E Line Corridor Study

SUMMARY REPORT

January 2020

The purpose of the E Line Corridor Study is to determine the recommended routing for the METRO E Line for approval by the Metropolitan Council. This Final Report includes the recommended alignment and summarizes the results of three technical memos prepared by Metro Transit and Kimley-Horn and Associates throughout the study process.

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Executive Summary

The METRO E Line is a planned arterial bus rapid transit (BRT) line that will substantially upgrade and replace portions of Route 6, one of Metro Transit's highest ridership bus routes, to provide faster, more reliable service and a more comfortable experience. It was studied in the 2012 Arterial Transitways Corridor Study (ATCS) as a high performing corridor for BRT implementation, but additional planning was needed to better define the arterial BRT concept in the corridor and determine the final routing for the E Line.

The E Line Corridor Study is the next step in the E Line planning process and builds on the planning work completed in the ATCS. The purpose of the E Line Corridor Study is to determine the recommended routing for the METRO E Line for approval by the Metropolitan Council.

Alignment Alternative Evaluation

The E Line Corridor Study began with seven alignment alternatives on the southern end of the corridor and two alignment alternatives on the north end of the corridor, following different segments of the existing Route 6.

The initial alternatives were evaluated based on how well each supported three project goals:

1. Improve Ridership, Speed, and Attractiveness of Service in the Corridor
2. Benefit Historically Disadvantaged Populations and Reduce Disparities
3. Integrate with the Existing and Planned Transit System

At this time, it was recommended that the northern alignment of the E Line continue along the Route 6U to serve 4th Street and University Avenue SE.

Based on the evaluation results, three of the southern end alignment alternatives were recommended for advanced analysis based on additional factors including ridership, feasibility of concept station locations, network effects, and potential transit advantage application.

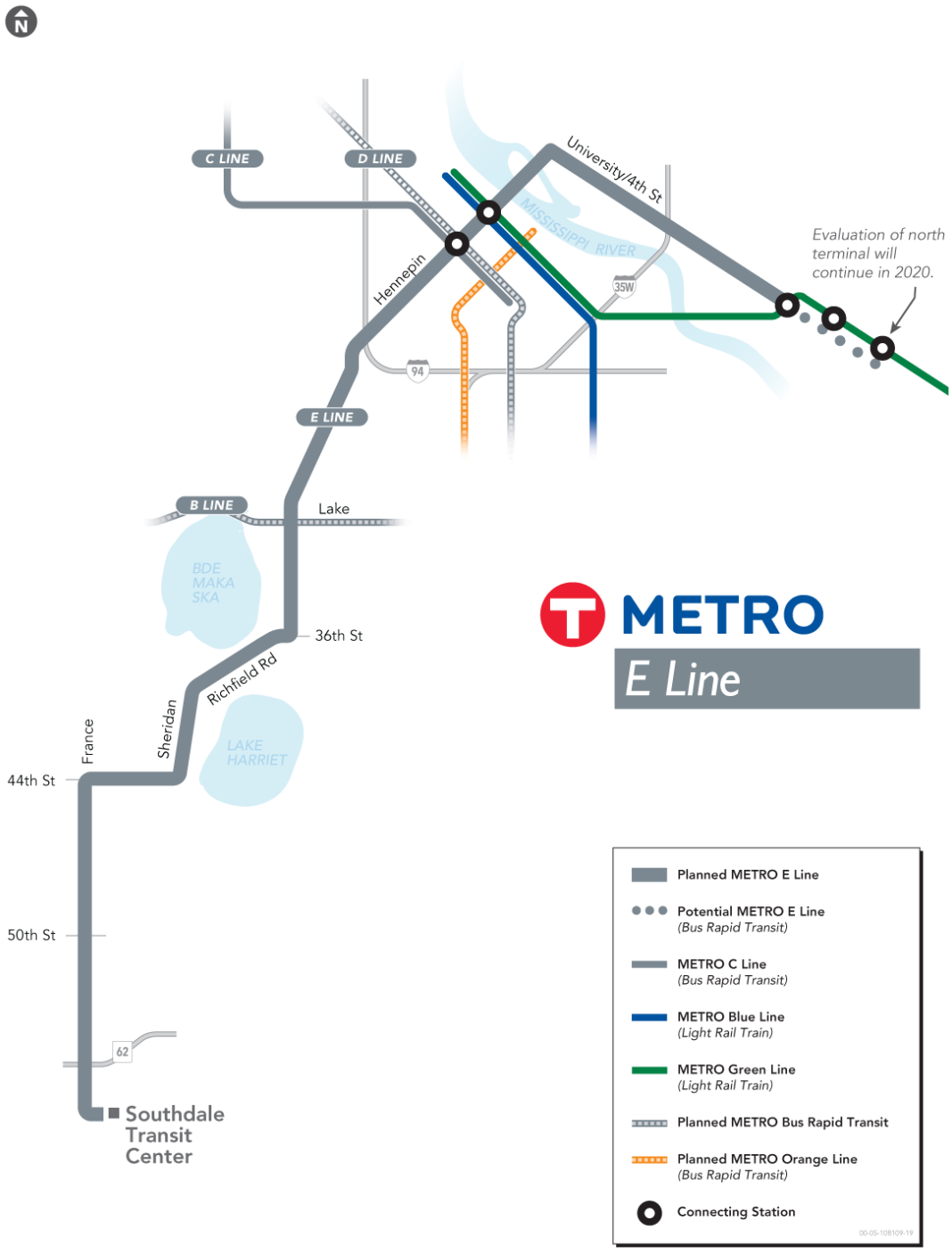
Recommended E Line Alignment

Further analysis did not significantly differentiate between the three advanced southern alignment alternatives. Each of the three alternatives performed comparably across the factors included in the advanced analysis.

While the three advanced alternatives are similar across multiple factors, the level of transit service provided to major regional destinations is a key differentiator between the alternatives.

