Rush Line Corridor Pre-Project Development Study
Locally Preferred Alternative Selection Report

September 2017

FINAL

RAMSEY COUNTY
Regional Railroad Authority

Prepared By:

AECOM

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1.0 Locally Preferred Alternative Summary

The Locally Preferred Alternative (LPA) is Dedicated Bus Rapid Transit (BRT), from Union Depot in downtown St. Paul to White Bear Lake (see Figure 1-1). The route will generally run along Phalen Boulevard, Ramsey County Regional Railroad Authority (RCRRA) right-of-way (Bruce Vento Trail), and Highway 61.

The Locally Preferred Alternative

Length: Approx. 14 miles

Percent Dedicated Guideway: 85%-90%

Number of Stations: 20 stations, including Union Depot and Maplewood Mall Transit Center

Schedule: 5 AM – 12 AM, 7 days/week; starts at 6 AM on Sundays

Frequency: every 10 minutes during rush hour; 15 minutes non-rush hour

Capital costs: $420 M (2021$); + $55 M for other transit routes to use the guideway

Annual Operating and Maintenance Costs: $7.9 - $8.0 M (2015$)

Travel time (minutes, one way):
White Bear Lake > Maplewood Mall: 14
Maplewood Mall > Robert/5th: 30
Robert/5th > Union Depot: 6

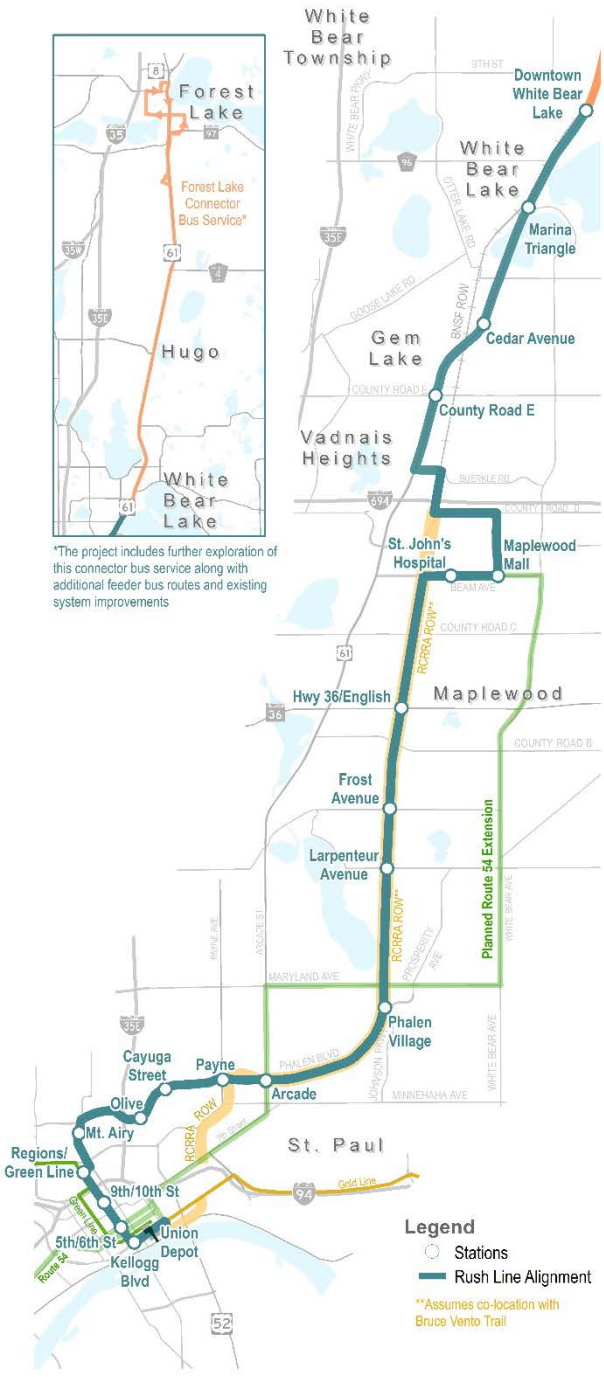
Average Daily Ridership (2040):
5,700-9,600; ridership range reflects other routes using guideway

# of Residents in Station Areas:
40,600 (2010); 60,200 (2040)

# of Jobs in Station Areas:
68,300 (2010); 106,700 (2040)

# of People Living Below Poverty in Station Areas: 11,700 (2014)

Figure 1-1: Locally Preferred Alternative



2.0 Introduction

The LPA Selection Summary Report summarizes the Pre-Project Development (PPD) Study evaluation process, which has resulted in the recommendation of an LPA for the Rush Line Corridor. This report describes which transit modes, facilities, and alignments were studied. This report also describes the major steps in the decision process, who was involved, and the next steps.

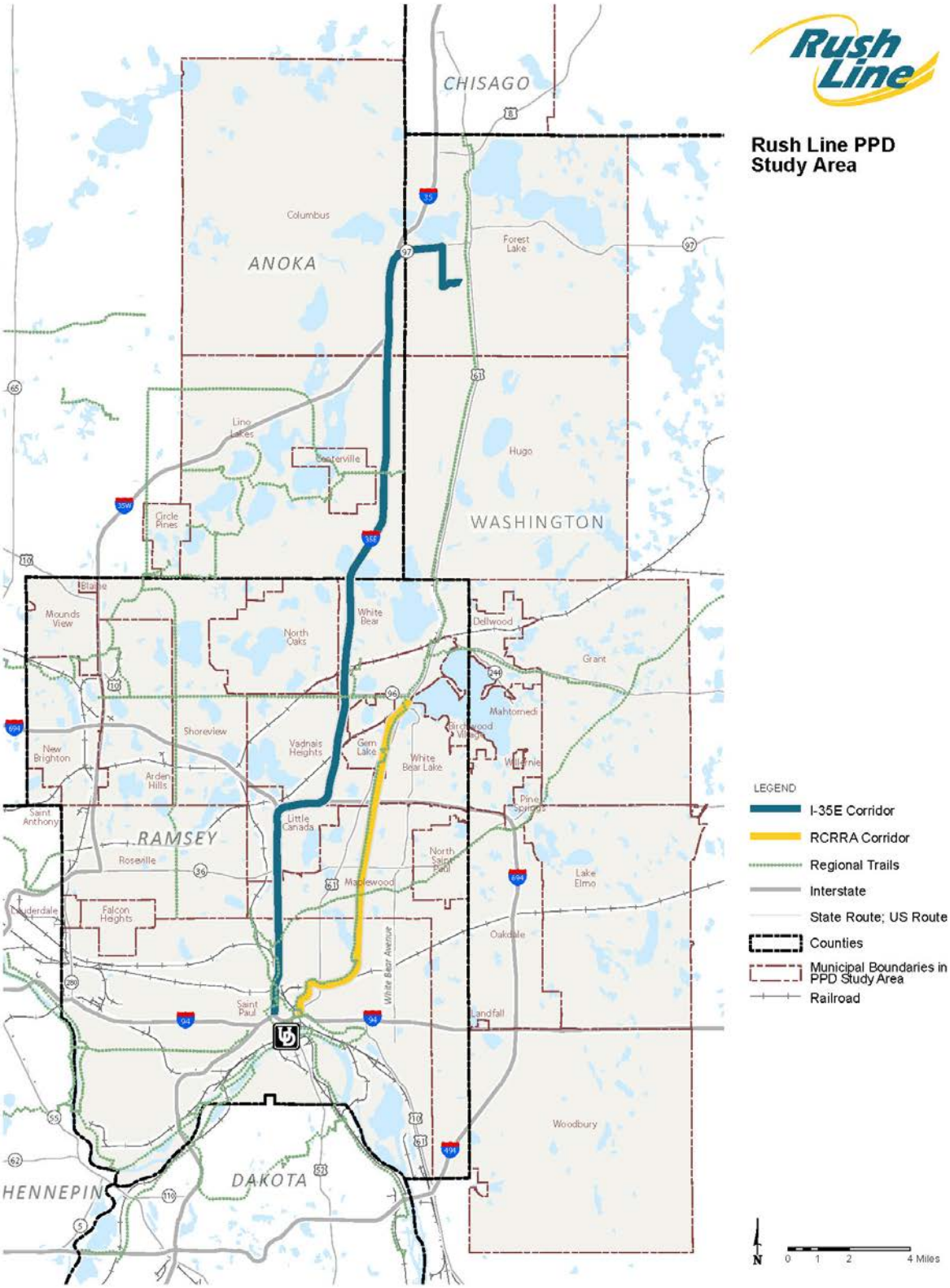
2.1 Project Description

The Rush Line Corridor is a transportation corridor extending 80 miles from Hinckley to the north, to Union Depot in downtown St. Paul to the south, roughly following Interstates 35 and 35E and Trunk Highway (TH) 61. This corridor has been identified by the Metropolitan Council/Metro Transit, the Minnesota Department of Transportation (MnDOT), the Rush Line Corridor Task Force, and the corridor counties for transportation improvements based on current and future population, employment and travel demand.

Based on the findings and recommendations of the 2001 Rush Line Transit Study and the 2009 Rush Line Corridor Alternatives Analysis, this PPD Study focused on analyzing bus and rail alternatives within the 30-mile study area between Forest Lake and Union Depot. The 2009 Rush Line Corridor Alternatives Analysis identified two promising transit corridors within Interstate 35E/35 and the Ramsey County Regional Railroad Authority right-of-way (as shown in Figure 2-1). Additional alternatives were developed and evaluated as part of the PPD Study. Following this alternative development and evaluation process and extensive public engagement activities, the study identified a transit mode and alignment for adoption as the corridor's LPA, which may be subject to refinement and revision during the subsequent environmental review process. The LPA is the transit investment alternative that best meets the purpose and need for the project and is competitive for funding through the Federal Transit Administration's (FTA's) New/Small Starts capital funding program.

The PPD Study was a joint local and regional planning effort conducted by the Rush Line Corridor Task Force and led by the RCRRA. The Rush Line Corridor Task Force (Task Force) is a joint powers board of local and regional representatives charged with exploring transit alternatives that support mobility, economic development and community and environmental enhancement within the Rush Line corridor.

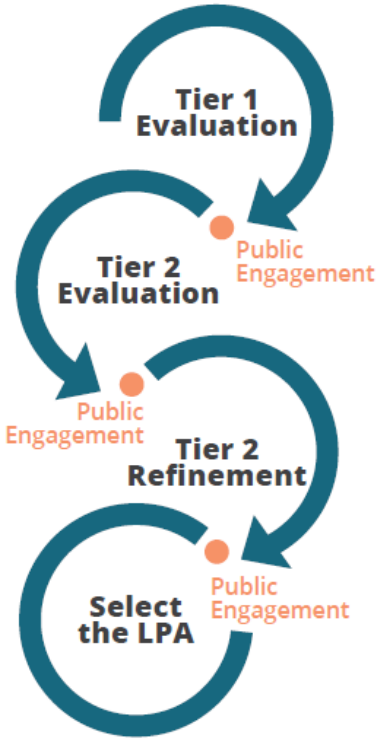
Figure 2-1: Rush Line Pre-Project Development Study Area



2.2 Project Process

In order to evaluate the initial group of transit modes and alignment options and identify the appropriate transit mode-alignment pairings that comprised the detailed alternatives, the Rush Line Pre-Project Development Study followed a three-step method:

- The first step ("Tier 1 Evaluation") entailed the assessment of each transit mode and alignment relative to overall implementation viability.
- The second step ("Tier 2 Evaluation") assessed the transit mode/alignment pairings that passed the Tier 1 Evaluation and compared the benefits and impacts of each.
- The alternative that fared best against the detailed criteria in this second step was further refined in the third step ("Tier 2 Refinement"). The refinement process is summarized in this report. The LPA was identified at the conclusion of this step.



The evaluation criteria associated with each step are a combination of quantitative and qualitative performance measures:

- The Tier 1 Evaluation applied fewer, but broader measures, including information from previous corridor/area studies. The analysis largely relied on broad estimates and comparisons to similar transit projects from around the country.
- The Tier 2 Evaluation applied more detailed and alternative-specific evaluation results.
- The Tier 2 Refinement evaluated the remaining Alternative against federal criteria to identify and refine the LPA.

This three-step process resulted in the identification of an LPA that not only meets locally-identified project purpose and needs, but is also eligible for federal funding.

2.3 Project Decision-Making

Several different committees and, most importantly, extensive public engagement, informed the decisions for the Rush Line Corridor PPD Study. Members of the Technical Advisory Committee (TAC), Policy Advisory Committee (PAC) and Project Management Team (PMT) included:

- Anoka County
- BNSF
- Canadian Pacific Railroad
- Chisago County
- City of Centerville
- City of Columbus
- City of Forest Lake
- City of Gem Lake
- City of Harris
- City of Hinckley
- City of Hugo
- City of Lino Lakes
- City of Little Canada
- City of Maplewood

- City of North Branch
- City of Pine City
- City of Rush City
- City of St. Paul
- City of Sandstone
- City of Stacy
- City of Vadnais Heights
- City of White Bear Lake
- City of Wyoming
- East Central Regional Development Commission
- East Metro Strong
- East Side Area Business Association
- Forest Lake Area Chamber of Commerce
- Metropolitan Council
- Metro TransitMetro State University
- Minnesota Commercial Railroad
- Minnesota Department of Natural Resources
- Minnesota Department of Transportation
- Minnesota Historical Society
- Pine County
- Ramsey County
- St. Paul Area Chamber of Commerce
- St. Paul Port Authority
- Union Pacific Railroad
- Washington County
- White Bear Area Chamber of Commerce
- White Bear Township

The PMT is made up of staff from Ramsey County, staff from the consulting firms, and a small group of people who represent some of the critical decision makers for the project. The PMT manages the overall project and materials, such as report and presentations before going before the TAC. The TAC consists of technical staff from agencies convened to advise on study deliverables and process. The TAC provides advice regarding local government perspectives and issues of concern. It also offers technical input and recommends project actions to the PAC. The PAC is composed of representatives from corridor communities and key partnering agencies and provides policy recommendations to the Task Force. Figure 2-2 shows how the TAC, PAC and public input work together to create the LPA.

Figure 2-2: LPA Recommendation and Selection Process

The recommendations and decisions of each of these committees were also informed by public input. Members of the public have been engaged throughout the Pre-Project Development Study process; a summary of public engagement activity can be found in Section 2.5 of this report.

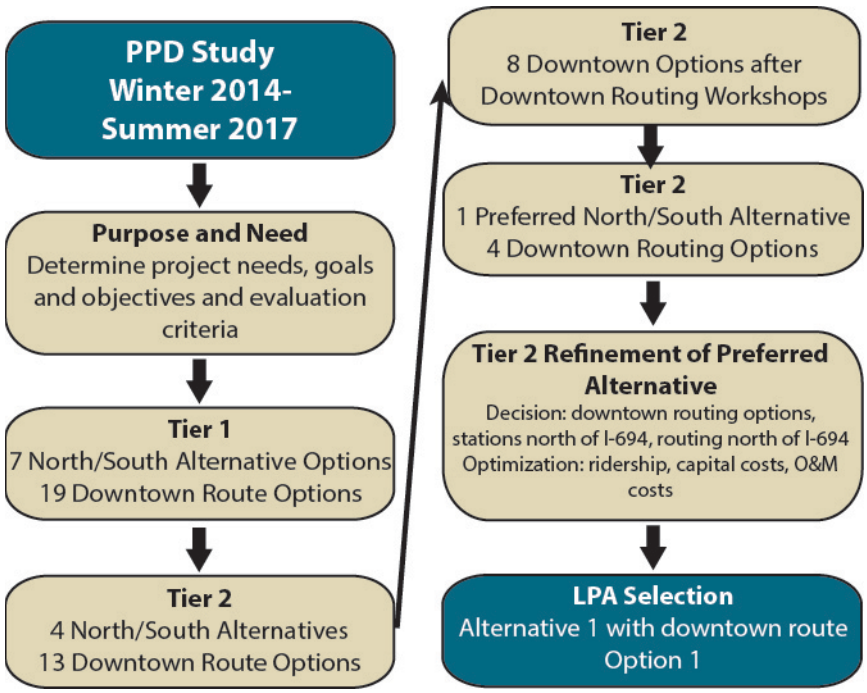
2.4 Project Evaluation Process

2.4.1 What is a Pre-Project Development Study?

A Pre-Project Development Study is a process for the local evaluation of the costs, benefits and impacts of transit alternatives that are designed to address mobility problems and other locally-identified objectives in a transportation corridor. It is used to identify the investment strategy to be advanced for more focused study and development. The PPD Study further serves as the basis for developing the technical information necessary to support a project's entry into the project development phase of the FTA Capital Improvement Grants (CIG) Program if the project is deemed eligible for federal funding. The PPD process officially concludes with the recommendation of an LPA for consideration in the regional long-range transportation plan, the 2040 Transportation Policy Plan.

Figure 2-3 shows the steps in the PPD process, specific to the Rush Line Corridor. Overall, the study started with a large universe of alternatives that was refined and reduced using the project's evaluation criteria and constantly measuring how well each of the alternatives met the project's purpose and need.

Figure 2-3: Alternative Analysis Process – Universe of Alternative to LPA Selection



2.4.2 What is a Locally Preferred Alternative and why is it important?

The LPA is the transitway alternative that the corridor's cities and counties prefer to best address the project's identified purpose and need. The LPA is a general description of the type of transit that will be used (mode) and the location (alignment). The LPA definition is general; LPA design specifics and definition of additional elements of the project, including station locations, can be refined during subsequent engineering and planning efforts.

Identification of an LPA is a critical step in pursuit of federal funding. The selection of an LPA tells the FTA which alternative local agencies expect to be the most competitive. It is expected that the region will pursue federal funding for the Rush Line Corridor project through the FTA New Starts program.

2.5 Summary of Public Engagement

A critical component of the PPD Study is stakeholder and public participation. Effective stakeholder and public participation is essential for good decision making and to assist in making a lasting contribution to the quality of life of those who live in the corridor. Based on the Stakeholder and Public Engagement Plan, the consultant team developed and conducted activities in the corridor since the inception of the PPD Study. Summaries and all materials related to public engagement activities over the course of the Rush Line PPD Study are available on the project website at www.rushline.org, and more information is available in Appendix B of this report.

