

Appendix F
Development and Evaluation of Design Adjustments Addressed in the
Supplemental Draft EIS

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- A Southwest Transitway Alternatives Analysis Final Report, Chapter 7

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APPENDIX F

1 Development and Evaluation of Design Adjustments Addressed in the Supplemental Draft EIS

This appendix provides a description of the development and evaluation of design adjustments to LRT 3A and LRT 3A-1 that were addressed in the Southwest Light Rail Transit (LRT) Project's Supplemental Draft Environmental Impact Statement (Supplemental Draft EIS), which was published by the Federal Transit Administration (FTA) and the Metropolitan Council (Council) in May 2015. That design adjustment process and its outcome is described in Sections 2.2 and 2.3 of the Supplemental Draft EIS.

In general, the design adjustment process was initiated in January 2013 after the close of the Draft EIS public comment period and concluded in April and July 2014 with the identification by the Council of the design adjustments to be incorporated into the LPA, including light rail and related design adjustments and freight rail modifications. The LPA includes double-tracked light rail line between Minneapolis and Eden Prairie with seventeen light rail stations and an Operations and Maintenance Facility (OMF). Under the LPA, the proposed light rail alignment would run through the Golden Triangle/Opus areas, to Hennepin County Regional Railroad Authority (HCRRA) property through Hopkins and St. Louis Park, then along the Kenilworth Corridor through Minneapolis to Royalston Station and connecting to Target Field Station. Two of the five build alternatives in the Draft EIS include the LPA (LRT 3A and LRT 3A-1). The transit improvements included in LRT 3A and LRT 3A-1 are coupled with the proposed relocation or co-location of TC&W freight trains currently operating along the Bass Lake Spur and Kenilworth Corridor. LRT 3A includes the proposed relocation of TC&W trains to the MN&S Spur and Wayzata Subdivision, while LRT 3A-1 includes the continued operations of TC&W freight trains currently operating along the Bass Lake Spur and Kenilworth Corridor.

This appendix provides the following: an overview of the design adjustment process to LRT 3A and LRT 3A-1 addressed in the Supplemental Draft EIS; coordination activities that have occurred to support that design adjustment process; and a detailed review of the development and evaluation of light rail-related design adjustments and freight rail modifications addressed in the Supplemental Draft EIS in the Eden Prairie Segment, for the proposed Hopkins Operations and Maintenance Facility (OMF), and in the St. Louis Park/Minneapolis Segment, which were the focus of the Supplemental Draft EIS. This appendix includes the following sections:

- 1.0 Overview of the Design Adjustment Process
- 2.0 Coordination
- 3.0 Eden Prairie Segment
- 4.0 Potential Operations and Maintenance Facility Sites
- 5.0 St. Louis Park/Minneapolis Segment

1.1 Overview of the Design Adjustment Process

This section summarizes the process used by the Council to identify design adjustments to the LRT 3A and LRT 3A-1 addressed in the Supplemental Draft EIS. The project team developed and evaluated the design adjustments in response to comments submitted on the Draft EIS, including proposed adjustments to: accommodate local goals and objectives; improve the performance of the proposed light rail extension; reduce project costs; and avoid or minimize the project's adverse environmental impacts.

The project's ongoing engagement and communication with the affected public has been a fundamental element of planning for the Southwest LRT Project, including the design adjustment process described in this appendix. That general process and timeframe is illustrated in Exhibit F-1.

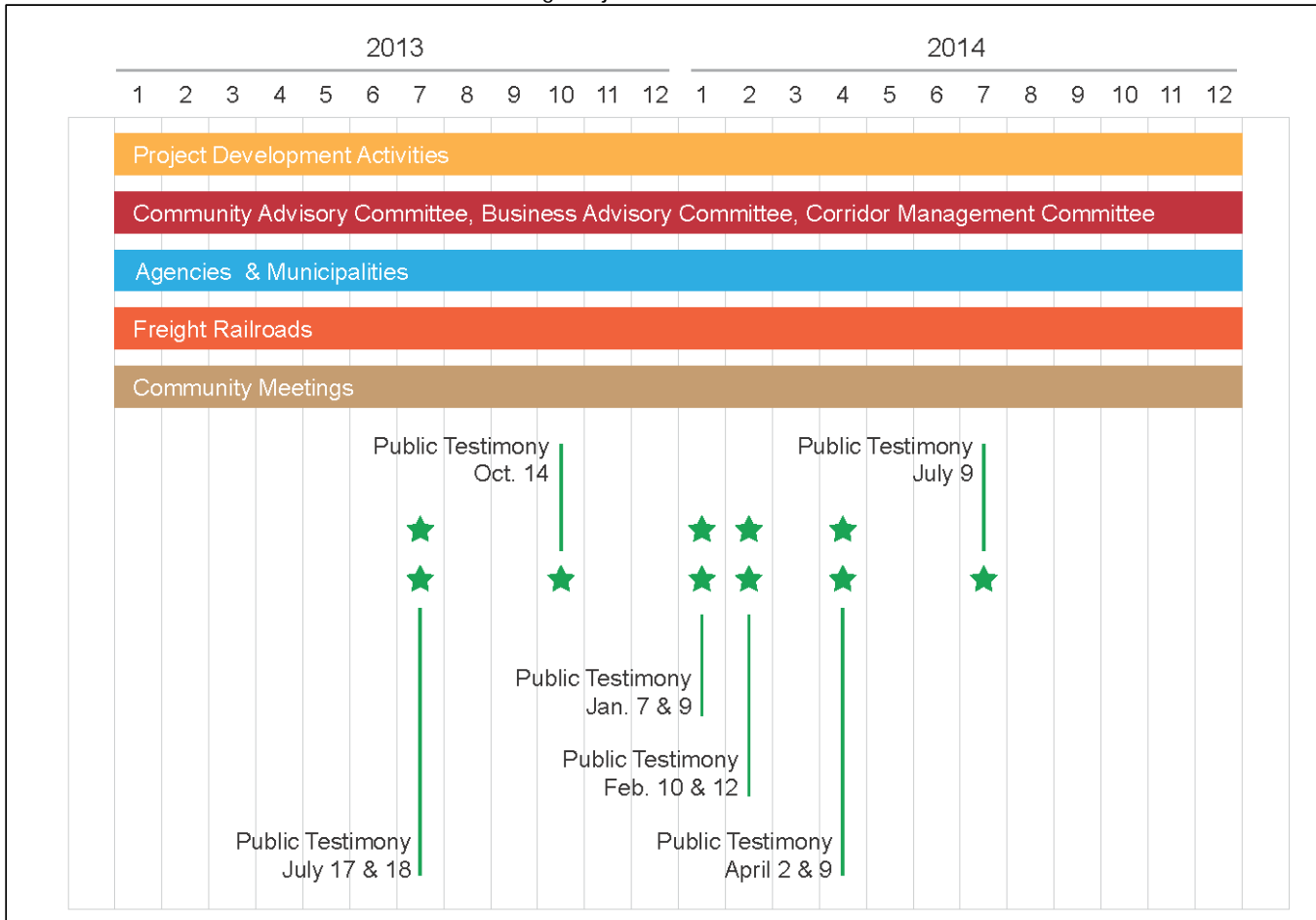
The design adjustment process implemented by the Council was supported by the project's Technical Project Advisory Committee (TPAC), which is composed of staff from the Council's Southwest LRT Project Office,

Hennepin County, MnDOT, the cities of Eden Prairie, Minnetonka, Hopkins, St. Louis Park, and Minneapolis, Three Rivers Park District, and the Council’s Metro Transit Rail Operations division. Community and business representatives serve on the project’s Business Advisory Committee (BAC) and Community Advisory Committee (CAC), which provide input and recommendations to the Corridor Management Committee (CMC), including design adjustments addressed in the Supplemental Draft EIS.

Starting in early 2013, the Council held approximately 20 public open houses and community meetings and provided dozens of presentations at the request of various groups throughout the project corridor. Meetings with the public have been tailored to present information and solicit feedback on specific project issues.

EXHIBIT F-1

Overview of Coordination Activities for SWLRT Design Adjustment Process



On March 31, 2014, Council staff released a draft recommendation of the design adjustments to be incorporated into the proposed project. Following receipt of public comment on those recommendations at its meeting on April 2, 2014, the CMC adopted a resolution recommending the design adjustments to be incorporated into the proposed project’s scope and budget. On April 9, 2014, the Council identified the adjustments to be incorporated into the proposed project. The Council’s action was based on its consideration of the technical analysis of the range of potential design adjustments to the proposed project, as summarized in Section 2.3 of the Supplemental Draft EIS. The Council also considered comments received from the public, agencies, jurisdictions, and committees within the project’s public involvement and agency coordination activities starting with the close of the Draft EIS public comment period, including public testimony received at its meeting on April 9, 2014. On July 9, 2014, the CMC considered additional design adjustments within the City of Minneapolis that were proposed in a memorandum of understanding between the Council and the City of Minneapolis. The CMC endorsed the additional proposed design adjustments, which the Council subsequently approved on July 9, 2014.

1.2 Coordination

This section provides a description of coordination activities that have occurred to support the design adjustment process addressed in the Supplemental Draft EIS. These activities helped to support the development and evaluation of design adjustments to LRT 3A and LRT 3A-1 described in Sections 3.0, 4.0, and 5.0 of this appendix, related to the Eden Prairie Segment, the Hopkins OMF, and the St. Louis Park/Minneapolis Segment.

1.2.1 Eden Prairie Segment

The process used to develop and evaluate the light rail improvements described in Section 3.0 of this appendix included the following coordination activities:

- Various public involvement activities, as illustrated in Exhibit F-1. These activities spanned the entire length of the segment's design adjustment process and included the opportunity to submit comments via printed public comment cards. Opportunities to provide public testimony were also available.
- Coordination with the project's participating agencies.
- Approximately 20 project-sponsored meetings associated with the Council's technical issue resolution process described in Chapter 4 of the Supplemental Draft EIS. Those meetings included, at various times, staff and/or consultants from the Council, MnDOT, Hennepin County, the City of Eden Prairie, Riley Purgatory Bluff Creek Watershed District, and SouthWest Transit.

1.2.2 Hopkins OMF

The process used to develop and evaluate the proposed location of the OMF described in Section 4.0 of this appendix included the following coordination activities:

- Various public involvement activities, as illustrated in Exhibit F-1. These activities spanned the entire length of the segment's design adjustment process and included the opportunity to submit comments via printed public comment cards. Opportunities to provide public testimony were also available.
- Coordination with the project's participating agencies.
- Approximately 25 project-sponsored meetings associated with the Council's technical issue resolution process described in Chapter 4 of the Supplemental Draft EIS. Those meetings included, at various times, staff and/or consultants from the Council, MnDOT, Hennepin County, and the cities of Eden Prairie, Minnetonka, Hopkins, St. Louis Park, and Minneapolis.

1.2.3 St. Louis Park/Minneapolis Segment

The process used to develop and evaluate light rail improvements and freight rail modifications described in Section 3 of this appendix included the following coordination activities:

- Various public involvement activities, as illustrated in Exhibit F-1. These activities spanned the entire length of the segment's design adjustment process and included the opportunity to submit comments via printed public comment cards. Opportunities to provide public testimony were also available.
- Coordination with the project's participating agencies.
- Project-sponsored meetings associated with the Council's technical issue resolution process described in Chapter 4 of the Supplemental Draft EIS. Those meetings included, at various times, staff and/or consultants from the Metropolitan Council, MnDOT, Hennepin County, the cities of Hopkins, Minneapolis, St. Louis Park, the Three Rivers Parks District, the Minneapolis Park and Recreation Board, Xcel Energy, and TranSystems, and representatives from BNSF, CP, and TC&W freight railroads.
- Attendance of and, at times, public comment by representatives from one or more freight railroads and/or freight rail shippers at approximately 30 project-sponsored committee or public involvement meetings (as documented in Section 2.0 of this appendix, respectively) or at meetings held between project staff and consultants and freight railroad representatives.

1.3 Eden Prairie Segment

This section provides a summary of the design adjustments to the LPA in the Eden Prairie Segment that were addressed in the Supplemental Draft EIS. This section first provides background information on the light rail and related improvements in the segment that were evaluated in the Draft EIS. Second, this section provides a description of the range of design adjustments to the LPA considered by the Council within the Eden Prairie Segment and how those potential design adjustments were evaluated.

1.3.1 Background

Four of the five light rail build alternatives evaluated in the Draft EIS (LRT 3A, LRT 3A-1, LRT 3C-1, and LRT 3C-2) included common proposed light rail and related improvements in Eden Prairie. Those alternatives, shown on Exhibit 2.2-3 and described in Section 2.2.3 of this Final EIS, included the following:

- **LRT Alignment:** The light rail alignment proposed within the Draft EIS within the Eden Prairie Segment extended east from a terminus just west of Mitchell Road, staying south of Highway 212 to the Southwest Station (cohabitated with the existing SouthWest Transit Center), and continuing east along Technology Drive to the intersection of Flying Cloud Drive and I-494.
- **LRT Stations:** The Draft EIS evaluated three proposed light rail stations in the Eden Prairie Segment, from west to east: (1) Mitchell Station, west of Mitchell Road and south of Highway 212, (2) Southwest Station, within the existing SouthWest Transit Center, and (3) Eden Prairie Town Center Station, on the south side of Technology Drive between Prairie Center and Flying Cloud drives.
- **LRT Park-and-ride Lots:** The Draft EIS proposed three park-and-ride lots within Eden Prairie: 400 surface and 400 structure spaces at Mitchell Station, 400 structured spaces at Southwest Station, and 650 structured spaces at Eden Prairie Town Center Station.

During the Draft EIS public comment period, the City of Eden Prairie asked the Council to investigate the feasibility of a more centrally located and walkable Eden Prairie Town Center Station that would provide better opportunities for transit-oriented development and redevelopment. The City noted that a station within walking distance of the Eden Prairie Center (a regional shopping mall) would help meet the City’s long-term economic development goals and provide higher ridership due to its proximity to concentrations of existing and future employment and commercial activity centers. For similar reasons, the City also asked the Council to evaluate a location for the Mitchell Station that would be located south along Technology Drive, somewhere between Mitchell and Wallace Roads, additionally noting that this location for a park-and-ride lot may be better positioned to intercept automobile traffic coming from the west.

1.3.2 Design Adjustments Considered in the Eden Prairie Segment

Project staff developed a wide range of design adjustments to the LPA (see Table F.3-1 and F.3-2 and Exhibit F-2) intended to address comments received by the project from the City of Eden Prairie and others on the Draft EIS, and to help avoid or minimize adverse impacts, increase transit ridership and reduce project costs, while meeting the project’s Purpose and Need (see Chapter 1).

TABLE F.3-1
Eden Prairie Segment – First- and Second-Step Adjustment Descriptions

First- and Second-Step Subsegment Adjustments	
Western Terminus to Prairie Center Dr.	
Draft EIS 3A	Mitchell Station would be on the west side of Mitchell Rd. and on the north side of the Eaton property. LRT alignment would follow the south side of Highway 212 east to Southwest Station.
5A	LRT alignment would be on the north side of Technology Dr. from Wallace Road to Mitchell Rd., turning south through private property bounded by Anderson Lakes Pkwy., Mitchell Rd., and Technology Dr., crossing Purgatory Creek on structure and passing between Flagship Corporate Center and Flagship Athletic Club facilities. Station on the north side of Anderson Lakes Pkwy. Could be aligned with a north-running or a center-running alignment adjustment on Singletree Ln., crossing Prairie Center Dr. on aerial structure.
8A	LRT alignment would be on the south side of Technology Drive from Wallace Road, crossing Purgatory Creek on the south side of Technology Dr. On south side of Technology Dr. adjacent to Purgatory Creek Park to Prairie Center Dr.

First- and Second-Step Subsegment Adjustments	
12A	LRT alignment would be on the north side of Technology Dr. from Wallace Rd. to future extension of Hiawatha St. then center-running along Technology Dr. to bus driveway at Southwest Station. At Purgatory Creek, the alignment would bridge over westbound Technology Dr. and remain on structure to cross the Southwest Station area just south of Southwest Transit Station parking garage. The structure would continue over to the east side of Prairie Center Dr. and connect to 21C.
18A	Same as 20A west of Purgatory Creek, turning south at Purgatory Creek (crossing on a structure) and passing between Flagship Corporate Center and Flagship Athletic Club facilities. Could be aligned with a north-running or center-running alignment on Singletree Ln., crossing Prairie Center Dr. on structure. Includes several station options along Technology Dr.
20A	Terminus station would be at Wallace Road. LRT alignment would run at-grade along north side of Technology Drive, switching to the south side of Technology Dr. at the west driveway at Eden Prairie City Center to the bus-only driveway at Southwest Station and cross Technology Dr. at-grade to Southwest Station.
23A	LRT alignment would be located on the north side of Technology Dr., from Wallace Rd. to future extension of Hiawatha St., and would turn north through privately owned commercial property to south side of Highway 212. The alignment would run along south side of Highway 212 to Southwest Station, similar to the Draft EIS.
26A	LRT alignment would be east-side-running along Wallace Rd. from Technology Dr. to Highway 212 and would turn east to follow the Draft EIS 3A alignment along south side to Highway 212 to Southwest Station.
Prairie Center Dr. between Southwest Station and Singletree Ln.	
2A	The alignment would be west-side-running along Prairie Center Dr., with an aerial crossing of Technology Dr. and crossing Prairie Center Drive near the Flagship Corporate Center to the bluff on the east side.
Draft EIS 3A	From Southwest Station, LRT alignment would follow the south side of Highway 212 eastbound off ramp and would cross under Prairie Center Dr. to south side of Technology Dr.
8A	LRT alignment would be west-side-running on Prairie Center Dr. (west) with either an at-grade or aerial crossing at Technology Dr. and either an at-grade or aerial crossing to the center of Singletree Ln. to connect to 24A.
8A1	Center-running LRT alignment along Prairie Center Dr. and center-running along Singletree Ln. (24A), to west-side-running along Prairie Center Dr. at new signal between Singletree Ln. and Technology Dr. At-grade crossing at Technology Dr.
21C	LRT alignment would be on the east side of Prairie Center Dr. (west) with either below-grade or aerial crossing at Technology Dr. continuing to the north side of Singletree Ln. (21C) or the center of Singletree Ln. (24A).
24A	LRT alignment would have an aerial crossing of Technology Dr. out of Southwest Station area, and be center-running on Prairie Center Dr. (west).
Prairie Center Dr. to I-494	
Draft EIS 3A	LRT alignment would follow the south side of Technology Dr. crossing several private driveways. The alignment would cross diagonally to north side of Technology Dr. at eastern access to Rosemount Emerson. The alignment would follow the north side of Technology Dr. to I-494 and would cross I-494 on an aerial structure.
1B	LRT alignment would cross Flying Cloud Dr. below-grade, and continue on the south side of West 78th St. and the center of Prairie Center Dr. (east). Would include a below-grade station option on east side of Flying Cloud Dr.
2A	Known as the "Comp Plan," the alignment would run between Costco and Bachman's on the bluff and between Rosemount Emerson and Brunswick Zone along Eden Rd., and would continue north along the west side of Flying Cloud Dr.
2A1	Alignment would be center-running or be on the north side of Singletree Ln. from Prairie Center Dr. (west) to an alignment following Glen Ln. Would include a connection into west-side-running on Flying Cloud Dr. north of Eden Rd.
2B	LRT alignment would follow alignment 2A between Prairie Center Dr. (west) and Flying Cloud Dr., crossing Flying Cloud Dr. at-grade and continuing along the south side of Leona Rd. and along the west side Prairie Center Dr. (east).
21C	LRT alignment on the north side of Singletree Ln., along west side of Flying Cloud Dr. Station on Singletree Ln. at Glen Ln.
24A	LRT alignment would be center-running along Singletree Ln. and either would cross to the north side at Eden Rd. intersection and would continue on the west side of Flying Cloud Dr. or continue across Flying Cloud Dr. to connect to 1B or 1A.
East of I-494	
Draft EIS 3A	From Technology Dr., LRT alignment would cross I-494, Flying Cloud Dr., and Viking Dr. on an aerial structure. To the north of Viking Dr., the alignment would follow the east side of Flying Cloud Dr. with at-grade crossing of Valley View Rd.
1A	From I-494, LRT alignment would run on the north side of Flying Cloud Dr. and would cross at-grade to south side at Viking Dr. Valley View Rd. crossing would be either at-grade or aerial.
1A2	From I-494, LRT alignment would run on the north side of Flying Cloud Dr. and would cross aerially at the intersection of Valley View Rd. and Flying Cloud Dr. to south side of Highway 212 entrance ramp.

First- and Second-Step Subsegment Adjustments	
1B	LRT alignment would be center-running along Prairie Center Dr. (east) and would cross Valley View Rd. at-grade at the intersection with Prairie Center Dr. (east) and Valley View Rd.
2B	LRT alignment would be on the west side Prairie Center Dr., crossing east at Viking Dr., crossing Valley View Rd. at-grade.
15A	LRT alignment would follow the I-494 ramp to eastbound Hwy 212 to the north of the Residence Inn and Hampton Inn along Hwy 212 right-of-way, crossing under the Valley View overpass of Highway 212 and beneath the ramps.

TABLE F.3-2
Eden Prairie Steps 1 and 2 Subsegments and Design Adjustments Considered

Subsegment ^a /Adjustment #	First Step	Second Step	Third Step Name (Supplemental Draft EIS Status)
Western Terminus to Prairie Center Drive			
3A	Retained	Dismissed	
12A	Dismissed		
5A	Dismissed		
20A	Retained	Retained	Technology Drive (retained)
18A	Dismissed		
8A	Dismissed		
23A	Retained	Retained	Highway 212 (dismissed)
26A	Retained	Dismissed	
Prairie Center Drive between Southwest Station and Singletree Lane			
3A	Retained	Dismissed	
24A	Retained	Retained	Singletree Lane ^b (dismissed)
21C	Dismissed		
2A	Retained	Retained	Comprehensive Plan ^b (retained)
8A	Retained	Dismissed	
8A1	Retained	Dismissed	
Prairie Center Drive to I-494			
3A	Retained	Dismissed	
2A	Retained	Retained	Comprehensive Plan ^b (retained)
21C	Dismissed		
24A	Retained	Retained	Singletree Lane ^b (dismissed)
1B	Dismissed		
2A1	Dismissed		
2B	Dismissed		
East of I-494			
3A	Retained	Dismissed	
1A	Retained	Dismissed	
1A2	Retained	Retained	Retained
1B	Dismissed		
2B	Dismissed		
15A	Dismissed		

^a The Steps 1 and 2 Western Terminus to Prairie Center Drive subsegment is equivalent to the Step 3 West subsegment. The other Steps 1 and 2 subsegments are equivalent to the Step 3 East subsegment.

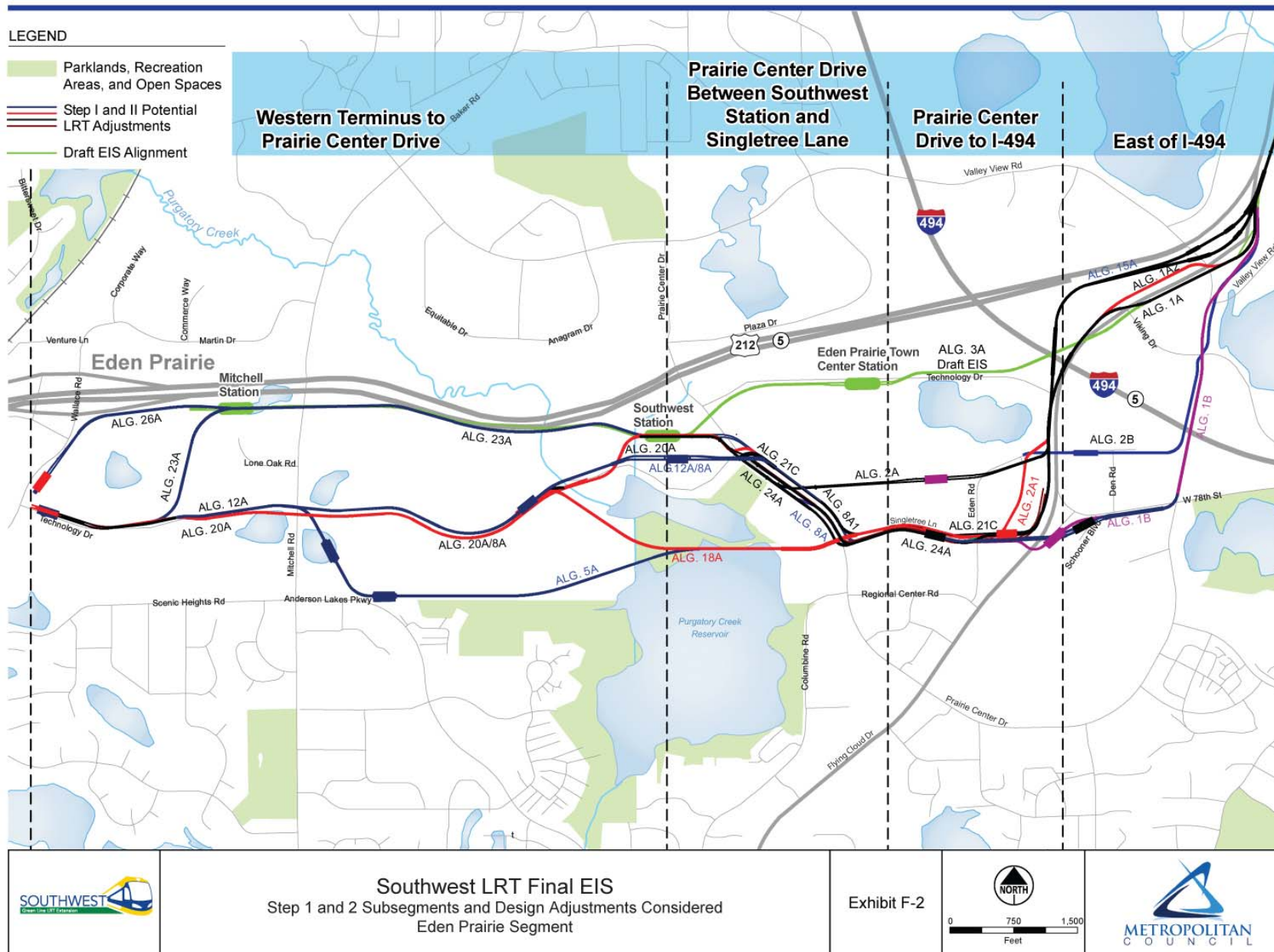
^b Steps 1 and 2 adjustments 2A and 24A in the Prairie Center Drive and Prairie Center Drive to I-494 subsegments were combined to form the Step 3 Comprehensive Plan and Singletree Lane alignment adjustments, respectively.

Source: The Council, January 2014. See Exhibit F-2 for an illustration of the design adjustments referenced in this table.

To meet those objectives, project staff implemented a three-step process for the Eden Prairie Segment to develop, evaluate, and receive stakeholder comment on a wide range of potential design adjustments to the LPA. Further, the stepwise process included a series of meetings with project staff, City of Eden Prairie and Hennepin County staff, and other stakeholders. The process also included presentations to and input from the TPAC, CAC, and BAC and presentations to and recommendations from the CMC (see Section 2.0 of this

EXHIBIT F-2

Step 1 and 2 Subsegments and Design Adjustments Considered - Eden Prairie Segment



appendix for additional detail). In addition, the process included public meetings and open houses for the public to receive information and comment on the various design adjustments to the LPA under consideration. The results of the analysis within this three-step process, along with the committee recommendations and public comments received, informed the Council in April 2014 to identify the adjustments to this segment of the LPA that are evaluated further in the Supplemental Draft EIS.

1.3.2.1 First-Step Evaluation

In the first step of evaluating the alignment adjustment process, project staff developed, reviewed, and discussed a wide range of potential adjustments to the LPA with affected jurisdictions and the TPAC. The first step of evaluation divided the Eden Prairie Segment into four general subsegments, with each having between six and eight potential light rail alignment-related adjustments developed and evaluated (see Exhibit F-2 and Tables F.3-1 and F.3-2):¹

- The western terminus to Prairie Center Drive (with eight potential adjustments)
- Prairie Center Drive between Southwest Station and Singletree Lane (with six potential adjustments)
- Prairie Center Drive to I-494 (with seven potential adjustments)
- East of I-494 (with six potential adjustments)

This range of design adjustments included consideration of an OMF site in part on the City of Eden Prairie’s existing maintenance facility garage site, which is located along Technology Drive west of Mitchell Road. Some configurations of potential adjustments would have combined the OMF site in Eden Prairie with the Mitchell Station and park-and-ride lot.

During the first step of evaluation, the potential alignment adjustments were analyzed for possible impacts to right-of-way, automobile and truck traffic, on- and off-street parking supply, and wetlands and other environmental resources. This initial analysis focused on adjustments to the proposed light rail alignment, station locations, and park-and-ride lots. As a result of the first step of analysis, between three and five alignment adjustments within each subsegment advanced into the second step of the evaluation. Table F.3-3 provides a summary of the measures used to evaluate the potential first step of adjustments to the LPA. Table F.3-3 also notes which design adjustments were advanced into the second step for additional evaluation.

TABLE F.3-3
Eden Prairie Alignment Adjustment – First-Step Evaluation²

Subsegment	Status	Measures
Western Terminus to Prairie Center Dr.		
Draft EIS 3A	Retained	<ul style="list-style-type: none"> • EIS/LPA alignment carried into second-step evaluation without assessment in the first-step evaluation
5A	Dismissed	<ul style="list-style-type: none"> • Parking: Property owner south of Technology Dr. not supportive of station on their property or shared parking • Environmental: Environmental impacts and potential Section 4(f) impacts across Purgatory Creek • Station: Would eliminate Southwest Station and replace it with a station on the north side of Anderson Lakes Pkwy just east of Mitchell Road, away from a major activity center.
8A	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Access impacts along Technology Dr. • Traffic: Impacts at the Prairie Center Dr./Technology Dr. intersection, and undesirable track geometry • Environmental: Environmental impacts and potential Section 4(f) impacts across Purgatory Creek pond, Impacts on Purgatory Creek Recreational Area park • Station: Precluded having Southwest Station and moved the station to the west on Technology Dr.

¹ Some potential design adjustments spanned two or more subsegments, while others were confined to one subsegment. The proposed light rail alignment and stations for the LPA as evaluated in LRT 3A and LRT 3A-1 of the Draft EIS were included and evaluated within each of the four subsegments and are accounted for within the number of adjustments in each subsegment.

² Throughout this appendix, “dismissed” means that a design adjustment was removed from further study at that time; “retained” means that a design adjustment was advanced into the next step of analysis for further study. Source for all tables is (Council, 2013/14), unless noted.

Subsegment	Status	Measures
12A	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: <ul style="list-style-type: none"> — Property impacts on Southwest Station businesses and Southwest condos; disrupts functionality of the area — Required roadway widening on both sides of Technology Dr. — Deep excavation for removal and replacement of engineered fill (up to 45 feet) — Numerous utility relocations — Access impacts on Southwest Station condominiums • Environmental: Visual impacts on Southwest Station condominiums and Purgatory Creek Park due to elevated LRT alignment in Southwest Station area
18A	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Requires closing the Bachman's/Watertower Apartments shared driveway • Environmental: impacts and potential Section 4(f) impacts across Purgatory Creek • Station: <ul style="list-style-type: none"> — Moves Southwest Station west on Technology Dr. — Property owner south of Technology Dr. not supportive of station on their property or shared parking — St. Andrews Church not supportive of a station and park-and-ride facility near its building
20A	Retained	<ul style="list-style-type: none"> • Right-of-Way: Fewer access impacts on Southwest Station condominiums than 12A • Traffic: Less roadway reconstruction along Technology Dr. than center-running (12A) • Environmental: Less visual impact on Southwest Station condominiums than 12A due to being at-grade through most of the Southwest Station area
23A	Retained	<ul style="list-style-type: none"> • Station: Achieves City desire for station with improved access to Hwy 212 west based on Draft EIS alignment
26A	Retained	<ul style="list-style-type: none"> • Right-of-Way: <ul style="list-style-type: none"> — Impacted property owner prefers this option over 23A — Requires removal of one building on private property • Station: Achieves City desire for station with improved access to Hwy 212 west based on Draft EIS alignment
Prairie Center Dr. between Southwest Station and Singletree Ln.		
Draft EIS 3A	Retained	<ul style="list-style-type: none"> • EIS/LPA alignment carried into second-step evaluation without assessment in the first-step evaluation
2A	Retained	<ul style="list-style-type: none"> • Traffic: Minimum traffic impacts
8A	Retained	<ul style="list-style-type: none"> • Traffic: Potential routing option to get to the west side of Prairie Center Dr. and to limit need for grade-separated crossing
8A1	Retained	<ul style="list-style-type: none"> • Traffic: Potential routing option to get to the west side of Prairie Center Dr. and to limit need for grade-separated crossing
21C	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Property impacts related to driveway impacts on the north side of Prairie Center Dr. • Traffic: <ul style="list-style-type: none"> — Undesirable intersection and track configuration connecting to center-running on Singletree Ln. — Traffic impacts and LRT signal delay at the Prairie Center Dr./Technology Dr. intersection
24A	Retained	<ul style="list-style-type: none"> • Traffic: Minimum traffic impacts • Other: Requires partial reconstruction of Prairie Center Dr. (west)
Prairie Center Dr. to I-494		
Draft EIS 3A	Retained	<ul style="list-style-type: none"> • EIS/LPA alignment carried into second-step evaluation without assessment in the first-step evaluation
1B	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Property impacts • Traffic: <ul style="list-style-type: none"> — Substantially higher LRT signal delays due to traffic and traffic signals on Prairie Center Dr. (east) — Traffic impacts along Prairie Center Dr. • Station: <ul style="list-style-type: none"> — Below-grade station — Eden Prairie Center owner not supportive of station on its property and sharing parking
2A	Retained	<ul style="list-style-type: none"> • Traffic: Minimum traffic impacts • Other: Alignment as shown in City of Eden Prairie's adopted Comprehensive Plan
2A1	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: <ul style="list-style-type: none"> — Glen Lane-only access for businesses along Flying Cloud Dr. — Insufficient right-of-way on Glen Lane for LRT, roadway, and pedestrian facilities • Station: Limits station location options to just in front of Brunswick

Subsegment	Status	Measures
2B	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Property impacts • Traffic: <ul style="list-style-type: none"> — Substantially higher LRT signal delays from traffic and signals on Flying Cloud/Prairie Center Dr. — Impacts on traffic crossing Flying Cloud Dr. and along Prairie Center Dr.
21C	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Access questions raised by Bachman’s can be mitigated with full access from Prairie Center Dr. (west), but access concerns of the shared access with Watertower Apartments cannot be mitigated • Other: <ul style="list-style-type: none"> — Maintains existing cross section of Singletree Ln. compared to 24A — Less compatible with Eden Prairie’s City Center walkability goals
24A	Retained	<ul style="list-style-type: none"> • Other: <ul style="list-style-type: none"> — More compatible with City’s walkability goals than 21C; reduced cross section for Singletree Ln. — Requires realignment of Glen Lane
East of I-494		
Draft EIS 3A	Retained	<ul style="list-style-type: none"> • EIS/LPA alignment carried into second-step evaluation without assessment in the first-step evaluation
1A	Retained	<ul style="list-style-type: none"> • Traffic: North side of Flying Cloud Dr. has fewer impacts on utilities and traffic • Other: More favorable crossing of I-494 than Draft EIS alignment (shorter bridge)
1A2	Retained	<ul style="list-style-type: none"> • Traffic: <ul style="list-style-type: none"> — North side of Flying Cloud Dr. has fewer impacts on utilities and traffic — Fewer traffic impacts than 1A — Fewer LRT signal delays than 1A • Other: More favorable crossing of I-494 than Draft EIS alignment (shorter bridge)
1B	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Property impacts • Traffic: <ul style="list-style-type: none"> — Substantially higher LRT signal delays due to traffic and traffic signals on Prairie Center Dr. (east) — Traffic impacts along Prairie Center Dr. • Environmental: Vibration impact concerns at Fox 9 Television
2B	Dismissed	<ul style="list-style-type: none"> • Right-of-Way: Property impacts • Traffic: <ul style="list-style-type: none"> — Substantially higher LRT signal delays due to traffic and traffic signals on Prairie Center Dr. (east) — Traffic impacts along Prairie Center Dr. • Other: Need to lengthen the existing I-494 bridges over Prairie Center Dr. (east)
15A	Dismissed	<ul style="list-style-type: none"> • Traffic: Traffic impacts on the Valley View Rd. and Hwy 212 interchange during construction • Other: <ul style="list-style-type: none"> — Need to lengthen the existing Valley View Rd. Bridge — Extensive retaining walls needed along Highway 212

1.3.2.2 Second-Step Evaluation

The second step of evaluating alignment adjustments in the Eden Prairie Segment included an in-depth traffic investigation, an assessment of property acquisitions and on- and off-street parking displacements, and input from local businesses and the public. Based on the second step of analysis and evaluation, the project team identified four proposed alignment adjustments in the Eden Prairie Segment to be further considered in the third step of evaluation. Table F.3-4 provides a summary of the measures used to evaluate the potential second-step adjustments to the LPA. Table F.3-4 also notes the four design adjustments that were advanced into the third step for additional evaluation.

1.3.2.3 Third-Step Evaluation

For the third-step evaluation, the Eden Prairie Segment was divided into two subsegments that were different than the subsegments used in the first two steps: West (west of the existing SouthWest Transit Center) and East (east of the existing SouthWest Transit Center) (see Exhibit F-3). Two potential alignment adjustments were evaluated in each of the two subsegments. Either West alignment could be paired with either East adjustment (resulting in four possible combinations): Technology Drive and Highway 212 alignment adjustments in the West subsegment and the Singletree Lane and Comprehensive Plan alignments

in the East subsegment, shown on Exhibit F-3. Each alignment adjustment had two or more variations, addressing possible station locations, roadway treatments, park-and-ride lot locations, and accommodation of an OMF. None of the third-step alignment adjustments were evaluated in the Draft EIS, although the proposed location of the Southwest Station would be in a similar location as proposed in the Draft EIS and in the third-step evaluation of design adjustments. The third-step evaluation addressed a range of measures related to cost, transit travel times and ridership, wetland, floodplain, existing land use near proposed station areas, and various other measures (see Table F.3-5).

TABLE F.3-4
Eden Prairie Alignment Adjustment – Second-Step Evaluation

Subsegment	Status	Measures
Western Terminus to Prairie Center Dr.		
Draft EIS 3A	Dismissed	<ul style="list-style-type: none"> • Environmental: Noise, vibration, and visual concerns at Southwest Station condominiums • Right-of-Way: Impacts on private property (right-of-way acquisition) • Traffic: Mitchell Station difficult to access from west where most park-and-ride (P&R) trips would originate • Other: Modifications required to the Highway 5/212 ramps at Mitchell Rd. • Local Input: 20A preferred by stakeholders through committee process
20A	Retained	<ul style="list-style-type: none"> • Environmental: <ul style="list-style-type: none"> — Fewer impacts on Southwest Station condos (noise, vibration, right-of-way) than 23A/26A — Potential floodplain concerns • Local Input: Achieves City of Eden Prairie desire for a station with improved access to Highway 212 west • Traffic: LRT travel times and ridership not substantially different from other alternative segments
23A	Retained	<ul style="list-style-type: none"> • Environmental: <ul style="list-style-type: none"> • Noise, vibration, and visual concerns to Southwest Station condominiums • Right-of-Way: Impacts on private property (bisects Eaton Property) • Other Modifications required to the Highway 5/212 ramps at Mitchell Rd. • Local Input: 20A preferred by stakeholders through committee process
26A	Dismissed	<ul style="list-style-type: none"> • Local Input: Achieves City desire for centralized station with improved access to Highway 212 west • Right-of-Way: Requires removal of one building on private property
Prairie Center Dr. Between Southwest Station and Singletree Ln.		
Draft EIS 3A	Dismissed	<ul style="list-style-type: none"> • Local Input: <ul style="list-style-type: none"> — Located beyond the core of the Eden Prairie City Center area — Does not adequately serve City-identified areas of potential growth • Other: <ul style="list-style-type: none"> — Limited transit-oriented development opportunities — Generates least number of LRT-projected riders — Limited pedestrian connectivity to Eden Prairie Center — Conflicts with power transmission lines — Substantial construction impacts due to tunnel construction
2A	Retained	<ul style="list-style-type: none"> • Traffic: Minimal traffic impacts • Other: LRT travel times and ridership not substantially different from other alternative segments • Right-of-Way: Fewer property and roadway impacts than 24A • Local Input: 2A preferred by stakeholders and public through committee process
8A	Dismissed	<ul style="list-style-type: none"> • Traffic: Traffic/LRT delay crossing Singletree Ln./Prairie Center Dr. intersection at-grade • Other: Dismissed in favor of center-running on Prairie Center Dr. (8A1) • Right-of-Way: Driveway impacts on Flagship Athletic Club
8A1	Dismissed	<ul style="list-style-type: none"> • Other: Requires partial reconstruction of Prairie Center Dr. (west) • Traffic: Substantial traffic impacts on Prairie Center Dr. at Singletree Ln. and Technology Dr.
24A	Retained	<ul style="list-style-type: none"> • Traffic: More temporary/construction traffic impacts than 2A; reconstruction of Prairie Center Dr. • Right-of-Way: More property impacts than 2A • Other: Below-grade separation at Technology Dr., concerns about high groundwater level • Local Input: 2A preferred by stakeholders and public through committee process
Prairie Center Dr. to I-494		
Draft EIS 3A	Dismissed	<ul style="list-style-type: none"> • Local Input: <ul style="list-style-type: none"> — Located beyond the core of the Eden Prairie City Center area — Does not adequately serve City-identified areas of potential growth • Other: <ul style="list-style-type: none"> — Limited transit-oriented development opportunities

Subsegment	Status	Measures
		<ul style="list-style-type: none"> — Generates least number of LRT projected riders — Limited pedestrian connectivity to Eden Prairie Center — Conflicts with power transmission lines — Construction impacts due to tunnel construction
2A	Retained	<ul style="list-style-type: none"> • Traffic: Minimum traffic impacts • Right-of-Way: Fewer property and roadway impacts than 24A • Other: <ul style="list-style-type: none"> — Compatible with Eden Prairie’s City Center walkability goals — LRT travel times and ridership not substantially different from other alternative segments • Local Input: 2A preferred by stakeholders and public through committee process
24A	Retained	<ul style="list-style-type: none"> • Local Input: <ul style="list-style-type: none"> — More compatible with Eden Prairie’s City Center walkability goals than 2A but requires a reduced cross section of Singletree Ln. — 2A preferred by stakeholders and public through committee process • Right-of-Way: <ul style="list-style-type: none"> — Access concerns to businesses during construction — Requires higher number of property impacts than 2A • Other: Requires reconstruction of Singletree Ln.
Draft EIS 3A	Dismissed	<ul style="list-style-type: none"> • Environment: <ul style="list-style-type: none"> — Substantial structure over I-494 and Flying Cloud Dr. — Aerial structure has high visual impact on businesses — Conflicts with power transmission lines • Traffic: <ul style="list-style-type: none"> — More traffic impacts at Valley View Rd. than 1A2 • More LRT signal delay at Valley View Rd. than 1A2
1A	Dismissed	<ul style="list-style-type: none"> • Traffic: <ul style="list-style-type: none"> — More traffic impacts than 1A2 — More LRT signal delay than 1A2 • Environment: Aerial structure has high visual impact on businesses
1A2	Retained	<ul style="list-style-type: none"> • Traffic: <ul style="list-style-type: none"> — Fewer traffic impacts than 1A — Fewer LRT signal delay than 1A • Other: <ul style="list-style-type: none"> — Aerial structure has fewer visual impacts — LRT ridership not substantially different from other alternative segments • Environment: Noise and vibration concerns to existing businesses (Residence Inn and other hotels)

1.3.2.4 Conclusion

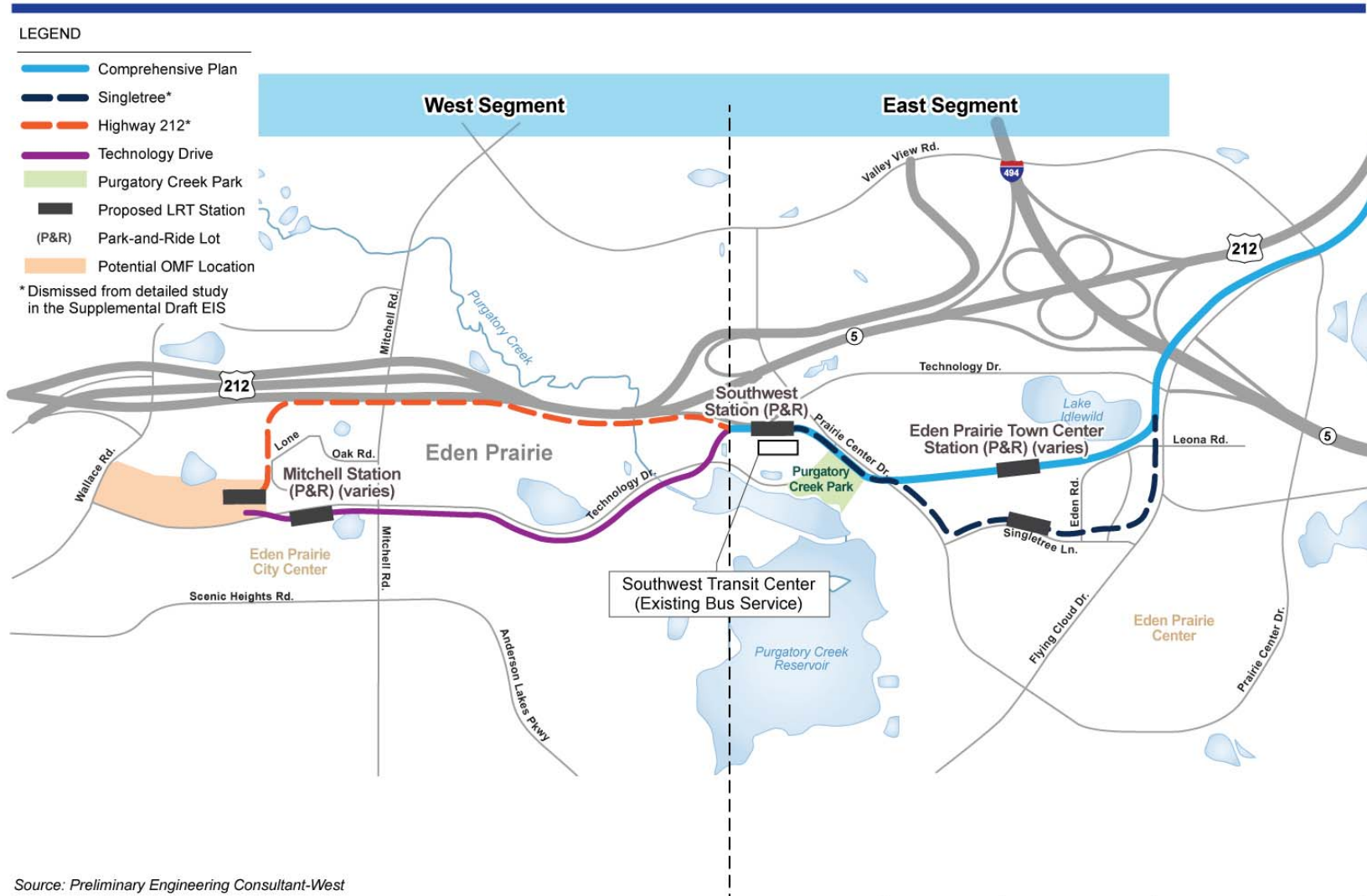
Table F.3-5 provides a summary of the criteria and measures used to evaluate the potential third step of adjustments to the LPA. Based on the analysis documented in this appendix and through the agency coordination and public involvement process described in this appendix, in April 2014 the Council identified the following adjustments to be incorporated into the LPA:

- Combined with both the Comprehensive Plan and Singletree Lane alignments. Retaining the Technology Drive alignment in the West subsegment, which moves the western terminus station from immediately south of Highway 212 west of Mitchell Road to immediately south of Technology Drive west of Mitchell Road
- Retain the Comprehensive Plan alignment adjustment in the East subsegment and dismissing the Singletree Lane alignment adjustment

In summary, in the West subsegment, the Technology Drive alignment would provide better placement of the Mitchell Station relative to existing and planned development. In the East subsegment, relative to the Singletree alignment, the Comprehensive Plan alignment adjustment would result in fewer potential traffic conflicts and fewer property acquisitions and business displacements.