Each of the three alternatives ends at Southdale Transit Center. The alternative traveling via 44th Street and France Avenue serves major regional commercial nodes at 44th Street and France Avenue and 50th Street and France Avenue as well as the Fairview Southdale Hospital Campus. Providing improved transit access to the jobs and services available at these locations is the primary differentiator between the alternatives evaluated, leading to the selection of this alternative as the recommended E Line alignment.

Figure 1: Recommended METRO E Line Alignment



Introduction

The METRO E Line is a planned arterial bus rapid transit (BRT) line that will substantially upgrade and replace portions of Route 6, one of Metro Transit's highest ridership bus routes, to provide faster, more reliable service and a more comfortable experience.

Route 6 is the primary transit route along Hennepin Avenue and runs approximately 12 miles from Stadium Village to Southdale Center via 4th Street SE and University Avenue, downtown Minneapolis, Hennepin Avenue, and either France Avenue, Wooddale Avenue, or Xerxes Avenue. Additional Route 6 service extends south of Southdale Center to Minnesota Drive and the Edina Industrial Park.

The purpose of the E Line Corridor Study is to determine the recommended routing for the METRO E Line for approval by the Metropolitan Council. This Final Report includes the recommended E Line routing and compiles the results of three technical memos prepared by Metro Transit and Kimley-Horn and Associates throughout the study process.

Technical Memo #1 includes a detailed overview of the Arterial BRT concept, a review of existing conditions within the corridor study area and identifies the initial E Line alignment alternatives considered in this study.

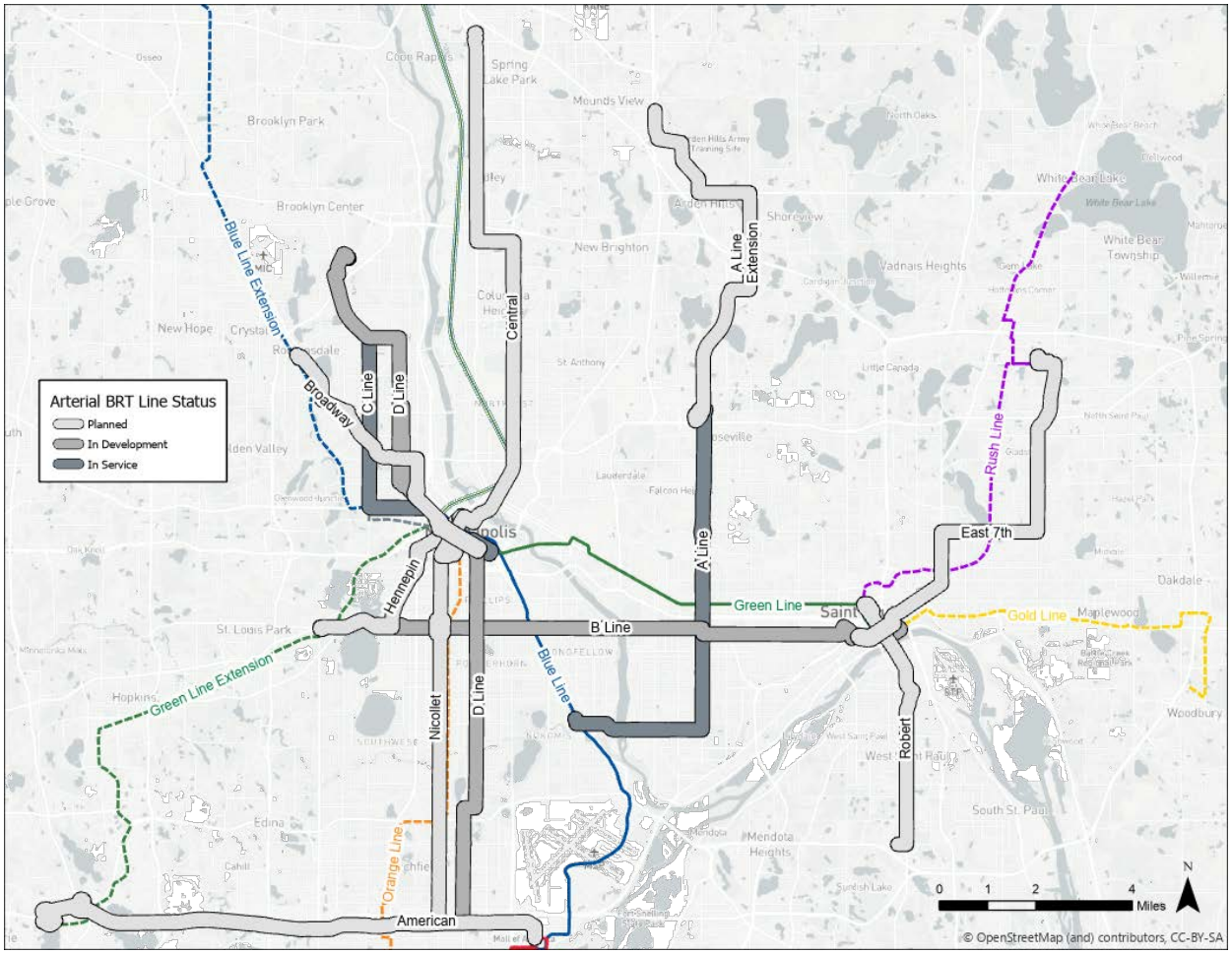
Technical Memo #2 evaluates the E Line alignment alternatives developed in Technical Memo 1 and identifies alternatives for additional study.

Technical Memo #3 evaluates the E Line alignment alternatives advanced for further study in Technical Memo #2 and identifies a recommended alignment for the E Line.

E Line Planning Background

Arterial BRT has been operating in the Twin Cities region since the opening of the A Line in 2016. In 2012, Metro Transit completed the Arterial Transitway Corridors Study (ATCS), which developed the arterial BRT service concept and identified 11 urban corridors with high-ridership bus routes for implementation of arterial BRT service. Figure 2 shows the current status of arterial BRT lines in development.