2.5.1 Public Involvement Goal and Approach

The goal of public involvement is to ensure that the concerns and issues of those with a stake in the corridor are identified and addressed. To achieve this goal, the Rush Line PPD Study:

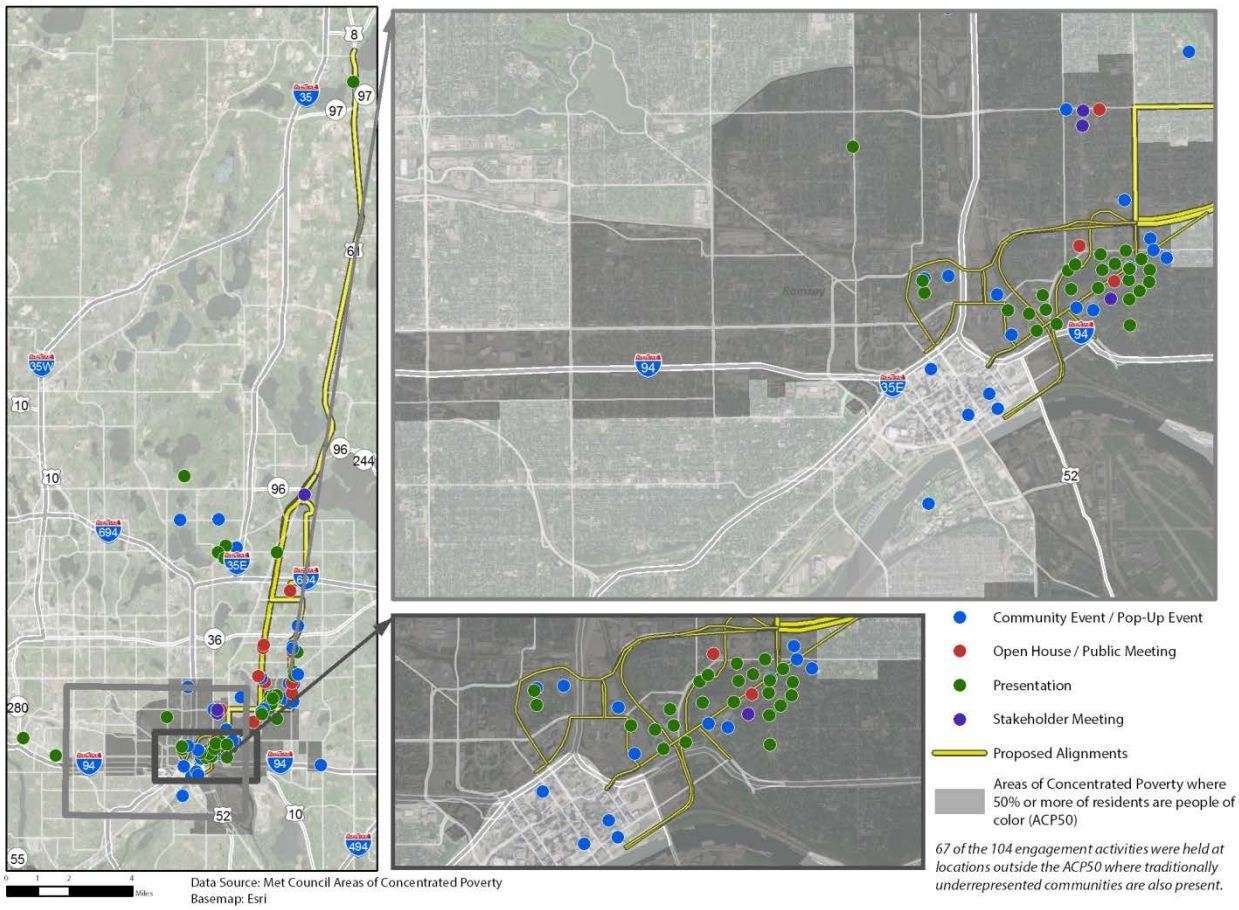
- Identified stakeholders, including disadvantaged populations not traditionally involved in transit decision making.
- Engaged stakeholders in meaningful and accessible ways.
- Solicited early and continuous involvement from stakeholders.
- Offered reasonable public availability of project information.
- Sought out collaborative input on alternatives and evaluation criteria.
- Provided transparency during the decision-making process.

Effective and meaningful engagement and outreach to under-represented populations was instrumental to the success of this study. Strategies that were used to reach under-served populations included:

- Providing meeting notices in ethnic media publications for communities represented in the corridor.
- Ensuring that the news releases reach ethnic media outlets.
- Translating meeting notices and project information, at a minimum, to Spanish, Somali and Hmong.
- Providing interpretation services and/or staff that are bi-lingual at public meetings, at a minimum, in Spanish, Somali and Hmong.
- Attended meeting of established organizations that serve specific cultural/ethnic groups or business communities.
- Attended local events and festivals to provide information and answer questions about the project.

Figure 2-4 shows the location of public engagement activities and those activities that also fall within the Metropolitan Council's predefined Areas of Concentrated Poverty where 50 percent or more of residents are people of color (ACP50).

Figure 2-4: Engagement Activities in Underrepresented Areas



2.5.2 Tier 1 Public Engagement

Several public engagement activities occurred during the Tier 1 phase of public engagement (August 20, 2015 through October 23, 2015). Public meetings were held that allowed residents and businesses to view the Tier 1 Evaluation results and talk with staff. Two neighborhood meetings were held in Maplewood and St. Paul and directly focused on residents and property owners who live adjacent to the Ramsey County right-of-way/Bruce Vento Trail. In addition, three larger community meetings were held in Forest Lake, Maplewood and St. Paul that provided an opportunity for a broad attendance and a more formal opportunity for attendees to participate in a public "town hall" session with project staff. Members of the Public Engagement Advisory Panel were also consulted during this phase on engagement activities and materials. Frequent PAC meetings continued over the course of the study.

Comments and feedback collected from these activities provided insight into preferred routes and transit vehicle alternatives. The approximately 90 comments received were taken under consideration in the approval of the Tier 1 route and transit mode alternatives, and informed the Tier 2 study process, see section 4.4 for more detail.

2.5.3 Tier 2 Public Engagement

To collect input and engage the community during the Tier 2 phase of public engagement (November 1, 2015 through January 4, 2017), the study team conducted public meetings and other activities: pop-up informational tables; presentations; online engagement (website, social media,

email updates, web-based engagement platforms); and distributed project information through mailings and displays. During this time, over 1,500 public contacts were made through the engagement activities. Monthly TAC, PAC, and PMT meetings continued during the Tier 2 phase of the study, see section 5.2 for more detail..

2.5.4 Locally Preferred Alternative Public Engagement

Public engagement related to the Draft LPA was from March 24 to May 4, 2017. To collect input and engage the community, the study team conducted an open house and public hearing and other activities: pop-up informational tables; presentations; online engagement (website, social media, email updates); and distributed project information through mailings and displays. Between the public hearing and the open house, there were 85 attendees, 30 speakers and 18 comment sheets. There were 80 attendees at the pop-up events, and 65 attendees at the presentations, see section 7.2 for more detail.

Public Input Received on Draft LPA

Opportunities

- Less visual and noise impacts than LRT
- Less expensive than LRT or other routes
- Possibility to convert to LRT in future
- Perceived as safer than LRT
- Faster travel times
- Preference for hybrid or electric buses

Challenges

- Need to consider how people will access service at stations
- Concerns about potential impacts to existing green space, trail, and private property
- Perception that it will impact property value and quality of life and/or change character of neighborhood
- Concerns about safety in neighborhood and along route

2.5.5 Summary of Public Engagement

In total, more than 5,200 people participated in the Rush Line Study through 104 community events, workshops, business outreach, presentations, pop-up events, social media, and online engagement forums.

Community input was critical to shaping the process and outcomes of the study, including:

- Which routes and transit vehicle options should be explored
- Where proposed stations should be located
- Which goals are the most important to community members
- How to minimize or avoid potential impacts

Figure 2-5: Rush Line Public Involvement

Public engagement will continue through the environmental phase of the study, which is anticipated to begin in fall 2017.

Public Involvement Summary

- More than 5,200 people participated
- 104 community events

Common feedback heard by the project team:

- Provide all-day transit service
- Connect people to businesses, services, jobs and education
- Preserve natural spaces
- Concern about property and business impacts
- Pursue highest transit investment possible to make areas more desirable
- Transit options should also be cost-effective

3.0 Project Purpose and Need

3.1 Purpose and Need

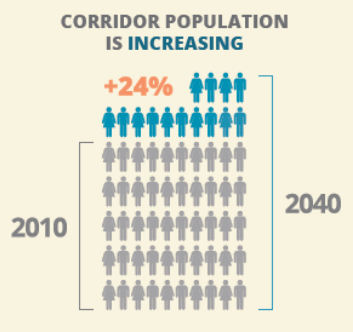
One of the first reports completed for the Rush Line PPD Study was the Purpose and Need Statement. This document identified the transportation needs of the corridor, which in turn led to the development of the alternatives (transit modes paired with routes) that could meet these needs.

The purpose of this study is to:

- Provide transit service that satisfies the long-term regional mobility needs for businesses and the traveling public and catalyzes sustainable development within the study area.

The development of the project purpose also identified the four following project needs:

1. **Project Need 1: Sustainable growth and development**
   - Study area communities, and the surrounding region, need transportation options that are supportive of sustainable growth and development patterns.
   - The overall corridor population will increase by 24 percent by 2040.
   - Area employment will increase by 30 percent with 70,000 jobs added by 2040.
   - Major residential, commercial and mixed-use activity centers are planned throughout the study area.



2. **Project Need 2: People who rely on transit**
   - Study area demographics are shifting toward households that must or choose to rely on transit to meet their mobility needs.
   - The population is growing older and additional mobility options are needed to support quality of life for the aging population that cannot or chooses not to drive.
   - Average household income has decreased and the number of people living below the poverty line has increased. Multi-modal mobility options offer travelers a lower user-cost alternative to car ownership while maintaining mobility and accessibility.

   - The number of households without a car has increased in the areas with the least amount of transit service. Shifts in generational preferences are increasing the number of households that choose not to own a car.
3. **Project Need 3: Sustainable travel options are limited**
   - Study area commute times are increasing. Improvements to the study area transit network will provide options and may encourage commuters to shift from driving to transit service that offers consistent and competitive commute times.

- Traffic volumes are growing. The scale of roadway expansion required to mitigate this growth in traffic volume and resulting congestion is unlikely to be financially feasible, environmentally sensitive or aligned with the region's vision for growth.

4. **Project Need 4: Increasing demand for transit**
   - Corridor bus ridership trends indicate increasing demand for express, suburban local and northern-oriented bus routes. Additional transportation network investment that matches these emerging transit demand patterns will improve mobility within the study area, improve connectivity to the regional transit network and increase transit system ridership.

3.2 Goals

As part of the development of the project's purpose and needs, six project goals were developed to describe the outcomes that the LPA hopes to deliver. Evaluation criteria were developed to assist in understanding the degree to which each alternative would meet these project goals. The TAC and PAC provided input into what information would be useful in determining an alternative's ability to meet the project goals, and which evaluation criteria would help identify the key differentiators between the alternatives.

1. **Project Goal – Increase Transit Use**

Daily ridership on the Rush Line Corridor, overall ridership within the study area, transit travel time, and the number of new transit riders and transit-dependent riders were calculated to determine the ability of each alternative to meet the goal of increasing transit use.

Daily ridership estimates the total number of riders that will use each alternative. Transit travel time calculates how long a one-way trip on each alternative would take. Travel time influences the numbers of riders – the longer a transit trip takes, the less likely people are to use transit. The number of transit-dependent riders helps decision-makers to ensure that the alternative would expand the mobility of people who rely on transit to meet their everyday needs.

Figure 3-1: Project Goals

2. **Project Goal – Develop an Implementable Project**

The evaluation considered construction costs, operating and maintenance costs, and the FTA cost effectiveness calculation to assist in determining whether an alternative is implementable (from a local funding perspective) and eligible for FTA's New Starts or Small Starts Capital Investment Program (from a federal funding perspective).

3. **Project Goal – Improve Quality of Life**

Determining whether an alternative will improve quality of life for residents is critical to ensure that both benefits and adverse impacts are measured. Quality of life criteria include consideration of water resources, noise and vibration issues, potential parkland and cultural resource impacts, as well as

increasing services to transit-dependent populations, such as households below poverty and zero-car households.

4. Project Goal – Improve Sustainable Transportation Options

Sustainable transit options maximize the connectivity of bicyclists and pedestrians to the transit system. This increased access is measured by determining the number of residents within reasonable walking and biking distance of stations and the degree to which the routes to the stations are comfortable for bicyclists and pedestrians.

5. Project Goal – Enhance Regional Connectivity

It is important to understand that transit is part of a larger transportation network and must work well with drivers, bicyclists and pedestrians, as well as the existing transit network. The criteria that measure this goal were designed to measure potential impacts to drivers and transit users by identifying the number of driveways and local roadways intersecting each alternative, calculating the level of existing traffic congestion on corridor roadways, inventorying the number of existing transit routes the service could connect with, and counting the potential number of parking spaces impacted by each alternative.

6. Project Goal – Supports the Local Vision for Sustainable Development

To support the local vision for sustainable development patterns, a transit alternative should minimize impacts to adjacent property while encouraging future development. It should also focus service to areas with the highest levels of forecast population and employment growth, and complement the development plans of the communities in the corridor by maximizing development potential near the transit corridor.

3.3 Evaluation Criteria

This project's sponsors will likely apply for capital funding through the FTA's Capital Investment Grants Program. This program uses predefined criteria to evaluate projects, and the Rush Line Evaluation process has been designed to incorporate these criteria into the local evaluation process. The Rush Line PPD Study evaluation process was designed to identify which alternatives meet local needs and also complete a high-level review of their eligibility for federal funding.

Table 3-1: Rush Line PPD Evaluation Criteria

	Evaluation Phases		
Project Goals	Tier 1 Evaluation (qualitative analysis)	Tier 2- Detailed Evaluation (qualitative and quantitative)	Tier 3 – LPA Refinement (quantitative and qualitative
Increase the use of transit and its efficiency and attractiveness for all users	Ridership capacity • Current corridor transit ridership • Typical transit mode capacity	Ridership New transit riders Transit-dependent riders Travel time	Mobility improvements* Congestion relief*

Project Goals	Evaluation Phases		
Improve sustainable travel options between and within study area communities	Multi-modal connectivity • Proximity to planned and existing bike routes and pedestrian facilities • Proximity to activity centers	Multi-modal connectivity to and between activity centers Access provided to the community	Mobility improvements* Congestion relief*
Enhance connectivity of the corridor to the regional transportation network	Multi-modal connectivity • Proximity to existing and regional transit and transportation services	Potential right-of-way impacts Bicycle and pedestrian safety Parking and traffic impacts	Congestion relief*
Support sustainable growth and development patterns that reflect the vision of local and regional plans and policies	Land use / economic development • Consistency with local and regional plans • Consistency with existing land use • Proximity to planned and existing activity centers	Compatibility with local and regional plans Land use and economic development opportunities	Economic development* Land use*
Contribute to improving regional equity, sustainability and quality of life	• Contributed to improved transportation network safety	• Contributed to improved transportation network safety	• Contributed to improved transportation network safety
Develop and select an implementable and community-supported project	• Capital and operating and maintenance costs • Cost effectiveness • Community support	• Capital and operating and maintenance costs • Cost effectiveness • Community support	• Capital and operating and maintenance costs • Cost effectiveness • Community support

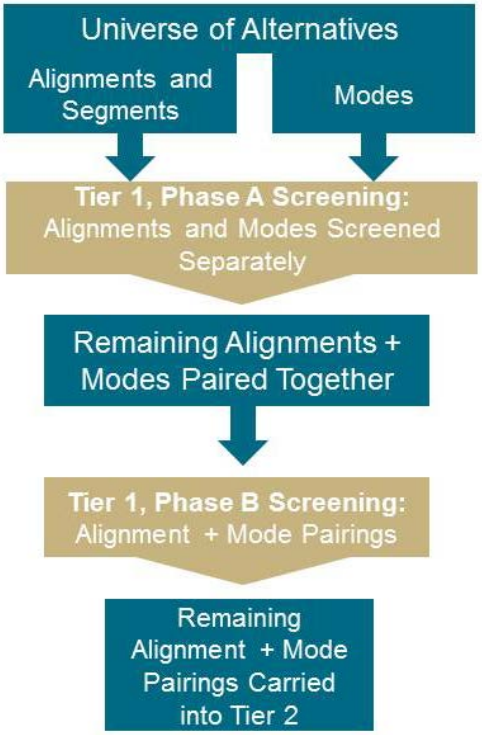
**consistent with FTA New Starts/Small Starts criteria*

See Appendix B for additional information on public engagement and feedback received during the Purpose and Need phase of the study.

4.0 The Tier 1 Evaluation

The Tier 1 Analysis was a two-step process that relied on readily available information and focused on high-level, qualitative assessments of alignments and transit modes. The purpose of the Tier 1 Analysis was to identify the alignments and modes that are feasible for implementation within the Rush Line Corridor and eliminate those that are not feasible. Based on the results of the analysis, some alignments and transit modes were determined to be infeasible and removed from further consideration; other alignments and transit modes were determined to be feasible and carried forward for further definition and analysis during the Tier 2 analysis.

Figure 4-1: The Evaluation Process



The Tier 1 Analysis was broken down into two phases.

- The **Phase A** analysis focused on the separate evaluation of alignments and transit modes north of Phalen Boulevard.
    - The analysis found that all alignments and transit modes were feasible for implementation; therefore, all alignments and transit modes were carried forward into the Phase B analysis.
- The **Phase B** analysis paired the alignments and transit modes together to create alternatives.
    - Four north/south alternatives (north of Phalen Boulevard) and 13 segments into downtown St. Paul were recommended for further study during Tier 2.

4.1 Tier 1, Phase A Transit Modes for Evaluation

In the Tier 1, Phase A project phase, there were eight transit modes under consideration. These modes were:

- No Build*
- Local Bus
- Arterial Bus Rapid Transit (BRT)
- Streetcar
- Light Rail Transit (LRT)
- Diesel Multiple Unit (DMU)
- Dedicated Guideway BRT
- Highway BRT Station to Station
- Highway BRT Express

*No build is not technically a transit mode, but just assumes the continuation of existing transit, with no improvements beyond any improvements that are already planned.

Figure 4-2 describes the typical frequency, runningway, system length, capital costs and station spacing associated with each of these transit modes.

Figure 4-2: Tier 1 Transit Modes

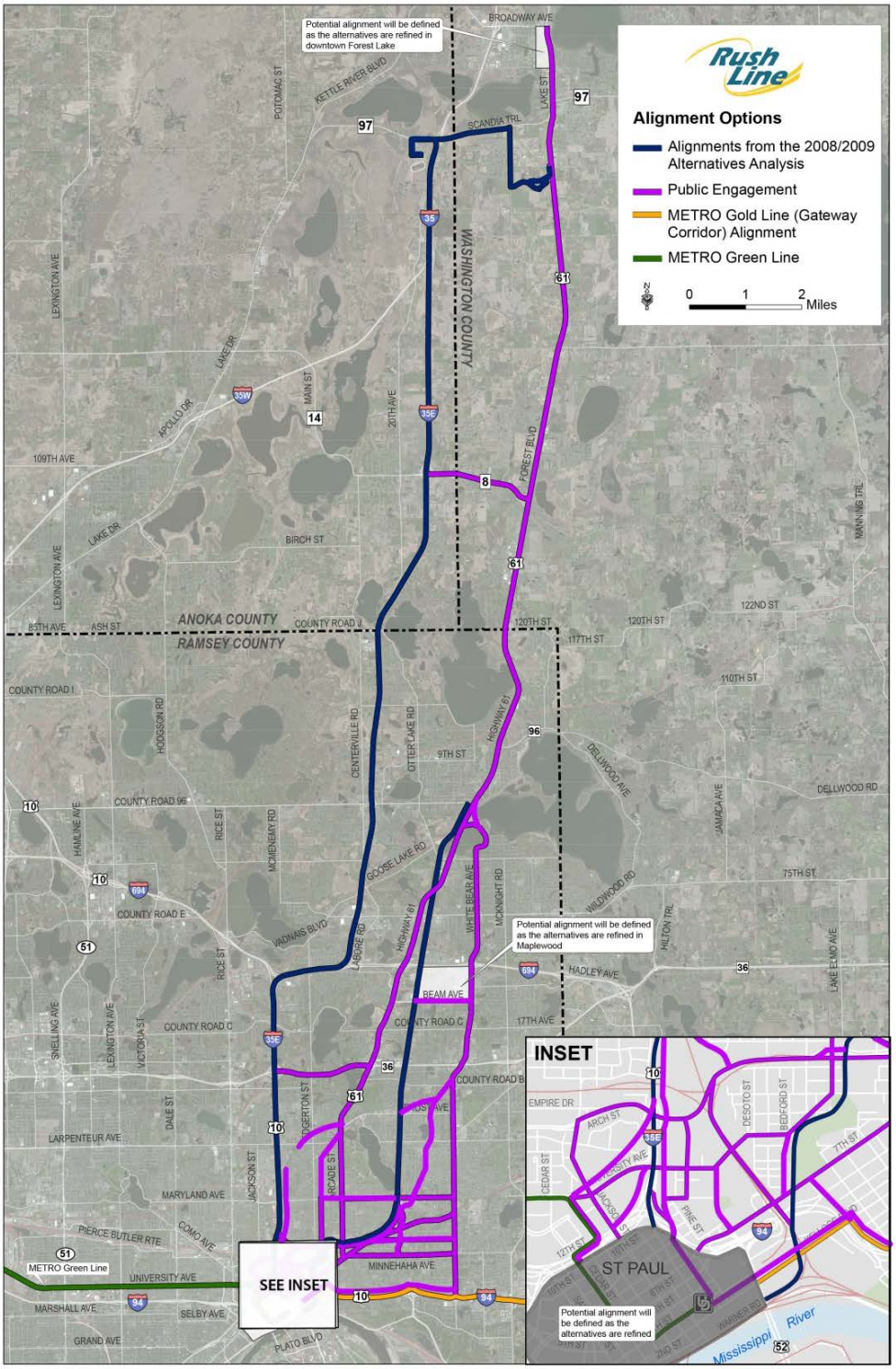
	MODE	Frequency: How often does a typical bus or train arrive at a stop?	Runningway: Does a typical bus or train travel in mixed traffic or its own dedicated lane? – Mixed Traffic	Runningway – Dedicated Guideway	System Length: From end-to-end, how far does a typical bus or train travel?	Capital Costs: What is the relative cost to construct this mode?	Station Spacing: What is the average mileage between each station for this mode?
All-Day Frequent Service	 Local Bus	Varies	●		Varies	$	1/8 - 1/6 mile
	 Arterial Bus Rapid Transit (BRT)	Every 7 - 15 minutes	●		5 - 15 miles	$$	1/4 - 1/2 mile
	 Streetcar	Every 7 - 15 minutes	●		1 - 5 miles	$$$	1/8 - 1/4 mile
	 Light Rail Transit (LRT)	Every 10 minutes		●	10 - 30 miles	$$$$$	1 mile
	 Diesel Multiple Unit (DMU)	Every 10 minutes		●	20 - 40 miles	$$$$$	1 mile
	 Dedicated Guideway BRT	Every 10 minutes		●	10 - 30 miles	$$$$	1 mile
	 Highway Bus Rapid Transit Station-to-Station	Every 10 - 15 minutes	●	●	10 - 20 miles	$$$	2 miles
Commuter Express Service	 Highway Bus Rapid Transit Express	Every 30+ minutes	●	●	10 - 25 miles	$$-$$$	5 miles (market specific)

