously, the Metropolitan Council identified seven corridors as potential candidates to consider for exclusive busway implementation. These seven potential busway corridors are illustrated in Figure 1.

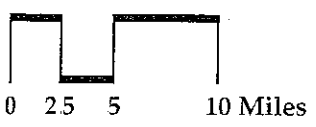
A preliminary assessment has been conducted to identify those corridors with the highest potential for implementation before the year 2010 (designated Tier I). The remaining corridors (designated as Tier II) have not been eliminated from consideration as potential candidates, but are either currently under study for a variety of transit modes or have barriers to early implementation.

A full discussion of the preliminary assessment of alternatives is provided in Section 3.4. A summary of this assessment is provided below.



- | Tier I                           | Tier II   |
|----------------------------------|---|
| ⓑ Minneapolis Southwest Corridor | Ⓐ Central Corridor                                |
| ⓓ Minneapolis Northwest Corridor | Ⓒ Minneapolis East Corridor                       |
| ⓕ Saint Paul Northeast Corridor  | Ⓔ Riverview Corridor                              |
|                                  | Ⓕ Extension to Dakota County on Hiawatha Corridor |

Figure 1  
**Busway Corridors**



1. Central Corridor – The built-up nature and high traffic activity (rail and vehicular) is an indication of the constraints present and the importance of existing transportation facilities in the corridor. Previous transit studies in this corridor indicate that busway implementation would require I-94 reconstruction. The Mn/DOI Commuter Rail Study identified commuter rail implementation in this corridor along the BNSF as a high priority. The line haul function of the busway would be redundant with this commuter rail implementation. The Ramsey County Regional Railroad Authority (RCRRA) has recently initiated the Central Transit Corridor Study to revisit the study of transit improvements given the potential implementation of commuter rail. Year 2020 weekday ridership is estimated at 28,500 to 30,500. The above factors indicate that time is needed to identify a preferred transit solution, and therefore, this corridor has been designated for Tier II exclusive busway implementation.
2. Southwest Corridor Extension – The exclusive busway concept uses an abandoned rail corridor owned by Hennepin County. This corridor was purchased by Hennepin County for transit (LRT) implementation and currently accommodates crushed limestone trail as an interim use. The corridor passes adjacent to Shady Oak Lake, which may require some shoreline alteration, but would not result in new lake crossing impacts. In most cases, existing bridge structures could accommodate the busway. The diagonal orientation of the corridor with respect to the roadway system—a positive for line haul transit service—and the potential to connect with future IH 212 bus shoulder lanes make this corridor highly compatible with the transit system. The IH 212 bus shoulder connection would create a 21-mile transitway (downtown Minneapolis to IH 41 in Eden Prairie). Year 2020 average weekday ridership potential is estimated at 19,500 persons per day. Based on the above factors, this corridor has been designated for Tier I exclusive busway implementation.
3. Minneapolis East Corridor – The exclusive busway alignment uses an active rail corridor (two trains per day local switching operation) east of I-35W. Freight rail relocation within the existing right-of-way would be necessary to implement the busway. A segment of rail corridor from I-35W to Broadway is abandoned providing an available right-of-way for the busway. The railroad right-of-way terminates at Broadway with no identified exclusive busway linkage to downtown Minneapolis. The corridor is currently contains infrastructure along County Road C, including high tension overhead utility support structures and a trail in addition to the rail operation. Several wetland/lake impacts would be created including a new crossing of Lake Owasso. A number of

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bridge structure replacements east of Victoria Street would be necessary. Grade crossings at seven arterial streets would be operationally problematic and increase delays on the roadway system (i.e., I-35W Interchange, Stinson Boulevard, Cleveland Avenue, Fairview Avenue, Snelling Avenue, Hamline Avenue, and Lexington Avenue). The corridor is somewhat redundant with the bus shoulders planned for TH 36 and ranks low with respect to transit system compatibility. Year 2020 average weekday ridership potential is estimated at 11,400 persons per day. The above factors indicate that more study is needed to assess the feasibility of running an exclusive busway concurrent with active rail operations and to address other corridor constraints. Therefore, this corridor has been designated Tier II for exclusive busway implementation.

4. Minneapolis Northwest Corridor – The exclusive busway alignment uses an active BNSF rail line that serves as an industrial lead for local customers and NSP in Monticello. Freight rail relocation within the existing right-of-way would be necessary to implement the exclusive busway. Potential major overpass structures may be necessary at TH 169 and the TH 55/I-94 interchange area. Several potential wetland/creek impacts have been identified in the Wirth Park area. Due to the magnitude of these impacts relative to the Tier I corridors, a preliminary assessment of environmental impacts has been conducted for this corridor. A summary of this assessment is included in the Appendix E. This corridor is highly compatible with the transit system with its diagonal orientation with respect to the roadway system is a positive for line haul transit service—and does not overlap coverage area with other transit system components. Year 2020 average weekday ridership has been estimated at 15,700. This corridor was retained as a Tier I corridor for much of the study process. However, as the concept was defined, constraints were identified, and initial cost estimates were developed, the Study Review Team shifted the corridor to a Tier II designation. Key factors in designating this corridor as Tier II include the feasibility of running an exclusive busway concurrent with active rail operations, structure costs, overhead high tension utility support realignment costs, and stream crossing/ wetland impacts. Recently, the Metropolitan Council requested that the Northwest Corridor be shifted back to a Tier I corridor to be consistent with its Regional Master Plan for Transit.
5. Riverview Corridor – The Riverview Corridor is physically constrained with Sheppard Road, Union Pacific Railroad and Canadian Pacific Railroad mainline tracks, TH 5, 7<sup>th</sup> Street, and the Mississippi River/Bluff. The ongoing Riverview Corridor Major Investment Study has not yet identified a recommended transit

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alternative, but has identified two bus mode alignments in addition to LRT as transit alternatives. The corridor has good transit system compatibility connecting Hiawatha Corridor with downtown St. Paul. Year 2020 average weekday ridership has been estimated at 7,500. Given the complexity of the corridor and the ongoing study, it will take additional time to identify a preferred transit alternative for the corridor. Based on the above, Riverview Corridor has been designated Tier II.

- 6 St. Paul Northeast Corridor – The exclusive busway concept uses an abandoned rail corridor currently owned by Ramsey County from Kellogg Boulevard to Beam Avenue. A portion of this corridor currently accommodates an interim trail. North of Beam Avenue, Minnesota Commercial (MNNR) operates a low volume customer access line. Although MNNR plans to expand service on this line, the low current train activity (two to three trains per week), the low number of customers (two), and the relatively short segment of affected rail line (2.8 miles) indicate that restricted hours of operation might be considered to allow rail and busway operations to coexist in the corridor. Furthermore, discussions between staff at Mn/DOI and the City of White Bear Lake have revealed that there may be plans to relocate a business served by MNNR. This would make it easier to establish a busway in this corridor. In the future, a portion of the alignment near downtown St. Paul is planned to accommodate the Phalen Boulevard project. Commuter rail is also a possibility on this alignment. Buses in mixed traffic or bus shoulder lanes could be incorporated into the Phalen Boulevard design cross-section while accommodating the trail proposed to share the Phalen Boulevard right-of-way. The City of St. Paul has indicated that a busway route along Phalen Boulevard does not fit with their redevelopment plans. Based on this, a number of options for the connection to downtown have been considered in this report. The Phalen Boulevard alignment option has been selected as a worst case in terms of capital cost with the most extensive limits of busway related construction. The Rush Line Corridor Study being conducted by Ramsey County Regional Railroad Authority (RCRRA) will examine alternative transit modes including commuter rail and busways on a parallel alignment to this corridor. This corridor was ranked low for commuter rail implementation in Mn/DOI's Commuter Rail Study<sup>4</sup>. It may be possible to combine the St. Paul Northeast and the Rush Line Corridor in developing a transit solution. This corridor provides good transit system compatibility with a connection to future TH 36 bus shoulders and compatibility with Metro Transit's bus system restructuring plan. Year 2020 average weekday ridership has been estimated at 8,100. Based on the above, the St. Paul Northeast Corridor has been designated Tier I.

- 7 Cedar Avenue Corridor – A portion of this corridor has bus shoulder lanes with implementation along the entire length planned for the year 2010. Implementation of an exclusive busway in this corridor would include the following: a new bridge crossing of the Minnesota River, reconstruction of Cedar Avenue to accommodate a busway in the median or side slope, and significant property impacts south of CR 38. Busway crossings at signalized intersections south of CR 38 would be operationally problematic and create delays on the roadway system. This corridor has high compatibility with the transit system as an extension to the Hiawatha LRT line. The net increase in year 2020 ridership of this extension has been estimated at 4,400. This corridor is currently under study by Dakota County for a variety of transit modes. Based on the above, the Cedar Avenue Corridor has been designated Tier II.

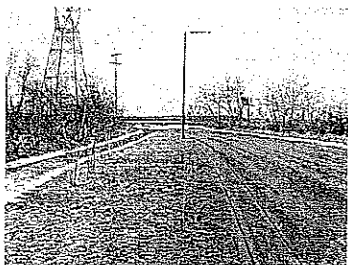
As indicated, the Minneapolis Southwest and St Paul Northeast Corridors are recommended as Tier I corridors. The Minneapolis Northwest Corridor has been included as a Tier I corridor late in the study as requested by the Metropolitan Council.

## 2.6 Concept Definition for Cost Estimates

Concepts assume existing trail function replacement adjacent to busway



Existing Minneapolis Southwest Extension Corridor



U of M Transitway with adjacent trail

The three Tier I corridors recommended for early implementation have been developed to a conceptual level of detail in order to identify major design elements, determine construction feasibility, and to develop conceptual cost estimates.

