2.0 ALTERNATIVES CONSIDERED

This chapter describes the alternatives considered for the Central Corridor Light Rail Transit (LRT) Project and the process used to select them. The alternatives under consideration in this Final Environmental Impact Statement (FEIS) consist of a No-Build Alternative, which serves as a basis for the evaluation of transportation and environmental impacts, and the locally preferred alternative (LPA) providing for the implementation of LRT service in the Central Corridor. This chapter also describes the alternatives development and screening process that resulted in the build alternative evaluated in the Alternatives Analysis and Draft Environmental Impact Statement (AA/DEIS) and the Supplemental Draft Environmental Impact Statement (SDEIS).

Section 2.1 provides an overview of the alternatives developed and screened in the early phases of project development and a detailed description of the AA/DEIS LPA that was selected for the Central Corridor LRT Project. This section also discusses the process of developing and examining numerous design alternatives developed since adoption of the AA/DEIS LPA. These proposed changes to the AA/DEIS LPA were evaluated in the SDEIS.

The AA/DEIS and the SDEIS are incorporated by reference and are considered a part of this FEIS.

Section 2.2 provides a description of the adopted Preferred Alternative evaluated in this FEIS.

2.1 Alternatives Previously Considered

2.1.1 Alternatives Analysis Process

The Central Corridor Transit Study (Transit Study) was initiated in 1999. The Transit Study process was done in two parts: 1) a feasibility study for commuter rail, which was completed in 2001, and 2) an AA/DEIS for baseline, LRT, and bus rapid transit (BRT) in the corridor, which was completed in 2006. The Transit Study identified a multi-modal package of transportation improvements. These improvements are intended to address future travel demand and meet the goals of the community, which include economic opportunity, community and environmental benefits, and transportation and mobility improvements.

A review of existing and projected future conditions resulted in the development and adoption of a purpose and need statement by the Central Corridor Coordinating Committee (CCCC). Goals and objectives were established in response to the identified problems and needs. They were based on adopted long range plans, federal major investment planning criteria, public outreach efforts, and agency coordination. These goals and objectives are summarized in Chapter 1.

The development of alternatives in the Transit Study began with a universe of alternatives. It evaluated potential transit technologies, alignments, and station locations in the Central Corridor LRT Study Area. Potential alternatives were screened on their ability to satisfy project goals and objectives. After the first level of evaluation, the universe of alternatives was reduced to 19 options. These options were then evaluated in a Screen I Evaluation, which yielded nine alternatives for a Screen II Evaluation. Evaluation criteria included cost effectiveness, mobility and accessibility, and community and environmental benefits. The Screen II Evaluation applied the same evaluation parameters, with an increased level of detail, to the nine build alternatives retained from Screen I. Resulting alternatives from the Screen II Evaluation were evaluated in the AA/DEIS (see Section 2.1.2, below).

The Administrative Record for the Central Corridor LRT Project includes all public documents, technical analysis, and public and agency coordination. Specific descriptions of the screening process are recorded in the following documents: Universe of Alternatives Memorandum (July 2000), Technical Memorandum 2: Screen I Evaluation (September 2000), and Technical Memorandum 3: Screen II Evaluation (January 2002).

2.1.2 Alternatives Evaluated in the AA/DEIS

Based on the Screen II Evaluation results, the CCCC determined on February 15, 2001, that three build options would be retained for advancement in the project development process. The initiation of the AA/DEIS for the Central Corridor began with a formal scoping process, which provided an opportunity for regulatory agencies and the public to respond to the concept of proposed transit in the Central Corridor LRT Study Area and to identify issues of concern. The scoping process was officially initiated on June 5, 2001, with publication in the *Federal Register* of the Notice of Intent (NOI) to prepare an Environmental Impact Statement. The Notice of Availability (NOA) of the Central Corridor Scoping Booklet was published in the Minnesota Environmental Quality Board (EQB) Monitor on June 11, 2001. The comment period closed on July 20, 2001. One agency scoping meeting and three public scoping meetings were held. The screening process and methodology employed during the project development process was consistent with requirements under the National Environmental Policy Act (NEPA). The process ensures that all reasonable and prudent alternatives are evaluated during the environmental process. The process also ensures that alternatives that are flawed or do not meet the purpose and need are screened early. This streamlined process also ensures that valuable resources are expended evaluating promising alternatives that are both reasonable and prudent.

The alternatives presented during scoping included LRT and BRT on University Avenue and LRT on Interstate 94 (I-94). A No-Build Alternative and a Baseline Alternative were also included in the scoping process. A more detailed description of the alternatives is presented below:

- **No-Build Alternative –** This alternative included roadway and bus system improvements for which funding has been committed along the University Avenue and I-94 corridors as specified in the appropriate agency Transportation Improvement Programs (TIPs) and 2030 Transportation Policy Plan. The current transportation and transit facilities and services, with minimal modifications or expansions, form the basis of the No-Build Alternative.
- **Baseline Alternative –** This alternative served as a basis for comparison to the build alternatives as part of the Federal Transit Administration's (FTA) New Starts Process. It is also designed to do the "best that can be done" to improve transit service in the Central Corridor LRT Study Area without a major capital investment. Low capital cost infrastructure and bus transit improvements for the Central Corridor included bus operations, intelligent transportation systems (ITS) techniques, travel demand management (TDM), and other system improvements. Bus operation strategies that build upon existing transit services and facilities provide connectivity within the Central Corridor LRT Study Area. ITS uses the latest technology to more effectively manage transportation systems. TDM strategies help reduce congestion by encouraging the use of alternative modes of transportation rather than only driving.
- **University Avenue LRT Alternative –** This alternative provided LRT service between downtown St. Paul and downtown Minneapolis and to the University of

Minnesota (U of M), primarily in exclusive lanes in the center of University Avenue. 16 station locations exclusive to the Central Corridor and the cumulative effects to five stations shared with Hiawatha LRT and the Northstar commuter rail were analyzed. This included feeder bus improvements to provide local and regional access to the proposed LRT system.

- **University Avenue BRT Alternative –** This alternative provided BRT service between downtown St. Paul and downtown Minneapolis and to the U of M, primarily in an exclusive guideway in the center of University Avenue. Up to 16 station locations exclusive to the Central Corridor and the cumulative effects to five stations shared with Hiawatha LRT and the Northstar commuter rail were analyzed. This alternative included feeder bus improvements to provide local and regional access to the proposed BRT system.
- **I-94 LRT Alternative –** This alternative provided LRT service between downtown St. Paul and downtown Minneapolis and to the U of M, primarily in barrier-separated exclusive lanes in the median of I-94. Up to 17 station locations exclusive to the Central Corridor and the cumulative effects to five stations shared with Hiawatha LRT and the Northstar commuter rail were analyzed. This included feeder bus improvements to provide local and regional access to the proposed LRT system.

Alternative alignments for LRT and Busway/BRT through the U of M, State Capitol, and downtown St. Paul were suggested during scoping. Project partners including the U of M, St. Paul's Capitol Area Architectural and Planning Board (CAAPB), and the City of St. Paul advocated minor changes in the alignment or affirmed their preference for specific alignments. Additional analysis was undertaken to satisfy concerns and to respond to comments received.

Through the scoping process, alignments and alternatives that were not prudent or reasonable and did not satisfy requirements of the purpose and need were not carried forward for additional analysis in the AA/DEIS. Scoping results are included in the Scoping Summary Report (December 7, 2001). Two build alternatives were selected for evaluation in the AA/DEIS in addition to a Baseline Alternative. The build alternatives included the following:

- University Avenue LRT
- University Avenue BRT

2.1.3 Selection of the AA/DEIS Locally Preferred Alternative

After publication of the AA/DEIS and completion of the public hearings, the Metropolitan Council adopted the AA/DEIS LPA for the Central Corridor (June 28, 2006, Metropolitan Council Resolution No. 2006-15). The University Avenue LRT Alternative was selected as the AA/DEIS LPA. As shown on Figure 2-1, the AA/DEIS LPA is 11 miles in length, of which 9.8 miles consists of new alignment and 1.2 miles use the existing Hiawatha LRT alignment in downtown Minneapolis.