Figure 2: Planned Arterial BRT Network



The Hennepin Avenue corridor, later identified as the E Line, was one of the 11 corridors evaluated in the ATCS. The corridor identified in the ATCS ran along Hennepin Avenue and Lake Street from downtown Minneapolis to the future METRO Green Line West Lake Street Station. The study determined that the Hennepin Avenue corridor performed well on the

technical evaluation criteria but that additional planning was needed to better develop the arterial BRT and connecting bus service concept in the corridor.

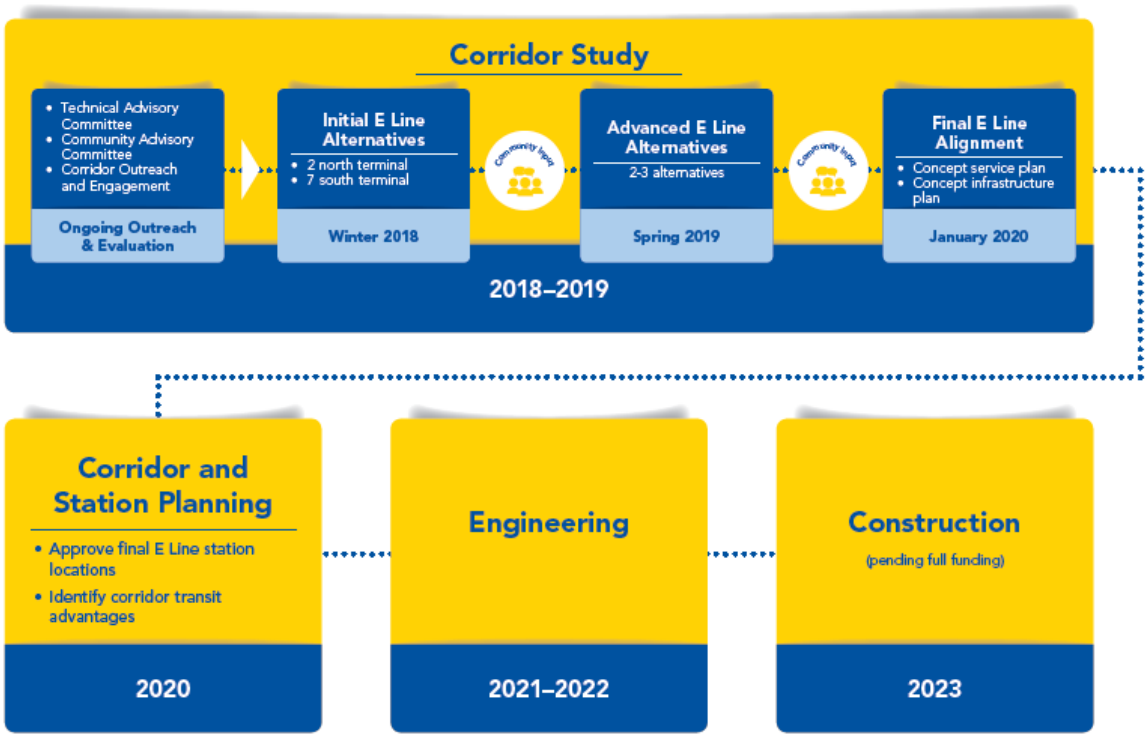
E Line Corridor Study Purpose and Scope

The E Line Corridor Study is the next step in the E Line planning process and builds on the planning work completed in the ATCS. The purpose of the E Line Corridor Study is to determine the recommended routing for the METRO E Line for approval by the Metropolitan Council. The study includes the development of the recommended E Line routing, concept locations for future E Line stations, and concept connecting local bus service plan for when the E Line begins operation.

E Line Project Next Steps and Timeline

Following the approval of the recommended E Line routing developed in the E Line Corridor Study, Metro Transit will begin the development of the E Line Corridor Plan. The E Line Corridor Plan will identify and finalize E Line Station locations and designs. After the completion of the Corridor Plan in 2020, engineering work will begin in 2021 and continue through 2022. Construction of the E Line is planned for 2023, pending full funding.