The concept definition includes all major elements needed to implement an exclusive busway in each corridor. These elements include the following:

- Busway road bed
- Trail replacement/impact mitigation (where feasible)
- Structures (i.e., new and retrofitted bridge structures needed for grade separation of major roadway/railroad facilities)
- Utilities (i.e. utility relocations necessary to implement the busway)
- Communications (i.e. busway/station area communications system to ensure safe efficient busway operations)
- Stations
- Park and ride locations
- Fare collection facilities



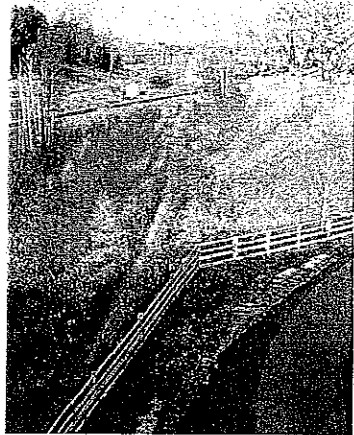
- 
- Buses (includes enough ATTB's to serve line haul function as a representative cost for bus vehicles. As discussed earlier, detailed development of the busway operating plan is necessary to understand the net increase in bus vehicle needs.)
  - Traffic control devices
  - Right-of-way acquisition

A summary of Tier I corridor characteristics is presented in the following section including figures that graphically show the limits of each corridor alignment. A more detailed discussion of corridor characteristics is provided in the body of this report. Conceptual alignments for the Minneapolis Southwest and St. Paul Northeast Corridors are shown on the Metropolitan Council's aerial base mapping<sup>5</sup> and are included in Appendix B.

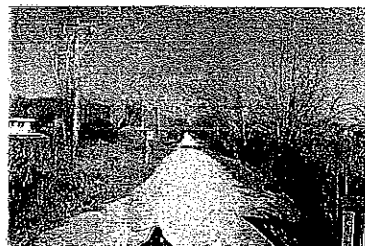
## **2.7 Tier I Corridor Project Characteristics**

The key characteristics identified in this study for the three Tier I corridors are summarized below:

## Minneapolis Southwest Corridor



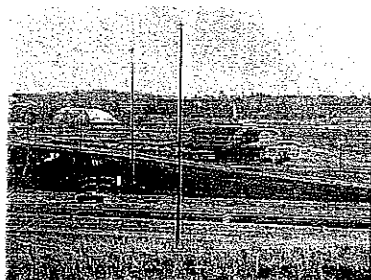
Southwest Corridor Extension  
– Minimal railroad conflicts  
with a single TC&W track  
crossing



Existing interim use trail.

- Provides a 14.9-mile high speed, reliable transit connection between downtown Minneapolis and TH 212 in Eden Prairie. With a direct busway connection to TH 212 shoulder bus lanes, this connection would extend to TH 41, for a total distance of 21 miles
- High ridership of 19,500 riders per day by 2020 (preliminary estimate)
- Potential high-type connections to I-494 and TH 212 would further enhance connectivity with the transit system and boost ridership for the corridor. A direct busway connection to TH 212 bus shoulder lanes would extend the exclusive transit connection to the TH 41 in Chaska, a distance of 21 miles from downtown Minneapolis
- High construction feasibility with the use of an abandoned rail corridor currently occupied by an interim light rail transit (LRT) bicycle/pedestrian trail.
- Five park and ride facilities including extension segment facilities near TH 62 and TH 212
- Seventeen stations providing an average station spacing of less than one-mile.
- Six additional A/T/B's for the Southwest Corridor Extension (Hopkins to Eden Prairie) added to the 28 A/T/B's assumed by the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study (downtown Minneapolis to Hopkins) provides a very conservative assessment of bus vehicle costs.
- Accommodates existing trail function adjacent to the busway.

This corridor is shown graphically in Figure 2.



Southwest Transit Hub  
connectivity is a design goal  
for the Southwest Corridor  
Extension



Southwest Corridor Benefit –  
Uses existing bridge  
structures

## Characteristics

- 2020 Ridership - 19,500
- Abandoned Rail Corridor Occupied by Interim Trail
- 17 Stations
- 5 Park and Ride Lots
- Connections to I-494 and T.H. 212
- 34 Advanced Technology Buses
- 14.9 Mile Corridor

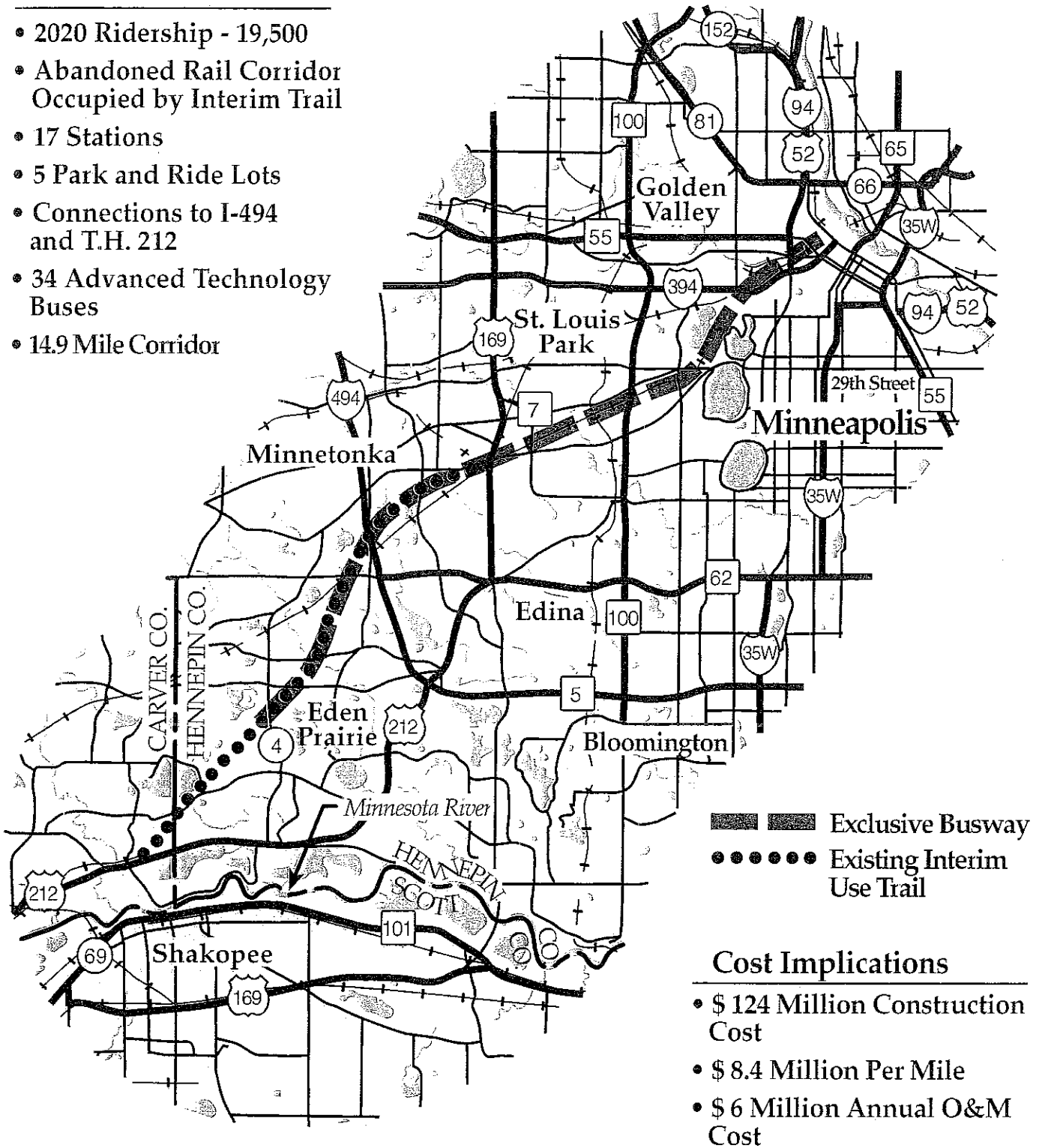
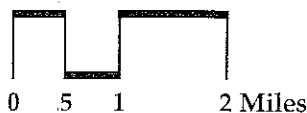


Figure 2

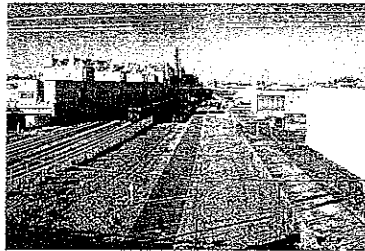
## Minneapolis Southwest Corridor Concept Definition



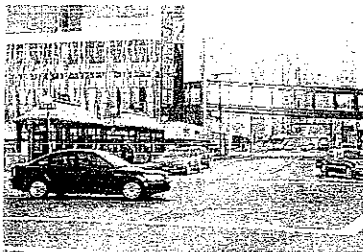
## St. Paul Northeast Corridor



St. Paul Northeast Corridor – Existing interim use trail



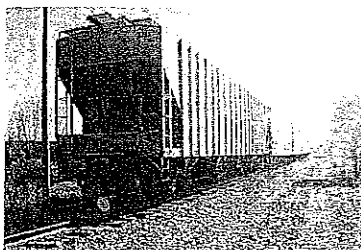
Following the future Phalen Boulevard alignment is a design option



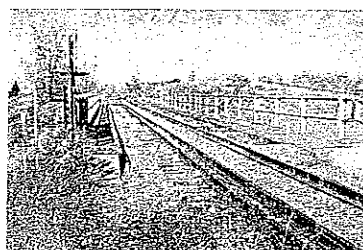
St. Paul Northeast Corridor – Connectivity with the 5<sup>th</sup> Street Transit Hub is a design goal

- Provides a 9.8-mile high speed, reliable transit connection between Pennsylvania Avenue/I-35E in St. Paul and Whitaker Avenue in White Bear Lake. Assuming ultimate improvements, buses may run an additional 1.8 miles on surface streets to connect with downtown St. Paul via Jackson Street through the Capitol area. A 7<sup>th</sup> Street route is also being considered.
- Medium ridership of 8,100 riders per day by 2020 (preliminary estimate).
- Potential high-type connection or transfer with TH 36 would further boost utility (ridership) for the corridor.
- High construction feasibility with the use of an abandoned rail corridor currently occupied by an interim bicycle/pedestrian trail and the potential for shared operations with an existing freight customer access spur.
- Potential integration with Phalen Boulevard construction.
- Three park and ride facilities near TH 36, Beam Avenue and Whitaker Street.
- Eleven stations providing an average station spacing of one-mile.
- Twenty-four ATTB's provide a conservative assessment of bus vehicle costs.
- Accommodates existing trail function adjacent to the busway.