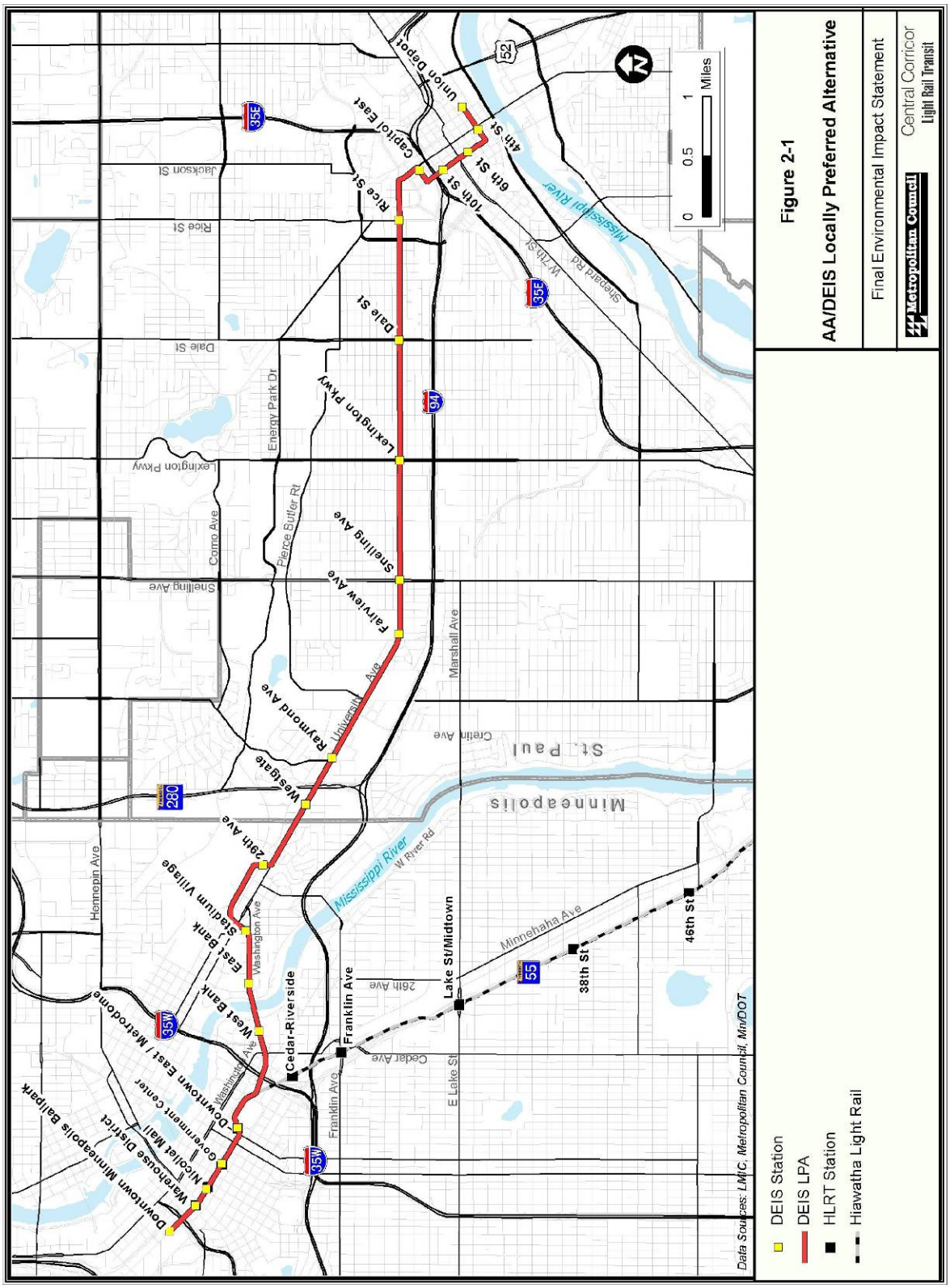


Figure 2-1
AA/DEIS Locally Preferred Alternative
Final Environmental Impact Statement
Central Corridor
Light Rail Transit
Metropolitan Council
DEIS Station
DEIS LPA
HLRT Station
Hiawatha Light Rail
Data Sources: LMIC, Metropolitan Council, MnDOT
Miles
0
0.5
1
Union Depot
Capitol East
4th St
6th St
10th St
Rice St
Jackson St
Mississippi River
Shepard Rd
W 7th St
Dale St
Lexington Pkwy
Energy Park Dr
Pierce Butler Rt
Como Ave
Snelling Ave
Fairview Ave
Raymond Ave
University Ave
Marshall Ave
Westgate
29th Ave
Hennepin Ave
Minneapolis
St. Paul
Crelin Ave
W River Rd
Mississippi River
Cedar-Riverside
Franklin Ave
26th Ave
Lake St/Midtown
Minnehaha Ave
38th St
46th St
Cedar Ave
E Lake St
Washington Ave
Washington Ave
Stadium Village
East Bank
West Bank
Downtown East / Metrodome
Downtown East
Government Center
Nicollet Mall
Warehouse District
Downtown Minneapolis Ballpark
35E
35W
94
55
280
52

The University Avenue BRT Alternative was not selected as the AA/DEIS LPA and was not recommended for further review or analysis in the project development process after detailed evaluation in the AA/DEIS. After circulation of the AA/DEIS, the Metropolitan Council and project partners reviewed the relative merits and benefits of each of the alternatives. This evaluation of the alternatives is presented in the AA/DEIS and is included in the Evaluation of Central Corridor Alternatives (Technical Memorandum submitted to Central Corridor Coordinating Committee, May 30, 2006).

The University Avenue BRT Alternative had substantially lower performance on measures of effectiveness including ridership, travel time savings, cost per rider, and other project objectives. Additionally, the University Avenue BRT alternative did not fully satisfy a principal element of project purpose and need — to adequately meet forecast demand for Central Corridor transit ridership by providing sufficient capacity to meet forecast need. The University Avenue BRT Alternative would not provide the required capacity to meet year 2030 transit demand. 2030 ridership forecasts for the Corridor show that loading volumes at specific BRT station areas would exceed the capacity of the BRT alternative. The corridor is already congested and experiences platooning of buses at critical areas along the alignment. An increase of this phenomenon in the future, as was forecast for the BRT Alternative in the AA/DEIS, would compromise the ability for BRT to provide the increased frequencies required to meet travel demand. Therefore, it has been determined that the University Avenue BRT Alternative is not a reasonable alternative in meeting the project purpose and need and is not brought forward for further evaluation in this FEIS.

The AA/DEIS LPA is described in detail below:

Alignment Segments

State Capitol Area and Downtown St. Paul

The LRT was proposed to run at-grade on Robert Street, Columbus Street, Cedar Street, and 4th Street, and to terminate in front of the Union Depot.

University Avenue

The LRT was proposed to run at-grade in the median between 29th Avenue SE and Robert Street near the State Capitol.

University of Minnesota and Prospect Park

The LRT was proposed to run in the median of 3rd Street and 4th Street. It would have connected to Washington Avenue and then run in a tunnel under Washington Avenue through the East Bank campus of the U of M. It would then connect with the U of M Transitway at-grade, and proceed to University Avenue along 29th Avenue SE in Prospect Park.

Downtown Minneapolis

The Central Corridor LRT was proposed to connect with the Hiawatha LRT at-grade just east of the Downtown East/Metrodome Station.

Guideway

Light rail vehicles (LRVs) were proposed to operate on standard gauge railroad embedded track. The proposed system would be double-tracked throughout, providing a separate track for eastbound and westbound trains. Generally, a cross-section of at-grade double tracks for LRT alignment requires 28 feet of right-of-way. The minimum vertical clearance is approximately 14 feet from top of rail. Crossovers to allow trains to cross from the eastbound

to the westbound tracks were proposed to be provided at regular intervals for special operations. Because of the overall urban characteristics of the alignment, the tracks would be embedded for most of the alignment.

Vehicles

The vehicles proposed for operations on this corridor would be consistent with those operated by Metro Transit on the Hiawatha LRT line. Train control would use current Metro Transit design and operations criteria.

Stations

Sixteen new stations and five shared stations with the existing Hiawatha LRT were proposed. Passenger boarding was proposed to occur at designated station sites. LRT stations would vary in spacing and configuration, depending on their location and function. Boarding platforms would be approximately 200 feet long to accommodate two-car trains. Stations would be 14 inches above the top of rails to allow for level boarding with a low-floor vehicle. Each station would consist of either one center-loading platform approximately 18 to 30 feet wide located between the tracks, or two side-loading platforms, each approximately 12 feet wide, located on the side of the tracks. Generally, each platform would be furnished with a canopy and windscreen for weather protection, signs, seating, trash receptacles, and self-service fare equipment. Station platforms were proposed to be expanded to 300 feet to accommodate three-car trains in the future.

