E Line Corridor Study

TECHNICAL MEMO #3

This technical memo evaluates the three METRO E Line alignment alternatives advanced for further study in Technical Memo 2. This memo includes the results of the additional analysis and identifies a recommended E Line alignment.

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Advanced Analysis

Technical Memo #2 identified the three E Line alignment alternatives selected for advanced analysis. These analyses focused on each alignment's service quality and attractiveness, level of service for historically disadvantaged populations, and integration with the existing and planned transit system. This memo furthers the development of the three selected alignments along additional factors: concept station locations, potential transit advantages, ridership analysis, and network effects.

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 the fall 2017 Route 6 boardings, typical BRT station spacing practice of every one-third to one-half 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.

Analysis Methods

The potential concept station locations along each alternative were analyzed based on the physical constraints present at each intersection location, as well as any potential right-of-way acquisition required. Analysis was based on the existing condition at each intersection location and did not incorporate potential future conditions resulting from upcoming or ongoing planning efforts led by roadway authorities. The conditions below were documented at each location and utilized in the analysis:

- Existing Bus Stops
- On-Street Parking
- Bicycle Facilities
- Sidewalk Width
- Right-of-Way Width
- Intersection Control
- Adjacent Property Type
- Existing Roadway Profile Grade

These existing conditions were used to determine the feasibility of placing a 60-foot minimum length station platform with a 12-foot minimum width at the location being

studied. After analyzing the physical conditions listed above, a designation was made for the specific location of "suitable, candidate, or unsuitable". These designations are described as follows:

- Suitable – There is sufficient right-of-way available to accommodate the minimum length and width of a platform, and there are no major obstacles preventing platform construction.
- Candidate – The location being studied appeared to be feasible, but further study would be required to determine feasibility based on existing obstacles that may be present. Some of these obstacles include right-of-way width validation, visually steep roadway grade, adjacent infrastructure (i.e. awnings, driveways, etc.), and interaction with bicycle lanes.
- Unsuitable – The location being studied would not accommodate a BRT platform without major impacts to adjacent properties. Items that dictated an unsuitable designation include driveways too close to an intersection (i.e. not enough length for a station platform) or insufficient existing right-of-way width for a platform.

Feasible concept station locations were identified for each of the three alternatives, with none of the alternatives limited in concept station locations. The feasibility analysis of concept station locations along each alignment did not result in significant differentiation between the alternatives. A detailed spreadsheet of this analysis can be found in Appendix A. A graphic showing the concept station locations and existing conditions in the corridor can be seen in Figure 1, in Appendix A, and the preliminary platform feasibility analysis can be seen in Figure 2 and Table 1, 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 and with potential station neighbors. Station and platform locations will be finalized in the Final E Line Corridor Plan in late 2020.

Potential Transit Advantages

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.

Analysis Methods

The analysis included documenting the existing physical constraints along each route, including roadway width, intersection control, and lane configuration. Utilizing this information, the analysis determined the feasibility of implementing queue jump lanes, transit only lanes, or transit signal priority based on existing conditions and without major infrastructure modifications. A summary of how each transit advantage was evaluated is as follows:

- Transit Signal Priority (TSP) - Transit signal priority is recommended for further study at all signalized intersections and four-way stop-controlled intersections.
- Queue Jump Lanes – Queue jump lanes were evaluated at each signalized intersection within each alternative. Feasibility of queue jump lanes was evaluated based on the existing roadway width at the intersection. The intent was to reallocate space for existing shoulder or on-street parking for queue jump lanes, without requiring curb modifications. If the existing cross-section could be modified to allow for adequate width for a travel lane and queue jump lane, a queue jump lane was identified to be feasible.
- Transit Only Lanes – Between each intersection along each alternative, it was determined if there was sufficient width from curb to curb to restripe, remove parking, and/or decrease lane widths to fit transit only lanes in both directions or one direction. This initial analysis only evaluated if there was physical space for this change and did not weigh the importance of parking or if traffic volumes would warrant 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 Figure 2 of 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 condition. Additional planning and analysis, in close coordination with all roadway authorities, will be done to determine transit advantages recommended to be implemented along the E Line Corridor.

Ridership Analysis

A ridership analysis was performed to develop order of magnitude ridership forecasts for the E Line alternatives. This approach used high-level service estimates to compare potential impacts of the E Line and underlying local bus service throughout the Metro Transit system. The analysis assumed each alternative would provide 10-minute all-day E Line service, with 30 stops along the route and an average travel speed of 15.5 miles per hour.

Analysis Methods

The ridership analysis utilized a STOPS model calibrated from other BRT projects in development in the Twin Cities region—the Gold Line and Rush Line. Small adjustments were made to the existing model to simplify the analysis. Much of the data originated from the 2016 systemwide on-board survey.

Key Findings

The model produced an estimate with current (2016) ridership conditions, as well as projections for 2040. The alternatives produced similar ridership estimates. This is likely due to the high percentage (87 percent) of existing Route 6 boardings that occur on the segment shared by all three alternatives and the relative similarity between France Avenue and Xerxes Avenue segments.