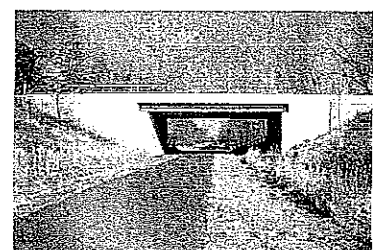
This corridor is shown graphically in Figure 3



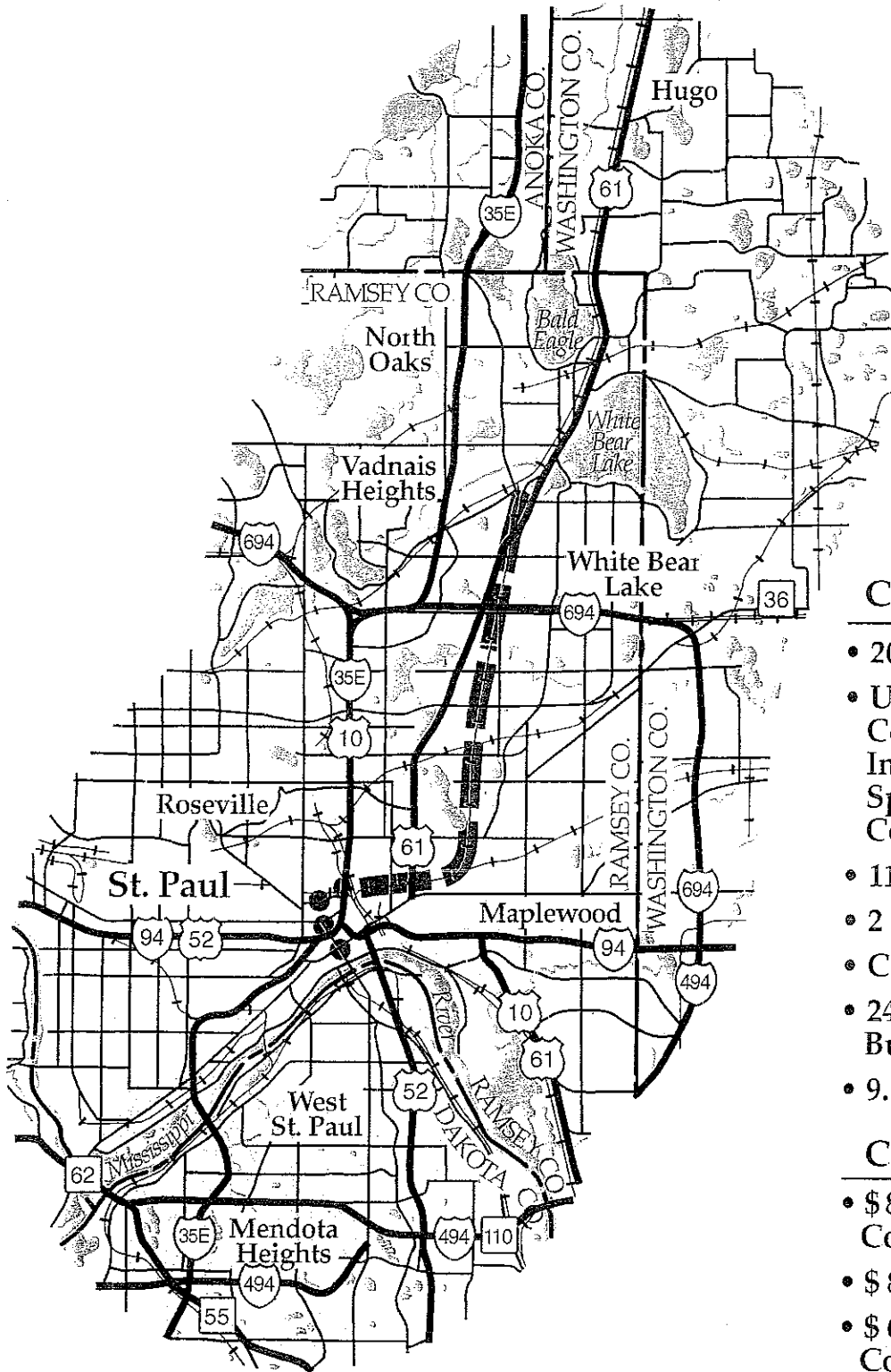
Existing MNNR rail customer operations will need to be addressed





New structures



Use existing structures.



-  Exclusive Busway
-  Buses on Existing Streets

### Characteristics

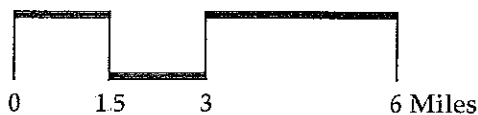
- 2020 Ridership - 8,100
- Use of Abandoned Rail Corridor Occupied by Interim Trail, Active Rail Spur, Phalen Boulevard Corridor
- 11 Stations
- 2 Park and Ride Lots
- Connection to T.H. 36
- 24 Advanced Technology Buses
- 9.8 Mile Corridor

### Cost Implications

- \$ 87.5 Million Construction Cost
- \$ 8.9 Million Per Mile
- \$ 6 Million Annual O&M Cost

Figure 3

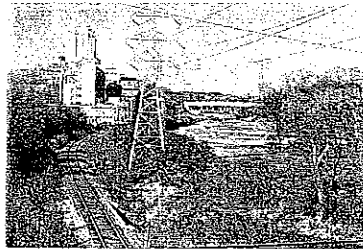
## St. Paul Northeast Corridor Concept Definition



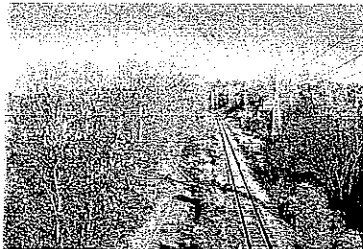
## Minneapolis Northwest Corridor



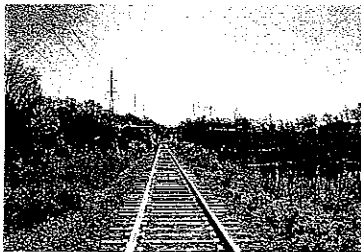
Minneapolis Northwest Corridor – Existing rail operations to be maintained.



Relocation of high tension overhead utility lines and freight track required



Theodore Wirth Park Trail



Minneapolis Northwest Corridor – Numerous stream crossings and wetland constraints



Existing slopes necessitate extensive wall sections

- Provides a 13.9-mile high speed, reliable transit connection between the 5<sup>th</sup> Street transit hub (planned commuter rail station) in Minneapolis to the future TH 610 in Maple Grove.
- High Ridership of 15,700 persons per day by 2020 (preliminary estimate)
- Use of an active rail corridor (BNSF, two trains per day). Existing BNSF track would be realigned within right-of-way to accommodate space for a busway.
- Requires relocation/pole replacement of high tension overhead utility lines within the existing right-of-way for over 6.72 miles to accommodate busway and relocated freight track
- Five park and ride facilities near Golden Valley Road, Bass Lake Road, 63<sup>rd</sup> Avenue North, TH 169, and TH 610.
- Twelve stations providing an average station spacing of approximately one-mile
- Thirty-two advanced technology transit buses AITB's provide a conservative assessment of bus vehicle costs
- Accommodates existing trail function along two segments of the busway near Theodore Wirth Park and north of Golden Valley Road

This corridor is shown graphically in Figure 4.



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## 2.8 Segmentation

As discussed in the Study Purpose (Section 1.3), one of the primary advantages of exclusive busways is that phased implementation can be pursued based on funding considerations, barriers to implementation, or other factors. Because of vehicle operating flexibility, segments of the busway can be implemented over time while service along the full extent of the corridor can be implemented early. (Buses use the existing street system for segments of the busway not yet implemented).

Although segmenting exclusive busway implementation may be desirable from a funding standpoint or to allow the resolution of impacts along portions of the corridor, the ideal outcome for ridership potential, reduced congestion, and organized "smart" growth is to build the full extent of each corridor as soon as possible.

Because the Minneapolis Northwest Corridor was added late in the study process, segmentation of this corridor has not been included in this study. However, scenarios are presented below as examples of how segmentation may be pursued for the Minneapolis Southwest and St. Paul Northeast Corridors.

### Minneapolis Southwest

Logical segmentation points include 5<sup>th</sup> Avenue in Hopkins, TH 62 in Eden Prairie, TH 5 in Eden Prairie, and CSAH 4 in Eden Prairie.