Downtown Minneapolis

The Central Corridor LRT was proposed to share stations with the Hiawatha LRT in downtown Minneapolis. The Hiawatha LRT runs on 5th Street South with stations at the following locations:

- Minneapolis Multi-modal Station (5th Street South/5th Avenue North)
- Warehouse District Station (Hennepin Avenue at 1st Avenue North)
- Nicollet Mall Station
- Government Center Station (between 3rd and 4th Avenue South)
- Downtown East/Metrodome Station

University of Minnesota and Prospect Park

- West Bank Station—Depressed center platform near existing bus stop on Washington Avenue
- East Bank Station—Depressed center platform in front of Coffman Union on Washington Avenue
- Stadium Village Station—Depressed center platform
- 29th Avenue SE Station—Two side platforms on northwest quadrant of 29th Avenue SE and University Avenue

University Avenue

- Westgate Station—Split side platforms
- Raymond Avenue Station—Center platform between Carleton and LaSalle streets
- Fairview Avenue Station—Two side platforms on west side of intersection

- Snelling Avenue Station—Split side platforms
- Lexington Parkway Station—Split side platforms
- Dale Street Station—Split side platforms
- Rice Street Station—Center platform on west side of intersection

Capitol Area and Downtown St. Paul

- Capitol East Station—Two side platforms on Columbus Street, west of Robert Street
- 10th Street Station—Two side platforms in median between 11th and 10th Streets at Cedar Street
- 6th Street Station—Two side platforms between 7th and 6th Streets at Cedar Street
- 4th Street Station—Two side platforms between Robert and Minnesota streets
- Union Depot Station—Center platform with potential expansion in front of the Union Depot

Fare Collection

Fare collection systems were proposed to use current Metro Transit design and operations criteria.

Power System

Traction power substations (TPSS) were proposed to be located at regular intervals along the proposed LRT line. Most TPSS would be located near LRT stations. The TPSS would generally be single-story buildings approximately 40 feet by 20 feet on about a 4,000-square-foot limited access site. They would transform and rectify the utility three-phase alternating current to the direct current LRT electrification voltage. The power would then be distributed to the trains through an overhead contact system (OCS).

Traffic Control

Active devices, including traffic signals, railroad-type flashers, and bells were proposed to control traffic at locations where the proposed Central Corridor LRT crossed public streets. In low-speed areas, including downtowns, intersection traffic signals would be used. Traffic and pedestrian signals, signs, and markings would generally be in accordance with the current *Manual on Uniform Traffic Control Devices* (MUTCD).

Yard and Shop

Expansion of the Hiawatha LRT Operations and Maintenance facility was proposed to accommodate additional trains from the Central Corridor LRT. The facility would then be used for storage, servicing, and maintaining the LRVs. It would also be where LRT administrative staff would report for work, and where trains would enter and leave revenue service. Vehicles would be cleaned and repaired inside and outside daily. They would also be inspected and serviced according to a fixed inspection and maintenance schedule to help ensure operational safety and reliability.

An additional vehicle maintenance and storage facility near the eastern terminus of the proposed LRT line was also proposed as part of the AA/DEIS LPA. The facility was proposed to include storage for 10 to 12 cars and vehicle washing and cleaning equipment.

The Reevaluation for Hiawatha Avenue (TH55) Light Rail Transit Final Environmental Impact Statement, August 12, 1999, defined and evaluated the impacts of the proposed Hiawatha LRT Yard and Shop Facility in Minneapolis. Additionally, the Record of Decision (ROD) for the Hiawatha LRT (April 26, 2000) included the yard and shop facility in the definition of the federal action, and specified mitigation measures for the facility. The findings and commitments identified in the Hiawatha LRT ROD are therefore incorporated by reference into the Central Corridor AA/DEIS. The implementation of LRT in the Central Corridor would not require physical expansion (that is, no additional right-of-way would be required at the existing maintenance facility) of the existing yard and shop property. Only covered storage tracks added to the current building would be required to accommodate the expanded fleet, including LRVs.

Accessibility

The AA/DEIS LPA was to be designed to be fully compliant with the Americans with Disabilities Act (ADA). The LRVs would be fully accessible with level boarding from accessible platforms (equipped with ramps and elevators) and provisions for wheelchair space on all cars.

Operating Hours and Frequency

The Central Corridor LRT was proposed to operate from 5:00 a.m. to 12:30 a.m. seven days a week. Frequency would vary between 7.5 minutes during peak hours to 10 minutes during off-peak hours and weekends. The standard operating plan would be modified to accommodate special events (for example, evening or weekend cultural or sporting events).

The AA/DEIS LPA included the components of the Baseline Alternative. The bus system associated with the Baseline Alternative would be restructured to coordinate and interface with the proposed LRT service. Details of the AA/DEIS LPA bus and transit operating plans are described in Section 2.3.2 of the AA/DEIS.

2.1.4 Alternatives Evaluated in the Supplemental Draft Environmental Impact Statement

Subsequent to the completion of the AA/DEIS for the Central Corridor LRT Project, several unresolved policy questions and design element options arose which required additional study. These design considerations responded to changed conditions within the corridor, technical, operational, and financial constraints, and major infrastructure requirements that were not fully documented in the AA/DEIS.

The goal of the SDEIS was to assist the Metropolitan Council, resource agencies, and key project partners in understanding and resolving critical project elements within the context of the National Environmental Policy Act (NEPA). It provided an opportunity to document and disclose local decision-making related to project elements as they were refined during the preliminary engineering (PE) effort. The SDEIS was of limited scope and focused on proposed changes to the AA/DEIS LPA and relevant updates to information provided in the AA/DEIS. Figure 2-2 SDEIS Project Description, depicts proposed changes to the AA/DEIS LPA that were evaluated in the SDEIS.

An NOI to prepare the SDEIS for the Central Corridor LRT Project was published in the *Federal Register* (Federal Register / Vol. 73, No. 37 / Monday, February 25, 2008/ p. 10090-10091) as well as the Minnesota EQB Monitor on February 25, 2008.