Figure 3: E Line Project Timeline



E Line Corridor Study Area

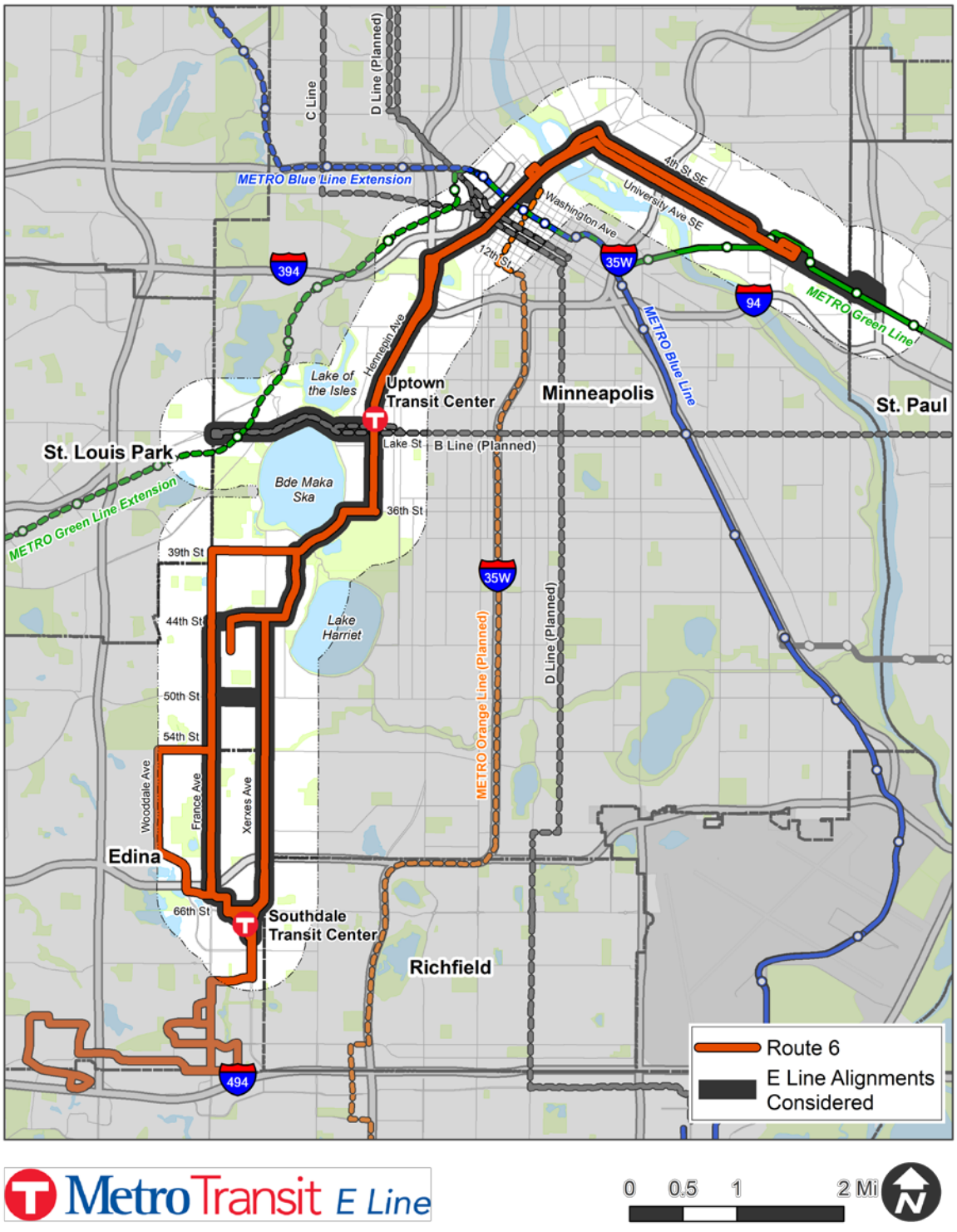
The E Line corridor study area consists of the area within 1/2 mile of an E Line alignment alternative considered in the E Line Corridor Study, shown in Figure 4. As alignment alternatives are compared, the study area generally includes those populations and areas that would benefit or be impacted by the implementation of the E Line.

It runs north to south from the METRO Green Line Westgate Station along 4th Street SE and University Avenue SE through downtown Minneapolis and uptown Minneapolis via Hennepin Avenue. From Hennepin Avenue and Lake Street, it includes the segment of West Lake Street from Hennepin to the future Green Line West Lake Street Station and also continues south through the Chain of Lakes to Southdale Transit Center via France Avenue and Xerxes Avenue.

The study area is primarily located within the cities of Minneapolis and Edina. It also includes small sections of St. Louis Park, Richfield, and St. Paul.

Detailed documentation of existing corridor conditions, including population and job characteristics, existing transit service, and roadway characteristics can be found in Technical Memo #1.

Figure 4: E Line Corridor Study Area



Initial E Line Alignment Alternatives

Based on existing population, employment, and existing transit ridership and route patterns in the corridor, seven initial alignment alternatives have been identified for the southern end of the corridor and two initial alignment alternatives have been identified for the northern end of the corridor.

Known E Line Core Segment

The known portion of the E Line runs from downtown Minneapolis near Washington Avenue to Lake Street via Hennepin Avenue along the trunk portion of the existing Route 6. Alternatives identified below are for the northern and southern segments of the E Line beyond this core segment.

Northern E Line Alignment Alternatives

Alternative 1: End in downtown Minneapolis

The first alternative on the northern end of the E Line ends in downtown Minneapolis near Washington Avenue where a significant portion of the current Route 6 service ends today. This alternative corresponds with the initial corridor definition included in the 2012 ATCS.

Alternative 2: Serve 4th Street and University Avenue SE

The second northern end alternative continues through downtown along the current Route 6U routing to serve 4th Street SE and University Avenue SE. This alternative would end either at the current Route 6U terminal at 27th Avenue SE and University, connecting to the METRO Green Line Stadium Village Station, or continue farther east on University Avenue to Westgate Station.

Southern E Line Alignment Alternatives

Alternative 1: End at 50th St and France Ave via 44th St

The first alternative on the southern end of the E Line corridor ends at 50th Street and France Avenue extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue and 44th Street.

Alternative 2: End at 50th St and France Ave via 50th St

The second alternative on the southern end of the E Line corridor ends at 50th Street and France Avenue extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue, Xerxes Avenue, and 50th Street.

Alternative 3: End at 50th St and Xerxes Ave via Xerxes Ave

The third alternative on the southern end of the E Line corridor ends at 50th Street and Xerxes Avenue extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue, and Xerxes Avenue.

Alternative 4: End at Southdale Transit Center via 50th St and France Ave

The fourth alternative on the southern end of the E Line corridor ends at Southdale Transit Center extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue, Xerxes Avenue, 50th Street and France Avenue.

Alternative 5: End at Southdale Transit Center via 44th St and France Ave

The fifth alternative on the southern end of the E Line corridor ends at Southdale Transit Center extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue, Xerxes Avenue, 44th Street and France Avenue.