Segmentation of 5<sup>th</sup> Avenue would provide exclusive busway service as far out as downtown Hopkins and a convenient bus connection to TH 169. Given that Hennepin County has progressed through a detailed study, the connection between downtown Minneapolis and Hopkins is a logical first segment for the entire transit corridor.

Buses could complete the outer portion of the route via TH 169 and TH 212.

Segmentation at TH 62 could provide access to a potential park and ride adjacent to TH 62. Buses could complete the outer portion of the route via I-494 (potential ramps) and TH 212.

Segmentation at TH 5 would avoid a long structure over TH 5 with the potential development of a park and ride at the TH 212/Wallace Road interchange. Buses would access TH 212 via the Wallace Road interchange. Depending on land availability for a park and ride and the results of a detailed functional design/traffic operations assessment, TH 5 could be pursued as the ultimate terminus for the Southwest Corridor.



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## St. Paul Northeast

Logical segmentation points include Arcade Street in St. Paul, Beam Avenue in Maplewood, and Whitaker Street in White Bear Lake.

Segmentation at Arcade Street in St. Paul provides connectivity with the Capitol area and the planned Metro Transit Bus garage at the I-35E/Pennsylvania Avenue interchange. Jackson Street would be used for access to downtown St. Paul. Numerous options have been considered including using portions of Phalen Boulevard connecting to West 7<sup>th</sup> Street or University Avenue.

Segmentation at Beam Avenue in Maplewood could provide access to a proposed park and ride adjacent to the busway opposite St. John's Hospital. Buses could access the Maplewood Mall Transit Hub via Beam Avenue and service outer portions of the route via TH 61 and White Bear Avenue. This would allow time to resolve the existing rail operating issues north of Beam Avenue while having a significant portion of the busway in operation.

Whitaker Street could be pursued as the ultimate terminus for the St. Paul Northeast Corridor.

## 2.9 Conceptual Level Construction Cost Estimates

The alignment limits and major design elements for each of the three Tier I corridors have been identified based on extensive field review of existing conditions and input from the Study Review Team. As such, the elements included in the total project cost represent what is thought to be desirable based on available information. A more detailed study will allow for a better assessment of these elements and will result in a more substantiated program definition for each busway.

As discussed in the previous section, segmentation has not been addressed for the Minneapolis Northwest Corridor.

The cost estimates do not include the restructuring of bus system/feeder bus routes to correlate with the busway or operations and maintenance costs. As discussed previously, a detailed study of the transit system plan with the busways in place is needed to provide a meaningful assessment of these costs. The Metropolitan Council has estimated that the busways would have annual operations and maintenance costs of \$18 million (approximately \$6 million per corridor). This may be conservative depending on the actual net increase in bus vehicles necessary to operate the busway.

A summary of project construction costs for each corridor are presented below in Table 1 (in current year 2000 millions of dollars).

**Table 1**  
**Conceptual Level Cost Estimate Summary**  
**Year 2000 Millions of Dollars**

	<b>Year 2000 Construction Cost (millions)</b>
<b>Minneapolis Southwest Corridor</b>	
Downtown Minneapolis to 5 <sup>th</sup> Avenue in Hopkins*	\$74.0
5 <sup>th</sup> Avenue in Hopkins to TH 62 in Eden Prairie	21.5
TH 62 in Eden Prairie to TH 5 in Eden Prairie	19.5
TH 5 in Eden Prairie to CSAH 4/TH 212	8.0
Interchange	
I-494 Bus Ramps	1.0
<b>Downtown Minneapolis to CSAH 4 in Eden Prairie</b>	<b>\$124.0</b>
<i>Equivalent Cost Per Mile (14.9 miles)</i>	<i>\$8.4</i>
<b>St. Paul Northeast Corridor</b>	
I-35E to Arcade Street along Phalen Boulevard	\$8.6
Arcade Street in St. Paul to Beam Avenue in Maplewood	50.7
Beam Avenue in Maplewood to Whitaker Street in White Bear Lake	28.2
TH 36 Bus Ramps	2.0
<b>Downtown St. Paul to Whitaker Avenue in White Bear Lake</b>	<b>\$87.5</b>
<i>Equivalent Cost Per Mile (9.8 miles)</i>	<i>\$8.9</i>
<b>Minneapolis Northwest Corridor</b>	
<b>Downtown Minneapolis to TH 610 in Maple Grove</b>	<b>\$152</b>
<i>Equivalent Cost Per Mile (13.9 miles)</i>	<i>\$10.9</i>

\* Based on 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study cost estimates. The minimum project limits correlate with the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study project limits from downtown Minneapolis to 5<sup>th</sup> Avenue in Hopkins. The cost presented has been adjusted to year 2000 dollars and to eliminate bus storage and maintenance facility costs. See Appendix C for cost calculation documentation

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## 3.0 Key Study Element Details

### 3.1 Technology Review

There are two areas of technology developed by the Federal Transit Administration (FTA)<sup>3</sup> during the 1990's that could enhance the operating characteristics of Twin Cities exclusive busways. These areas include bus vehicle technology (being investigated in detail by the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study) and advanced vehicle control systems (AVCS).

#### ATTB Technology

The FTA is currently developing prototypes of the ATTB. The ATTB will integrate the following features and benefits into a single vehicle:

- *Light Weight* – Reduced fuel consumption, brake/tire wear, road pavement damage, and extended bus service life.
- *Low Floor* – One step boarding simplifies ingress/egress, reduces dwell times, and provides for unassisted boarding for persons with disabilities.
- *Ultra-Low/Zero Emissions* – Meets or exceeds 1998 EPA/CARB exhaust emissions standards utilizing a hybrid propulsion system.
- *User Friendly* – ADA Compliant flat floor, and a new independent front and rear suspension system that improves ride for passengers.

#### AVCS Technology

Bus guidance systems enable high-speed, high-volume, level boarding operations typically associated with rail systems and permits a narrower right-of-way than is required for manually steered buses. Although in the research and development stage, electronically automated guidance has promising application for exclusive busways and should be considered during design development.

The most promising technology is electronic dual mode concepts that allow for normal bus operations in mixed traffic and automated guidance in the exclusive busway. Electronic guidance systems use a transmitting antenna embedded in the roadway to guide buses equipped with a receiving antenna and an electronic control system along the desired path.

The concept definition and cost estimates contained in this report include ATTB vehicles in conformance with Hennepin County's 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study, but do not assume an automated guidance system. The roadway elements identified assume full pavement and clear zone widths for a manually operated bus. This will provide a conservative assessment of

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right-of-way impacts and construction costs (savings in reduced guideway element costs could more than offset automated guidance cost).

### 3.2 Exclusive Busway Design Assumptions

In order to provide a preliminary feasibility assessment of the viability of the seven busway corridor candidates, a number of initial design criteria have been identified to guide concept development. The intent of using design criteria is to provide a comparative assessment between corridors and a conservative assessment of exclusive busway infrastructure needs.

During a future preliminary design phase, these criteria will be revised based on a more detailed review and selection of technology and on physical constraints in each of the corridors.

For the purposes of this study, the exclusive busway is assumed to be a two-lane facility (one-lane per direction) on exclusive right-of-way dedicated for buses only. The total effective width of the busway is 40 feet to allow for 28 feet of pavement and 6 feet for clear zones on each side of the busway.

Grade separation at high volume cross streets and gate crossing arms at low volume crossings are assumed to provide reliable service and a positive transit image for the busway. These assumptions will provide a conservative assessment of right-of-way impacts, construction costs, and allow maximum flexibility in bus vehicle characteristics (the busway could accommodate a typical bus from the existing fleet as well as the ATTB's discussed previously).

Automated guidance technology permits operational benefits and a narrower right-of-way than manually steered buses. A more detailed study is needed on a corridor specific basis to fully assess the desirability of automated guidance application. This should include a detailed understanding of the transit operating plan with the busway in place, as well as an understanding of the right-of-way benefits of implementing automated guidance. Automated guidance has **not** been assumed for the cost estimates in this study. This should provide a conservative cost estimate—it may be found that the savings in reduced guideway element costs could more than offset automated guidance equipment costs.

It is difficult to identify the vehicle fleet needed to operate the proposed busways at this level of study. Again, a detailed definition of the transit-operating plan is necessary to do this. It is likely that the vehicle fleet could be made up of the ATTB vehicles mentioned earlier and typical buses similar to those in the existing fleet. Some of these typical buses may come from existing routes that would be eliminated

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or restructured with busway implementation. In order to provide a conservative assessment of vehicle needs, the cost estimates include a number of new ATTB vehicles in correlation with Hennepin County's 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study.

Accommodation of existing active rail operations has been a base assumption for all corridors. Generally, this means rail track relocation has been assumed within the existing right-of-way to provide the space necessary for the busway envelope.

Key design criteria are summarized below:

### **General Envelope**

**Characteristics:** Highly exclusive facility (high speed/low conflict) for entire length.

Grade separation at high volume arterial crossings. Crossing signals with gate arms for busway priority at-grade crossings.

**Busway Dimensions:** 28-foot pavement (one 14-foot lane per direction).

6-foot berm/clear zone outside pavement.

40-foot total envelope.

**Railroad Treatment:** Maintain existing freight activity.

Offset track centerline 25 feet from edge of pavement.

**Trail Treatment:** Accommodate existing trail function adjacent to busway as needed.

**Utility Treatments:** Structured overhead transmission line supports relocated within right-of-way where necessary.

Locate underground utilities outside busway pavement, especially to accommodate potential future LRT.

### **Park and Ride/Station Locations:**

Initial station locations identified by Metropolitan Council.

Identify outer termini park and ride locations based on review of compatible parcels.

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**Design Speed:** 65 mph design speed.  
55 mph maximum operating speed.  
30 mph average route speed including stops.