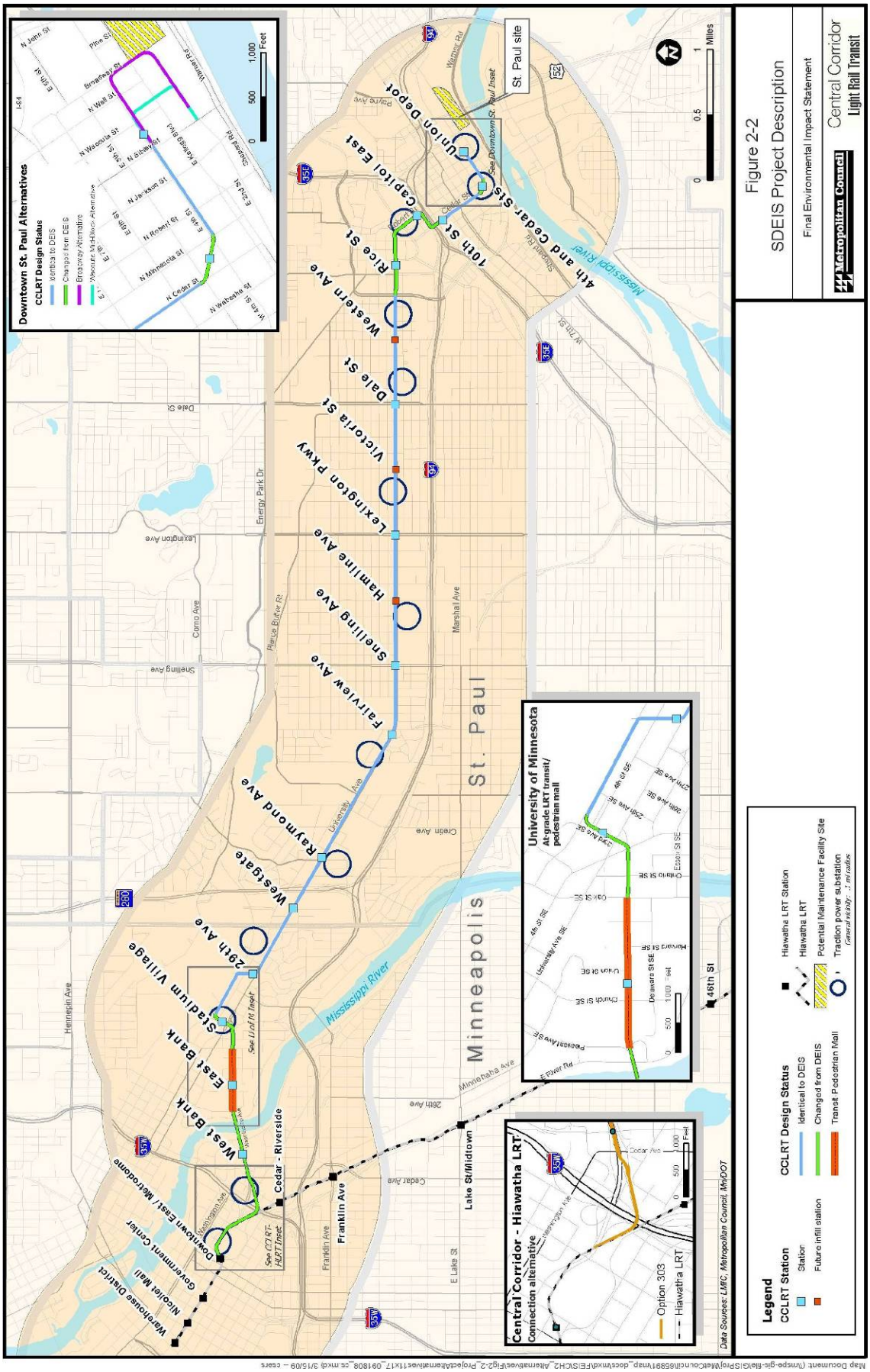


Figure 2-2
SDEIS Project Description
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
Legend
CCLRT Station
Station
Future infill station
CCLRT Design Status
Identical to DEIS
Changed from DEIS
Transit Pedestrian Mall
Hiawatha LRT Station
Hiawatha LRT
Potential Maintenance Facility Site
Traction power substation
Downtown St. Paul Alternatives
CCLRT Design Status
Identical to DEIS
Changes from DEIS
Broadway Alternative
Wacouta Mid-Block Alternative
Central Corridor - Hiawatha LRT
Connection alternative
Option 303
Hiawatha LRT
University of Minnesota
At-grade LRT transit/ pedestrian mall
St. Paul site
Union Depot
10th St
Capitol East
4th and Cedar Sts
Rice St
Western Ave
Dale St
Victoria St
Lexington Pkwy
Hamline Ave
Snelling Ave
Fairview Ave
Raymond Ave
Westgate
29th Ave
Stadium Village
East Bank
West Bank
Cedar - Riverside
Downtown East / Metrodome
Government Center
Nicollet Mall
Warehouse District
Franklin Ave
Lake St/Midtown
46th St
St. Paul
Minneapolis
Mississippi River
Data Sources: LMIC, Metropolitan Council, MnDOT
Map Document: (\\mspe-gis-file\GIS\Proj\MetCouncil\SS991\mxd_docs\mxd\FEIS\CH2_Alternatives\Fig2-2_ProjectAlternatives11x17_091808_cs.mxd) 3/15/09 – csers

2.1.4.1 Resolution of Key Project Issues in Early Preliminary Engineering

Key issues affecting implementation of the AA/DEIS LPA were identified by the Metropolitan Council and other project stakeholders. These key issues represented engineering constraints, operational issues, concerns of project stakeholders, and FTA comments. To address the key project issues, the Metropolitan Council and project partners formed issue resolution teams comprised of representatives from the cities of St. Paul and Minneapolis, Ramsey and Hennepin counties, the CAAPB, the State Department of Administration, the Minnesota Department of Transportation (MnDOT), and the U of M, as well as other interested stakeholders. The issue resolution teams provided opportunities for stakeholder participation in resolving each key issue, developing design options, and assessing the level of complexity and need for additional environmental review and disclosure during the SDEIS process. Nine Key Project Elements were identified as having the potential to result in significant social, economic, and environmental impacts due to changes from the AA/DEIS LPA, or as lacking the appropriate level of disclosure in the AA/DEIS.

After extensive community involvement and agency coordination, on February 27, 2008, the Metropolitan Council endorsed the unanimous recommendation made by the Central Corridor Management Committee to approve the SDEIS project description (the U of M voted “to approve with reservations”). The Council’s action refined the scope of the approximately 11-mile Central Corridor linking downtown St. Paul and downtown Minneapolis and thereby established the project for inclusion in the SDEIS. The action came after the project staff, working collaboratively with the key issue resolution teams, developed multiple scenarios for improving cost efficiency, addressing community needs, and identifying engineering solutions.

The following alternatives were evaluated in the SDEIS to assist decision-makers and the public in understanding how proposed changes to the LPA as described in the AA/DEIS may affect the physical, human, and natural environment. No-Build and Baseline alternatives were evaluated against proposed changes to the AA/DEIS LPA.

2.1.4.2 No-Build Alternative

The No-Build Alternative included roadway and bus system improvements for which funding had been committed along the University Avenue and I-94 corridors as specified in the appropriate agency TIPs and 2030 Transportation Policy Plan. The current transportation and transit facilities and services, with minimal modifications or expansions, formed the basis for this alternative.

2.1.4.3 SDEIS Baseline Alternative

This alternative served as a basis for comparison to the build alternatives as part of the FTA’s New Starts Process. It was also designed to do the “best that can be done” to improve transit service in the Central Corridor LRT Study Area without a major capital investment. In consultation with FTA, refinements to service levels were made to resolve inconsistencies between supporting feeder bus networks and the Baseline and Preferred Alternatives described in the AA/DEIS. These changes were reflected in the Baseline Alternative prepared for the 2006 New Starts application and approval for admission into PE.

To provide a fair comparison of the Baseline and Preferred Alternatives, select changes were made to the AA/DEIS Service Plan. These changes resulted in a common/consistent feeder bus service level for each of these alternatives. Additionally, the Baseline service was proposed to operate at the same service frequencies as those proposed for the LRT

service – 7.5-minute peak period and 10-minute midday, evening, and on weekends. Following is a list of changes made to the Baseline and Central Corridor LRT Alternative documented in the SDEIS.

- Route 16 – Modified AA/DEIS assumption of 10-minute all day service frequency to 20-minute peak period, 30-minute midday, evening, and weekend (same as Build LRT Alternative)
- Route 50 (new Baseline Service) – Modified AA/DEIS assumption of 15-minute peak/30-minute midday (no evening and weekend service) to 7.5-minute peak/ 10-minute midday, evening, and weekends (same as Build LRT frequencies). Equilibrated Baseline assumed to operate 6-minute peak period headways
- Route 94B – Eliminated midday and weekend service
- Route 94C – Eliminated weekday, midday, and evening service

The Baseline Alternative used the existing Route 50 limited stop service along University Avenue as the Baseline service. This route would stop at the same locations as the Build LRT Alternative station locations (including the revised downtown St. Paul alignment). The Baseline Alternative assumed a shorter headway of 6 minutes (7.5 minutes assumed on Build LRT) during peak hours to account for peak loads on the Route 50 service. The Baseline Alternative required 23 additional fleet vehicles over existing service. Supporting feeder bus service under the Baseline Alternative would operate identical alignments and service headways as assumed for the SDEIS build alternatives.

2.1.4.4 SDEIS Build Alternatives

As described in Section 2.1.4.1, the Metropolitan Council passed a resolution on February 27, 2008 approving the project scope, which contained the Key Project Elements described in the NOI. The SDEIS documented and disclosed the effects of the Key Project Elements and changes since adoption of the AA/DEIS LPA. Table 2-1 summarizes the SDEIS Project Description. Each of the design alternatives in the table includes a description of the proposed change to the AA/DEIS LPA.