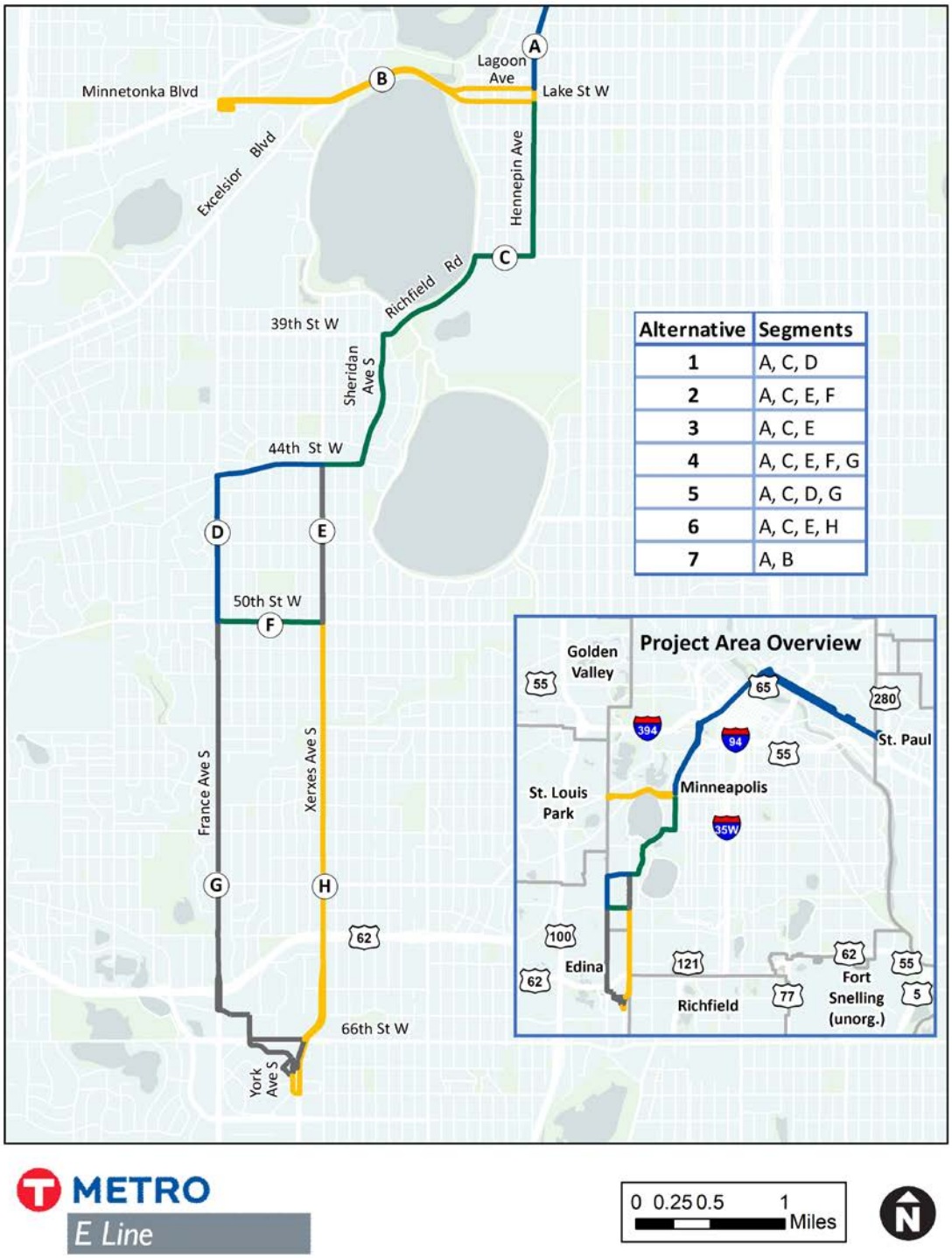
Alternative 6: End at Southdale Transit Center via Xerxes Ave

The sixth alternative on the southern end of the E Line corridor ends at Southdale Transit Center extending from the known segment via Hennepin Avenue, 36th Street, the Chain of Lakes area, Sheridan Avenue, and Xerxes Avenue.

Alternative 7: End at the future METRO Green Line West Lake Street Station

The seventh alternative on the southern end of the E Line corridor ends at the future METRO Green Line West Lake Street Station extending from the known segment via West Lake Street. This alternative corresponds with the initial corridor definition identified in the 2012 ATCS.

Figure 5: Southern E Line Alignment Alternatives



Initial Alignment Alternative Evaluation

Evaluation Criteria

Project goals and evaluation criteria for the E Line were developed by the project team and refined with the Technical Advisory Committee and public input. The goals for the project are to:

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 1.

Table 1: 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

Northern E Line Alignment

The initial concept for the Hennepin Avenue corridor developed in the 2012 ATCS included 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 support facilities needed for the E Line.

Southern Alignment Alternative Evaluation

Goal 1: Improve Ridership, Speed, and Attractiveness

As shown in Table 2 below, Alternatives 4, 5, and 6 each scored the maximum number of points for Population, Jobs, and Percent of Existing Ridership. 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.

Table 2: Goal 1 Results

Alternative	Route	Goal 1
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 2: Benefit Historically Disadvantaged Populations

As shown in Table 3, 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.

Table 3: 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

As shown in Table 4, 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 lowest on Goal 3. Across all the evaluation criteria, these alignment alternatives earned the lowest scores on percent of existing service hours replaced.

Table 4: Goal 3 Results

Alternative	Route	Goal 3
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.	

Summary of Southern Alignment Evaluation Results

Evaluation of each criterion revealed three alternatives with a clear advantage in meeting the project goals. The alternatives serving Southdale Transit Center 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 were selected for further study. Table 5 shows the initial evaluation summary.

Table 5: Summary of Initial E Line Alternatives Evaluation

Alternative	Route	Goal 1	Goal 2	Goal 3	Advance?
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.	◕	◕	◐	✗

Advanced Alternative Analysis

To further differentiate between the three advanced alternatives, further concept development and analysis was performed on additional factors: concept station locations, potential transit advantages, ridership analysis, and network effects. Additional information about the results and methodology of each additional factor can be found in Technical Memo #3.