Current year (2016) results show 8,600 to 10,300 trips on the E Line and 11,400 to 12,300 for the corridor in the 2016 scenario. This represents a 33 to 43 percent increase in overall ridership along the corridor due to an enhanced quality of service.

By 2040, ridership is projected to increase by 15 percent on Route 6 under no build conditions, or by 33 to 45 percent with each of the three alternatives. E Line ridership estimates range from 10,000 to 12,000 in 2040, with corridor ridership reaching 13,000 to 14,500. Table 2 and Table 3 show the no build, high and low ridership scenarios for each alternative and the existing Route 6.

Table 1: Current Year (2016) Ridership Estimates

Route	Observed	Alternative 4		Alternative 5		Alternative 6	
		Low	High	Low	High	Low	High
E Line		8,600	10,100	8,700	9,900	9,200	10,300
Route 6	8,600	2,400	1,700	2,600	1,900	2,300	2,000
Potential Route 36		400	400	300	300	-	-
Corridor Total	8,600	11,400	12,200	11,600	12,100	11,600	12,300
Change Observed		+33%	+42%	+35%	+41%	+35%	+43%

Table 2: 2040 Ridership Estimates

Route	2040 No Build	Alternative 4		Alternative 5		Alternative 6	
		Low	High	Low	High	Low	High
E Line		9,900	11,900	9,800	11,600	10,800	12,100
Route 6	9,900	2,900	2,000	3,200	2,200	2,600	2,300
Potential Route 36		500	500	400	400		
Corridor Total	9,900	13,200	14,300	13,400	14,200	13,400	14,400
Change Observed		+33%	+44%	+35%	+43%	+35%	+45%

Network Effects

Analysis Methods

The E Line will substantially replace parts of the Route 6 through the Hennepin Avenue corridor. The purpose of this analysis was to understand the impact the E Line would have on systemwide network effects, including 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[1], which accounts for transit service coverage, frequency of service, time period, transfer opportunities, accessibility to transit stops, and bus speeds. These calculations utilized TAZ-level data from the Metropolitan Council and American Community Survey.

60-minute accessibility represents the average number of jobs accessible 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 on each alternative. 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 4 and Table 5. All of the alternatives provide slightly higher access to jobs according to the 60-minute threshold. The weighted accessibility index shows that this trend also holds true when jobs/destinations are assigned greater value for proximity.

Table 3: Average Number of Jobs (2014 Employment) Accessible to each Worker by Transit

Alternative	# Jobs Accessible
Existing	87,500
Alternative 4	89,000
Alternative 5	89,000
Alternative 6	90,000

[1] http://access.umn.edu/publications/america/

Table 4: Weighted Accessibility Index by Alternative

Alternative	Weighted Accessibility Index
Existing	1,307
Alternative 4	1,326
Alternative 5	1,327
Alternative 6	1,357

Key Findings

These network affects analysis confirmed 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, capital cost estimates, 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 1 through Figure 4 show the similar context for each potential alignment.

