E Line Corridor Study

TECHNICAL MEMO #2

This technical memo evaluates the E Line alignment alternatives developed in Technical Memo 1 and identifies alternatives for additional study.

Contents

Project Overview

Northern E Line Alignment

The initial concept for the Hennepin Avenue corridor developed in the Arterial Transitways Corridor Study in 2012 had a northern terminal in downtown Minneapolis. The E Line Corridor Study recommends that the E Line alignment continue north through downtown Minneapolis to serve 4th Street SE and University Avenue SE via the existing Route 6U alignment.

This recommendation is based on the high existing Route 6 ridership on this segment, high population and job density, and service to the University of Minnesota. The precise terminal location has not yet been determined, but it is anticipated that the final station will be at either the METRO Green Line Stadium Village Station or Westgate Station. The final determination will be made in 2020, based on additional planning for needed support facilities for the E Line.

Southern E Line Alignment Alternatives

Seven southern alignment alternatives were identified based on existing population, employment, and transit ridership and route patterns in the corridor.

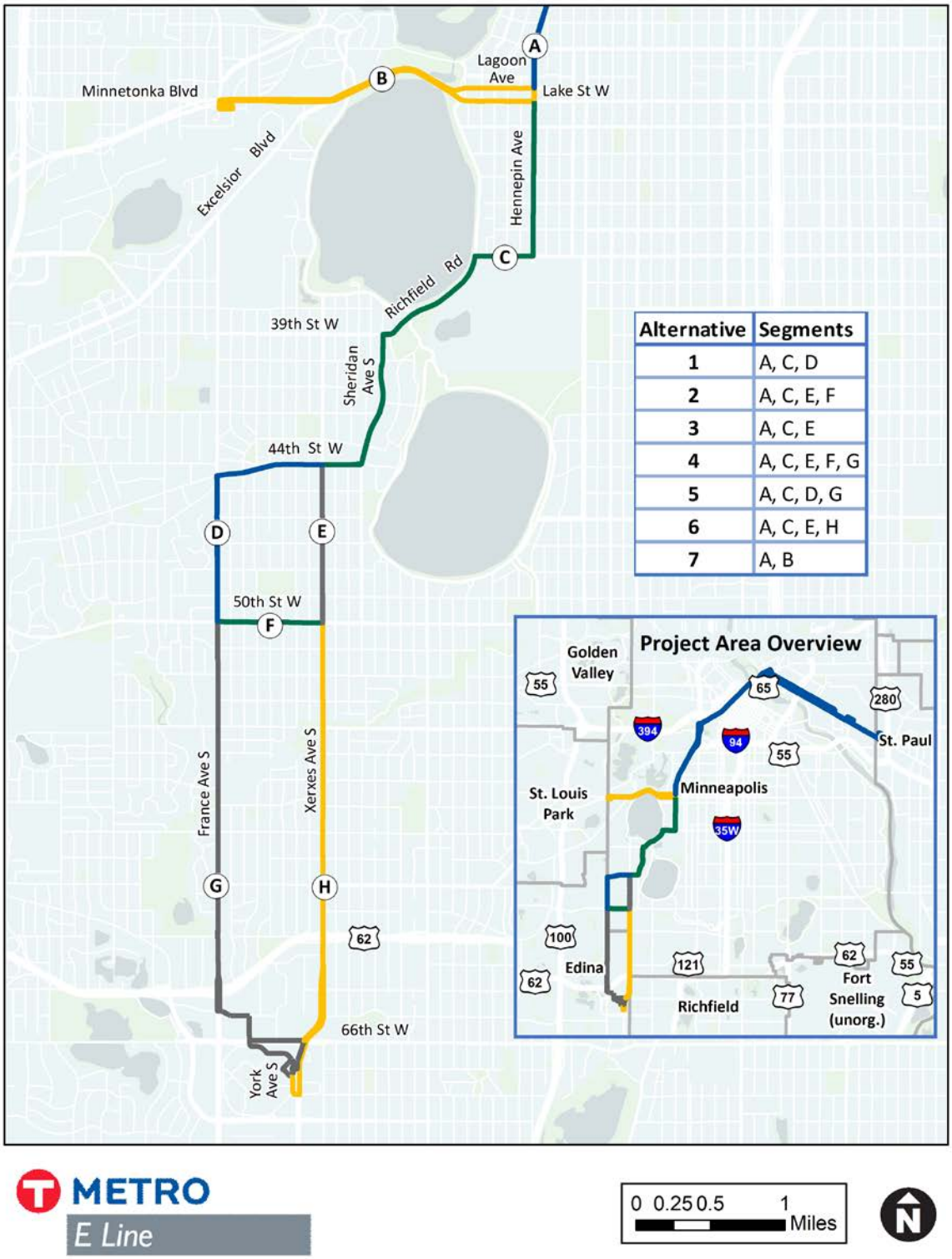
Table 1: Southern End Alternative Alignments

Alternative	Roundtrip Length (mi)	Alignment
1	16.8	**Ends at 50th & France** West on 44th and South on France
2	17.7	**Ends at 50th & France** South on Xerxes and West on 50th
3	16.7	**Ends at 50th and Xerxes** South on Xerxes
4	21.8	**Ends at Southdale** South on Xerxes, West on 50th, and South on France
5	21.7	**Ends at Southdale** West on 44th and South on France
6	21.1	**Ends at Southdale** South on Xerxes
7	13.2	**Ends at Future West Lake Street Station** West on Lake

Each alternative shares the same recommended northern terminus near the University of Minnesota. The alternatives vary south of Hennepin Avenue & Lagoon Avenue/Lake Street. There are two additional points where alternatives vary, at 44th Street West & Xerxes Avenue South, and at 50th Street West & Xerxes Avenue South (as shown in Figure 1). The analysis discussed in this section examined only the portions of the proposed corridor that differ – south or west of Hennepin Avenue South & Lagoon Avenue/West Lake Street.

The alignment of each alternative is described in Table 1. Figure 1 highlights alignment alternative segments that combine to create Alternatives 1 through 7. Further information on each of the alternatives is available in Technical Memo 1.

Figure 1: Southern Alignment Segments



Concept Connecting Bus Plans

Metro Transit developed preliminary concept connecting bus plans for each of the alternatives for initial evaluation purposes. These plans illustrate what connecting bus service could look like and do not represent the final plan for service on opening day of the E Line. Following the selection of a recommended E Line alignment, additional connecting local bus planning will occur. These preliminary plans, which are shown in Figures 2 through 8, include the routing and frequency of the E Line alternative, the routing and frequency of supporting local bus service, the existing Route 6 alignment, Route 6 boardings from fall 2017, and the existing and planned METRO lines.