### 3.3 Corridor Identification

As discussed earlier, the Metropolitan Council initially identified seven corridors for study. In general, these corridors have been identified based on right-of-way availability, ridership potential, and their compatibility with other elements of the overall transit system plan. Corridors that were recommended for Tier I commuter rail implementation or LRT implementation (Hiawatha Corridor) were not included as busway corridor candidates.

In identifying an alignment within each of the seven corridors, the primary goal is to define an exclusive busway envelope with minimal conflicts and a limited number of stops from a logical outer terminal transit center to a logical connection with the central business districts of Minneapolis and St. Paul.

The seven exclusive busway candidate corridors are shown in Figure 1 of the Executive Summary.

### 3.4 Preliminary Assessment Of Study Corridors

A preliminary assessment of the seven exclusive busway corridor candidates conducted by the Study Review Team has identified two corridors with high potential for early implementation by the year 2010—**Minneapolis Southwest** and **St. Paul Northeast**. As discussed previously, an additional corridor, **Minneapolis Northwest**, was added as a Tier I corridor late in the study at the request of the Metropolitan Council. The scope of this preliminary assessment is to develop an understanding of the potential for each of the seven corridor candidates for development as exclusive busways based on information from previous/ongoing studies, physical constraints, and ridership potential.

The remaining corridors, designated Tier II, may be highly desirable for exclusive busway implementation based on ridership potential and have not been eliminated from consideration as exclusive busway candidates. These corridors are either currently under study for a variety of transit modes, have barriers to early implementation

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### 3.4.1 Central Corridor

#### Relevant Factors

The Central Corridor has three major linear right-of-way opportunities that have been considered for transit improvements in the past: I-94, University Avenue, and Burlington Northern Railroad. It is fully developed and has high traffic activity (rail and vehicular) in each of the three rights-of-way. The built-up nature and high traffic activity is an indication of the constraints present and the importance of existing transportation facilities in the corridor.

Transit improvements have been analyzed in this corridor by the Central Corridor Study, which included a busway option in the median of I-94. This option required the reconstruction of I-94 and was estimated to cost \$284 million to construct (in 1993 dollars). The Mn/DOT Commuter Rail Study identified commuter rail implementation in this corridor along the BNSF as a high priority. The line haul function of the busway would be redundant with this commuter rail implementation. The Ramsey County Regional Railroad Authority (RCRRA) has recently initiated the Central Transit Corridor Study to revisit the study of transit improvements given the potential implementation of commuter rail.

Year 2020 weekday ridership is estimated at 28,500 to 30,500 persons per day (high rating).

#### Assessment

It is recommended that Central Corridor be designated a Tier II Busway Corridor based on the following observations:

- The ongoing Central Transit Corridor Study has not yet identified a preferred transit alternative.
- The complexity of the corridor may result in longer term implementation of a busway relative to other corridors.
- The ultimate transit improvement is likely dependent on commuter rail implementation in the corridor.
- The cost estimate for the I-94 exclusive busway implementation is expensive and indicative of the physical barriers in this corridor.

### 3.4.2 Southwest Corridor Extension

#### Relevant Factors

The Southwest Corridor Extension is currently an abandoned rail corridor owned by Hennepin County. This corridor was purchased for transit implementation (LRT) and currently accommodates an interim use crushed limestone trail.

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The Southwest Corridor was studied under LRT Systems Plan and Commuter Rail Study. The segment west of TH 169 was previously recommended as a Tier III commuter rail corridor.

Hennepin County Transit and Community Works is conducting the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study for the segment of this corridor from downtown Minneapolis to 5<sup>th</sup> Avenue in Hopkins. Based on the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study, the Southwest Corridor Extension assessment focuses on the segment from 5<sup>th</sup> Avenue in Hopkins to the terminus at CSAH 4.

The corridor passes adjacent to Shady Oak Lake, which may require some shoreline alteration, but would not result in new lake crossing impacts. In most cases, existing bridge structures could accommodate the busway.

The diagonal orientation of the corridor with respect to the roadway system—a positive for line haul transit service—and the potential to connect with future TH 212 bus shoulder lanes make this corridor highly compatible with the transit system. The TH 212 bus shoulder connection would create a 21-mile transitway (downtown Minneapolis to TH 41 in Chaska). The potential connection with I-494 bus shoulders would further increase the utility of the corridor.

Year 2020 average weekday ridership potential is estimated at 19,500 persons per day (high rating).

#### Assessment

It is recommended that the Southwest Corridor be designated a Tier I corridor based on the following observations

- Public ownership of corridor and the potential use of existing bridge structures result in few physical barriers to implementation.
- The diagonal orientation of the corridor and ridership estimates indicate the high potential utility of the corridor for transit use.
- The potential connectivity with I-494 and TH 212 bus shoulders provide good compatibility with the transit system.

### **3.4.3 Minneapolis East Corridor**

#### Relevant Factors

The Minneapolis East Corridor is currently utilized by active rail operations of two trains per day local switching operation. The existing 100-foot right-of-way was recently purchased by MNNR from BNSF. Freight rail relocation within the existing right-of-way would be necessary to implement the busway.



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The available right-of-way now terminates at Broadway Avenue NE. The Wye connection has recently been removed, and a distribution center is being constructed along the Burlington Northern mainline. A feasible exclusive busway between Broadway and downtown Minneapolis has not been identified.

The segment of the corridor from Broadway Avenue NE to I-35W is currently undergoing the abandonment process.

Implementation of a busway along County Road C would be problematic. Railroad right-of-way presently accommodates high tension utility lines/large support structures and a trail. Grade crossings at seven arterial streets would be operationally problematic and increase delays on the roadway system (e.g., I-35W Interchange, Stinson Boulevard, Cleveland Avenue, Fairview Avenue, Snelling Avenue, Hamline Avenue, and Lexington Avenue). Several wetland/lake impacts would be created including a new crossing of Lake Owasso. A number of bridge structure replacements east of Victoria Street would be necessary.

The potential busway corridor is somewhat redundant with the bus shoulders planned for TH 36. The number of grade crossings for the corridor mentioned above indicates the corridor may be less desirable than the TH 36 bus shoulders.

Year 2020 average weekday ridership potential is estimated at 11,400 persons per day (medium/high rating).

#### Assessment

It is recommended that the Minneapolis East Corridor be designated a Tier II Busway Corridor based on the following observations:

- More study is needed to assess the feasibility of running an exclusive busway concurrent with active rail operations and to address other corridor constraints.
- The lack of an identified exclusive connection to downtown Minneapolis, the physical constraints along County Road C, lake/wetland impacts, and bridge structure replacement create significant barriers to implementation.

The corridor ranks low with respect to transit system compatibility considering its redundancy with bus shoulder lanes along the parallel TH 36 facility.

### **3.4.4 Northwest Corridor**

#### Relevant Factors

The Northwest Corridor is an active rail corridor. The BNSF Railroad right-of-way is 100 feet wide and functions as an industrial lead for

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local customers. It also provides service to NSP in Monticello. Busway implementation requires realignment of existing rail line within right-of-way and consolidation of operations.

The corridor has been studied under the LRT Systems Plan, HCRRRA Commuter Rail Study, and Mn/DOT Commuter Rail Study. It was recommended as a low priority for Commuter rail implementation.

The recently initiated CR 81 Study process will assess transit improvements in corridor.

This corridor is highly compatible with the transit system with its diagonal orientation with respect to the roadway system—a positive for line haul transit service—and does not overlap coverage area with other transit systems components.

However a new bridge structure would be needed at TH 169 and existing bridge replacements would be needed throughout the corridor. Wetland/creek impacts are throughout the Wirth Park area. It is likely that the high tension overhead transmission line supports would need to be relocated/replaced.

Year 2020 average weekday ridership has been estimated at 15,700 persons per day (high rating).

#### Assessment

This corridor has been retained as a Tier I corridor for much of the study process. However, as a concept was developed, the following key factors shifted the study team's assessment to Tier II:

- The existing track relocation/consolidated operations, new structures, high tension overhead utility structure relocation, bridge replacements, and wetland/creek impacts create relatively high construction costs and barriers to early implementation.
- A more detailed study is needed to assess the feasibility of running an exclusive busway concurrent with active rail operations.
- The recently initiated CR 81 Study may provide detailed analysis of potential transit modes in the corridor.

As mentioned previously, late in the study the corridor was redesignated as a Tier I corridor based on the request of the Metropolitan Council.

### **3.4.5 Riverview Corridor**

#### Relevant Factors

The Riverview Corridor is physically constrained by Sheppard Road, Union Pacific Railroad and Canadian Pacific Railroad mainline tracks, TH 5/7<sup>th</sup> Street, and the Mississippi River/Bluff.

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Ramsey County Regional Railroad Authority (RCRRA) is conducting the Riverview Major Investment Study. This ongoing study has not yet identified a recommended transit alternative, but has identified two bus mode alignment options in addition to LRT transit alternatives. The bus mode options use combinations of TH 5, 7<sup>th</sup> Street, and the rail corridor.

The Riverview Corridor has good transit system compatibility connecting the Hiawatha Corridor to downtown St. Paul.

Year 2020 average weekday ridership has been estimated at 11,500 persons per day (medium/high rating).

#### Assessment

It is recommended that the Riverview Corridor be designated a Tier II Busway Corridor based on the following observations:

- Ongoing Riverview MIS Study has not yet identified a preferred transit alternative.
- Complexity of corridor and physical barriers may make implementation longer term relative to other corridors.