EXHIBIT F-3

Third Step LRT Alignment Adjustments Evaluated in the Supplemental Draft EIS - Eden Prairie Segment



Source: Preliminary Engineering Consultant-West


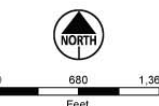

	<p>Southwest LRT Final EIS Third Step LRT Alignment Adjustments Evaluated in the Supplemental Draft EIS Eden Prairie Segment</p>	<p>Exhibit F-3</p>		
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TABLE F.3-5
Eden Prairie Alignment Adjustment – Third-Step Evaluation

Criteria/Measures	Draft EIS ^a	OPTION 1	OPTION 2	OPTION 3	OPTION 4
	Draft EIS LPA - Mitchell Rd. Station Terminal	Technology Dr./ Singletree Ln.	Highway 212/ Singletree Ln.	Technology Dr./ Comprehensive Plan	Highway 212/ Comprehensive Plan
Alignment Description ^b	Draft EIS 3A	20A-24A-1A2	23A-24A-1A2	20A-2A-1A2	23A-2A-1A2
Western Terminus Station	Mitchell Rd.	Wallace Rd.	Wallace Rd.	Mitchell Road at City Center ^c	Wallace Rd.
Capital Cost and Key Capital Cost Drivers					
Capital Cost (millions) ^d	\$234.9	\$276.8	\$274.9	\$270.4	\$286.4
Total Park and Ride Spaces in Segment	1,450 structured 400 surface	950 structured 160 surface	950 structured 160 surface	1380 structured 160 surface	950 structured 160 surface
Mitchell Station	800 spaces (400 structured 400 surface)	950 structured	950 structured	900 structured	950 structured
Southwest Station	1,325 structured ^a (924 existing) (400 ramp)	924 structured (existing; bus + LRT); assumes sharing of existing ramp by SouthWest Transit and Southwest LRT	924 structured (existing; bus + LRT); assumes sharing of existing ramp by SouthWest Transit and Southwest LRT	480 new structured; 440 for LRT demand and 40 to replace existing impacted spaces	924 structured (existing; bus + LRT); assumes sharing of existing ramp by SouthWest Transit and Southwest LRT
Eden Prairie Town Center Station	650 structured	160 surface	160 surface	160 surface	160 surface
Right-of-way Impacts ^e	1 full 13 partial	2 full 28 partial	2 full 27 partial	2 full 20 partial	2 full 21 partial
Substantial Utility Impacts	Overhead high-voltage utilities near Town Center Station (east-west and north-south direction); immediately adjacent to Eden Prairie water treatment plant	None	Immediately adjacent to Eden Prairie water treatment plant	Water mains, sewer and gas mains run parallel to, beneath, or cross alignment	Immediately adjacent to Eden Prairie water treatment plant
Transit Travel Time Differences					
Number of Signalized Intersections LRT Runs Through (existing and new)	3	11	9	7	6
Change in LRT Travel Time from Draft EIS LPA (minutes) ^f	0.0	4.9 minutes	4.8 minutes	3.4 minutes	3.8 minutes
LRT Length (miles) - from 1,000 Feet East of Valley View	2.6 miles	3.3 miles	3.5 miles	2.8 miles	3.3 miles
Transit Ridership Differences					
Change in Daily Ridership (2030) from Draft EIS LPA	0	410	410	410	410
Change in Transit Dependent Riders (Year 2030) from Draft EIS LPA	0	90	90	90	90

Criteria/Measures	Draft EIS ^a	OPTION 1	OPTION 2	OPTION 3	OPTION 4
	Draft EIS LPA - Mitchell Rd. Station Terminal	Technology Dr./ Singletree Ln.	Highway 212/ Singletree Ln.	Technology Dr./ Comprehensive Plan	Highway 212/ Comprehensive Plan
Environmental Considerations					
Potential Wetland Impacts ^g	+0.7 acres	+2.2 acres	+0.7 acres	+2.2 acres	+0.7 acres
Potential FEMA Floodplain Impacts	0 cubic yards	60 – 2000 cubic yards	0 cubic yards	60 – 2000 cubic yards	0 cubic yards
Other Factors					
Construction Impacts	PCD/Technology Dr. intersection/tunnel, Technology Dr. businesses	Singletree Ln. businesses, Flying Cloud Dr.	Singletree Ln. businesses, Flying Cloud Dr.	Eden Rd. businesses, Flying Cloud Dr.	Eden Rd. businesses, Flying Cloud Dr.
Traffic Impacts (Year 2030) (Unmitigated)	Flying Cloud Dr./Valley View	Technology Dr./ Flying Cloud Dr.	Technology Dr./ Flying Cloud Dr.	Technology Dr./ Flying Cloud Dr.	Technology Dr./ Flying Cloud Dr.
Intersections at Level of Service E/F due to LRT (without mitigation)		Mitchell Rd./ Technology Dr.	Mitchell/Highway 5 ramps	Mitchell Rd./ Technology Dr.	Mitchell Rd./ Technology Dr. Mitchell/Highway 5 ramps
Walkability at Eden Prairie City Center Station	Poor	Very Good	Very Good	Good	Good
Existing Land Use – Within 0.5 Mile of Eden Prairie City Center Station					
Population	697	1467	1,467	1,350	1,350
Housing Units	474	887	887	841	841
Employment	4,422	7,551	7,551	6,195	6,195
Existing Land Use – Within 0.5 Mile of Mitchell Station					
Population	279	606	606	606	606
Housing Units	132	221	221	221	221
Employment	2,442	2,124	2,124	2,124	2,124
Status	Dismissed	Dismissed	Dismissed	Retained	Dismissed

^a Dismissed from further study in the second step; characteristics are provided for comparison only.
^b Options represent combinations of light rail alignments and stations illustrated on Exhibit F-2.
^c Also evaluated with a Wallace Road terminus.
^d Capital costs are expressed in year-of-expenditure dollars and include allocated and unallocated contingencies and design costs.
^e Does not include displacements due to improvements to Mitchell Road.
^f The traffic analysis in the Draft EIS was based on proposed light rail preemption at traffic signals, which would result in no delay for light rail vehicles, but that could lead to unacceptable levels of service at some local roadway intersections preempted by light rail. In the current analysis, the LRT delay will vary by treatment at each affected intersection.
^g Based on initial assessment, refined at a later date.

The LPA, as evaluated in the Supplemental Draft EIS, reflects the inclusion of the project’s western terminus at Mitchell Station by way of Technology Drive and the Comprehensive Plan alignment (see Exhibit F-3). Other potential design adjustments developed and evaluated in this section were removed from further study.

1.4 Potential Operations and Maintenance Facility Sites

This section provides a summary of the range of potential OMF sites that were addressed in the Supplemental Draft EIS. This section first provides background information on OMF sites that were addressed for the Draft EIS and provides a description of the wide range of OMF sites considered after the Draft EIS and how those potential OMF sites were evaluated. The *Draft Operations and Maintenance Facility*

Site Selection TI # 23 (AECOM/Kimley-Horn and Associates, 2013) provides additional detail on the evaluation of OMF sites that occurred following the Draft EIS.

1.4.1 Background

As noted in the Draft EIS, the light rail alternatives would need an OMF for light vehicle maintenance, running repairs for the light rail vehicles, and storage of vehicles not in service. In general, light rail vehicles would be cleaned and repaired daily inside and outside and the vehicles would be inspected and serviced to ensure operational safety and reliability. Features and functions needed at the OMF are identified in Section 2.3.3.9 of the Draft EIS. The OMF would be designed and configured to store 30 light rail vehicles, sufficient to support Southwest LRT operations through 2030. Positioning an OMF in an efficient location along the proposed rail line is important in minimizing nonrevenue mileage traveled by trains, providing operator access, and providing for adjustments to train lengths during different periods of the day.

The following OMF site characteristics were used in the Draft EIS evaluation (see Appendix H of the Draft EIS):

- Approximately 10- to 15-acre site to store at least 30 light rail vehicles through 2030, with the ability to expand to accommodate up to 36 vehicles, and to conduct maintenance activities
- Rectangular shape, generally three times longer than wide
- Ability to move trains into and out of both ends of the facility
- Adjacent to a straight and relatively flat section (a grade equal to or less than 1 percent) of mainline track to accommodate turnouts and crossovers
- Good roadway access for equipment and employees

In addition, the Draft EIS identified the following preferred characteristics of an OMF:

- Compatibility with adjacent current and planned land uses
- Land zoned industrial, light industrial, or both
- Undeveloped property to minimize acquisition and relocation costs
- Public land
- Preferred location near one end of line to minimize deadheading of empty vehicles

The Draft EIS identified 14 sites that satisfied the project's requirements for an OMF. Of those 14 sites, four were carried forward into the Draft EIS for more detailed study. Appendix H (Part 1) of the Draft EIS summarizes the evaluation of the 14 OMF sites and the identification of four sites for inclusion in the Draft EIS. Section 2.3.3.9 of the Draft EIS contains brief descriptions of the four sites evaluated; these sites are numbered west to east in the Supplemental Draft EIS: EP-1, EP-2, EP-3, and M-4. The locations of these four potential sites are illustrated on Exhibit F-4. The Draft EIS did not identify a preferred OMF site.

1.4.2 Operations and Maintenance Facility Sites Considered after Publication of the Draft Environmental Impact Statement

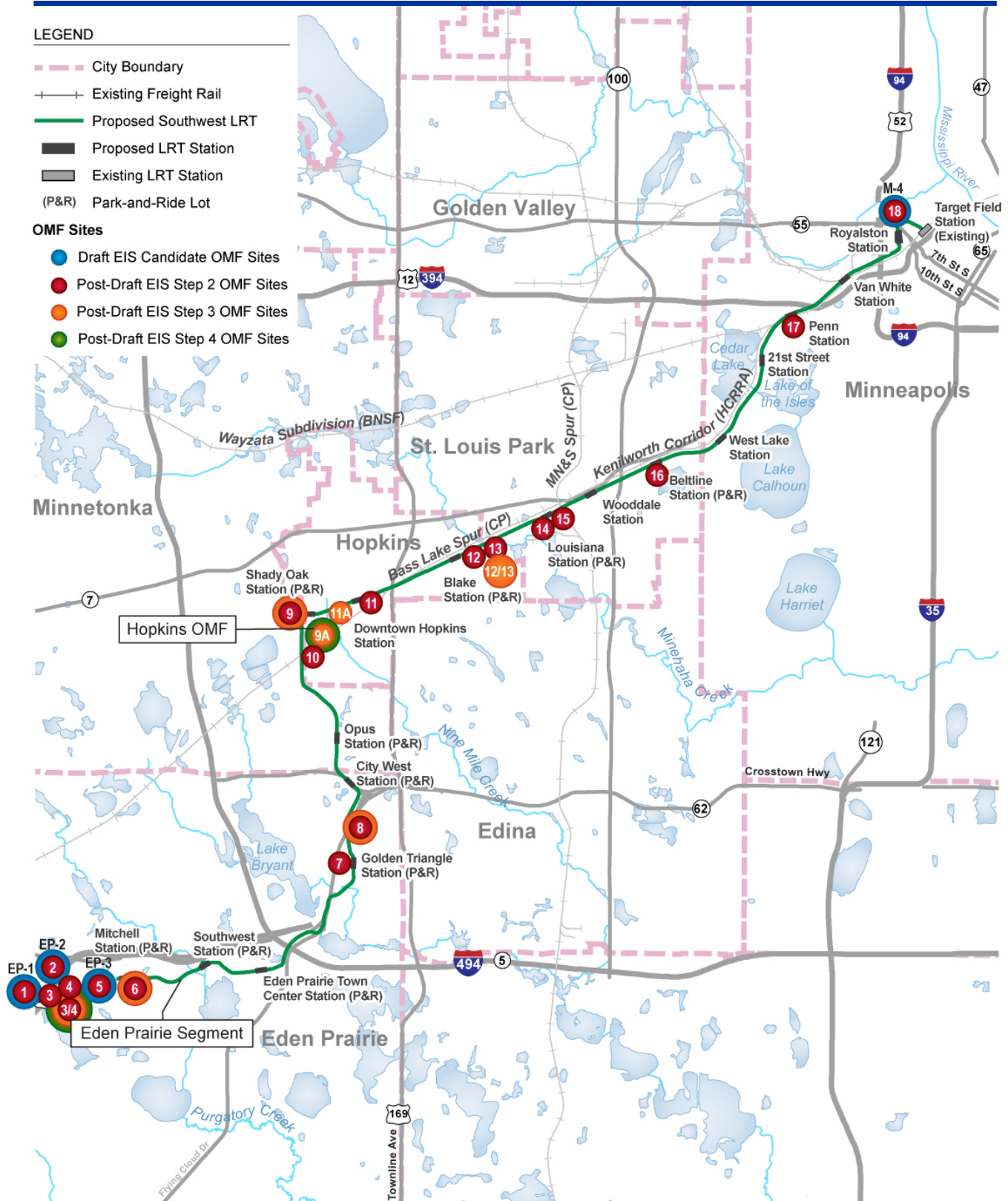
Following publication of the Draft EIS, the Council determined that selecting the proposed project's OMF site—one that accommodates its functional and spatial needs and is compatible with surrounding uses—would require additional site identification and evaluation to build upon and complement the studies conducted during the Draft EIS phase.


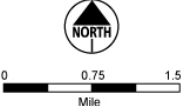

The project team used a four-step process to identify and evaluate the expanded range of OMF sites. The process entailed the following steps of development and evaluation:

- **First-Step Evaluation.** A preliminary site evaluation, narrowing potential sites from approximately 30 to 18.
- **Second-Step Evaluation.** A detailed assessment based on 13 criteria, narrowing from 18 to seven OMF sites.

EXHIBIT F-4

OMF Sites Considered



	<p align="center">Southwest LRT Final EIS OMF Sites Considered</p>	<p align="center">Exhibit F-4</p>		
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- **Third-Step Evaluation.** An operational analysis and public and jurisdiction review and input, narrowing from seven to two sites.
- **Fourth-Step Evaluation.** A detailed assessment and public and jurisdictional review of two sites.

Throughout the OMF development and evaluation process, the project team coordinated with the project’s business, community, and technical committees and with the general public to obtain a wide range of stakeholder views on the OMF sites (see Section 2.0 of this appendix for additional detail). Exhibit F-4 illustrates the potential OMF sites evaluated through this four-step process.

1.4.2.1 First-Step Evaluation

As the first step in expanding upon the OMF site search conducted for the Draft EIS, the project team conducted a preliminary site identification process. Within that process, project staff reviewed aerial photographs to understand land use patterns, parcels, the physical context, and potential environmental concerns for parcels adjacent to the proposed light rail alignments. This desktop analysis was followed by field surveys to examine candidate locations based upon parcel proximity to the proposed light rail alignment and available parcel size. As a result of this analysis, the project team identified approximately 30 first-step sites that warranted more detailed review and evaluation, including the four sites evaluated in the Draft EIS.

Concurrent with the preliminary site identification process, the project team worked with Metro Transit rail operations staff to develop a Space Needs Program for the OMFs. The Space Needs Program, which established the approximate size of the OMF building needed to accommodate its major functions (rail operations, materials management, rail maintenance, and facilities maintenance), served as the foundation for the project team to develop the initial site selection criteria. The criteria used during the first-step evaluation were similar to those used for the Draft EIS, as follows:

- Site of 10 to 15 acres
- Regular geometric parcel shape and flat
- Efficient light rail train movement to and from the site
- Good roadway access to the site
- Compatible with adjacent land use

The first step of evaluation resulted in identification of 18 candidate sites to be developed and evaluated further in the second step, which included portions of the sites studied in the Draft EIS. The first-step sites are numbered sequentially west to east, as sites 1 to 18, and their general locations are illustrated on Exhibit F-4. Site EP-1 became site 1; a portion of EP-2 is included in site 2; a portion of EP-3 became site 5; and M-4 became site 18. The measures used to evaluate the first-step OMF sites are summarized in Table F.4-1. The process used to identify the 18 sites and the evaluation criteria were shared with the TPAC, CAC, BAC, CMC, and Metro Transit operations and maintenance staff for their review and input.

TABLE F.4-1
Operations and Maintenance Facility Site Selection – First-Step Evaluation Criteria

Category	Criteria
Site Size	Site needed to have 10 to 15 acres available for development
Site Shape and Terrain	Site needed to have a regular geometric shape (rectangular) and relatively flat terrain
Connection to LRT Alignment	Site had to provide efficient light rail train movement to/from the OMF site to LRT alignment
Local Roadway Access	Site had to have access to the local roadway network
Land Use Compatibility	Site had to be compatible with adjacent land use

1.4.2.2 Second-Step Evaluation

To further evaluate the 18 second-step candidate sites, more detailed evaluation criteria were developed addressing four operational characteristics and nine site characteristics, listed in Table F.4-2. As part of the second step of evaluation, the project team visited each site; reviewed community comprehensive plans,

zoning codes, and county property records; and obtained information about onsite soils and subsurface conditions. Based on this research, the project team and Metro Transit staff used the criteria to qualitatively rate the second-step candidate sites. The evaluation of the sites was reviewed with corridor jurisdictions through the TPAC, CAC, BAC, and CMC.

TABLE F.4-2
Operations and Maintenance Facility Site Selection – Second-Step Evaluation

	Screening Criteria													Status
	Operational Characteristics				Site Characteristics									
	Site Configuration	Alignment Proximity/Connectivity	Alignment Location	Site Access	Neighborhood Compatibility	TOD/Economic Development Impact	Zoning/Land Use	Site and Facilities Cost	Real Estate Acquisition	Relocation Cost	Environmental Impact	Cultural Resources	Stormwater Management	
1 Eden Prairie – Hwy 212 ROW	G	U	M	G	E	VG	G	U	VG	E	G	E	M	Dismissed
2 Eden Prairie – Wallace Rd	G	VG	M	VG	M	G	U	G	M	U	E	E	E	Dismissed
3 Eden Prairie – City Garage W	E	E	G	E	VG	VG	E	VG	G	G	E	E	VG	Retained ^a
4 Eden Prairie – City Garage E	E	E	G	E	VG	VG	E	VG	VG	VG	M	E	G	Retained ^a
5 Eden Prairie – Mitchell West	M	VG	G	M	G	VG	E	M	G	VG	M	E	M	Dismissed
6 Eden Prairie – Mitchell East	E	E	G	E	G	M	VG	VG	G	E	G	E	E	Retained
7 Eden Prairie – Flying Cloud/West 70th St	E	E	G	E	VG	VG	G	G	M	M	M	E	VG	Dismissed
8 Eden Prairie – Shady Oak/West 70th St	E	E	VG	E	E	VG	VG	VG	G	VG	VG	E	E	Retained
9 Minnetonka – K-Tel	E	E	E	E	E	G	VG	VG	VG	G	VG	E	E	Retained
9A Minnetonka – K-Tel East	VG	VG	E	VG	E	G	E	G	VG	G	VG	E	E	Retained
10 Hopkins – 7th St	E	VG	E	VG	VG	E	M	M	M	E	M	E	E	Dismissed
11 Hopkins – 11th Ave	G	E	E	E	VG	M	G	G	G	G	VG	E	E	Dismissed
11A Hopkins – K-Tel at 11th Ave	E	E	E	E	E	G	E	M	VG	G	E	VG	VG	Retained
12 Hopkins – Excelsior West	E	E	VG	E	VG	VG	VG	VG	VG	G	VG	E	E	Retained ^a
13 Hopkins/St. Louis Park –Excelsior East	E	VG	VG	E	E	E	VG	VG	VG	G	VG	E	E	Retained ^a
14 St. Louis Park – Louisiana West	VG	VG	VG	E	E	M	VG	VG	G	G	G	E	VG	Dismissed
15 St. Louis Park – Louisiana East	VG	G	VG	E	E	M	VG	VG	G	G	VG	E	VG	Dismissed
16 St. Louis Park – Beltline	U	U	G	E	E	U	VG	VG	VG	G	E	E	VG	Dismissed
17 Minneapolis – Penn	E	G	M	U	M	M	M	VG	E	E	U	M	E	Dismissed
18 Minneapolis –5th St North	U	U	M	E	VG	U	M	VG	VG	VG	M	M	G	Dismissed

^a Combined in third-step evaluation.

Acronym: TOD = transit-oriented development.

Initially, the 18 second-step sites were narrowed to seven sites based on the 13 criteria and evaluation measures included in Table F.4-2. Members of the project team met with staff from the Cities of Eden Prairie, Minnetonka, Hopkins, and St. Louis Park to discuss the OMF evaluation process and the seven most highly rated sites.

In April 2013, the seven OMF sites were presented to TPAC, which includes the staff from cities along the proposed light rail alignment. TPAC representatives from Hopkins and Minnetonka requested the project team evaluate two additional OMF sites that were not previously evaluated: 9A and 11A, both in Hopkins,

bringing the number of OMF sites under consideration to nine. The project team evaluated the two sites proposed using the criteria outlined in Table F.4-3, and both sites ranked as high as the seven other remaining sites. Based upon more detailed analysis, the project team then combined sites 3 and 4, as well as sites 12 and 13, to better meet OMF spatial requirements and to provide more area for buffering at the edges of the site, bringing the number of sites back to seven.

1.4.2.3 Third-Step Evaluation

The project team prepared conceptual layout plans for each of the seven third-step OMF sites listed in Table F.4-3. The conceptual plans also examined the relationship to adjacent edges, setbacks, environmentally sensitive areas, and remnant space within the OMF site available for redevelopment. The project team presented the seven OMF sites at three public open houses on May 13 (Eden Prairie), May 15 (St. Louis Park), and May 22, 2013 (Hopkins/Minnetonka).

Within the third step of evaluation, the project team analyzed the operational performance of the seven remaining OMF sites in greater detail based on conceptual site layouts, compliance with current land use planning and zoning, preliminary costing, and a preliminary assessment of potential environmental impacts. Based on the evaluation of the seven third-step sites (Table F.4-3) and on public and committee input discussed in Section 2.0 of this appendix, the project team identified OMF sites 3/4 (Eden Prairie) and 9A (Hopkins) for further detailed consideration. In summary, these two potential OMF sites had the least conflict with either existing or adjacent land uses and planned development. A few sites were eliminated due to environmental factors, limitations in operations, and higher costs of construction elements. Still other sites posed potential conflict with transit-oriented development due to existing land uses adjacent to proposed light rail stations.

1.4.2.4 Fourth-Step Evaluation

The project's fourth step of evaluation of potential OMF sites focused on two potential sites: Site 3/4 in Eden Prairie and Site 9A in Hopkins (see Table F.4-4).

A. Eden Prairie Site 3/4

The Eden Prairie 3/4 site is an approximately 20-acre parcel between Technology Drive on the south, Highway 5 on the north, Mitchell Road on the east, and Wallace Road to the west (see Exhibit F-5). Wallace Road and Mitchell Road would provide regional access from Highway 5. The proposed OMF site would be comprised of four parcels. On the east half of the site, a large wetland abuts a building owned by the Eaton Corporation. The west half of the site includes the city's maintenance facility, and the northeast quadrant at the intersection of Wallace Road and Technology is leased by Metro Machine & Engineering. The project team considered three conceptual site layouts for the Eden Prairie OMF, because two light rail alignment adjustments and three different access possibilities were also under consideration in the Eden Prairie Segment. Exhibits F-5 to F-7 illustrate the three conceptual site layouts for the Eden Prairie OMF.

B. Hopkins Site 9A

The Hopkins 9A site is an approximately 15-acre parcel between the CP Railroad on the south, 5th Street South (K-Tel Drive) on the north, 15th Avenue South on the east, and the proposed LRT mainline on the west (see Exhibit F-4). Sixteenth Avenue South runs through the middle of the site and connects to 15th Avenue South via 6th Street South. Regional access would be provided by 5th Street, 11th Avenue, Excelsior Boulevard to the north, and Highway 169 to the east. Two small constructed ponds and surrounding wetlands are located at the south end of the site adjacent to the railroad. The Hopkins OMF site would be located about 1,000 feet south of the proposed Shady Oak Station and closely adjacent to the proposed light rail alignment, about midway between downtown Minneapolis and Eden Prairie.

The OMF 9A site would be comprised from eight parcels: one undeveloped lot and seven properties with office/warehouse uses or light manufacturing and assembly. Development on parcels adjacent to the Hopkins site includes office/industrial to the north, the Hopkins landfill south of the CP tracks, office/industrial/distribution to the east across 15th Avenue, and industrial/distribution to the west beyond the proposed LRT mainline.

TABLE F.4-3
Operations and Maintenance Facility Site Selection – Third-Step Evaluation

OMF Site #	Screening Criteria									Status	Rationale
	Operational Characteristics								Cost Comparison (millions)		
	Site Configuration	Alignment Proximity/Connectivity			Alignment Location		Site Access				
		Length of Lead Tracks (feet)	Lead Tracks At-Grade	Lead Track Redundancy	Distance from Center of Mainline (miles)	Distance from Downtown Minneapolis (miles)	Roadway Access	Walking Distance to Station (miles)			
3/4 Eden Prairie City Garage	Compatible with OMF	500	Yes	Possible	7.5	15.0	Local	0.25	\$25 – \$30m greater	Retained	<ul style="list-style-type: none"> • Consistent with land use/zoning • No City objections to conditions, dependent on public works • Opportunity to include station and park-and-ride facilities on one site
6 Eden Prairie Mitchell East	Compatible with OMF	0	Yes	Yes	6.5	14.0	Local	0.33	\$25 – \$30m greater	Dismissed	<ul style="list-style-type: none"> • Site dependent upon Eden Prairie LRT mainline alignment • Operator relief access is poor or not favorable due to distance to station • Wetland impacts • Not consistent with City and property owner development plans
8 Eden Prairie Shady Oak/ West 70th St.	Compatible with OMF	500	Bridge Required	No	3.5	11.0	State	0.5	\$45 – \$50m greater	Dismissed	<ul style="list-style-type: none"> • Not consistent with City's redevelopment plans • Operator relief access is poor or not favorable due to distance from station • Require substantial lead track/structure
9 Minnetonka K-Tel	Compatible with OMF	500	Yes	Possible	1.0	8.5	Local	0.25	\$50 – \$55m greater	Dismissed	<ul style="list-style-type: none"> • Requires sewer interceptor relocation • Residential use west of Shady Oak Rd. • Sensitive medical assembly facility to south
9A Hopkins K-Tel East	Compatible with OMF	0	Yes	Possible	1.0	8.5	Local	0.25	\$35 – \$40m greater	Retained	<ul style="list-style-type: none"> • Consistent with land use and zoning • Operator relief access/station proximity favorable • Freight rail and LRT alignment buffer along property borders • Redevelopment potential of remnant area
11A Hopkins 11th Ave. West	Compatible with OMF	0	Yes	Possible	0.5	8.0	Local	0.25	\$40 – \$45m greater	Dismissed	<ul style="list-style-type: none"> • Nine Mile Creek crosses the site • Known site contamination • Potential development impact on Shady Oak Station area

OMF Site #	Screening Criteria								Cost Comparison (millions)	Status	Rationale
	Operational Characteristics										
	Site Configuration	Alignment Proximity/Connectivity			Alignment Location		Site Access				
		Length of Lead Tracks (feet)	Lead Tracks At-Grade	Lead Track Redundancy	Distance from Center of Mainline (miles)	Distance from Downtown Minneapolis (miles)	Roadway Access	Walking Distance to Station (miles)			
12/13 Hopkins/St. Louis Park Excelsior	Compatible with OMF	0	Yes	Yes	1.5	7.0	Local	0.33	\$45 – \$50m greater	Dismissed	<ul style="list-style-type: none"> • Environmental justice concerns • Neighborhood opposition • Multifamily residential to the west/south • Not consistent with land use guidance and City’s redevelopment goals

TABLE F.4-4
Operations and Maintenance Facility Site Selection – Fourth-Step Evaluation

OMF Site #	Screening Criteria		Rationale	Status
	Strengths	Weaknesses		
3/4 Eden Prairie City Garage	<ul style="list-style-type: none"> • Use would be consistent with municipal adopted land use guiding and zoning • Operator relief would be available given proximity to LRT station (Shady Oak) • City presented no objection to OMF, with exception of public works building location • Opportunity would exist to include LRT station and park-and-ride facilities on or near site 	<ul style="list-style-type: none"> • Site dependent on Eden Prairie LRT mainline alignment extending to the site • Wetland impacts would likely require permitting and mitigation • Noise and vibration impacts would pose concerns for Eaton industrial property • End-of-line location would pose operational limitations • Coordination with station and park-and-ride facilities would be required 	Improved out-of-service operations and operating cost savings would be realized due to its relative central location on the proposed light rail line (about midway between downtown Minneapolis and Eden Prairie) compared to the Eden Prairie OMF (3/4), which would be located west of the light rail line’s western terminus. Why? Because Site 3/4 would require 6 additional operators for the system, which will increase operations cost.	Dismissed
9A Hopkins K-Tel East	<ul style="list-style-type: none"> • Use would be consistent with adopted municipal land use guiding and zoning • Operator relief would be available given proximity to LRT station (Shady Oak) • Freight rail and proposed LRT alignment would buffer south and west property borders • Redevelopment potential remnant areas would be possible 	<ul style="list-style-type: none"> • Wetland impacts would likely require permitting and mitigation • Flood-prone conditions would need to be addressed in the southern portion of the site • Geotechnical considerations may be limiting in southern portion of site • City has presented concerns regarding tax base and jobs impacts 		






EXHIBIT F-5
Eden Prairie OMF Site 3/4 – Option 1

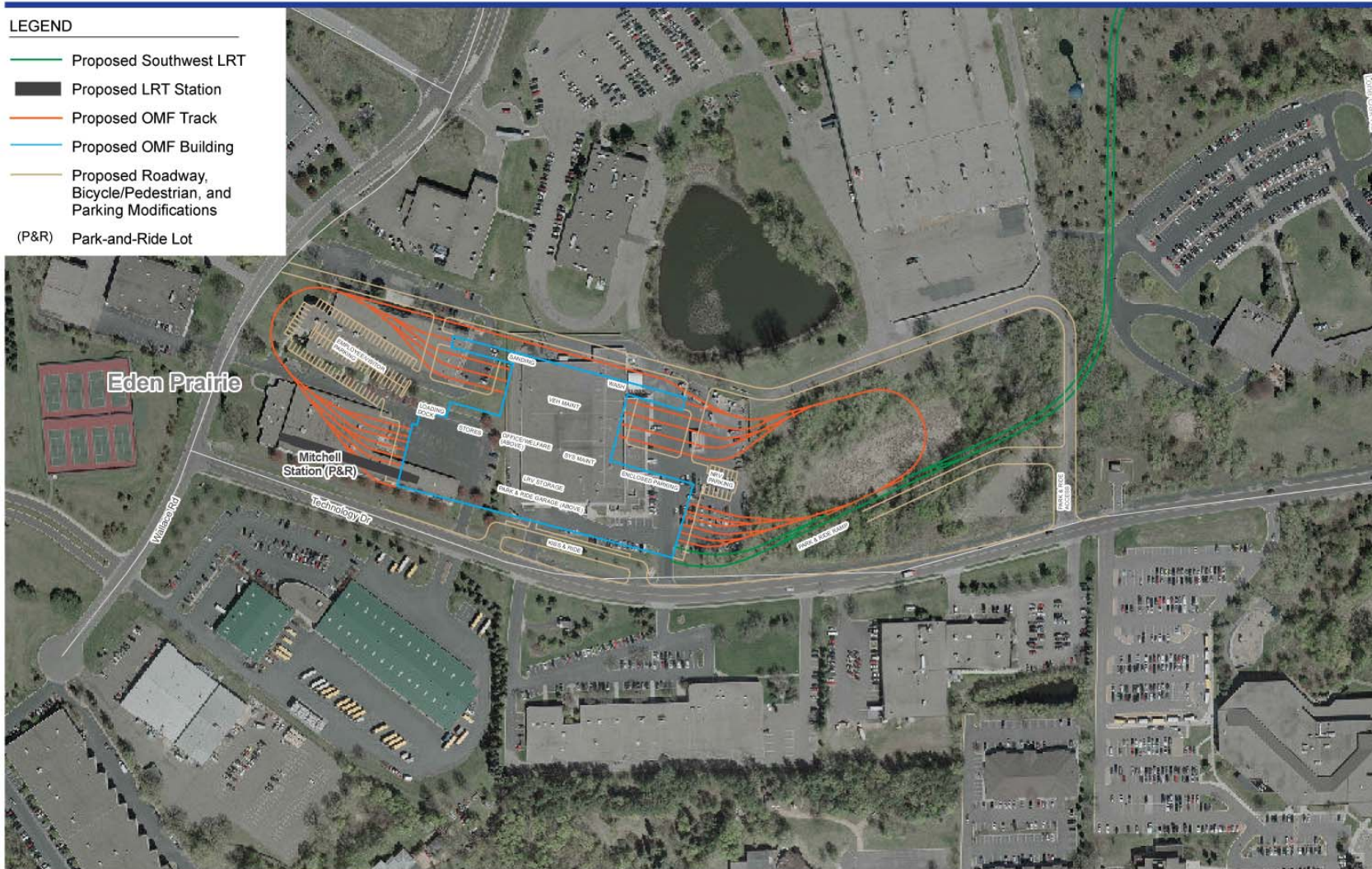


	<p>Southwest LRT Final EIS Eden Prairie OMF Site 3/4 – Option 1</p>	<p>Exhibit F-5</p>		
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EXHIBIT F-6
Eden Prairie OMF Site 3/4 – Option 2

LEGEND

-  Proposed Southwest LRT
-  Proposed LRT Station
-  Proposed OMF Track
-  Proposed OMF Building
-  Proposed Roadway, Bicycle/Pedestrian, and Parking Modifications
- (P&R) Park-and-Ride Lot



	<p>Southwest LRT Final EIS Eden Prairie OMF Site 3/4 – Option 2</p>	<p>Exhibit F-6</p>		
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The development of conceptual layout plans led to one layout design for the Hopkins OMF site due to the shape and parcels, as well as its connection to the adjacent proposed light rail alignment. Fifth Street and 15th Avenue would remain in place, and access from the OMF to the light rail mainline would occur at 5th Street. Under the conceptual layout design, the proposed OMF would be located along the west edge of the site adjacent to the proposed light rail mainline. As a result of that layout, there would likely be a portion of the site to the east that would remain unused as part of the OMF. Because the eastern side of the site has relatively few buildings and other improvements, if there were any excess property remaining after construction that the Council and the FTA chose to dispose of, this land could potentially accommodate new industrial development (see Section 3.1.2.2 of the Supplemental Draft EIS for additional information on how the project could address the disposition of unused portions of parcels acquired by the project).

1.4.2.5 Conclusion

Based on the analysis summarized in this section and Table F.4-4, and through the process described in Sections 1.0 and 2.0 of this appendix, the Council identified the Hopkins OMF 9A as the OMF to be incorporated into the project's LPA. A key advantage of the Hopkins OMF is the improved out-of-service operations and operating cost savings due to its relatively central location on the proposed light rail line (about midway between downtown Minneapolis and Eden Prairie), compared to the Eden Prairie OMF 3/4, which would be located west of the light rail line's western terminus.

The LPA, as evaluated in the Supplemental Draft EIS, reflects the inclusion of the Hopkins OMF 9A. Other potential OMF sites developed and evaluated in this section were dismissed from further study.

1.5 St. Louis Park/Minneapolis Segment

This section provides a summary of the design adjustments to the LPA in the St. Louis Park/Minneapolis Segment that were addressed in the Supplemental Draft EIS. Section 5.1 of this appendix provides background information on the light rail-related improvements and freight rail modifications in the segment, which were addressed in the Draft EIS. Section 5.2 of this appendix provides a description of the range of design adjustments to the LPA considered by the Council within the St. Louis Park/Minneapolis Segment and a summary of how those potential design adjustments were evaluated.

1.5.1 Background

As previously noted, the Draft EIS evaluated two alternatives that combined the LPA and freight rail modifications in the area within the St. Louis Park/Minneapolis Segment: LRT 3A and LRT 3A-1 (see Exhibit F-8). As described in the Draft EIS, both LRT 3A and LRT 3A-1 encompassed the LPA at that time, which included a proposed light rail alignment, stations, park-and-ride lots, and related roadway, bicycle and pedestrian improvements. As defined in Chapter 2 of the Draft EIS, the primary difference between LRT 3A and LRT 3A-1 is how freight rail modifications would be incorporated into the LPA.

Following is a brief summary of the common proposed light rail-related improvements and differing freight rail modifications included in the Draft EIS under LRT 3A and LRT 3A-1. Sections 2.2.1.3 and 2.2.3 of the Draft EIS provide additional information.

- **Light Rail-Related Improvements.** Within the Draft EIS, the LPA under LRT 3A and LRT 3A-1 included a proposed light rail alignment, stations, park-and-ride lots, and related roadway, bicycle and pedestrian improvements. Those improvements are described in Section 2.3 of the Draft EIS under LRT 3A and LRT 3A-1. LRT 3A and LRT 3A-1 in the Draft EIS in the St. Louis Park/Minneapolis Segment included six light rail stations and six surface park-and-ride lots, with a total capacity of 650 spaces. In general under LRT 3A, the light rail alignment would have been located primarily at-grade, north of the existing freight rail alignment and trail for the section west of the Kenilworth Corridor and north of the trail in the Kenilworth Corridor, with freight rail relocated to the MN&S Spur and Wayzata Subdivision in St. Louis Park and removed east of the MN&S Spur. Under LRT 3A-1, the light rail alignment would be located in the same location west of the MN&S Spur, with a light rail bridge over the freight tracks between the MN&S Spur and Wooddale Station, which would locate the light rail tracks south of the freight rail tracks. Within the Kenilworth Corridor, light rail would be located primarily at-grade south of the existing

freight rail alignment and north of the existing trail. The trail would be located south of the light rail line, east of Wooddale Avenue South.

- **Freight Rail-Related Improvements.** The Draft EIS evaluated two ways in which freight rail modifications would be incorporated into the LPA. Under LRT 3A, TC&W freight trains currently operating along the Kenilworth Corridor would be rerouted to the MN&S Spur and Wayzata Subdivisions; or, under LRT 3A-1, the TC&W freight trains would continue to operate along the Bass Lake Spur and Kenilworth Corridor. LRT 3A and LRT 3A-1 are also referred to in the Draft EIS as “relocation” and “co-location,” respectively, and are shown on Exhibit F-8.

1.5.2 Design Adjustments Considered in the St. Louis Park/Minneapolis Segment

After the Draft EIS public comment period, the development and evaluation of adjustments to the LPA in the St. Louis Park/Minneapolis Segment was undertaken by the Council using the process illustrated in Exhibit F-9 and described in detail in this section.

In this segment, the project team developed and evaluated two sets of potential adjustments to the LPA:

- **Set 1 Adjustments.** The first set of potential adjustments for the St. Louis Park/Minneapolis Segment focused on the question of whether the LPA should include: (1) the relocation of TC&W freight trains currently operating along the Bass Lake Spur and Kenilworth Corridor to sections of the MN&S Spur and Wayzata Subdivision; or (2) the continued operation of TC&W freight trains along the Bass Lake Spur and Kenilworth Corridor. See Exhibit F-10 for an illustration of the freight rail owners and operators within the project vicinity.
- **Set 2 Adjustments.** The second set of potential adjustments for the St. Louis Park/Minneapolis Segment focused on other potential adjustments to light rail-related improvements that would occur throughout the segment, which would affect freight rail modifications but would not entail relocation of freight rail service outside of the Kenilworth Corridor.

The project team closely coordinated the development and evaluation of these two sets of potential adjustments to the LPA in the St. Louis Park/Minneapolis Segment. The resulting light rail related design adjustments and freight rail modifications identified by the Council in April 2014 and July 2014 reflect a unified set of adjustments to the LPA and freight rail modifications, as described in Section 2.5 of the Supplemental Draft EIS. That unified set of adjustments forms the basis for the evaluation of potential environmental impacts addressed in Chapter 3 of the Supplemental Draft EIS.

1.5.2.1 Set 1 Design Adjustments

After the close of the Draft EIS public comment period, the Council undertook a four-step process to develop and evaluate Set 1 Adjustments to the LPA directly related to the following: (1) whether TC&W freight trains currently operating along the Kenilworth Corridor should be rerouted to sections of the MN&S Spur and Wayzata Subdivision (termed “freight rail relocation adjustments”); or (2) whether the TC&W freight trains should continue to operate along the Bass Lake Spur and Kenilworth Corridor as they currently do (termed “Kenilworth Corridor adjustments”).

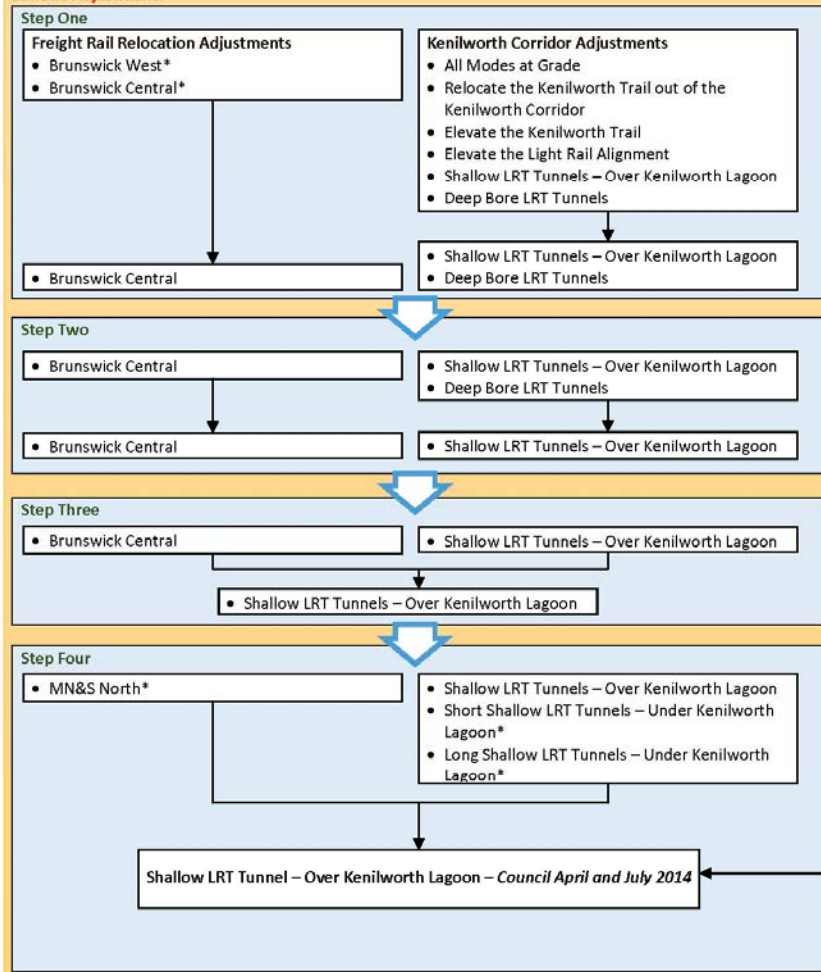
An important element of the Set 1 design adjustment evaluation was the assessment of each design adjustment’s ability to meet a key element of the project’s Purpose and Need Statement: the “need to develop and maintain a balanced and economically competitive multimodal freight system” (see Chapter 1). As such, the evaluation of the Set 1 Design Adjustments included an assessment of the effects of the design adjustments on freight rail operations and safety, which involved the participation of freight rail owners and operators in the development and review of potential freight rail modifications that could be incorporated into the LPA. The results of that coordination are reflected in the reporting of Set 1 Design Adjustment evaluation measures cited within this section.