4.2 North/South Segments for Evaluation

There were seven north/south alignments that were evaluated as part of the Tier 1, Phase A analysis. These alignments were developed by the PMT and the TAC in fall 2014. They were recommended by the TAC in December 2014. The public then gave their input on the alignments during the January 2015 open houses; those routes are highlighted in purple in Figure 4-3. Finally, they were approved by the PAC in February 2015. The alignments are listed below and shown in Figure 4-3:

- Alignment A: I-35E
- Alignment B: RCRRA / BNSF / WCRRA right-of-way (ROW)
- Alignment C: Trunk Highway (TH) 61
- Alignment D: Payne Avenue
- Alignment E: White Bear Avenue
- Alignment F: Prosperity / Johnson Parkway
- Alignment G: Gateway Corridor

Figure 4-3: Tier 1 North/South Alignments

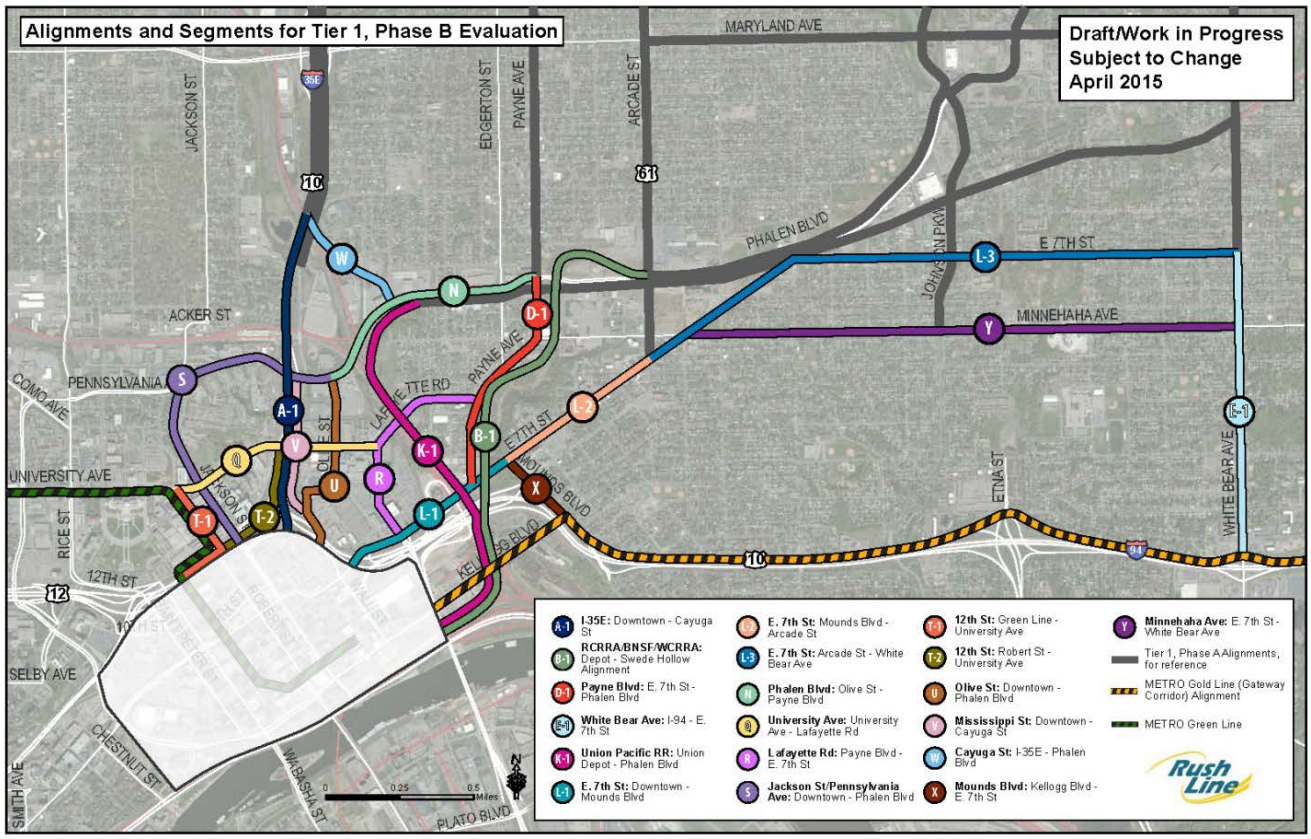


In addition to Alignments A through G, there were several east/west connector alignments that were defined that could potentially connect one north/south alignment to another.

4.3 Downtown Segments for Evaluation

At the start of the Tier 1 Phase A evaluation process, there were 19 downtown alignments under consideration, see Figure 4-4.

Figure 4-4: Tier 1, Phase A Downtown Alignments



4.4 Tier 1 Public Feedback

Several public engagement activities took place during the Tier 1 phase. Below is a summary of the comments that were received.

Dedicated BRT on County/Rail ROW to Forest Lake

Opportunities

- Goes farther north; serve more communities
- Fast, reliable route
- Provides needed weekday and weekend service
- Less expensive than rail
- Infrastructure could be used by other buses
- Lead to potential development on Hwy 61
- Assist to relieve highway traffic
- Properties along Hwy 61 are commercial not residential

- Park and ride option in Forest Lake

Challenges

- Preference for maintaining and/or improving existing express bus service
- Route runs along Bruce Vento Trail
- Route runs through Swede Hollow

LRT/DMU on County/Rail ROW to White Bear Lake

Opportunities

- Less bus exhaust/emissions
- Quiet, efficient
- Practical: rail-bed is still in place; county-owned
- Cost effective
- Rail option would have better ridership
- Provides other options to commuters
- Dedicated lanes: provides a faster route

Challenges

- LRT is expensive and inflexible compared to BRT
- Not in favor of DMU
- Preference for BRT on this route
- Route runs along Bruce Vento Trail
- Route runs through Swede Hollow

Arterial BRT on White Bear Avenue to White Bear Lake

Opportunities

- Benefits the neighborhoods who need this service the most
- More accessible for residents
- Better access to businesses
- Increase business in the area
- Faster than regular bus
- Flexible
- Less expensive
- More frequent all day service
- Improved stations
- Sidewalk improvements
- Less impact on home values

Challenges

- Loss of parking
- Impacts to properties and businesses
- Preference for LRT instead of bus

Routes into downtown

Opportunities

- Connect to the 30,000 plus people of Payne Ave/Phalen Blvd
- Connect to areas of low income; there is a need for improved transportation
- Connect Lafayette Office Park to Green Line
- Coordinate with city and their future projects
- RCRRA ROW: Union Depot to Swede Hollow
- E. 7th Street routes
- Union Pacific Railroad: Union Depot to Payne Ave
- Phalen Blvd: Olive St to Payne Ave
- Jackson St/Pennsylvania Ave: Downtown to Phalen Blvd
- Robert St/University Ave /Olive St/Phalen Blvd

Challenges

- RCRRA ROW: Union Depot to Swede Hollow
- Routes adjacent to Regions Hospital

Route: RCRRA ROW/Swede Hollow

Opportunities

- East Side would benefit the most from this route
- Provides access to residents
- Makes sense: county-owned

Challenges

- No access to businesses
- Unsafe
- Minimal development opportunities
- Loss of greenspace and community resource
- Increase noise
- Lower property values
- Impacts to natural environment
- Decreases quality life and health of community

Route: General Comments

- Should serve the local community, people reliant on transit and commuters
- Need a fast connection to the Green Line, especially from the East Side
- Extend route past Forest Lake

Petitions were received from the following organizations:

- Friends of Swede Hollow
    - Material submitted with a preferred alternative route for the Rush Line corridor: from the Green Line at University Avenue and Robert Street to Phalen Boulevard; referenced an online petition with 352 supporters
- St. Paul Garden Club
    - Petition submitted with 34 signatures requesting that a transit alignment not go through Swede Hollow Park

City Council/Committee Input

- St Paul
    - Desire to serve areas of concentrated poverty and provide access to jobs for various skill levels
    - Interested in development opportunities at station locations (Phalen Village)
- Maplewood
    - Concern about impacts along rail ROW alternatives and the need for closer examination
    - Desire to serve Gladstone and Maplewood Mall areas
- Middle Cities (White Bear Lake, Gem Lake, Vadnais Heights, White Bear Township)
    - See a strong need for Rush Line service
    - Input on where station stops should be located
    - See the potential for people to reverse commute to suburbs for jobs
- Northern Cities (Forest Lake, Hugo, Centerville, Lino Lakes)
    - Do not see as strong a need for Rush Line service
    - Supportive of existing express bus service on I-35E
    - Interest in feeder connections

District Council Input

- District 2: Greater East Side
    - Took action to express "general support of LRT in District 2", but did not identify a specific route
- District 5: Payne Phalen

  - Rush Line creates tremendous opportunity for community residents and region
  - Phalen Boulevard alignment serves community better than others (high transit dependent population and opportunity for job creation and development)
  - Community not supported well by any alignment that impacts Swede hollow and the northern portion of the Bruce Vento Trail
  - Encourage consideration of creative hybrid solutions
  - Evaluation should look at broader environmental impacts (natural, heath, equity)
- District 6: North End
  - Supportive of more transit connections to job centers in the district
- District 4: Dayton's Bluff
  - Supportive of Rush Line but not through Swede Hollow

Business Community Input

- Concern about property impacts, loss of parking and access restrictions for alignments along arterials
- Desire to see service to 5,000 plus jobs in Lafayette Business Park
- East 7th Street, Beacons Bluff and Phalen Village also identified as areas to be potentially served
- Pursue highest transit investment possible to make areas more desirable
- Identified need for transit improvements to get employees to work

4.5 Tier 1 Evaluation Process and Results

4.5.1 Phase A Transit Mode Evaluation

The following criteria were used to evaluate each of the transit modes listed above in section 4.1. These criteria were selected because they related specifically to mode choice, whereas other criteria are more specific to the alignment.

- **Ridership capacity:** How many passengers the transit mode can typically carry.
- **Economic development:** Whether there is a demonstrated ability of a transit mode to catalyze economic development in other communities across the country.
- **Environmental impacts:** Assessment based on anticipated property acquisition, construction activity and transit operations that are associated with each of the modes.
- **Capital costs:** This was calculated by taking the average per-mile capital costs of similar projects constructed around the country.
- **Community awareness:** For information only, a description to assess the degree to which community members are familiar with different types of modes.

Each transit mode was rated on each criterion, and received 3, 2 or 1 point(s). The total, overall score is presented in Figure 4-5.

Figure 4-5: Tier 1 Transit Mode Evaluation Results

MODE	OVERALL SCORE (out of 15)	
No Build	8	
	10	
	10	
	10	
	10	
	10	
	9	

Decision: The differences between the overall scores for each of the transit modes was not significant enough to remove any transit modes from further consideration, therefore all transit modes were carried forward to the Tier 1, Phase B analysis.

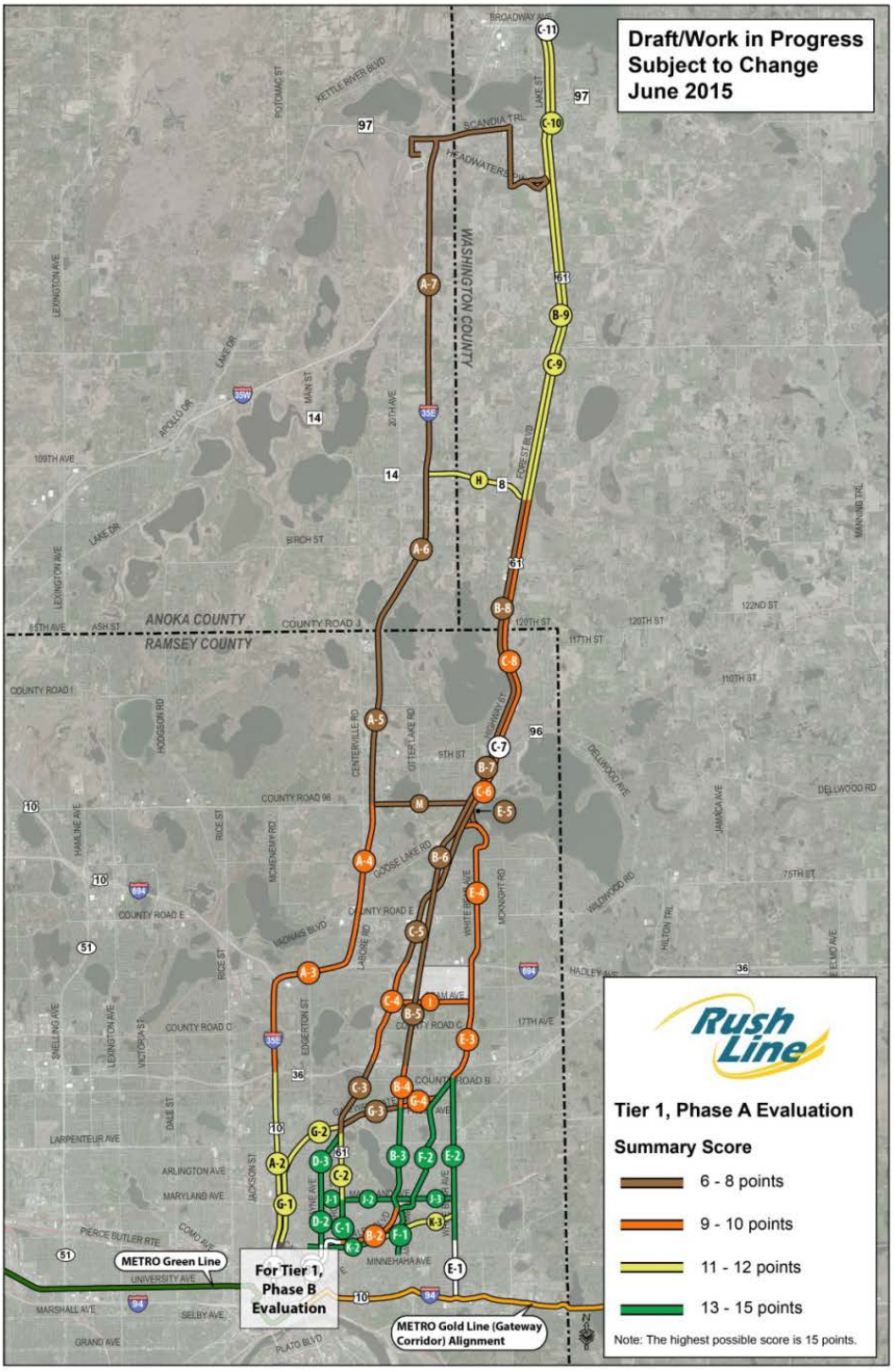
4.5.2 Phase A Alignment Evaluation

For evaluation purposes, alignments were broken down into several segments to facilitate the analysis, and determine if part of an alignment would perform differently than another part of the same alignment. After evaluation, it was determined that all alignments would be carried forward into the Phase B analysis. While the differences between the alignments were not significant enough to remove an alignment from further consideration, there were some areas to note where there are strengths and weaknesses, including:

- Alignment A: I-35E lost points on multi-modal connectivity, land use/economic development and equity.
- The northern segments of TH 61 lost points on regional connectivity, land use/economic development and equity.
- The southern segments had better regional connectivity and fewer environmental impacts than northern segments.
- The segments north of the City of Saint Paul had lower equity scores.
- All segments in the City of Saint Paul had strong performance across the board.

The results of the Tier 1, Phase A alignment evaluation are shown in Figure 4-6.

Figure 4-6: Tier 1, Phase A Alignment Evaluation Results



Decision: All alignments were carried forward into the Tier 1, Phase B analysis.

4.5.3 Phase B Paired Transit Mode and Alignment Evaluation

The Tier 1, Phase B analysis paired the transit modes and alignments together to create alternatives. This process was developed with the guidance of the PMT. Table 4-1 shows how the modes were paired with the major north/south alignments. Some modes are better suited for some alignments than others. For example, Arterial Bus needs to run an alignment that is an arterial street and therefore, could not run on the RCRRA/BNSF/WCRRA right-of-way.

Table 4-1: Phase B Transit Mode and Alignment Pairing

ALIGNMENT ▸ / MODE ▾	A: I-35E	B: RCRRA/ BNSF/ WCRRA	C: TH 61	E: White Bear Ave
NO BUILD	●	●	●	●
ARTERIAL BUS RAPID TRANSIT (BRT)			●	●
STREETCAR			●	●
LIGHT RAIL TRANSIT (LRT)		●	●	●
DIESEL MULTIPLE UNIT (DMU)		●	●	●
DEDICATED GUIDEWAY BRT		●	●	●
HIGHWAY BRT STATION-TO-STATION	●			

The Tier 1, Phase B analysis was a seven-step process:

1. Define north/south alternatives and criteria (modes combined with alignments are called alternatives).
2. Apply environmental criteria to north/south alternatives.
3. Apply the other criteria to remaining north/south alternatives.
4. Apply all criteria to the east/west connector segments.
5. Apply all criteria to the downtown segments.
6. Meet with the PMT and review results.
7. Apply existing transit/transportation policies to the alternatives.

Steps 1-5 are considered the technical analysis and steps 6 and 7 are considered the policy analysis.