Figure 2: Alternative 1 Connecting Bus Plan

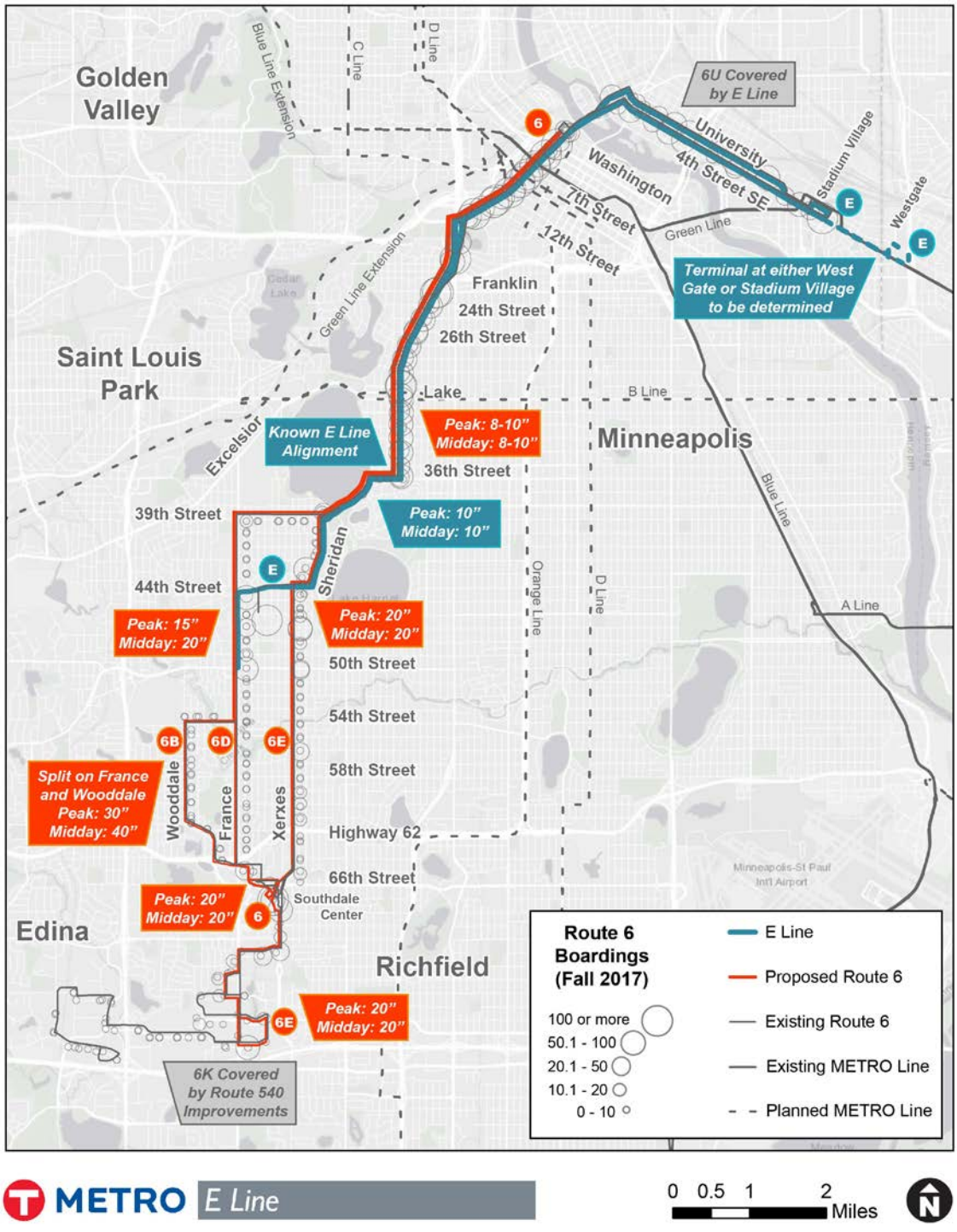


Figure 3: Alternative 2 Connecting Bus Plan

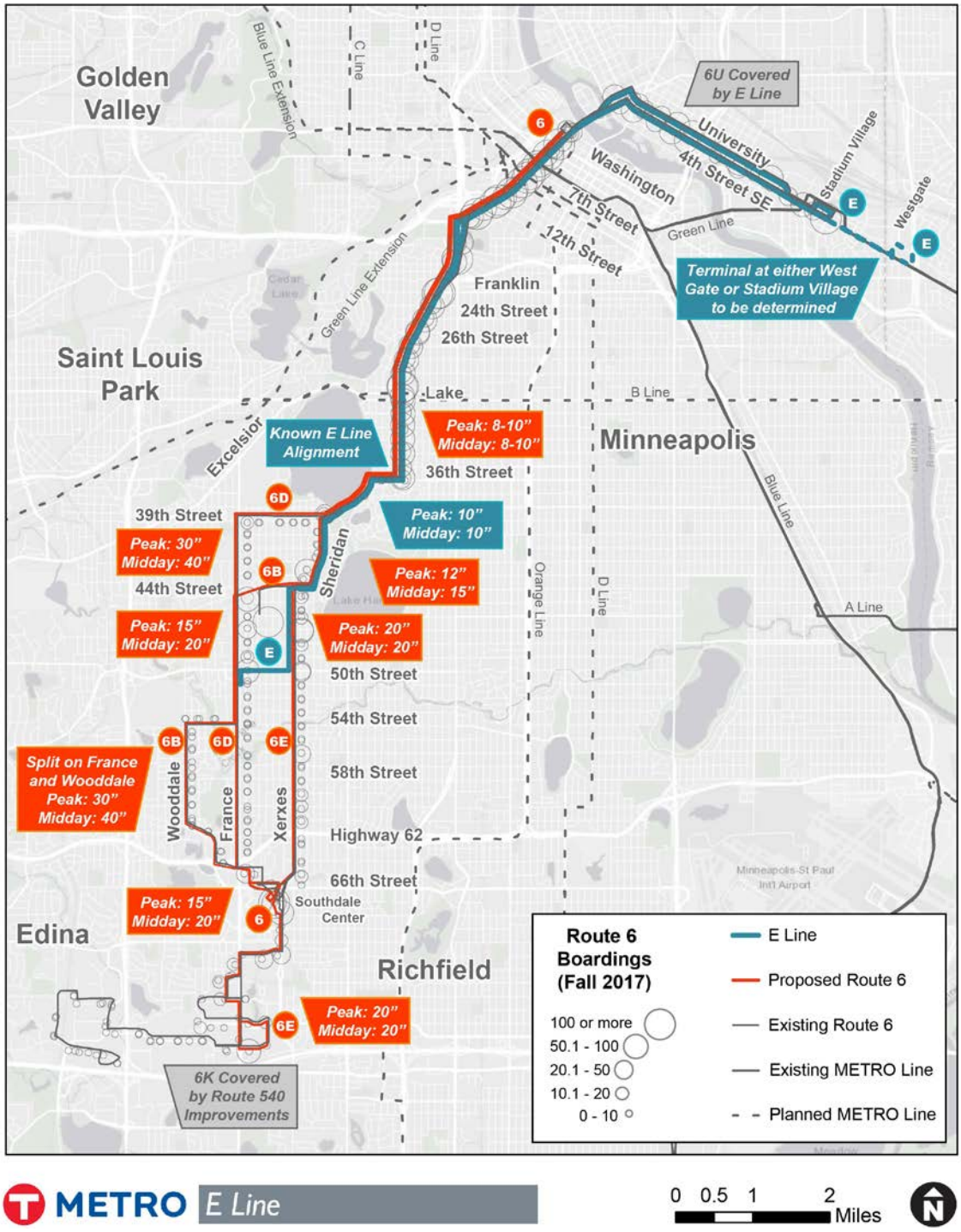


Figure 4: Alternative 4 Connecting Bus Plan

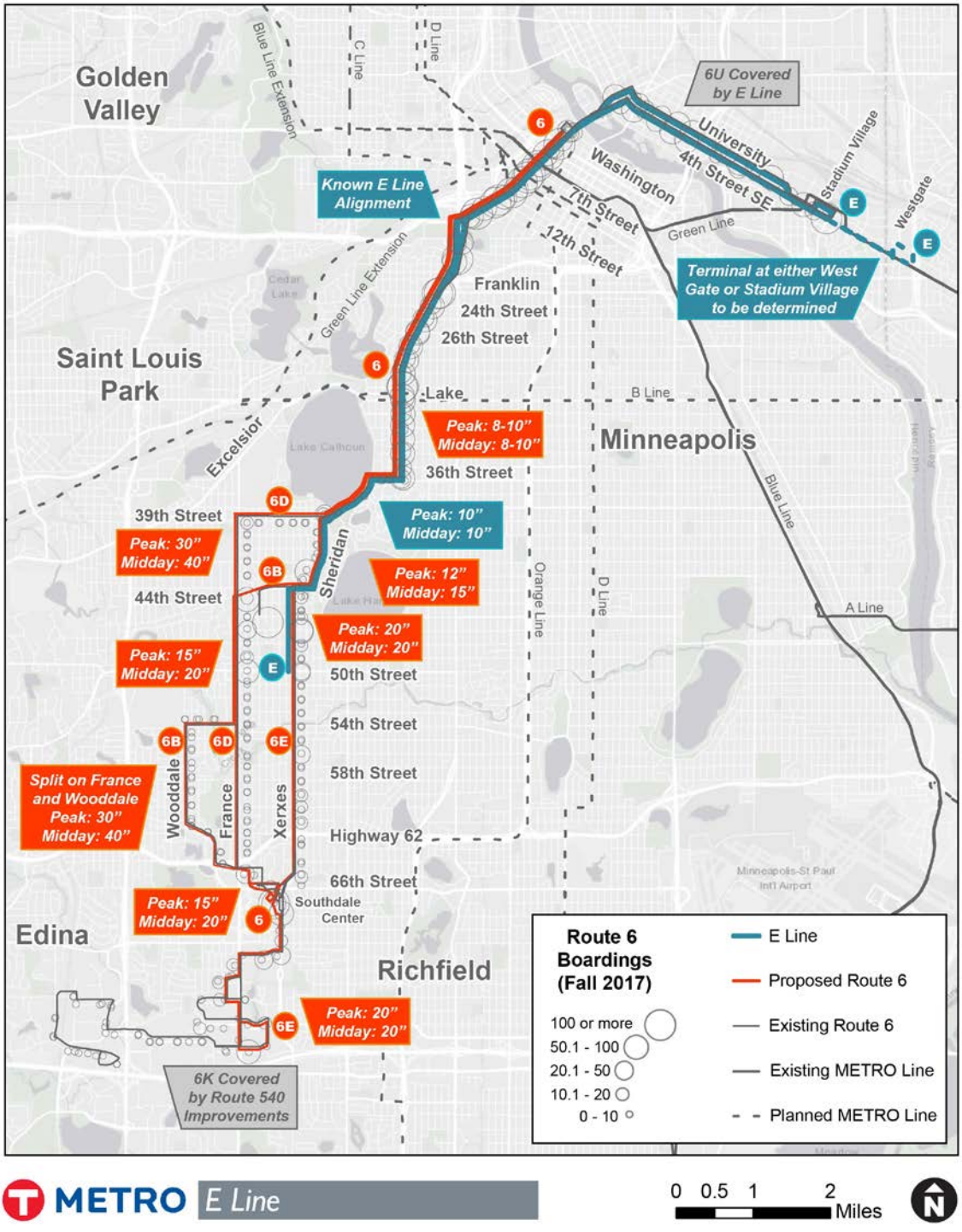


Figure 5: Alternative 4 Connecting Bus Plan

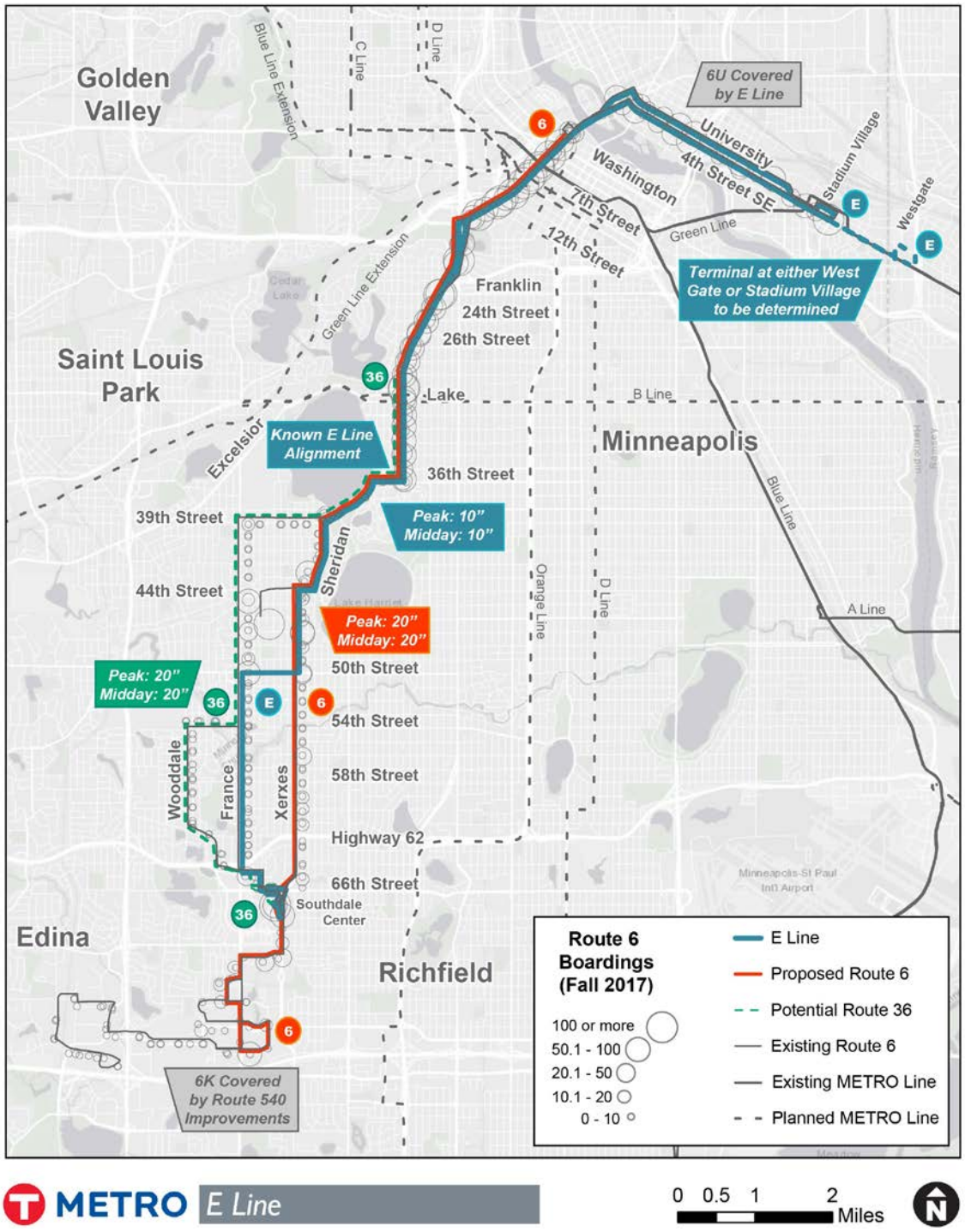


Figure 6: Alternative 5 Connecting Bus Plan

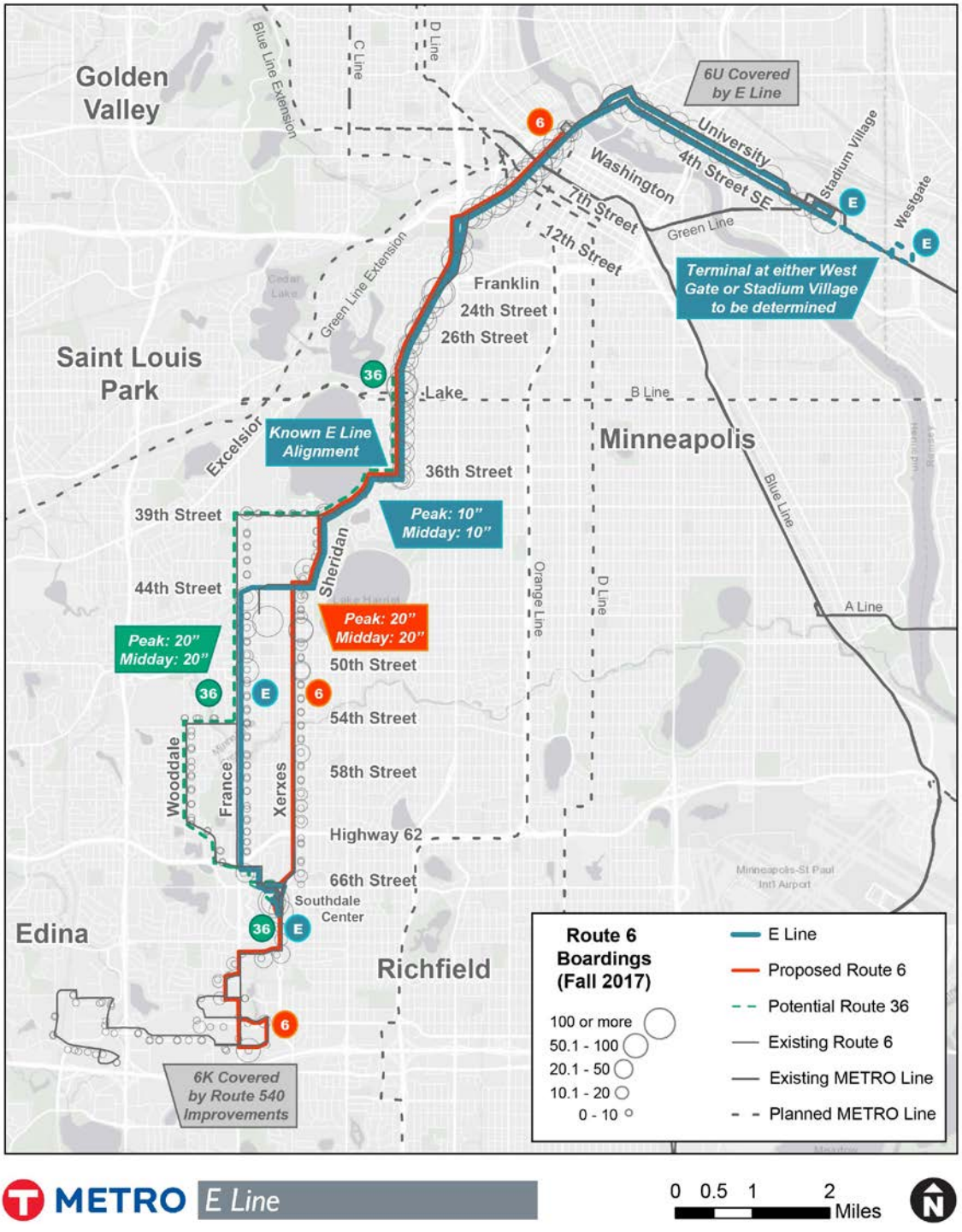


Figure 7: Alternative 6 Connecting Bus Plan

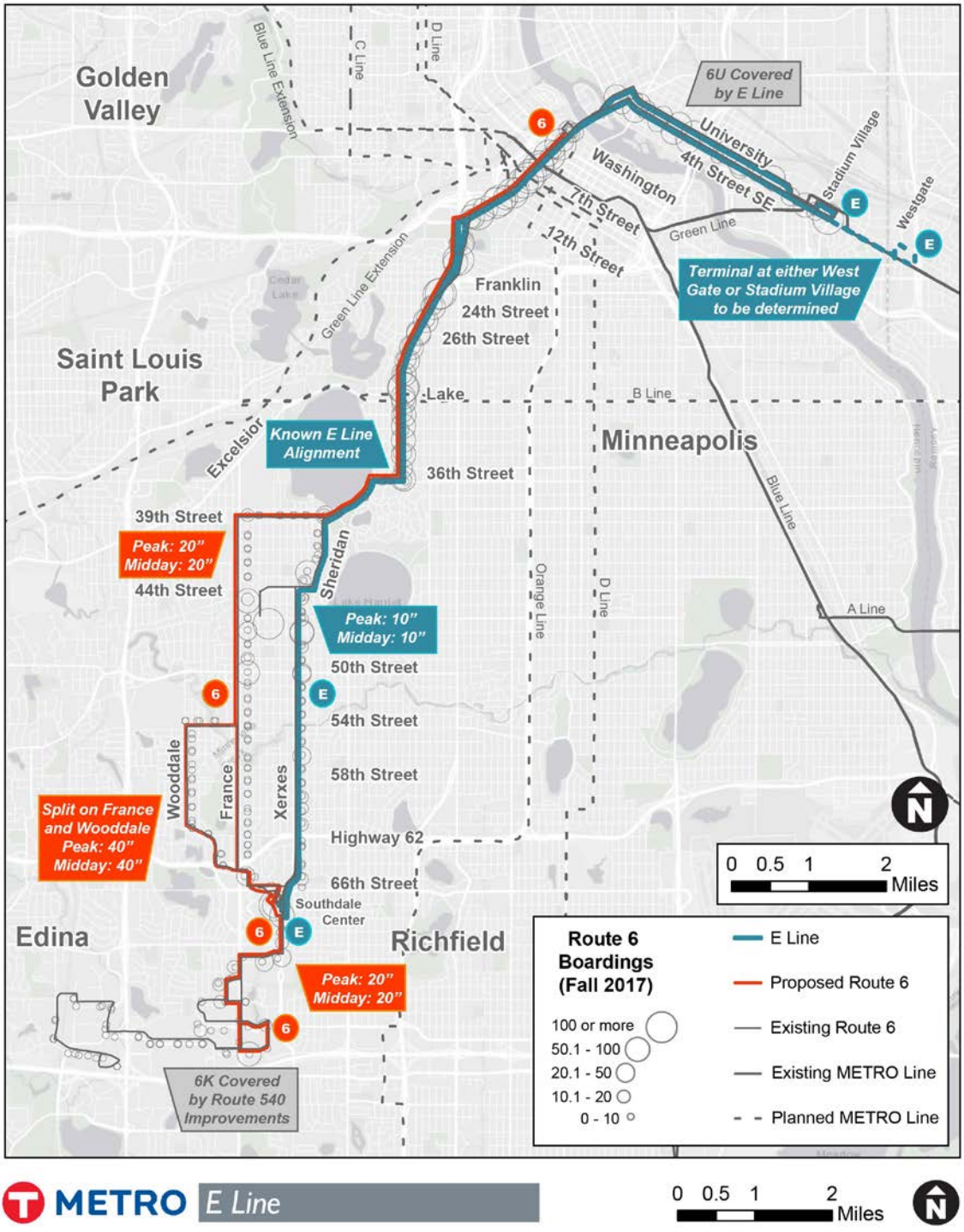
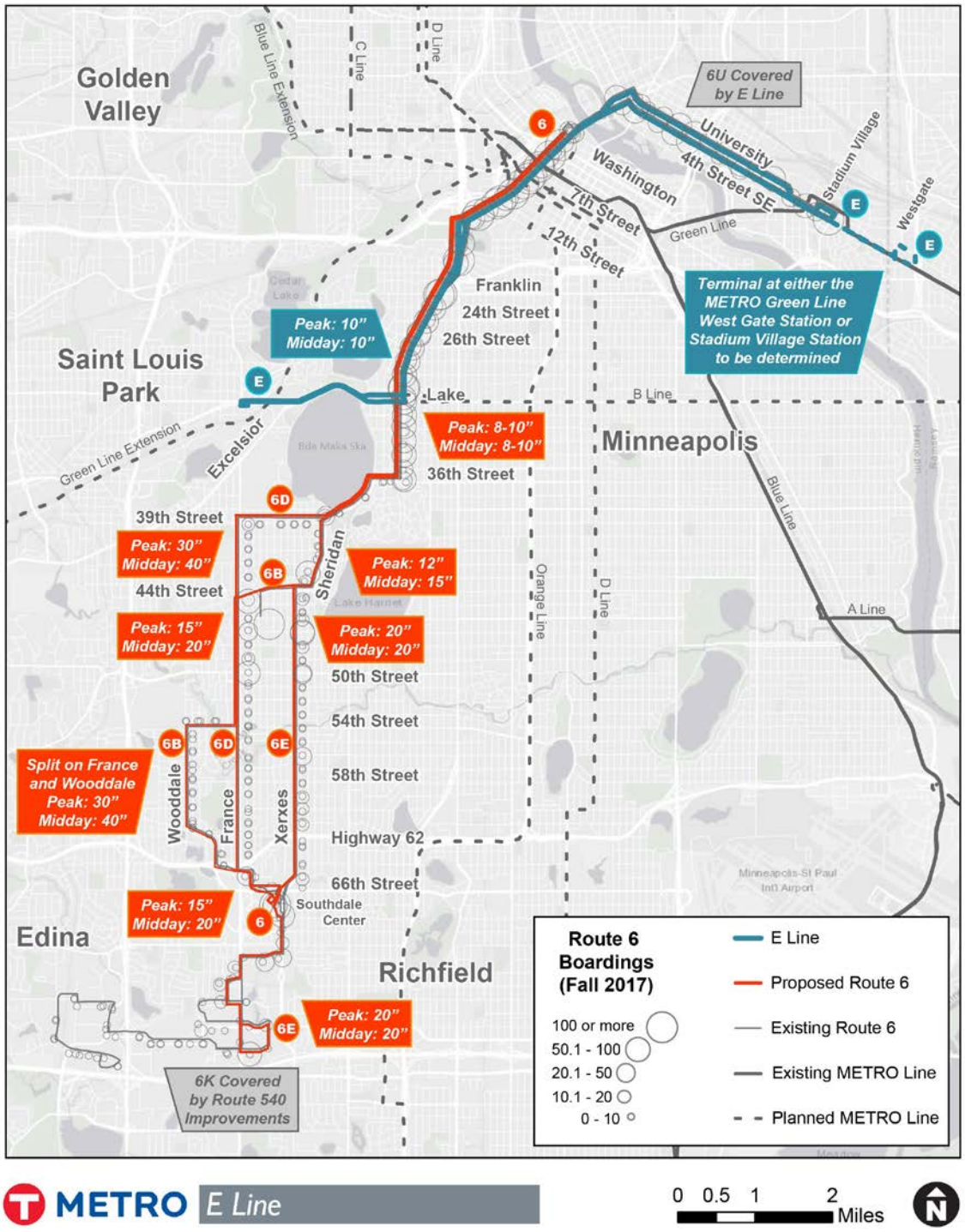


Figure 8: Alternative 7 Connecting Bus Plan