Table 2-1 SDEIS Project Description Summary

SDEIS Alternative	Proposed Changes to the AA/DEIS LPA
1. Hiawatha/Central Connection	The SDEIS evaluated an engineering modification to optimize the connection of the Central Corridor LRT to the existing Hiawatha LRT in downtown Minneapolis, west of the proposed West Bank Station. The modification would cross eastbound Washington Avenue with a new signal, then rise to cross Interstate 35W (I-35W) on an aerial structure and connect to Hiawatha on the existing bridge structure with crossovers to provide full bi-directional movements. This option provided a storage track for special operations.
2. University of Minnesota Alignment	The SDEIS evaluated an at-grade LRT alignment on Washington Avenue running from the Washington Avenue Bridge to Oak Street, which would function as a transit mall. This alternative would change the operation of this segment by excluding automobile traffic. Enhancements would be made to pedestrian and other transit facilities operating in this segment. Emergency vehicle access would be maintained. The Stadium Village Station would be located at the proposed U of M multi-modal center. The East Bank Station would be located on Washington Avenue at Union Street.
3. Future Infill Stations at Hamline, Victoria or Western	The SDEIS evaluated three additional stations at Hamline Avenue, Victoria Street, and Western Avenue. The inclusion of new stations addressed concerns of residents and stakeholders, including the City of St. Paul and Ramsey County, to increase access to the neighborhoods and businesses. The locations of these stations would reduce the station spacing from approximately one mile to one-half-mile along University Avenue in this portion of the Study Area. The SDEIS evaluated implementation of each of these stations; however ridership analysis conducted during the SDEIS did not support the inclusion of these new stations. The SDEIS project definition was amended to include below grade infrastructure to allow for station construction at a future date when funding availability and ridership merited construction.
4. Capitol Area Alignment and Stations	The SDEIS evaluated engineering modifications to the alignment along University Avenue and Robert Street directly adjacent to the Capitol Area. Evaluation of these modifications to the AA/DEIS LPA was necessary to accommodate several new Capitol Area structures and grade constraints along University Avenue. The station at Rice Street was modified to respond to roadway geometry and concerns about access and optimized bus connections.

SDEIS Alternative	Proposed Changes to the AA/DEIS LPA
5. Downtown St. Paul alignment/station modifications	The SDEIS evaluated and disclosed two alignment alternatives that would extend the alignment disclosed in the AA/DEIS beyond the St. Paul Union Depot Headhouse. Both alignments would provide access to the St. Paul Union Depot concourse level where a future connection to a multi-modal terminal is being planned. The two alignment options considered for this connection included the Wacouta Mid-Block and Broadway extensions. Both these alternatives would be constructed to include a new connection to a proposed maintenance and storage facility. The SDEIS also evaluated an alignment and station option that would travel south on Cedar Street to a point south of 5th Street, where it then would turn southeast onto the 4th/Cedar Street block. The alignment would continue diagonally across the block, emerging onto 4th Street at Minnesota Street. This alignment consolidated two AA/DEIS stations (6th Street and 4th Street) into one station on the diagonal through the block.
6. Traction Power Substations	The SDEIS evaluated and disclosed the number and general location of substations required for operation of the Central Corridor LRT.
7. Three-Car Train Requirement	The SDEIS evaluated and disclosed the characteristics of three-car train operations and the physical impacts of constructing three-car platforms. This change responded to the desire for interoperability between Hiawatha LRT and Central Corridor LRT. Hiawatha LRT is planned to begin three-car operations prior to Central Corridor LRT beginning revenue service in 2014.
8. Vehicle Maintenance and Storage Facility	The SDEIS evaluated and disclosed the proposed location of a vehicle maintenance and storage facility in downtown St. Paul. The facility is referred to as the Operations and Maintenance Facility (OMF) in the Preferred Alternative.
9. Washington Avenue Bridge	The SDEIS evaluated and disclosed the proposed modifications to the Washington Avenue Bridge to accommodate operation of the Central Corridor LRT on the existing structure.

2.1.4.5 Refinements after Publication of the SDEIS

Based on comments received on the SDEIS, continued coordination with project partners and refinements during preliminary engineering, several modifications were proposed to the AA/DEIS LPA and the subsequent changes described in the SDEIS. These proposed refinements were necessary to remedy several design issues, reduce cost, and to minimize specific environmental and community impacts along the corridor. The refinements are described below:

TPSS

The SDEIS disclosed the number and location of proposed TPSS locations along the alignment. The 14 TPSS locations were determined using standard design criteria based on the level of engineering during preparation of the SDEIS. During more detailed preliminary engineering, exact location and systems requirements were refined, thus reducing the number of TPSS required to operate LRT to 13 (12 along the corridor and one at the OMF) and minimizing project impacts. The TPSS located near Union Depot was eliminated. This TPSS was consolidated with the TPSS located near the 4th and Cedar Station. Preliminary engineering drawings included in Appendix L show the 13 TPSS locations.

Operations and Maintenance Facility

The AA/DEIS identified an expansion of the existing Franklin Avenue Yard and Maintenance Facility to accommodate storage, service, and maintenance of Central Corridor LRT vehicles. However, with expansion of Hiawatha LRT to three-car operations in the near future, the Franklin facility will be taken up in large part by Hiawatha operations. The Franklin facility will not have the capacity to meet all the needs to store and perform light maintenance for Central Corridor vehicles, so the need to explore siting and construction of a maintenance and storage facility for the Central Corridor LRT was identified in early phases of PE.

The Operations and Maintenance Facility (OMF) and approaches described in the SDEIS and approved through the local municipal consent process included a mid-block Wacouta crossing of Kellogg Boulevard to the Union Depot elevated railyard, and a new OMF located on Ramsey County-owned land east of Union Depot. Since publication of the SDEIS, several significant issues were expressed by project partners and stakeholders. The concerns were associated with impacts to historic resources, specifically the Union Depot and its associated facilities, potential constraints on Ramsey County plans for a multimodal transit hub re-using the Union Depot concourse, and additional project costs due to poor soil conditions identified on the site for the OMF.

Specifically, cultural and historic resource impacts were identified by the State Historic Preservation Office (SHPO) and by other stakeholders during the Section 106 process, including consulting parties to the Programmatic Agreement. Potential adverse impacts included a change in the St. Paul Union Depot access and setting, demolition of a portion of the historic railyard, and potential changes to the multi-modal design in and around the proposed Union Depot Project by Ramsey County. Other impacts of note included right-of-way takings associated with station placement and configuration in front of the Union Depot headhouse and impacts to an existing St. Paul City park (tot lot located at the corner of 4th and Sibley streets). Advancing preliminary engineering on the Ramsey County site identified a large area of poor (highly compressible) soils. The Metropolitan Council performed a series of value engineering exercises to deal with this engineering issue, the

result of which was an OMF that, while still meeting minimal functional requirements, did not provide the level of functionality desired.

With the identification of substantial challenges on the Ramsey County-owned site east of Union Depot, an alternative site for the OMF was identified in downtown St. Paul re-using the Diamond Products building on Broadway and Prince Streets. Refining the Preferred Alternative to include this site had numerous project advantages:

- It avoided almost all Section 4(f) historic resource issues identified by SHPO and other consulting and interested parties.
- Connecting to this site using public right-of-way is possible with minimal to no access disruptions to adjacent buildings and sites on 4th Street.
- The Diamond Products building can be re-used for the OMF and provides for added functionality.
- Alternative use of the Ramsey County site is possible.

The Diamond Products site was proposed as an alternate OMF for inclusion and evaluation in the FEIS. The site, just north of the site disclosed in the SDEIS, would minimize numerous project impacts, including potentially significant impacts to historic resources and would not incur additional project costs. This site is shown in Figures 2-3 and 2-4. Preliminary engineering drawings included in Appendix L show this modification.

West Bank Alignment and Station Location

The design of Central Corridor LRT elements in the West Bank area was refined to meet several needs as expressed through the SDEIS public comment period. Refinements were made to the design to ensure the Preferred Alternative would not preclude MnDOT and the City of Minneapolis from reconfiguring access to and from I-35W in the future. The refined alignment shifts the West Bank Station further to the west, while still maintaining access to Cedar and 19th Avenues. This shift accommodates space for a future double-track crossover between the West Bank Station and the Washington Avenue Bridge to allow for maximum future flexibility to run “gap trains” or special event trains. The refined alignment of access ramps in the area of the West Bank Station allows the U of M and the City of Minneapolis the ability to redevelop parcels of land which would have been impacted by the previous design. Finally, a refinement to the I-35W off-ramp provides for better and safer traffic operations in this area. These new refinements also eliminate temporary constructions impacts to Currie Park. Additionally, the refinement improves LRT operations due to improved track geometry. Preliminary Engineering drawings included in Appendix L show this modification.