EXHIBIT F-9

St. Louis Park/Minneapolis Segment Design Adjustment Process and Adjustments Considered

St. Louis Park/Minneapolis Segment Design Adjustment Process and Adjustments Considered

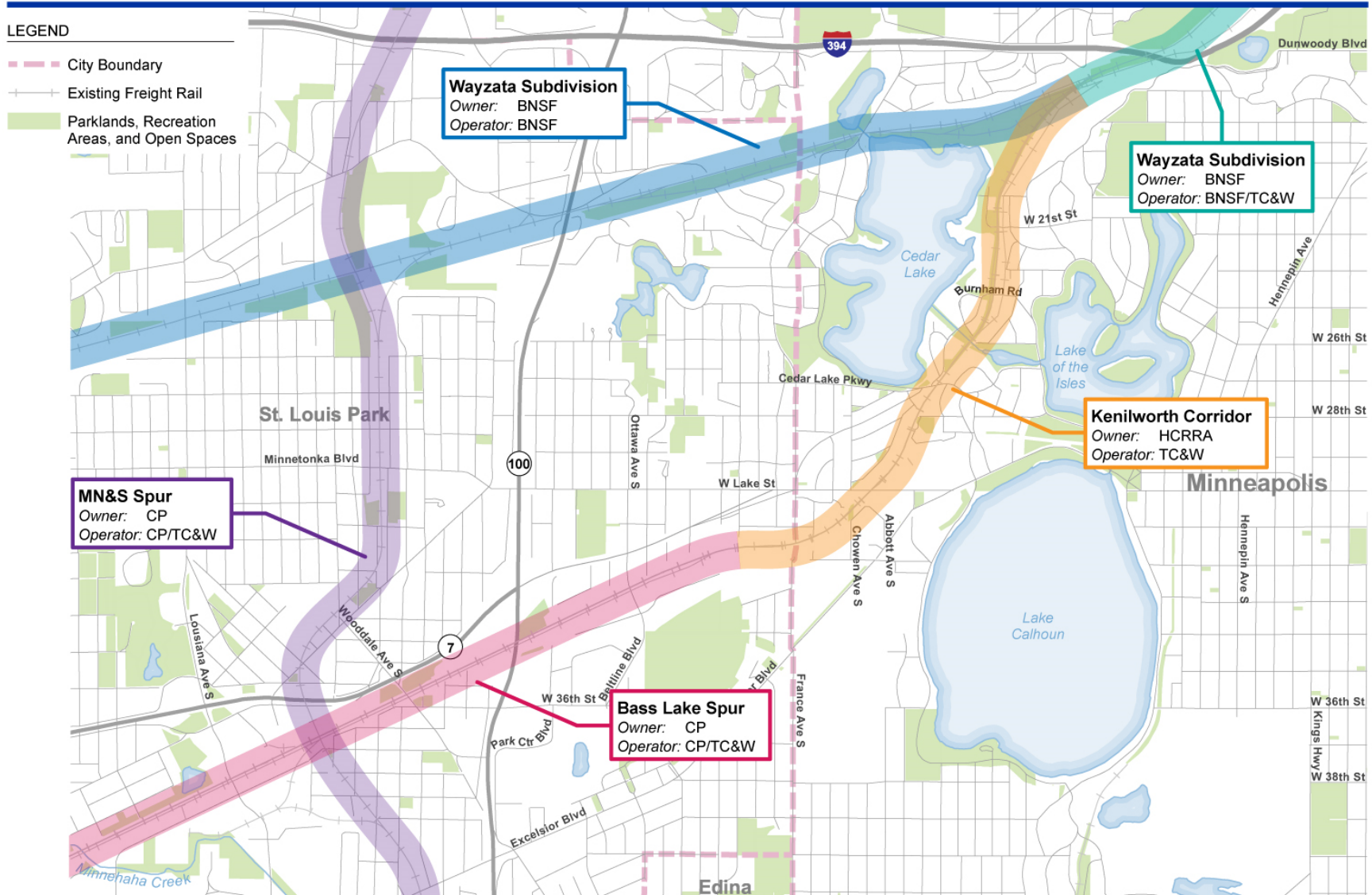
Set One Adjustments



- Set Two Adjustments**
- Freight Rail and Light Rail “Swap” and “Southerly Connection”
 - Adjustment to the Location of the Louisiana Station
 - Adjustment to the Capacity and Locations of Park-and-Ride Lots

*Additional designs were developed, evaluated, and dismissed as described in this section.

EXHIBIT F-10
Existing Freight Rail Owners and Operators



	<p>Southwest LRT Final EIS Existing Freight Rail Owners and Operators</p>	<p>Exhibit F-10</p>		
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The following four steps were used for evaluation of the Set 1 Design Adjustments. See Tables F.5-1 and F.5-2 for a listing of the design adjustments addressed in the Set 1 evaluation process and the results of the evaluation process, respectively.

TABLE F.5-1

St. Louis Park/Minneapolis Segment Design Adjustment Descriptions

	Option	Alignment Adjustment Description
Freight Rail Relocation ^a	Draft EIS LRT 3A	As presented in the Draft EIS, this adjustment would provide a new connection to the CP MN&S Spur from the CP Bass Lake Spur near Louisiana Avenue and a reconstructed connection between the MN&S Spur and the BNSF Wayzata Subdivision. Maximum horizontal curve would be 8 degrees, and maximum compensated grade would be 1.82% for the connection from the Bass Lake Spur to the MN&S Spur.
	Brunswick West	Brunswick West option would have the modified freight rail alignment to minimize the number of horizontal curves, elevated to minimize the number of vertical curves and vertical grade changes and to provide adequate grade separation to allow Dakota Ave. and Lake St. to extend under the freight tracks. The connection would be located west of the existing CP MN&S spur and cross over the Wooddale Ave./Lake St. intersection to tie into the MN&S Spur east of Brunswick Avenue South, near West 32nd Street. Maximum horizontal curve 4 degrees, maximum compensated grade 0.8.
	Brunswick Central	Brunswick Central option would have the modified freight rail alignment to minimize the number of horizontal curves, elevated to minimize the number of vertical curves and vertical grade changes and to provide grade separation of Dakota Ave. and Lake St. to extend under the freight tracks. The alignment would be located west of the existing CP MN&S Spur corridor and cross east of the Wooddale Ave./Lake St. intersection to tie into the MN&S Spur at the same location as Brunswick West. Maximum horizontal curve 4 degrees, maximum compensated grade 0.8.
	MN&S North	MN&S North Alignment was developed as part of the independent freight rail analysis performed by TranSystems. This alignment adjustment was developed to minimize both the impacts of the elevated profile and straightened alignment between Highway 7 and 34th Street and the impacts on commercial, residential, and public properties associated with the Brunswick Central Elevated alignment. Maintains the existing MN&S rail tracks south of Highway 7 including the current freight rail bridge over the Bass Lake Spur to a connection with the existing alignment between Library Lane and Dakota Avenue. The alignment begins with an elevated grade on bridge structure on the Bass Lake Spur west of Louisiana Avenue, continuing east on bridge structure over the west corner of the Xcel Substation and across Highway 7, matching existing grades at Library Lane and connecting to the existing MN&S between Library Lane and Dakota Avenue. Maximum horizontal curve 5 degrees, maximum compensated grade 0.95.
Kenilworth Corridor	Draft EIS LRT 3A-1	As presented in the Draft EIS. A preliminary typical section is assumed to be 94 feet wide. This width includes 25 feet of separation between the freight rail track and outside edge of right-of-way, 25 feet of separation between the freight rail track and LRT track (centerline to centerline), 14 feet of separation between the two LRT tracks (centerline to centerline), and 10-foot spacing between LRT track and the trail. A 16-foot minimum width would be used for the trail.
	All Modes At-Grade (81-foot-wide section)	Similar to LRT 3A-1, but based on a revised typical section that would be 81 feet wide (based on coordination with TC&W Railroad). This width would include 12 feet of separation between the freight rail track and outside edge of right-of-way, generally matching existing conditions. The remaining section would match the 94-foot-wide section of LRT 3A-1.
	Trail Relocation	The Trail Relocation option would include rerouting the trail west of the existing TC&W tracks between 21st St. and Cedar Lake Pkwy. The west segment of the relocated trail would cross Cedar Lake Pkwy. at-grade, run along the existing median on Sunset Blvd., cross France Ave. at-grade or on a structure, continue south, and cross County Rd. 25 to the County Rd. 25 service road to Inglewood Ave. From Inglewood Ave., the trail would turn south and connect to the current Cedar Lake Trail alignment. The east segment would run along Cedar Lake Pkwy., cross the parkway, and be located between Dean Pkwy. one-way pair and connect to the current Midtown Greenway trail alignment east of Dean Pkwy.
	Elevated Trail	The elevated trail structure would be approximately 3,000 feet long and would be located between the freight rail track and LRT tracks north of West Lake St. to north of Burnham Rd. The elevated trail would approach touchdown south of West Lake St. and north of Burnham Rd. The trail would be elevated approximately 30 feet high, with a 20-foot-wide trail surface supported by 7-foot-wide piers. A vertical connection at Cedar Lake Pkwy. would be provided.
	Elevated LRT	The elevated LRT structure would be approximately 3,000 feet long and would be located between the freight rail track and trail. It would run along the Kenilworth Corridor from the Midtown Greenway to Burnham Rd. with varying height of 35 to 38 feet, supported by 10-foot-wide piers.
	Shallow Cut-and-Cover Tunnels – Over Kenilworth Lagoon ^b	Would consist of two tunnels and a generally at-grade section connecting the two tunnels: The South Tunnel would be approximately 2,200 feet long and located along the Kenilworth Corridor with the south portal beginning at West Lake St. and the north portal south of the Channel Creek Crossing. Over the channel, LRT alignment would cross at-grade on a bridge 14 feet above the channel water level. The section of LRT track over the channel would be approximately 1,088 feet

	Option	Alignment Adjustment Description
		long (including transition zones). North of the channel, LRT alignment would drop into the North Tunnel, a 2,500-foot tunnel south of Burnham Rd. to north of 21st St. There would be 300-foot transition zones outside the tunnel portals.
	Kenilworth Deep Bore LRT Tunnel	Two parallel tunnels that would be approximately 5,900 feet long and would run along the Kenilworth Corridor with the south portal at West Lake St. and the north portal north of 21st St. There would be a 1,000-foot-long cut-and-cover tunnel segment and a 500-foot-long transition section south of the southern portal. There would be a 550-foot-long cut-and-cover tunnel segment and a 500-foot transition section north of the northern portal. The twin tunnels would be about 20 feet in diameter with a minimum of 30 feet of cover. The deep tunnel would be approximately 30 feet below the Kenilworth Lagoon surface elevation.
	Short Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon ^c	The Short Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon would consist of a tunnel approximately 3,100 feet in length along the Kenilworth Corridor with the south portal beginning at West Lake Street and the north portal north of the Kenilworth Channel. At the channel, the LRT crosses below-grade, in the tunnel beneath the water level. There are 300-foot transition zones outside the tunnel portals.
	Long Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon ^c	The Long Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon would consist of a tunnel approximately 5,800 feet in length along the Kenilworth Corridor with the south portal beginning at West Lake Street and the north portal north of 21st Street. At the channel, the LRT crosses below-grade, in the tunnel beneath the water level. There are 300-foot transition zones outside the tunnel portals.

^a Additional freight rail modifications were also developed and evaluated in the first-step evaluation that were dismissed from further consideration due to safety and freight rail operating concerns expressed by one or more effected freight rail operators/owners. Those additional modifications included MN&S Modified; Brunswick East; an at-grade variation of the Brunswick West; and an at-grade variation of the Brunswick Central. This section includes additional information on these variations.

^b On July 9, 2014, considering a recommendation from the Corridor Management Committee (CMC), the Metropolitan Council (Council) identified additional design adjustments to the LPA within the City of Minneapolis, which were proposed in the then-draft memoranda between the Council and the City of Minneapolis (see Appendix D, Sources and References Cited, for instructions on how to access the executed memoranda). In summary, the additional design adjustments: (1) reduced project capital costs by eliminating the northern of the two proposed light rail tunnels in the Kenilworth Corridor (including the re-establishment of the proposed at-grade light rail station at 21st Street); (2) incorporated into the LPA a variety of bicycle and pedestrian improvements associated with proposed light rail stations in the City of Minneapolis; and (3) established the Council's and the City's intent relative to aspects of long-term property ownership and freight rail operations in the Kenilworth Corridor.

^c In February 2014, the Minneapolis Parks and Recreation Board requested that the Council evaluate a design adjustment that would connect the two Shallow LRT Tunnels with a cut-and-cover constructed tunnel segment under the Kenilworth Lagoon, rather than a bridge over the lagoon. In response, the Short and Long Shallow LRT Tunnel – Under Kenilworth Lagoon design adjustments were developed and evaluated as a part of the fourth-step of evaluation. In addition, project staff developed variations of the Short and Long Shallow LRT Tunnel – Under Kenilworth Lagoon design adjustments to evaluate if the northern and southern cut-and-cover LRT tunnel segments could be connected under the Kenilworth Lagoon via a bored tunnel segment, rather than via a cut-and-cover constructed tunnel segment. These variations were dismissed from further consideration due to schedule delays, complex construction techniques and cost factors. This section includes additional information on these variations.

Acronyms: CP = Canadian Pacific Railway; MN&S = Minneapolis, Northfield, and Southern Railway; TC&W = Twin Cities and Western Railway Company.

TABLE F.5-2

Set 1 Design Adjustments Developed and Evaluated in the St. Louis Park/Minneapolis Segment, by Step

Step	Adjustment Type	Design Adjustments	Status ^a
1	Freight Rail Relocation ^b	Brunswick West	Dismissed
		Brunswick Central	Retained
	Kenilworth Corridor	All Modes at Grade	Dismissed
		Relocate the Kenilworth Trail out of the Kenilworth Corridor	Dismissed
		Elevate the Kenilworth Trail	Dismissed
		Elevate the Light Rail Alignment	Dismissed
		Shallow LRT Tunnels – Over Kenilworth Lagoon ^c	Retained
		Deep Bore LRT Tunnels	Retained
2	Freight Rail Relocation	Brunswick Central	Retained
	Kenilworth Corridor	Shallow LRT Tunnels – Over Kenilworth Lagoon ^c	Retained
		Deep Bore LRT Tunnels	Dismissed
3	Freight Rail Relocation	Brunswick Central	Dismissed
	Kenilworth Corridor	Shallow LRT Tunnels – Over Kenilworth Lagoon ^c	Retained

Step	Adjustment Type	Design Adjustments	Status ^a
4	Freight Rail Relocation	MN&S North ^d	Dismissed
	Kenilworth Corridor	Shallow LRT Tunnels – Over Kenilworth Lagoon ^c	Retained ^e
		Short Shallow LRT Tunnel – Under Kenilworth Lagoon ^f	Dismissed
		Long Shallow LRT Tunnel – Under Kenilworth Lagoon ^f	Dismissed

^a Status as of completion of the step.

^b Additional freight rail modifications were also developed and evaluated in the first-step evaluation that were dismissed from further consideration due to safety and freight rail operating concerns expressed by one or more effected freight rail operators/owners. Those additional modifications included Brunswick East; an at-grade variation of the Brunswick West; and an at-grade variation of the Brunswick Central. This section includes additional information on these variations.

^c The shallow tunnels would be constructed using a cut-and-cover technique.

^d The MN&S North design adjustment was developed and evaluated as an element of the independent engineering analysis.

^e The Shallow LRT Tunnels – Over Kenilworth Lagoon option, which included two proposed light rail tunnels (one south and one north of the Kenilworth Lagoon), was modified by the Council on July 9, 2014, to eliminate the northern light rail tunnel (primarily to reduce project capital costs and to allow for an at-grade light rail W 21st Street and to make other related design modifications.

^f In February 2014, the Minneapolis Parks and Recreation Board requested that the Council evaluate a design adjustment that would connect the two Shallow LRT Tunnels with a cut-and-cover-constructed tunnel segment under the Kenilworth Lagoon, rather than a bridge over the lagoon. In response, the Short and Long Shallow LRT Tunnel – Under Kenilworth Lagoon design adjustments were developed and evaluated as a part of the fourth-step of evaluation.

- **First-Step Evaluation.** The development of a relatively wide range of adjustments to the light rail improvements and freight rail-related modifications under the two freight rail operating scenarios, focusing on meeting key design parameters, while avoiding or minimizing adverse impacts and minimizing project costs. The resulting adjustments were then presented to the public, stakeholders and participating agencies for review and comment. Based on comments received from the public, stakeholders, and participating agencies and on the evaluation measures summarized in Tables F.5-3 and F.5-4, the design adjustments were narrowed to one freight rail relocation and two Kenilworth Corridor adjustments.
- **Second-Step Evaluation.** A detailed analysis of the potential adjustments identified in the first-step evaluation, narrowing to one design adjustment under each of the two freight rail operating scenarios. This evaluation included public and agency review of and comment on the second-step findings (see Table F.5-5 for a summary of the second-step evaluation measures).
- **Third-Step Evaluation.** Refinement of the two second-step design adjustments, addressing public and agency comments, followed by a detailed assessment of the tradeoffs between the two potential adjustments remaining after the second-step evaluation, and identification of one design adjustment to advance into the fourth-step evaluation (see Table F.5-6 for a summary of the Third-Step evaluation measures).
- **Fourth-Step Evaluation.** The Fourth Step evaluation consisted of three components (see Table F.5-7 and F.5-8 for a summary of the Fourth-Step evaluation measures):
 - An independent engineering analysis that (1) evaluated potential freight rail relocation adjustments that were developed or identified in prior studies and (2) developed and evaluated a new design adjustment that would relocate existing freight rail service from the Kenilworth Corridor (this new design adjustment (MN&S North) was compared to the freight rail relocation design adjustment (Brunswick Central) advanced from the third-step evaluation)
 - The development and evaluation of two variations of the design adjustment advanced from the third-step evaluation (these two new designs (Short Shallow LRT Tunnel – Under Kenilworth Lagoon and Long Shallow LRT Tunnel – Under Kenilworth Lagoon), suggested by a local jurisdiction, were compared to the design adjustment advanced from the third-step evaluation) Identification by the Council of the design adjustment incorporated into the LPA and its further refinement to reflect a memorandum of understanding between the Council and the City of Minneapolis. (See Appendix D, Sources and References Cited, for instructions on how to access the executed memorandum).

TABLE F.5-3

St. Louis Park/Minneapolis Segment – First-Step Evaluation – Freight Rail Relocation Adjustments^a

Alignment Adjustment	Costs	Measures	Status
Draft EIS	\$91m ^b	<ul style="list-style-type: none"> • Rejected by railroad companies, described in comments received on the Draft EIS, due to the following concerns: <ul style="list-style-type: none"> — Rejected by railroad companies, described in comments received on the Draft EIS, due to the following concerns: <ul style="list-style-type: none"> — Includes reverse horizontal curves and a number of vertical curves and vertical grade changes that would compromise freight rail operational safety — High compensated grade — Higher operational cost for freight rail • Concerns from community groups, businesses, education institutions, and citizens received on the Draft EIS on the following: <ul style="list-style-type: none"> — Traffic surrounding high school — Bus flow for schools — Noise and vibration — Safety and security • At-Grade Freight Crossings: five at-grade freight crossings • Right-of-Way: Concerns surrounding loss of homes and businesses due to right-of-way acquisition • Environment: Additional wetland impacts in the “Iron Triangle” area at connection with BNSF Wayzata Subdivision 	Dismissed
Brunswick West – Elevated	\$285–\$300m ^c	<ul style="list-style-type: none"> • Cost: higher capital cost • Railroad: <ul style="list-style-type: none"> — Supported by railroad companies from a physics of design standpoint — Freight rail operators expressed concern about potential increased operating cost to be addressed later if the design progressed — Freight rail is elevated between Highway 7 and Brunswick Ave. — Freight rail profile is raised north of 33rd St. — Eliminates freight tracks east of MN&S Spur on Bass Lake Spur/Kenilworth Corridor • Concerns from community and educational institutions: alignment would go through high school football field (potential 4(f) impact) • At-Grade Freight Crossings: removes five at-grade freight crossings • Right-of-Way: <ul style="list-style-type: none"> — Requires acquisition of a portion of the existing Xcel substation and potential impact on substation function — Concerns surrounding loss of homes and businesses due to right-of-way • Pedestrian: includes two new pedestrian underpasses • Roadway: <ul style="list-style-type: none"> — Requires lowering of south frontage road and reconfiguration of local street network — Improves frontage road south and north of Highway 7 by grade separation • Environment: Additional wetland impacts in the “Iron Triangle” area at connection with BNSF Wayzata Subdivision 	Dismissed

Alignment Adjustment	Costs	Measures	Status
Brunswick Central - Elevated	\$275– \$290m ^c	<ul style="list-style-type: none"> • Cost: Lower capital cost • Railroad: <ul style="list-style-type: none"> — Supported by railroad companies from a physics of design standpoint — Freight rail operators expressed concern about potential increased operating cost to be addressed later if the design progressed — Freight rail is elevated between Highway 7 and Brunswick Ave — Freight rail profile is raised north of 33rd St. — Eliminates freight tracks east of MN&S Spur on Bass Lake Spur/Kenilworth Corridor • Concerns from community and educational institutions: alignment would go through a portion of the Park Spanish Immersion School playground area (potential 4(f) impact) • At-Grade Freight Crossings: removes five at-grade freight crossings • Right-of-Way: Concerns surrounding loss of homes and businesses due to right-of-way • Pedestrian: includes two new pedestrian underpasses • Roadway: <ul style="list-style-type: none"> — Requires lowering of south frontage road and reconfiguration of local street network — Improves frontage road south and north of Highway 7 by grade separation • Environment: Additional wetland impacts in the “Iron Triangle” area at the connection with BNSF Wayzata Subdivision 	Retained

^a Additional freight rail modifications were also developed and evaluated in the first-step evaluation that were dismissed from further consideration due to safety and freight rail operating concerns expressed by one or more effected freight rail operators/owners. Those additional modifications included Brunswick West; and an at-grade variation of the Brunswick Central.

^b Source: *Southwest Transitway Draft EIS* (FTA, HCRRA, Council; October 2012) in 2012 dollars, which used a different cost methodology than the Brunswick West/Central estimates.

^c Includes freight track and structures (Louisiana Avenue to Cedar Lake Junction), BNSF siding, freight signaling, freight track removal, pedestrian underpass and roadway relocations/upgrades near St Louis Park High School, North Cedar Lake Trail crossing, right-of-way; Includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana, Southerly Connector).

TABLE F.5-4
St. Louis Park/Minneapolis Segment – First-Step Evaluation – Kenilworth Corridor Adjustments

	Full Acquisitions	Costs	Measures	Status
Draft EIS or All Modes At-Grade (94-foot-wide section)	55 properties	\$160 - \$170m ^a	<ul style="list-style-type: none"> • Displacement of residences due to right-of-way acquisition • Potential visual impacts on Kenilworth Lagoon 	Dismissed
All Modes At-Grade (81-foot-wide section)	26 properties	\$135 – \$145m ^a	<ul style="list-style-type: none"> • Displacement of residences due to right-of-way acquisition • Potential visual impacts on Kenilworth Lagoon 	Dismissed
Relocate the Kenilworth Trail out of the Kenilworth Corridor	0 properties	\$120 – \$130m ^b	<ul style="list-style-type: none"> • Portion of the Kenilworth trail relocated from the Kenilworth Corridor between Cedar Lake Pkwy and Midtown Greenway • Strengths include the following: <ul style="list-style-type: none"> — No homes impacted — Low capital costs — Relocated trail would be an off-road, shared-use facility 	Dismissed
Elevate the Kenilworth Trail	0 properties	\$135 – \$145m ^c	<ul style="list-style-type: none"> • Visual impacts due to structure height and connecting ramps • Impacts the visual quality and setting of the trail (e.g., separation from ground vegetation) and the addition of grade changes to the trail • Potential visual impacts on Kenilworth Lagoon • Strengths include the following: <ul style="list-style-type: none"> — No homes displaced 	Dismissed

	Full Acquisitions	Costs	Measures	Status
Elevate the Light Rail Alignment	0 properties	\$190 – \$200m ^d	<ul style="list-style-type: none"> • Visual impacts due to structure height and elevators at stations • Potential visual impacts on Kenilworth Lagoon • Strengths include the following: <ul style="list-style-type: none"> — No homes displaced 	Dismissed
Place LRT in Shallow Cut-and-Cover Tunnels	0 properties	\$235 – \$250m ^e	<ul style="list-style-type: none"> • High capital cost • Challenging construction • Potential visual impacts on Kenilworth Lagoon • Eliminates 21st St. Station • Existing freight rail and trail bridges across the Kenilworth Lagoon would need to be replaced to accommodate construction of a new light rail and trail bridge and a freight rail bridge (which would be approximately 40 feet west of the existing freight rail bridge) • Strengths include the following: <ul style="list-style-type: none"> — Would not require acquisition of homes and businesses in the Kenilworth Corridor — Retains at-grade West Lake Station 	Retained
Place LRT in Deep Bored Tunnels	0 properties	\$405 – \$420m ^f	<ul style="list-style-type: none"> • Highest capital cost • Challenging construction • Underground station at West Lake St. • Reconstruction of West Lake Street bridge • Eliminates 21st St. Station • Existing freight rail and trail bridges across the Kenilworth Lagoon would need to be replaced to accommodate construction of the bored tunnels^g • Strengths include the following: <ul style="list-style-type: none"> — Would not require acquisition of homes and businesses in the Kenilworth Corridor 	Retained

^a Includes freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), deduct for LRT/trail underpass at Cedar Lake Parkway, right-of-way; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^b Includes trail aerial structure/retaining walls at France Avenue, connection to Cedar Lake Trail at Inglewood Avenue, freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^c Includes elevated trail structure/retaining walls and retains 21st Street Station, vertical trail connection at Cedar Lake Parkway, freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), deduct for LRT/trail underpass at Cedar Lake Parkway, deduct for trail bridge over Kenilworth Channel; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^d Includes elevated LRT structure/retaining walls and retains 21st Street Station, freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, deduct for LRT/trail underpass at Cedar Lake Parkway, deduct for LRT bridge over Kenilworth Channel, right-of-way; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^e Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^f Includes parallel deep bore tunnels (tunnels, bore pits, systems/support facilities), underground West Lake Station, freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), removal/replacement of West Lake Bridge, LRT direct fixation track, temporary freight accommodations, deduct for LRT bridge over Kenilworth Channel, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^g The tunnels would be bored within the HCRRA and BNSF right-of-way at the Kenilworth Lagoon and the existing freight rail and trail bridges across the lagoon would need to be replaced because the existing wood bridge piers would likely extend into the tunneling area. Because the existing bridge piers are wood and there are no as-built construction drawings available, it would be difficult to determine precisely how deep the existing piers extend under the lagoon. However, even if they do not extend in the bored tunnel construction area, the piers would be susceptible to settlement during tunnel construction due to soil conditions at the site.

TABLE F.5-5

St. Louis Park/Minneapolis Segment Alignment Adjustment – Second-Step Evaluation

Adjustment	Full Acquisitions	Costs	Measures	Status
Brunswick Central - Elevated	32 properties	\$275 - \$290m ^a	<ul style="list-style-type: none"> • Supported by railroad companies from a physics of design standpoint • Cost: Second highest capital cost • Right-of-Way: <ul style="list-style-type: none"> — Displacement of homes and businesses due to right-of-way acquisition — Displacement of the Park Spanish Immersion School playground, which is likely a Section 4(f)-protected property • Traffic: <ul style="list-style-type: none"> — Requires lowering of south frontage road and reconfiguration of street network — Improves frontage road south and north of Highway 7 by grade separation • Freight: <ul style="list-style-type: none"> — Freight rail would be elevated between Highway 7 and Brunswick Avenue — Freight rail profile would be raised north of 33rd Street — Eliminates freight tracks east of MN&S Spur — Eliminates five at-grade freight rail crossings • Environment: Fill within relatively high-quality wetlands in the “Iron Triangle” area at BNSF connection • Potential effects to the historic Kenilworth Lagoon and the Brownie/Cedar Lakes channel • Bicycle and pedestrian: Allows for two new pedestrian grade underpasses • Stations: Retains 21st Street Station 	Retained
Kenilworth Corridor Shallow LRT Tunnels	0 properties	\$235 - \$250m ^b	<ul style="list-style-type: none"> • Supported by railroad companies from a physics of design standpoint • Cost: Lowest capital cost • Right-of-Way: Does not require acquisition of homes and businesses in the Kenilworth Corridor • Challenging construction due to various constraints in the Kenilworth Corridor • Environment: At-grade crossing of Kenilworth Lagoon, with potential visual impacts • Bicycle and pedestrian: Temporary detour of Kenilworth Trail • Stations: Eliminates 21st St Station • Existing freight rail and trail bridges across the Kenilworth Lagoon would need to be replaced and the total width of the new bridges would be approximately double the width of the existing bridges • Potential adverse effect to the historic Kenilworth Lagoon 	Retained

Adjustment	Full Acquisitions	Costs	Measures	Status
Kenilworth Deep Bore LRT Tunnels	0 properties	\$405 - \$420m ^c	<ul style="list-style-type: none"> • Supported by railroad companies from a physics of design standpoint • Cost: Highest capital cost – likely to be financially infeasible on regional level due to lack of local funding support • Right-of-Way: <ul style="list-style-type: none"> — Does not require acquisition of homes and businesses in the Kenilworth Corridor — Risk of potential settlement to immediately adjacent existing buildings and other structures due to construction • Construction: <ul style="list-style-type: none"> — Challenging construction due to various constraints in the Kenilworth Corridor — Reconstruction of West Lake Street due to tunneling conflicts with existing bridge piles, including demolition and replacement of the existing bridge over Kenilworth Corridor, generally located between Market Plaza and Chowen Ave S — Closure of West Lake Street (Market Plaza to Chowen Ave S) for approximately 12-18 months; related increases in traffic congestion; increased vehicle travel times due to out-of-direction travel and/or increased congestion • Operations: Increased travel time (approximately one minute) for all trips that would use the below ground West Lake Street station, reducing transit ridership • Existing freight rail and trail bridges across the Kenilworth Lagoon would need to be replaced to accommodate construction of the bored tunnels^d • Potential effects to the historic Kenilworth Lagoon and the Brownie/Cedar Lakes channel • Bicycle and pedestrian: Temporary detour of Kenilworth Trail • Stations: <ul style="list-style-type: none"> — Includes underground West Lake Street Station — Eliminates 21st Street Station 	Dismissed

^a Includes freight track and structures (Louisiana Avenue to Cedar Lake Junction), BNSF siding, freight signaling, freight track removal, pedestrian underpass and roadway relocations/upgrades near St Louis Park High School, North Cedar Lake Trail crossing, right-of-way; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^b Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^c Includes parallel deep bore tunnels (tunnels, bore pits, systems/support facilities), underground West Lake Station, freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), removal/replacement of West Lake Bridge, LRT direct fixation track, temporary freight accommodations, deduct for LRT bridge over Kenilworth Channel, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^d The tunnels would be bored within the HCRRA and BNSF right-of-way at the Kenilworth Lagoon and the existing freight rail and trail bridges across the lagoon would need to be replaced because the existing wood bridge piers would likely extend into the tunneling area. Because the existing bridge piers are wood and there are no as-built construction drawings available, it would be difficult to determine precisely how deep the existing piers extend under the lagoon. However, even if they do not extend in the bored tunnel construction area, the piers would be susceptible to settlement during tunnel construction due to soil conditions at the site.

TABLE F.5-6

St. Louis Park/Minneapolis Segment Alignment Adjustment – Third-Step Evaluation

	^a	Weaknesses ^a	Status
Brunswick Central - Elevated	<ul style="list-style-type: none"> Freight rail at-grade crossings eliminated between Blake Road and 28th Street along MN&S route Non-emergency freight train horn use eliminated between Blake Road and 28th Street Freight rail relocated away from St. Louis Park High School Freight rail track removed in the Kenilworth Corridor and a portion of the Bass Lake Spur east of the existing MN&S Spur 	<ul style="list-style-type: none"> Acquisition of 32 residential, commercial, and institutional parcels Elevated freight rail track through St. Louis Park and related visual impacts Displacement of Park Spanish Immersion School playground, which is likely a Section 4(f) protected property Construction challenges to accommodate ongoing freight rail traffic Greater amount of wetlands filled Community cohesion impacts Greater capital costs Additional design refinements and/or operating agreement with affected freight railroads would likely be required to address potential adverse economic impacts to the affected railroads, which would likely increase project costs 	Dismissed
Kenilworth Corridor Shallow LRT Tunnels Strengths	<ul style="list-style-type: none"> No acquisition of homes and businesses in Kenilworth Corridor 200-plus LRT trips per day mostly below-grade through Kenilworth Corridor LRT daylights between north and south tunnels for approximately 20 seconds per train West Lake Street bridge preserved Kenilworth Trail preserved within corridor for long-term Lower capital costs No adverse effects to groundwater or nearby lake levels 	<ul style="list-style-type: none"> 21st Street Station eliminated Council sewer relocation Temporary detour of Kenilworth Trail 	Retained

^a See also Table F.5-6 for additional evaluation measures considered in the third-step evaluation.

TABLE F.5-7

St. Louis Park/Minneapolis Segment Alignment Adjustment – Fourth-Step Evaluation - Kenilworth Corridor Adjustments

Shallow LRT Cut-and-Cover Tunnels – Over Kenilworth Lagoon and MN&S North

Alignment Adjustment	Costs	Measures	Status
Shallow LRT Cut-and-Cover Tunnels – Over Kenilworth Lagoon	\$235 - 250m ^a	<p>Daily Freight Operations: Expected average of 2 freight trains daily on the MN&S corridor and 3 daily within the Kenilworth Corridor</p> <p>Daily LRT Operations: Expected average of 200-plus LRT trains per day in a tunnel and at-grade at the channel in the Kenilworth Corridor</p> <p>Safety Considerations:</p> <ul style="list-style-type: none"> 4 at-grade freight crossings (existing and proposed) – Wooddale, Beltline, Cedar Lake, 21st Street 2 LRT at-grade crossing with freight –Wooddale and Beltline Freight at station areas - Wooddale, Beltline and West Lake <p>Community (between Louisiana Ave and Cedar Lake):</p> <ul style="list-style-type: none"> No school buildings within 150 feet of freight tracks 750 residential units within 150 feet of freight tracks 	Retained

Alignment Adjustment	Costs	Measures	Status
		<ul style="list-style-type: none"> No street closures Right-of-Way: No permanent acquisitions (not including acquisitions for Louisiana Station or Southerly connection) Operating Costs: Increased operations and maintenance costs for ventilation, lighting and other tunnel systems Developable Land: Reduction of 2 acres of developable land Schedule: Lower risk of potential delays Stations: No 21st Street Station Channel Crossing: 74-foot combined width of two reconstructed bridges; total width, including space between bridges, of 82-foot Opening Year: 2019	
MN&S North	\$240 - \$265m ^b	Daily Freight Operations: Expected average of five freight trains daily on the MN&S corridor and zero daily within the Kenilworth Corridor Daily LRT Operations: Expected average of 200-plus LRT trains per day at-grade in the Kenilworth Corridor Safety considerations: <ul style="list-style-type: none"> 2 at-grade freight crossings - Proposed new crossings at Library and Dakota, proposed closure of existing crossings at Walker, West Lake, 28th and 29th, new grade-separation at 27th 3 LRT only at-grade crossings with Wooddale, Beltline, 21st Street No freight at station areas Opposed by affected freight rail operators due to safety and operational concerns Community (between Louisiana Ave to Cedar Lake): <ul style="list-style-type: none"> One school building within 150 feet of freight tracks 240 residential units within 150 feet of freight tracks No street closures Right-of-Way: Permanent acquisition requiring relocations of 6 residential units, 7 private businesses and 1 school (not including acquisitions for Louisiana Station or Southerly connection) Operating Costs: Maintenance costs for an additional 5,400 linear feet of freight bridge structure and 81,000 square feet of freight retaining walls Developable Land: Addition of approximately 3 acres of developable land Schedule: Potential delay of up to two years Stations: Includes station at 21st Street Channel Crossing: 54-foot width of reconstructed single bridge over the channel Opening Year: 2021	Dismissed

^a Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements costs of approximately \$85 to \$90 million (US-169 to Louisiana Avenue, Southerly Connector).

^b TranSystems identified \$112M in costs in an estimate provided to the Southwest LRT Project Office (February 7, 2014) including freight track and structures (Blake Road to BNSF near MN&S Spur), freight track and structures (Southerly Connection), BNSF siding, freight signaling, pedestrian overpass and roadway relocations/upgrades near St Louis Park High School, engineering/contingency; Southwest LRT Project Office identified additional costs for the design including freight track (US-169 to Blake Road), North Cedar Lake Trail crossing, additional right-of-way, additional LRT retaining walls, additional freight track removal, additional soft costs (contingency, escalation, engineering, financing); cost shown does not include Xcel substation impacts; cost shown includes freight Common Elements costs of approximately \$90 to 100 million (US-169 to Louisiana Avenue, modified Southerly Connector with additional new freight rail structure length).

TABLE F.5-8

St. Louis Park/Minneapolis Segment Alignment Adjustment – Fourth-Step Evaluation - Kenilworth Corridor Adjustments
Shallow LRT Cut-and-Cover Tunnels – Over and Under Kenilworth Lagoon

Adjustment	Full Acquisitions	Costs	Measures	Status
Shallow LRT Cut-and-Cover Tunnels – Over Kenilworth Lagoon	0 properties	\$240 – \$260m ^a	<ul style="list-style-type: none"> • Cost: Lowest capital cost • Construction Considerations: <ul style="list-style-type: none"> — Less challenging construction (relative to other fourth-step Kenilworth Corridor adjustments) — Shorter construction period, 2019 opening year — Closure of recreational traffic on Kenilworth Lagoon of limited durations during construction of bridges • Visual impacts on Kenilworth Lagoon • Stations: Eliminates 21st Street Station • Channel Crossing: <ul style="list-style-type: none"> — At-grade LRT crossing of Kenilworth Channel — 74-foot combined width of two new bridges (combined pedestrian/LRT bridge and freight bridge); total width, including space between bridges, of 82-feet • Strengths include the following: <ul style="list-style-type: none"> — Would not require acquisition of homes and businesses in the Kenilworth Corridor — Achieves municipal goal to avoid co-locating freight rail traffic with light rail traffic at-grade along much of the length of the Kenilworth Corridor — Retains at-grade West Lake Station 	Retained ^b
Short Shallow LRT Cut-and-Cover Tunnel – Under Kenilworth Lagoon	0 properties	\$270 - \$300m ^c	<ul style="list-style-type: none"> • Cost: Second highest capital cost • Construction Considerations: <ul style="list-style-type: none"> — Challenging construction due to substantially constrained construction environment — Existing freight rail and trail bridges across the lagoon would need to be replaced and their replacement would need to be sequenced with the tunnel construction — Longer construction period, 2020 opening year — Closure of recreational traffic on Kenilworth Lagoon for approximately one to two years during construction — Additional emergency ventilation and intermediate emergency egress stairways compared to two shorter tunnels — Volume of groundwater pumped during construction for the tunnel segment under the lagoon would increase substantially, compared to other tunnel segments — Challenges in developing and maintaining effective waterproofing systems around the submerged tunnel segment • Stations: Retains the 21st Street Station • Channel Crossing: <ul style="list-style-type: none"> — Below-grade LRT crossing of Kenilworth Channel — 43-foot combined width of two new bridges (pedestrian and freight); total width, including space between bridges, of 88 feet • Strengths include the following: <ul style="list-style-type: none"> — Would not require acquisition of homes and businesses in the Kenilworth Corridor — Achieves municipal goal to avoid co-locating freight rail traffic with light rail traffic at-grade along much of the length of the Kenilworth Corridor (but less than the other fourth-step Kenilworth Corridor adjustments) — Retains at-grade West Lake Station 	Dismissed

Adjustment	Full Acquisitions		Measures	Status
Long Shallow LRT Cut-and-Cover Tunnel – Under Kenilworth Lagoon	0 properties	\$305 - \$345m ^d	<ul style="list-style-type: none"> • Cost: Highest capital cost • Construction Considerations: <ul style="list-style-type: none"> — Challenging construction due to substantially constrained construction environment — Existing freight rail and trail bridges across the lagoon would need to be replaced and their replacement would need to be sequenced with the tunnel construction — Longer construction period, 2020 opening year — Closure of recreational traffic on Kenilworth Lagoon for approximately one to two years during construction — Additional emergency ventilation and intermediate emergency egress stairways compared to two shorter tunnels — Volume of groundwater pumped during construction for the tunnel segment under the lagoon would increase substantially, compared to other tunnel segments — Challenges in developing and maintaining effective waterproofing systems around the submerged tunnel segment • Stations: Eliminates the 21st Street Station • Channel Crossing: <ul style="list-style-type: none"> — Below-grade LRT crossing of Kenilworth Channel — 43-feet combined width of two bridges (pedestrian and freight); total width, including space between bridges of 88 feet • Strengths include the following: <ul style="list-style-type: none"> — Would not require acquisition of homes and businesses in the Kenilworth Corridor — Achieves municipal goal to avoid co-locating freight rail traffic with light rail traffic at-grade along much of the length of the Kenilworth Corridor — Retains at-grade West Lake Station 	Dismissed

^a Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway; includes freight Common Elements (US-169 to Louisiana Avenue, Southerly Connector).

^b On July 9, 2014, considering a recommendation from the Corridor Management Committee (CMC), the Metropolitan Council (Council) identified additional design adjustments to the LPA within the City of Minneapolis, which were proposed in the then-draft memoranda between the Council and the City of Minneapolis. (See Appendix D, Sources and References Cited, for instructions on how to access the executed memoranda.) In summary, the additional design adjustments: (1) reduced project capital costs by eliminating the northern of the two proposed light rail tunnels in the Kenilworth Corridor (including the re-establishment of the proposed at-grade light rail station at 21st Street); (2) incorporated into the LPA a variety of bicycle and pedestrian improvements associated with proposed light rail stations in the City of Minneapolis; and (3) established the Council's and the City's intents relative to aspects of long-term property ownership and freight rail operations in the Kenilworth Corridor.

^c Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway. Includes additional tunnel segment under Kenilworth Lagoon (tunnel, systems/support facilities), additional LRT direct fixation track, deduct for LRT bridge over Kenilworth Lagoon, deduct for portion of north tunnel and LRT direct fixation track, retention of 21st Street Station; cost shown includes freight Common Elements (US-169 to Louisiana Avenue, Southerly Connector).

^d Includes north and south shallow cut-and-cover tunnels (tunnels, portals, systems/support facilities), freight track and structures (Louisiana Avenue to Cedar Lake Junction), trail bridges & retaining walls (east of Beltline Avenue, near Penn Station), LRT direct fixation track, temporary freight accommodations, Burnham Road bridge support, deduct for 21st Street Station, deduct for LRT/trail underpass at Cedar Lake Parkway. Includes additional tunnel segment under Kenilworth Lagoon (tunnel, systems/support facilities), additional LRT direct fixation track, deduct for LRT bridge over Kenilworth Lagoon; cost shown includes freight Common Elements (US-169 to Louisiana Avenue, Southerly Connector).

Table F.5-2 identifies the design adjustments developed and evaluated within each of the four steps, including identification of their status at the completion of each step. Following is a more detailed description of each step and the design adjustments developed and evaluated within each step.

A. First-Step Evaluation

The first-step evaluation process for the Set 1 Design Adjustments in the St. Louis Park/Minneapolis Segment included the development and analysis of potential adjustments to both the existing freight rail lines and/or to the proposed light rail alignment and related improvements. However, the range of adjustments from the two efforts differ substantially: (1) the **freight rail relocation adjustments** focus almost exclusively on changes to the proposed freight rail alignment; and (2) the **Kenilworth Corridor adjustments** primarily focus on potential changes to the proposed light rail improvements within the Kenilworth Corridor.

In addition to ensuring that the project continues to meet its Purpose and Need, as outlined in Chapter 1 of the Supplemental Draft EIS, both of these efforts had the same overall objectives: (1) develop potential adjustments that meet the current freight rail operator's operational and safety requirements; (2) minimize adverse impacts to the project's surrounding environment, including avoiding or minimizing property acquisitions; and (3) minimize capital and operating costs.

The design adjustment process for the Set 1 Adjustments also included discussions with the affected railroad companies, including an examination of their existing operations and an assessment of freight rail alignment conditions between the Highway 169/Highway 62 interchange in the west to Cedar Lake Junction in the east. Key areas of concern expressed by affected freight rail companies on freight rail modifications developed within the Set 1 Adjustments included: freight rail safety related to the railroad's design and operating standards; and long-term freight rail operating complexities and costs. Draft designs of freight rail modifications that were developed during this process and that were evaluated by the affected railroad companies were dismissed from further study if one or more of the affected railroad companies determined that the draft modification would not meet their design or operational safety standards. The draft freight rail modifications that were dismissed from further study based on design or operational concerns raised by the affected railroad companies are noted within this section.

The potential freight rail relocation adjustments developed and considered involved a range of changes to the freight rail modifications envisioned under LRT 3A (as described in Section 2.3.3 of the Draft EIS). The design adjustments developed primarily focused on changes to the potential freight rail connection between the Bass Lake and MN&S spurs and, to a lesser degree, to the potential freight rail connection between the MN&S Spur and the Wayzata Subdivision.

Conversely, the Kenilworth Corridor adjustments developed focused primarily on the development and evaluation of a range of significant changes to the proposed light rail alignment within the Kenilworth Corridor, compared to those proposed under LRT 3A-1 of the Draft EIS.