Evaluation Criteria

Project goals and evaluation criteria for the E Line were developed with project committees and refined by the project team. The goals developed for the project include:

1. Increase ridership and improve the speed and attractiveness of transit in the Route 6 corridor.
2. Benefit historically disadvantaged populations and work to reduce regional disparities.
3. Integrate effectively into the existing and planned transit network.

Evaluation criteria were developed to measure how well the alternatives addressed the project goals. The evaluation criteria by goal is provided in Table 2.

Table 2: Evaluation Criteria by Goal

Goal	Evaluation Criteria
Goal 1: Improve Ridership, Speed, and Attractiveness	Population
	Jobs
	% of Existing Ridership at Potential Stations
Goal 2: Benefit Historically Disadvantaged Populations	Population of Color
	Low Income Population
	Vehicle Availability
	Low-Paying Jobs (<$40,000)
Goal 3: Integrate with Existing and Planned Transit System	% of Existing Service Hours Reallocated
	Estimated Corridor Operating Cost
	% of Current Ridership with an Additional Transfer

Evaluation Method and Assumptions

A half-mile buffer around each alternative was used for the evaluation. Since the geography of these datasets did not perfectly align with these areas, data was proportionally attributed to each alternative area based on the percentage of the dataset area that was within the alternative surrounding area.

Once the evaluation criteria were calculated for each alternative, each was assigned a score based on its performance compared to the other alternatives. The score was determined as a percent of the best performing alternative for each metric. A cumulative score was then calculated, with equal weight to each of the three goals, to identify the top alternatives for further analysis.