Washington Avenue Transit/Pedestrian Mall

Refinements to the design of the Washington Avenue Transit/Pedestrian Mall have been made since publication of the SDEIS. These refinements focused on creating zones for pedestrian amenities, and concepts for how the transit mall would operate and appear. These concepts were developed in partnership with representatives of the U of M, Hennepin County, the City of Minneapolis, and other stakeholders in this process.

The Transit/Pedestrian Mall will be constructed between Church Street and Walnut Street on Washington Avenue through the U of M East Bank campus. It will consist of center-running LRT tracks and will include a center-platform LRT station located between Union

Street and Harvard Street. It will include a pedestrian amenity zone extending between the LRT tracks which will be approximately 20 feet in width from Church Street to Walnut Street. Pedestrian movements within the Transit Mall and pedestrian amenity zone will be channeled at signalized intersections and designated non-signalized crossings at locations controlled by traffic markings and signage and traffic and/or pedestrian-only signals. Other features of the Transit/Pedestrain Mall include a 12-foot wide zone between the LRT tracks and the sidewalks that will be used by emergency service vehicles and bicyclists. The concept of operations within the Transit Mall being discussed as this FEIS was completed includes initially employing a shared use operation of the LRT guideway for buses and LRT vehicles. Performance and safety metrics will be developed with input from the U of M and other stakeholders to determine the viability of such operations over the long-term. Under the shared use operation scenario the buses would not use the light-rail stations for passenger boarding and alighting but would have their own bus pull-outs to safely accommodate this activity outside of the Transit Mall area. This concept of operations will be refined and finalized with input from Metro Transit Operations, the U of M and other stakeholders and will include a review by the Metro Transit Safety Department and the Minnesota Department of Public Safety.

Washington Avenue Bridge Rehabilitation

To accommodate the Preferred Alternative, proposed improvements would need to be made to the Washington Avenue Bridge. The bridge was opened in 1965 and, in its current configuration, carries two lanes of vehicular traffic in each direction on a lower deck, and pedestrian traffic on an upper deck. With Central Corridor LRT, the inside lane in each direction on the lower deck would be converted to exclusive LRT use, while one lane of vehicular traffic would remain in each direction on the outside lanes. The pedestrian deck would remain unchanged (see Chapter 9 for a discussion of a project led by Hennepin County to make improvements to the pedestrian deck).

During the AA/ DEIS phase, preliminary evaluation of the bridge indicated that minimal changes to the structure would be required to accommodate LRT operations. However, during Preliminary Engineering, a more rigorous and detailed analysis of the bridge uncovered some existing conditions that do not meet current design requirements. These conditions are not related to light rail, but to design codes that have been changed since the bridge was originally constructed. In addition, portions of the Washington Avenue Bridge employ a design (non-redundant) that makes the structure more vulnerable to potential catastrophic failure. Therefore, in order to correct the design code conditions and to furnish a structure that would be structurally redundant and provide years of remaining service life for both LRT and the vehicular and pedestrian traffic that would remain on the bridge, the Preferred Alternative includes a major rehabilitation of the bridge. Elements of this rehabilitation include the following:

- Strengthening of existing bridge girders to correct the current design code requirements. This would generally involve adding steel plates to the existing girder flanges.
- Adding new longitudinal structural elements to the structure to provide additional load-carrying capacity and a redundant structure. These elements would be placed underneath the existing bridge deck, located inside the existing girders, and run the length of the bridge.

- Replacing the existing bridge deck to provide additional load carrying capacity and as part of increasing the bridge's structural redundancy, the design will integrate the concrete deck with the steel structural members.
- Modifying and strengthening the bridge substructures to carry the additional structural elements. This would involve adding concrete to the bridge piers as needed to support the new members.

All of the improvements proposed for the bridge superstructure would take place within the envelope of the existing structure and no changes would be visible or apparent to the bridge's appearance from motorists or observers at the roadway or pedestrian levels. An observer standing directly under the bridge would see the new structural elements and the bridge piers would have additional concrete to support the new structural members. No changes to the bridge clearance, spans, or waterway openings are proposed.

2.1.4.6 Adoption of the Preferred Alternative

After the publication of the SDEIS, an NOA was published in the *Federal Register* on July 11, 2008, and the Minnesota EQB Monitor on July 14, 2008. After the closing of the formal comment period (August 25, 2008), the Metropolitan Council adopted the Preferred Alternative for Central Corridor LRT based upon the analysis undertaken during preliminary engineering and the comments received on the SDEIS. LRT was selected as the preferred technology for the Central Corridor operating at-grade on Washington and University Avenues, passing north of the Capitol and turning south on Robert Street, turning west at 12th Street to Cedar Street, and then continuing south on Cedar Street into downtown St. Paul turning diagonally at 4th Street, and continuing east to end at St. Paul's Union Depot with tail track leading to an operations and maintenance facility farther east (Metropolitan Council Resolution No. 2008-26). The Preferred Alternative would include 20 (15 new and five shared with Hiawatha) stations. This decision, revising the AA/DEIS LPA, forms the basis of the evaluation undertaken and documented in this FEIS.

2.2 Alternatives Evaluated in the Final Environmental Impact Statement

This FEIS has been prepared to assist decision-makers and the public in understanding how the Preferred Alternative as described in this FEIS may affect the physical, human, and natural environment. The FEIS compares the effects of the Preferred Alternative against the No Build and Baseline Alternatives.

2.2.1 No-Build Alternative

The No-Build Alternative for the AA/DEIS included Metro Transit services and facilities that were programmed to be in operation in fiscal year 2014 (Central Corridor LRT opening year) and the regional roadway/highway facilities that were programmed to be in place by 2030. The No-Build Alternative was defined as existing and committed transportation projects. The regional roadway/highway facilities included in the analysis assume implementation of all projects included in the financially constrained 2030 Transportation Policy Plan. For the transit component of this analysis, the Metropolitan Council took a more conservative approach. Committed transit projects were only those projects with committed funding for capital and operations through 2014. The No-Build Alternative includes no other new high-capacity transit service. A detailed description of the No-Build 2030 transit system, bus network, and roadway/highway facilities is included in Chapter 6 of this FEIS.

Under requirements included in CFR 1502.14(d), the alternatives analysis in the project development process must include the alternative of no-action or no-build. This analysis provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the action alternatives. It is also an example of a reasonable alternative outside the jurisdiction of the agency which must be analyzed. Inclusion of such an analysis in the process is necessary to inform Congress, the public, and the President as intended by NEPA (Section 1500.1(a)).

2.2.2 Baseline Alternative

This alternative serves as a basis for comparison to the build alternatives as part of the FTA's New Starts Process. It is also designed to do the "best that can be done" to improve transit service in the Central Corridor LRT Study Area without a major capital investment. Low capital cost infrastructure and bus transit improvements for the Central Corridor included bus operations, ITS techniques, TDM, and other system improvements. Bus operation strategies that build upon existing transit services and facilities provide connectivity within the Central Corridor LRT Study Area. ITS uses the latest technology to more effectively manage transportation systems. TDM strategies help reduce congestion by encouraging the use of alternative modes of transportation rather than driving alone. This alternative is not evaluated in all sections of the FEIS. Rather, it is used in sections where a more appropriate level of comparison and analysis is required to understand the difference between the Preferred Alternative and more modest investments. Comparative analysis of the Baseline Alternative is included in Chapter 6 and relevant sections of Chapter 10.

2.2.3 Preferred Alternative

Figures 2-3 through 2-8 illustrate the alignment and related facilities of the Preferred Alternative. Detailed plan set drawings of the alignment, station locations, system elements, and other ancillary facilities are contained in Appendix L of this FEIS. These preliminary engineering drawings were developed for the purposes of preparing cost estimates and

identifying environmental impacts. The following section provides a description of the Preferred Alternative.