Concept Station Locations

Analysis was conducted along each of the three advanced alignment alternatives to identify potential concept station locations. The potential station locations were identified through several inputs, including Route 6 ridership (fall 2017 data), typical BRT station spacing practice of 2-3 stations per mile, and connections to other Metro Transit service. Existing site constraints were documented at each potential station location and were used to determine the high-level feasibility of station placement in a given location.

Feasible concept station locations were identified for each of the three alternatives. There is not significant differentiation between the alternatives based on concept station location feasibility. A detailed map and table documenting this analysis can be found in Appendix A.

The results of this analysis represent preliminary analysis of concept station locations. Detailed station and platform location planning will occur through 2020 and will include outreach and engagement along the corridor with customers and potential station neighbors. Station and platform locations will be finalized in the E Line Corridor Plan in late 2020.

Potential Transit Advantages

Transit advantages are treatments to the street that can give buses priority over other traffic. Analysis of each alignment alternative identified potential transit advantages that could be implemented within each alignment. Transit advantages that were studied include the addition of queue jump lanes, transit signal priority, and transit only lanes.

After analyzing the physical constraints along the alternative alignments, potential locations to implement transit advantages were identified. The potential transit advantages for further study can be seen in Appendix B.

The results of this analysis represent potential opportunities for the implementation of transit advantages along the E Line corridor within the existing roadway conditions. These potential treatments will be further analyzed in close coordination with roadway authorities to determine transit advantages to be implemented along the E Line.

Ridership Analysis

A ridership analysis was performed to develop order-of-magnitude comparative ridership forecasts for the E Line alternatives in year 2040. This approach used high-level service estimates to compare potential effects of the E Line and underlying local bus service throughout the Metro Transit system. Details on the analysis methodology can be found in Appendix F.

As shown in Table 6 below, projected future ridership is not a key differentiator between the alternatives. The alternatives produced similar ridership estimates, likely because the vast majority of existing Route 6 boardings (87 percent) occur on the segment shared by all three alternatives.

Table 6: E Line Alternative 2040 Ridership Projections

Route	2040 No-Build	Alternative 4	Alternative 5	Alternative 6
E Line	-	9,900 – 11,900	9,800 – 11,600	10,800 – 12,100
Corridor Local Service	9,900	2,500 – 3,400	2,600 – 3,600	2,300 – 2,600
Corridor Total	9,900	13,200 – 14,300	13,400 – 14,200	13,400 – 14,400

Network Effects

The E Line will substantially replace parts of Route 6. The purpose of this analysis was to understand the impact the E Line would have on systemwide network effects, including cumulative access to jobs and opportunities.

Access to Jobs

This job accessibility measurement has two components: the average number of jobs accessible to each worker within 60 minutes and a weighted accessibility index. These

indicators are calculated with a similar methodology to the University of Minnesota's Accessibility Observatory, which accounts for transit service coverage, frequency of service, time period, transfer opportunities, accessibility to transit stops, and bus speeds. These calculations utilized transportation analysis zone (TAZ)-level data from the Metropolitan Council and American Community Survey.

60-minute accessibility represents the average number of jobs accessible within 60 minutes to workers in the region by transit, accounting for walk time, wait time, transfer time, and in-vehicle time during the AM peak.

The weighted accessibility analysis takes this further, assigning more value for jobs or destinations that are closer to workers. For example, this analysis assigns a higher score for connecting jobs that are 10 minutes away than 60 minutes away from population centers.

The results of each component are shown in Table 7. All the alternatives provide slightly higher access to jobs according to the 60-minute threshold and when jobs are assigned greater value for proximity.

Table 7: Average Number of Jobs (2014 Employment) Accessible to each Worker by Transit

Alternative	# Jobs Accessible	Weighted Accessibility Index
Existing	87,500	1,307
Alternative 4	89,000	1,326
Alternative 5	89,000	1,327
Alternative 6	90,000	1,357

The key finding of this network effects analysis is that the addition of the E Line and associated route changes would have net positive aggregate benefits across the regional transit system. All three alternatives would have a very similar impact in terms of regional accessibility. More information on the network affects analysis and findings can be found in Appendix G.

Alternative Selection

Further development and analysis show that there is not significant differentiation between the three advanced E Line alignment alternatives along the factors included: concept station locations, potential transit advantages, ridership analysis, and network effects.

Each of the three alternatives allow for appropriate spacing of concept stations and, based on initial review, all concept stations identified have feasible platform locations in each direction. There is not a significant difference between the alternatives and potential for transit advantage implementation along the corridor.

Ridership and accessibility analysis do not significantly differentiate between the three alternatives, as each alternative would provide time savings and accessibility increases to a similar number of riders, and each would result in a similar number of new riders in the Metro Transit system.

The relative similarity between the three advanced alternatives along the above factors is due in large part to the relative similarity between France Avenue and Xerxes Avenue. These two corridors exist largely within the same context, with respect to transit-supportive land use and demographics.