### **3.4.6 St. Paul Northeast Corridor**

#### Relevant Factors

The St. Paul Northeast Corridor is an abandoned rail corridor currently owned by Ramsey County from Kellogg Boulevard to Beam Avenue. A portion of this corridor currently accommodates an interim pedestrian trail North of Beam Avenue, MNNR operates a low volume customer access line (recently purchased by MNNR from BNSF). Existing operations consist of a low volume, relatively short segment customer access line (2.8 miles, two customers, 2 to 3 trains per week). This line currently serves the NSP substation south of I-694 and a plastic transload customer north of Buerkle Road.

This corridor has been studied previously under the LRT Systems Plan and the Commuter Rail Study. It was recommended for Stage 4 implementation by the Commuter Rail Study. The recently initiated Rush Line Corridor Study being conducted by Ramsey County Regional Railroad Authority (RCRRA) will examine alternative transit modes including commuter rail and busways on a parallel alignment to this corridor. It may be possible to combine the St. Paul Northeast and the Rush Line Corridor in developing a transit solution.

Although MNNR plans to expand service on this line, the low current train activity and short segment of affected track indicates that restricted hours of operation might be considered to allow rail and busway operations to coexist in the corridor. However, realignment of the existing rail line within its right-of-way may still be required.

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Furthermore, discussions between staff at Mn/DOT and the City of White Bear Lake have revealed that there may be plans to relocate a business served by MNNR. This would make it easier to establish a busway in this corridor.

A portion of the alignment near downtown St. Paul is planned to accommodate the Phalen Boulevard project. Commuter rail is also a possibility on this alignment. Buses in mixed traffic or bus shoulder lanes could be incorporated into the Phalen Boulevard design cross-section while accommodating the trail proposed to share the Phalen Boulevard right-of-way. The City of St. Paul has indicated that a busway route along Phalen Boulevard does not fit with their redevelopment plans. Based on this, a number of options for the connection to downtown have been considered in this report. The Phalen Boulevard alignment option has been selected as a worst case in terms of capital cost.

This entire corridor provides good transit system compatibility with a connection to future TH 36 bus shoulders and compatibility with Metro Transit's bus system restructuring plan.

Year 2020 average weekday ridership has been estimated at 8,100 persons per day (medium rating).

#### Assessment

It is recommended that the St. Paul Northeast Corridor be designated a Tier I corridor based on the following observations:

- Public ownership of corridor results in few physical barriers to implementation.
- Freight rail compatibility – low volume customer access provides potential for shared operations.
- Transit system compatibility is heightened with connections to TH 36 shoulder bus lanes and access to the City of White Bear Lake.
- The diagonal orientation of the corridor and ridership estimates indicate the high potential utility of the corridor for transit use.

### **3.4.7 Cedar Avenue Corridor**

#### Relevant Factors

The Cedar Avenue Corridor has three major segments with respect to physical characteristics:

1. Minnesota River Crossing – Crosses river valley on structure over flood plain.
2. TH 13 to Dakota CR 38 – Freeway design with grade separated cross streets and interchanges.

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3. From Dakota CR 38 South – Expressway design with signalized control of full access intersections.

Commercial and residential development is currently adjacent to Cedar Avenue throughout the corridor. A wildlife refuge and Fort Snelling State Park are intersected by the corridor in the Minnesota River Valley area. The limited crossings of the Minnesota River have long been recognized as a capacity constraint of the regional transportation system.

A portion of this corridor has bus shoulder lanes with implementation along its entire length planned for the year 2010 by the Transit 2020 System Plan. The Cedar Avenue Corridor Study is currently being conducted by Dakota County and is considering a variety of transit modes. An exclusive busway in this corridor would serve as an extension to Hiawatha Corridor LRT making the busway highly compatible with the transit system plan.

The character of Cedar Avenue as a freeway north of CR 38 (138<sup>th</sup> Street) is conducive to a busway in the median or a sideslope design concept. A sideslope treatment on the east side of the corridor with grade separations at interchanges correlates with the available open space for a park and ride facility in the northeast quadrant of TH 13 and the Apple Valley Transit Center located on the east side of Cedar Avenue. However, implementation of an exclusive busway south of CR 38 appears to be problematic with at-grade signalized control and the built-up nature of adjacent land uses. Bus in shoulder lanes may be a desirable alternative to an exclusive busway on Cedar Avenue or Galaxie Drive south of CR 38.

In summary, implementation of an exclusive busway in this corridor would include the following: a new bridge crossing of the Minnesota River, reconstruction of Cedar Avenue to accommodate a busway in the median or sideslope with significant property impacts south of CR 38.

The net increase in year 2020 ridership of this extension has been estimated at 4,400 persons per day that would increase the Hiawatha Corridor ridership total to 29,900 (low rating).

#### Assessment

It is recommended that Cedar Avenue be designated a Tier II Busway Corridor based on the following observations:

- Ongoing Cedar Avenue Corridor Study has not yet identified a preferred transit alternative.
- Difficult barriers to implementation and operating limitations, south of CR 38.

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- Complexity of the corridor will likely result in longer term implementation relative to other corridors.

### **3.5 Tier I Corridor Analysis**

The alignment limits and major design elements for each of the three Tier I corridors have been identified based on a preliminary review of overall transportation system linkages and transit system compatibility. As such, the elements included in the total project cost represent what is thought to be desirable based on available information. A more detailed study will be able to assess the utility of these elements resulting in a more substantiated program definition for each busway.

The Tier I corridor analysis presented in this section consists of three major components including concept definition, cost estimates and cost savings measures

#### **3.5.1 Concept Definition for Cost Estimates**

The three Tier I corridors have been developed at a conceptual level of detail in order to identify major design elements, determine construction feasibility, and ultimately to develop conceptual cost estimates

The conceptual alignments including station locations have been developed using Metropolitan Council's 1997 aerial base mapping<sup>4</sup>. These conceptual alignment plans were used in study committee work sessions for review and refinement. Figures 2, 3, and 4 in the Executive Summary illustrate the three corridors. Reduced scale figures showing the Minneapolis Southwest and St. Paul Northeast concepts on the aerial base are included in Appendix B of this report.

The concept definition includes all the major elements needed to implement an exclusive busway in each corridor. These elements include the following:

- Busway road bed
- Trail replacement/impact mitigation (where feasible)
- Structures (e.g., new and retrofitted bridge structures needed for grade separation of major roadway/railroad facilities)
- Utilities (e.g. utility relocations necessary to implement the busway)
- Communications (e.g. busway/station area communications system to ensure safe efficient busway operations)
- Stations
- Park and ride locations

- Fare collection facilities
- Buses (includes enough ATTB's to serve line haul function as a representative cost for bus vehicles. As discussed earlier, detailed development of the busway operating plan is necessary to understand the net increase in bus vehicle needs.)
- Traffic control devices
- Right-of-way acquisition

The concept definitions for each corridor are summarized below.

The conceptual level construction cost by the major element needed to implement all three busway corridors, is as follows:

**Conceptual Level Construction Costs  
(Year 2000 Millions of Dollars)**

Element <sup>1</sup>	Southwest Corridor	Northeast Corridor	Northwest Corridor	Total
Roadway	20.34	25.69	43.99	90.02
Utilities	0.84	1.28	6.18	8.30
Communications	5.16	7.91	11.18	25.25
Park & Ride	2.76	4.14	6.90	13.80
Fare Collection Systems	1.38	3.03	3.31	7.72
Stations	4.38	9.64	10.51	24.53
Signals	1.10	2.02	3.86	6.98
Freight Rail	0.11	2.24	7.91	10.26
Agency/Engineering/Insurance	9.02	13.99	23.46	46.47
Right-of-Way	1.48	2.27	3.21	6.96
Vehicles	3.80	15.19	20.25	39.24
Substantial Wetland Mitigation	--	--	11.03	11.03
Subtotal	50.36	87.40	151.79	289.55
Southwest Corridor - Minneapolis to Hopkins Segment <sup>2</sup>	73.84	--	--	73.84
<b>Total (rounded)</b>	<b>124.00</b>	<b>87.50</b>	<b>152.00</b>	<b>363.50</b>

<sup>1</sup> Unit costs for each element are detailed in Appendix C.

<sup>2</sup> Source: 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study. The cost for this segment of the Minneapolis Southwest Corridor was adjusted for year 2000 dollars and excludes duplicated costs related to bus storage and maintenance facilities which were factored in this study.

**Minneapolis Southwest Corridor Extension (Figure 2, Appendix B  
Figures A1 to A8)**

The Minneapolis Southwest Corridor Extension examines the Southwest Corridor interim non-motorized trail alignment between 5<sup>th</sup> Avenue in Hopkins (the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study terminus) and the CSAH 4/TH 212 interchange in Eden Prairie; a total distance of 6.4 miles. Connectivity to the

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Southwest Transit Hub at TH 5/Prairie Center Drive in Eden Prairie is a major design feature for this corridor.

Other major design features are as follows:

- Accommodate existing trail function adjacent to busway in existing 100-foot right-of-way where appropriate.
- Wall on both sides of busway through the Minnetoga Lake area, a wetland, fill sections north and south of Valley View Road, and along the approaches to be a planned TH 5 overpass (7,050 feet).
- Wall on one side of busway through the Shady Oak Lake area and fill sections south of Edenvale Boulevard (3,800 feet).
- Five stations (Shady Oak Road, Baker Road, TH 62, Valley View Road, and TH 212).
- Retrofitted structures 0
- Replace/new structures 2
- Use existing structures 4
- Road crossing signals 6
- Rail grade crossings 1 (IC&W)

### **St. Paul Northeast Corridor (Figure 3, Appendix B Figures A9 to A18)**

This corridor is a total 9.8 miles in length and generally travels along the Burlington Northern Trail right-of-way south of I-694 and MNNR right-of-way north of I-694. The corridor limits are between the Cedar/5<sup>th</sup> Street Transit Hub in downtown St. Paul and Whitaker Avenue in White Bear Lake. Relocation/shared operations with the MNNR tracks north of I-694 would be necessary.