The first step of the evaluation process for Set 1 Adjustments resulted in the development and evaluation of the following potential design adjustments (see Exhibit F-11):

- **Set 1 Freight Rail Relocation Adjustments**

- Brunswick West – Elevated - the relocation of freight rail to the MN&S Spur and Wayzata Subdivision primarily above-grade and on new right-of-way between Bass Lake Spur and 33rd Street
- Brunswick Central – Elevated - the relocation of freight rail to the MN&S Spur and Wayzata Subdivision primarily above-grade, slightly east of Brunswick Central between Bass Lake Spur and 33rd Street

- **Set 1 Kenilworth Corridor Adjustments**

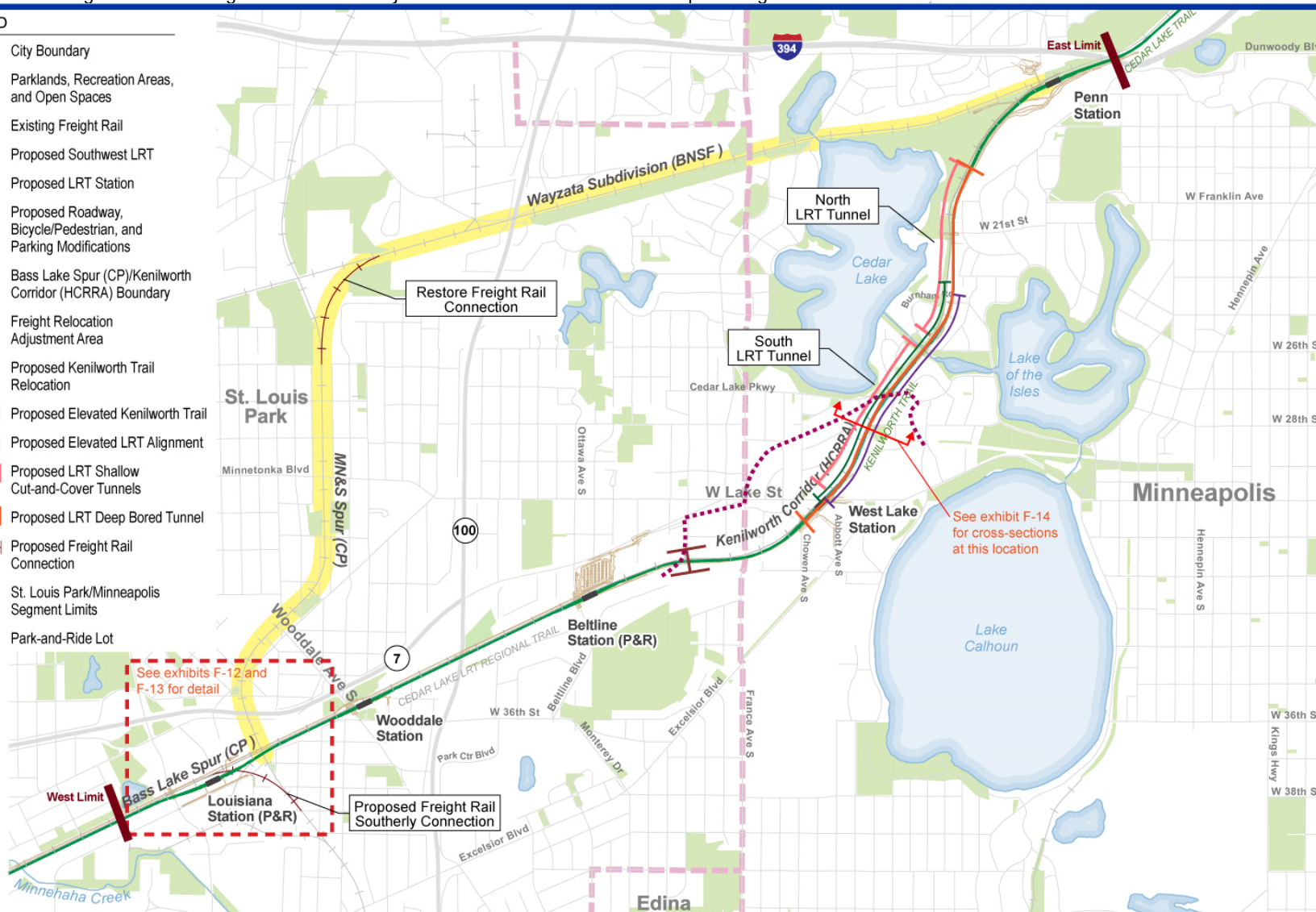
- All Modes at Grade—light rail, freight rail, and trails at-grade through Kenilworth Corridor

EXHIBIT F-11

Areas of Potential Light Rail and Freight Rail-Related Adjustments – St. Louis Park/Minneapolis Segment

LEGEND

- City Boundary
- Parklands, Recreation Areas, and Open Spaces
- Existing Freight Rail
- Proposed Southwest LRT
- Proposed LRT Station
- Proposed Roadway, Bicycle/Pedestrian, and Parking Modifications
- Bass Lake Spur (CP)/Kenilworth Corridor (HCRRA) Boundary
- Freight Relocation Adjustment Area
- Proposed Kenilworth Trail Relocation
- Proposed Elevated Kenilworth Trail
- Proposed Elevated LRT Alignment
- Proposed LRT Shallow Cut-and-Cover Tunnels
- Proposed LRT Deep Bored Tunnel
- Proposed Freight Rail Connection
- St. Louis Park/Minneapolis Segment Limits
- (P&R) Park-and-Ride Lot



	<p>Southwest LRT Final EIS Areas of Potential Light Rail and Freight Rail-Related Adjustments St. Louis Park/Minneapolis Segment</p>	<p>Exhibit F-11</p>		
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- Relocate the Kenilworth Trail out of the Kenilworth Corridor—the relocation of the Kenilworth Trail between the Midtown Greenway and Cedar Lake Parkway
- Elevate the Kenilworth Trail—the placement of the Kenilworth trail on structure above the light rail alignment, east of the West Lake Street bridge to north side of Burnham Road bridge
- Elevate the Light Rail Alignment—the placement of proposed light rail alignment on an elevated structure in the Kenilworth Corridor, east of the West Lake Street bridge to north side of Burnham Road bridge
- Place the Light Rail Alignment in Shallow Cut-and-Cover Tunnels—the placement of the proposed light rail alignment within two cut-and-cover tunnels (the south tunnel segment between north of the West Lake Street bridge and south of the Kenilworth Lagoon; the north tunnel segment between north of the Kenilworth Lagoon and approximately 1,000 feet north of 21st Street) and a light rail bridge over the Kenilworth Lagoon between the two tunnels
- Place the Light Rail Alignment in Deep Bore Tunnels—the placement of the proposed light rail alignment within twin bored tunnels between west of West Lake Station and approximately 1,000 feet north of 21st Street, with West Lake Station below-grade

Set 1 Freight Rail Relocation Adjustments Considered in the First-Step Evaluation

During the Draft EIS public comment period, individuals, organizations, and jurisdictions expressed concerns with the proposed freight rail track connection in St. Louis Park that would allow for the relocation of freight rail out of the Kenilworth Corridor. In particular, TC&W, the existing freight rail operator in the Kenilworth Corridor, raised safety and operational concerns with the horizontal and vertical curvature of the proposed new connection between the Bass Lake Spur and the MN&S Spur, as well as insufficient lengths of straight track, based on their design standards for operating up to 120-car-unit trains. TC&W also noted that the proposed routing of their freight trains from the Bass Lake Spur and the Kenilworth Corridor to the MN&S Spur and the Wayzata Subdivision could adversely affect the railroad's operational costs due to track geometry, increased track distances, and operating environments.

Based on those and other comments received on the Draft EIS, the project team developed a variety of design adjustments to allow for the relocation of freight rail service, while balancing two primary objectives: design the connection to meet the safety and operational design standards of the affected railroads; and maintain the adjusted freight rail alignment within the existing right-of-way as much as possible. This effort focused on adjustments to the potential freight rail connection between the Bass Lake and MN&S spurs and adjustments to the track alignment along the MN&S Spur to the reconstructed connection to the Wayzata Subdivision.

Step one of this design development and evaluation process utilized the public involvement, agency coordination, and freight rail coordination efforts described in Section 2.0 of this appendix. The process, which generally spanned from February to June 2013, used a systematic approach to the development and evaluation of design adjustments to the freight rail relocation design under LRT 3A that the Draft EIS was based on and that representatives of freight railroads objected to during the Draft EIS public comment period, specifically citing safety and railroad operations and economic concerns. The design of the adjustments that would have relocated freight rail from the Bass Lake Spur and the Kenilworth Corridor and onto the MN&S Spur and the Wayzata Subdivision changed through this systematic process of design development by project staff and review and comment on the revised design by others, including the representatives of the affected freight rails. The review of the draft designs by representatives of the affected freight railroads, especially related to design and operational safety, played a key role in the development of the freight rail relocation design adjustments. In general, that design development process for freight rail relocation adjustments went through the following steps before two potential design adjustments were identified as likely meeting the design and operational safety requirements of the affected railroads (which are described below and are termed the Brunswick West and Brunswick Central):

1. **Draft EIS MN&S.** The starting point for the freight rail relocation design adjustment process was the design of freight rail modifications described in the Draft EIS under LRT 3A. This design would have

provided a northern connection between the Bass Lake Spur and the MN&S Spur via a new freight rail connection, allowing freight rail service to be rerouted from the Bass Lake Spur east of the MN&S Spur and the Kenilworth Corridor, onto the MN&S Spur and the Wayzata Subdivision. The design of that connection (see Appendix F of the Draft EIS) was found to have safety and operational concerns by representatives of the affected freight railroads. The safety concerns were based on freight rail alignment curves and grades. Out of the nine curves associated with the design, four had high compensated grades (between 1.6 and 1.8 percent) and one curve was sharper than 6 degrees. Based on the safety and operational issues raised, the Draft EIS MN&S design was dismissed from further consideration.

2. **MN&S Modified.** Project staff prepared a modified MN&S design, based on the design from the Draft EIS, with the following changes: all horizontal curves are adjusted to be less than or equal to 6 degrees, maximum compensated grades are 0.91 percent, the alignment crosses Highway 7 on a new freight rail bridge and the horizontal and vertical alignment in the vicinity of the existing Minnetonka Blvd. bridge is adjusted. Representatives from affected railroads noted that the reverse horizontal curves located immediately north of the Bass Lake Spur on the proposed relocation route would not provide sufficient tangent (i.e., straight) track length to allow for the safe operations of their trains and, while the design was an improvement over the Draft EIS MN&S design, the reverse curve would render the design unacceptable due to the potential for derailment of freight rail cars navigating the curves.
3. **Brunswick East.** Developed and evaluated concurrently with the Brunswick West – At Grade and the Brunswick Central – At Grade alignments, the Brunswick East design eliminated the reverse curves in the MN&S Modified design. Further, the design would extend the existing MN&S tangent alignment south, connecting to the Bass Lake Spur with a 4-degree curve with maximum compensated grades of 0.80 percent. The alignment would run on an earth retaining structure on the Bass Lake Spur, cross over Highway 7 and Wooddale Avenue on bridge, run on earth retaining structure generally parallel to Brunswick Avenue, cross over Lake Street on bridge. This design was dismissed from further consideration for two key reasons: 1) representatives of the effected freight railroads expressed the same safety concerns expressed for the Draft EIS MN&S design, particularly the presence of reverse curves and inadequate tangent track length for the through movement on the MN&S that could lead to derailment of freight trains; and 2) the design would potentially result in the displacement of approximately 55 residential properties, the Park Spanish Immersion School, and one commercial building.
4. **Brunswick West – At-Grade.** Developed and evaluated concurrently with the Brunswick East and the Brunswick Central – At Grade designs, the Brunswick West – At Grade design would connect to the MN&S tangent alignment south of Minnetonka Boulevard, introducing a 4 degree curve. It would also place a tangent section of track through the Orioles Stadium (a Section 4(f) property) and it would cross the north west corner of the Xcel substation, tying into the Bass Lake Spur near Louisiana Avenue South with a 4 degree curve. This design would include at-grade freight rail crossings of Library Lane and West Lake Street/Dakota Avenue South. This design was dismissed from further consideration due to safety concerns raised by the affected railroads due to the associated at-grade crossings and the additional horizontal and vertical curves that could lead to rail car decoupling and/or train derailments.
5. **Brunswick Central – At-Grade.** Developed and evaluated concurrently with the Brunswick East and the Brunswick West – At Grade designs, the Brunswick Central – At Grade design would connect to the existing MN&S tangent track alignment south of Minnetonka Boulevard, introducing a 4 degree curve that would cross Brunswick Avenue at grade and that would continue on tangent track crossing West Lake Street and Wooddale Avenue South at grade. This design was dismissed from further consideration due to safety concerns raised by the affected railroads due to the associated at-grade crossings and the additional horizontal and vertical curves that could lead to rail car decoupling and/or train derailments.
6. **Brunswick West (Elevated).** The Brunswick West – At Grade design was modified to place the freight rail alignment between Highway 7 and 33rd Street on an elevated profile with bridge and earth retaining structures, thereby eliminating the at-grade crossings of Library Lane and West Lake Street/Dakota Avenue South and minimizing the vertical curves. This modified design was found acceptable to

representatives from the effected freight railroads and was advanced into the first step evaluation (its more detailed description follows).






7. **Brunswick Central (Elevated).** The Brunswick Central – At Grade design was modified to place the freight rail alignment between Highway 7 and 33rd Street on an elevated profile with bridge and earth retaining structures, thereby eliminating the at-grade crossings of Brunswick Avenue, West Lake Street and Wooddale Avenue South and minimizing the vertical curves. This modified design was found acceptable to representatives from the effected freight railroads from a geometric perspective and was advanced into the first step evaluation (its more detailed description follows).

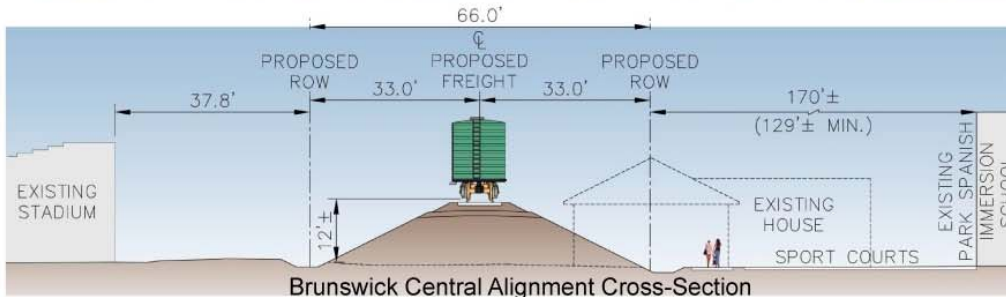
The adjustments developed for the potential freight rail connection at the conclusion of the freight rail relocation design development process were termed Brunswick Central and Brunswick West (see Exhibits F-12 and F-13, respectively) and are described as follows:

- **Brunswick Central (Elevated).** The Brunswick Central freight rail relocation adjustment was developed to minimize impacts to commercial, residential, and public properties associated with the Brunswick West alignment. This design adjustment would shift the existing MN&S rail tracks to the east, south of Highway 7, replacing the current freight rail bridge over the Bass Lake Spur and realigning the MN&S Spur between Bass Lake Spur and 33rd Street on new railroad right-of-way elevated on bridge and earth retaining structures. Under the Brunswick Central design adjustment, the potential freight rail connection would be elevated to minimize the number of vertical curves and vertical grade changes and flatten horizontal curves needed to meet the railroad operator's operational and safety requirements. This design adjustment would require full or partial acquisition of approximately 32 residential, business, or public properties; two new structures over Highway 7; and a new freight rail structure over the MN&S Spur. Both Highway 7 and the frontage road would be lowered approximately five feet to provide the required vertical bridge clearance over Highway 7. This design adjustment would result in relocating the Park Spanish Immersion School playground, a property that would likely meet the qualifications for protection under Section 4(f). Under this design adjustment, all freight rail street crossings would be grade-separated, except for an at-grade crossing at 28th Street. Underpasses would allow the Spanish Immersion School to retain access to Oriole Field and would provide vehicle, bicycle, and pedestrian access at other locations where the freight alignment would be elevated on retained fill (which is the construction of retaining walls to support fill where tracks are raised above existing grade). New freight rail bridges would be constructed over, Wooddale Avenue, 34th Street, and Lake Street. The modified freight rail alignment would generally meet up with the existing MN&S Spur alignment east of Brunswick Avenue South, in the vicinity of West 32nd Street, with relatively minor modifications to the existing tracks. Those modifications would be to the elevation of the existing freight rail tracks to accommodate the connection between the new and existing alignment. Finally, there would be a restored freight rail connection made between the MN&S Spur and the Wayzata Subdivision.
- **Brunswick West (Elevated).** The Brunswick West freight rail relocation adjustment would provide a freight rail connection between the Bass Lake and MN&S spurs that would meet the freight rail operators' design and safety standards for horizontal and vertical track curvature. The vertical profile of this alignment would require the freight rail track to be elevated between the Bass Lake Spur and approximately 33rd Street on bridge and earth retaining structures. However, the design adjustment would require full or partial acquisition of approximately 46 residential, business, or public properties; construction of freight rail bridge structures; lowering of the south frontage road at Highway 7; and reconfiguration of several local roads that would be severed due to the adjusted freight rail alignment. The Brunswick West freight rail relocation adjustment would realign and re-establish the MN&S tracks between the Bass Lake Spur and 33rd Street on a new freight rail right-of-way. The alignment would also include realignment of the MN&S Spur to the south of the Bass Lake Spur. It also would displace Oriole Stadium, which serves as St. Louis Park High School's football field and as a community recreation facility and most likely would meet the qualifications for a Section 4(f)-protected property. The Brunswick West alignment would also close through access at Walker Street/Library Lane and would realign Lake Street from Walker Street to Dakota Avenue. It would also require additional roadway modifications to

EXHIBIT F-12
Brunswick Central - Elevated Freight Rail Relocation Adjustments

LEGEND


-  Proposed Brunswick Central Freight Rail Relocation Alignment
-  Existing Freight Rail
-  Proposed Removal of Freight Rail
-  Proposed Southwest LRT
-  Cross Section Location

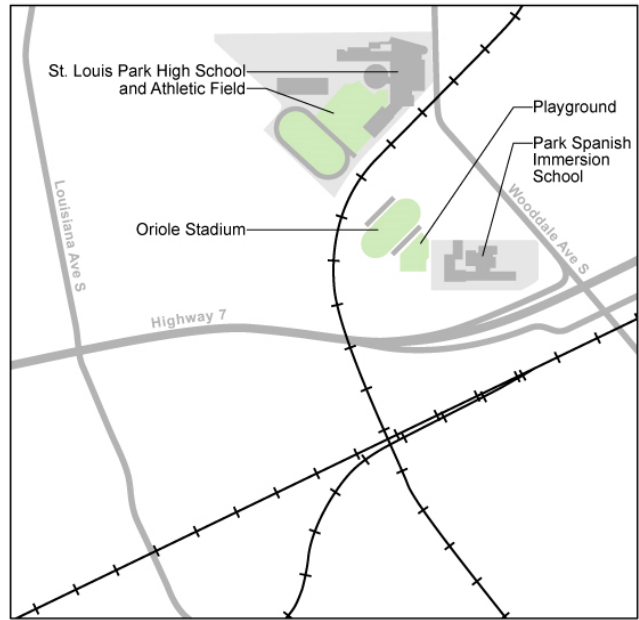


	<p>Southwest LRT Final EIS Brunswick Central Freight Rail Relocation Adjustments</p>	<p>Exhibit F-12</p>		
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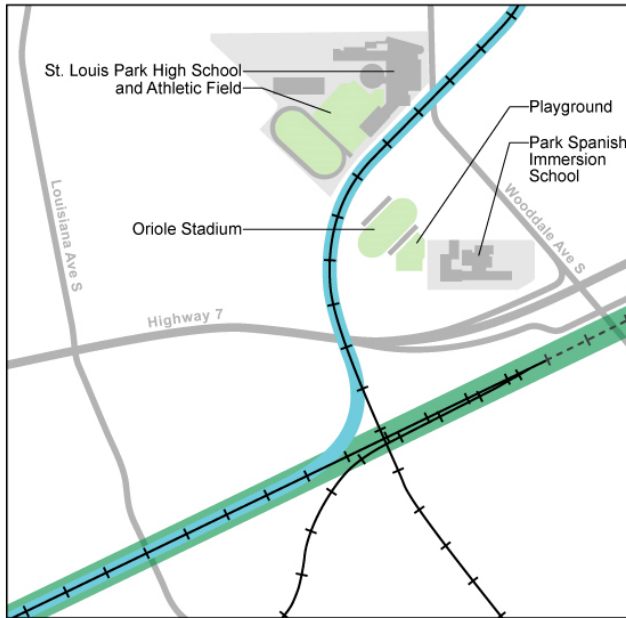
EXHIBIT F-13
Draft EIS and Brunswick West Freight Rail Relocation Adjustments

LEGEND

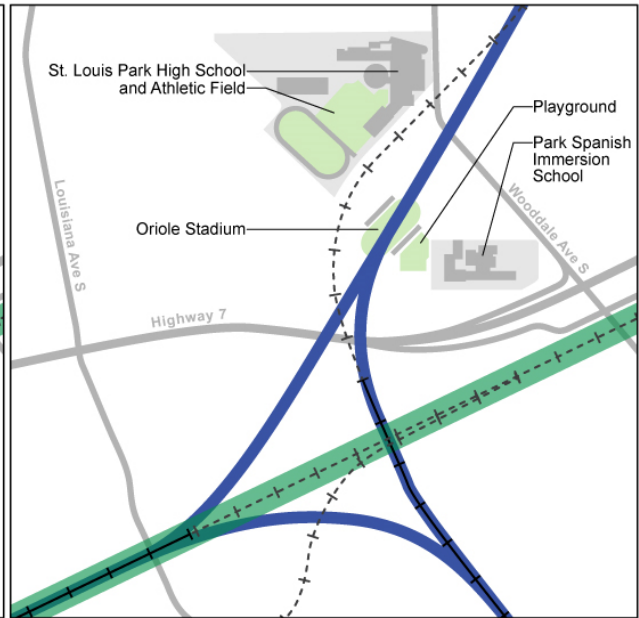
-  Proposed Draft EIS Freight Rail Relocation Alignment
-  Proposed Brunswick West Freight Rail Relocation Alignment
-  Existing Freight Rail
-  Proposed Removal of Freight Rail
-  Proposed Southwest LRT




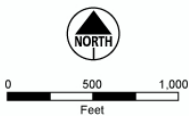

Existing Freight Rail Alignment



Draft EIS Relocation Design



Proposed Brunswick West Alignment

	<p>Southwest LRT Final EIS Draft EIS and Brunswick West Freight Rail Relocation Adjustments</p>	<p>Exhibit F-13</p>		
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continue to provide vehicular access to the high school's athletic field. The modified freight rail alignment would generally meet up with the existing MN&S Spur alignment east of Brunswick Avenue South, in the vicinity of West 32nd Street, with relatively minor modifications to the existing tracks. Those modifications would be to the elevation of the existing freight rail tracks to accommodate the connection between the new and existing alignment. Finally, there would be a restored freight rail connection made between the MN&S Spur and the Wayzata Subdivision.

Set 1 Kenilworth Corridor Adjustments Considered in the First-Step Evaluation

Concurrent with the potential freight rail relocation adjustment process, the project team reviewed comments submitted on the Draft EIS and advanced design activities to identify adjustments that would allow freight rail to continue operations in the Kenilworth Corridor.

As described in the Draft EIS, under LRT 3A-1, TC&W trains would not have been rerouted from the Kenilworth Corridor to the MN&S Spur and Wayzata Subdivision. Instead, the proposed double-tracked light rail alignment would be located adjacent to the existing Bass Lake Spur until entering the Kenilworth Corridor, where the light rail alignment would run parallel to the current single freight rail track and the Kenilworth Trail. Based on the conceptual design at the time, the Draft EIS analysis reflected a 94-foot cross section for LRT 3A-1 in the Kenilworth Corridor. Because of the limited width of the existing HCRRA-owned Kenilworth Corridor right-of-way at several locations, LRT 3A-1 would have resulted in the acquisition of approximately 55 residential and two commercial properties. Responding to a wide variety of comments on the Draft EIS, the project team developed and evaluated a range of design adjustments to the LRT 3A-1 that would allow for freight rail service to be retained within the Kenilworth Corridor along with the proposed light rail alignment and related improvements.

The project team developed and evaluated five potential design adjustments in addition to advancing the conceptual design of LRT3A-1 from the Draft EIS that would have placed the freight rail, light rail, and trail alignments at-grade throughout the Kenilworth Corridor.³ The six potential design adjustments developed and evaluated for the Kenilworth Corridor, that would retain freight rail within the corridor, are briefly described below, and are illustrated on Exhibits F-11 and F-14 of the Supplemental Draft EIS:

- **All Modes at-Grade.** As previously noted, the conceptual design of LRT 3A-1 in the Draft EIS would have placed the existing freight rail and Kenilworth Trail alignments and the proposed light rail alignment at-grade within the Kenilworth Corridor. The cross section of this design was adjusted based on additional information from the railroad operator⁴ and on consideration of the potential acquisition of BNSF-owned right-of-way located immediately west of the Kenilworth Corridor. The adjusted typical cross section for this placing all modes at-grade within the Kenilworth Corridor would require 81 feet of right-of-way and would have required full acquisition of approximately 26 residential properties.
- **Relocate the Kenilworth Trail out of the Kenilworth Corridor.** This potential adjustment would generally require a typical cross-section width of approximately 61 feet for the existing freight and proposed light rail alignments. In summary, this design adjustment would avoid full residential property acquisitions but would likely require some partial property acquisitions and the construction of a new trail route from Inglewood Avenue South to Cedar Lake Parkway, including at-grade crossing or trail overpass structures over Highway 25 and France Avenue.
- **Elevate the Kenilworth Trail.** This potential adjustment generally requires a typical cross-section width of approximately 61 feet. The trail structure would be south of and parallel to the existing right-of-way north of West Lake Street and south of Burnham Road. At these locations, the trail would be elevated on retained fill, transitioning to bridge structure across the freight rail and light rail alignments. The trail

³ A single-track light rail alignment within the most constrained sections of the Kenilworth Corridor was considered and dismissed due to unacceptable constraints that it would place on operating light rail service in the Southwest and Central corridors.

⁴ These adjustments were unable to achieve a 25-foot clearance envelope between the centerline of the freight track and the right-of-way line. TC&W reviewed their existing operating clearance envelope within the Kenilworth Corridor, which is a minimum of 12 feet. TC&W has indicated that the existing operating clearance is acceptable.

would be elevated approximately 30 feet above-grade, with a 20-foot-wide trail surface supported by eight-foot-wide piers. This option would not require any full residential property acquisitions, but it would require the construction of an elevated trail structure, including an ADA-accessible connection to Cedar Lake Parkway.

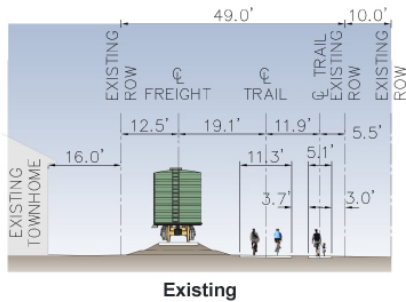
- **Elevate the Light Rail Alignment.** This potential adjustment would require a typical cross section of approximately 59 feet. The proposed light rail structure would be approximately 3,000 feet long with 10-foot-wide bridge piers. Generally, the light rail structure would be located between the Midtown Greenway and Burnham Road and would be approximately 35 feet high. This design adjustment would not result in any full residential property acquisitions.
- **Shallow LRT Tunnels – Over Kenilworth Lagoon.** This potential adjustment would result in a typical cross section of approximately 62 feet for the at-grade freight rail and trail alignments where the double-tracked light rail alignment would be within the two tunnels. The two light rail tunnels would generally be within the Kenilworth Corridor (with some relatively minor exceptions). In general, the tunnels would be located under the reconstructed Kenilworth Trail (Exhibit F-14 illustrates a typical cross section), with depth of cover ranging from 6 feet to 8 feet. Exhibit F-15 A/B illustrates the general construction sequence that would be used to construct the LRT tunnels using a cut-and-cover construction technique. The south light rail tunnel would extend approximately 2,200 feet from just north of West Lake Street to approximately 400 feet south of the Kenilworth Lagoon, which is a constructed channel connecting Lake of the Isles to Cedar Lake. The light rail alignment would rise back to grade to cross the lagoon on a new bridge with approximately the same vertical clearance over the lagoon as is provided today under the existing freight rail and Bicycle and pedestrian trail bridges. After crossing the lagoon, the light rail alignment would descend and enter the north tunnel approximately 600 feet north of the lagoon. The north light rail tunnel would extend for approximately 2,500 feet, rising back to the surface approximately 1,000 feet north of 21st Street. Due to the relatively high cost of a tunnel station construction and the relatively low ridership projected at the proposed 21st Street Station, the design refinement eliminated the station. Each end of the two tunnels would include portal areas that would span approximately 300 to 500 feet, which would provide for the transition between the at-grade and tunnel alignments. Fencing and other facilities would protect the tunnel portals from unauthorized entry. This design adjustment would not result in any full residential property acquisitions.
- **Deep Bore LRT Tunnels.** Under this potential design adjustment, a portion of the proposed light rail alignment in the Kenilworth Corridor would be in two parallel tunnels that would be approximately 30 to 50 feet deep. The two parallel tunnels would be constructed using boring machines and each tunnel would be approximately 5,900 feet long. The tunnels' south portal would be north of West Lake Street and the north portal would be approximately 1,000 feet north of 21st Street. Each of the two light rail tunnels would be approximately 20 feet in diameter, with the depth of cover ranging from 30 feet at the West Lake Station to approximately 50 feet where the tunnels would cross under the Kenilworth Lagoon (30 feet from the Kenilworth Lagoon water surface elevation). This potential design adjustment would require a typical cross section in the Kenilworth Corridor of 59 feet to accommodate the at-grade freight rail and trail alignments where the light rail alignment would be within the two parallel tunnels. The deep bore tunnel would also require an underground station at West Lake Street,⁵ as well as reconstruction of the existing West Lake Street bridge over the Kenilworth Corridor and the approaches to the bridge (generally between Market Plaza and Drew Avenue South).⁶ Due to the relatively high cost

⁵ Under the Deep Bore LRT Tunnels adjustment, an at-grade station at West Lake Street would require the tunnel portal to be located north of the West Lake Street bridge, which would result in the acquisition and displacement of residential properties in this area.

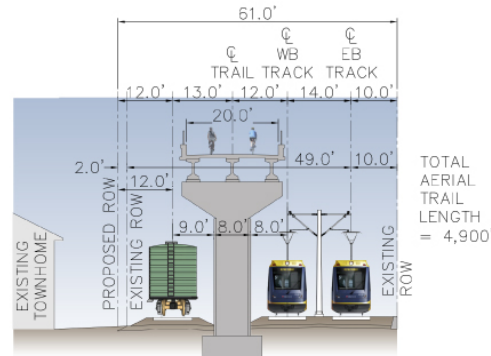
⁶ Due to various constraints (such as existing development on either side of the roadway and the conflict of existing bridge piers in relationship to the proposed tunnel), West Lake Street, generally between Market Plaza and Chowen Avenue South, would be closed to through traffic for approximately 12 to 18 months to allow for demolition of the existing bridge and approaches and for construction of the new bridge and approaches.

EXHIBIT F-14

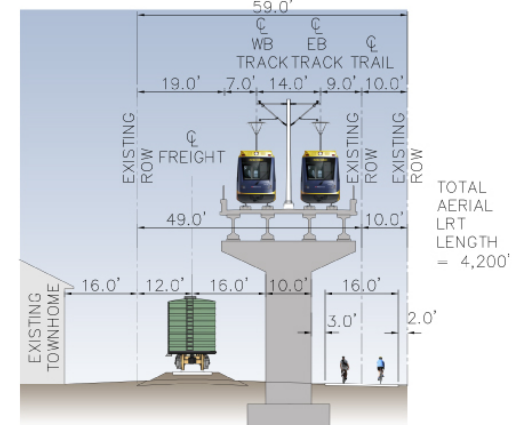
Kenilworth Corridor Adjustments Considered



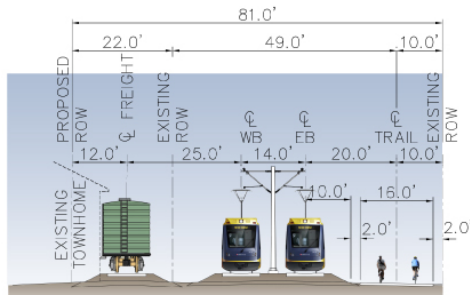
Existing



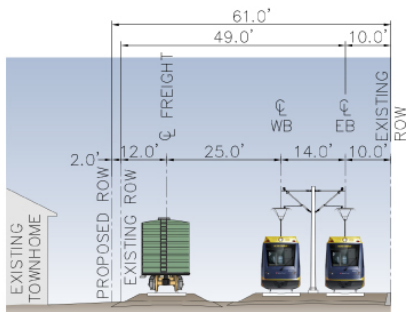
Elevate the Kenilworth Trail



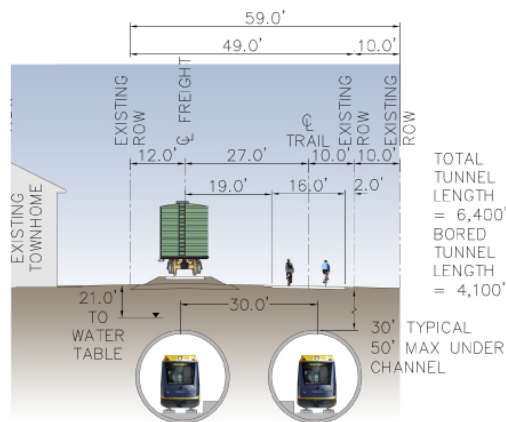
Elevate the Light Rail Alignment



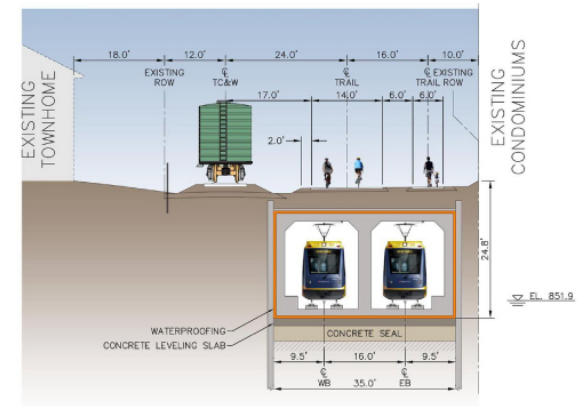
Conceptual Design from the Draft EIS (All Modes At-Grade)



Relocate the Kenilworth Trail out of the Kenilworth Corridor (see Exhibit F-11 for trail relocation route)



Place LRT in Deep Bored Tunnels

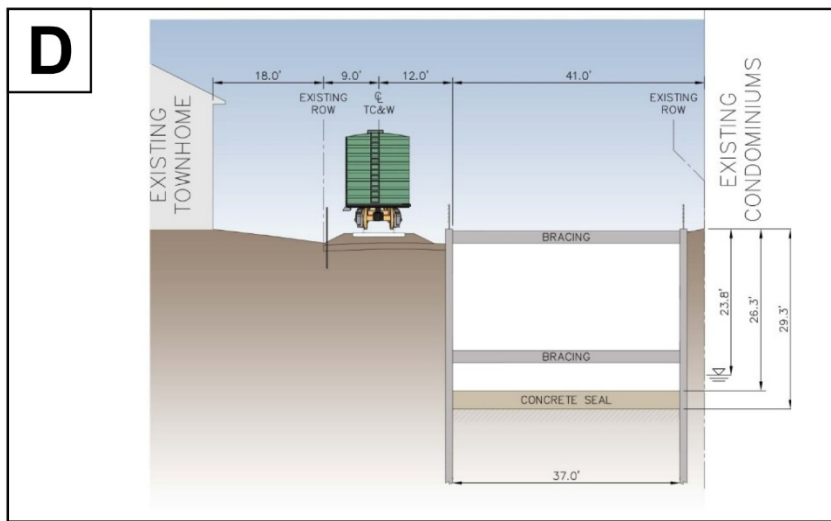
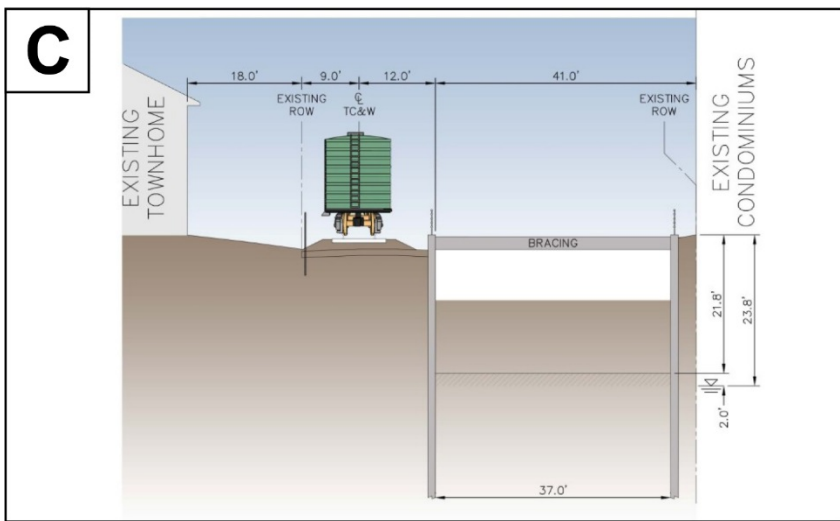
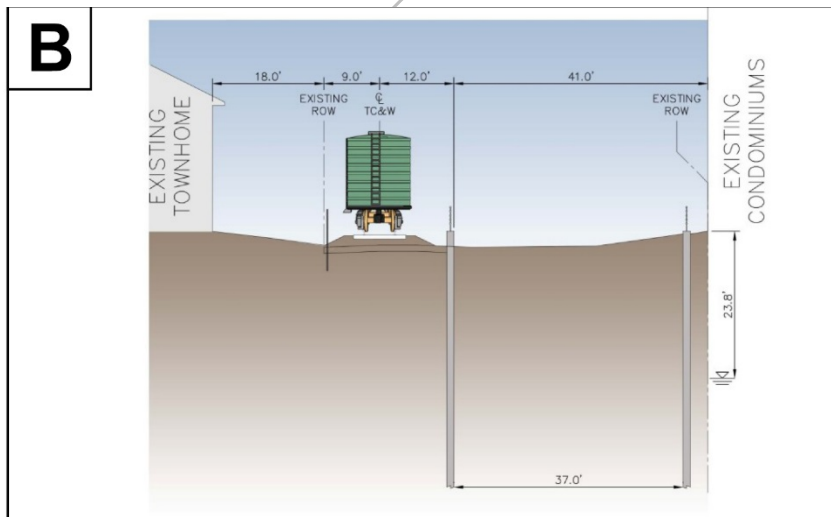
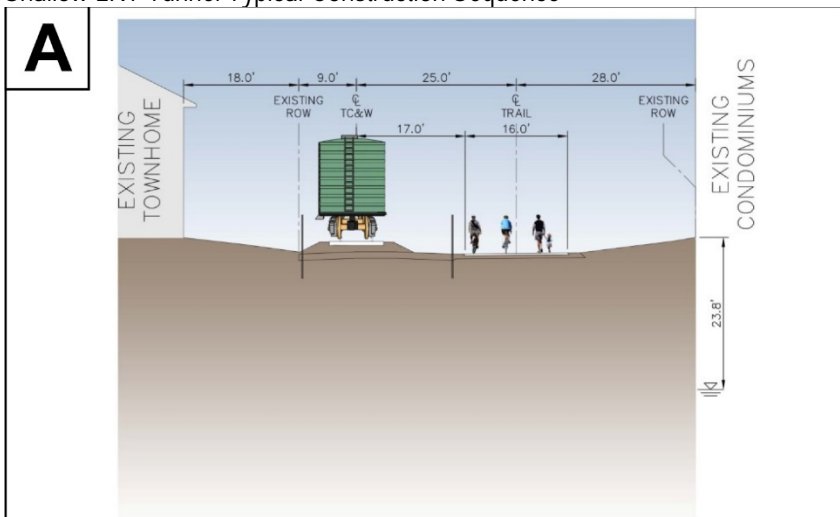


Place LRT in Shallow Cut-and-Cover Tunnel

	<p>Southwest LRT Final EIS Kenilworth Corridor Adjustments Considered</p>	<p>Exhibit F-14</p>		
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EXHIBIT F-15A

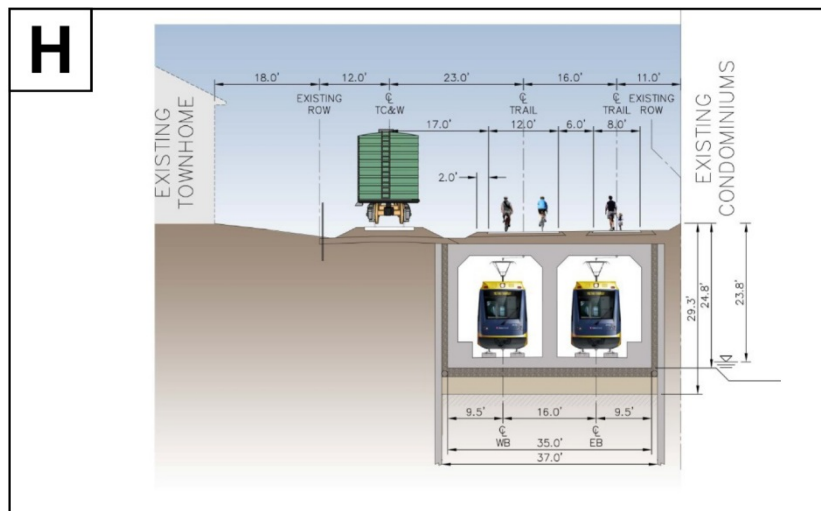
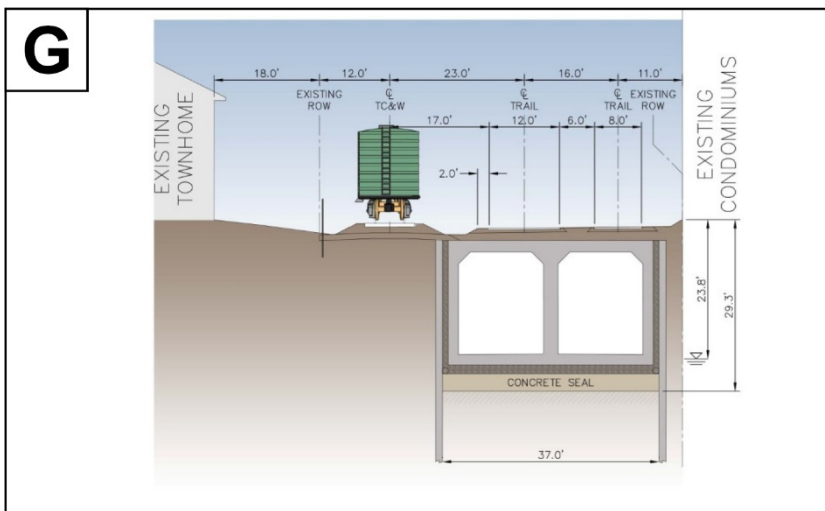
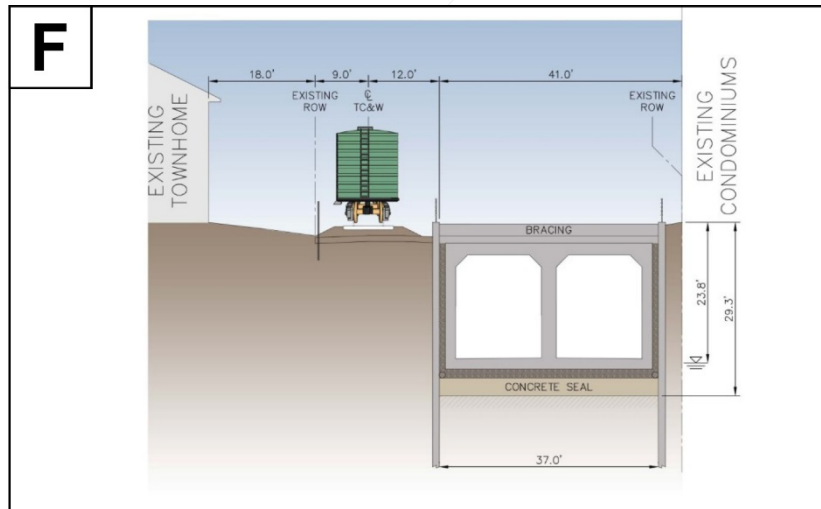
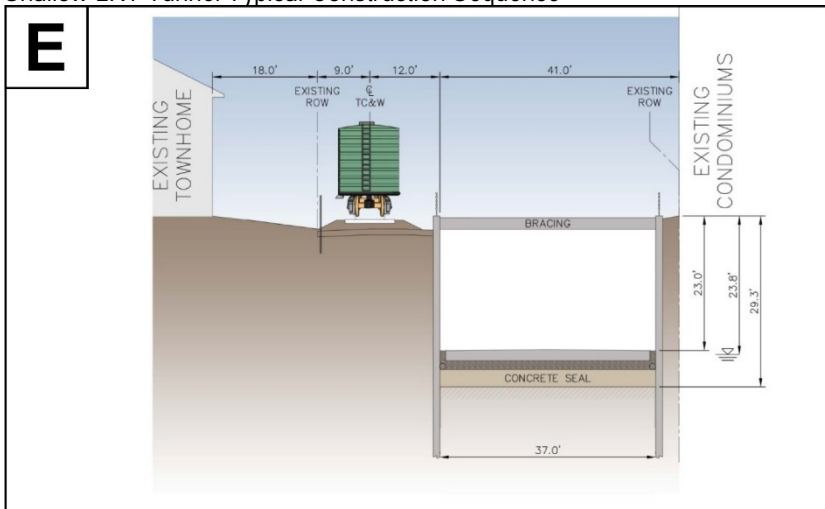
Shallow LRT Tunnel Typical Construction Sequence



	<p>Southwest LRT Final EIS Shallow LRT Tunnel Typical Construction Sequence St. Louis Park/Minneapolis Segment</p>	<p>Exhibit F-15A</p>	
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EXHIBIT F-15B

Shallow LRT Tunnel Typical Construction Sequence



	<p>Southwest LRT Final EIS Shallow LRT Tunnel Typical Construction Sequence St. Louis Park/Minneapolis Segment</p>	<p>Exhibit F-15B</p>	
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of a tunnel station construction and the relatively low ridership projected at the proposed 21st Street Station, this design refinement would eliminate the 21st Street Station. This potential design adjustment would not require any full residential property acquisitions.

Conclusion of the First-Step Evaluation

During the first step of evaluation, the Council held public open houses during July 2013 to present the design adjustments developed to date and to receive comments on those potential adjustments. Primary concerns raised through that process included noise, visual effects on adjacent residences, and narrower distances between residential properties and proposed rail or light rail tracks. The design adjustments developed during the first-step evaluation were also reviewed by the CAC and BAC and were presented to the St. Louis Park and Minneapolis city councils and to the St. Louis Park School Board.

Based on the evaluation measures prepared for the first-step evaluation, provided in Tables F.5-2 and F.5-3, the public and agency comments received and the committee recommendations made, the range of potential freight rail relocation and Kenilworth Corridor adjustments were narrowed to the following for further study in the second-step evaluation:

- Freight Rail Relocation with Brunswick Central Alignment Adjustment
- Kenilworth Corridor Shallow LRT Tunnels
- Kenilworth Corridor Deep Bore LRT Tunnel

B. Second-Step Evaluation

Relatively minor changes were made to the potential design adjustments in the St. Louis Park/Minneapolis Segment during the second-step evaluation. For example, additional design detail was added or modified, in response to questions or requests from jurisdictions, to meet a specific design requirement or to avoid or minimize an identified adverse environmental impact. Additional elements were included in the designs, such as additional pedestrian access points under the Brunswick Central adjustment, and minor modifications to the location of crash walls between the proposed freight rail and light rail alignments and fencing details at the tunnel portals were added to the tunnel alignments.