Step 1- Define North/South Alternatives

The first step was to identify the key corridor destinations (see Figure 4-7). The following destinations were identified:

- Downtown Forest Lake
- Running Aces Transit Center
- Forest Lake Transit Center
- Downtown Hugo
- Downtown White Bear Lake
- Maplewood Mall
- Phalen Village

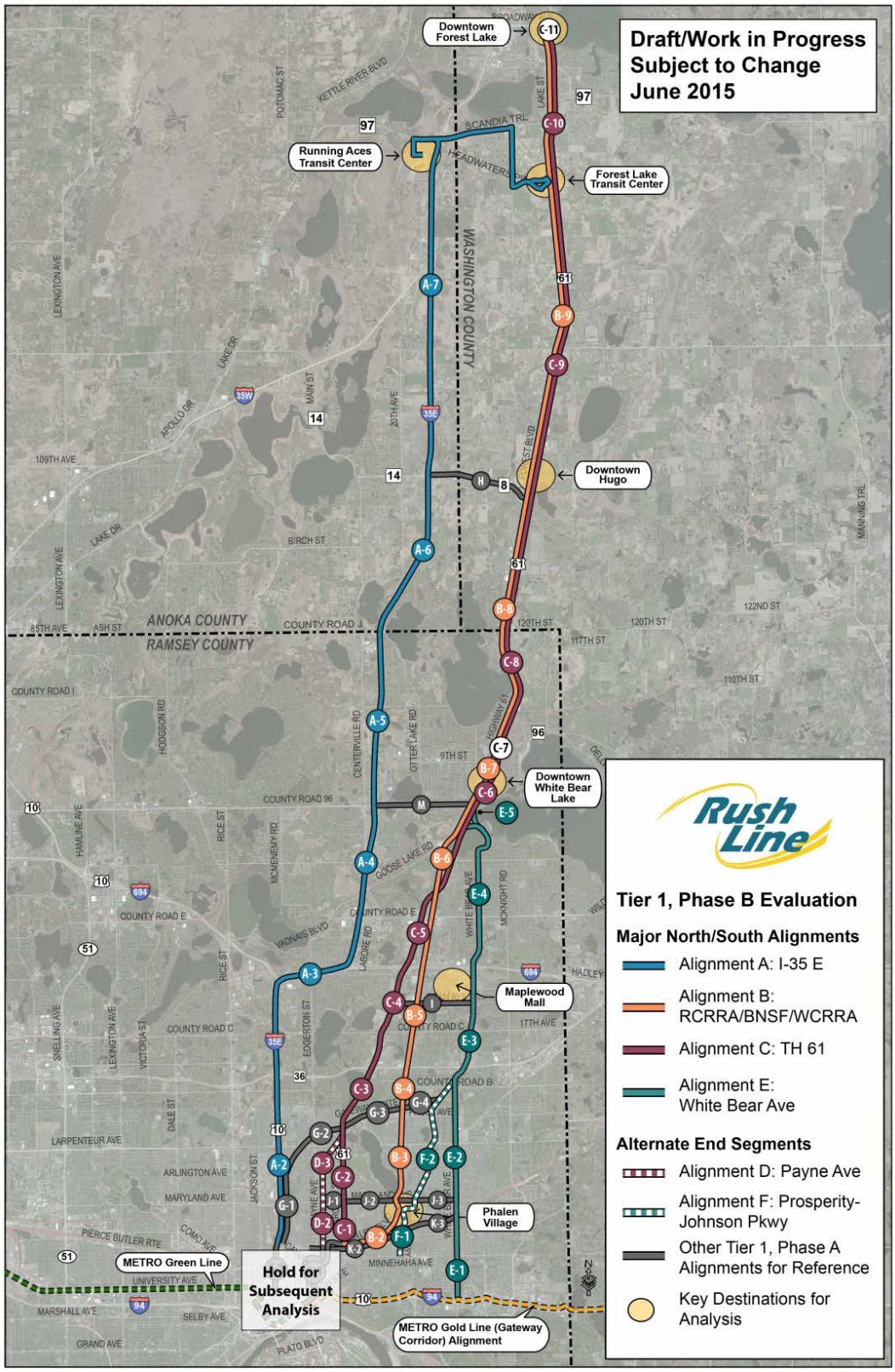
Next, the alignments were sub-divided into major north/south alignments and alternative end segments (see Figure 4-7). The major north/south alignments were:

- Alignment A: I-35E
- Alignment B: RCRRA / BNSF / Washington County Regional Railroad Authority (WCRRA)
- Alignment C: TH 61
- Alignment E: White Bear Avenue

The alternate end segments were (see Figure 4-7):

- Alignment D: Payne Avenue
- Alignment F: Prosperity – Johnson Parkway

Figure 4-7: Tier 1, Phase B Step 1 – Key Corridor Destinations with Major North/South Alignments



The alternatives considered in the Phase B analysis extend the full length of the corridor, into downtown St. Paul to Union Depot. Four criteria were used to evaluate the north/south alternatives and east/west connectors:

- **Environmental impacts:** Anticipated property acquisition, construction activity and transit operations impacts along the alignments.
- **Land use/Economic development:** Degree to which transit service within each alignment is compatible with local and regional plans, existing and future land uses and is close to existing and planned activity centers.
- **Capital costs:** Average per-mile capital costs of transit modes applied to the estimated length of the alternative.
- **Travel times:** Total distance divided by average mode speed.

Two additional criteria were used to evaluate the downtown segments. These criteria are particularly relevant to the downtown segments

- **Multi-modal connectivity:** Segment connectivity to the larger transportation network.
- **Equity:** Proximity of segments to Metropolitan Council-defined Areas of Concentrated Poverty and Racially Concentrated Areas of Poverty (RCAP).

Step 2 – Apply Environmental Criteria to North/South Alternatives

In Step 2, the environmental criterion was applied to the major north/south alternatives. The environmental criterion was intended as a "first cut", meaning if the ROW was insufficient or too constrained, it would not be feasible to implement an alternative, regardless of performance against any of the other criteria.

Decision: The results of this analysis removed LRT, DMU and Dedicated BRT on Highway 61 and White Bear Avenue from further consideration as part of this project

Step 3 – Apply Other Criteria to Remaining North/South Alternatives

The remaining major north/south alternatives were then evaluated on the other three criteria. A threshold was established for each of these criteria, intended as a cut-off point when an alternative would be removed from further consideration in this study. These thresholds were established by the PMT. Capital cost is a representative comparison in current year dollars.

- **Land use:** Low density existing land uses; planned land uses to remain low, and below transitway-supportive thresholds.
- **Capital cost:** More than $1 billion.
- **Travel time:** More than 75 minutes.

The results of the analysis are described below.

Decisions:

Alignment A: I-35

Alignment A: I-35E was removed from further consideration because the densities of existing and planned land uses are too low to support high-capacity transit investment. The existing express bus market has been improved through planned MnPass investment, and the removal of this alignment from consideration does not limit the ability to advocate for future express bus improvements.

Alignment B: RCRRA / BNSF / WCRRA

Streetcar and LRT north of downtown Hugo and DMU north of the Forest Lake Transit Center were removed from further consideration because of combination of high capital costs (over $1 billion) and long travel times (over 75 minutes). While Dedicated Guideway BRT did not perform well when evaluated against land use around the Forest Lake Transit Center (due to low existing and planned density), it did pass the criterion for downtown Forest Lake, so it was recommended to be carried forward in the study.

Alignment C: Highway 61

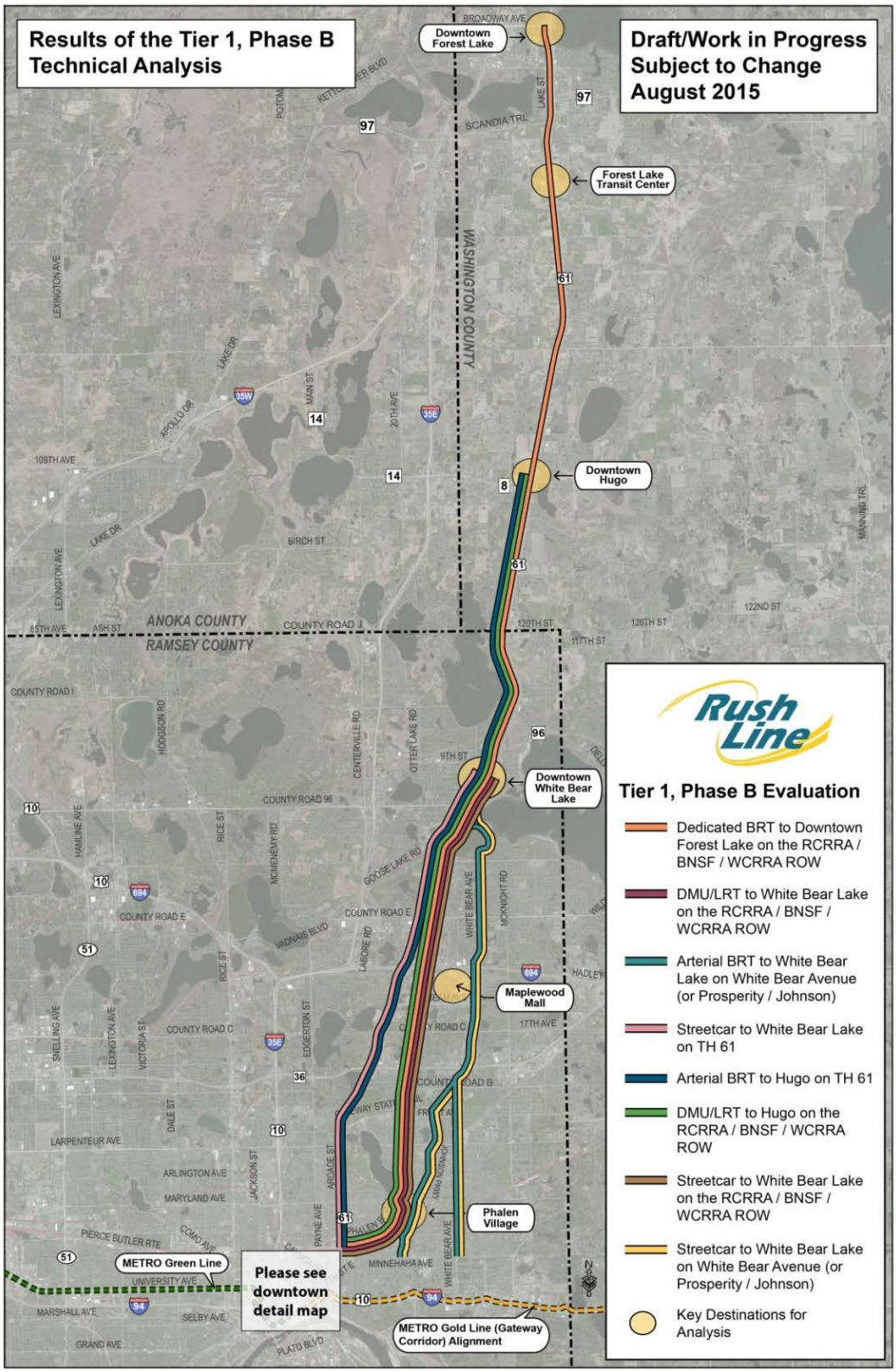
Arterial BRT north of downtown Hugo was deferred because of long travel times (over 75 minutes), streetcar north of downtown White Bear Lake was deferred because of high capital costs (over $1 billion) and long travel times, and as previously mentioned, LRT, DMU and Dedicated Guideway BRT were deferred because of environmental reasons (ROW is too narrow). LRT and DMU also performed poorly for travel time and capital cost at the northern end of the corridor.

Alignment E: White Bear Avenue

During the technical analysis in Step 2, LRT, DMU, and Dedicated Guideway BRT were deferred because of environmental reasons (ROW is too narrow). Arterial BRT and streetcar to downtown White Bear Lake passed the technical analysis.

The major north/south alternatives that passed the technical analysis are shown in Figure 4-8.

Figure 4-8: Results of Tier 1, Phase B the North/South Alternatives Technical Analysis



Step 4 – Apply All Criteria to East-West Connectors

Step 4 involved applying all of the criteria to the east/west connectors. The results of the analysis are summarized below.

- Environmental criteria did not eliminate many mode/segment pairings except DMU, LRT and Dedicated BRT on Maryland Avenue.
- Connectors did not generate benefits (multi-modal and regional connectivity, land use/development impacts, equity) but added capital costs and travel time.
- When the number of alignments was reduced, there was less of a need for the connectors.

Decision: Based on these results, the east/west connectors were removed from further consideration.

Step 5 – Apply All Criteria to the Downtown Segments

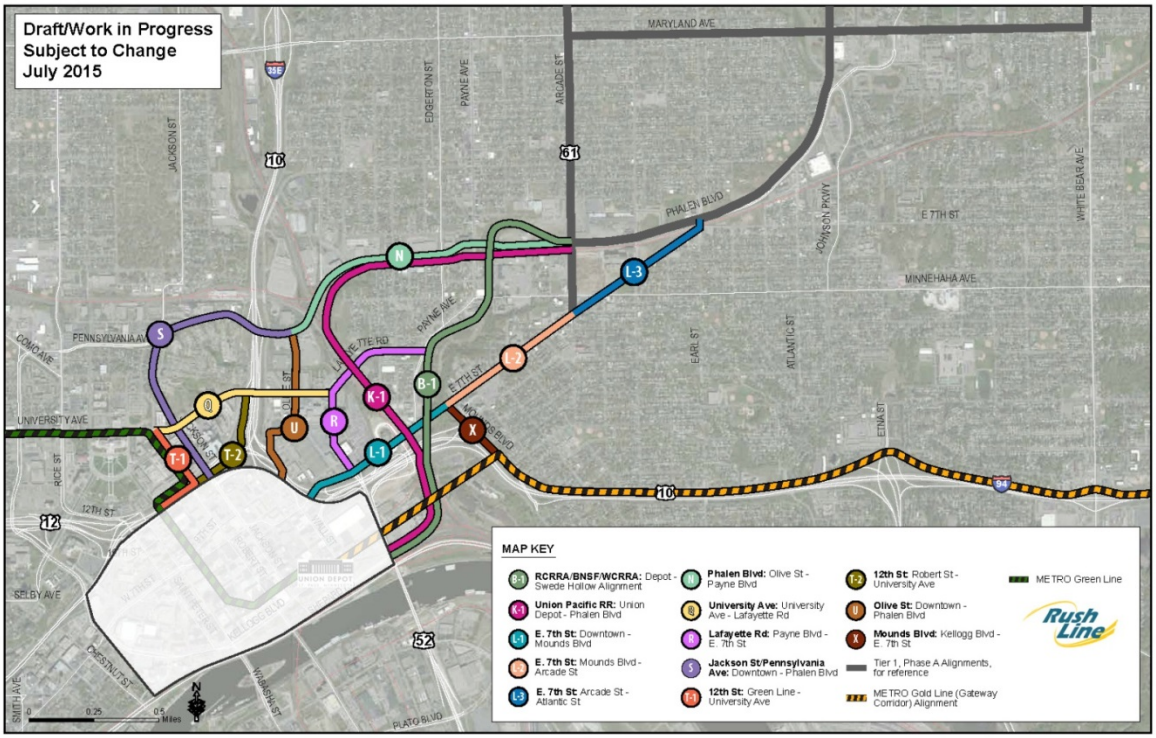
All criteria were applied to the downtown segments in Step 5, see Figure 4-9. The results of the analysis are summarized below.

- Environmental criteria did not eliminate many transit mode/segment pairings except DMU, LRT and Dedicated BRT on White Bear Avenue, Minnehaha Avenue, and Payne Avenue.
- Benefits and costs were not significant enough to differentiate between the segments.
- Having fewer north/south alignments reduced the need for as many downtown segments.

Decisions: During the technical analysis, two of the downtown St. Paul segments (A-1 and W) were immediately removed from consideration based on their connection to Alignment A, which was recommended for deferral.

Following the environmental analysis of the downtown segments, segments D-1, E-1, V and Y were recommended for deferral. None of the remaining downtown segments failed when evaluated against the remaining criteria (land use, capital costs, travel time, multi-modal connectivity, and equity).

Figure 4-9: Tier 1, Phase B Recommended Downtown Segments



Step 6 – Meet with the PMT and Review Results

Step 6 was the start of the policy analysis. This was initiated by a meeting of the PMT in July 2015. At the meeting, the PMT met to review the results of the technical analysis. The PMT recommended the following alternatives move forward.

- To Downtown Forest Lake
  - Dedicated BRT on the County/Rail ROW
- To Hugo
  - LRT/DMU on the County/Rail ROW
  - Arterial BRT on Highway 61
- To White Bear Lake
  - LRT/DMU on the County/Rail ROW
  - Streetcar on Highway 61
  - Streetcar on the County/Rail ROW
  - Streetcar on White Bear Avenue
  - Arterial BRT on White Bear Avenue

Step 7 – Apply Existing Transit Policies to the Alternatives

Step 7 applied existing transportation plans and policies to make sure that the alternatives that emerged from the technical analysis were consistent with the regional plans.

Six alternatives that passed the technical analysis did not pass the policy analysis and were deferred from the rest of this study. Those alternatives and the reason for their deferral are summarized in Table 4-2.

Table 4-2: Results of the Policy Analysis

Destination	Alternative	Reason for Deferral
Hugo	LRT/DMU on the RCRRA/BNSF/WCRRA ROW	High cost plus low existing and planned development density does not make it a competitive alternative
	Arterial BRT on Highway 61	Low existing and planned development density does not make it a competitive alternative
White Bear Lake	Streetcar on Highway 61	Existing and planned land uses along Highway 61 and White Bear Avenue are not compatible with streetcar AND
	Streetcar on White Bear Avenue	High capital costs plus long travel times do not make it a competitive alternative
White Bear lake (Prosperity/Johnson)	Arterial BRT on Prosperity/Johnson	Existing and planned land uses on Prosperity/Johnson are less transit-supportive than White Bear Avenue
White Bear Lake	Arterial BRT south of Maryland on White Bear Avenue	Metro Transit's Arterial Transitway Corridor Study recommends ABRT on Maryland Avenue / Arcade Street

4.6 Tier 1 Recommendation for Detailed Definition and Evaluation

Based on the results of the technical analysis and the policy analysis, and the public feedback, the major north/south alignments that were recommended for Tier 2 analysis are listed below and shown in Figure 4-10.

- **Alignment B: County/Rail ROW**
  - LRT / DMU to White Bear Lake
  - Dedicated BRT to Downtown Forest Lake
- **Alignment E: White Bear Avenue**
  - Arterial BRT to White Bear Lake

The downtown segments that are recommended for Tier 2 analysis are shown in Figure 4-9. The transit modes that could run on the downtown segments are:

- Arterial BRT could operate along any of the streets, but could not operate in the County/Rail ROW.
- Dedicated Guideway BRT, LRT and DMU were considered for operation on all of the alignments.

Decision:

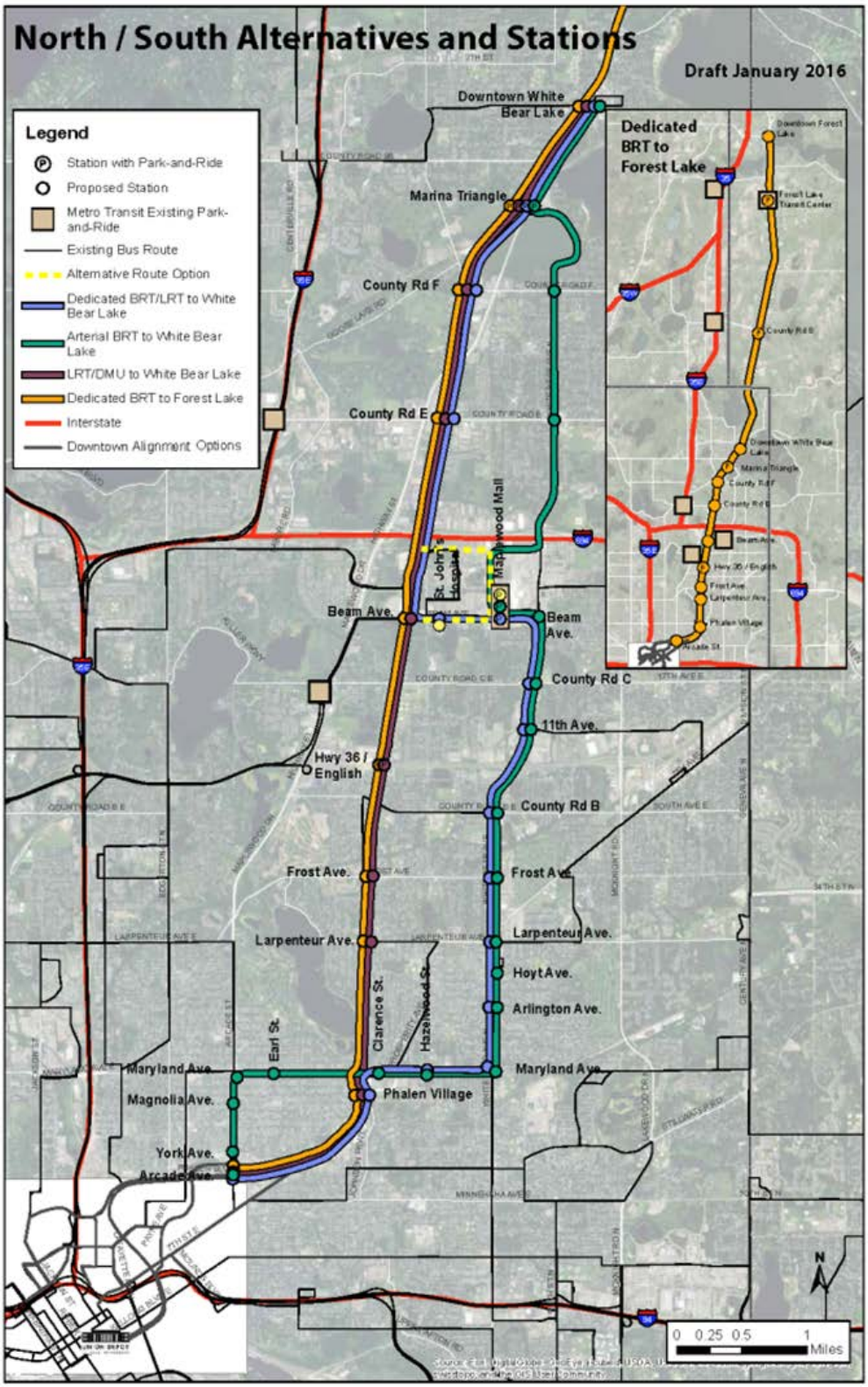
In addition, based on community input, it was recommended by the TAC and PAC to add Dedicated BRT or LRT on White Bear Avenue back into consideration for the Tier 2 Analysis. LRT on White Bear Avenue had originally been deferred because of the environmental criterion; the ROW was too constrained to accommodate LRT in this corridor. However, more consideration is being given into how Dedicated BRT or LRT could be feasible on White Bear Avenue if mixed traffic operations were considered through the most constrained areas.