There are a number of options for the downtown St. Paul connection beginning at Earl Street where the rail corridor right-of-way turns east-west and is included in the proposed Phalen Boulevard alignment. There are two key assumptions made for the Phalen Boulevard segment of the busway for the St. Paul Northeast Corridor. The first was that full exclusive busway operating section has been assumed for the length of this segment. The second is that no structure cost was included for the I-35E bridge over Pennsylvania Avenue for the future Phalen Boulevard bridge over BNSF.

The full busway operating section has been assumed to provide a conceptual estimate of the busway cost component of the Phalen Boulevard improvement. The I-35E bridge will be reconstructed as



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part of the I-35E/Cayuga interchange project. Due to the length of the bridge over BNSF and that the bridge is near the expected terminus of the busway, it is likely that the busway would terminate prior to this bridge with buses merging into shared travel lanes for the BNSF crossing.

Buses would then operate in mixed traffic lanes via Pennsylvania Avenue and Jackson Street to connect with the Capitol area and downtown St. Paul. Other options are addressed in the cost savings section of this report.

Major design features are as follows:

- Accommodates two segments of bituminous trail (7<sup>th</sup> Street to Johnson Parkway in St. Paul and from Frost Avenue to Beam Avenue in Maplewood).
- Wall on one side of busway from 7<sup>th</sup> Street to Arcade Street (6,500 feet) and south of County Road C (3,000 feet).
- Wall on both sides of busway from Buerkle Road to Otter Lake Road (7,500 feet).
- Realign existing railroad track in existing 100 feet right-of-way (7,550 feet/1.43 miles).
- Transmission lines parallel right-of-way from I-694 north to Whitaker Avenue.
- Stations 11
- Retrofitted structures 1
- Replace/new structures 12
- Use existing structures 9
- Road crossing signals 9
- Rail grade crossings 3 (Gillette Spur, 3M Spur, BNSF Railroad Wye Track)

#### **Minneapolis Northwest Corridor (Figure 4)**

The Minneapolis Northwest Corridor is a total of 13.9 miles in length and travels along the BNSF right-of-way. The corridor limits are between the 5<sup>th</sup> Street Transit Hub in downtown Minneapolis and IH 610 in Maple Grove.

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Relocation of the BNSF tracks and the high tension overhead utility supports within the existing right-of-way would be necessary to accommodate the busway.

Major design features are as follows:

- Accommodates two segments of bituminous trail (adjacent to Wirth Park and north of Golden Valley Road).
- Wall on one side of busway south of Golden Valley Road (5,000 feet)
- Wall on both sides of busway east of Cedar Lake Road and proposed TH 169 flyover (4,500 feet)
- Realign existing railroad track in existing 100-foot right-of-way (52,800)
- Relocation/replacement of high tension overhead transmission line supports from Cedar Lake Road to Bass Lake Road (35,480 feet).
- Stations 11
- Retrofitted structures 1
- Replace/new structures 12
- Use existing structures 9
- Road crossing signals 9
- Rail grade crossings 4 (Willmar mainline, Monticello mainline, CP Rail spur, CP Rail mainline)

### 3.5.2 Conceptual Level Cost Estimates

Conceptual construction cost estimates are based on the previously identified concept definition and match the methodology used for the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study.

Given the preliminary nature of this study, the cost estimates rely on an extensive visual inventory of the corridor. Representative cross-sections have been developed under unique conditions throughout each corridor to identify major cost elements. These cross-section costs have been supplemented by average costs for stations and other elements on a per unit of length basis along the corridor.

The conceptual level cost estimates presented in this study are intended as input into the Regional Master Transit Plan and should not be interpreted as detailed construction cost estimates.

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Major cost estimate methodology assumptions are discussed below.

**Capital Costs and contingencies** are broken down into eight construction elements:

<u>Element</u>	<u>Contingency</u>
Roadway	15%
Utilities	30%
Communications	10%
Park and Ride	20%
Fare Collections	10%
Stations	20%
Signals	15%
Freight Rail	20%

With the exception of roadway and freight rail elements, costs for the above elements are based on average costs from the Hiawatha Corridor Study.

**Roadway Elements** are based on sketch-level alignment definition and representative cross sections.

**Retrofit of Existing Structures** at overpass locations have been assumed wherever possible.

**Agency/Engineering/Insurance** 25% of total segment construction cost is assumed.

**Park and Ride Lots and Station** costs have been derived from the Hiawatha Corridor project and are similar to the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study methodology.

**Fare Collection** systems have been assumed to be equivalent to those for LRT service and similar to the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study methodology.

**Buses** have been assumed to be hybrid diesel/electric low-floor vehicles similar to those in the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study.

**Right-of-Way** costs are based on cost estimates provided by Mn/DOT (October 1999), which in turn are based on recent acquisition costs in the metro area.

**Operation and Maintenance** cost estimates are not included.

The construction cost for the two Tier I corridors are summarized in Table 2. As indicated, it is estimated that the Minneapolis Southwest Corridor from downtown Minneapolis to TH 212 in Eden Prairie will cost \$124 million and the St. Paul Northeast Corridor will cost \$87.5

million to implement. These costs do not include operating and maintenance costs.

Full cost estimate documentation including the identification of all major elements and representative cross-sections are contained in the Appendix of this report.

**Table 2**  
**Conceptual Level Cost Estimate Summary**  
**Year 2000 Millions of Dollars**

Tier I Corridor	Construction Cost (millions)	Length (miles)	Cost Per Mile (millions)
Minneapolis Southwest Corridor	\$124.0	14.86	\$8.4
St. Paul Northeast Corridor	\$87.5	9.85	\$8.9
Minneapolis Northwest Corridor	\$152	13.92	\$10.9

### 3.5.3 Potential Cost Savings Measures

A number of cost saving measures have been identified for the Minneapolis Southwest and St. Paul Northeast Corridors. These measures include eliminating connectivity with major system routes or reducing the limits of the project. These measures can be used to segment the project into buildable elements from a funding standpoint.

Because the Minneapolis Corridor was added back in to the Tier I category late in the study process, cost saving measures were not identified for the Minneapolis Northwest Corridor.

#### Minneapolis Southwest Corridor Extension

##### *Eliminate I-494 Bus Only Ramps*

The bus only ramps connecting the busway with I-494 to/from the south would provide good system continuity with the shoulder bus lanes on I-494 and a connection with the Southwest Transit Hub at TH 5 and Prairie Center Drive in Eden Prairie. This means that the Southwest Transit Hub buses oriented for downtown Minneapolis would bypass the TH 62 station/potential park and ride site. Potential implications of not providing these ramps are that Southwest Transit Hub oriented buses would either use Baker Road or would travel west on TH 5 to access the exclusive busway.

A more detailed analysis is needed to fully understand the desirability/utility of these ramps especially in relation to the Metro Transit's Bus System Restructuring Plan that is currently under study for this area of the Twin Cities.

Cost Savings: \$1 million

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*Reduce Southern Terminus to TH 5 in Eden Prairie*

The southern terminus at TH 5 could eliminate one-mile of exclusive busway and a lengthy bridge structure over TH 5 while providing a similar level of access to TH 212 as the fully extended concept at CSAH 4. It appears that Mn/DOT currently controls a sizeable parcel (2.7 acres) southwest of the Wallace Road/Venture Avenue intersection. This parcel could provide for an attractive park and ride site.

A more detailed analysis is needed to understand busway connectivity with TH 212 bus shoulder lanes, accessibility of the park and ride site by transit patrons, and the potential to acquire land for a terminus park and ride site.

Cost Savings: \$8.0 million

*Reduce Southern Terminus to TH 62 in Eden Prairie*

The Study Review Committee identified TH 62 as a potential terminus/logical segmentation point for the Southwest Corridor based on a number of issues.

- The segment terminus intercepts a major arterial (TH 62) outside the I-494 ring.
- Southwest Transit owns 10 acres in the area that accommodates their bus garage. Some of this land may be used for a future park and ride location.
- The City of Eden Prairie is planning for redevelopment in the area adjacent to the Southwest Corridor south of TH 62. A park and ride location may be incorporated into a shared use development site.
- I-494 ramps to the proposed busway along with bus shoulder lanes on I-494 and TH 212 could provide a viable busway connection for the Southwest Transit Hub and areas to the west until the full length of the busway is built.

A more detailed analysis is needed to understand the implications of a less direct transit connection via TH 212 and I-494 for areas to the southwest and the viability of TH 62 as a transit terminus. In addition, the timing of the TH 212 improvements needs to be considered. It may be desirable to build the full extent of the busway to capture transit ridership during TH 212 construction when traffic congestion is at its worst.

Cost Savings: \$19.5 million

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*Reduce Southern Terminus to 5<sup>th</sup> Avenue in Hopkins*

Service to downtown Hopkins, a large park and ride, and the TH 169 corridor may be considered a logical terminus for a first stage of construction.

Cost Savings: \$21.5 million (No-Build for Southwest Extension)

St. Paul Northeast Corridor

*Eliminate TH 36 Bus Only Ramps/Transfer Station*

A bus transfer station or bus only ramp connection to the exclusive busway for bus routes in the TH 36 bus shoulder lanes (proposed by Transit 2020<sup>1</sup>) have been included in the cost estimate.

A more detailed analysis is needed to fully understand the desirability/utility of these ramps especially in relation to Metro Transit's Bus System Restructuring Plan currently under study.