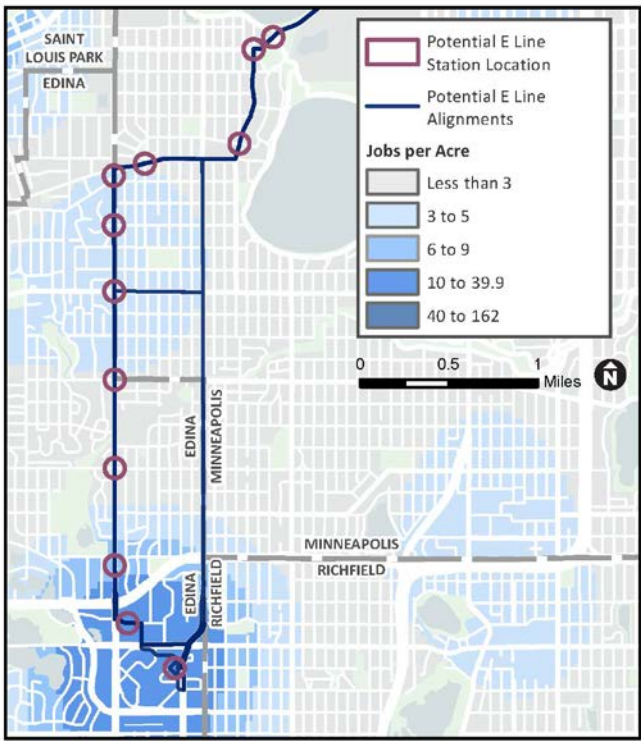

Figure 1. Job Density in the E Line Corridor

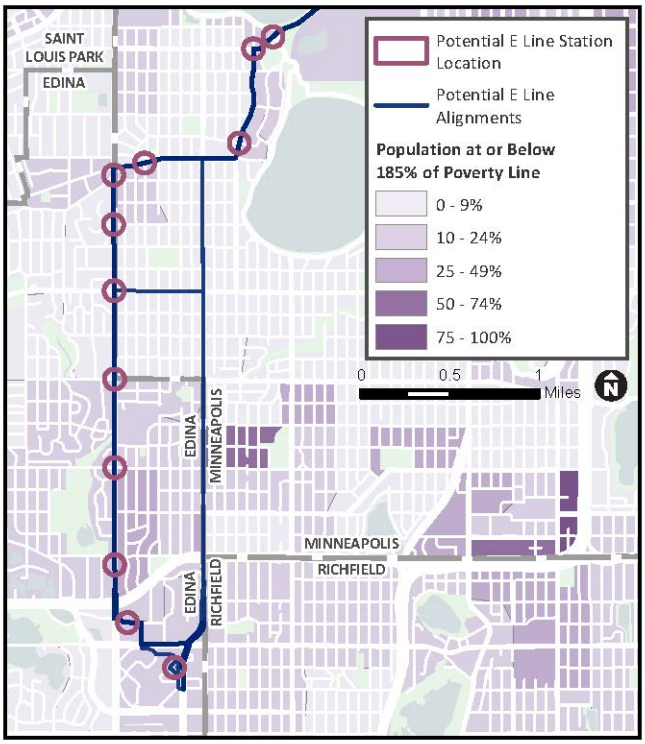

Figure 2. Population at or Below 185% of the Poverty Line in the E Line Corridor

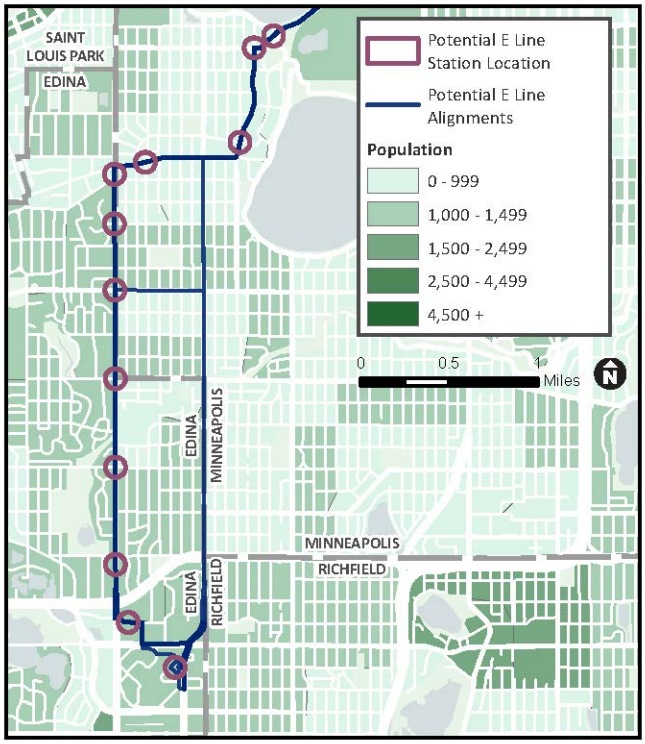

Figure 4. Population in the E Line Corridor

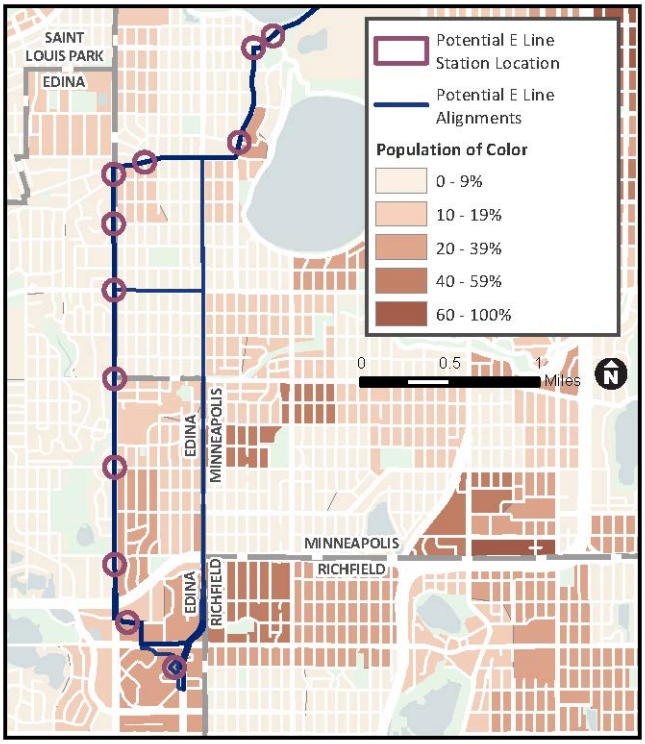

Figure 3. Non-White Population in the E Line Corridor

Key Differentiator: Service to Major Regional Destinations

While the three advanced alternatives are similar to each other across multiple important factors, the level of transit service provided 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.

Improved transit 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.

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 recommended E Line alignment will be considered by the Metropolitan Council for approval in January 2020. Following approval, work will begin to 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 following testing in 2024.