Four alignments moved into the Tier 2 Analysis. For further information about the Tier 1 Analysis, please visit the project website, www.rushline.org, for the full report.

Decision: Move the following alternative into Tier 2:

- **Alignment B: County/Rail ROW**
  - LRT / DMU to White Bear Lake
  - Dedicated BRT to Downtown Forest Lake
- **Alignment E: White Bear Avenue**
  - Arterial BRT to White Bear Lake
  - Dedicated BRT / LRT on White Bear Avenue

Figure 4-10: Recommended Major North/South Alignments for Tier 2 Analysis



5.0 The Tier 2 Detailed Evaluation of Alternatives

Using suggestions from community meetings and direction from the TAC and PAC, the Tier 2 analysis added additional details to the recommended routes and transit vehicles that were carried forward from the Tier 1 analysis and more definition to how they would be analyzed, such as:

- Station locations based on federal and regional spacing guidelines, the desire to access employment or public activity centers, and connections to other major transit routes.
- Connecting bus routes were developed to support the Rush Line corridor transit service.
- Mixed traffic options, where the transit vehicle uses an existing travel lane with current traffic, should be used, if needed, to minimize property impacts.
- Impacts to environmental and culturally important landmarks should be reviewed and potential impacts determined.

Additional detail and refinement resulted in four alignment alternatives for the North/South portion of the corridor (between Phalen Village and Forest Lake) along with eight options for routing into downtown St. Paul to the Union Depot.

5.1 Alternatives for Evaluation

5.1.1 North/South Alternatives

The four alternatives that were recommended from the Tier 1 analysis were renamed for clarity in the Tier 2 analysis; a description of each of the alternatives is below and maps are included in Figure 5-1.

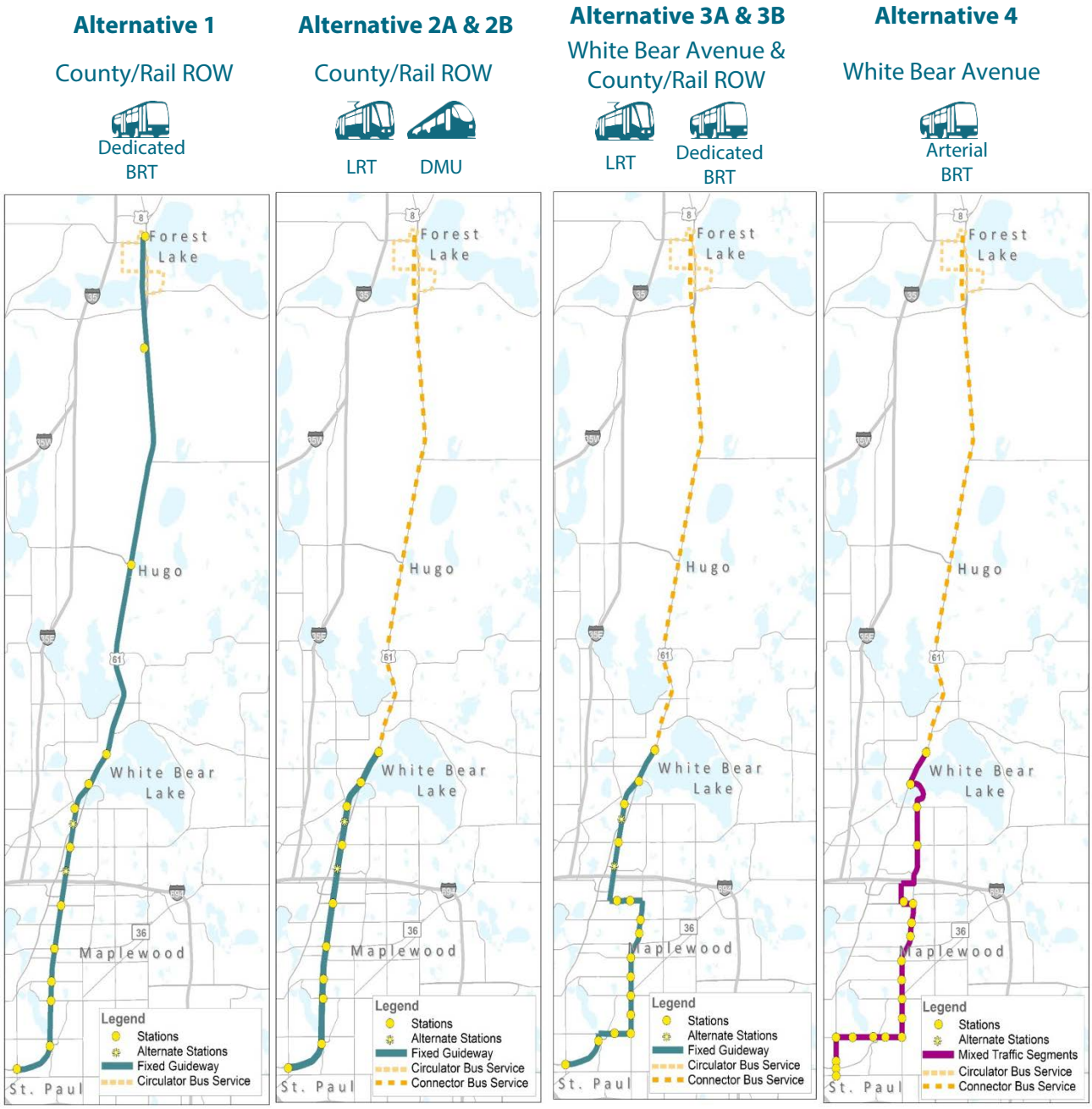
Alignment 1 would use the County/Rail corridor from Phalen Village to Forest Lake with Dedicated BRT transit option. Alignment 1 is 23 miles long and includes 13 station locations. This alignment would use Dedicated Guideway BRT as the transit mode.

Alignment 2A (LRT)/2B (BRT) would use the County/Rail corridor from Phalen Village to White Bear Lake with LRT or Diesel Multiple Unit (DMU) as the transit mode. The alignment is nine miles long and includes 10 stations. This Alternative includes a connecting bus route from downtown White Bear Lake to downtown Forest Lake

Alignment 3A (LRT)/3B (BRT) would use a combination of Maryland Avenue, White Bear Avenue and County/Rail corridor from Phalen Village to White Bear Lake with LRT or Dedicated BRT as the transit mode. The alignment is 11 miles long and includes 16 stations. This alternative includes a connecting bus route from downtown White Bear Lake to downtown Forest Lake.

Alignment 4 would use Arcade Street, Maryland Avenue, White Bear Avenue, and Highway 61 to White Bear Lake with Arterial BRT as the transit mode, operating in mixed traffic. This alignment is 12 miles long and includes 20 stations.

Figure 5-1: North/South Alternatives for Tier 2 Evaluation



5.1.2 North/South Alternative Sub-Options

In addition to the four base North/South Alternatives, three sub-options were considered.

Maplewood Mall Sub-Option

For the alternatives using the County/Rail corridor (Alternatives 1 and 2), the sub-option would deviate from the County/Rail corridor at Beam Avenue, continue east to Southlawn Drive at Maplewood Mall, and use County Road D to reconnect to the County/Rail corridor. This sub-option was considered to make a direct connection to Maplewood Mall and Transit Center that was identified

early in the study as a key destination and employment center. The route would also directly connect to St. John's Hospital.

Highway 61 Sub-Option

The option to use Highway 61 north from Maplewood Mall to White Bear Lake applied to all alternatives. For Alternatives 2 and 3, this provides an alternative route to the BNSF-owned rail corridor. For Alternative 4, the sub-option would provide an alternative to using White Bear Avenue north of Beam Avenue. This option was considered in order to provide an additional alignment option aside from the BNSF rail ROW. The right-of-way for Highway 61 is wide enough to accommodate the transit options here.

Mixed Traffic Sub-Option

For the mixed traffic sub-option, segments of the LRT and Dedicated BRT alternatives would no longer use a dedicated guideway. Instead, the transit vehicle would use existing travel lanes on the roadways. This sub-option is being considered along segments where existing roadway right of way is limited and significant property impacts along one or both sides of the roadway would be needed to accommodate a dedicated guideway.

Locations where this sub-option was considered for the North/South alternatives include:

- Maryland Avenue between Arcade Street to White Bear Avenue
- White Bear Avenue south of Larpenteur Avenue to Maryland Avenue
- East 7th Street from Phalen Boulevard into downtown St. Paul
- Highway 61 between County Road F and downtown White Bear Lake
- Buerkle Road

5.1.3 Downtown Routing Options

Three downtown routing workshops were held to develop and analyze the routes into downtown St. Paul from Phalen Village, the southern end of the North/South Alternatives. The Downtown Routing Workshops involved community representatives, including District Council members, Chamber of Commerce and Business associations and community groups who were asked to participate and evaluate the downtown routing options carried forward from the Tier 1 analysis. Participants discussed the proposed routes, reviewed demographic data, assessed the feasibility of different types of transit vehicles and reviewed travel times. Small group discussion and presentations from the Rush Line staff provided opportunities for representatives to make recommendations on route preferences.

The first two workshops focused on taking the 13 segments that were moved from Tier 1 into the Tier 2 analysis and creating routes to connect to the Union Depot. In addition, there was a discussion about what types of transit vehicle should be applied to each of the routes depending on the feasibility of implementation. For example, the DMU vehicle is a better fit in existing rail corridors, since the benefit of the vehicle is its ability to share tracks with freight trains. Based on these discussions, the community members agreed to have eight routing options analyzed in the Tier 2 analysis (see Figure 5-2). These routing options were:

Option 1

Option 1 is Dedicated BRT on Phalen Boulevard, Pennsylvania Avenue and Jackson Street. The route is 2.3 miles long and includes eight station locations.

Option 2

Option 2 is Dedicated BRT or LRT on Phalen Boulevard, Olive Street, Lafayette Road and East 7th Street. The route is 2.1 miles long and includes six stations.

Option 3

Option 3 is Dedicated BRT or LRT via Phalen Boulevard, and East 7th Street. The route is 1.9 miles long and includes six stations.

Option 4

Option 4 is Arterial BRT via Arcade Street and East 7th Street. The route is 1.6 miles long and includes five stations.

Option 5

Option 5 is DMU via Union Pacific RR. The route is 2.5 miles long and includes six stations.

Option 6

Option 6 is Dedicated BRT or LRT or DMU via Swede Hollow. The route is 2.1 miles long and includes four stations.

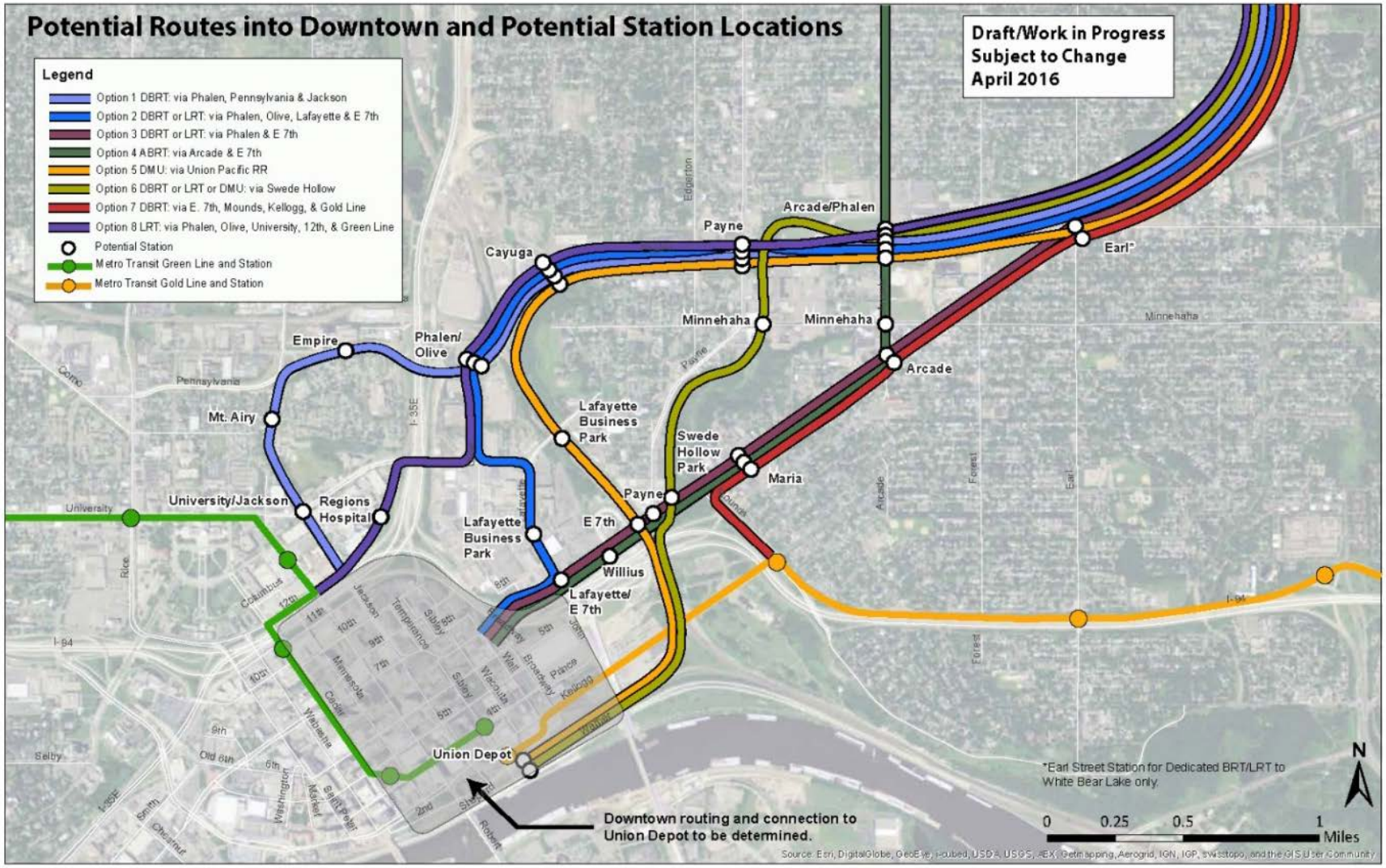
Option 7

Option 7 is Dedicated BRT via East 7th Street, Mounds Boulevard, and Kellogg Boulevard. The route is 1.5 miles long and includes four stations.

Option 8

Option 8 is LRT via Phalen Boulevard, Olive Street, University Avenue, and 12th Street. The route is 2.0 miles long and includes sharing track with the existing Green Line LRT line and has eight stations, include two existing Green Line Stations at 10th Street and Central.

Figure 5-2: Downtown Routing Options



5.2 Tier 2 Public Feedback

Below is a summary of public comments from open houses and engagement activities during the Tier 2 Detailed Evaluation.

Alternative 1: Dedicated BRT on County/Rail ROW to White Bear Lake

- Better fit for County/Rail ROW than LRT; less visual and noise impact
- Best option for corridor; less expensive; safer than LRT; possibly convert to LRT in future
- Need to consider how people will access service
- Concerns with how both a trail and bus would fit in the corridor; changes to character of neighborhood; safety; increase in traffic, noise, pollution
- Potential impacts to green space, trail, private property; lowers property value and quality of life

Alternative 2: LRT on County/Rail ROW to White Bear Lake

- Perception that personal safety on LRT is better than bus
- Felt LRT on this route would be easier to implement than on White Bear Avenue
- More attractive to riders
- More development potential
- Potential impacts to trail
- Potential negative impacts to neighborhood; noise, visual impacts, loss of green space
- Great safety concern for children
- Too expensive
- Difficult to get funding and support from legislature

Alternative 3A/3B: Dedicated BRT/LRT on White Bear Avenue to White Bear Lake

- On existing bus route
- Better access to businesses and services
- More potential for development opportunities
- Not enough space for dedicated lanes; too much impact to businesses and private property
- Will increase traffic in area and change character of neighborhood
- Concerns with safety and construction impacts to businesses and residents
- Too expensive

Alternative 4: Arterial BRT on White Bear Avenue to White Bear Lake

- Minimal impact to neighborhood and businesses
- Uses existing road and bus line
- Improves transit to East Side and to businesses and does not impact Bruce Vento Trail
- Increases traffic
- Travel time will be slow

- Does not make sense with future route 54 extension

Routes into Downtown

- Option 1: DBRT via Phalen, Pennsylvania and Jackson
  - Good access for people reliant on transit
- Option 2: DBRT via Phalen, Olive, Lafayette and E. 7th Street
  - Fast route to Union Depot
- Option 3: DBRT via Phalen and E. 7th Street
  - E. 7th Street: Better at-grade access to Metro State University and businesses than Phalen Boulevard; too narrow for dedicated lanes; concern with parking impacts
- Option 8 DBRT via Phalen, Olive, University, 12th and Green Line
  - Access to medical center, hospitals, jobs; good for senior citizens; connection to the Green Line

5.3 Summary of Initial Assessments

A series of initial assessments was conducted to evaluate and screen the remaining options, sub-options, and transit vehicle types in an effort to reduce the potential number of full alternatives. For these initial assessments, transit vehicle and route options were evaluated against each other and options that best met the project goals were retained.

A total of six initial assessments were completed. Each initial assessment is summarized below. For a more detailed description of the technical assessment by project goal, see the Rush Line Tier 2 Alternative Ranking Memo.

Initial Assessment 1: Review of Downtown Routing Options

The eight downtown routing options were evaluated based on their performance in meeting the project goals and input from the Downtown Stakeholder Workshops. Each of the eight downtown routing options were ranked Low, Medium or High, for meeting project goals and objectives using the evaluation criteria, see Figure 5-3.

Figure 5-3: Downtown Routing Initial Assessment

	Option 1 BRT	Option 2 BRT/LRT	Option 3 BRT/LRT	Option 4 Art BRT	Option 5 DMU	Option 6 BRT/LRT/ DMU	Option 7 BRT	Option 8 LRT
TRAVEL TIME/RIDERSHIP	Med	BRT Med LRT	BRT Med LRT	Med	Med	LRT/DMU H M BRT	Med	High
COST (Low Ranking = Higher Cost, High Ranking = Lower Cost)	Med	BRT H L LRT	BRT H L LRT	High	Low	BRT/LRT M L DMU	High	Med
ENVIRONMENTAL	Low	Med	Med	High	High	Low	Med	Med
EQUITY	High	Med	Med	Low	Med	Low	Med	High
PED/BIKE CONNECTIVITY	High	Med	Med	Med	Med	Low	Med	High
ON-STREET PARKING/ACCESS, EXISTING TRANSIT SERVICE	Med	Med	Low	Med	Med	Med	Low	Med
EMPLOYMENT/DEVELOPMENT POTENTIAL	High	Med	Low	Low	Low	Med	Med	High
RIGHT-OF-WAY	Med	Med	Low	High	High	High	Low	Med
DOWNTOWN ROUTING STAKEHOLDER INPUT	Med	High	Med	Low	Low	Low	Low	High
OVERALL RANKING	+2	+2 /+0	-2/-4	+0	-2	-2/-4	-2	+5

Decision: Based on this analysis, Options 3, 5, 6 and 7 ranked Low. The PAC voted at the September 8, 2016 meeting to remove Option 5, Option 6, and Option 7. The PAC action also redefined Option 3 as mixed-traffic only operation, increasing its overall ranking to Medium, due to a reduction in property and parking impacts.