2.2.3.1 Preferred Alternative Facilities and Equipment

The Central Corridor Preferred Alternative is proposed to be a 10.9-mile double tracked alignment with a total of 20 stations between downtown Minneapolis and downtown St. Paul with intermediate service to the U of M. The Central Corridor Preferred Alternative would be primarily at-grade except for aerial structures over I-35W, Trunk Highway 280 (TH 280), I-94, and the Washington Avenue Bridge facility over the Mississippi River. In downtown Minneapolis, the Preferred Alternative is proposed to share the Hiawatha LRT alignment. The Preferred Alternative uses an exclusive at-grade alignment and is center-running throughout all segments, except where noted below. Figures 2-9 and 2-10 illustrate two typical sections at various locations along the alignment. The Preferred Alternative is described in detail below:

Alignment Segments

Downtown St. Paul

For this segment, the Preferred Alternative would begin at the proposed OMF located east of the Union Depot between 4th Street and Warner Road. A non-revenue connection on 4th Street would connect to the terminal station on the north side of the Union Depot. The Preferred Alternative would continue from the Union Depot along 4th Street to a point just west of Minnesota Street and turn northwest to continue diagonally through the block bounded by 4th and 5th Streets and by Cedar and Minnesota Streets. The alignment would continue diagonally across the block, emerging onto Cedar Street at a point north of 5th Street. It would provide for a new station along the diagonal. The alignment would continue north along Cedar Street through the rest of the segment.

Capitol Area

For this segment, the alignment continues north on Cedar, then turns east onto 12th Street East. The alignment runs on the north side of 12th Street East for two blocks, before turning north onto Robert Street. The alignment runs along the west side of Robert Street, then turns west to run along the south side of University Avenue. Between Rice Street and Marion Street, the Preferred Alternative will transition from south-side running on University Avenue to center running.

Midway East/Midway West

The Preferred Alternative for both the Midway East and Midway West segments would run down the center of University Avenue.

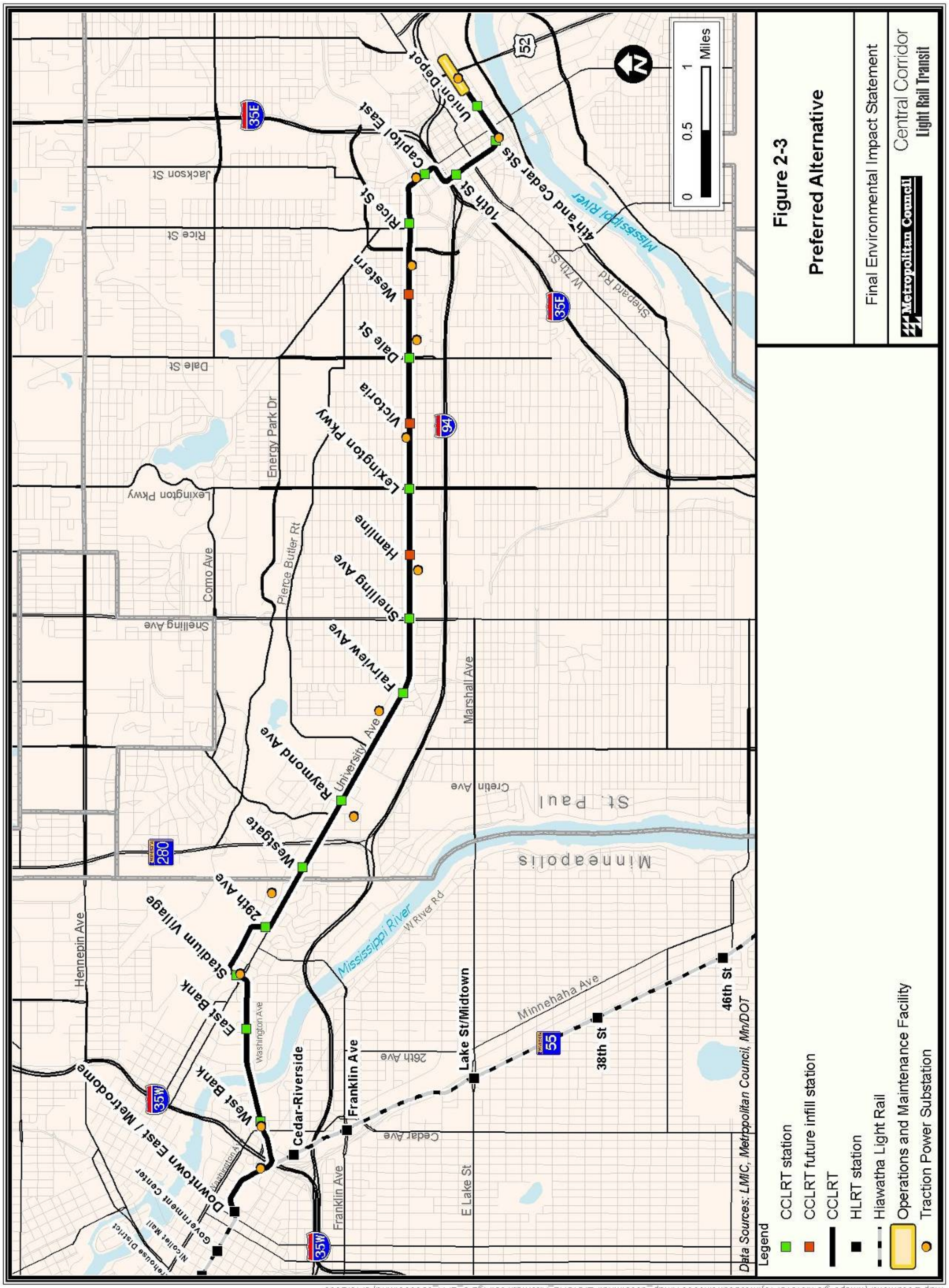


Figure 2-3
Preferred Alternative
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
Legend
CCLRT station
CCLRT future infill station
CCLRT
HLRT station
Hiawatha Light Rail
Operations and Maintenance Facility
Traction Power Substation
Data Sources: LMIC, Metropolitan Council, Mn/DOT
0
0.5
1
Miles
Union Depot
Capitol East
10th St
4th and Cedar Sts
Rice St
Western
Dale St
Victoria
Lexington Pkwy
Hamline
Snelling Ave
Fairview Ave
Raymond Ave
Westgate
29th Ave
Stadium Village
East Bank
West Bank
Downtown East / Metrodome
Government Center
Nicollet Mall
Warehouse District
Cedar-Riverside
Franklin Ave
Lake St/Midtown
38th St
46th St
Mississippi River
St. Paul
Minneapolis
University Ave
Jackson St
Rice St
Dale St
Lexington Pkwy
Snelling Ave
Como Ave
Energy Park Dr
Pierce Butler Rt
Marshall Ave
Cretin Ave
Hennepin Ave
Washington Ave
26th Ave
Cedar Ave
Franklin Ave
E Lake St
Minnehaha Ave
W River Rd
W 7th St
Shepard Rd
35E
35W
94
52
280
55

Map Document: (\\mspe-gis-file\GISProj\MetCouncil\6589\map_docs\mxd\FEIS\CH2_Alternatives\Fig2-3_LPA_030509.mxd) 3/15/2009