The Council used the criteria and the measures reported in Table F.5-5 to evaluate the three potential freight rail-related design adjustments to the LPA. Based on the evaluation measures prepared for the second-step evaluation, the Deep Bore LRT Tunnel adjustment was dropped from the third-step evaluation, as recommended by the CMC. In summary, the Deep Bore LRT Tunnel adjustment was dismissed from further study based upon the following:

- Highest capital costs, which would likely be economically infeasible at the regional level
- Demolition and reconstruction of the existing West Lake Street bridge over the Kenilworth Corridor and approach spans to the bridge, generally between Market Plaza and Chowen Avenue South, which would require the closure of West Lake Street bridge and approach spans to the bridge for approximately 12 to 18 months, resulting in rerouting of approximately 26,500 vehicle trips per average weekday
- Walk access time to and from West Lake Station, which would be the highest ridership station, would increase by approximately one minute due to additional time to access below ground station, resulting in reduced transit ridership at that station
- Increased operating and maintenance costs associated with an underground West Lake Station
- Longer and deeper transition areas with retaining walls between the proposed at-grade light rail alignment and the two tunnel portals, which would lead to additional adverse impacts to visual quality and aesthetics in the Kenilworth Corridor
- Large construction staging areas and access pits at the two tunnel portals, which would generate noise and dust from construction equipment and trucks delivering supplies and removing spoils from the tunnel, and additional short-term adverse impacts to visual quality and aesthetics in the Kenilworth Corridor

- Reconstruction of the existing freight rail and light rail bridges across the Kenilworth Lagoon and the adverse effects of those construction activities would not be avoided
- Potential risk of settlement to existing buildings and other structures immediately adjacent to the deep bore tunnels

C. Third-Step Evaluation

The third step of evaluation involved the detailed comparison of the Freight Rail Relocation Brunswick Central and the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustments. Based on a recommendation adopted by the CMC in October 2013, the analysis concluded that the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustments would provide the best balance of costs, benefits, and environmental impacts, compared to the Freight Rail Relocation Brunswick Central adjustments. In summary, the advantage of the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment is that it would avoid the various adverse impacts associated with the Freight Rail Relocation Brunswick Central design, including: additional capital costs; the full acquisition of approximately 32 residential, commercial, and institutional parcels; the use of the Park Spanish Immersion School playground; increased wetland impacts, and the adverse visual, neighborhood, and community cohesion impacts resulting from the construction of elevated freight rail track alignment and structures associated with the modified freight rail alignment in the vicinity of St. Louis Park High School. By comparison, the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment would not result in the full acquisition of any residential, commercial, or institutional properties or displacement of residences or commercial/institutional buildings, or uses. The third-step evaluation measures are summarized in Table F.5-6. As a result of the third-step evaluation, the Freight Rail Relocation Brunswick Central design adjustment was dismissed from further study and the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment was advanced into the fourth-step evaluation (see Exhibit F-16).

D. Fourth-Step Evaluation

The fourth step of evaluation was initiated in October 2013 and involved three primary components: (1) preparation of the independently-prepared *SWLRT Engineering Evaluation of Freight Rail Relocation Alternatives* (TranSystems, 2014),⁷ which identified the MN&S North design adjustment for further evaluation; (2) the development and evaluation of variations of the Shallow Cut-and-Cover Tunnels design adjustment; and (3) additional design adjustments reflected in a memorandum of understanding between the Council and the City of Minneapolis (see Appendix D, Sources and References Cited, for instructions on how to access the executed memorandum). Following is a description of the design concepts considered in the fourth-step evaluation and a summary of how they were evaluated by the Council.

Independent Engineering Evaluation of Freight Rail Relocation

The first component of the fourth step of evaluation was the independent study commissioned by the Council to provide an analysis of previously studied freight rail relocation designs that would provide for the rerouting of TC&W freight rail trains out of the Kenilworth Corridor and identification of any potential new design adjustments or concepts.⁸ In particular, the study, which was performed by TranSystems, consisted of an analysis of the technical, safety, and operational considerations of eight options that would allow for the rerouting of TC&W freight trains that were developed in prior freight rail studies and two additional concepts developed by the Southwest LRT Project Office (SPO) during the first step of the four-step evaluation process. The scope of the analysis generally covered the following: identification of operational cost drivers; identification of community and other impacts; and assessment of possible operational adjustments.

⁷ The report was funded by the Council and the Council submitted comments on the draft report during its public comment period. However, the report was independently prepared by TranSystems and the Council did not have editorial control over the report. See Appendix D for details on how to access the final report.

⁸ The Council also commissioned an independent review of the project's prior groundwater studies in the Kenilworth Corridor related to the Shallow LRT Tunnels adjustments, documented in the *Southwest Light Rail Transit: Kenilworth Shallow LRT Tunnels Water Resources Evaluation* (Burns & McDonnell, 2014). See Appendix D for a link to the final report.

The TranSystems analysis and report evaluated the following options for relocation of freight rail from the Kenilworth Corridor:

- Far Western Minnesota Connection – Appleton to Benson (Exhibit F-17)
- Western Minnesota Connection – Granite Falls to Willmar (Exhibit F-18)
- Chaska Cutoff (Exhibit F-19)
- Highway 169 Alignment to Burlington Northern Santa Fe (Exhibit F-20)
- Midtown Corridor (Exhibit F-21)
- United Transportation Route (Exhibit F-22)
- MN&S South Connection with Union Pacific (Exhibit F-23)
- MN&S North (Source: TranSystem’s Concept) (Exhibit F-24)

The draft *SWLRT Engineering Evaluation of Freight Rail Relocation Alternatives* was issued by independently by TranSystems on January 30, 2014, which initiated a public comment period on the draft report. The public comment period extended through March 12, 2014 and it included town hall meetings on February 10 and 12, 2014.

Exhibits F-22 and F-23 from TranSystem’s independent *SWLRT Engineering Evaluation of Freight Rail and Relocation Alternatives* report illustrate TranSystem’s evaluation of the freight rail relocation designs. As represented in the exhibits, TranSystems conducted their evaluation within a two-tiered process. In summary, TranSystem’s independent *SWLRT Engineering Evaluation of Freight Rail and Relocation Alternatives* report made the following recommendations:

1. The study finds that five of the freight rail relocation options evaluated are “fatally flawed” for a variety of reasons, primarily related to an assessment showing that the affected freight rail operators would not find them acceptable due to economic, operations, or safety concerns. As such, the report does not recommend any additional study of those five options:
 - Far Western Minnesota Connection – Appleton to Benson (Exhibit F-17)
 - Western Minnesota Connection – Granite Falls to Willmar (Exhibit F-18)
 - Chaska Cutoff (Exhibit F-19)
 - Highway 169 Alignment to Burlington Northern Santa Fe (Exhibit F-20)
 - MN&S South Connection with Union Pacific (Exhibit F-23)
2. In addition, the independent report does not recommend further study of three other freight rail options that it evaluated, primarily due to significant impediments to their implementation. The final report finds that, while the Brunswick Central alignment was acceptable to the affected freight rail operator from an operational, economic, and safety perspective, it was dismissed from further study (in step three of the evaluation) due to its wide range of adverse impacts. The final report also finds that an option termed the MN&S South, which would connect the Bass Lake Spur south to the MN&S Spur, might be able to be designed to meet engineering standards, but that it “would face severe obstacles with respect to property acquisition and permitting...” (TranSystems, 2014; page 34). Finally, due to several identified implementation challenges, the report does not recommend further study of the Midtown Corridor. The identified challenges include: likely “significant” capital costs; the corridor is listed on the National Register of Historic Places and two bridges on the alignment are on park land; and it may “complicate or thwart plans for a streetcar in the corridor.” (TranSystems, 2014; page 19)
3. TranSystems independent report concluded that a range of designs included within what it termed the Kenilworth Corridor – Co-Location (including the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment) constituted a “viable route,” warranting further development and study.⁹

⁹ The independent TranSystems final report also concluded that “above-ground options [in the Kenilworth Corridor] present an insurmountable engineering challenge.” Further, the final report “defers to [others] to offer conclusions regarding the engineering for the shallow tunnel option.” (*SWLRT Engineering Evaluation of Freight Rail and Relocation Alternatives* – TranSystems; March 2014; page 24).

4. The independent study by TranSystems also resulted in the identification of an additional freight rail relocation alignment in the vicinity of St. Louis Park High School that could potentially accommodate the relocation of freight rail from the Kenilworth Corridor to the MN&S Spur and the Wayzata Subdivision. The report recommends that this design adjustment receive further consideration by the Council. This freight rail modification design adjustment, which has many similarities to other options previously developed and considered by the Council, was termed the MN&S North design adjustment (see Exhibit F-24).

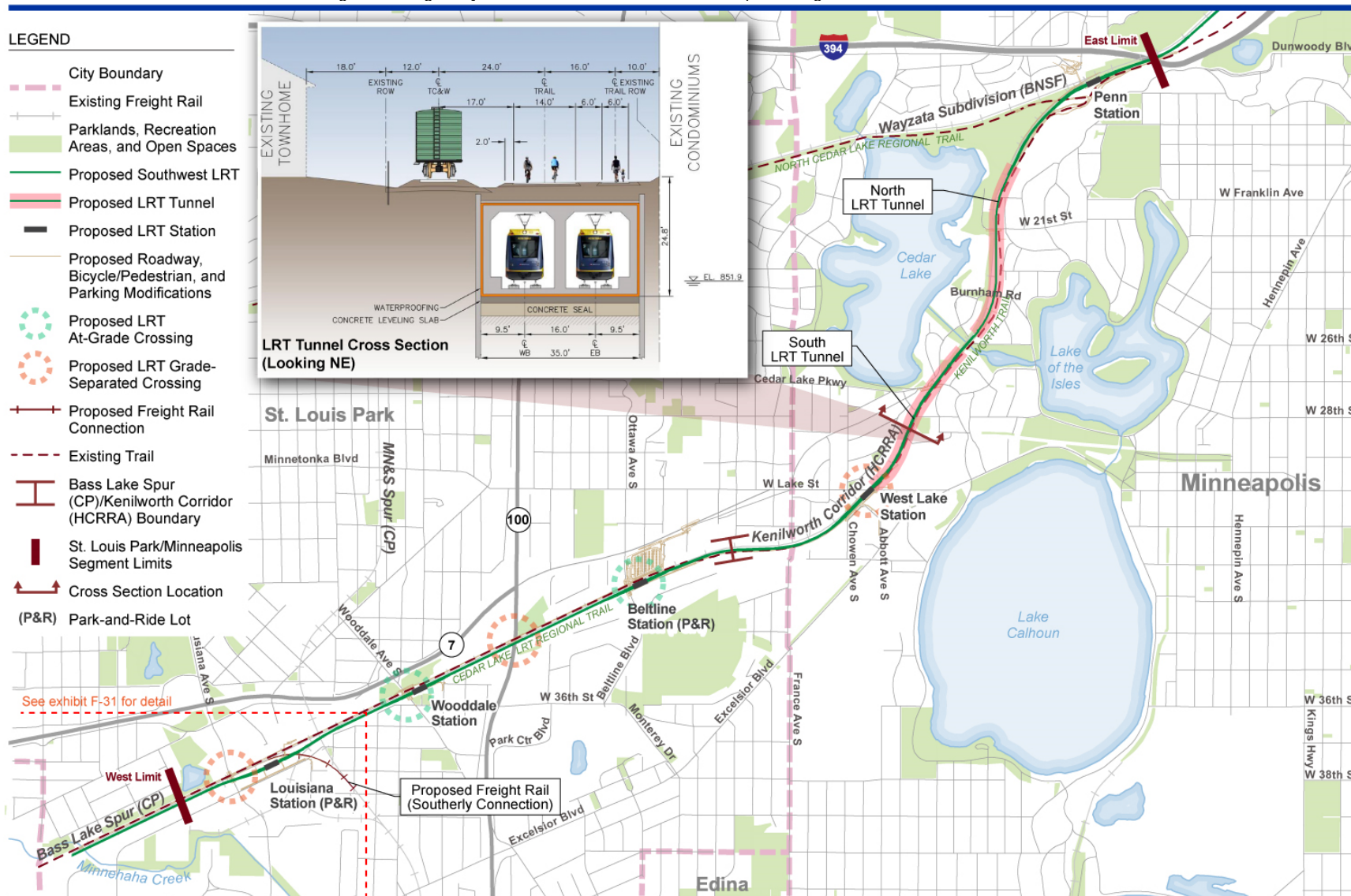
Following is a description of the MN&S North design adjustment:¹⁰

- **MN&S North.** The MN&S North freight rail relocation adjustment was developed to avoid or minimize the adverse impacts of the elevated and straightened freight rail alignment between Highway 7 and 34th Street and the adverse impacts to commercial, residential, and public properties associated with the Brunswick Central design adjustments. The MN&S North design adjustment would maintain the existing MN&S rail tracks south of Highway 7, including the current freight rail bridge over the Bass Lake Spur to a connection with the existing freight rail alignment between Library Lane and Dakota Avenue. Under the MN&S North design, the potential freight rail connection between the Bass Lake Spur and the MN&S Spur would begin with an elevated grade on bridge structure on the Bass Lake Spur west of Louisiana Avenue, with the freight rail alignment continuing east on bridge structure over the west corner of the Xcel Substation and across Highway 7, matching existing grades at Library Lane and connecting to the existing MN&S alignment between Library Lane and Dakota Avenue. Approximately 800 feet of tangent (i.e., straight) track would be provided between two reversing curves located between the Bass Lake Spur and the existing MN&S. This design adjustment would require full or partial acquisition of approximately 20 residential, business, or public properties and a new structure over Louisiana Avenue and Highway 7. Both Highway 7 and the south frontage road would be lowered to provide the required vertical bridge clearances under the freight rail bridge. This design adjustment would result in undetermined impacts to the Xcel Substation property and facilities. Under this design adjustment, existing at-grade freight rail street crossings would be closed at Walker Street, West Lake Street, 28th Street, and 29th Street. Existing at-grade freight rail crossings at Library Lane and Dakota Avenue would be maintained and a new freight rail bridge would be constructed over 27th Street, with 27th Street becoming a through street. In general, the modified freight rail alignment would connect to the existing MN&S Spur alignment between Library Lane and Dakota Avenue, with relatively minor modifications to the existing freight rail tracks to the north. Those modifications would be made to adjust the profile of the existing freight rail tracks to flatten grades south and north of the existing Minnetonka Boulevard freight rail bridge. Underpasses and overpasses across the freight rail alignment would provide vehicle, bicycle, and pedestrian access at locations where the freight alignment would be elevated (which would entail the construction of retaining walls to support fill where tracks would be raised above existing grade). Finally, there would be a restored freight rail connection constructed between the MN&S Spur and the Wayzata Subdivision.

¹⁰ The *Conclusion* at the end of this section and in Table F.5-7 summarizes the Council's evaluation of the MN&S North design adjustment.

EXHIBIT F-16

Shallow LRT Tunnels – Over Kenilworth Lagoon Design Adjustments St. Louis Park/Minneapolis Segment



	<p>Southwest LRT Final EIS Shallow LRT Tunnels – Over Kenilworth Lagoon Design Adjustments St. Louis Park/Minneapolis Segment</p>	<p>Exhibit F-16</p>		
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EXHIBIT F-17

Far Western Minnesota Connection – Appleton to Benson

Source: TranSystems; February 2014.

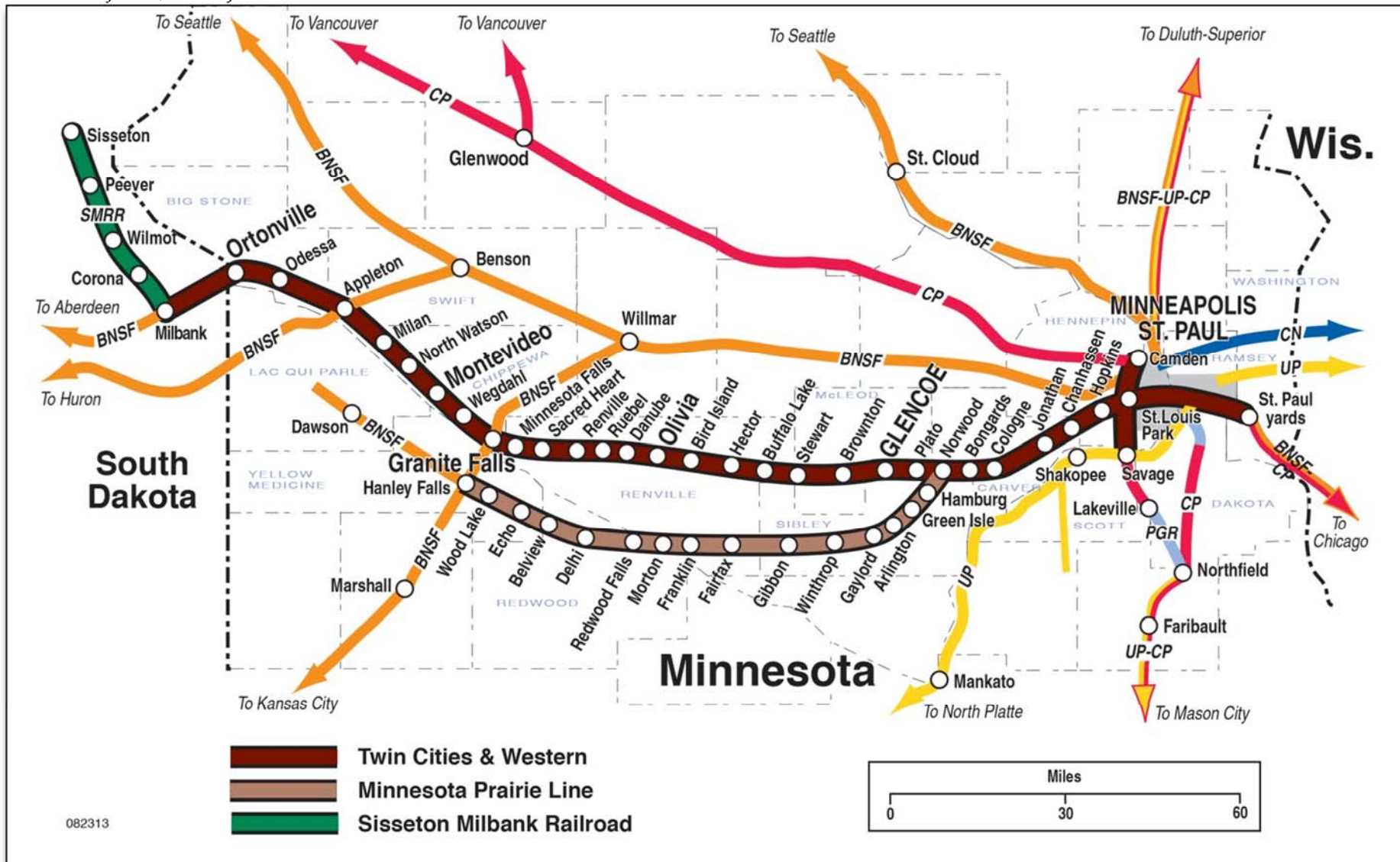


EXHIBIT F-18

Western Minnesota Connection – Granite Falls to Willmar

Source: TranSystems; February 2014.

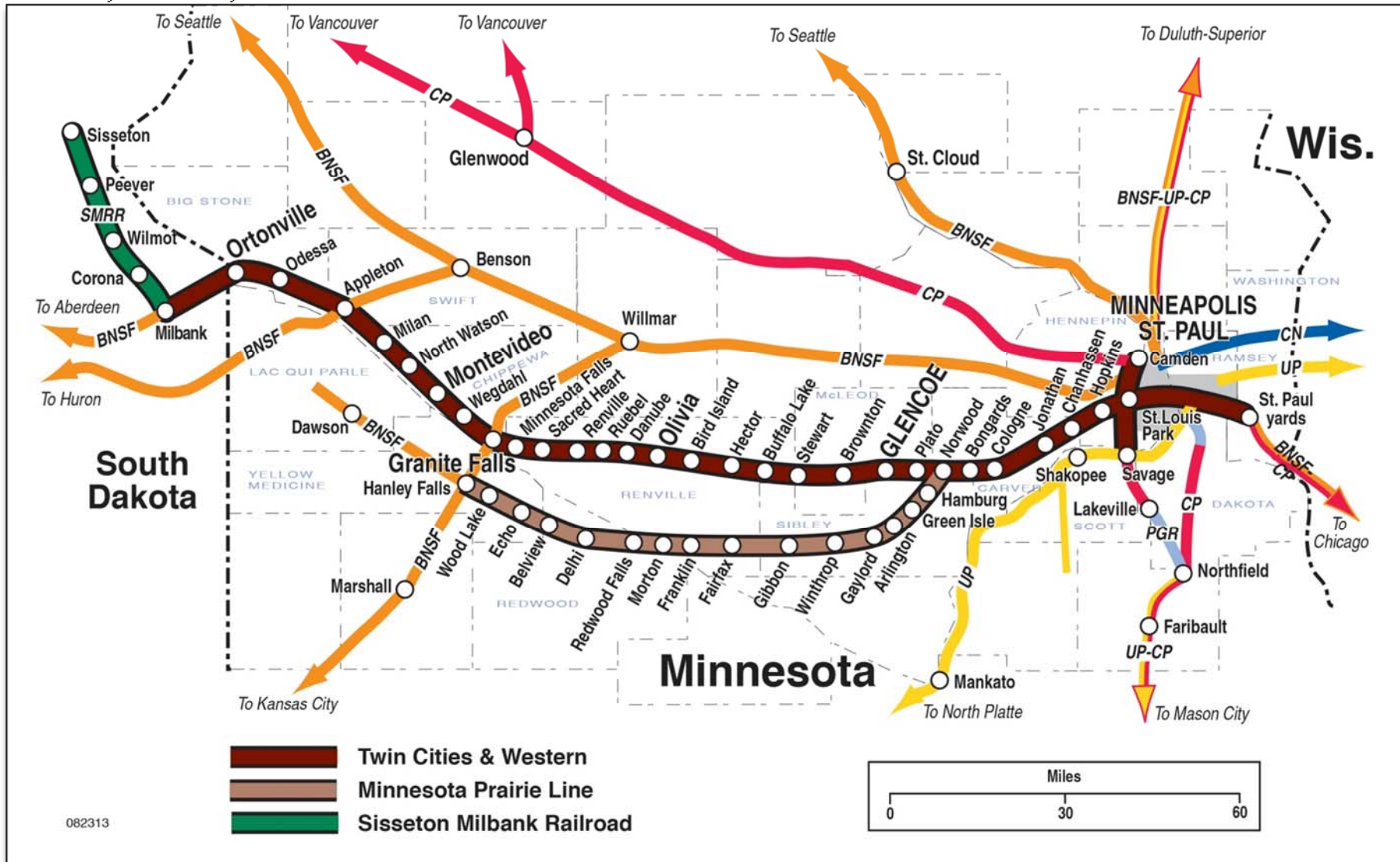


EXHIBIT F-19

Chaska Cutoff

Source: TranSystems; February 2014.

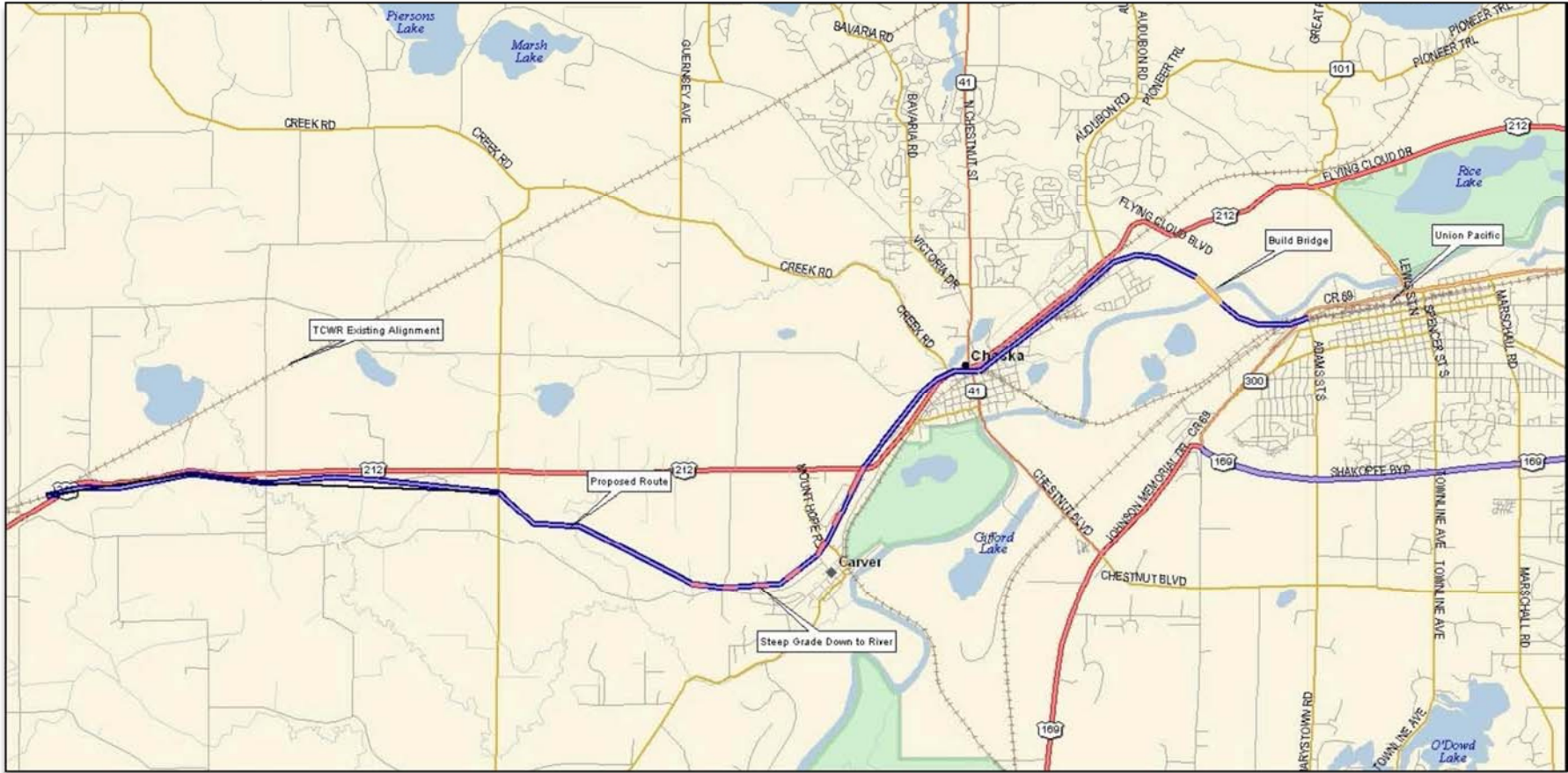


EXHIBIT F-20

Highway 169 Alignment to Burlington Northern Santa Fe

Source: TranSystems; February 2014.

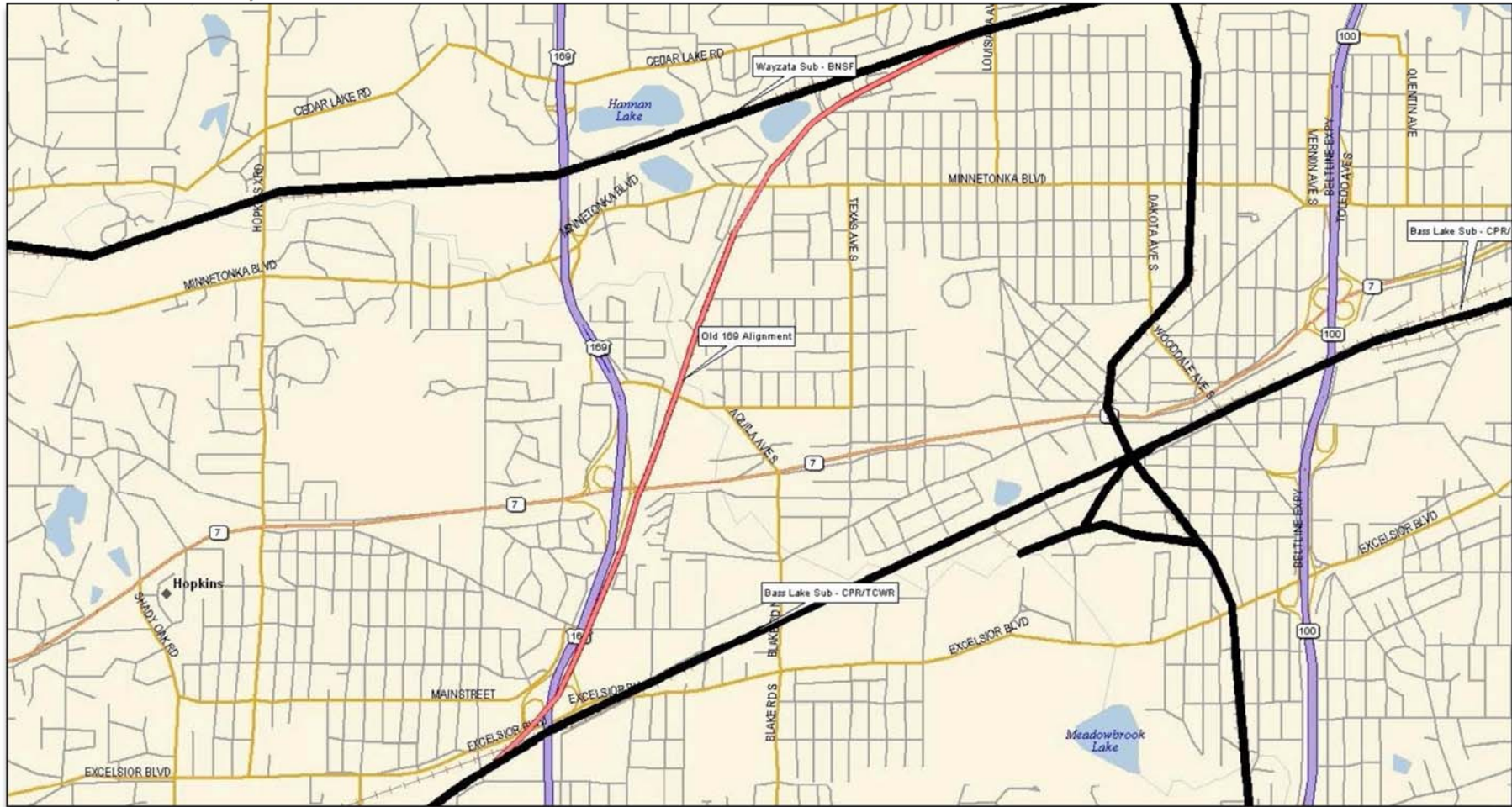


EXHIBIT F-21

Midtown Corridor

Source: TranSystems; February 2014.

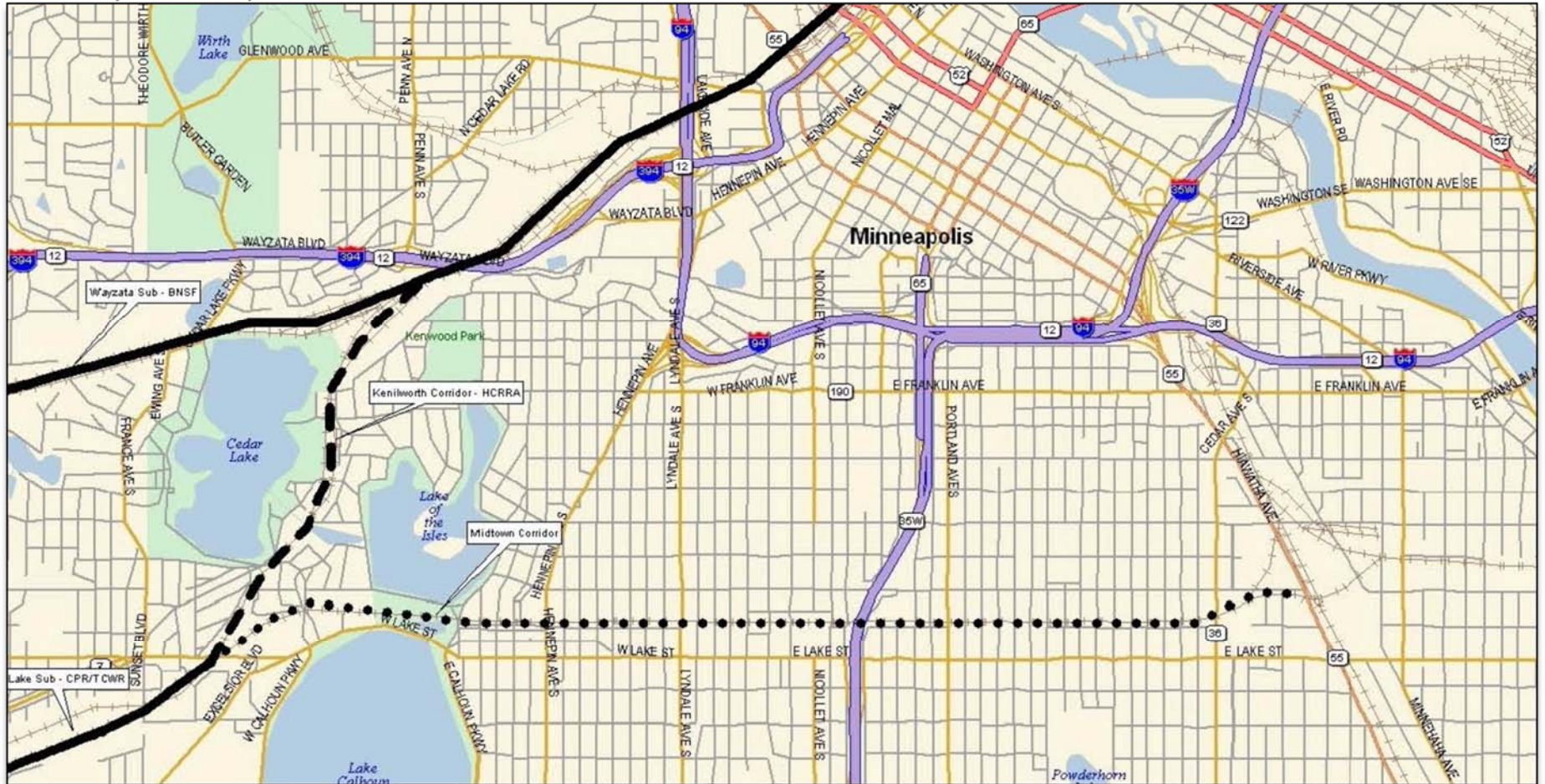


EXHIBIT F-22

United Transportation Union Route

Source: TranSystems; February 2014.

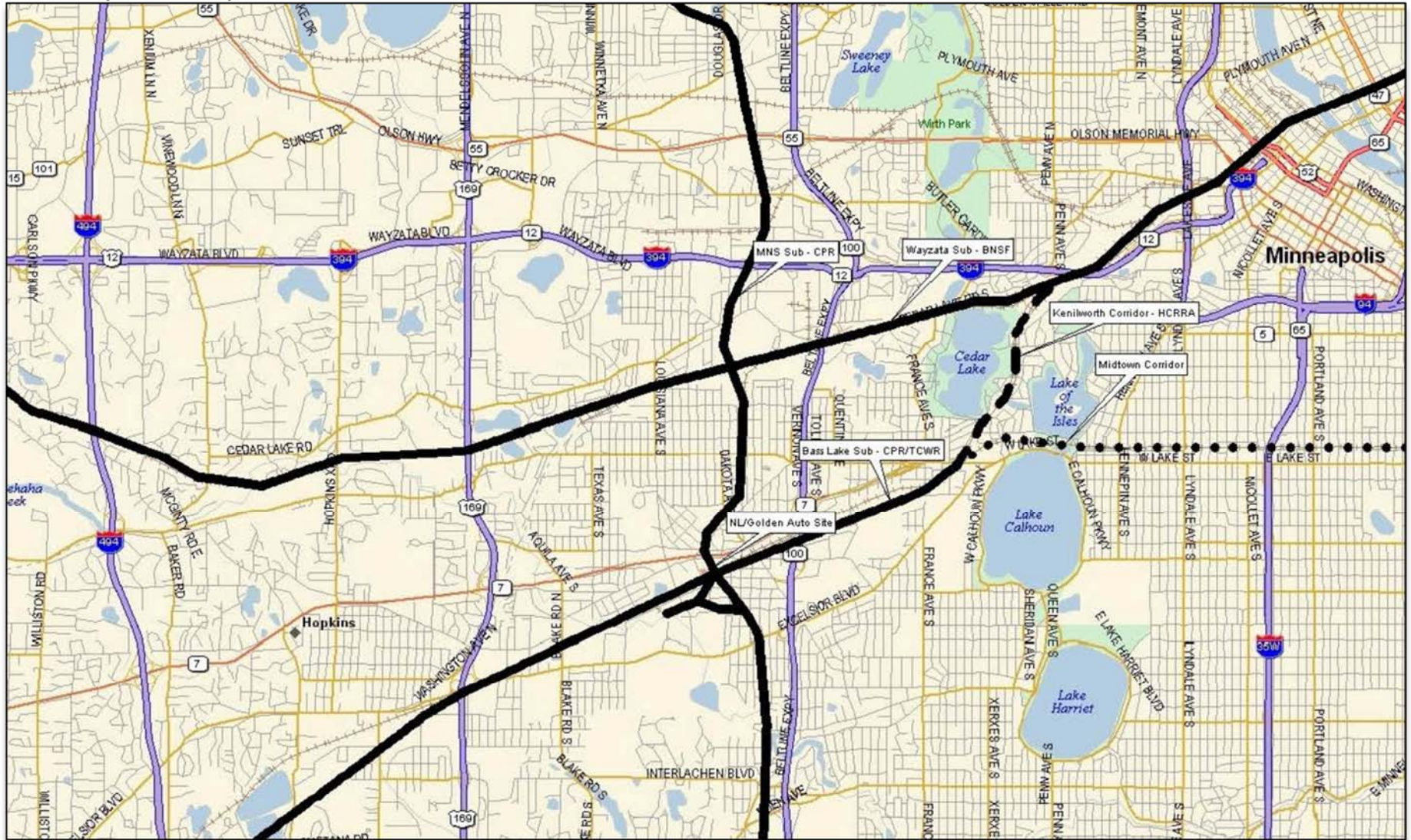


EXHIBIT F-23

MN&S South Connection with Union Pacific

Source: TranSystems; February 2014.

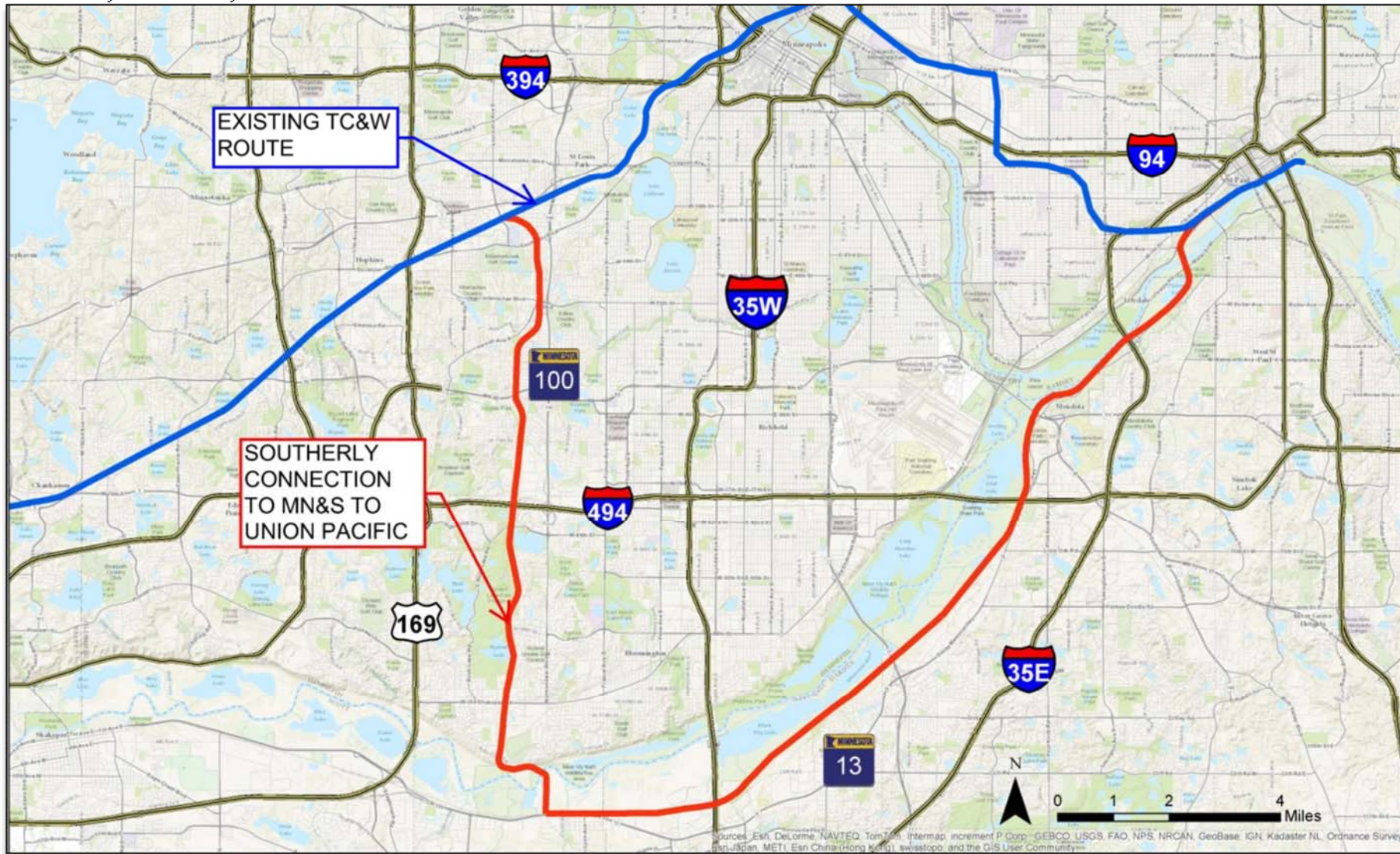


EXHIBIT F-24

MN&S North

Source: TranSystems; February 2014.

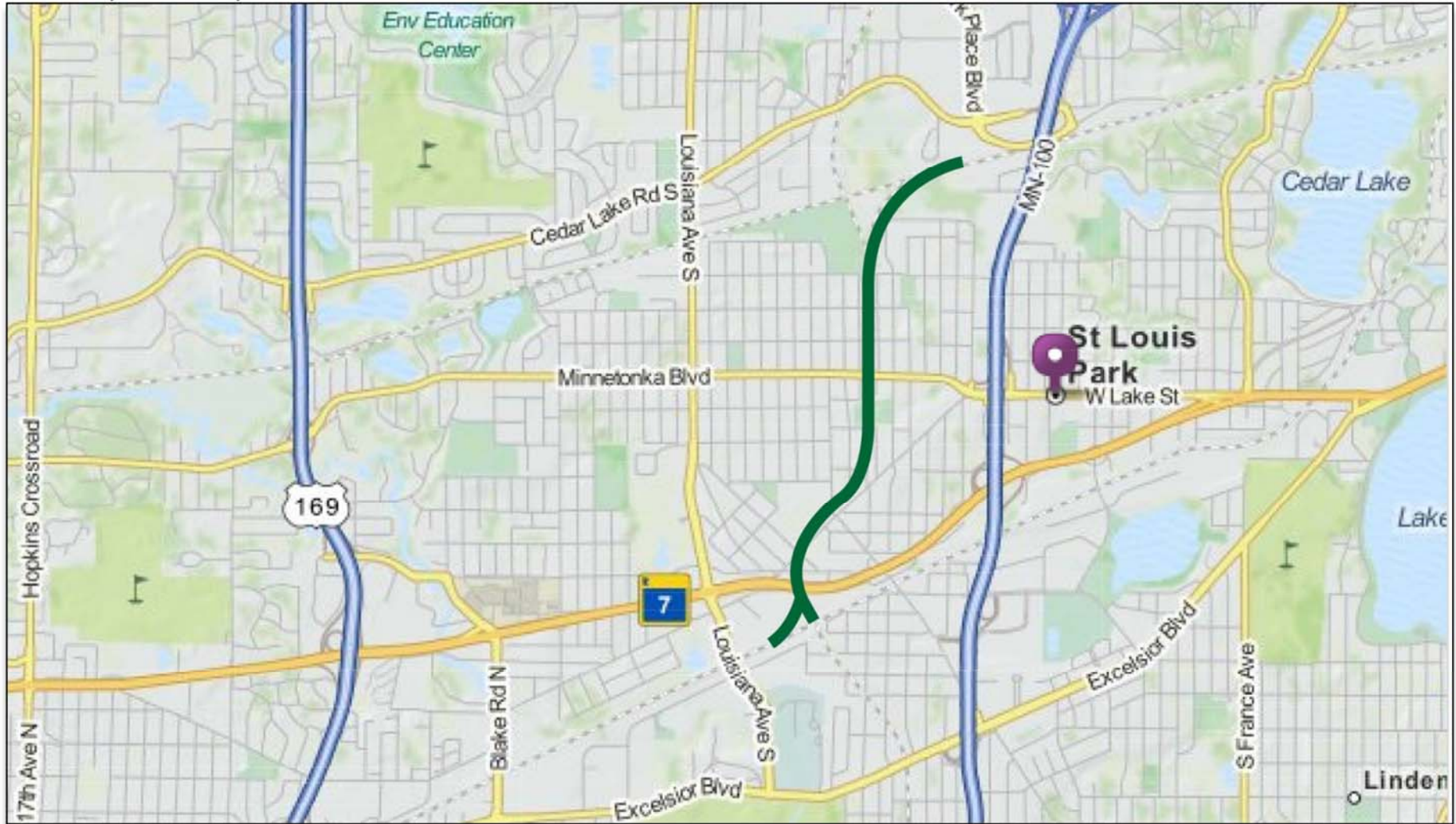


EXHIBIT F-25

TranSystems Tier 1 Screening Summary

Source: SWLRT Engineering Evaluation of Freight Rail and Relocation Alternatives – TranSystems; March 2014.

Proposed Freight Route	Operations	Commercial Considerations	Implementation Considerations
Kenilworth Corridor – No-build	○	○	●
Kenilworth Corridor – Co-location	○	○	◐
Far Western MN connection with BNSF (Appleton-Benson)	●	●	●
Western MN connection with BNSF (Granite Falls-Willmar)	●	●	●
Chaska Cut-off	◐	◐	●
Hwy 169 Alignment to BNSF	◐	◐	●
MN&S Spur North	◐	○	◐
UTU route	◐	○	●
MN&S Spur South	◐	◐	●
Midtown Corridor	○	○	●

○ Strongly supports goal ◐ Supports goal ● Does not support goal

EXHIBIT F-26

TranSystems Tier II Screening Summary

Source: SWLRT Engineering Evaluation of Freight Rail and Relocation Alternatives – TranSystems; March 2014.