Initial Assessment 2: Review of Transit Vehicles

The second assessment compared the four transit vehicle types (DMU, LRT, Dedicated BRT and Arterial BRT) to review how the transit options performed considering the project goals. Based on the results of the evaluation, DMU performed lower than the other three vehicles. DMU would be more expensive (additional cost of $200 million to $850 million) to build with no significant ridership increase.

Decision: At the September 8, 2016 PAC meeting, the PAC voted to remove DMU (Alternative 2B) from further consideration for the Rush Line Corridor.

Initial Assessment 3: Dedicated Guideway Northern End

Alternative 1 is the only alternative with a dedicated guideway option between White Bear Lake and Forest Lake. All other alternatives end at White Bear Lake and provide a connecting bus route to Forest Lake.

- The alternative with dedicated guideway to Forest Lake would be 14 miles longer than the other three North/South alternatives.
- The alternative to Forest Lake would only attract 14 percent more riders per day than the Dedicated BRT alternative that ends in White Bear Lake
- Construction costs to Forest Lake would be 70 percent higher and operations and maintenance costs would be 37 percent higher than the Dedicated BRT alternative that ends in White Bear Lake.
- The alternative to Forest Lake had the highest number of wetland, noise sensitive receptors, parkland and cultural resources within the buffer of all alternatives (due to the longer alignment).

Decision: Due to the higher cost and limited additional ridership, the PAC, at its October 2016 meeting, voted to modify the northern end of Alternative 1, ending dedicated guideway at White Bear Lake and continuing a connecting bus route to Forest Lake. This modification better met the goals of the project, described in section 3.2.

Initial Assessment 4: Mixed Traffic Sub-Options

There are several points along the mixed traffic route where right-of-way less than 70 feet wide. This narrow width would require private property acquisition along one side of the roadway to fit both travel lanes in each direction and a dedicated guideway within the corridor. Because of this potential impact, a combination of dedicated guideway and mixed-traffic operations was proposed.

- Property impacts could be reduced by almost 75 percent on White Bear Avenue south of Larpenteur and Maryland Avenue.
- There would be a capital cost decrease of five percent to 14 percent depending on the transit vehicle, since dedicated guideway infrastructure would not be needed.
- There would be an increase in travel time, which reduces ridership by two percent and increases operating costs by two percent.

Decision: Given the reduced property impacts and cost savings associated with the mixed traffic option, the PAC, at its October 2016 meeting, voted to assume mixed traffic operations for the segments on Maryland Avenue and White Bear Avenue south of Larpenteur Avenue, see section 5.1.2.

Initial Assessment 5: Maplewood Mall Sub-Options

Maplewood Mall was identified early in the study as a key corridor destination. Alternatives 1 and 2 included potential connection via sub-options on Beam Avenue, Southlawn Drive and County Road D. Compared to staying on the County/Rail corridor, the Maplewood Mall sub-option would:

- Increase ridership by six percent, even with a three-to-six minute increase in travel time, depending on which downtown routing option is used.
- Increase construction costs by 13-16 percent, depending on the transit vehicle used and operating costs increase by ten percent.
- Increase access by households below the poverty line, people of color, and zero-car households, compared to staying in the County/Rail corridor.
- Increase access to employment by 20 percent and improve connections to existing transit at the Mall's existing park-and-ride facility.
- Increase potential property impacts from 20 to 25 parcels.

Decision: The benefits of increase access to jobs and projected ridership, improving existing transit connections and expanding equitable access to transit led the PAC to vote at the October 2016 meeting to approve using the direct connection to the Mall as the preferred route for Alternatives 1 and 2 moving forward.

Initial Assessment 6: Highway 61 Sub-options

The Highway 61 sub-options would use the Highway 61 corridor instead of the County/Rail corridor north of I-694; this segment of the corridor is an active freight corridor owned by the BNSF railway. For Alternatives 1, 2 and 3, the sub-option would use the County/Rail corridor north of Buerkle Road. For Alternative 4, the sub-option would connect to Highway 61 at Beam Avenue. Compared to the County/Rail corridor, Highway 61 generates:

- No difference in equitable access and population access at station.
- Better connection to jobs for Alternative 4 on Highway 61, compared to White Bear Avenue north of Beam Avenue; there is no difference for Alternatives 2 and 3.
- Reduction in noise impacts by 20-50 fewer impacted properties.
- Higher potential water resources impacts to Goose Lake with using Highway 61.

Decision: After the initial assessment, there was no decision between the County/Rail corridor and the Highway 61 corridor for all alternatives. Both options will move forward into the refinement stage of the study.

5.4 Summary of the Tier 2 Evaluation Results by Goal

Based on the results of the initial assessments, the remaining North/South Alternatives were paired with the Downtown Routing Options to create full corridor alternatives from Union Depot in St. Paul

to Forest Lake (see Figure 5-4). The overall Tier 2 assessment categorizes the project goals into two groups: 1) goals and evaluation criteria that are influenced by the type of transit vehicle and 2) goals and evaluation criteria that are directly tied to the route chosen. For example, the development potential analysis found that the amount of new development is directly related to the type of transit vehicle chosen. Vehicle options that have either dedicated guideway or embedded rail have the most positive impact on development. In comparison, travel time is directly tied to the route chosen. Each alternative was reviewed looking at the goals in these two categories, and benefits and disadvantages were highlighted for each. Based on this overall assessment, recommendations to either move an alternative forward into further refinement or remove from further consideration were presented to the PAC in November 2016.

Figure 5-4: Tier 2 North/South Alternatives Paired with Downtown Routing Options

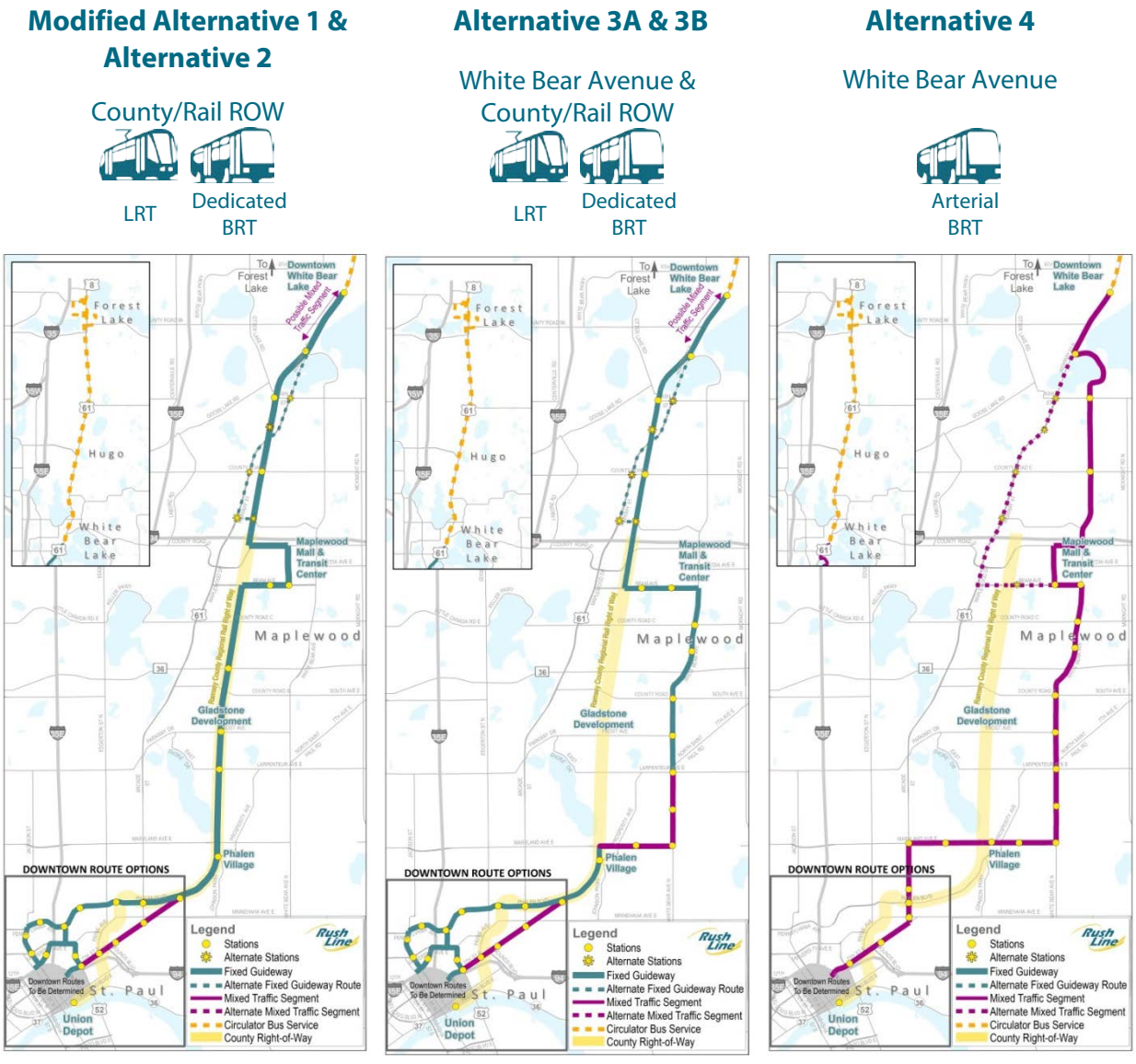


Table 5-1 summarizes the evaluation of each alternative based on the project criteria.

Table 5-1: Alternative Evaluation by Criteria

Transit Mode/Alignment	Criteria	Alternative 1 (BRT) Rating	Alternative 2 (LRT) Rating	Alternative 3A (LRT) Rating	Alternative 3B (BRT) Rating	Alternative 4 (BRT) Rating
Transit Mode	Ridership	**Average**: 5,400 riders per day, 65% of which are new riders.	**Good**: 6,400-9,500 riders per day, 62% of which are new riders.	**Poor**: 4,900 riders per day, lowest ridership of all alternatives, 70% are new riders.	**Good**: 6,400-9,500 riders per day; 59% are new riders.	**Poor**: 5,700-6,000 riders per day; 34% are new riders. Less new riders because the service replaces the planned Route 54 service along White Bear Avenue.
	Cost Effectiveness	**Average**: Lowest cost of fixed guideway options, at most $733 million, lowest O&M costs; cost per rider has potential to be eligible for federal funding with refinement.	**Poor**: Higher costs ($1.2 billion+) compared to other dedicated guideway options; higher O&M costs than other options; cost per rider unlikely to qualify for federal funding.	**Poor**: Higher costs ($900 million+) compared to other dedicated guideway BRT options; average O&M costs compared to other options; cost per rider unlikely to qualify for federal funding.	**Poor**: Highest costs ($1.6 billion+) of all options; higher O&M costs compared to others; cost per rider unlikely to qualify for federal funding.	**Good**: Lower costs ($75 million) of all options; average O&M costs compared to others; cost per rider likely to be eligible for federal funding.
	Development Potential	**Good**: Longest route with fixed guideway of all options; likely to increase development potential around stations.	**Good**: Longest route with dedicated guideway of all options; likely to increase development potential around stations.	**Average**: Less dedicated guideway than County/Rail ROW alternatives; dedicated guideway alternatives likely to increase development.	**Average**: Less dedicated guideway than County/Rail ROW alternatives; dedicated guideway alternatives likely to increase development.	**Poor**: No dedicated guideway; likely to have limited influence on development potential around stations.
Alignment	Travel Time	**Good**: Shortest travel time; depending on downtown routing options (37-42 minutes)	**Good**: Shortest travel time; depending on downtown routing options (37-42 minutes)	**Poor**: Longer travel time; depending on downtown routing options (46-51 minutes).	**Poor**: Longer travel time; depending on downtown routing options (46-51 minutes)	**Poor**: Longest travel time (56 minutes)
	Environmental	**Average**: Moderate level of potential impacts; they can likely be mitigated.	**Average**: Moderate level of potential impacts; they can likely be mitigated.	**Average**: Moderate level of potential impacts; they can likely be mitigated.	**Average**: Moderate level of potential impacts; they can likely be mitigated.	**Good**: Lowest potential for environmental impact due to staying within current roadway footprint.
	Equity	**Average**: Good accessibility at stations; 900 zero-car households. 3,500 households living below poverty and 9,500	**Average**: Good accessibility at stations; 900 zero-car households. 3,400 households living below poverty and 9,500	**Good**: Highest level of accessibility at stations; 1,800 zero-car households, 7,200 households below poverty and	**Good**: Highest level of accessibility at stations; 1,800 zero-car households, 7,200 households below poverty, and	**Good**: Highest level of accessibility at stations; 2,600 zero-car households, 11,400 households below poverty and

Transit Mode/Alignment	Criteria	Alternative 1 (BRT) Rating	Alternative 2 (LRT) Rating	Alternative 3A (LRT) Rating	Alternative 3B (BRT) Rating	Alternative 4 (BRT) Rating
		people of color within station areas.	people of color within station areas.	17,000 people of color within station areas	17,000 people of color within station areas.	24,600 people of color within station areas.
	Ped/Bike Connectivity	**Average**: Good accessibility at stations for pedestrians and bicyclists. 76,000 people within walking/biking distance.	**Average**: Good accessibility at stations for pedestrians and bicyclists. 76,000 people within walking/biking distance.	**Good**: Good accessibility at stations for pedestrians and bicyclists. 100,000 people within walking/biking distance.	**Good**: Good accessibility at stations for pedestrians and bicyclists; 100,000 residents within walking/biking distance.	**Good**: Good accessibility at stations for pedestrians and bicyclists; 115,000 residents within walking/biking distance.
	On-street Parking/Access, Existing Transit Service	**Average**: Limited impacts to existing parking and access since route within County/Rail ROW; good access to existing transit routes.	**Average**: Limited impacts to existing parking and access since route within County/Rail ROW; good access to existing transit routes.	**Average**: Limited impacts to existing parking and access; average access to existing transit routes.	**Average**: Limited impacts to existing parking and access; average access to existing transit routes.	**Average**: Average: Limited impacts to existing parking and; good access to existing transit routes.
	Employment	**Average**: Good access to employers at station locations; dependent on downtown route; 13,700 jobs within station areas.	**Average**: Good access to employers at station locations; dependent on downtown route; 13,700 jobs within station areas.	**Good**: Good access to employers at station locations; dependent on downtown route; 19,400 jobs within station areas	**Good**: Good access to employers at station locations; dependent on downtown route; 19,400 jobs within station areas	**Good**: Good access to employers at station locations; 17,700 jobs within station areas.
	Property Impacts	**Good**: Least private property impacts of all dedicated guideway options because it operates in the County/Rail ROW.	**Good**: Least private property impacts of all dedicated guideway options because it operates in the County/Rail ROW.	**Poor**: Greatest private property impacts of all dedicated guideway options.	**Poor**: Greatest private property impacts of all dedicated guideway options.	**Good**: Least private property impacts because it uses existing roadway.

Modified Alternative 1

Modified Alternative 1 would use Dedicated BRT as the transit mode on the County/Rail ROW, running from downtown St. Paul to White Bear Lake. This alignment shares the County/Rail ROW with the Bruce Vento Trail and a connecting bus route to Forest Lake.

Decision: This alternative is recommended to advance for further refinement. This alternative is recommended because:

- It is the longest route with dedicated guideway, maximizing development potential.
- It has the least amount of private property impacts of all dedicated guideway options.
- It has the shortest travel time between St. Paul and White Bear Lake.
- The cost per rider, with further refinement, could qualify for federal funding.

Alternative 2

Alternative 2 would use LRT as the transit mode on the County/Rail ROW, running from downtown St. Paul to White Bear Lake and a connecting bus route to Forest Lake.

Decision: This alternative was not recommended to advance. It did not meet the project goals as well as other alternatives. The primary reason for its deferral is that the cost per rider is unlikely to qualify for federal funding.

Alternative 3A

Alternative 3A would use Dedicated BRT as the transit mode on White Bear Avenue, running from downtown St. Paul to White Bear Lake and a connecting bus route to Forest Lake.

Decision: This alternative was not recommended to advance. It did not meet the project goals as well as other alternatives did. The route has the greatest negative property impacts and it has the longest travel time. The travel time could be up to 14 minutes longer than the County/Rail ROW route. Finally, the cost per rider is unlikely to qualify for federal funding.

Alternative 3B

Alternative 3B would use LRT as the transit mode on White Bear Avenue, running from downtown St. Paul to White Bear Lake and a connecting bus route to Forest Lake.

Decision: This alternative was not recommended to advance. It has similar route benefits as Alternative 1 and it does not meet the project goals as well as other alternatives. The cost per rider is also unlikely to qualify for federal funding.

Alternative 4

Alternative 4 would use Arterial BRT as the transit mode on White Bear Avenue, running from downtown St. Paul to White Bear Lake and a connecting bus route to Forest Lake.

Decision: This alternative was not recommended to advance. This alternative does not meet project goals as well as other alternatives. This alternative has the lowest number of new riders and total corridor ridership and it also has the lowest potential to generate economic development due to lack of a dedicated guideway investment. The planned Route 54 extension will also provide similar service.

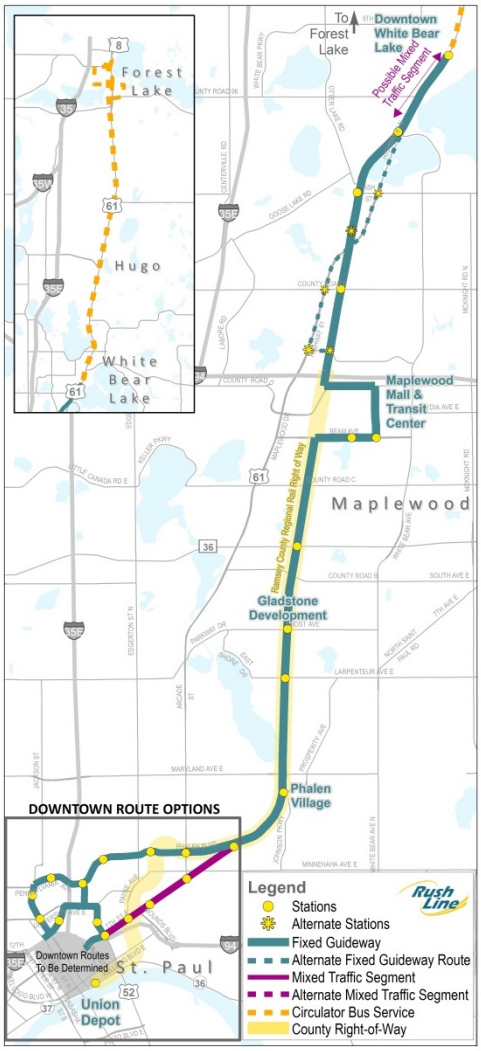
5.5 Tier 2 Recommendation for Refinement

Based on the analysis of each of the alternatives, Modified Alternative 1 was recommended as the Preferred Alternative to advance for further refinement, see Figure 5-5. This alternative ranked the best for meeting the project goals based on the transit vehicle and route assessment. It has the longest route with fixed guideway, maximizing development potential. There would be no private property impacts along the County/Rail ROW portion of the route. And it has the shortest travel time between downtown St. Paul and White Bear Lake. With further refinement, the cost per rider would likely qualify for FTA funding.

The additional refinements to Alternative 1 focused on:

- Determining the preferred downtown routing option,
- Using Highway 61 or County/Rail ROW north of I-694,
- Determining station locations north of I-694, and
- Optimizing capital costs, O&M costs and ridership.