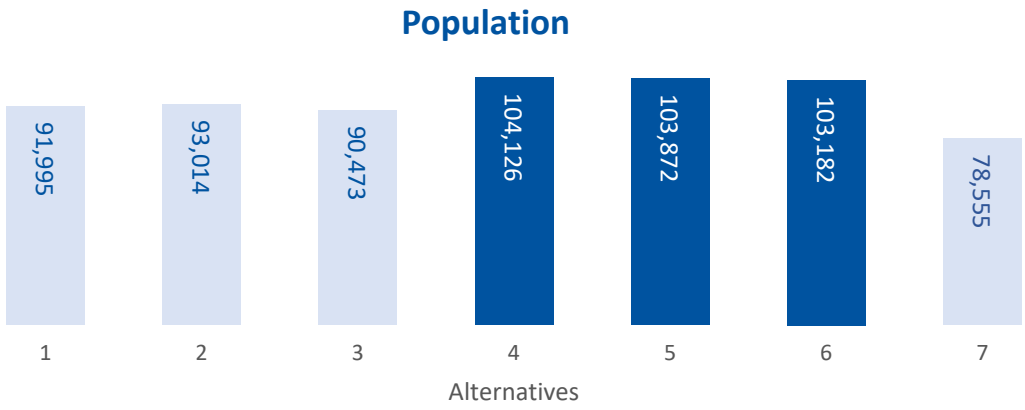
Evaluation Results

Goal 1: Improve Ridership, Speed, and Attractiveness

Population

Definition: Number of residents within the half-mile corridor buffer

Source: U.S. Census Bureau 2013-2017 American Community Survey (ACS) Data



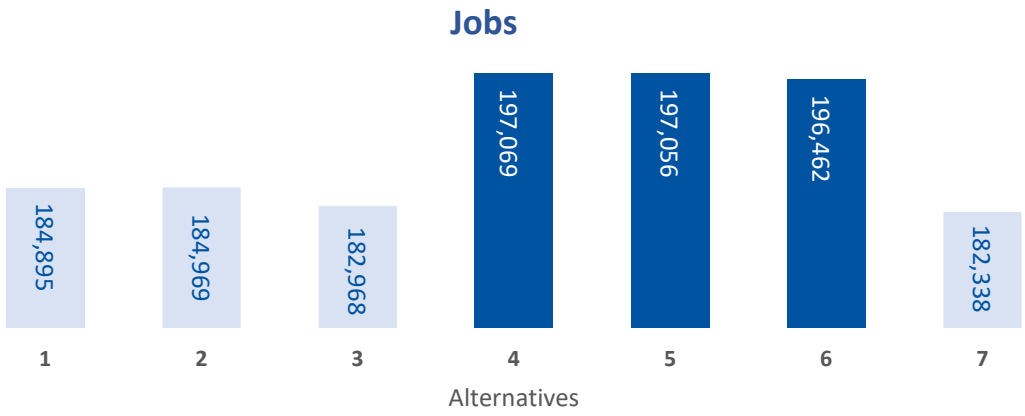
Results:

As the longest alignment alternatives, Alternatives 4, 5 and 6 would serve the greatest number of people. Each alternative would serve the densest segment of the corridor, while the longer alternatives extend through lower density residential areas. As a result, the population difference between the middle and longest alternatives is not as significant as it would be with the population density found further north in the corridor.

Jobs

Definition: Number of jobs within the half-mile corridor buffer

Source: U.S. Census Bureau, 2015 Longitudinal Employer-Household Dynamics Origin Destination Employment Statistics (LODES)



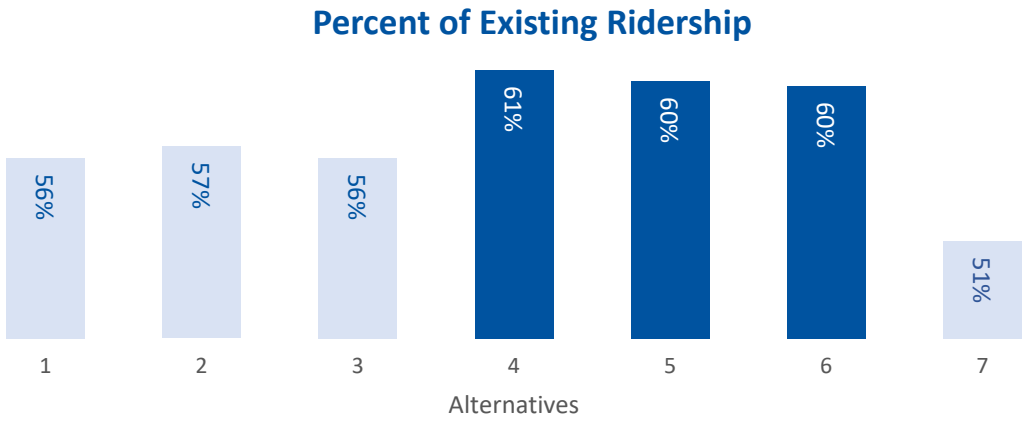
Results:

Alternatives 4, 5 and 6 would connect two major employment centers along the alignment: downtown Minneapolis and the Southdale Center commercial area. While all alignments pass through downtown Minneapolis and the Uptown area, those ending at Southdale would create the highest access to jobs.

Percent of Existing Ridership at Potential Stations

Definition: Percent of ridership on current Metro Transit routes that would be served by concept stations on each alignment alternative

Source: Metro Transit Fall 2017 ridership data



Results:

Based on existing Metro Transit bus ridership patterns, potential stations along Alternatives 4, 5, and 6 would serve the highest number of existing riders.

Goal 1 Summary

Overall, Alternatives 4, 5, and 6 each scored the maximum number of points for Population, Jobs, and Percent of Existing Ridership (Figure 9). As the longest alternatives, they are accessible to the greatest number of people and jobs/workers along the corridor. The lowest performing alignments were those with the shortest length.

Figure 9: Goal 1 Results

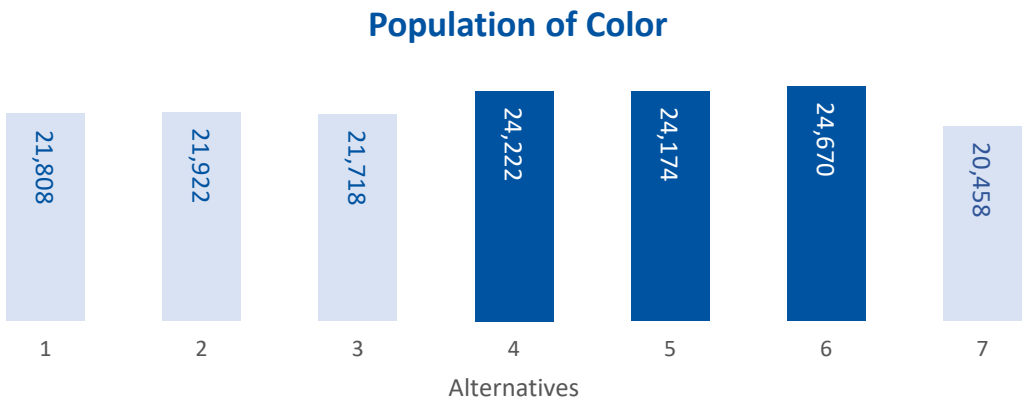
Alternative	Route	Goal 1
1	End at 50th Street and France Avenue via 44th Street to France Avenue.	
2	End at 5oth Street and France Avenue via Xerxes Avenue and 50th Street	
3	End at Xerxes Avenue and 50th Street via Xerxes Avenue.	
4	End at Southdale Transit Center. Routing along Xerxes Avenue to 50th Street, 50th Street to France Avenue	
5	End at Southdale Transit Center. Routing along 44th Street to France Avenue.	
6	End at Southdale Transit Center. Routing along Xerxes Avenue.	
7	End at METRO Green Line Extension West Lake Street Station. Routing along Lake Street.	