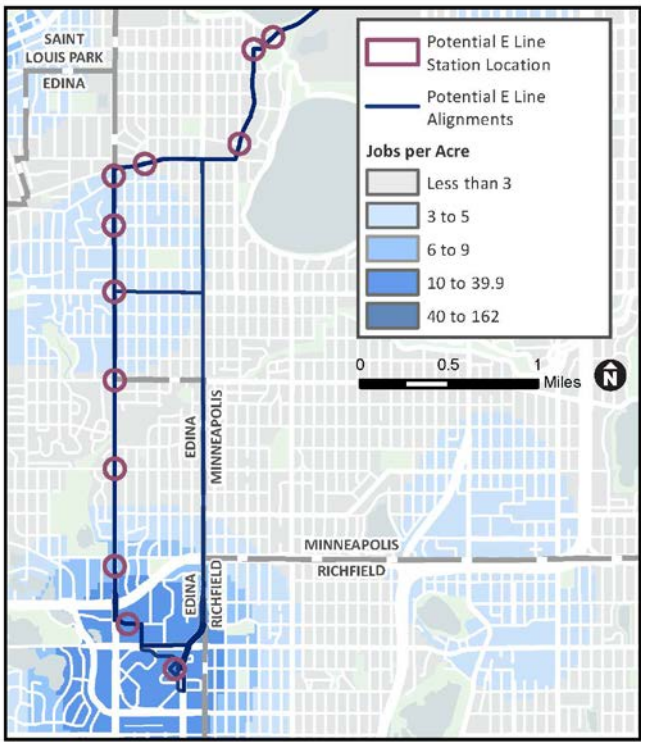


Figure 6. Job Density in the E Line Corridor

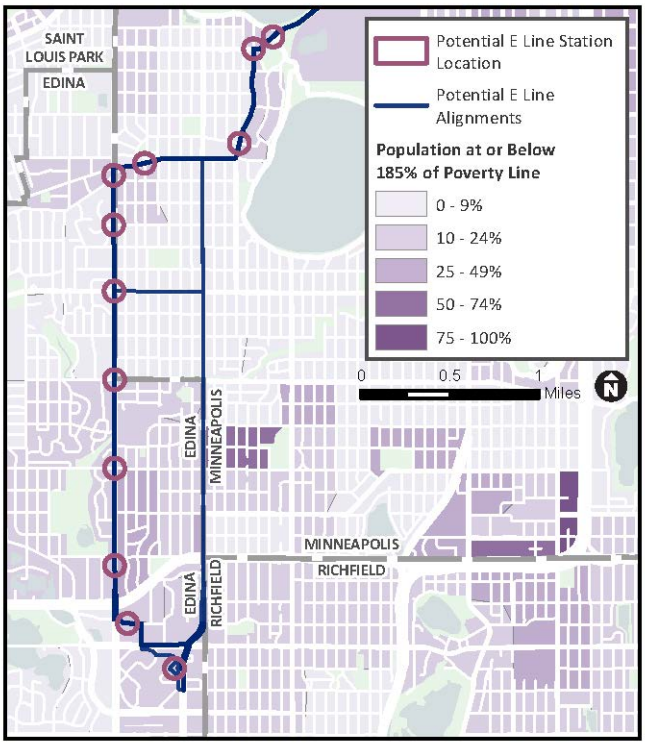


Figure 7. Population at or Below 185% of the Poverty Line in the E Line Corridor

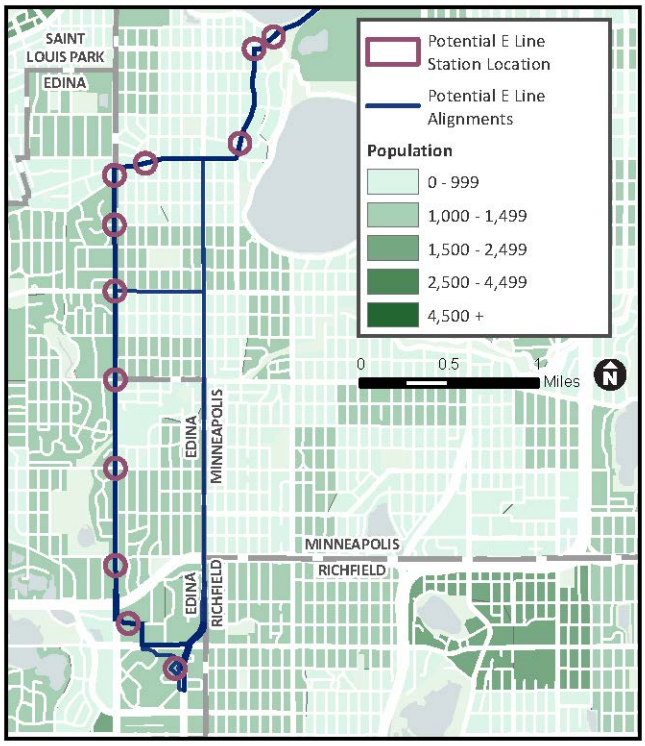


Figure 9. Population in the E Line Corridor

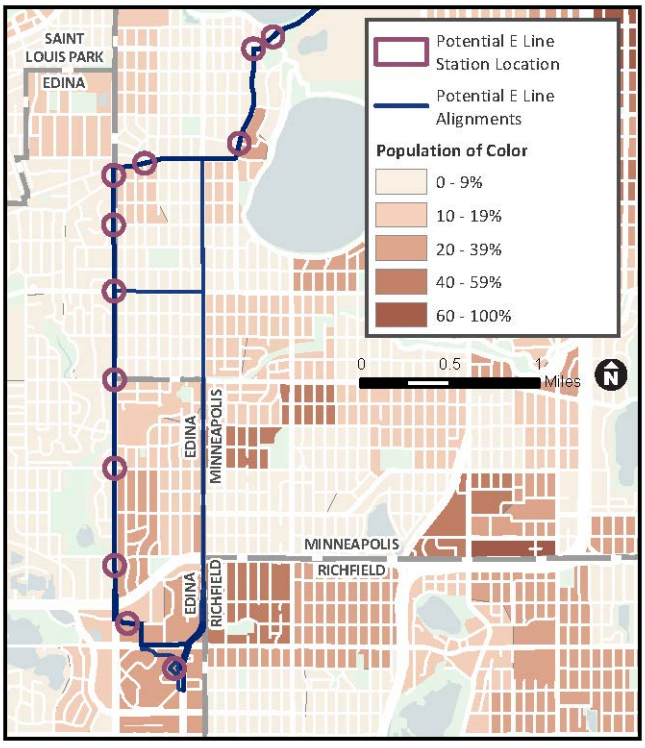


Figure 8. Non-White Population in the E Line Corridor

Key Differentiator: Access to Major Regional Destinations

While the three advanced alternatives are similar to each other across multiple important factors, access to major regional destinations is a key differentiator between the alternatives.