Figure 5-5: Modified Alternative 1 for Refinement



6.0 Tier 2 Refinement

The Preferred Alternative that emerged from the Tier 2 evaluation process was Modified Alternative 1, which was originally defined as dedicated BRT on the County/Rail ROW alignment from Union Depot in downtown St. Paul to Forest Lake. Based on the Tier 2 technical analysis of cost and ridership of Dedicated BRT between White Bear Lake and Forest Lake, the northern terminus was modified to White Bear Lake, with a potential connecting bus route to Forest Lake.

The Preferred Alternative would attract approximately 5,400 riders per day, with over 65 percent as new transit riders. This alternative had the lowest cost of the fixed guideway options at $470-735 million, depending on downtown routing and alignment north of I-694, as well as the lowest annual O&M costs of all alternatives[1]. Furthermore, the cost per rider could qualify for federal funding with refinement. Because this route is the longest route with a fixed guideway, it is more likely than other alternatives to increase development potential around stations. Fixed guideway is beneficial because it creates the potential for more economic development due to its permanence, reliability, high-capacity and integration with other transit modes.

The route for the Preferred Alternative had several additional benefits over the other proposed alignments. These benefits include: having the shortest travel time between downtown St. Paul to White Bear Lake; providing moderate to high accessibility at stations for households that are below poverty and to zero-car households; limited impacts to existing parking and access; and the least amount of ROW is needed for all fixed guideway options due to existing County/Rail ROW being used.

For the other criteria in the route assessment, the Preferred Alternative was neutral when compared to the other alignments. For example, the Preferred Alternative provides average accessibility at stations for pedestrians and bicyclists; there is average access to existing transit routes; and there is moderate access to employers at station locations, depending on the downtown route.

Before being selected as the LPA, the Preferred Alternative needed additional refinements including three key decisions: 1) determining the preferred downtown routing option; 2) determining whether to use Highway 61 or County/Rail ROW north of I-694; and 3) selecting the station locations north of I-694. The refinements also involved optimizing three criteria for federal evaluation: 1) capital cost refinements; 2) operating and maintenance cost refinements; and 3) ridership forecasts. After these refinements were made, both the TAC and PAC recommended that this refined alternative move forward for consideration as the draft Locally Preferred Alternative.

6.1 Decision 1: Routing into Downtown St. Paul

Several different routing options into downtown from Arcade and Phalen to Union Depot were discussed throughout the project. At the end of the Tier 2 evaluation, four options remained; these options were 1, 2, 3, and 8, see Figure 6-1. From the north, Option 1 takes Phalen Boulevard to Pennsylvania Avenue to Robert Street to Union Depot; Option 2 takes Phalen Boulevard to Olive Street, through Lafayette Business Park to E. 7th Street and into downtown to Union Depot; Option 3 goes down Arcade to E. 7th Street to Union Depot; and Option 8 runs down Phalen Boulevard to Olive Street, University Avenue to Robert Street to Union Depot.

[1] The low end of capital cost range reflects the PACs decision to redefine downtown Option 3 as a mixed traffic option.

These four options offered different advantages and disadvantages and were furthered evaluated and analyzed to determine which option best meets the project's overall needs and goals.

These routing options were further evaluated based on public input and updated criteria to determine which option best meets the project's purpose and need. The criteria included:

- Development potential
- Equity access
- Employment access
- Environmental impacts
- Connection to key destinations
- Ridership (new riders, total riders, and transit dependent riders)
- Costs (capital and operating)
- Travel times
- Potential property, parking and traffic impact

Figure 6-1: Downtown Routing Options

	Option 1	Option 2*	Option 3*	Option 8
				
Ridership *BRT ONLY* *OTHER GUIDEWAY TRANSIT*	**Highest** 5,800 riders 3,400 riders	**Low** 5,000 riders 2,300 riders	**Low** 5,000 riders 2,300 riders	**-200** 5,600 riders 3,400 riders
Capital Cost	**+$6 million** $412 - $467 million	**+$5-6 million** $411 - $467 million	**+$3-4 million** $409 - $465 million	**Lowest Cost** $406 - $461 million
O&M Costs	**+$100,000** $7.9 million	**+$200,000** $8.0 million	**+$100,000** $7.9 million	**Lowest Cost** $7.8 million
Travel Time	**Fastest Time** 25 minutes	**+3 minutes** 28 minutes	**+4 minutes** 29 minutes	**Fastest Time** 25 minutes
% Ded. Guideway	**85% - 90%**	**80% - 85%**	**65% - 70%**	**85% - 90%**
Current Transit	No existing transit on Phalen	No existing transit on Phalen	Route 61, 74 Proposed Route 54 Ext	No existing transit on Phalen
Connection to Green Line	Station Adjacent to Green Line Station	Station adjacent on outbound route only	Station adjacent on outbound route only	Station Adjacent to Green Line Station
Activity Centers	Regions Hospital HealthPartners Specialty Clinic	HealthPartners Specialty Clinic Lafayette Business Park	Metropolitan State University Lafayette Business Park	Regions Hospital HealthPartners Specialty Clinic Lafayette Business Park

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*Comparative purposes only

	Option 1	Option 2*	Option 3*	Option 8
# of Stations	**10 stations**	**11 stations**	**10 stations**	**9 stations**
Potential Parking Impacts	**30 spaces** *Jackson* **69 spaces** *Robert St*	**52 spaces** *Olive*	**Lowest** Potential impacts only at station locations	**52 spaces** *Olive* **69 spaces** *Robert St*
2040 Employment	**Highest** 93,700 employees	**-2,300** 91,400 employees	**-6,200** 87,500 employees	**-800** 92,900 employees
Households Below Poverty	**Highest** 8,200 households	**-900** 7,300 households	**-1,000** 7,200 households	**-700** 7,500 households
# Minority Population	**Highest** 12,100 people	**-1,100** 11,000 people	**-3,600** 8,300 people	**-1,000** 11,100 people
Zero Car Households	**Highest** 3,100 households	**-200** 2,900 households	**-400** 2,700 households	**-100** 3,000 households

- No difference for right-of-way needs; latest cost assumptions assume guideway would not require additional right-of-way within the downtown segments

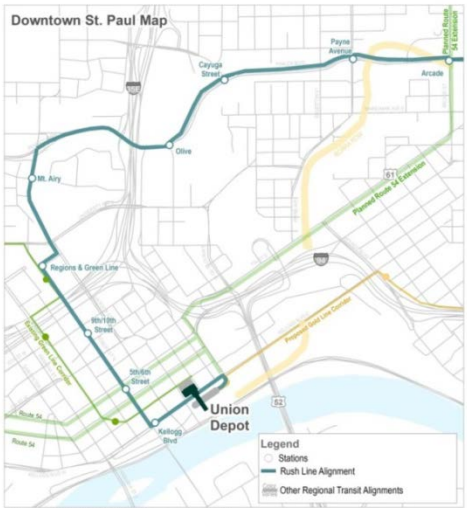
*Comparative purposes only

Decision: After the analysis, Option 1 emerged as the preferred downtown routing option (see Figure 6-2). Downtown Option 1 was chosen as the preferred downtown routing option at March 23, 2017 PAC meeting.

This option was selected for several reasons:

- This option has the highest ridership potential (5,800 – 9,200 riders). The ridership range reflects other bus routes sharing the guideway.
- It has the fastest travel time (25 minutes from Phalen Village to Union Depot).
- It is one of the longest routes within fixed guideway out of all the options (85-90% in fixed guideway), and therefore had more potential for development around the stations.
- There are currently no existing transit routes on Phalen Boulevard; therefore this option introduces transit to a roadway that currently does not have direct access to transit.
- The station adjacent to a Green Line station will be optimal for west bound transfers and connections to the entire transit network.
- It has the highest number of employees along the corridor (93,700) and connects two out of the four key activity centers within the project area.
- It provides high accessibility for households that are below poverty, as well as high accessibility to zero-car households.
- The capital costs are only slightly higher than the lowest cost option, and the benefits outweigh the additional cost.

Figure 6-2: Preferred Downtown Route – Option 1



6.2 Decision 2: Routing North of I-694

There were two routing options under consideration north of I-694: continuing on the County/Rail ROW or using Highway 61 to continue north to White Bear Lake, see Figure 6-3. One option would be to convert the shoulders of Highway 61 to dedicated outside lanes, however, further coordination with MnDOT would be needed to pursue this option.

The trade-offs between these two options included concerns about freight traffic along BNSF Rail ROW and concerns about the speed and efficiency of operating Dedicated BRT on Highway 61.

Figure 6-3: Routing Options North of I-694

These routing options were further evaluated based on public input and updated criteria to determine which option best meets the project's purpose and need. The criteria included:

- ROW ownership coordination with existing freight service on the BNSF rail ROW vs. traffic on Highway 61;
- A comparison of station equity, employment, pedestrian/bicycle access and development potential;
- Travel time;
- Capital and operating costs; and
- Ridership.

See Figure 6-4 for more details on the analysis between the BNSF Rail corridor and Highway 61.

Figure 6-4: BNSF Rail Corridor vs. Highway 61 Corridor

	BNSF Rail Corridor	Hwy 61 Corridor
Ridership	**Highest** 5,000 – 9,150 riders	**- 150** 4,850 – 9,000
Cost	**+ $39 million** $430 - $441 million	**Lowest Cost** $391 – $402 million
O&M Costs	**Lowest Cost** $7.6-$7.9 million	**+ $55k** $7.7-8.0 million
Travel Time Phalen Village to White Bear	**Fastest Time** 22.5 minutes	**+ 2 minutes** 24.5 minutes
Mixed Traffic Segments	**1 mile** (Marina Triangle and Downtown White Bear)	**1 ¼ mile** (Marina Triangle and Downtown White Bear and Buerkle Road
Water Resources	**Goose Lake**	**Goose Lake**
Noise	**+ 50** 350 sensitive receptors	**Lowest** 300 sensitive receptors
Employment	**- 600 employees** 13,200 employees	**Highest** 13.800 employees

- No difference for Parkland, Cultural/Historic Resources, Bike/Ped, Equity, Population

Decision: Based on this analysis, Highway 61 was the preferred routing option north of I-694. This was approved in the March 23, 2017 PAC meeting.

Highway 61 was selected for several reasons:

- Highway 61 has similar ridership to the BNSF Rail ROW
- Highway 61 has lower costs

- Highway 61 serves higher employment areas
- This option best meets the project goals with lower costs and higher employment access (an additional 600 employees) with similar ridership to the BNSF rail ROW corridor.

6.3 Decision 3: Stations North of I-694

At the northern end of the corridor, there were two station locations north of I-694 that needed to be decided on; the station location choices are between either Buerkle Road or County Road E, and either Cedar Avenue or County Road F, see Figure 6-5.

Each of these stations were further evaluated based on public input and updated criteria to determine which option best meets the project's purpose and need. The criteria included:

- Compatibility with land use plans;
- Comparison of station equity access;
- Employment
- Pedestrian/bicycle access;
- Development potential;
- Station spacing;
- Ridership (new riders, total riders and transit dependent riders);
- Capital and operating costs; and
- Travel times.

Figure 6-5: Preferred Station Locations North of I-694

Buerkle Road vs. County Road E

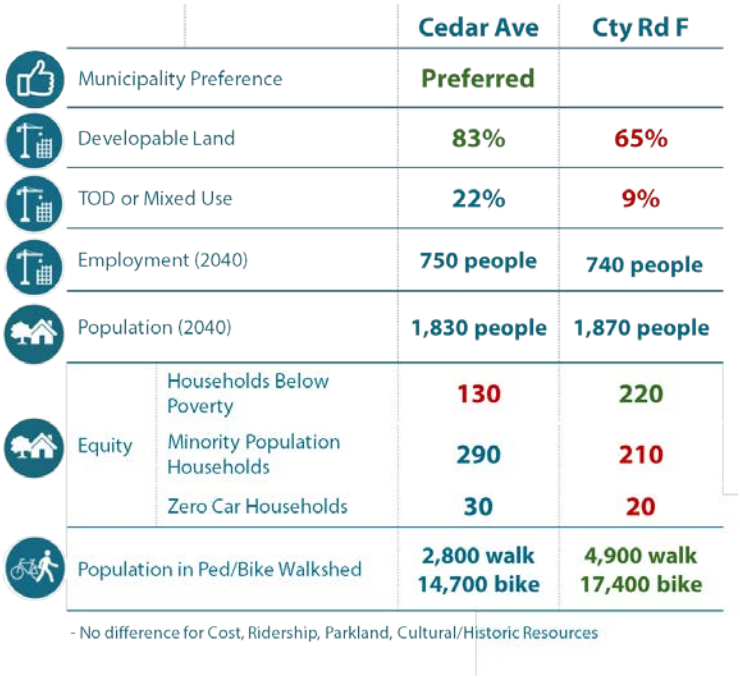
County Road E was the preferred choice over Buerkle Road because it includes more developable land, more potential for transit-oriented development (TOD) and mixed-use development. There are also more people who live nearby and more people are within a reasonable walking and biking distance of the station. Additionally, both the Cities of Vadnais Heights and Gem Lake prefer this location. Buerkle Road does have more employment, but development opportunities are limited due to the nature preserve on the west side of Highway 61.

Figure 6-6: Buerkle Road vs. County Road E

		Buerkle St	Cty Rd E
City Preference			Preferred
Developable Land		63%	81%
TOD or Mixed Use		6%	33%
Employment (2040)		Highest 3,900 people	-1,520 2,380 people
Population (2040)		-510 690 people	Highest 1,200 people
Equity	Households Below Poverty	270	140
	Minority Population Households	370	300
	Zero Car Households	50	40
Population in Ped/Bike Walkshed		700 walk 7,800 bike	5,900 walk 9,600 bike

- No difference for Cost, Ridership, Parkland, Cultural/Historic Resources

Figure 6-7: Cedar Avenue vs. County Road F



		Cedar Ave	Cty Rd F
Municipality Preference		Preferred	
Developable Land		83%	65%
TOD or Mixed Use		22%	9%
Employment (2040)		750 people	740 people
Population (2040)		1,830 people	1,870 people
Equity	Households Below Poverty	130	220
	Minority Population Households	290	210
	Zero Car Households	30	20
Population in Ped/Bike Walkshed		2,800 walk 14,700 bike	4,900 walk 17,400 bike

- No difference for Cost, Ridership, Parkland, Cultural/Historic Resources

Cedar Avenue vs. County Road F

Cedar Avenue was the preferred choice over County Road F because it includes a higher percentage of developable land, greater near-term redevelopment potential, better connections to established neighborhoods and new Waters Senior Housing, and the City of White Bear Lake had a preference for the Cedar Avenue location. The drawbacks of the County Road F location are that it has less development potential with its proximity to Goose Lake and the current land uses that are less likely to turn over for redevelopment.

Decision: County Road E and Cedar Avenue were recommended as the preferred station locations because they are supported by the local municipalities and offer the greatest station area development potential. This was approved at the March 23, 2017 PAC Meeting.

6.4 Optimization 1: Capital Costs

Preferred Alternative

The Preferred Alternative included building a two-lane dedicated guideway from downtown St. Paul to White Bear Lake. While the majority of the alignment utilized the County/Rail ROW, the alternative also included major new construction on the roadways south of Phalen Village and around the Maplewood Mall Transit Center. Constructing this new guideway involved new bridges over freight railroad track and interstates and the acquisition of additional ROW to construct the new guideway.

Because of these significant capital improvements, the estimated capital costs of the Preferred Alternative ranged from $470-735 million (2021$).

LPA

The Preferred Alternative was revisited with the specific intention of lowering the capital costs and increasing the ridership, with the ultimate goal of improving the projects' rating under the FTA's Project Justification Criteria for New Starts. The cost reductions were determined by identifying locations along the alignment where existing infrastructure could be utilized, rather than constructing new infrastructure. In particular, this was accomplished by identifying roadway segments that could be converted to dedicated transit guideway, rather than constructing a new guideway. This resulted in the ability to reduce the necessary right-of-way acquisition and new construction. In addition, the

station cost assumptions were revised to be consistent with the Gold Line BRT, which lowered the cost per station.

In addition to cost reductions, the adjacent bus routes were evaluated to determine they could benefit from the use of the dedicated guideway and stations being built for the Rush Line project. Based on ridership forecasts, a few corridor bus routes (68, 71, 270, and 272) would experience an increase in ridership if they were rerouted to take advantage of the dedicated guideway and improved stations constructed for the Rush Line BRT. However, this increase in ridership would require providing additional capacity in the corridor. In particular, it would require providing a park-and-ride at English and Highway 36, and providing additional trips on Routes 270 (express service to downtown Minneapolis) and 272 (express service to University of Minnesota)[2].

Optimization Results: The capital costs for the draft LPA without the costs associated with rerouting the adjacent bus routes is estimated at $420 million (2021$); the capital costs with the additional costs of rerouting the bus routes to the guideway is approximately $475 million (2021$).

The overall cost reduction from the Preferred Alternative to the LPA was approximately $270 million (2021$). The cost savings primarily came from:

- Refinement of the dedicated guideway and not reconstructing existing bridges ($31 million);
- Reduction of unit cost for BRT stations ($46 million);
- Roadway and intersection sitework ($108 million);
- Reduction in signals ($27 million); and
- Reduction in ROW costs ($46 million).

6.5 Optimization 2: O&M Costs and Service Plan

Preferred Alternative

Operating and Maintenance costs for the Preferred Alternative ranged from $7.0 million to $7.4 million (2015$), depending on the final downtown alignment pairing. When Alternative 1 was paired with downtown Option 1 (the draft LPA), its O&M cost was estimated at $7.4 million. Costs among the downtown Options varied based on distance and travel time differences. The addition of four connecting bus routes and additional service added to Route 265 during the midday and Route 64 on Sunday totaled to $4.2 million.

The Preferred Alternative saw several refinements in the evolution towards the draft LPA. These refinements changed the alignment, which impacted the amount of dedicated right-of-way, costs related to station amenities, the number of stations and number of intersection controls. In total, the increase in O&M between the Preferred Alternative and LPA for these changes was approximately $400,000.

[2] Rerouting of other corridor bus routes to utilize the Rush Line guideway and stations must demonstrate service for existing transit riders on those routes will be as good or better as a result of the rerouting to utilize project facilities.

The White Bear Lake connecting bus route was extended west of I-35E to serve a commercial/retail activity center located at the intersection of Centerville Road and Highway 96. This resulted in a longer travel time (affecting total revenue service), an additional vehicle requirement, and subsequent increase of roughly $300,000 in O&M costs for this service. Refinements were also done on the other services and O&M costs increased between the Preferred Alternative and LPA by $1 million.

LPA

The Preferred Alternative was refined to lower the capital costs and increase ridership. This included selecting both sub-option A (in addition to the included sub-option B), deviation to Highway 61 via Buerkle Road from County/Rail ROW, downtown routing Option 1, and removing Empire Station (isolated and low performing location).

BRT frequencies and span of service are unchanged from prior service level recommendations for the draft LPA; however midday and evening frequencies were increased on the Forest Lake to White Bear Lake connecting bus route and Maplewood Mall connecting bus route in the evening. Overall, connecting bus route service O&M costs for the draft LPA saw an increase with an alteration to the White Bear Lake service, and in addition to refinements on the other routes, totaled $5.2 million (2015$).

Optimization Results: The additional time and distance associated with sub-option A resulted in a total annual O&M cost of $7.9 million for the BRT service (2015$).

6.6 Optimization 3: Ridership

Preferred Alternative

The alignment for the Preferred Alternative was run on BNSF Rail ROW and Ramsey County Regional Railroad ROW between downtown White Bear Lake and Phalen Village, using downtown route Option 8. The forecasted ridership was approximately 5,400 trips.

LPA

Ridership projections were optimized between the Preferred Alternative and LPA. The route shifted to Highway 61 for the LPA between Buerkle Road and White Bear Lake. This also changed station locations and added a couple of minutes of travel time. Additionally, the downtown option was changed from Option 8 to Option 1, and added a station at Mt. Airy and still maintained a similar travel time. The extension of the guideway to Mt. Airy also allowed for additional shared guideway trips from Route 68 to be included in project trip calculations. The White Bear Lake connecting bus route also shifted alignments, resulting in a ridership increase.