Goal 2: Benefit Historically Disadvantaged Populations

Population of Color

Definition: Population not identifying as non-Hispanic and/or White only within the half-mile corridor buffer

Source: U.S. Census Bureau 2013-2017 ACS Data



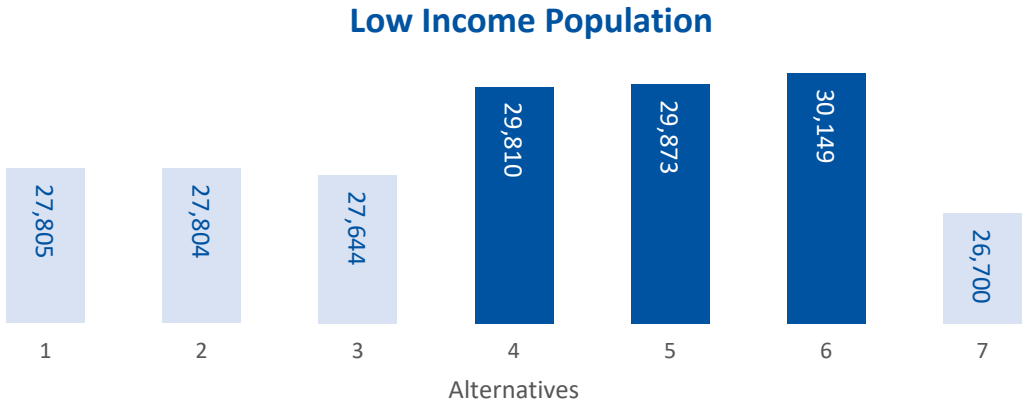
Results:

The longest alternatives, (Alternatives 4, 5, and 6) would serve the most people of color along the corridor.

Low Income Population

Definition: Population at or under 185 percent of poverty line only within the half-mile corridor buffer

Source: U.S. Census Bureau 2013-2017 ACS Data



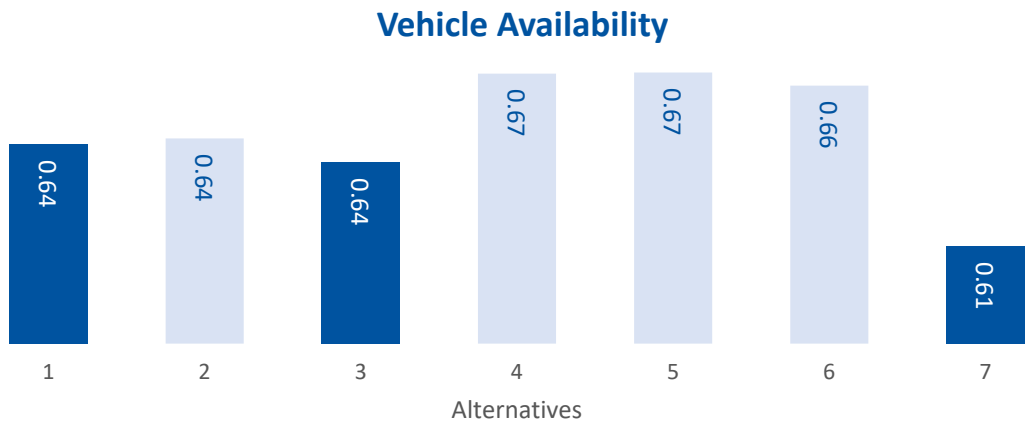
Results:

The longest alternatives (Alternatives 4, 5, and 6) would serve the most people with low incomes along the corridor.

Vehicle Availability

Definition: Number of vehicles in the alternative area divided by the number of people over age 16 (displayed as vehicles per person)

Source: U.S. Census Bureau 2013-2017 ACS Data



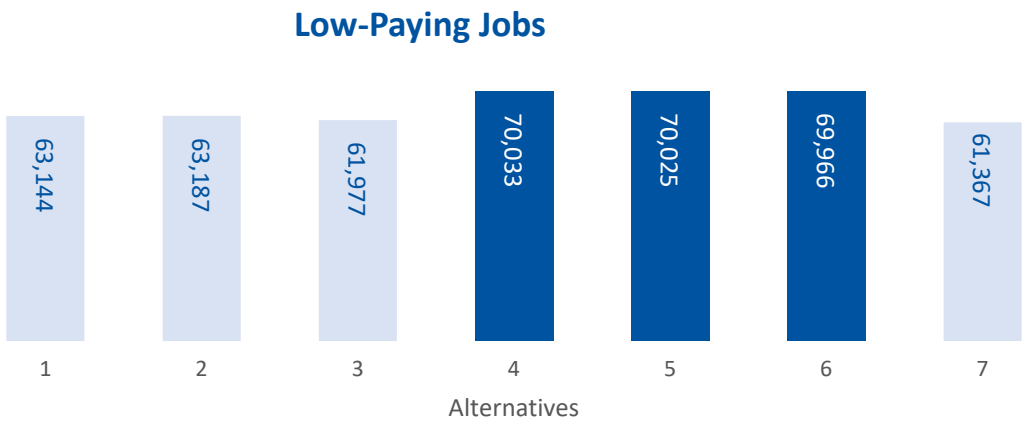
Results:

Residents along Alternatives 1, 3, and 7 have the lowest number of vehicles per person, or the least access to a vehicle, and the most to benefit from increased transit accessibility.

Low-Paying Jobs

Definition: Number of jobs paying less than $40,000 annually

Source: 2015 LEHD Origin Destination Employment Statistics (LODES)



Results:

Alternatives 4, 5, and 6 would provide access to Southdale Center, along with adjacent retail and service sector jobs. As a result, these alignments would connect with the largest number of low-paying jobs.

Goal 2 Summary

The longest alternatives would serve the greatest number of historically disadvantaged populations and earned the highest score for Goal 2. Alternatives 4, 5, and 6 would serve the most people of color, people with low incomes, and people with low-paying jobs. The other alternatives would serve more people with less access to a vehicle but fewer of each of the other target populations. Alternative 7 would serve the fewest historically disadvantaged populations.

Figure 10: Goal 2 Results

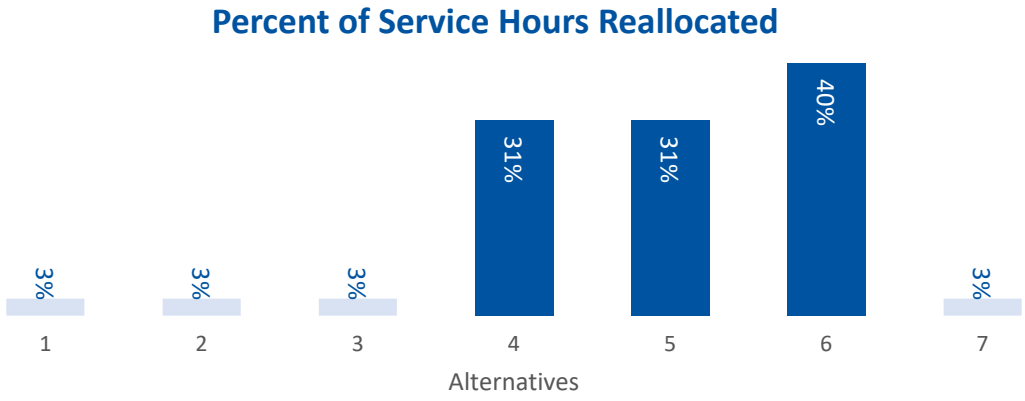
Alternative	Route	Goal 2
1	End at 50th Street and France Avenue via 44th Street to France Avenue.	
2	End at 50th Street and France Avenue via Xerxes Avenue and 50th Street	
3	End at Xerxes Avenue and 50th Street via Xerxes Avenue.	
4	End at Southdale Transit Center. Routing along Xerxes Avenue to 50th Street, 50th Street to France Avenue	
5	End at Southdale Transit Center. Routing along 44th Street to France Avenue.	
6	End at Southdale Transit Center. Routing along Xerxes Avenue.	
7	End at METRO Green Line Extension West Lake Street Station. Routing along Lake Street.	