Proposed Freight Route	Tier I Screening			Tier II Screening			
	Operations	Commercial	Implementation Obstacles	Engineering	Safety	Community	Cost
Kenilworth Corridor – Co-Location	○	○	◐	○	○	◐	\$20 to \$330 Million*
MN&S Spur North	◐	○	◐				
DEIS connection	The MN&S Spur North has various concepts for achieving the necessary rail connections which were assessed separately in Tier 2 Screening.			●	◐	◐	N/A
Modified MN&S Spur connection				●	◐	◐	N/A
Brunswick East connection				◐	◐	●	N/A
Brunswick West connection (at-grade and elevated)				◐	◐	●	N/A
Brunswick Central connection (at-grade and elevated)				◐	◐	●	N/A
TranSystems Alternate connection				○	○	◐	\$220 to \$240 Million


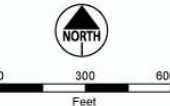

○ Strongly supports goal ◐ Supports goal ● Does not support goal

EXHIBIT F-27
 MN&S North Freight Rail Relocation Adjustments

LEGEND

-  Proposed MN&S North Freight Rail Relocation Alignment
-  Existing Freight Rail
-  Proposed Removal of Freight Rail
-  Proposed Southwest LRT



	<p>Southwest LRT Final EIS MN&S North Freight Rail Relocation Adjustments</p>	<p>Exhibit F-27</p>		
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Preparation of the independent report and the development and evaluation of the MN&S North design adjustment utilized an extensive public involvement process that included:¹¹

- Availability of the documents online
- Town hall meetings on January 7 and 9, 2014
- Public review and comment period for the draft report that spanned from January 30 to March 12, 2014;
- Studies discussed and reviewed by:
 - BAC (at February 26, 2014 meeting)
 - CAC (at February 27 and March 27, 2014 meetings)
 - CMC (at February 5 and 20; March 12 and 26, 2014 meetings)
- Town hall meetings on February 10 and 12, 2014, to present the findings within, discuss and take comment on the draft independent reports (see Appendix D for instructions on how to view a copy of the presentation made by the preparers of the draft independent reports)
- Project-sponsored meeting as a part of the issue resolution process described in Section 2.0 of this appendix, which included participation by representatives from affected freight railroads
- Release of the final report on March 21, 2014, which addressed comments received on the draft report.

Shallow LRT Tunnels – Over Kenilworth Lagoon – Variations

At the request of the Minneapolis Parks and Recreation Board (MPRB) in February 2014, the Council developed and evaluated two variations of the Shallow LRT Tunnels – Over Kenilworth Lagoon design adjustment as a part of the fourth step of evaluation in the St. Louis Park/Minneapolis Segment. As previously described in this section, the Shallow LRT Tunnels – Over Kenilworth Lagoon design adjustment would have the light rail alignment cross over the Kenilworth Lagoon on a new bridge, located between the freight rail and trail alignments, connecting the two light rail tunnels. The MPRB asked the Council to develop and evaluate a variation of the design adjustment that would continue the tunnels under the Kenilworth Lagoon, thus avoiding some of the project's long-term impacts to the Kenilworth Lagoon that could result from the new light rail bridge across the lagoon. In response, the Council developed and evaluated two additional design adjustments: (1) Long Shallow LRT Tunnel – Under Kenilworth Lagoon; and (2) Short Shallow LRT Tunnel – Under Kenilworth Lagoon. Under these two design adjustments, construction of the tunnel under the Kenilworth lagoon would be achieved through utilization of the cut-and-cover technique.¹² These designs and their evaluation were presented to MPRB staff and consultants at meetings and through correspondence following their development. Following are descriptions of those two design adjustments:

¹¹This public review and comment process was also used for the *Kenilworth Shallow LRT Tunnels Water Resources Evaluation* (Burns & McDonnell; March 2014).

¹²In addition, project staff developed two variations of the Short and Long Shallow LRT Tunnel – Under Kenilworth Lagoon design adjustments to determine if the northern and southern cut-and-cover LRT tunnel segments could be connected under the Kenilworth Lagoon via a bored tunnel segment, rather than via a cut-and-cover constructed tunnel segment. In effect, these variations would be a combination of two cut-and-cover-constructed tunnel segments connected with a bored-constructed tunnel segment under the Kenilworth Lagoon. In effect, these variations would be a variation of the Kenilworth Deep Bore LRT Tunnel option, with longer cut-and-cover tunnel segments connected to a shorter bored tunnel under the Kenilworth Lagoon. These two combination variations were dismissed from further study due to: 1) complex construction considerations inherent in bored tunnel construction techniques located within a constrained physical environment; 2) additional schedule delays related to bored tunnel construction techniques located within a constrained physical environment; 3) substantially higher capital costs relative to other design adjustments under consideration; 4) potential additional property acquisitions that could be required to accommodate a southern bored-tunnel staging area and temporary freight rail alignments in the vicinity of the construction area; and 5) reconstruction of the existing freight rail and trail bridges across the lagoon and the related long-term and short-term (construction related) adverse impacts would not be avoided.

- **Short Shallow LRT Tunnel – Under Kenilworth Lagoon.** This potential design adjustment would result in a typical cross section of approximately 62 feet for the at-grade freight rail and trail alignments where the double-tracked light rail alignment would be within one tunnel. The light rail tunnel would generally be within the Kenilworth Corridor, with some relatively minor exceptions (see Exhibit F-29). Except at the two tunnel portals and in the vicinity of the Kenilworth Lagoon, the light rail tunnel would be under the reconstructed Kenilworth Trail with about 6 feet to 8 feet of cover above the tunnel measured from existing ground elevation (similar to the Shallow LRT Cut-and-Cover Tunnels adjustment illustrated on Exhibit F-16). The light rail tunnel would extend approximately 3,100 feet from just north of West Lake Street to approximately 400 feet north of the Kenilworth Lagoon. Beneath the lagoon, the tunnel would descend to a depth of cover of approximately 25 feet where the tunnels would cross under the Kenilworth Lagoon (approximately 10 feet from the Kenilworth Lagoon water surface elevation)(in part, the additional depth of the tunnel would be needed to resist long-term buoyancy forces). A portal area at each end of the tunnel would span approximately 300 feet, which would provide for the transition between the at-grade and tunnel alignment. Fencing and other facilities would protect the tunnel portals from unauthorized entry. This design adjustment would not result in any full residential property acquisitions and the proposed 21st Street Station would be retained at-grade.
- **Long Shallow LRT Tunnel – Under Kenilworth Lagoon.** This potential design adjustment would result in a typical cross section of approximately 62 feet for the at-grade freight rail and trail alignments where the double-tracked light rail alignment would be within one tunnel. The light rail tunnel would generally be within the Kenilworth Corridor, with some relatively minor exceptions (see Exhibit F-29). Except at the two tunnel portals and in the vicinity of the Kenilworth Lagoon, the light rail tunnel would be under the reconstructed Kenilworth Trail with about 6 feet to 8 feet of cover above the tunnel measured from existing ground elevation (similar to the Shallow LRT Cut-and-Cover Tunnels adjustment illustrated on Exhibit F-16). The light rail tunnel would extend approximately 5,800 feet between just north of West Lake Street and approximately 1,000 feet north of 21st Street. Beneath the lagoon, the tunnel would descend to a depth of cover of approximately 25 feet where the tunnels would cross under the Kenilworth Lagoon (approximately 10 feet from the Kenilworth Lagoon water surface elevation)(in part, the additional depth of the tunnel would be needed to resist long-term buoyancy forces). A portal area at each end of the tunnel would span approximately 300 feet, which would provide for the transition between the at-grade and tunnel alignment. Fencing and other facilities would protect the tunnel portals from unauthorized entry. This design adjustment would not result in any full residential property acquisitions.

Exhibits F-30A/B illustrate the general sequence of steps that would be required to construct a light rail tunnel under the Kenilworth Lagoon using the cut-and-cover technique.

Identified Design Adjustments – April 2014

Based on the analysis prepared, committee recommendations, and public comments received during the four-step process described in this section, the Council identified in April 2014 the design adjustments to be incorporated into the LPA: the Shallow LRT Tunnels – Over Kenilworth Lagoon (see Exhibit F-16). In doing so, the MN&S North, the Short Shallow LRT Tunnel – Under Kenilworth Lagoon and the Long Shallow LRT Tunnel – Under Kenilworth Lagoon design adjustments were dismissed from further study (see Tables F.5-2, F.5-7, and F.5-8). The Council found that, relative to the other options considered, the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment would provide the best balance of costs, benefits, and environmental impacts, and in doing so found that it would best meet the project’s Purpose and Need (see Chapter 1 of the Supplemental Draft EIS).

Following is a description of the benefits of the Shallow LRT Tunnels – Over Kenilworth Lagoon design adjustment, compared to the other design adjustments developed and evaluated in the step four evaluation.

- **Shallow LRT Tunnels – Over Kenilworth Lagoon and MN&S North Adjustments.** Table F.5-7 provides a summary of the evaluation measures considered by the Council as it compared the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment to the MN&S North adjustments. First, the MN&S North adjustments were opposed by the affected freight rail operator (TC&W), primarily based on safety

EXHIBIT F-28

Short Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon
















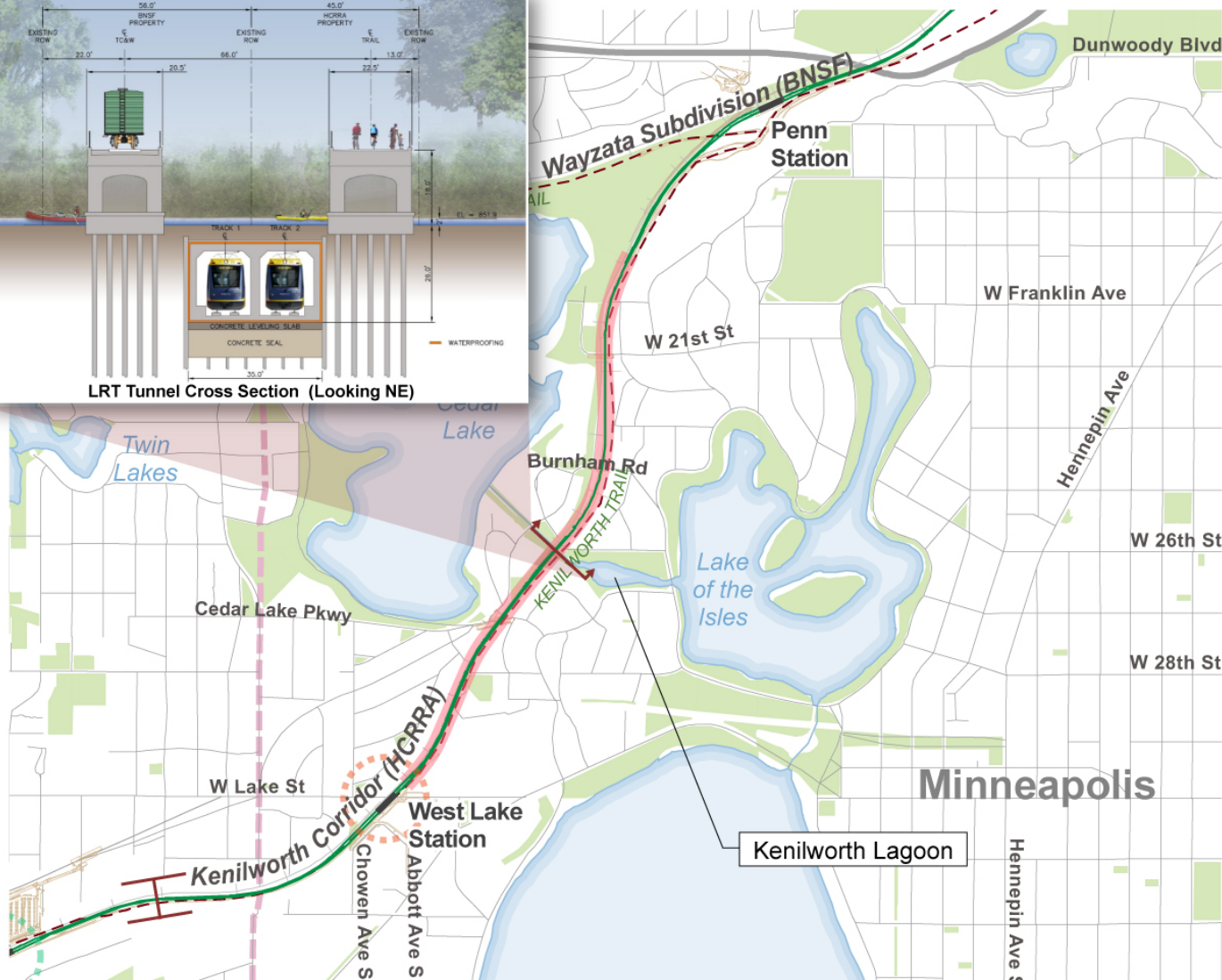
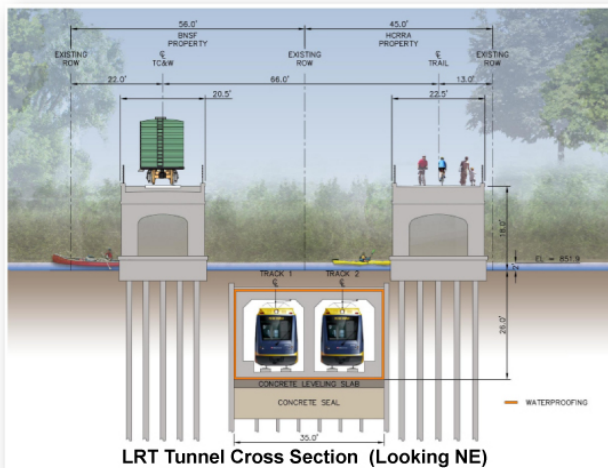
	<p>Southwest LRT Final EIS Short Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon</p>	<p>Exhibit F-28</p>		
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EXHIBIT F-29

Long Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon

LEGEND

-  City Boundary
-  Existing Freight Rail
-  Parklands, Recreation Areas, and Open Spaces
-  Proposed Southwest LRT
-  Proposed LRT Tunnel
-  Proposed LRT Station
-  Proposed Roadway, Bicycle/Pedestrian, and Parking Modifications
-  Proposed LRT At-Grade Crossing
-  Proposed LRT Grade-Separated Crossing
-  Proposed Freight Rail Connection
-  Existing Trail
-  Bass Lake Spur (CP)/Kenilworth Corridor (HCRRA) Boundary
-  Cross Section Location (P&R) Park-and-Ride Lot




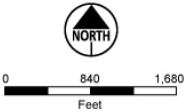

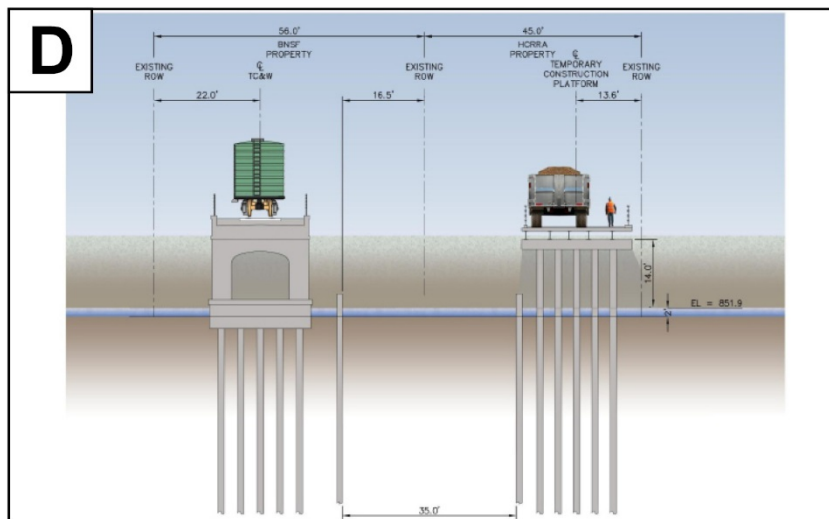
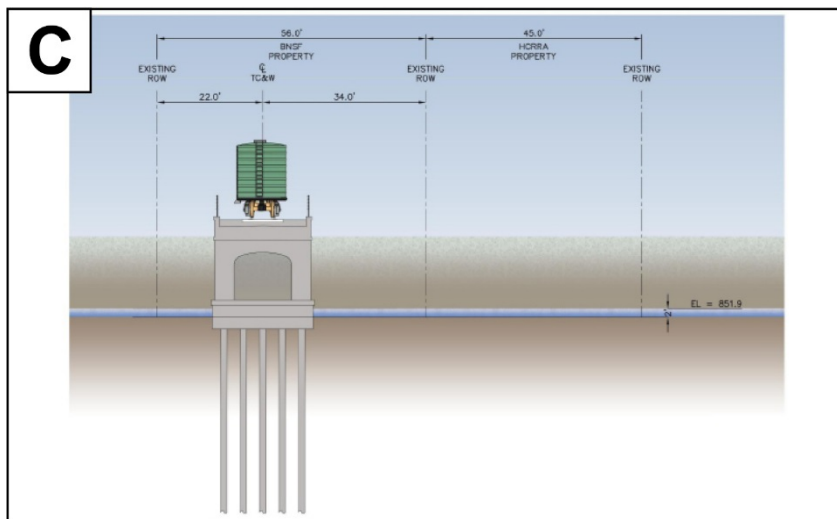
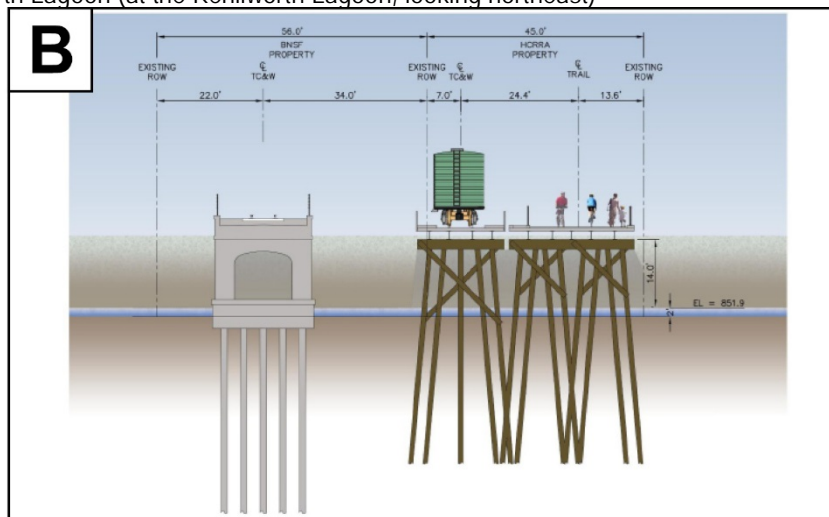
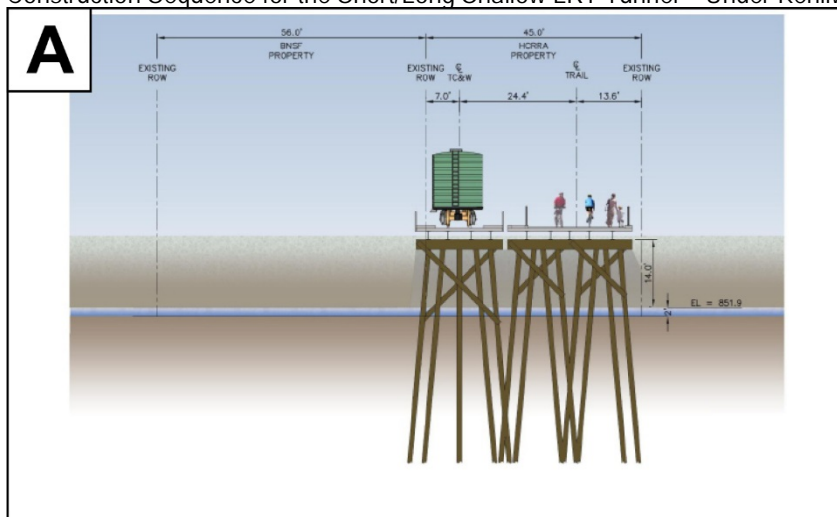
	<p>Southwest LRT Final EIS Long Shallow Cut-and-Cover Tunnel – Under Kenilworth Lagoon</p>	<p>Exhibit F-29</p>		
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EXHIBIT F-30A

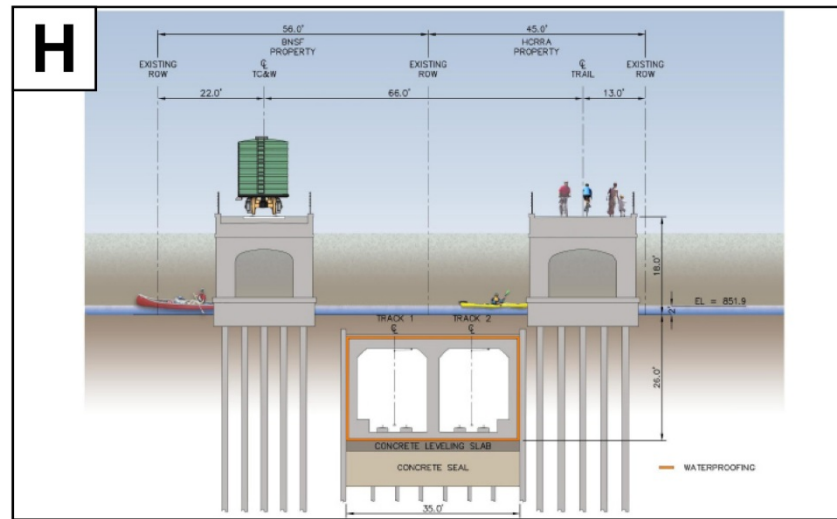
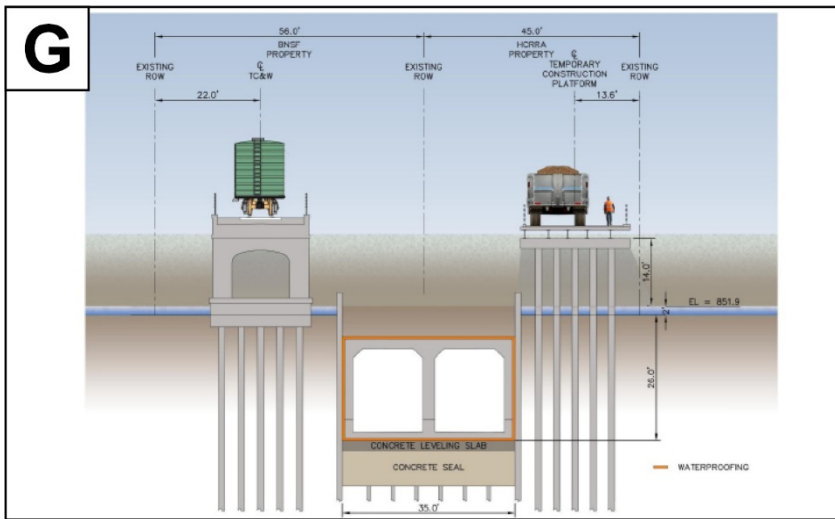
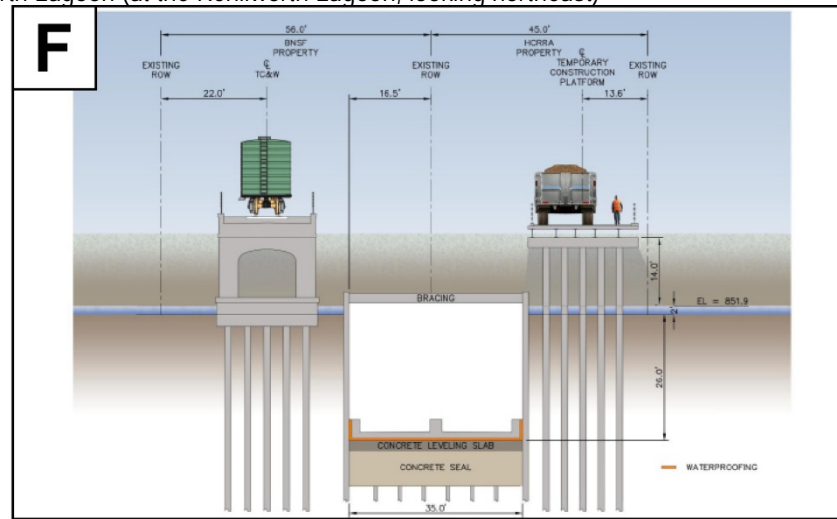
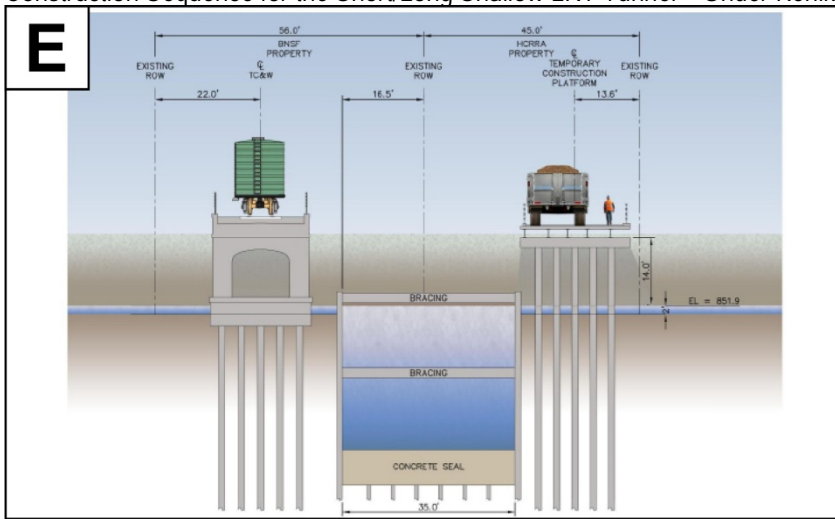
Construction Sequence for the Short/Long Shallow LRT Tunnel – Under Kenilworth Lagoon (at the Kenilworth Lagoon, looking northeast)



	<p style="text-align: center;">Southwest LRT Final EIS Construction Sequence for the Short/Long Shallow LRT Tunnel – Under Kenilworth Lagoon (at the Kenilworth Lagoon, looking northeast) St. Louis Park/Minneapolis Segment</p>	<p style="text-align: center;">Exhibit F-30A</p>	
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EXHIBIT F-30B

Construction Sequence for the Short/Long Shallow LRT Tunnel – Under Kenilworth Lagoon (at the Kenilworth Lagoon, looking northeast)



	<p>Southwest LRT Final EIS Construction Sequence for the Short/Long Shallow LRT Tunnel – Under Kenilworth Lagoon (at the Kenilworth Lagoon, looking northeast) St. Louis Park/Minneapolis Segment</p>	<p>Exhibit F-30B</p>	
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and operational concerns, including three reversing horizontal curves in the proposed freight rail alignment that would be especially problematic (the operator did not express similar concerns about the freight rail alignment that is part of the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment). In addition, the advantage of the Shallow LRT Tunnels – Over Kenilworth Lagoon, relative to the MN&S North adjustment, is that it would avoid: the potential displacement of approximately six residences and seven businesses and the acquisition of some St. Louis Park High School property; additional cost increases due to project delay of approximately \$45 to \$50 million; closure of local streets; and extension of the project's construction schedule by up to two years.¹³

- **Shallow LRT Tunnels – Over Kenilworth Lagoon; Short Shallow LRT Tunnel – Under Kenilworth Lagoon; and Long Shallow LRT Tunnel – Under Kenilworth Lagoon Adjustments.** Table F.5-8 provides a summary of the evaluation measures considered by the Council as it compared the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment to the two variations that would tunnel under the lagoon. In summary, the advantage of the Shallow LRT Tunnels – Over Kenilworth Lagoon adjustment, relative to the Short Shallow LRT Tunnel – Under Kenilworth Lagoon and the Long Shallow LRT Tunnel – Under Kenilworth Lagoon adjustments, is that it would: avoid closure of recreational traffic on the Kenilworth Lagoon for approximately one additional year; reduce short-term impacts to the Kenilworth Lagoon during construction, including the disruption of existing habitat within and adjacent to the Lagoon and closure of fish passage between Lake of the Isles and Cedar Lake during construction of the tunnel under the Lagoon; reduce long-term impacts to the Kenilworth Lagoon due to its reconstruction; avoid additional construction costs of \$30 to \$85 million and additional costs due to project delay of \$45 to \$90 million; and avoid extension of the project's construction schedule by up to one year.

Additional Design Adjustments – July 2014

In July 2014, the Council and the City of Minneapolis proposed a set of additional adjustments to the design of the Shallow LRT Tunnels – Over Kenilworth Lagoon option. The proposed additional design adjustments were outlined in a memorandum of understanding between the Council and the City. (See Appendix D, Sources and References Cited, for instructions on how to access the subsequently executed memorandum). In summary, the proposed additional design adjustments were intended to: (1) reduce project capital costs by eliminating the northern of the two proposed light rail tunnels in the Kenilworth Corridor (including the re-establishment of the proposed at-grade light rail station at West 21st Street) and (2) incorporate into the project a variety of bicycle and pedestrian access improvements associated with proposed light rail stations in the City of Minneapolis. On July 9, 2014, the CMC voted to recommend the additional design adjustments and, considering the recommendation from the CMC, the Council voted to approve the additional design adjustments proposed in the memorandum between the Council and the City of Minneapolis.

The LPA, as evaluated in the Supplemental Draft EIS, reflects the inclusion of the Shallow LRT Tunnel – Over Kenilworth Lagoon and the other light rail-related improvements described in this section as identified by the Council on April 9, 2014, and amended on July 9, 2014. Other potential light rail-related improvements and freight rail modifications developed and evaluated in this section were removed from further study.

1.5.2.2 Set 2 Design Adjustments

Following is a summary of the Set 2 Adjustments made to LRT3A. As previously noted, these design adjustments, which were approved by the Council in April 2014, were developed and evaluated in a process that paralleled the Set 1 Design Adjustment process. Further, these Set 2 Adjustments and the Set 1 Adjustments have been fully integrated into the revised LPA and they form the basis of the environmental analysis in the Supplemental Draft EIS for the St. Louis Park/Minneapolis Segment.

¹³ Approximately one year of the anticipated delay is for the pursuit of an adverse abandonment with the STB for existing freight rail service on the CP-owned Bass Lake Spur, east of the MN&S Spur, and the HCRRA-owned Kenilworth Corridor. The outcome and actual duration of this process would remain uncertain until conclusion of the process. Approval by STB could require TC&W and CP to cease freight rail operations in the Kenilworth Corridor and relocate those operations from the current location.

- **The Freight Rail and Light Rail “Swap” and “Southerly Connection.”** In coordination with the cities and affected railroad owners, the project developed and evaluated a design adjustment (i.e., the freight rail and light rail “Swap”) that would place the proposed Blake, Louisiana, and Wooddale stations south of a portion of the existing CP freight line (under the Draft EIS conceptual design, those stations would have been located north of the existing CP freight line). The intent of the adjustment is to situate those proposed light rail stations closer to primary existing activity centers and potential development/redevelopment sites, which are predominantly south of the existing freight line. The design adjustment would generally place the proposed light rail alignment and stations within the current freight rail right-of-way, and the freight rail alignment would be moved approximately 45 feet north onto right-of-way currently owned by HCRRA (purchased as future light rail right-of-way and where light rail would have been under the conceptual design of LRT 3A and LRT 3A-1 within Draft EIS). In addition, the Cedar Lake LRT Trail, which is a permitted temporary use within the HCRRA-owned right-of-way north of the existing freight rail alignment, would be reconstructed further north within that same right-of-way, staying north of the repositioned freight rail alignment. The design adjustment, illustrated on Exhibit F-31, would include a grade-separated crossing of the proposed light rail alignment over the freight rail alignment immediately east of Excelsior Boulevard to permit the freight rail and light rail alignments to swap locations within the corridor. The adjustment also would require the elimination of the northern branch of the Skunk Hollow switching wye and its replacement with the “Southerly Connection” (allowing TC&W trains continued access between the Bass Lake Spur eastbound to the southbound MN&S Spur and the reverse), also illustrated on Exhibit F-31. The Swap would also require the modification of the Cedar Lake LRT Trail at several locations, although continuity of and connections to the trail would be maintained. Further, this would result in the closure of approximately 11,771 feet of freight rail siding track segments, generally between the Downtown Hopkins Station and east of Beltline Boulevard. The Council incorporated the Swap design modification into the LPA in April 2014 because the potential land use and economic development benefits and improved transit access to existing activity centers outweighed its additional cost and adverse environmental impacts, such as the additional moderate visual impacts of the new light rail overcrossing of the freight rail alignment in St. Louis Park.
- **Adjustment to the Location of Louisiana Station.** At the request of the City of St. Louis Park, the project team developed a range of potential design adjustments that would place the proposed Louisiana Station further south than it would have been under the conceptual design of LRT 3A and LRT 3A-1 in the Draft EIS, based on the freight and light rail swap previously discussed. The objective of these proposed design adjustments was to bring the light rail station further south, closer to activity centers North of Excelsior Boulevard. Two general design adjustments were developed and evaluated. The first would place the light rail station approximately halfway between the location of the existing freight rail tracks and Oxford Street. The second would use the north leg of the Skunk Hollow switching wye (to be abandoned and replaced with the Southerly Connection under the freight and light rail swap) to place the Louisiana Station approximately 300 feet north of Louisiana Circle. The second potential design adjustment would also have resulted in abandonment of the south leg of the Skunk Hollow switching wye and relocation of the Robert B. Hill Company salt facility at the end of the switching wye because it would no longer have freight rail access. The Council incorporated the first design refinement into the LPA in April 2014, because of its relatively lower costs and property acquisition needs compared to the second design refinement and because of the potential development and redevelopment benefits of placing a light rail station closer to Oxford Street.
- **Adjustment to the Capacity and Locations of Park-and-Ride Lots.** Based on the City of Minneapolis’ comments on the Draft EIS, the project team developed design adjustments that would change the proposed location and capacities of park-and-ride lots in the area included within the St. Louis Park/Minneapolis Segment. In particular, the City asked that proposed surface park-and-ride lots be removed from the stations within the City of Minneapolis. Concurrently, to help ensure park-and-ride lot capacity to meet forecast demand in 2030, the project team also developed and evaluated options for increased capacity at the Beltline Station because of its relatively direct automobile access to and from Highway 100 (via Highway 7, Highway 25 and West Lake Street). As a result of the proposed design adjustment, the number of park-and-ride lots in the segment would be reduced from six to two, while the

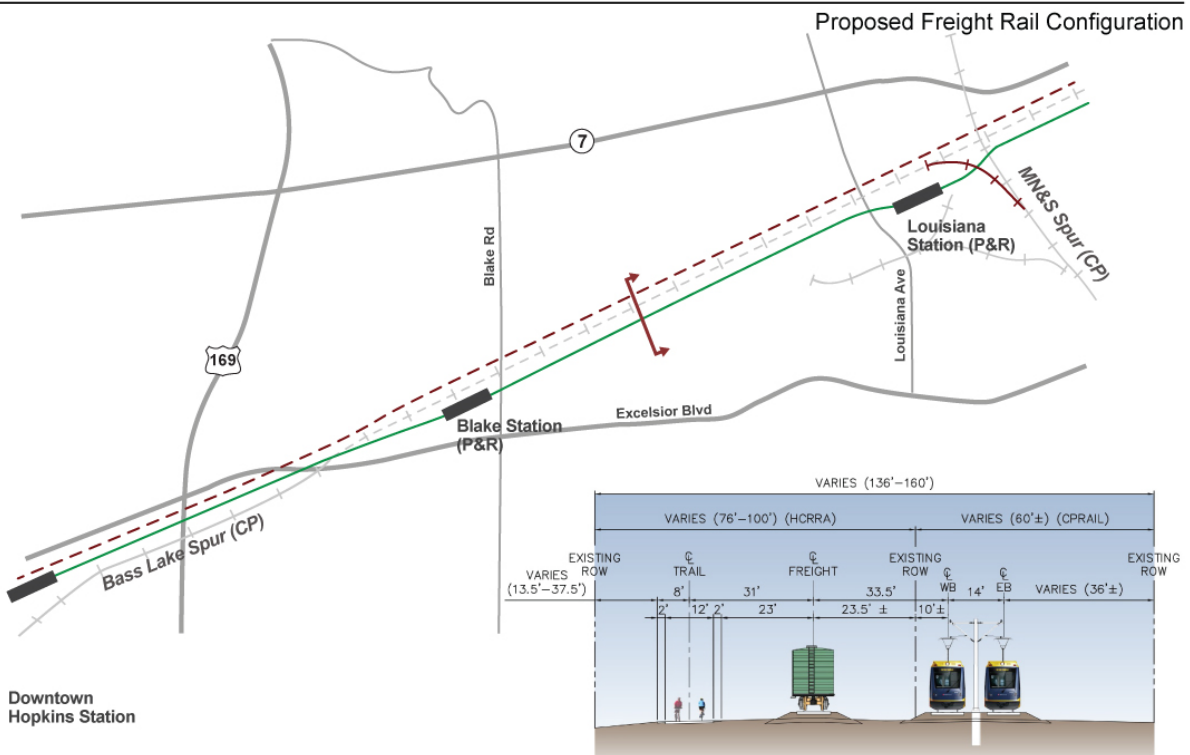
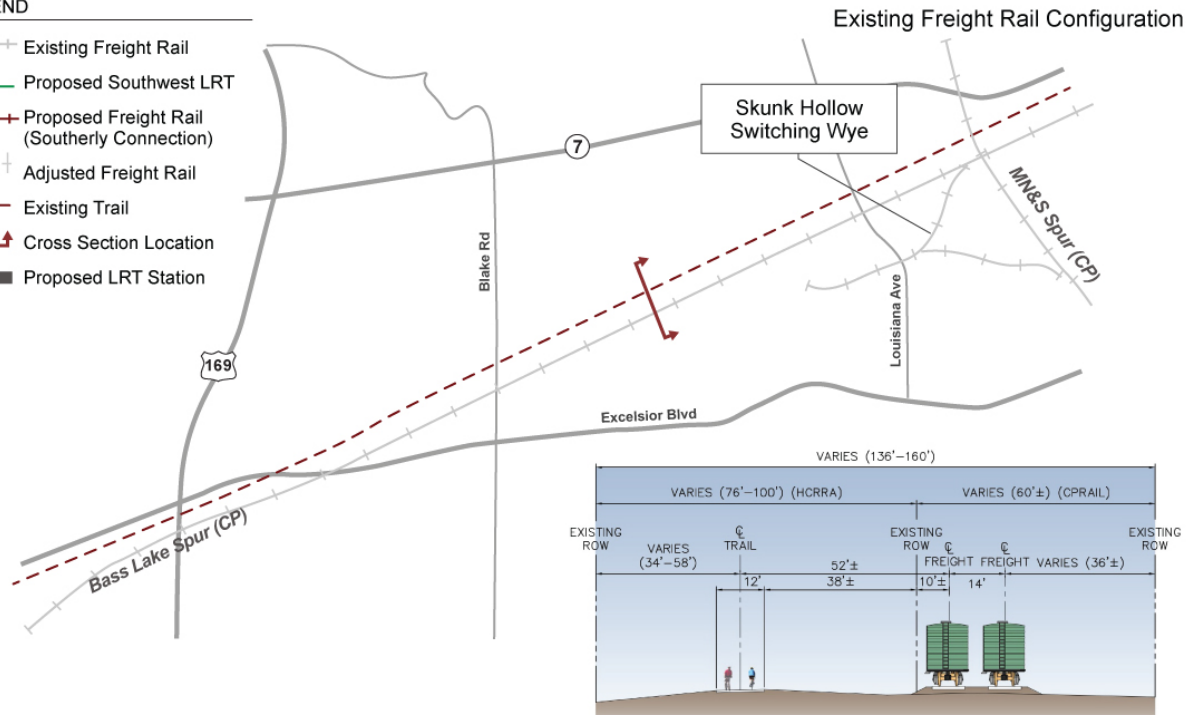
park-and-ride capacity would increase from 650 to 809 spaces, relative to the conceptual design of LRT 3A and LRT 3A-1 in the Draft EIS (see Section 2.3.3 of the Draft EIS). The Council incorporated the design adjustment into the LPA because of the generally improved access between regional highways and proposed park-and-ride lot locations.

Bicycle, Pedestrian, and Bus Access Improvements at West Lake and Penn Stations. Based on the City of Minneapolis' comments on the Draft EIS, the project team developed and evaluated adjustments to the proposed bicycle, pedestrian, and bus facilities at West Lake and Penn stations. The adjustments developed include the addition of vertical circulation connecting the West Lake Station and the West Lake Street bridge and on-street bus transfer facilities on West Lake Street. The adjustments also include grade-separated bicycle and pedestrian connections and improved kiss-and-ride facility at the Penn Station. The Council incorporated the design adjustment into the LPA in April and July 2014 due to the relatively high level of projected ridership at the two stations and the improved access that the adjustments would provide to walk-on and bus-transfer riders.


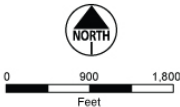

EXHIBIT F-31
Proposed Freight Rail Modifications

LEGEND

- +— Existing Freight Rail
- Proposed Southwest LRT
- +— Proposed Freight Rail (Southerly Connection)
- Adjusted Freight Rail
- - - Existing Trail
- ↕ Cross Section Location
- █ Proposed LRT Station



Downtown Hopkins Station

	<p>Southwest LRT Final EIS Proposed Freight Rail Modifications</p>	<p>Exhibit F-31</p>		
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7.0 Evaluation

7.1 Overview

This chapter describes the evaluation process and documents the evaluation results of the Southwest Transitway Alternatives Analysis (AA). Detailed information on the Southwest Transitway AA evaluation results are included in *Technical Memorandum No. 4, Evaluation Process and Results*.

The purpose of the evaluation was to identify key benefits, costs and impacts of each alternative in order to identify those alternatives most likely to successfully address the Southwest Transitway goals of improving mobility, providing a cost-effective/efficient travel option, protecting the environment, preserving the quality of life, and supporting economic development. After conducting a thorough evaluation of the alternatives only these alternatives were recommended for further study.

7.2 Background and Assumptions

To develop the evaluation measures, the Southwest Technical Advisory Committee (TAC) considered the Southwest Transitway goals and the Federal Transit Administration (FTA) New Starts Project Justification Evaluation Criteria.

7.2.1 Southwest Transitway Goals

The goals adopted by the Southwest Policy Advisory Committee (PAC) include the following:

1. Improve Mobility
2. Provide a Cost-Effective and Efficient Travel Option
3. Protect the Environment
4. Preserve the Quality of Life
5. Support Economic Development

7.2.2 Federal Transit Administration New Starts Evaluation Criteria

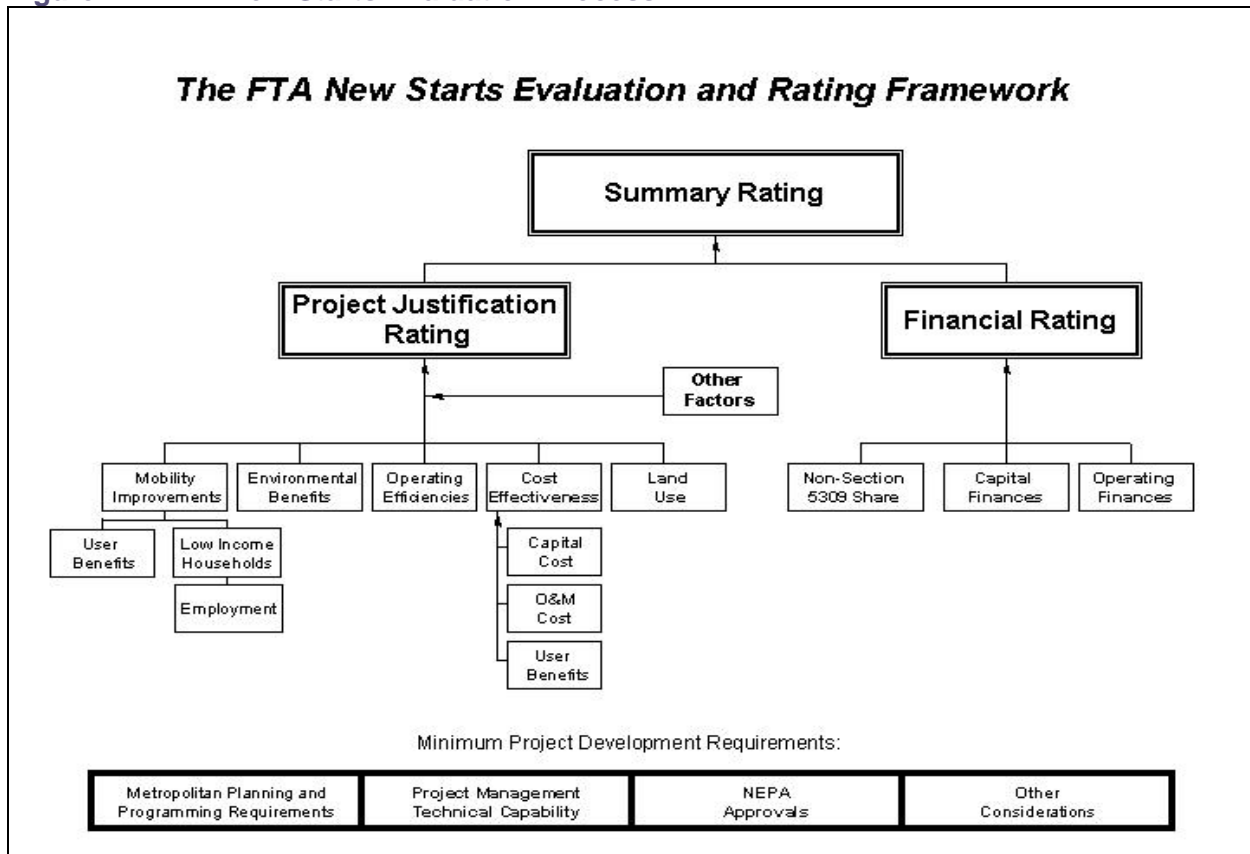
The FTA rates projects requesting Section 5309 New Starts funding in the areas of project justification and local financial commitment. These ratings are then combined into an overall project rating. Figure 7.1 graphically depicts the FTA New Starts Evaluation Process.

The FTA New Starts project evaluation is an on-going process. FTA evaluation and rating occurs annually in support of budget recommendations presented in the *Annual Report on New Starts* and when a project sponsor requests FTA approval to advance their proposed New Starts project into Preliminary Engineering and Final Design. Consequently, as proposed New Starts projects proceed through the project development process, information concerning costs, benefits and impacts are updated as the project becomes more refined and the ratings are updated to reflect this new information.

7.2.3 Project Justification Rating

The FTA requires that proposed New Starts projects be justified based upon their performance in the areas of mobility improvement, environmental benefits, operating efficiencies, cost-effectiveness and land use. These five criteria comprise the New Starts Project Justification Criteria, which are outlined in more detail in Table 7.1.

Figure 7.1 FTA New Starts Evaluation Process



Source: Annual Report on New Starts, Proposed Allocation of Funds for Fiscal Year 2007, Report of the Secretary of Transportation to the United States Congress, Pursuant to 49 U.S.C. 5309(k), Appendix B: FY 2007 Evaluation and Rating Process, page B-6.

Table 7.1 New Starts Project Justification Criteria and Supporting Measures and Categories

Criterion	Measures/Categories
Cost Effectiveness	<ul style="list-style-type: none"> Incremental Cost per Hour of Transportation System User Benefit
Transit-Supportive Land Use and Future Patterns	<ul style="list-style-type: none"> Existing Land Use Transit-Supportive Plans and Policies Performance and Impacts of Policies
Mobility Improvements	<ul style="list-style-type: none"> Normalized Travel Time Savings (Transportation System User Benefit per Project Passenger Mile) Low-Income Households Served Employment Near Stations
Operating Efficiencies	<ul style="list-style-type: none"> System Operating Cost per Passenger Mile
Environmental Benefits	<ul style="list-style-type: none"> Change in Regional Pollutant Emissions Change in Regional Energy Consumption EPA Air Quality Designation

Source: Annual Report on New Starts, Proposed Allocation of Funds for Fiscal Year 2007, Report of the Secretary of Transportation to the United States Congress, Pursuant to 49 U.S.C. 5309(k)(1), Appendix B: FY 2007 Evaluation and Rating Process, page B-8.