Cost Savings: \$20 million

*Reduce Northern Terminus to Beam Avenue in Maplewood*

The Study Review Committee identified Beam Avenue as a logical segmentation point for the Northeast Corridor based on a number of issues:

- Extending further north involves freight rail compatibility/cost issues. It is likely that freight rail realignment in the corridor and/or limited hours of operation would be necessary to implement the busway. The issues may take a substantial amount of time to resolve.
- A park and ride lot currently exists at Maplewood Mall that is a focal point for bus routes today and in the future under the restructuring plan. The Maplewood lot could supplement a park and ride adjacent to the busway north of Beam Avenue.
- Provides a busway crossing with TH 36, which may include a transfer/bus connection opportunity as discussed earlier.
- Does not require bridge replacement north of I-694

A more detailed analysis is needed to understand the implications of ending the busway at Beam Avenue.

Cost Savings: \$28.2 million

*Reduce Southern Terminus to Arcade Street in St. Paul*

A number of design treatments have been considered by the Study Committee for the connection between Earl Street and Cedar/5<sup>th</sup> Street in downtown St. Paul. These connections range from extending the

exclusive busway along the Phalen Corridor to using 7<sup>th</sup> Street beginning at Payne Avenue or Arcade Street to using University Avenue.

The southern terminus needs more detailed analysis including the input of all stakeholders, an assessment of ridership implications on various routes and compatibility with the transit restructuring plan.

The base cost estimate assumes the busway would extend along Phalen Boulevard to I-35E, thus providing a conservative cost estimate. Terminating the busway at Arcade Street represents the lowest cost option.

Cost Savings: \$8.6 million

A summary of project costs and potential cost saving elements are presented in Table 3 for the three Tier I corridors in current year 2000 millions of dollars.

**Table 3  
Potential Cost Savings Summary  
Year 2000 Millions of Dollars**

	<u>Year 2000 Construction Cost (millions)</u>
<b>Minneapolis Southwest Corridor</b>	
Downtown Minneapolis to 5 <sup>th</sup> Avenue in Hopkins*	\$74.0
5 <sup>th</sup> Avenue in Hopkins to TH 62 in Eden Prairie	21.5
TH 62 in Eden Prairie to TH 5 in Eden Prairie	19.5
TH 5 in Eden Prairie to CSAH 4/TH 212	8.0
Interchange	
I-494 Bus Ramps	1.0
<b>Downtown Minneapolis to CSAH 4 in Eden Prairie</b>	<b>\$124.0</b>
<i>Equivalent Cost Per Mile (14.9 miles)</i>	<i>\$8.4</i>
<b>St. Paul Northeast Corridor</b>	
I-35E to Arcade Street along Phalen Boulevard	\$8.6
Arcade Street in St. Paul to Beam Avenue in Maplewood	50.7
Beam Avenue in Maplewood to Whitaker Street in White Bear Lake	28.2
TH 36 Bus Ramps	2.0

	Year 2000 Construction Cost (millions)
<b>Downtown St. Paul to Whitaker Avenue in White Bear Lake</b>	<b>\$87.5</b>
<i>Equivalent Cost Per Mile (9.8 miles)</i>	<i>\$8.9</i>
<b>Minneapolis Northwest Corridor</b>	
<b>Downtown Minneapolis to TH 610 in Maple Grove</b>	<b>\$152</b>
<i>Equivalent Cost Per Mile (13.9 miles)</i>	<i>\$10.9</i>

\* Based on 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study cost estimates. The minimum project limits correlate with the 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study project limits from downtown Minneapolis to 5<sup>th</sup> Avenue in Hopkins. The cost presented has been adjusted to year 2000 dollars and to eliminate bus storage and maintenance facility costs. See Appendix C for cost calculation documentation.

### 3.6 LRT Compatibility

The 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study assessed the potential for busway conversion to LRT. This assessment indicates the incremental cost to convert a busway to LRT in the future is 17 percent greater than the cost of constructing LRT with no initial provision of busway service.

Research included in this study indicates there may be intermediate technology on the horizon between a busway and LRT that may be an important factor to consider in the decision-making process. This intermediate technology is a rubber tired vehicle with similar operating/performance characteristics to LRT and is in the experimental stages in Europe. See "New Concepts of Guided Transit Systems" article in the Appendix.

The key point to be taken from this information is that the design of busways in the Twin Cities region may choose to account for other future technologies other than LRT.



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## 4.0 Conclusions and Next Steps

### 4.1 Conclusions

Exclusive busway implementation in the three identified corridors could be implemented for construction costs in the range of \$8.4 to \$10.9 million dollars per mile. The Metropolitan Council has estimated that approximately \$6 million per year per corridor would be necessary for operations and maintenance costs.

The Minneapolis Southwest and St. Paul Northeast Corridors have available right-of-way in public ownership that could expedite implementation. Interim use trails exist in these two corridors. It has been assumed that the trail function would be maintained adjacent to the busway.

The Minneapolis Northwest Corridor would involve the relocation of active railroad track, significant wetland mitigation, high tension overhead utility support relocation, and the implementation/reconstruction of numerous structures. This corridor may take longer to implement than the other two corridors.

The remaining four corridors have not been eliminated from consideration, but are either currently under study for a variety of transit modes or contain significant physical barriers to early implementation.

### 4.2 Next Steps

1. The following steps should be taken to prioritize the three Tier I corridors for preliminary engineering.

**Local Support** – Assessment of local support through public meetings in affected communities. In order for effective communication of exclusive busway attributes, exhibits should include images of similar systems that exist in North America (e.g. Ottawa) and computer generated images of exclusive busway elements using photographs of representative locations in the three corridors under study.

**Market Analysis/Refined Ridership Projections** – Conduct a market analysis for each corridor that can be used to refine ridership projections and assess the support of the adjacent community/employment base in each travel shed. The market analysis should identify what transit system attributes would be attractive and enhance ridership potential.

**Design Development** – Additional technical details that assist in the comparative evaluation of corridors should be developed. This may include compatibility with the bus system restructuring plan, better understanding of vehicle fleet/maintenance facility needs,

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more understanding of potential corridor segmentation, constructability/ construction staging issues, and representative station/park and ride concepts at critical locations to address local interests/concerns.

**Implementation Plan** – A plan should be developed as the order of implementation for the three corridors is understood. This plan should verify whether each of the three corridors can be implemented by 2010 as proposed by Metropolitan Council after consideration is given to the physical barriers to implementation and funding limitations.

- 2 The entire length of the **Minneapolis Southwest Corridor**, the **St. Paul Northeast Corridor**, and the **Minneapolis Northwest Corridor** be given the highest priority for exclusive busway implementation for the Twin Cities metropolitan area.

Although segmenting the exclusive busway may be desirable from a funding standpoint or to allow time for the resolution of impacts along portions of the corridor, the ideal implementation outcome in regards to ridership potential, reduced congestion, and organized “smart” growth is to build the full extent of each corridor as soon as possible. However, if segmentation is necessary, this study recommends that the following segments within the limits of both corridors be implemented first:

Northeast Corridor between downtown St. Paul and Beam Avenue in Maplewood

Southwest Corridor between downtown Minneapolis and 5<sup>th</sup> Street in Hopkins

Because the Minneapolis Northwest Corridor has been added late in the study process, segmentation of this corridor is not included in this study.

- 3 A plan should be developed as the order of implementation for the three corridors is verified. This plan should determine whether each of the three corridors can be implemented by 2010 (as proposed by the Metropolitan Council) after consideration is given to physical barriers to implementation and funding limitations.

Some of the critical elements to be included in the implementation plan are listed below (assuming a six year total implementation schedule). This plan applies to the Minneapolis Southwest and St. Paul Northeast Corridors. It is unlikely that the Minneapolis Northwest Corridor will follow this implementation plan due to the barriers identified in this report. Depending on the method of funding allocation, agency approval requirements, and a potential focus upon segments with low barriers to implementation, it may

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be possible to compress this six year schedule to a shorter timeframe.

#### 0-2 Years

- Conduct a Preliminary Design Study that includes input/consensus of affected local units of government and all stakeholders (including adjacent property owners). The design study would address busway impacts, design characteristics, and design plan development to provide detailed system definition/cost estimates. Stations/park and rides, trail replacement, and bus storage facility space would be addressed.
- Identify design segments/staging of improvements.
- Identify and complete environmental study requirements.
- Identify funding sources/federal participation.
- Reserve/acquire land for park and ride/station facilities in areas experiencing high land development activity.
- Produce detailed ridership estimates as input to the design process.
- Produce detailed assessment of busway compatibility/system integration with Metro Transit's Transit System Restructuring Plan. This will include all refinements, additions, and removals of service routes to provide feeder bus integration with busways.
- ATTB vehicle procurement.
- Automated guidance system procurement (if necessary).

#### 2-4 Years

- Complete final design, permits, and approvals.
- Construct first phase of Exclusive Busway Implementation Plan (yet to be determined).

#### 4-6 Years

- Construct second phase of Exclusive Busway Implementation Plan (yet to be determined).

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## **Appendix A**

### References

## References

1. Transit 2020, Regional Master Plan for Transit, prepared by Metropolitan Council, January 2000.
2. 29<sup>th</sup> Street and Southwest Corridors Busway Feasibility Study, prepared for Hennepin County by SRF Consulting Group Inc, February 2000.
3. Federal Transit Administration Web site at <http://fta.dot.gov/fta/library/technology/attb.html>.
4. Twin Cities Metropolitan Commuter Rail Feasibility Study, prepared for Mn/DOT by Parsons Brinkerhoff, Phase II, January 1999.
5. Digital Ortho Photography for the Seven County Minneapolis–St Paul Metropolitan Area, Metropolitan Council, April 1997.