Ridership with and without shared guideway for the 2040 forecast increases from the Preferred Alternative to the LPA by about 100 due to the use of downtown Option 1 instead of Option 8, as well as the increased coverage from the White Bear Lake connecting bus route. The shared guideway project trips increase in the LPA primarily due to allowing Route 68 to continue on the guideway past Regions Hospital where there are more riders who would potentially use the transit routes in the Rush Line Corridor. The following stations have the highest ridership projections for 2040 LPA Maplewood Mall Transit Center, Highway 36 and English Park-and-Ride, Regions Hospital Station, and Robert

Street and 5th Street Station due to either park-and-ride demands and/or high transfer rates at those locations.

Optimization Results: Ridership for the LPA is projected to be between 5,700 – 9,600 trips. The higher end of the range accounts for trips from other routes using the shared guideway.

7.0 The Locally Preferred Alternative

7.1 Description of the LPA

After deciding on the downtown routing option, the routing north of I-694, the station locations north of I-694 and further refining the ridership estimates, capital costs, O&M costs, and the service plan, the Draft Locally Preferred Alternative (LPA) was recommended by the TAC and PAC in March 2017.

Table 7-1 details how the initial Preferred Alternative and the LPA changed through the refinement process.

Table 7-1: Comparison of Preferred Alternative to LPA Evaluation Results

Evaluation Criteria	Preferred Alternative	LPA
Ridership	5,400	5,700-9,600
Capital Cost (2021$)	$470-735 million	$420 million (+$55 million with additional guideway service)
O&M Costs (2015$)	$7.0-$7.4 million	$7.9-$8.0 million
Development Potential	High Potential	High Potential
Travel Time	37-42 minutes	50 minutes
Environmental	Moderate	Moderate
Equity	Moderately-high accessibility	Moderately-high accessibility
Pedestrian/Bicycle Connectivity	Good accessibility	Good accessibility
On-street parking impacts*	99 spaces	147 spaces
Employment Access	13,700 jobs at station areas	13,800 (106,700 including downtown segment)
Anticipated Right-of-Way	1-61 parcels impacted	1-61 parcels impacted

**Note: the count for the Preferred Alternative includes potential impacts at station locations only; refinement of the guideway design enabled a refined estimation of the potential impacts of the LPA*

Based on these refinements and the selection of the downtown routing option, the LPA is Dedicated BRT from Union Depot in downtown St. Paul to White Bear Lake, generally running along Phalen Boulevard and the County/Rail ROW to I-694 and Highway 61 to White Bear Lake (see Figure 7-1). The LPA uses downtown Option 1, generally running along Phalen Boulevard, Jackson Street and Robert Street. This LPA best meets the project goals and is a cost-effective solution that has the potential to qualify for FTA New Starts Funding.

There are 20 preliminary stop locations, all of which may be modified during the refinement of the LPA and environmental clearance process. The proposed stations are:

- Union Depot (existing station)
- Kellogg Boulevard
- 5th/6th Street
- 9th/10th Street
- Regions and Green Line
- Mt. Airy

- Olive Street
- Cayuga Street
- Payne Avenue
- Arcade and Phalen
- Phalen Village
- Larpenteur Avenue
- Frost Avenue
- Highway 36/English
- St. John's Hospital
- Maplewood Mall Transit Center (existing station)
- County Road E
- Cedar Avenue
- Marina Triangle
- Downtown White Bear Lake

Decision: The LPA was selected based on a thorough technical analysis as well as feedback from the public and guidance and input from the PAC and TAC. It is also responsive to the transportation needs that were defined in the project Purpose and Need Statement.

The Locally Preferred Alternative

Length: Approx. 14 miles

Percent Dedicated Guideway: 85%-90%

Number of Stations: 20 stations, including Union Depot and Maplewood Mall Transit Center

Schedule: 5 AM – 12 AM, 7 days/week; starts at 6 AM on Sundays

Frequency: every 10 minutes during rush hour; 15 minutes non-rush hour

Capital costs: $420 M (2021$); + $55 M for other transit routes to use the guideway

Annual O&M Costs: $7.9 - $8.0 M (2015$)

Travel time (minutes, one way):
White Bear Lake > Maplewood Mall: 14
Maplewood Mall > Robert/5th: 30
Robert/5th > Union Depot: 6

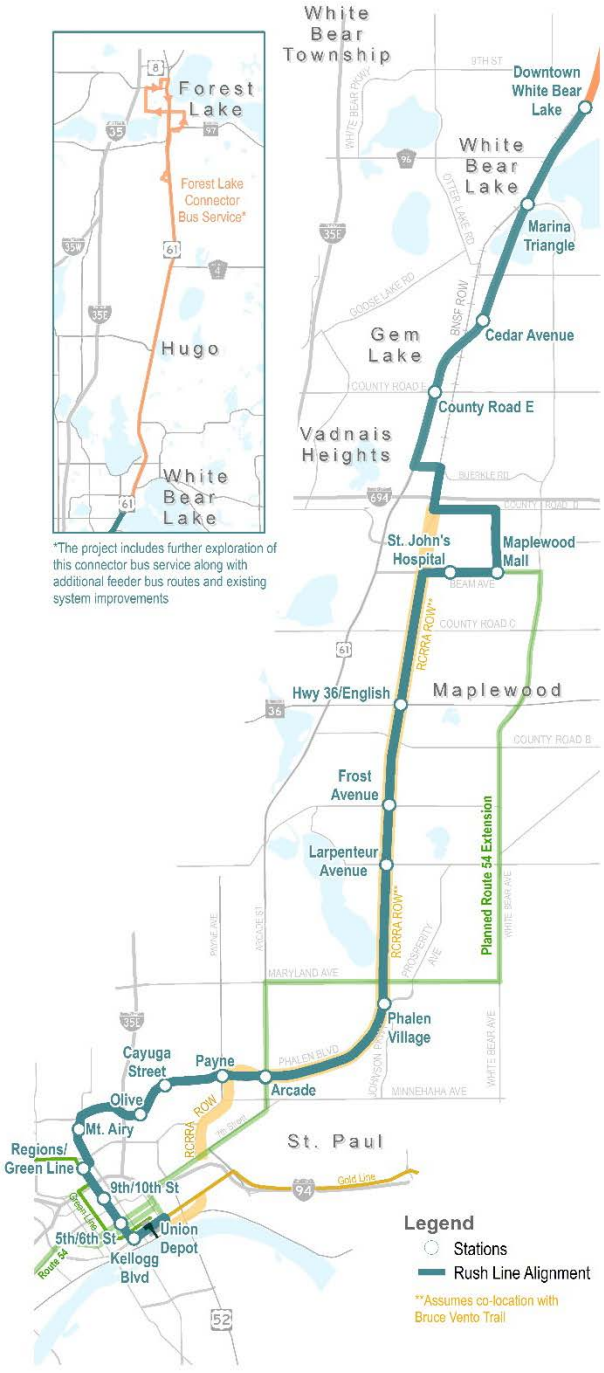
Average Daily Ridership (2040):
5,700-9,600; ridership range reflects other routes using guideway

# of Residents in Station Areas:
40,600 (2010); 60,200 (2040)

# of Jobs in Station Areas:
68,300 (2010); 106,700 (2040)

# of People Living Below Poverty in Station Areas: 11,700 (2014)

Figure 7-1: The Locally Preferred Alternative



7.2 Public Feedback

Below is a summary of the comments received during the LPA Public Engagement period.

Opportunities

- Less visual and noise impacts than LRT
- Less expensive than LRT or other routes
- Possibility to convert to LRT in future
- Perceived as safer than LRT
- Faster travel times
- Preference for hybrid or electric buses

Figure 7-2: LPA Public Engagement

Challenges

- Need to consider how people will access service at stations
- Concerns about potential impacts to existing green space, trail, and private property
- Perception that it will lower property value and quality of life and/or change character of neighborhood
- Concerns about safety in neighborhood and along route

Draft LPA Comments and Feedback

There were continuous efforts throughout the entire project, including the LPA phase to reach out to underrepresented communities in the corridor by coordinating activities in specific targeted areas.

What We Heard

- Many are reliant on transit or frequent transit users
- Supportive of improved transit services especially for seniors, people with disabilities, low-income
- Like proposed routes that provide better service for low-income and communities of color
- Concerns about safety at and around transit stations
- Green Line connection important
- Excited about Route 54 expansion

The LPA comments have been documents in the LPA Selection Report and Engagement Summary Report. The next phase of this project will include environmental analysis under the federal and state environmental review processes. This includes looking at ways to avoid, minimize and mitigate potential impacts. Additional community engagement will also be a key component of the next phase of this project.

7.3 Next Steps

7.3.1 Approval and Adoption of the LPA

The LPA was recommended to the PAC by the TAC at the TAC's May 11, 2017 meeting; the PAC approved the LPA resolution at its May 25, 2017 meeting, and forwarded the resolution to the cities of Saint Paul, Maplewood, Vadnais Heights, Gem Lake, White Bear Lake, White Bear Township, and Ramsey County for their action on it. The county and cities along the route confirmed their support for the LPA at the meetings on June 20, 2017 (Gem Lake City Council), June 26, 2017 (Maplewood City Council), July 25, 2017 (White Bear Lake City Council), July 19, 2017 (Vadnais Heights City Council), August 16, 2017 (St. Paul City Council), July 6, 2017 (White Bear Township Board), and September 12, 2017 (Ramsey County Regional Rail Authority Board). Resolutions of support were also sought from broader project partners; these resolutions are available in the attached Appendix C. Following the approval of the cities and counties, the RCRRA will submit the LPA and resolutions of support to the Metropolitan Council for consideration in August 2017. See Appendix C for all Resolutions of Support.

7.3.2 Compliance with National Environmental Policy Act

RCRRA has begun preliminary work to ensure the compliance with the National Environmental Policy Act (NEPA). The first step in this process will be to work with the FTA to make a Class of Action (COA) Determination. At this time it is anticipated that the COA for this project will be an Environmental Assessment (EA), however it could be elevated to an Environmental Impact Statement (EIS) or downgraded to a categorical exclusion (CE). RCRRA anticipates receiving a COA determination in fall 2017. The COA will affect the estimated time required to complete the appropriate NEPA documentation.

7.3.3 New Starts Process

While project funding still needs to be determined, it is likely that project sponsors will apply for capital funding through the FTA's New Starts Capital Investment Program. The FTA evaluates projects based two primary criteria: Local Financial Commitment and Project Justification. The Local Financial Commitment criterion is comprised of three sub-criteria: current capital and operating condition, commitment of capital and operating funds, and reasonableness of capital and operating cost estimates and planning assumptions/capital funding capacity. The Project Justification criterion is comprised of six sub-criteria: congestion relief, mobility improvements, cost effectiveness, environmental benefits, land use, and economic development. The Rush Line evaluation process has been designed to incorporate these criteria into the local evaluation process. Projects must receive a minimum of a Medium rating for both Local Financial Commitment and Project Justification to be eligible for funding through the New Starts Program. The New Starts criteria are based on the following measures:

- Congestion Relief – New transit trips (based on the average of current year ridership forecasts and 20-year forecasts)
- Mobility Improvements – Trips on project, with trips taken by transit dependent persons receiving twice the weight as trips by non-transit dependent persons (based on the average of current year ridership forecasts and 20-year forecasts)
- Cost Effectiveness – Annualized capital cost and annual operating and maintenance cost per annual trips on the project (based on the average of current year ridership forecasts and 20-year forecasts)

- Environmental Benefits – Monetized change in air quality (including carbon monoxide, mono-nitrogen oxides, particulate matter, and volatile organic compounds), energy use, greenhouse gas emissions, and safety (including disabling injuries and fatalities) associated with surface transportation (based on the average of current year ridership forecasts and 20-year forecasts) compared to the annualized capital cost and annual operating and maintenance cost
- Land Use – The population density and total employment within a half-mile of a station; share of legally binding affordable housing within a half-mile of a station compared to the share of legally binding affordable housing within the county(ies) served; central business district parking supply and pricing; pedestrian-friendly facilities
- Economic Development – Based on a qualitative review of transit-supportive plans and policies, performance and impact of policies, and tools to maintain or increase the share of affordable housing in the project corridor.

The Rush Line PPD Study evaluation process was designed to identify which alternatives meet local needs and also complete a high-level review of the eligibility for federal funding. The FTA criteria will continue to be refined and reviewed through the development of the Rush Line BRT. Figure 7-3 shows how the PPD Study evaluation criteria match the federal criteria.

When the draft LPA was selected, it was evaluated against the New Starts Project Justification criteria to determine the likely rating the project would receive if it were rated by FTA. Since the LPA leaves open the possibility that other bus routes could be routed on the Rush Line guideway for a portion of their trip, the New Starts evaluation was performed for both for the BRT only and BRT with other bus routes utilizing the guideway. Figure 7-4 presents the preliminary New Starts Project Justification rating for the Rush Line project both with and without other transit routes being routed along the guideway. Table 7-2 presents the values used to support the preliminary ratings. Overall, the Rush Line LPA is anticipated to receive a Medium-Low or Medium Project Justification rating without routing other transit routes onto the guideway and a Medium Project Justification rating with routing other transit routes onto the guideway.

Figure 7-3: Evaluation Criteria Comparison: Rush Line PPD Study vs. Federal Criteria

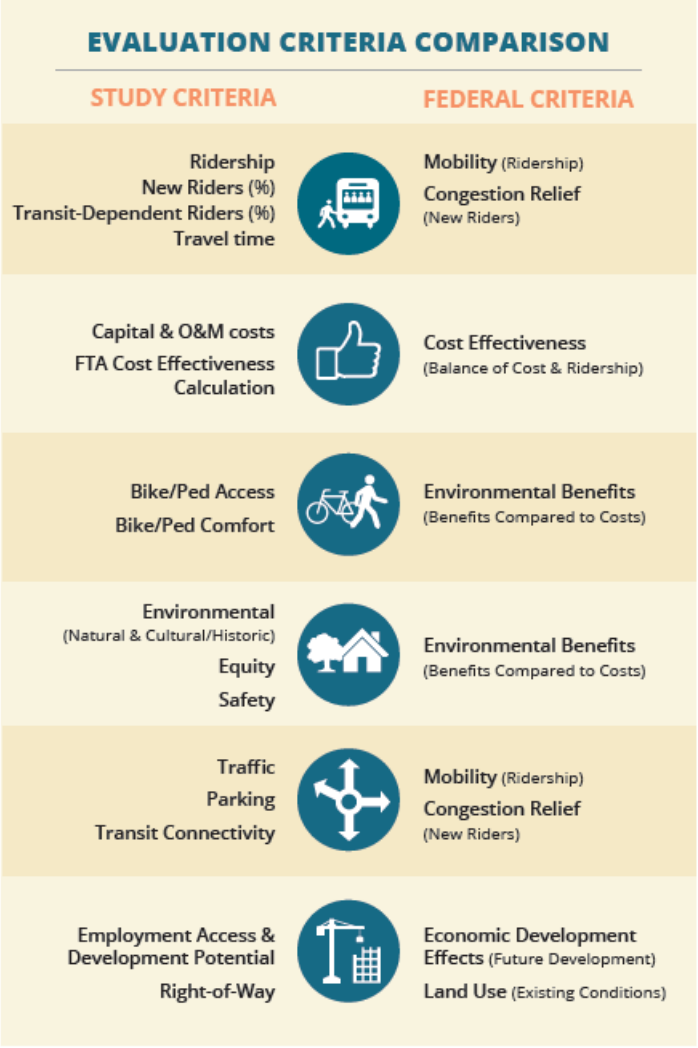
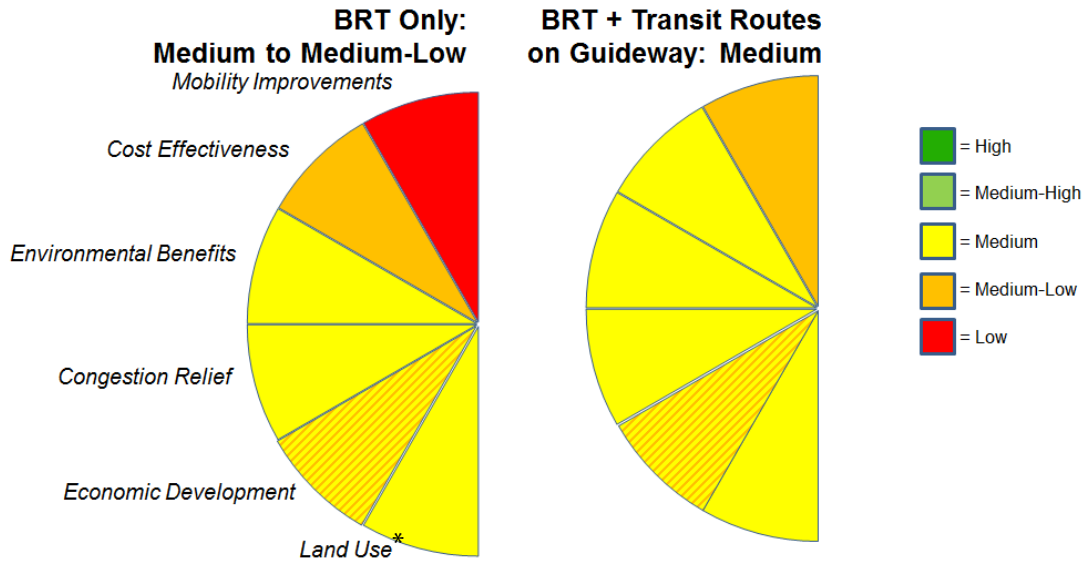


Figure 7-4: Preliminary New Starts Project Justification Rating (Medium Required)



**Based on current zoning and planning in the corridor the project would likely receive a Medium-Low for economic development, however, as has happened with the other New Starts projects in the region, it is anticipated that local governments will review their local planning and zoning efforts to encourage transit-supportive development prior to requesting rating from the FTA. It is anticipated that through revising local plans and policies to be transit-supportive, the economic development rating could be increased to a Medium.*

Table 7-2: Preliminary New Starts Project Justification Values

FTA New Starts Criteria		BRT Only	BRT + Transit Routes
Mobility Improvements	Trips on Project + Trips on Project by Transit Dependent Persons	2,100,000	3,200,000
Cost Effectiveness	Cost per Rider	$11.52	$8.30
Environmental Benefits	Ratio of Monetized Environmental Benefits to Project Costs	2.0%	2.8%
Congestion Relief	New Transit Riders	3,400	3,600
Economic Development	Local Plans and Policies to shape development in transit oriented development	Qualitative	
Land Use			
Population density	2010 pop/sq. mi.	3,870	
Employment served	2010	68,300	

FTA New Starts Criteria		BRT Only	BRT + Transit Routes
Affordable Housing	Share of affordable housing compared to the share of affordable housing in Ramsey County		2.76
CBD parking rate	Average Daily parking rate in the core of downtown Saint Paul		$9.36

7.3.4 Project Funding

In addition to receiving a Medium or higher for Project Justification, projects also must receive a Medium or higher for Local Financial Commitment based on the following measures:

- Capital and operating condition - The average fleet age, bond ratings, if given within the last two years, the current ratio as shown in the project sponsor's most recent audited financial statement (ratio of current assets to current liabilities), and recent service history including whether there have been significant cuts in service.
- Commitment of capital and operating funds - Percentage of funds (both capital and operating) that are committed or budgeted.
- Reasonableness of capital and operating cost estimates and planning assumptions/capital funding capacity - Capital and operating planning assumptions are comparable to historical experience, the reasonableness of the capital cost estimate of the project, adequacy of meeting state of good repair needs, and the project sponsor's financial capacity to withstand cost increases or funding shortfalls.

In the past, Twin Cities New Starts projects have received Medium or higher ratings for local financial commitment. The funding for the Rush Line Corridor project is anticipated to be FTA New Starts funds of up to 50% of the cost of the project and matching funds from Ramsey County and RCRRA.

The financial plan documenting Local Financial Commitment will be developed as the NEPA process is completed, which will occur prior to the request to enter Project Development.