7.2.4 Local Financial Commitment Rating

In addition to meeting the project justification criteria, the FTA requires that proposed New Starts projects be supported by an acceptable degree of local financial commitment, including evidence of stable and dependable financing sources to construct, maintain and operate the transit system.

The FY 2007 Local Financial Commitment evaluation measures were:

- The proposed share of total project costs from sources other than the Section 5309 New Starts program, including Federal formula and flexible funds, the local match required by Federal law, and any additional capital funding;
- The strength of the proposed capital financing plan; and
- The ability of the sponsoring agency to fund operation and maintenance of the entire system as planned once the guideway project is built.

7.3 Southwest Transitway Evaluation Process

After reviewing the FTA New Starts Criteria and considering the Southwest Transitway goals, the Southwest TAC developed and the Southwest PAC approved a set of evaluation measures. These evaluation measures attempt to incorporate the FTA New Starts Project Justification Criteria while at the same time addressing the adopted Southwest Transitway goals. For the most part the FTA New Starts Project Justification Criteria are included in the Southwest Transitway evaluation measures. However, the New Starts Local Financial Commitment Criteria were not included in the Southwest Transitway AA evaluation measures because the Southwest TAC and PAC considered it premature to focus on financing until it was known if a viable project existed.

Future project entry into the later Preliminary Engineering phase will require FTA approval based on the FTA's assessment of the material produced in the AA and the agency's project ratings. The complete Federal evaluation process for the Southwest Transitway will occur during a future phase of project development; however, as discussed above, many of the local evaluation measures mirror the current FTA evaluation measures, and thus give some early indication as to how the Southwest Transitway may be rated by FTA once a locally preferred alternative is submitted to FTA.

For purposes of evaluating the alternatives, the Southwest Transitway PAC prioritized the goals into two tiers. Tier One goals are those that must be achieved in order for a viable project to exist. Tier Two goals are those that should be achieved assuming a viable project exists. Tier One goals are (1) Improve Mobility and (2) Provide a Cost-Effective, Efficient Travel Option. Tier Two goals are (3) Protect the Environment, (4) Preserve the Quality of Life in the Study Area and the Region, and (5) Support Economic Development.

Both quantitative and qualitative data for the alternatives was developed for all transitway alternatives. The raw data was translated into ratings indicating how well each alternative addressed the Southwest Transitway goals and evaluation measures. The following ratings were used:

- Alternative strongly supports goal
- Alternative supports goal
- Alternative does not support goal

Tables 7.2 through 7.6 identify the ratings for each alternative with respect to the five goals. Tables containing the raw data for each of the evaluation measures can be found in *Technical Memorandum No. 4, Evaluation Process and Results*.

7.4 Southwest Transitway Evaluation Measures

The evaluation measures for each goal are listed below.

Goal 1: Improve Mobility

- Project Ridership (2030)
- New Transit Riders (2030)
- Travel Time Savings (2030)
- Transportation Capacity
- Travel Time Competitiveness
- System Integration
- Transit Dependent Populations Served
- Jobs and Population Served

Goal 2: Provide a Cost-Effective and Efficient Travel Option

- Capital Cost (2015)
- Operating Cost (2015)
- Preliminary Cost-Effectiveness Index (CEI)
- Peer City Comparisons
- Potential Impact to Street Network

Goal 3: Protect the Environment

- Vehicle Miles of Travel
- Emissions
- Potentially affected natural environment
- Potentially affected residences
- Inventory of compact land use at stations

Goal 4: Preserve the Quality of Life

- Anticipated impact of vehicle technology on property values
- Access to community amenities (libraries, parks, trails)
- Access to employment opportunities for low-income households (2030)
- Intermodal connections
- Integration and documentation of transit-oriented development (TOD) opportunities/plans in local comprehensive plans
- Transit ridership forecast (2030)
- Potential for intensification of land use around stations
- Consistency with regional growth plans
- Impact of park-and-ride lots on existing and planned development at stations
- Access to and accommodation of the existing and future trail system

Goal 5: Support Economic Development

- TOD potential at station locations
- Jobs within 1/2 mile of stations (2030)
- Other activity generators (schools, medical facilities, entertainment venues, etc.) within 1/2 mile of stations.
- Consistency with local comprehensive plan goals regarding economic development and redevelopment at stations, including park-and-ride sites

7.5 Evaluation Results

7.5.1 Goal 1: Improve Mobility

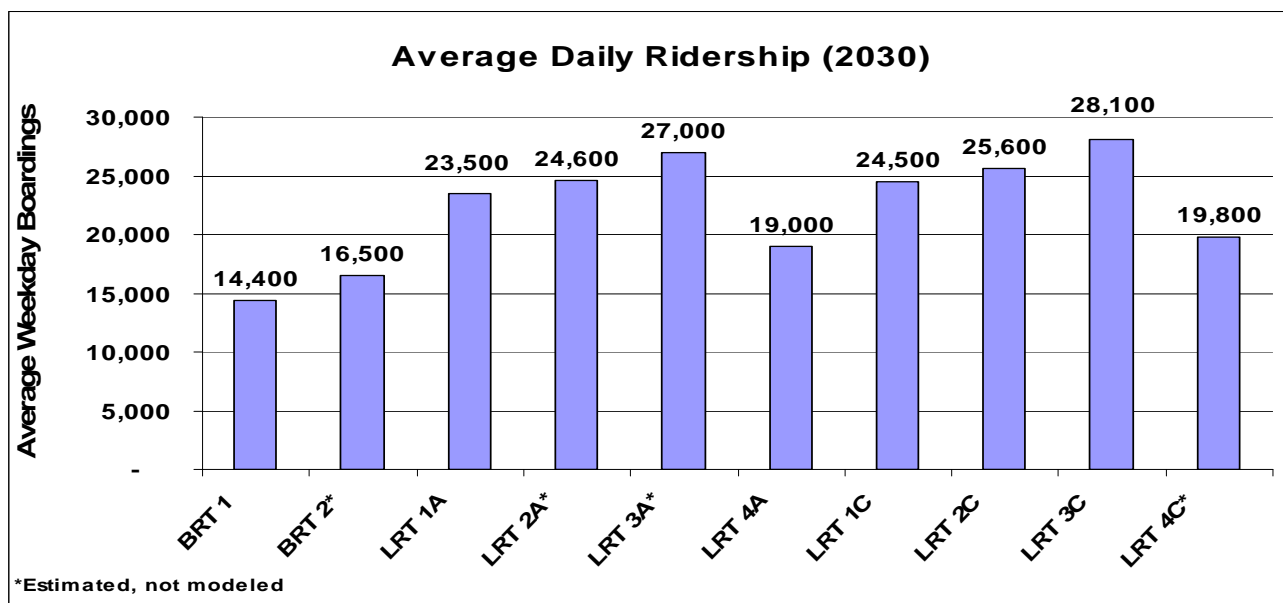
Each of the evaluation measures for Goal 1 was applied to the build alternatives described in Chapter 5, Definition of Alternatives. Resulting ratings are described below and summarized in Table 7.2.

Transit Ridership Forecast (2030) – Defined as the estimated number of transit riders in the forecast year of 2030 using the Metropolitan Council’s travel demand model.

<u>Ratings:</u>	Strongly supports goal =	More than 20,000 passengers per day
	Supports goal =	15,000 to 20,000 passengers per day
	Does not support goal =	Less than 15,000 passengers per day

Results:

Figure 7.2 Average Daily Ridership (2030)



LRT 1A, LRT 2A, LRT 3A, LRT 1C, LRT 2C and LRT 3C attract an average weekday ridership of over 20,000 passengers a day, and are therefore considered to strongly support the goal of improving mobility.

BRT 2, LRT 4A and LRT 4C attract an average weekday ridership of between 15,000 and 20,000 passengers a day, and are therefore considered to support the goal of improving mobility.

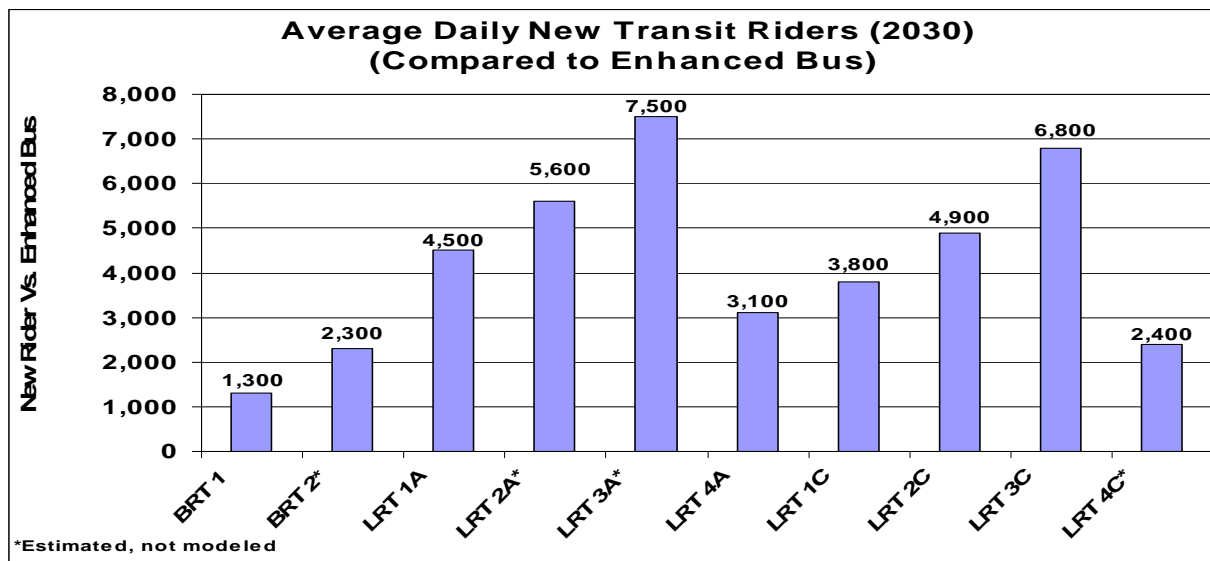
BRT 1 attracts an average weekday ridership of less than 15,000 and is therefore considered to not support the goal of improving mobility.

New Transit Riders (2030) - Defined as the estimated number of new transit riders compared to the Enhanced Bus alternative in the forecast year of 2030 using the Metropolitan Council's travel demand model.

Ratings: Strongly supports goal = More than 4,000 new passengers per day
 Supports goal = 2,000 to 4,000 new passengers per day
 Does not support goal = Less than 2,000 new passengers per day

Results:

Figure 7.3 Average Daily New Transit Riders (2030) Compared to Enhanced Bus



LRT 1A, LRT 2A, LRT 3A, LRT 2C and LRT 3C attract an average of over 4,000 new transit riders a day, and are therefore considered to strongly support the goal of improving mobility.

BRT 2, LRT 4A, LRT 1C and LRT 4C attract an average of between 2,000 and 4,000 new transit riders a day, and are therefore considered to support the goal of improving mobility.

BRT 1 attracts less than 2,000 new transit riders a day, and is therefore considered to not support the goal of improving mobility.

Travel Time Savings (2030) - Defined as the change in annual vehicle hours traveled (VHT) relative to the Enhanced Bus alternative in the forecast year of 2030 using the Metropolitan Council's travel demand model. This applies to automobile trips only.

Ratings: Strongly supports goal = More than a 1% savings in VHT
 Supports goal = 0 to 1% savings in VHT
 Does not support goal = Increased VHT

Results:

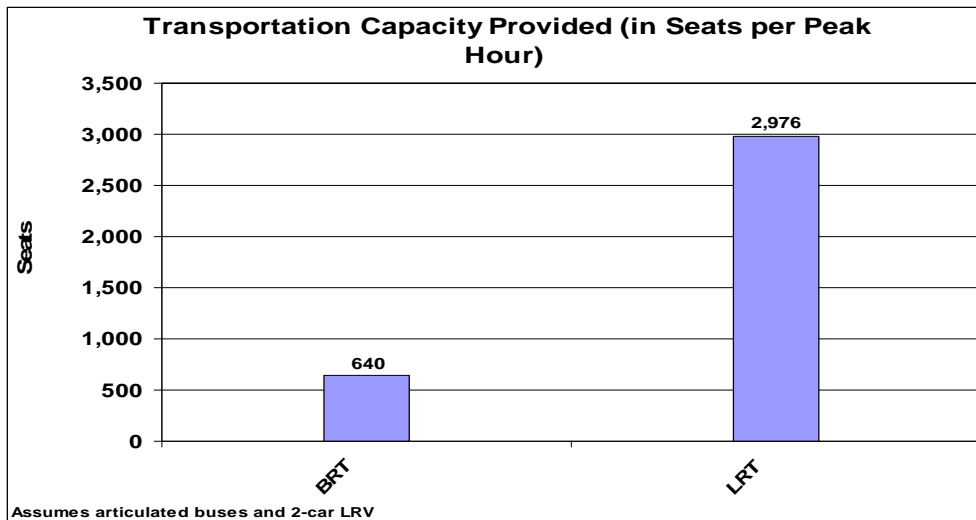
All 10 alternatives are projected to result in a reduction of vehicle hours of travel (VHT) of less than 1% and are therefore considered to support the goal of improving mobility.

Transportation Capacity Provided - Defined as the number of transit spaces provided by the alternative based upon vehicle capacity and frequency of service.

Ratings: Strongly supports goal = More than 2,000 seats during a peak hour.
Supports goal = 1,000 to 2,000 seats during a peak hour.
Does not support goal = Less than 1,000 seats during a peak hour.

Results:

Figure 7.4 Transportation Capacity Provided (in Seats per Peak Hour)



The BRT alternatives were estimated to provide 640 transit spaces during a peak hour; the LRT alternatives were estimated to provide 2,976 transit spaces during a peak hour. This was calculated by multiplying the vehicle capacity of the alternative by the number of trips during a peak hour. Using a 7.5 minute peak frequency, both the BRT and LRT alternatives would provide 8 trips per peak hour per direction. Because the BRT vehicles cannot be coupled into multiple-car trains, their passenger capacity is limited to 80 transit spaces per vehicle, assuming an articulated vehicle. This equates to 640 transit spaces per peak hour per direction. Because the LRT vehicles (LRVs) can be coupled into 2- and 3-car trains, with each LRV carrying 186 passengers, the passenger capacity per 2-car train set is 372. This equates to 2,976 transit spaces per peak hour per direction.

All LRT alternatives with 2-car trains can provide a peak hour, peak direction passenger capacity of 2,976 and are therefore considered to strongly support the goal of improving mobility.

BRT 1 and BRT 2 can provide a peak hour, peak direction passenger capacity of 640, and are therefore considered to not support the goal of improving mobility.

Travel Time Competitiveness - Defined as the estimated afternoon rush hour travel time via the proposed transitway versus the single occupant vehicle for a number of origin/destination pairs.

Ratings: Strongly supports goal = 2 minutes faster than auto in 3 + cases.
Supports goal = +/- 2 minutes of auto in 3 + cases.
Does not support goal = 2 minutes slower than auto in 3 + cases.

Results:

LRT 2C is the only alternative that provides travel times at least two minutes faster than an auto for three or more of the origin/destination pairs and is therefore considered to strongly support the goal of improving mobility.

LRT 1A, 2A, 3A, 4A, 1C, 3C and 4C provide travel times equivalent to automobile travel times in at least 3 of the origin/destination pairs and are therefore considered to support the goal of improving mobility.

The BRT alternatives provide travel times that are 2 minutes slower than an auto in three or more of the origin/destination pairs and are therefore considered to not support the goal of improving mobility.

System Integration - Defined as an alternative's ability to connect to existing and proposed transitways as identified in the Metropolitan Council's *Transportation Policy Plan* (TPP).

Ratings: Strongly supports goal = Can be easily interlined with existing and planned transitways.
Supports goal = Transfer required at either north or south end.
Does not support goal = Transfer required at both north and south end.

Results:

LRT 1A, 2A and 3A can be interlined with the Hiawatha and proposed Central LRT lines and are therefore considered to strongly support the goal of improving mobility.

LRT 1C, LRT 2C and LRT 3C require a transfer at the north end in downtown Minneapolis and LRT 4A requires a transfer at the south end and therefore are considered to support the goal of improved mobility.

The BRT and LRT 4C alternatives require transfers at both the north and south ends and therefore considered to not support the goal of improving mobility.

Transit Dependent Populations Served - Defined as the number of elderly (65 and older), youth (18 and younger), disabled, and zero-car households within ½ mile of stations based upon socioeconomic data contained in the 2000 Census. At the request of the Southwest Policy Advisory Committee (PAC), low income was also used as an indicator of transit dependency. Low-income households were defined as households with annual incomes less than 60% of the Median Family Income (MFI) in the 7-county metropolitan area. The MFI in 2000 was \$59,358; 60% of that is \$35,614.

Ratings: Strongly supports goal = Significant improvement over the Enhanced Bus alternative
 Supports goal = Similar to or moderate improvement over the Enhanced Bus alternative
 Does not support goal = Significantly below the Enhanced Bus alternative

Results:

Figure 7.5 Number of Transit Dependent Persons Living Within ½-Mile of Stations

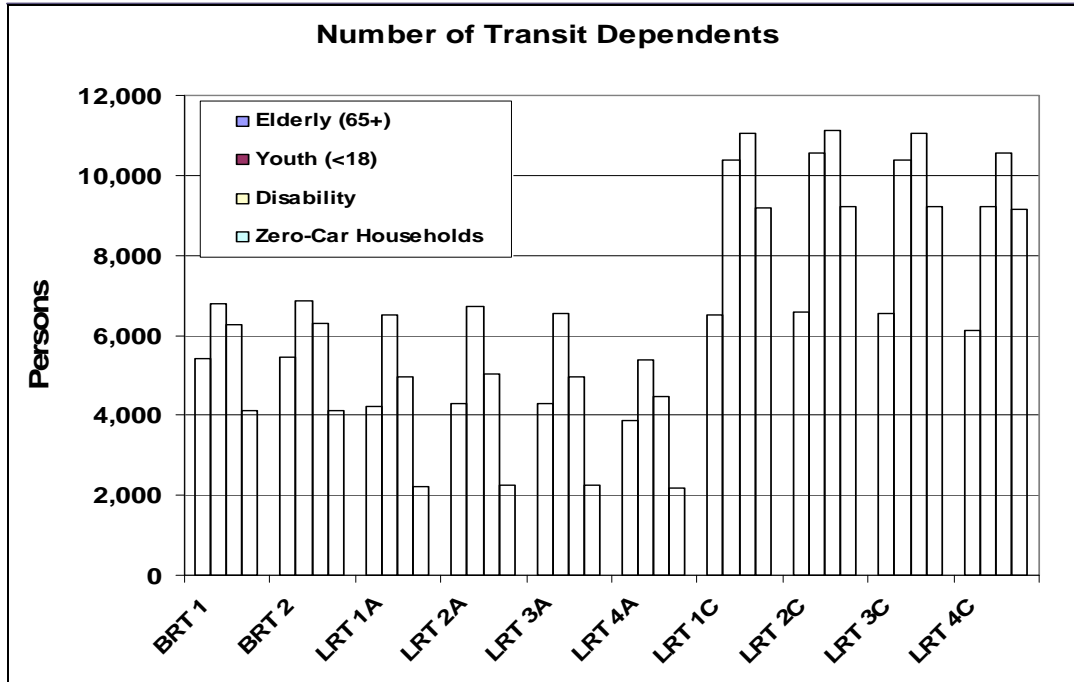
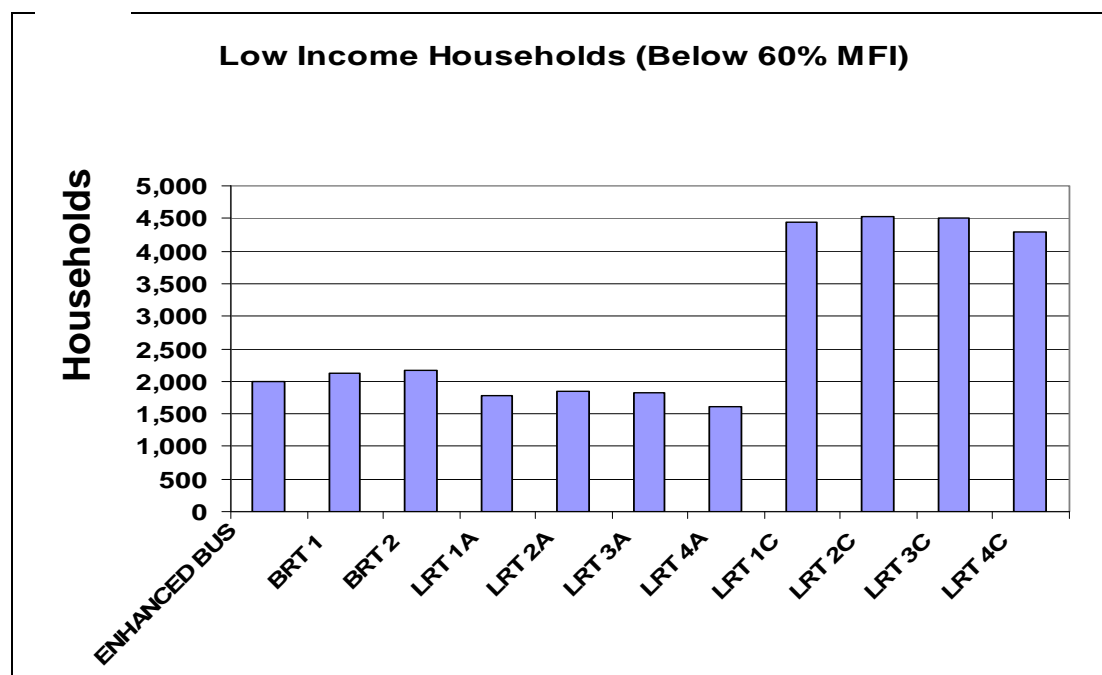


Figure 7.6 Low Income Households Living Within ½-Mile of Stations



Among the alternatives, LRT 1C, LRT 2C, LRT 3C and LRT 4C have the highest numbers of elderly (65 and older), youth (18 and younger), disabled, and zero-car households within ½ mile of stations in the forecast year of 2030 (Figure 7.5). LRT 1C, LRT 2C, LRT 3C and LRT 4C also have significantly higher populations of low income households within ½ mile of stations than does the Enhanced Bus alternative (Figure 7.6), and are therefore considered to strongly support the goal of serving transit dependent populations.

Compared to the LRT C alternatives, LRT 1A, LRT 2A, LRT 3A, LRT 4A, BRT 1 and BRT 2 have lower numbers of elderly (65 and older), youth (18 and younger), disabled, and zero-car households within ½ mile of stations in the forecast year of 2030. LRT 1A, LRT 2A, LRT 3A, LRT 4A, BRT 1 and BRT 2 also have similar or moderately higher populations of low income households within ½ mile of stations than the Enhanced Bus alternative, and are therefore considered to support the goal of transit dependent populations served.

It is important to note that LRT A alternatives terminate at the proposed Intermodal Station, and therefore do not extend into downtown Minneapolis as Southwest alternatives, but rather through the Hiawatha LRT line. Populations within ½ mile of the Hiawatha LRT stations (Warehouse, Nicollet, Government Center, and Metrodome) that would be accessed by the LRT 1A, LRT 2A, LRT 3A and LRT 4A alternatives are not included in these calculations because these stations are not technically considered part of those Southwest LRT alternatives.

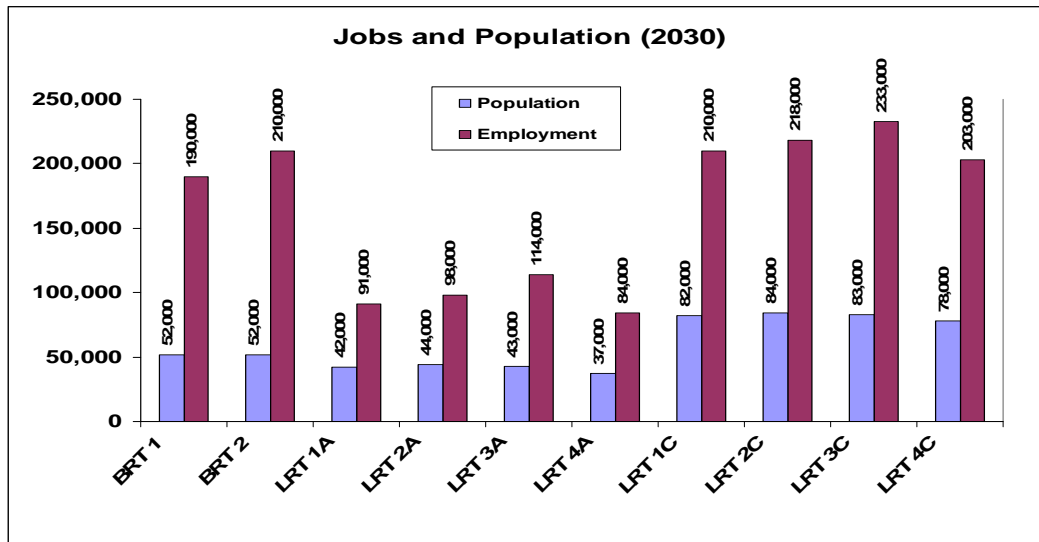
Jobs and Population within 1/2 mile of station (Year 2030) - Defined as jobs and population within ½ mile of stations in the forecast year of 2030 based upon socioeconomic forecasts contained in the Metropolitan Council’s travel demand model. As explained previously, jobs and population within ½ mile of the Hiawatha LRT stations (Warehouse, Nicollet, Government Center and Metrodome) that would be utilized by the LRT 1A, LRT 2A, LRT 3A and LRT 4A alternatives are not included in these

calculations.

<u>Ratings:</u>	Strongly supports goal =	More than 70,000 people More than 175,000 jobs
	Supports goal =	35,000 to 70,000 people 75,000 to 175,000 jobs
	Does not support goal =	Less than 35,000 people Less than 75,000 jobs

Results:

Figure 7.7 Jobs and Population Within ½-Mile of Stations (2030)



LRT 1C, 2C, 3C and 4C serve more than 70,000 people and 175,000 jobs and are therefore considered to strongly support the goal of improving mobility.

LRT 1A, 2A, 3A and 4A serve between 35,000 to 70,000 people and between 75,000 to 175,000 jobs, and are therefore considered to support the goal of improving mobility. BRT 1 and BRT 2 serve between 35,000 to 70,000 people and over 175,000 jobs, and are therefore considered to support the goal of improving mobility.

Table 7.2 Goal 1 Evaluation Ratings – Improve Mobility

Alternatives	Forecast Ridership (2030)	New Transit Riders (2030)	Travel Time Savings (2030)	Transitway Transportation Capacity Provided in Peak Hour	Travel Time Competitiveness (Transit vs. Auto)	System Integration	Transit Dependent Populations	Population and Employment ² (2030)	
BRT 1 Eden Prairie to Minneapolis, HCRRA	●	●	◐	●	●	●	◐	◐	○
BRT 2¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ TH 169/HCRRA	◐	○	◐	●	●	●	◐	◐	○
LRT 1A - Eden Prairie to Minneapolis, HCRRA/Kenilworth/ Royalston	○	○	◐	○	◐	○	◐	◐	◐
LRT 2A¹ - Eden Prairie to Minneapolis, I-494/HCRRA/ Kenilworth/Royalston	○	○	◐	○	◐	○	◐	◐	◐
LRT 3A¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/HCRRA/ Kenilworth/ Royalston	○	○	◐	○	◐	○	◐	◐	◐
LRT 4A - Hopkins to Minneapolis, HCRRA/ Kenilworth/Royalston	◐	◐	◐	○	◐	◐	◐	◐	◐
LRT 1C - Eden Prairie to Minneapolis, HCRRA/ Midtown/ Nicollet	○	◐	◐	○	◐	◐	○	○	○
LRT 2C - Eden Prairie to Minneapolis, I-494/HCRRA / Midtown/Nicollet	○	○	◐	○	○	◐	○	○	○
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/ Opus/HCRRA/ Midtown/Nicollet	○	○	◐	○	◐	◐	○	○	○
LRT 4C¹ - Hopkins to Minneapolis, HCRRA/Midtown/ Nicollet	◐	◐	◐	○	◐	●	○	○	○
¹ Estimated not modeled									
² Because LRT A alternatives end at the Intermodal Station, these alternatives access downtown employment via the Hiawatha line. Downtown employment is therefore not reflected in "A" station area numbers.									
Evaluation Breakpoints									
● Does not support goal	< 15 thousand	<2 thousand	Increased VHT	<1000 seats	>2 min slower than auto in 3 or more O/D pairs	Transfer required at north and south end	Below baseline alternative	<35 thousand	<75 thousand
◐ Supports goal	15-20 thousand	2-4 thousand	0-1% savings	1000-2000 seats	Equivalent to auto (w/in 2 min) in 3 or more O/D pairs	Transfer required at either north or south end	Moderate improvement over baseline alternative	35-70 thousand	75-175 thousand
○ Strongly supports goal	> 20 thousand	>4 thousand	>1% savings	>2000 seats	>2min faster than auto in 3 or more O/D pairs	Interlined with existing/planned transitway	Significant improvement over baseline alternative	>70 thousand	>175 thousand

¹Estimated not modeled

7.5.2 Goal 2: Provide a Cost-Effective and Efficient Travel Option

The performance of the alternatives under the evaluation measures for Goal 2 is described below and summarized in Table 7.3.

Capital Costs (2015) - Defined as the one-time costs to construct the transitway (guideway, stations, structures, right-of-way, engineering/design, administrations and contingencies), escalated from 2006 to 2015 using a 2.7% inflation rate.

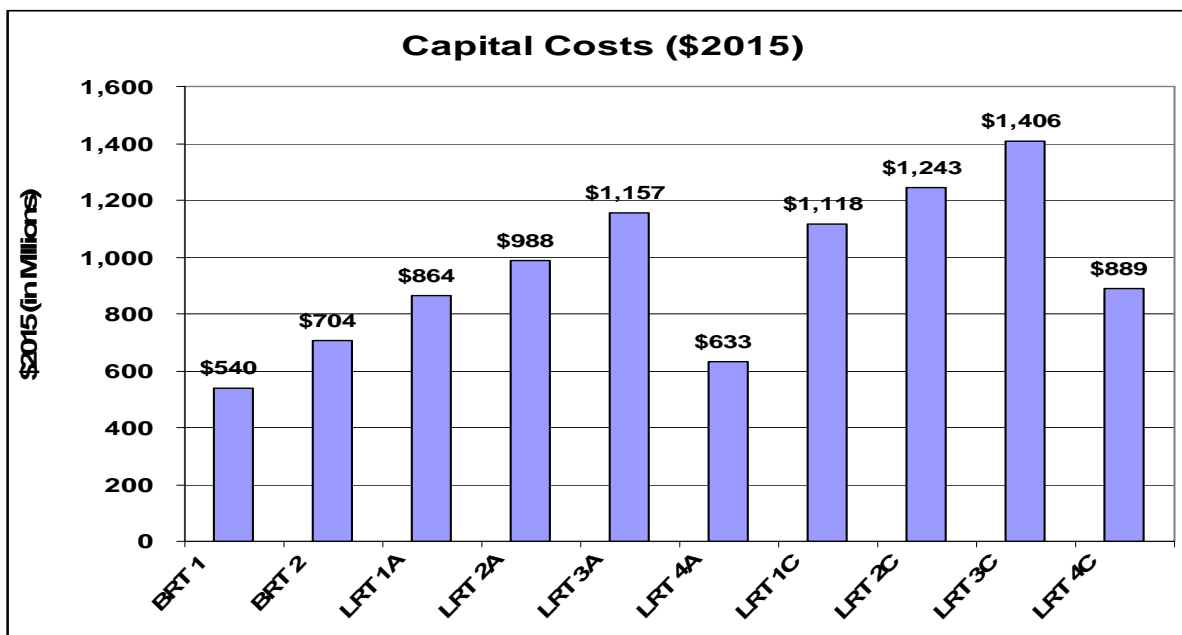
<u>Ratings:</u> Strongly supports goal =	Less than \$750 million total Less than \$40 million per mile
Supports goal =	\$750 million to \$1.5 billion total \$40 to \$90 million per mile
Does not support goal =	More than \$1.5 billion total More than \$90 million per mile

Results:

BRT 1, BRT 2 and LRT 4A have estimated capital costs less than \$750 million and are therefore considered to strongly support the goal of providing a cost-effective/efficient travel option.

LRT 1A, LRT 2A, LRT 3A, LRT 1C, LRT 2C, LRT 3C and LRT 4C have estimated capital costs between \$750 million and \$1.5 billion and are therefore considered to support the goal of providing a cost-effective/efficient travel option.

Figure 7.8 Capital Costs (2015)

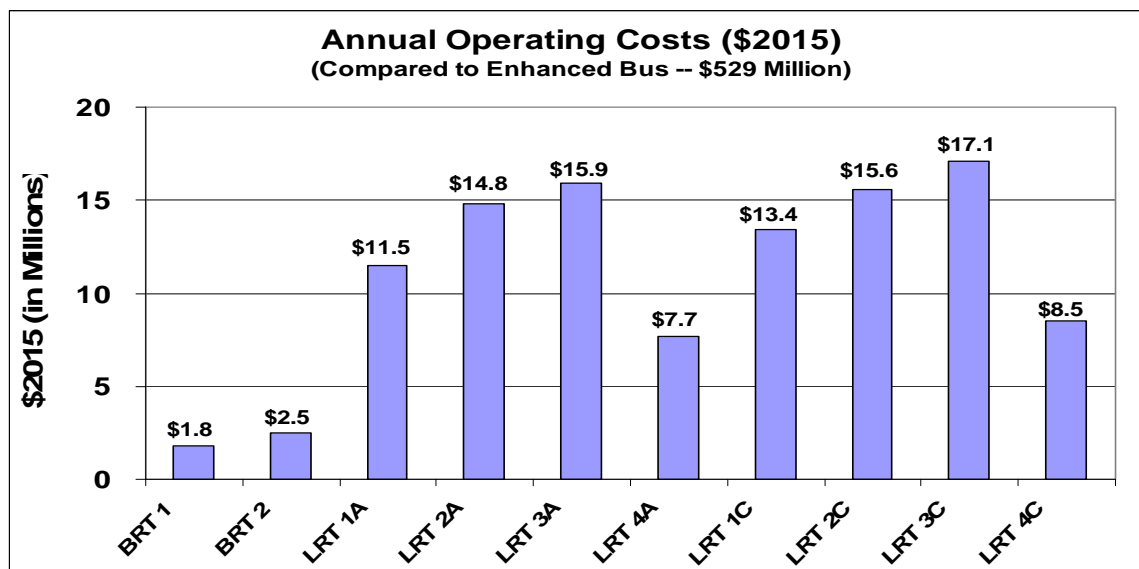


Operating Costs (2015) - Defined as the ongoing annual costs to operate and maintain the transitway alternative compared to the Enhanced Bus alternative, escalated from 2005 to 2015 using a 2.7 % inflation rate.

Ratings: Strongly supports goal = Less than \$12 million annually
 Supports goal = \$12 million to \$23 million annually
 Does not support goal = More than \$23 million annually

Results:

Figure 7.9 Annual Operating Costs (\$2015) Above Enhanced Bus



BRT1, BRT 2, LRT 1A and LRT 4A have projected operating costs of less than \$12 million annually and are therefore considered to strongly support the goal of providing a cost-effective/efficient travel option.

LRT 2A, LRT 3A, LRT 1C, LRT 2C, LRT 3C and LRT 4C have projected operating costs between \$12 million and \$23 million annually and are therefore considered to support the goal of providing a cost-effective/efficient travel option.

FTA Cost-Effectiveness Index (CEI) - Defined as an alternative’s annualized project cost (above the Enhanced Bus alternative) divided by its transportation system user benefits (above the Enhanced Bus alternative). User benefits are the traveler’s time savings. Preliminary CEIs were calculated using the capital and operating costs and ridership estimated and/or projected at the AA-level of analysis.

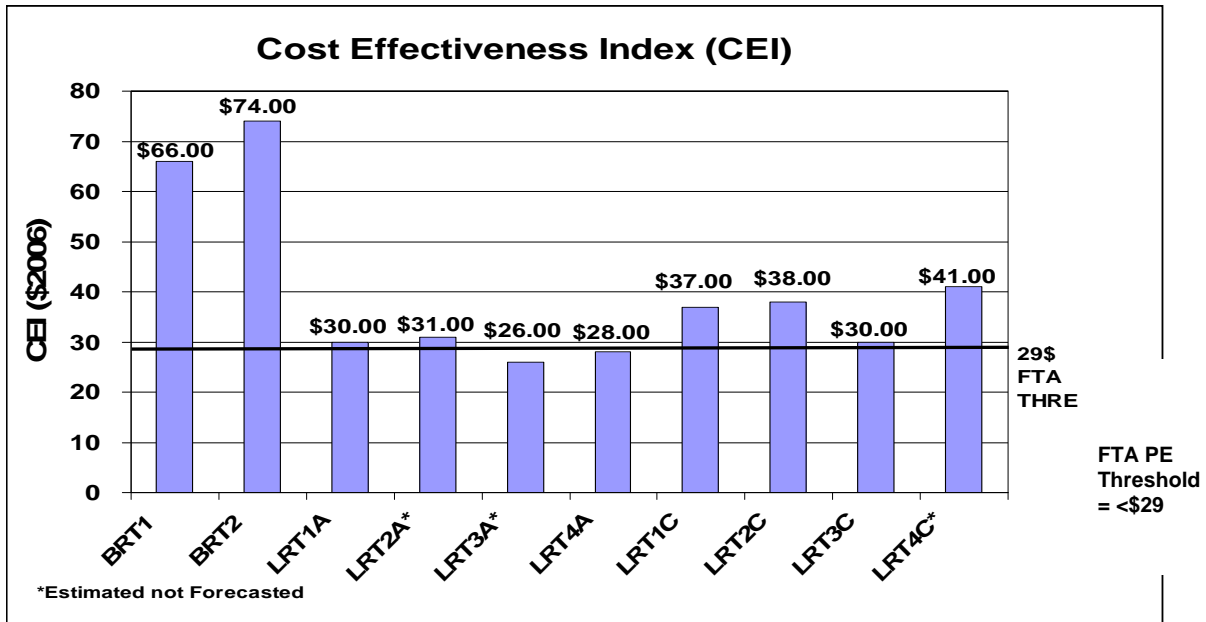
The FTA CEI threshold for approving a transitway to enter into Preliminary Engineering is \$28.99 or less.

Ratings: Strongly supports goal = Less than \$29 (under FTA threshold for PE)
 Supports goal = \$30 to \$35 (exceed FTA threshold by no more

Does not support goal = than 20%)
 More than \$35 (exceeds FTA threshold by more than 20%)

Results:

Figure 7.10 Cost Effectiveness Index (CEI)



LRT 3A and LRT 4A have preliminary CEIs that fall under the FTA threshold of \$29 and are therefore considered to strongly support the goal of providing a cost-effective and efficient travel option.

LRT 1A, LRT 2A and LRT 3C have preliminary CEIs that exceed the FTA threshold by no more than 20% and are therefore considered to support the goal of providing a cost-effective and efficient travel option.

BRT1, BRT 2, LRT 1C, LRT 2C and LRT 4C have preliminary CEIs that exceed the FTA threshold by more than 20% and are therefore considered to not support the goal of providing a cost-effective and efficient travel option.

Peer City Comparisons – This evaluation compared the Southwest AA alternatives to existing peer city systems for operating costs/passenger mile, operating costs/trip, operating costs/revenue hour, and passengers/revenue hour. These are standard measures in the transit industry for effectiveness and efficiency. The data source is the 2004 National Transit Database (NTD).

Ratings: Strongly supports goal = Better than range of peer systems
 Supports goal = Within range of peer systems
 Does not support goal = Worse than range of peer systems

Results:

All LRT and BRT alternatives perform better than their peers in terms of passengers/revenue hour, and fall within the range of their peer cities for the three other comparisons (operating costs / trip, and operating costs / revenue hour). All LRT and BRT alternatives are therefore considered to support the goal of cost effectiveness and efficiency.

Potential Impact to Street Network - Defined as the identification of intersections likely to require a traffic analysis during future detailed environmental study phase.

<u>Ratings:</u>	Strongly supports goal =	Avoids impact to street network
	Supports goal =	Some potential impact to street network
	Does not support goal =	Potentially significant impact to street network

Results:

BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A and LRT 4A are considered to have some potential impact to the street network and are therefore considered to support the goal of providing a cost-effective/efficient travel option.

LRT 1C, LRT 2C, LRT 3C and LRT 4C are considered to have potentially significant impacts to the street network, particularly in downtown Minneapolis, and are therefore considered to not support the goal of providing a cost-effective/efficient travel option.

Table 7.3 Goal 2 Evaluation Ratings – Provide a Cost-Effective and Efficient Travel Option

Alternatives	Transitway Capital Cost (2015)		Transitway Operating Costs (Annual Increment over Enhanced Bus) (2015)	Preliminary Cost Effectiveness Index (CEI) (2006\$) ¹	Peer City Comparison (2004)				Intersections identified for analysis during EIS
	Total	Per Mile			Operating cost / passenger mile ²	Operating cost / trip	Operating cost / revenue vehicle hour	Passengers / hour	
BRT 1 - Eden Prairie to Minneapolis, HCRRA	○	○	○	●	◐	◐	◐	○	◐
BRT 2¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ TH 169/ HCRRA	○	○	○	●	◐	◐	◐	○	◐
LRT 1A - Eden Prairie to Minneapolis, HCRRA/ Kenilworth/ Royalston	◐	◐	○	◐	◐	◐	◐	○	◐
LRT 2A¹ - Eden Prairie to Minneapolis, I-494/ HCRRA/ Kenilworth/ Royalston	◐	◐	◐	◐	◐	◐	◐	○	◐
LRT 3A¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRA/ Kenilworth/ Royalston	◐	◐	◐	○	◐	◐	◐	○	◐
LRT 4A - Hopkins to Minneapolis, HCRRA/ Kenilworth/ Royalston	○	◐	○	○	◐	◐	◐	○	◐
LRT 1C - Eden Prairie to Minneapolis, HCRRA/ Midtown/ Nicollet	◐	◐	◐	●	◐	◐	◐	○	●
LRT 2C - Eden Prairie to Minneapolis, I-494/ HCRRA/ Midtown/ Nicollet	◐	◐	◐	●	◐	◐	◐	○	●
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRA/ Midtown/ Nicollet	◐	◐	◐	◐	◐	◐	◐	○	●
LRT 4C¹ - Hopkins to Minneapolis, HCRRA/ Midtown/ Nicollet	◐	◐	◐	●	◐	◐	◐	○	●
¹ Estimated not modeled									
² FTA New Starts Evaluation Measure									
Evaluation Breakpoints									
● Does not support goal	>\$1.5 billion	>\$90 million	>\$23 million (2015)	>\$35.00 Exceeds FTA New Starts Threshold by >20%	Cost above range of peer systems	Cost above range of peer systems	Cost above range of peer systems	Below range of peer systems	Potentially significant impact to street network
◻ Supports goal	\$750-1.5 billion	\$40-90 million	\$12 million - \$23 million (2015)	\$20-35 Within 20% of FTA New Starts Threshold	Cost within range of peer systems	Cost within range of peer systems	Cost within range of peer systems	Within range of peer systems	Some impact to street network likely
○ Strongly supports goal	<\$750 million	<\$40 million	<\$12 million (2015)	<\$29.00 Consistent w/FTA New Starts Threshold	Cost below range of peer systems	Cost below range of peer systems	Cost below range of peer systems	Above range of peer systems	Avoids impact to street network

¹Estimated not modeled

7.5.3 Goal 3: Protect the Environment

The performance of alternatives under the evaluation measures for Goal 3 is described below and summarized in Table 7.4.

Change in vehicle miles of travel (VMT) (2030) - Defined as the change in VMT in the forecast year of 2030 using the Metropolitan Council's travel demand model.

<u>Ratings:</u> Strongly supports goal =	More than a 5% reduction
Supports goal =	0 to 5% reduction
Does not support goal =	No reduction

Results:

All 10 alternatives are expected to result in a reduction in VMT of less than 5% and are therefore all considered to support the goal of protecting the environment.

Reduction in emissions of hydrocarbons (HC), volatile organic compounds (VOC), nitrous oxides (NO_x) and carbon monoxide (CO) in annual metric tons (Year 2030) - Defined as the change/reduction in emissions in the forecast year of 2030, based on change in VMT using the Metropolitan Council's travel demand model.

<u>Ratings:</u> Strongly supports goal =	More than a 5% reduction
Supports goal =	0 to 5% reduction
Does not support goal =	No reduction

Results:

BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A, LRT 1C, LRT 2C and LRT 3C are expected to result in a reduction in HC, VOC, NO_x and CO of less than 5% and are therefore considered to support the goal of protecting the environment.

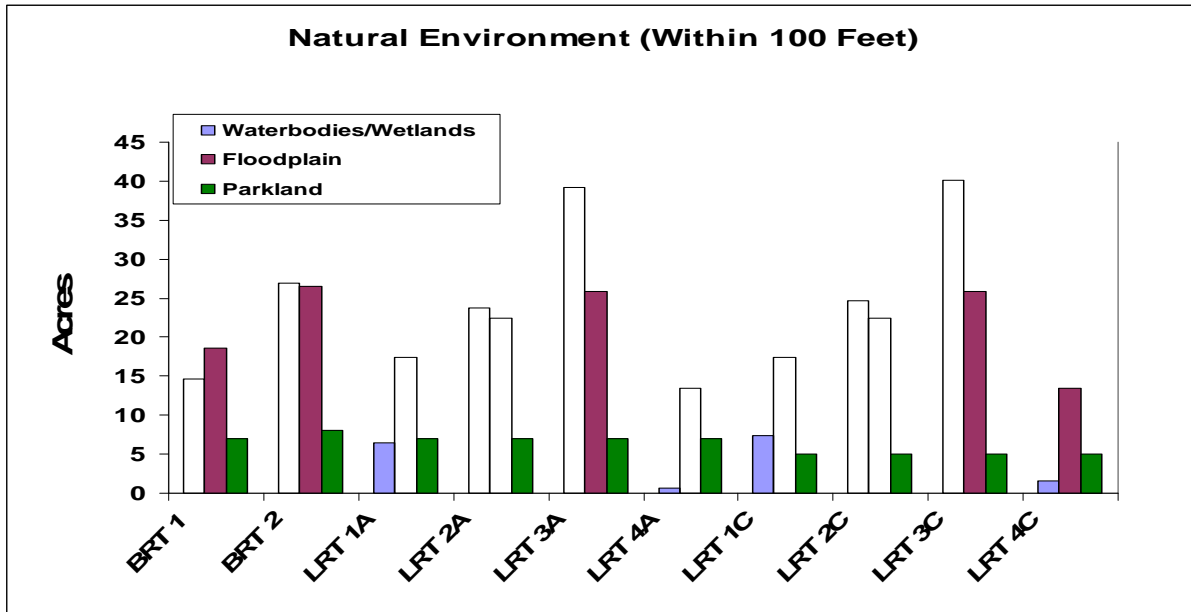
LRT 4A and LRT 4C are not expected to result in a reduction in HC, VOC, NO_x and CO, and are therefore considered to not support the goal of protecting the environment.