Goal 3: Integrate with Existing and Planned Transit System

Percent of Existing Platform Hours Reallocated

Definition: The amount of existing Route 6, Route 12, and Route 612 platform hours[1] potentially reallocated to the E Line

Source: Metro Transit Fall 2017 platform hours



Results:

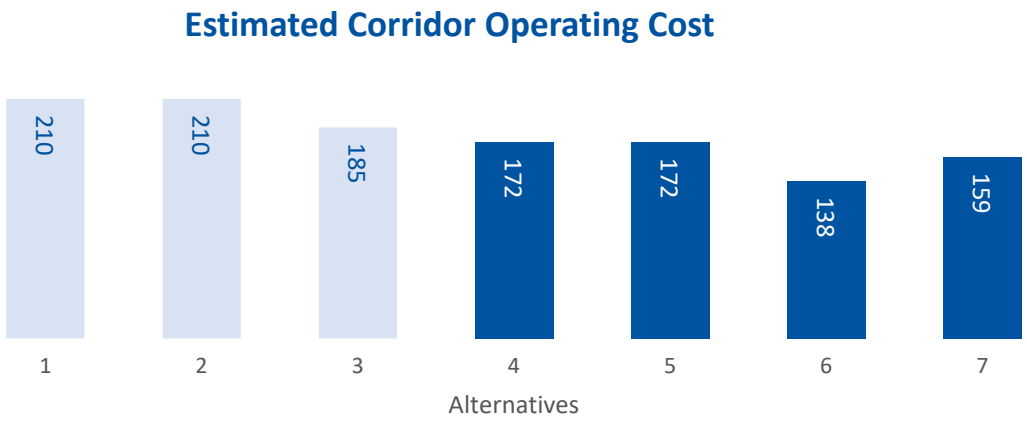
Since Alternatives 4, 5, and 6 are the longest alternatives, they require less connecting bus service in addition to the E Line. Alternative 6 replaces the most platform hours, since only one connecting bus route is required to cover the existing Route 6, compared to the two connecting bus routes that are needed for Alternatives 4 and 5.

[1] Platform hours are the number of hours that buses are outside of the garage operating a route. This includes the time to travel to/from the garage to the beginning or from the end of the route, the time the route is serving passengers, and the route recovery and layover time.

Estimated Corridor Operating Cost

Definition: Total net increase in weekday platform hours

Source: Metro Transit Fall 2017 platform hours



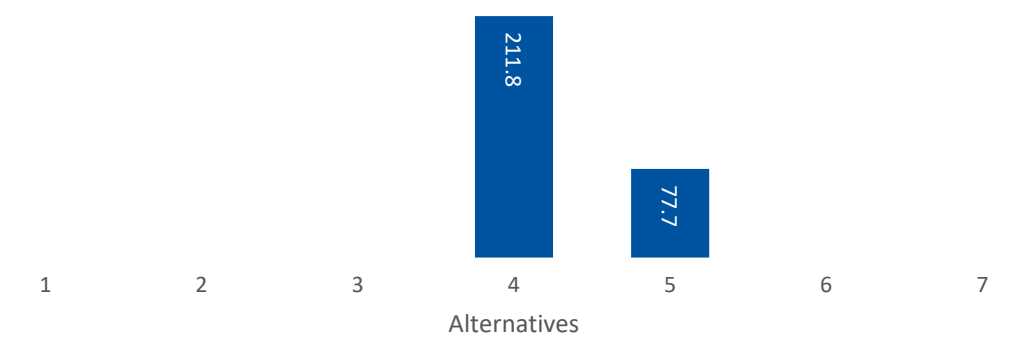
Results:

Alternatives 1, 2, and 3 require the highest net platform hours due to the amount of connecting bus service that would be needed to supplement the E Line based on existing Route 6 operations. Alternative 7 is the shortest E Line alignment alternative, which minimizes the net platform hours needed. Alternative 6 requires the fewest net platform hours, since it replaces a significant portion of the existing Route 6 and only requires one connecting bus to cover the remainder of existing Route 6.

Current Ridership with an Additional Transfer

Definition: Number of riders with an additional transfer

Source: Metro Transit Fall 2017 ridership data



Results:

Since many of the alternatives retain the service that currently exists as connecting bus service, most of the alternatives do not require riders to make an additional transfer. Alternatives 4 and 5 introduce a new connecting bus route to cover a portion of the existing Route 6 that would require some riders to make a transfer that do not need to make one today. Since Alternative 5 crosses over to France Avenue further north at 44th Street, this alternative requires fewer people to transfer than Alternative 4.

Goal 3 Summary

The three alignment alternatives serving the full length of the corridor scored the highest on Goal 3 metrics, demonstrating the greatest compatibility with the existing transit system. Alternative 6 earned the highest score by a significant margin, ranking first in percent of existing service hours replaced, estimated corridor operating cost, and percent of current ridership with an additional transfer. Alternatives 4 and 5 followed with lower scores in the first two metrics, and Alternative 4 fell shortest on current ridership with an additional transfer.

Alternatives 1 and 2 performed the worst on Goal 3. Across all of the evaluation criteria, alignment alternatives earned the lowest scores on percent of existing service hours replaced.

Figure 11: Goal 3 Results

Alternative	Route	Goal 3
1	End at 50th Street and France Avenue via 44th Street to France Avenue.	
2	End at 5oth Street and France Avenue via Xerxes Avenue and 50th Street	
3	End at Xerxes Avenue and 50th Street via Xerxes Avenue.	
4	End at Southdale Transit Center. Routing along Xerxes Avenue to 50th Street, 50th Street to France Avenue	
5	End at Southdale Transit Center. Routing along 44th Street to France Avenue.	
6	End at Southdale Transit Center. Routing along Xerxes Avenue.	
7	End at METRO Green Line Extension West Lake Street Station. Routing along Lake Street.	

Summary of Results

Evaluation of each criterion revealed three alternatives with a clear advantage in meeting the project goals, as shown in Figure 5. The longest alternatives would serve the most people, including historically disadvantaged populations, while maintaining the highest compatibility with the existing transit system. Based on this initial evaluation process, Alternatives 4, 5, and 6, shown in Figure 13, were selected for further study.

Figure 12: Summary of Initial E Line Alternatives Evaluation

GOAL 1: Increase ridership and improve the speed and attractiveness of transit in the Route 6 corridor.	**GOAL 2:** Benefit historically disadvantaged populations and work to reduce regional disparities.	**GOAL 3:** Integrate effectively into the existing and planned transit network.

Alternative	Route	Goal 1	Goal 2	Goal 3	Advance for more detailed study?
1	End at 50th Street and France Avenue via 44th Street to France Avenue.	◐	◐	◔	⊗
2	End at 5oth Street and France Avenue via Xerxes Avenue and 50th Street	◐	◐	◔	⊗
3	End at Xerxes Avenue and 50th Street via Xerxes Avenue.	◐	◐	◔	⊗
4	End at Southdale Transit Center. Routing along Xerxes Avenue to 50th Street, 50th Street to France Avenue	●	●	◔	✓
5	End at Southdale Transit Center. Routing along 44th Street to France Avenue.	●	●	◔	✓
6	End at Southdale Transit Center. Routing along Xerxes Avenue.	●	●	●	✓
7	End at METRO Green Line Extension West Lake Street Station. Routing along Lake Street.	◔	◔	◐	⊗

Figure 13: E Line Alignment Alternatives Advanced for Further Study