Alternative 5 along 44th Street and France Avenue provides improved service to the major commercial and retail nodes along 44th Street, the intersection of 44th Street and France Avenue, and 50th Street and France Avenue. In addition to the commercial and retail nodes along France Avenue, Alternative 5 would improve access to Fairview Southdale Hospital and surrounding health and elder care services.

E Line service at these locations expands access both to the goods and services available and to the significant concentration of jobs they represent. Expanded access from core urban areas to urban transition and suburban areas is an important goal of both Metro Transit and the Metropolitan Council.

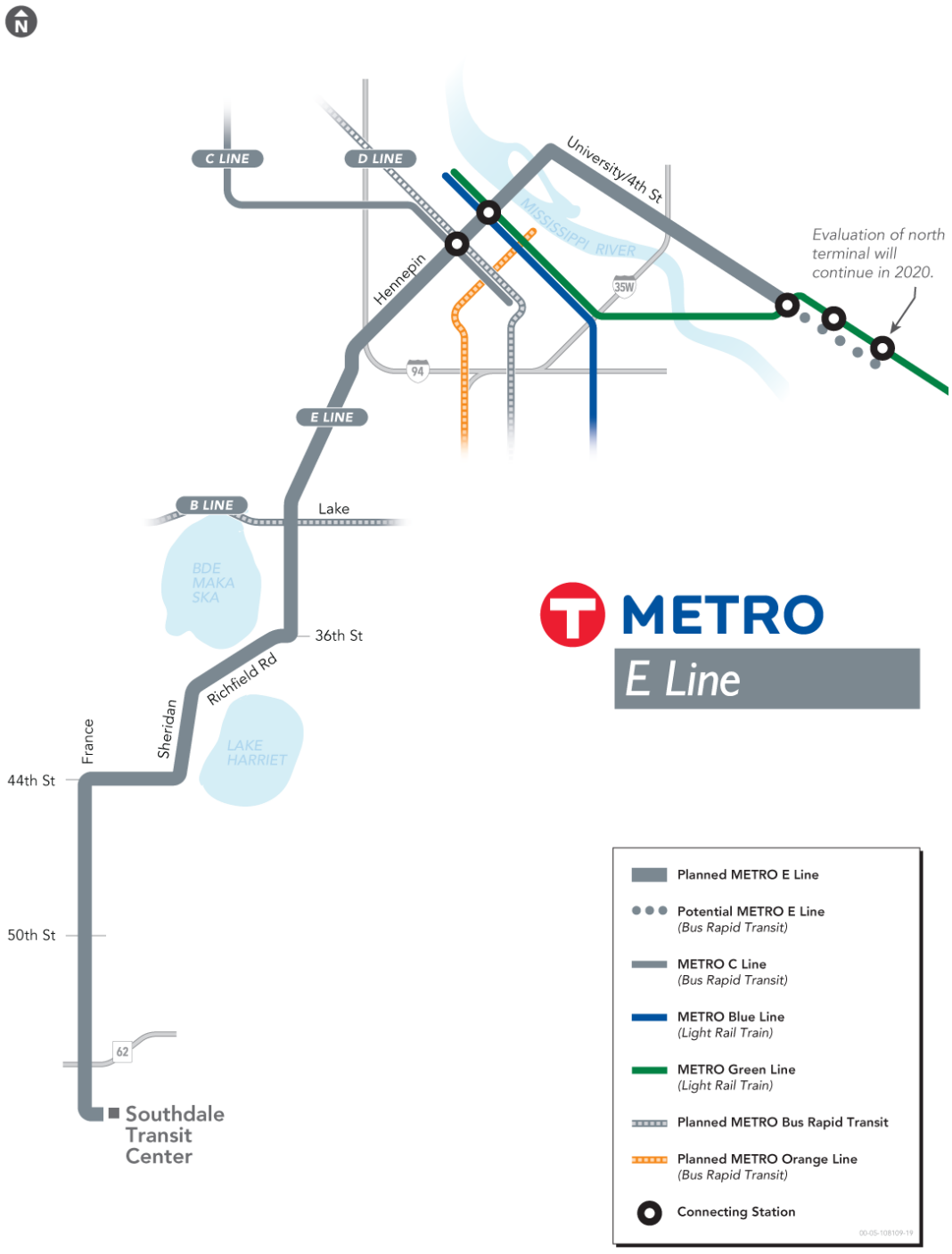
Recommended E Line Alignment

Based on the evaluation and key differentiator analysis, the Alternative 5 along 44th Street and France Avenue is the recommended southern alignment. The full corridor would run from the University of Minnesota are to Southdale Transit Center. See Figure 10 for a map of the recommended corridor. Table x below summarizes some key figures for the recommended alignment.

Table 8: Recommended E Line Alignment Key Figures

Corridor Length	13.3 Miles
Approximate Concept Station Count	31 Stations
Estimated 2040 Corridor Ridership (Average Daily Rides)	13,400 – 14,200
Population	103,872
Jobs	197,056
People of Color	24,174
Low-Income Population	29,873
Low-Wage Jobs	70,025
Percent of Existing Riders Within One Stop of a Concept Station	82%

Figure 10: Recommended METRO E Line Alignment



Conclusion and Next Steps

Based on the evaluation of the initial alternatives and the further development and analysis of the three advanced alternatives, Alternative 5 along 44th Street and France Avenue to Southdale Transit Center is recommended as the southern alignment for the E Line.

The Metropolitan Council approved the recommended E Line alignment in January 2020. Across 2020, Metro Transit will further develop station and platform locations and corridor transit advantages, with the completion of the Final Corridor Plan anticipated in late 2020. Pending full funding, the E Line is planned to begin construction in 2023, beginning operations in 2024.