Potentially affected natural environment (wetlands, waterbodies, parklands and floodplains) within 100 feet - Defined as the number of wetlands, waterbodies, parklands and floodplains within 100 feet of the center line of the proposed transitway. The MetroGIS database was used to compile this information.

<u>Ratings:</u> Strongly supports goal =	Less than 25 acres combined
Supports goal =	20 to 50 acres combined
Does not support goal =	More than 50 acres combined

Results:

Figure 7.11 Natural Environment (Within 100 Feet)



Due to their shorter routes, LRT 4A and LRT 4C affect less than 25 acres of the natural environment and are therefore considered to strongly support the goal of protecting the environment.

BRT 1, LRT 1A and LRT 1C are expected to affect between 25 and 50 acres of the natural environment and are therefore considered to support the goal of protecting the environment.

BRT 2, LRT 2A, LRT 3A, LRT 2C and LRT 3C are expected to affect more than 50 acres of the natural environment and are therefore considered to not support the goal of protecting the environment.

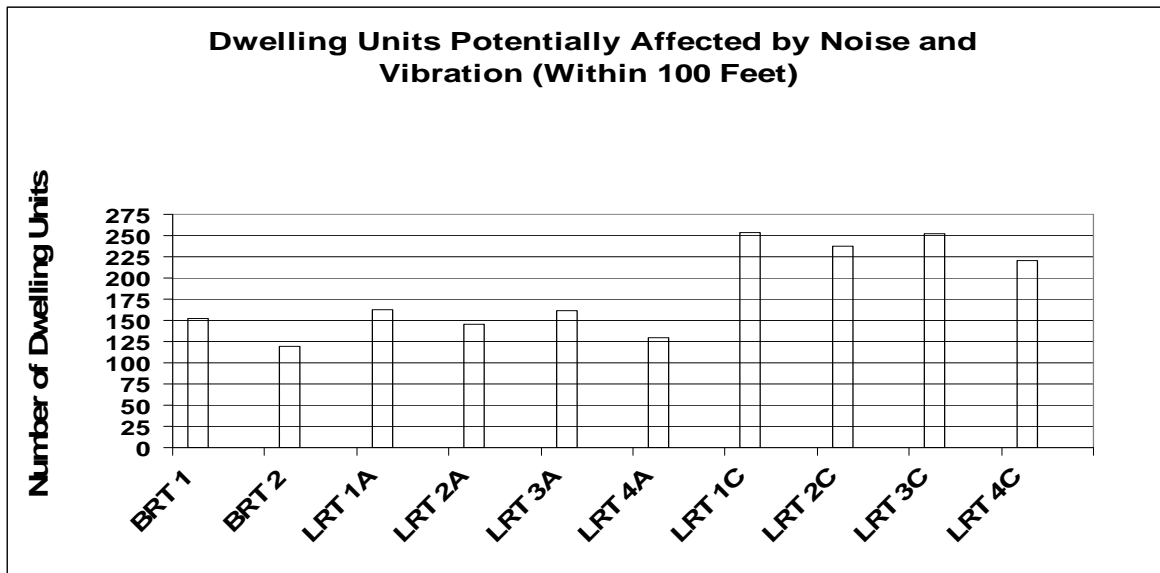
Residents potentially affected by noise or vibration - Defined as the number of dwelling units within 100 feet of the center of the proposed transitway which could potentially be affected by noise and vibration. It should be noted that detailed noise and vibration studies need to be conducted to identify dwelling units actually affected by noise and vibration. These detailed noise and vibration studies will be conducted at a later phase in the project development process.

For this analysis the MetroGIS database and county property information were used to compile the information.

<u>Ratings:</u>	Strongly supports goal =	Less than 50 units
	Supports goal =	50 to 200 units
	Does not support goal =	More than 200 units

Results:

Figure 7.12 Dwelling Units Potentially Affected by Noise and Vibration (Within 100 Feet)



BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A and LRT 4A may affect between 50 and 200 dwelling units and are therefore considered to support the goal of protecting the environment.

LRT 1C, LRT 2C, LRT 3C and LRT 4C may affect more than 200 dwelling units and are therefore considered to not support the goal of protecting the environment.

Inventory of efficient, compact land use at station locations - Consistent with FTA New Starts criteria, this evaluation criterion utilizes population density per square mile and total corridor employment within ½ mile of stations as quantitative guidelines to assign land use ratings. Denser development at station areas promotes transit use and helps protect the environment by reducing auto trips and emissions, as well as the amount of land used by development (sprawl).

<u>Ratings:</u> Strongly supports goal =	More than 10,000 persons per square mile More than 175,000 jobs within ½ mile of stations
Supports goal =	3,333 to 10,000 persons per square mile 75,000 to 175,000 jobs within ½ mile of stations
Does not support goal =	Less than 3,333 persons per square mile Less than 75,000 jobs within ½ miles of stations

Population

BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C are projected to have a population density of between 3,333 to 10,000 persons per square mile in 2030 and are therefore considered to support the goal of protecting the environment.

LRT 3A is projected to have a population density of less than 3,333 persons per square mile in 2030 and is therefore considered to not support the goal of protecting the environment.

Results:

Figure 7.13 Population Density Within ½ Mile of Station (2030)

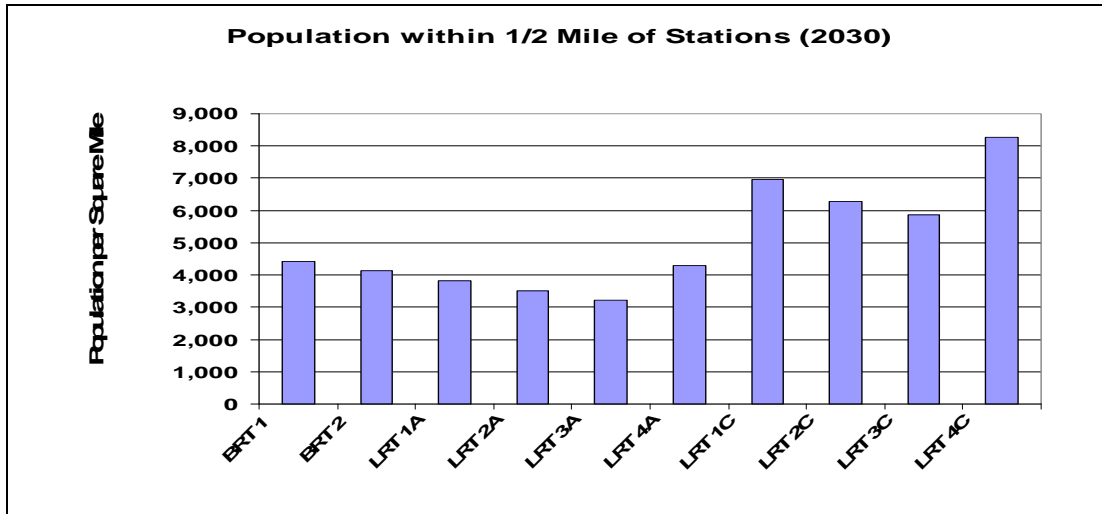
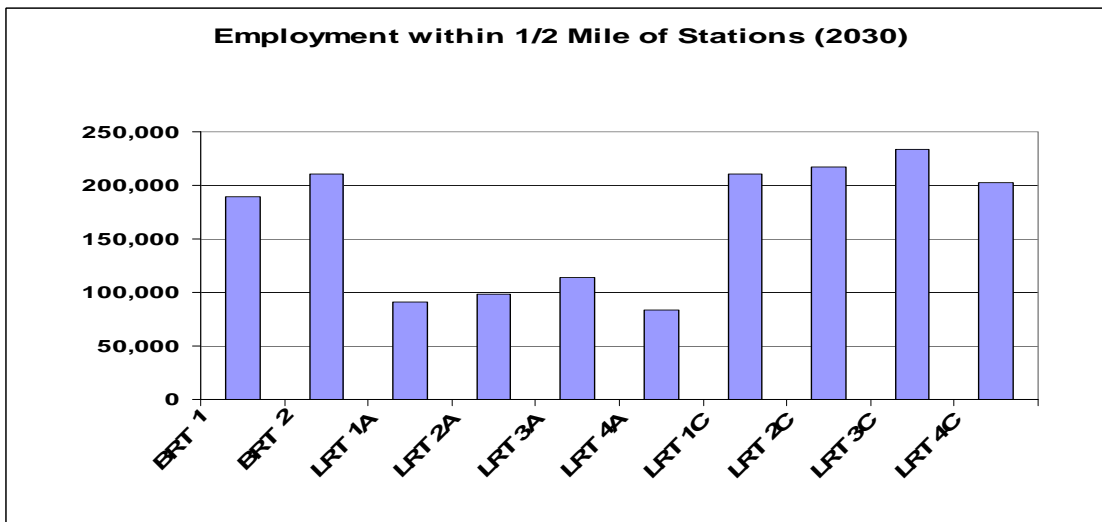


Figure 7.14 Employment Within ½ Mile of Station (2030)



Employment

BRT 1, BRT 2, LRT 1C, LRT 2C, LRT 3C and LRT 4C are projected to have more than 175,000 jobs within ½ mile of stations in 2030 and are therefore considered to strongly support the goal of protecting the environment.

LRT1A, LRT 2A, LRT 3A and LRT 4A are projected to have between 75,000 and 175,000 jobs within ½ mile of stations in 2030 and are therefore considered to support the goal of protecting the environment.

Table 7.4 Goal 3 Evaluation Ratings – Protect the Environment

Alternatives	Change in vehicle miles of travel (VMT) (Year 2030)	Reduction in VOC, NOX, CO in annual metric tons ² (Year 2030)	Potentially affected natural environment within 100 feet	Dwelling units potentially affected by noise or vibration	Inventory of efficient, compact land use within 1/2 mile of stations FTA New Starts Criteria	
					Population Density per Square Mile	Employment ³
BRT 1 - Eden Prairie to Minneapolis, HCRRRA	●	●	●	●	●	○
BRT 2¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ TH 169/ HCRRRA	●	●	●	●	●	○
LRT 1A - Eden Prairie to Minneapolis, HCRRRA/ Kenilworth/ Royalston	●	●	●	●	●	●
LRT 2A¹ - Eden Prairie to Minneapolis, I-494/ HCRRRA / Kenilworth/ Royalston	●	●	●	●	●	●
LRT 3A¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRRA/ Kenilworth/ Royalston	●	●	●	●	●	●
LRT 4A - Hopkins to Minneapolis, HCRRRA/ Kenilworth/ Royalston	●	●	○	●	●	●
LRT 1C - Eden Prairie to Minneapolis, HCRRRA/ Midtown/ Nicollet	●	●	●	●	●	○
LRT 2C - Eden Prairie to Minneapolis, I-494/ HCRRRA / Midtown/ Nicollet	●	●	●	●	●	○
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRRA/ Midtown/ Nicollet	●	●	●	●	●	○
LRT 4C¹ - Hopkins to Minneapolis, HCRRRA/ Midtown/ Nicollet	●	●	○	●	●	○
¹ Estimated not modeled						
² FTA New Starts Evaluation Measure. Note: HC, a component of VOC, not picked up separately by Mobile6 model						
³ Because LRT A alternatives end at the Intermodal Station, these alternatives access downtown employment via the Hiawatha line. Downtown employment is therefore not reflected in "A" station area numbers.						
Evaluation Breakpoints						
● Does not support goal	0% Reduction	0% Reduction	>50 acres of combined potentially affected wetland, parkland and floodplain	>200 units	<3,333	<75,000 FTA Threshold for Low ranking
● Supports goal	0-5% Reduction	0-5% Reduction	25-50 acres	50-200 units	3,333-10,000	75,000-175,000 FTA Threshold for Low-Medium/ Medium ranking
○ Strongly supports goal	>5% Reduction	>5% Reduction	<25 acres	<50 units	>10,000	>175,000 FTA Threshold for High-Med/ High ranking

¹Estimated not modeled

7.5.4 Goal 4: Preserve the Quality of Life

The performance of the alternatives under the evaluation measures for Goal 4 is described below and summarized in Table 7.5.

Anticipated impact of vehicle technology on property values - Defined as the anticipated impact of LRT or BRT on property values based upon the results of national case studies.

<u>Ratings:</u> Strongly supports goal =	Research indicates a definite positive impact at stations
Supports goal =	Research indicates generally positive impact at stations
Does not support goal =	Research does not support positive impact at stations.

Results:

Numerous national studies indicate that property values often increase around well designed, fixed guideway transit stations. An annotated bibliography by Smith and Gihring¹ is included in the *Southwest Transitway AA Land Use Technical Memorandum*.

The national studies focus primarily on fixed guideway modes (LRT, commuter rail, heavy rail, dedicated BRT). The studies found a correlation between increased property values and proximity to fixed guideway stations.² While BRT has demonstrated viability for land use intensification³, there are suggestions in the studies that BRT infrastructure can be perceived as less permanent than that of fixed rail systems, and therefore, developers may be less likely to invest in the adjacent land. The studies suggest that the closer the operation of a BRT system is to a local street bus service, the less likely it would be to influence an increase in property values. Conversely, the closer the operation of a BRT system becomes to a fixed guideway system, the more likely it would be to increase property values.

LRT 1A, LRT 2A, LRT 3A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C are exclusive guideways and are therefore considered to strongly support the goal of preserving the quality of life.

The routes for BRT 1 and BRT 2 consist of a majority of exclusive bus-only guideways, with the remainder of the route being bus-only shoulders, and are therefore more like the fixed guideways of LRT than Enhanced Bus service. Therefore, BRT 1 and BRT 2 are considered to support the goal of preserving the quality of life.

¹ Jeffery Smith and Thomas Gihring. "Financing Transit Systems Through Value Capture, An Annotated Bibliography", Victoria Transport Policy Institute, 2006.

² Litman, Todd, "Rail Transit in American, A Comprehensive Evaluation of Benefits", October 2004 Victoria Transport Policy Institute Produced with Support from the American Public Transportation Association.

³ *TCRP Report 90: Bus Rapid Transit: Volume 1: Case Studies in Bus Rapid Transit*, Transportation Research Board, Washington D.C., 2003.

Access to community amenities (libraries, parks, trails) - Defined as the number of existing libraries, parks, and trails within ½ mile of station locations.

Ratings: Strongly supports goal = Amenities within ½ mile of all stations
Supports goal = Amenities within ½ mile of several stations
Does not support goal = No amenities within ½ mile of stations

Results:

BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C have libraries, parks and trails within ½ mile of all stations and are therefore all considered to strongly support the goal of preserving the quality of life.

Access to employment opportunities for low-income households(2030) - Defined as the number of jobs and low-income households (below poverty level) within ½ mile of stations in the forecast year of 2030 based upon socioeconomic projections contained in the Metropolitan Council's travel demand model. Again, the jobs within ½ mile of the Hiawatha LRT stations (Warehouse, Nicollet, Government Center and Metrodome) that would be utilized by the LRT 1A, LRT 2A, LRT 3A and LRT 4A alternatives are not included in these calculations.

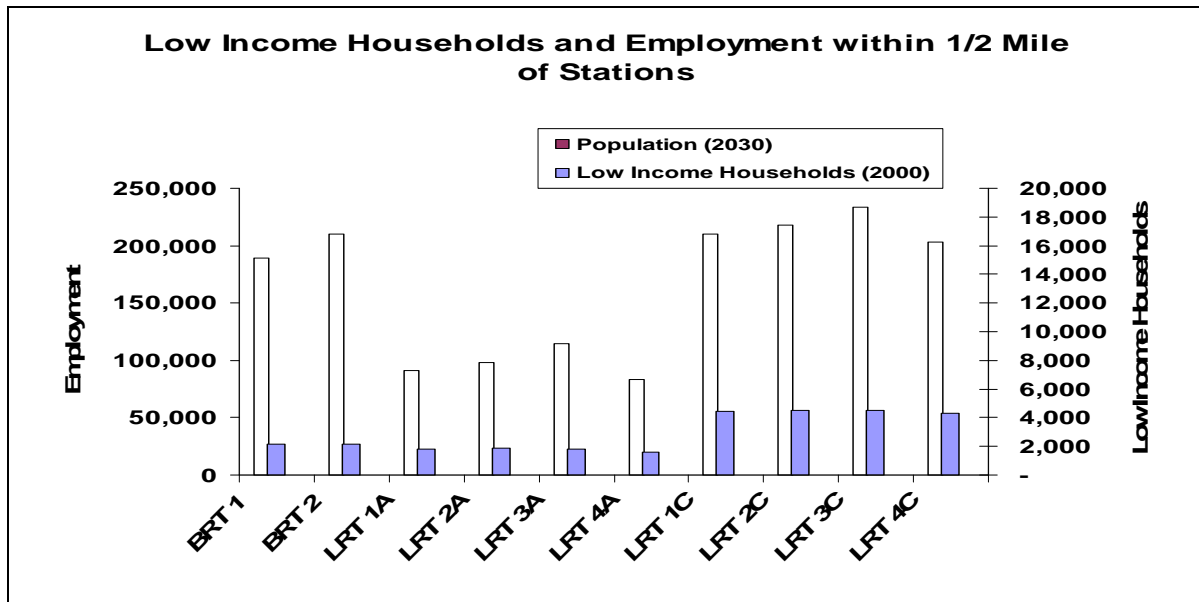
Ratings: Strongly supports goal = More than 4,000 low-income households
More than 175,000 jobs
Supports goal = 1,000 to 4,000 low-income households
75,000 to 175,000 jobs
Does not support goal = Less than 1,000 low-income households
Less than 75,000 jobs

Results:

LRT 1C, LRT 2C, LRT 3C and LRT 4C are projected to have more than 4,000 low-income households within ½ mile of stations, and over 75,000 jobs within ½ mile of stations, and are therefore considered to strongly support the goal of preserving the quality of life.

BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A and LRT 4A are projected to have between 1,000 and 4,000 low-income households within ½ mile of stations, and over 75,000 jobs within ½ of stations, and are therefore considered to support the goal of preserving the quality of life.

Figure 7.15 Low Income Households and Employment Within 1/2 Mile of Station



Intermodal connections - Defined as a measure of the quality of the pedestrian, bicycle, transit, and auto connections to/from station locations.

Ratings: Strongly supports goal = High at majority of stations
 Supports goal = Moderate at majority of stations
 Does not support goal = Poor at majority of stations

Results:

BRT 1, LRT 1A, LRT 4A, LRT 1C and LRT 4C have a high number of stations with direct connections to the bike/ pedestrian trail, moderately good access to the majority of stations for connecting buses, and moderately good access to the majority of stations for automobiles at stations that provide park-and-ride, and are therefore considered to strongly support the goal of preserving the quality of life in terms of pedestrian and bicycle access, and to support the goal of preserving the quality of life in terms of other transit and auto connections.

BRT 2, LRT 2A, LRT 3A, LRT 2C and LRT 3C have a moderate number of direct connections to the bike/ pedestrian trail at the stations, moderately good access to the majority of stations for connecting buses, and moderately good access for the majority of stations that provide park-and-ride, and are therefore considered to support the goal of preserving the quality of life in terms of pedestrian and bicycle access and to support the goal of preserving the quality of life in terms of other transit and auto connections.

Integration and documentation of transit-oriented development (TOD) opportunities/plans in local comprehensive plans – Defined as documentation of general transit-supportive development provisions in approved municipal comprehensive plans.

<u>Ratings:</u> Strongly supports goal =	TOD exists and is planned throughout the alternative alignment
Supports goal =	TOD exists and is planned in a majority of the alternative alignment
Does not support goal =	No TOD planning in major portions of the alternative alignment

Results:

Local comprehensive plans in all study area cities contain transit-supportive policies.

The LRT 3C alignment has existing TOD, and the majority of the stations have special area studies completed as part of their city’s comprehensive plan. LRT 3C is therefore considered to strongly support the goal of preserving the quality of life.

The majority of stations in alternatives BRT 2, LRT 3A, LRT 4A, LRT 1C, LRT 2C and LRT 4C have special area studies completed as part of their city’s comprehensive plan, and are therefore considered to support the goal of preserving the quality of life.

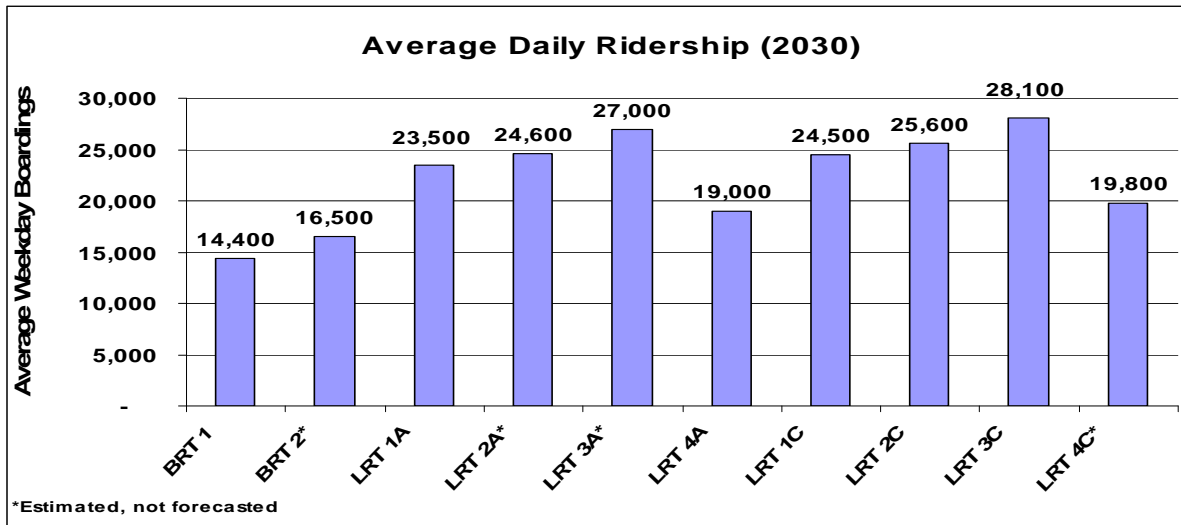
Less than half of the stations in alternatives BRT 1, LRT1A and LRT 2A have been identified for station area studies as part of their city’s comprehensive plan. These alternatives are therefore considered to not support the goal of preserving the quality of life.

Transit Ridership Forecast (2030) – Defined as the number of transit riders in the forecast year of 2030, estimated using the Metropolitan Council’s travel demand model.

<u>Ratings:</u> Strongly supports goal =	More than 20,000 passengers per day
Supports goal =	15,000 to 20,000 passengers per day
Does not support goal =	Less than 15,000 passengers per day

Results:

Figure 7.16 Average Daily Ridership (2030)



LRT 1A, LRT 2A, LRT 3A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C attract an average weekday ridership of over 20,000 passengers a day, and are therefore considered to strongly support the goal of preserving the quality of life.

BRT 2, LRT 4A and LRT 4C attract an average weekday ridership of between 15,000 and 20,000 passengers a day, and are therefore considered to support the goal of preserving the quality of life.

BRT 1 attracts an average weekday ridership of less than 15,000 and is therefore considered to not support the goal of the goal of preserving the quality of life.

Potential for intensification of land use around stations - Defined as the anticipated intensification of land use around stations for LRT and BRT based upon the results of national studies.

<u>Ratings:</u>	Strongly supports goal =	Research documents significant intensification likely
	Supports goal =	Research limited but supports intensification for bus transit if fixed guideway
	Does not support goal =	Research does not support intensification

Results:

National reports identify circumstances whereby intensification of land use (development or redevelopment) can be initiated by the introduction or enhancement of transit.⁴ These

⁴ Jeffery Smith and Thomas Gihring. "Financing Transit Systems Through Value Capture, An Annotated Bibliography," Victoria Transport Policy Institute, 2006

TCRP Report 90: Bus Rapid Transit: Volume 1: Case Studies in Bus Rapid Transit, Transportation Research Board, Washington D.C., 2003

studies and experiences also suggest that while transit by itself does not guarantee development around transit stations, transit can enhance and spur development, and supportive public policies can initiate or promote this effect.

Based on national research and the experience of other cities, LRT alternatives are anticipated to present the most significant potential for intensification of land use by virtue of the mode's success in attracting higher density development around fixed-guideway investments. The current intensification of development underway at Hiawatha LRT stations supports this assessment. LRT alternatives 1A, 2A, 3A, 4A, 1C, 2C, 3C and 4C are therefore considered to strongly support the goal of preserving the quality of life.

While BRT has demonstrated a modal viability for land use intensification,⁵ there are suggestions in the studies that BRT can be perceived as less permanent than fixed rail systems, and therefore developers may be less likely to invest in the adjacent land. A reasonable hypothesis is that the closer the operation of a BRT system is to local street bus service, the less likely it would be to leverage the availability of transit to enhance and spur development.

The routes for BRT 1 and BRT 2 consist of a majority of exclusive bus-only guideways, with the remainder of the route being bus-only shoulders, and are therefore more like the fixed guideways of LRT than Enhanced Bus service. Therefore, BRT 1 and BRT 2 are considered to support the goal of preserving the quality of life.

Consistency with regional growth plans - Defined as documentation of consistency with *Metropolitan Council Blueprint, Transportation Policy Plan (TPP) and 2030 Transit Plans*.

<u>Ratings:</u> Strongly supports goal =	Fully consistent
Supports goal =	Partially consistent
Does not support goal =	Not consistent

Results:

BRT1, BRT2, LRT 1A, LRT 2A, LRT 3A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C are all fully consistent within the area of corridor adopted in the *Metropolitan Council Blueprint, Transportation Policy Plan (TPP) and 2030 Transit Plan*, and are therefore considered to strongly support the goal of preserving the quality of life.

Impact of park-and-ride lots on existing and planned development at stations - Defined as calculation of percent of land used by park-and-ride related to station area parking supply.

<u>Ratings:</u> Strongly supports goal =	Station able to accommodate demand in planned area
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Robert Dunphy, et. al "Ten Principles for Successful Development Around Transit," Urban Land Institute 2003.

⁵ *TCRP Report 90:Bus Rapid Transit: Volume 1: Case Studies in Bus Rapid Transit*, Transportation Research Board, Washington D.C., 2003

Supports goal =	Station demand indicates shift to adjacent station required
Does not support goal =	Stations unable to accommodate demand

Results:

Park-and-ride demand in BRT 1, BRT 2, LRT 1A, LRT 2A, LRT 3A, LRT 4A, LRT 1C, LRT 2C, LRT 3C and LRT 4C indicates a shift of parking is required from the Hopkins Station to adjacent stations. The Shady Oak and Blake Stations can accommodate the overflow parking. BRT 2, LRT 3A and LRT 3C park-and-ride demand indicates a shift of parking is required from the Eden Prairie Town Center Station to the SouthWest Metro Station, which can accommodate the demand. The westerly end of all the alternates requires some structured parking, which can be accommodated. All BRT and LRT alternatives are therefore considered to support the goal of preserving the quality of life.

Access to and accommodation of the existing and future trail system - Defined as access to existing and planned trails, and accommodation of trail system within the proposed transit project.

Ratings: Strongly supports goal =	Continuous access throughout corridor, trail function maintained
Supports goal =	Limited gaps in predominately available access, trail function maintained
Does not support goal =	No access in significant segments of corridor

Results:

BRT 1, LRT 1A, LRT 4A and LRT 4C have direct connections to the trail system throughout the corridor, and the trail system along these alternatives is maintained. These alternatives are therefore considered to strongly support the goal of preserving the quality of life.

LRT 3A and LRT 1C have limited gaps southwest of Shady Oak along LRT 3A and north of 28th Street along LRT 1C, but predominately have access to the trail elsewhere throughout the corridor and are therefore considered to support the goal of preserving the quality of life.

LRT 2A and LRT 2C have no access west of Rowland for a significant segment of the corridor and are therefore considered to not support the goal of preserving the quality of life.

Table 7.5 Goal 4 Evaluation Ratings – Preserve the Quality of Life

Alternatives	Anticipated impact on property values ²	Community amenities within 1/2 mile of stations	Employment opportunities for low income households within 1/2 mile of stations ³		Intermodal Connections at Stations				Integration and documentation of TOD in local comprehensive plans	Intensification of land use around stations by mode	Forecast Ridership (2030)	Consistency with regional growth plans (qualitative)	Impact of park/ride lots on development at stations
			Low Income Households	Employment ⁴	Pedestrian	Bicycle	Other Transit	Auto					
BRT 1 - Eden Prairie to Minneapolis, HCRRA	●	○	●	○	○	○	●	●	●	●	●	○	●
BRT 2¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ TH 169/HCRRA	●	○	●	○	●	●	●	●	●	●	●	○	●
LRT 1A - Eden Prairie to Minneapolis, HCRRA/ Kenilworth/ Royalston	○	○	●	●	○	○	●	●	●	○	○	○	●
LRT 2A¹ - Eden Prairie to Minneapolis, I-494/ HCRRA/ Kenilworth/ Royalston	○	○	●	●	●	●	●	●	●	○	○	○	●
LRT 3A¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRA/ Kenilworth/ Royalston	○	○	●	●	●	●	●	●	●	○	○	○	●
LRT 4A - Hopkins to Minneapolis, HCRRA/ Kenilworth/ Royalston	○	○	●	●	○	○	●	●	●	○	●	○	●
LRT 1C - Eden Prairie to Minneapolis, HCRRA/ Midtown/ Nicollet	○	○	○	○	○	○	●	n/a	●	○	○	○	●
LRT 2C - Eden Prairie to Minneapolis, I-494/ HCRRA / Midtown/ Nicollet	○	○	○	○	●	●	●	n/a	●	○	○	○	●
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRA/ Midtown/ Nicollet	○	○	○	○	●	●	●	n/a	○	○	○	○	●
LRT 4C¹ -Hopkins to Minneapolis, HCRRA/ Midtown/ Nicollet	○	○	○	○	○	○	●	n/a	●	○	●	○	●

¹Estimated not modeled

²Based on national studies or national data

³Low Income Households from 2000 Census and defined as 60% of 7-county median family income (\$59,358/\$35,615); 2030 jobs from regional forecasts

⁴Because LRT A alternatives end at the Intermodal Station, these alternatives access downtown employment via the Hiawatha line. Downtown employment is therefore not reflected in "A" station area numbers.

Evaluation Breakpoints

● Does not support goal	Research does not support positive impact at stations	No amenities w/in 1/2 mi.	<1,000	<75,000	Poor at majority of stations	No TOD planning in major portions of the alternative	Research does not support intensification	< 15 thousand	Not consistent	Stations unable to accommodate demand
● Supports goal	Research supports general positive impact at stations	Amenities w/in 1/2 mi. of several stations	1000-4,000	75,000 - 175,000	Moderate at majority of stations	TOD exists and is planned in a majority of the alternative	Research limited but supports intensification for bus transit if fixed guideway	15-20 thousand	Partially consistent	Station demand indicates shift to adjacent station required
○ Strongly supports goal	Research supports definite positive impact at stations	Amenities w/in 1/2 mi. of all stations	>4000	>175,000	High at majority of stations	TOD exists and is planned throughout alternative	Research documents significant intensification	> 20 thousand	Fully consistent	Stations able to accommodate demand in planned area

¹Estimated not modeled

7.5.5 Goal 5: Support Economic Development

The performance of the alternatives under the evaluation measures for Goal 2 is described below and summarized in Table 7.6.

TOD potential at station locations - Defined as description of adaptability of station area land for TOD, and corridor and station economic development market potential for transit oriented and supportive development.

<u>Ratings:</u> Strongly supports goal =	Local comprehensive plans contain transit-supportive policies. TOD already present and/or multiple special area studies completed
Supports goal =	Local comprehensive plans contain transit-supportive policies, special area studies proposed
Does not support goal =	Limited TOD potential and/or planning

Results:

LRT 3C has existing TOD and the majority of the stations are within a planned growth area, and is therefore considered to strongly support the goal of supporting economic development.

BRT 2, LRT 3A, LRT 4A, LRT 1C, LRT 2C and LRT 4C have the majority of stations within a planned growth area and are therefore considered to support the goal of supporting economic development.

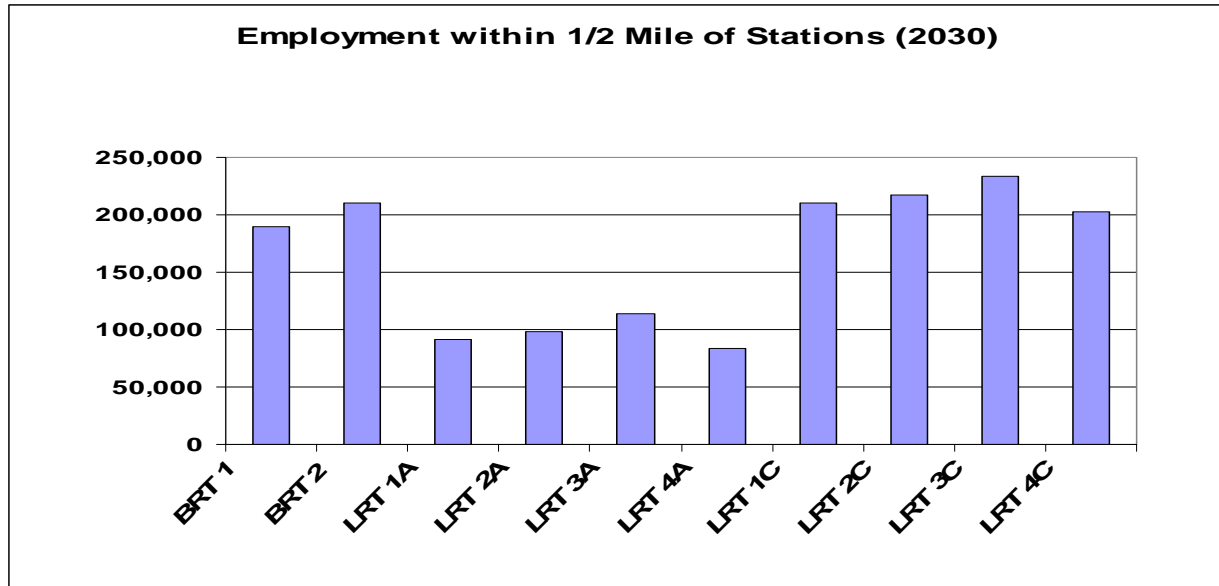
BRT 1, LRT1A and LRT 2A have major portions of the alternative outside a planned growth area and are therefore considered to not support the goal of supporting economic development.

Jobs within 1/2 mile of station (2030) - Defined as the number of jobs within ½ mile of stations based upon the Metropolitan Council's socioeconomic projects for the forecast year of 2030. As described previously, the jobs and population within ½ mile of the Hiawatha LRT stations that would be utilized by the LRT 1A, LRT 2A, LRT 3A and LRT 4A alternatives are not included in these calculations.

<u>Ratings:</u> Strongly supports goal =	More than 175,000 jobs
Supports goal =	75,000 to 175,000 jobs
Does not support goal =	Less than 75,000 jobs

Results:

Figure 7.17 Employment Within ½ Mile of Stations (2030)



BRT 1, BRT 2, LRT 1C, LRT 2C, LRT 3C and LRT 4C are projected to serve more than 175,000 jobs and are therefore considered to strongly support the goal of supporting economic development.

LRT 1A, LRT 2A, LRT 3A and LRT 4A are projected to serve between 75,000 and 175,000 jobs and are therefore considered to support the goal of supporting economic development.

Other generators (schools, medical facilities, entertainment venues, etc.) - Defined as the number of schools, medical facilities, entertainment venues and other trip generators within ½ mile of stations.

<u>Ratings:</u>	Strongly supports goal =	More than 90
	Supports goal =	50 to 90
	Does not support goal =	Less than 50

Results:

Maps showing the other generators within ½ mile of stations can be found in *Technical Memorandum No. 4, Evaluation Process and Results*.

BRT 2, LRT 1C, LRT 2C and LRT 3C would serve more than 90 activity generators and are therefore considered to strongly support the goal of supporting economic development.

BRT 1, LRT 1A, LRT 2A, LRT 3A, LRT 4A and LRT 4C would serve between 50 and 90 activity generators and are therefore considered to support the goal of supporting economic development.

Consistency with local comprehensive plan goals regarding economic development and redevelopment at stations, including park-and-ride sites - Defined as documentation of specific station area transit-supportive development provisions in approved municipal comprehensive plans

<u>Ratings:</u> Strongly supports goal =	Comprehensive plans support TOD in all segments of alignment; redevelopment planning underway throughout the alignment
Supports goal =	Comprehensive plans support development at stations in all segments of alignment
Does not support goal =	Comprehensive plans do not support development in significant segment of alignment

Results:

BRT 1, BRT 2, LRT 3A, LRT 4A, LRT 1C, LRT 3C and LRT 4C have comprehensive plans that support development in all segments of the alignment. Redevelopment planning is underway in all segments of these alignments and these alternatives are therefore considered to strongly support the economic development goal.

LRT 1A has comprehensive plans that support development at all the stations in all the segments of the alignment and therefore is considered to support the economic development goal.

LRT 2A and 2C have comprehensive plans that do not support development in a significant segment of the alignment along I-494, and these alternatives are therefore considered to not support the economic development goal.

Table 7.6 Goal 5 Evaluation Ratings – Support Economic Development

Alternatives	Existing & Planned TOD Potential at Station Locations (Qualitative)	Planned Jobs within 1/2 mile of station ^{2,3} (Year 2030)	Existing Other Generators within 1/2 mile of Stations	Consistency with local comprehensive plan goals regarding economic development & redevelopment at stations
BRT 1 - Eden Prairie to Minneapolis, HCRRA	●	○	◐	○
BRT 2 ¹ - Eden Prairie to Minneapolis, Golden Triangle/Opus/ TH 169/ HCRRA	◐	○	○	○
LRT 1A - Eden Prairie to Minneapolis, HCRRA/ Kenilworth/ Royalston	●	◐	◐	◐
LRT 2A ¹ - Eden Prairie to Minneapolis, I-494/ HCRRA/ Kenilworth/ Royalston	●	◐	◐	●
LRT 3A ¹ - Eden Prairie to Minneapolis, Golden Triangle/Opus/ HCRRA/ Kenilworth/ Royalston	◐	◐	◐	○
LRT 4A - Hopkins to Minneapolis, HCRRA/ Kenilworth/ Royalston	◐	◐	◐	○
LRT 1C - Eden Prairie to Minneapolis, HCRRA/ Midtown/ Nicollet	◐	○	○	○
LRT 2C - Eden Prairie to Minneapolis, I-494/ HCRRA/ Midtown/ Nicollet	◐	○	○	●
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/Opus/ HCRRA/ Midtown/ Nicollet	○	○	○	○
LRT 4C ¹ - Hopkins to Minneapolis, HCRRA/ Midtown/ Nicollet	◐	○	◐	○

¹ Estimated not modeled

² FTA New Starts Evaluation Measure

³ Because LRT A alternatives end at the Intermodal Station, these alternatives access downtown employment via the Hiawatha line. Downtown employment is therefore not reflected in "A" station area numbers.

Evaluation Breakpoints

● Does not support goal	Local comprehensive plans contain transit supportive policies. TOD already present and/or multiple special area studies completed	<75K	<50	Comprehensive plans do not support development in significant segment of alignment
◐ Supports goal	Local comprehensive plans contain transit supportive policies, special area studies proposed	75-175K	50-90	Comprehensive plans support development at stations in all segments of alignment
○ Strongly supports goal	Limited TOD potential and/or planning	>175K	>90	Comprehensive plans support TOD in all segments of alignment; redevelopment planning underway throughout alignment

¹ Estimated not modeled

7.6 Summary of Evaluation

Tier 1 Goals: Improve Mobility and Provide a Cost-Effective/Efficient Travel Option

Based upon the evaluation, LRT 1A, LRT 2A, LRT 3A and LRT 3C are considered to meet the goals of improving mobility and providing a cost-effective and efficient travel option.

BRT 1 and BRT 2 are considered to not meet the goals of improving mobility and providing a cost-effective/efficient travel option.

- Lower ridership than LRT - 14,400 to 16,500 vs. 23,500 to 28,100 passengers/day.
- Fewer new riders attracted to system - 1,300 to 2,300 vs. 3,800 to 7,500 new riders/day.
- Passenger capacity significantly lower than LRT - During a peak hour with a 7.5 minute headway a BRT system can serve 640 passengers while a LRT system can serve 2976 passengers. (This is due to LRT's ability to train vehicles)..
- System cannot accommodate peak hour demand - The estimated peak hour demand for BRT service is 2,000 passengers/hour which cannot be accommodated by a BRT operating on a 7.5 minute headway.
- Estimated to significantly exceed FTA's \$29 CEI threshold for Preliminary Engineering - Estimated CEI of \$66 to \$74.

LRT 4A

LRT 4A does not meet the Tier 1 goals because it does not adequately serve the travel demand that exists in the Southwest metro area. LRT 4A is already encompassed in the full-length "A" alternatives. A shortened version of the preferred alignments may be identified as a future minimum operating segment (MOS) if required in the future. In the event an MOS is required as the initial phase of staged implementation of the full alternative selected, detailed analysis of impacts and mitigation required to serve as an interim route terminus would be undertaken.

- Sufficient ridership demand to extend line to Eden Prairie
- Relatively high per mile capital cost

LRT 1C, LRT 2C and LRT 4C

While LRT 1C, LRT 2C and LRT 4C are estimated to generate ridership levels equivalent to their "A" counterparts, they do not attract as many new transit riders, cannot be interlined with the Hiawatha and proposed Central LRT lines in downtown Minneapolis, are approximately \$250 million higher in capital costs, and have a cost-effectiveness index that makes them unlikely to compete well for FTA New Starts Funding.

- Higher capital and operating costs compared to LRT 1A, 2A and 4A (approximately \$250 million in 2015 dollars)

-
- Attract an equivalent number of passengers to LRT 1A, 2A and 4A (the “C” alternatives attract approximately 100 more passengers/day than the “A” alternatives)
 - Attract fewer new riders than LRT 1A, 2A and 4A (the “C” alternatives attract approximately 700 fewer new passengers/day than the “A” alternatives)
 - Cannot be interlined with the Hiawatha and/or Central LRT lines
 - Estimated to exceed the FTA <\$29 CEI threshold by more than 20% (LRT 1C = \$ 37, LRT 3A = \$ 38, LRT 3C = \$ 41)

Tier 2 Goals: Protect the Environment, Preserve Quality of Life, and Support Economic Development

LRT 1A, LRT 3A and LRT 3C are considered to meet the goals of protecting the environment, preserving the quality of life, and supporting economic development.

LRT 2A is considered to not meet the Tier 2 goal of supporting economic development.

LRT 1A, LRT 3A and LRT 3C are considered to meet the goals of preserving the environment, protecting the quality of life, and supporting economic development. LRT 2A was considered to not adequately meet the Tier 2 goals because it does not provide the reverse commute and economic development opportunities of LRT 3A and LRT 3C, nor the capital and operating cost advantages of LRT 1A.

- Lack of good opportunity for TOD
- No current city planning for development/redevelopment west of Shady Oak Road

Table 7.7 summarizes the evaluation ratings under each goal for each alternative.

Table 7.7 Summary of Evaluation Ratings

Alternatives	Tier 1 Goals		Results	Tier 2 Goals			Recommendation
	Goal 1: Improve Mobility	Goal 2: Provide a Cost-Effective, Efficient Travel Option		Goal 3: Protect the Environment	Goal 4: Preserve and Protect the Quality of Life in the Study Area and Region	Goal 5: Support Economic Development	
Enhanced Bus (Baseline)	Carry forward as Baseline alternative (Required)			Carry forward as Baseline alternative (Required)			Carry forward as Baseline Alternative
BRT 1 - Eden Prairie to Minneapolis, HCRRRA	●	●	Does not meet Tier 1 Goals; Do not carry forward				
BRT 2¹ - Eden Prairie to Minneapolis, Golden Triangle/Opus/TH 169/HCRRRA	●	●	Does not meet Tier 1 Goals; Do not carry forward				
LRT 1A - Eden Prairie to Minneapolis, HCRRRA/ Kenilworth/ Royalston	◐	◐	Meets Tier 1 Goals; Carry Forward to Tier 2	◐	◐	◐	Carry forward for further analysis
LRT 2A¹ - Eden Prairie to Minneapolis, I-494/HCRRRA /Kenilworth/Royalston	◐	◐	Meets Tier 1 Goals; Carry Forward to Tier 2	◐	◐	◐	Other alternatives better meet Tier 2 Goals. Do not carry
LRT 3A¹ - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRRA/ Kenilworth/ Royalston	◐	◐	Meets Tier 1 Goals; Carry Forward to Tier 2	◐	◐	○	Carry forward for further analysis
LRT 4A - Hopkins to Minneapolis, HCRRRA/ Kenilworth/ Royalston	●	◐	Part of full alternative. Do not carry forward				
LRT 1C - Eden Prairie to Minneapolis, HCRRRA/ Midtown/ Nicollet	◐	●	Does not meet Tier 1 Goals; Do not carry forward				
LRT 2C - Eden Prairie to Minneapolis, I-494/ HCRRRA/ Midtown/ Nicollet	◐	●	Does not meet Tier 1 Goals; Do not carry forward				
LRT 3C - Eden Prairie to Minneapolis, Golden Triangle/ Opus/ HCRRRA/ Midtown/ Nicollet	◐	◐	Meets Tier 1 Goals; Carry Forward to Tier 2	◐	◐	○	Carry forward for further analysis
LRT 4C¹ - Hopkins to Minneapolis, HCRRRA/ Midtown/ Nicollet	●	●	Part of full alternative. Do not carry forward				
¹ Estimated not modeled							
Evaluation Breakpoints							
● Does not support goal				Supports goal on fewer than 4 of 6 measures	Supports goal on fewer than 7 of 10 measures	Supports goal on fewer than 3 of 4 measures	
◐ Supports goal				Supports goal on 4 of 6 measures	Supports goal on 7 of 10 measures	Supports goal on 3 of 4 measures	
○ Strongly supports goal				Supports goal on all measures	Supports goal on all measures	Supports goal on all measures	
¹ Estimated not Modeled							