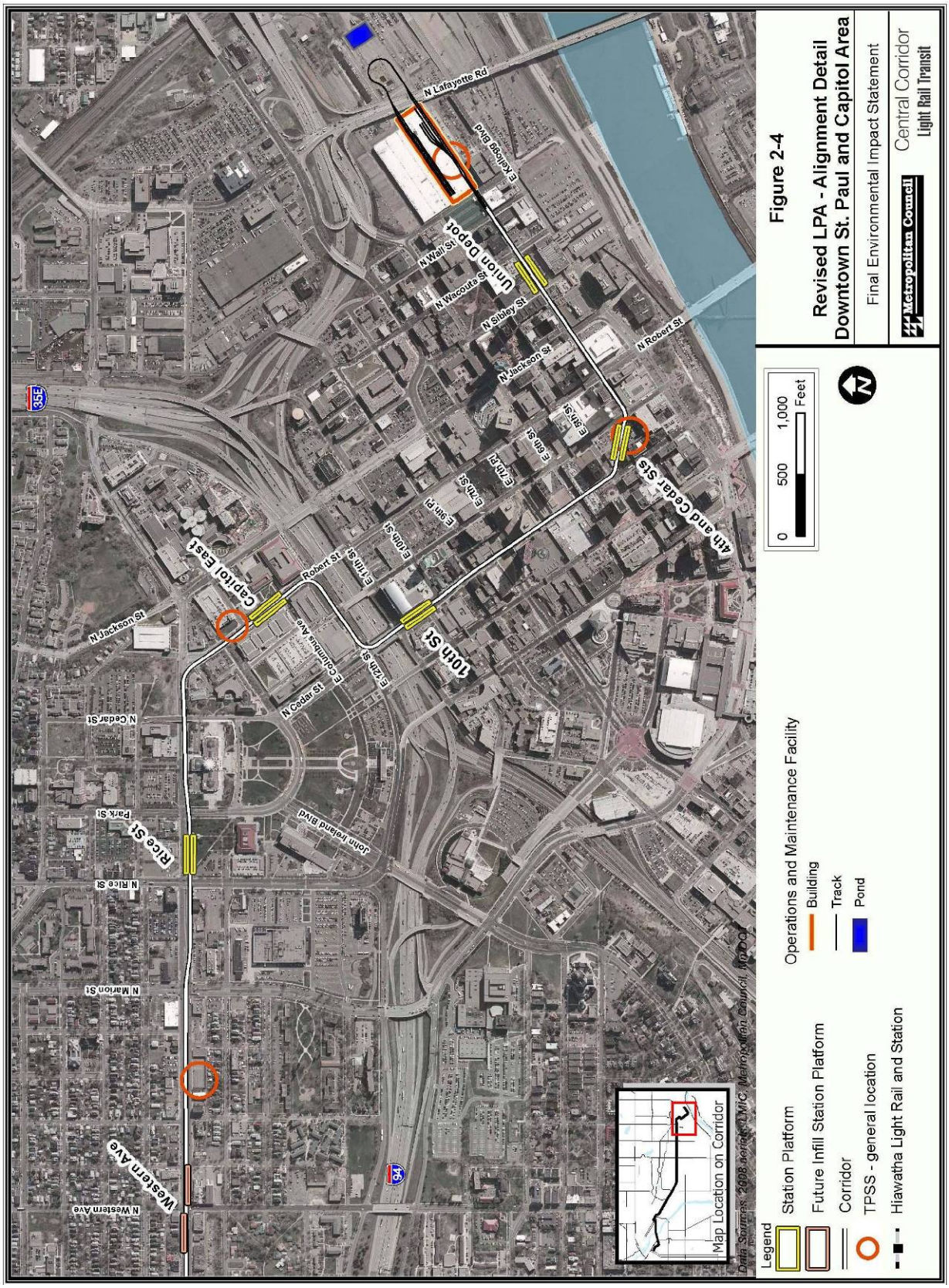


Figure 2-4
Revised LPA - Alignment Detail
Downtown St. Paul and Capitol Area
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
0
500
1,000
Feet
N
Legend
Station Platform
Future Infill Station Platform
Corridor
TPSS - general location
Hiawatha Light Rail and Station
Operations and Maintenance Facility
Building
Track
Pond
Map Location on Corridor
Data Sources: 2008 aerial, CMC, Metropolitan Council, MnDOT
N Lafayette Rd
E Kellogg Blvd
Union Depot
N Wall St
N Wacouta St
N Sibley St
N Jackson St
N Robert St
4th and Cedar Sts
E 4th St
E 5th St
E 6th St
E 7th Pl
E 8th St
E 9th Pl
E 9th St
10th St
Robert St
E 7th St
E 6th St
E 5th Pl
E 4th St
Capitol East
N Jackson St
E Columbus Ave
N Cedar St
E 12th St
N Cedar St
John Ireland Blvd
Rice St
Park St
N Rice St
N Marion St
Western Ave
N Western Ave
35E
94

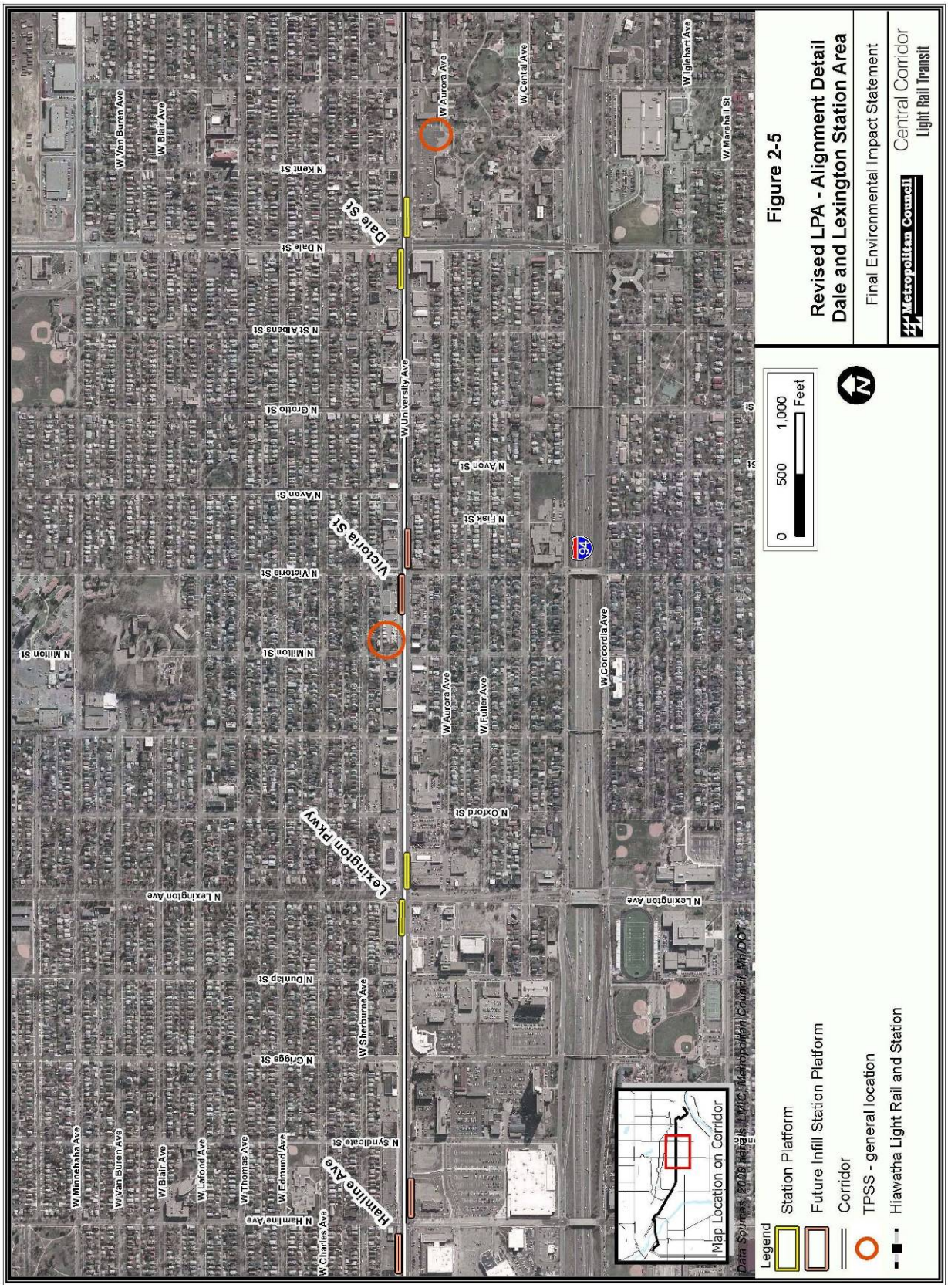


Figure 2-5
Revised LPA - Alignment Detail
Dale and Lexington Station Area
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
Legend
Station Platform
Future Infill Station Platform
Corridor
TPSS - general location
Hiawatha Light Rail and Station
Map Location on Corridor
0
500
1,000
Feet
N
Dale St
Victoria St
Lexington Pkwy
Hamline Ave
N Lexington Ave
W University Ave
W Aurora Ave
W Central Ave
W Iglehart Ave
W Marshall St
W Concordia Ave
N Oxford St
N Fisk St
N Avon St
N Victoria St
N Milton St
N Dale St
N Kent St
N St Albans St
N Grotto St
W Van Buren Ave
W Blair Ave
W Minnehaha Ave
W Lafond Ave
W Thomas Ave
W Edmund Ave
N Hamline Ave
W Charles Ave
N Syndicate St
N Griggs St
W Sherburne Ave
N Dunlap St


Figure 2-6
Revised LPA - Alignment Detail
Snelling to Raymond Station Area
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
0 500 1,000 Feet
Legend
Station Platform
Future Infill Station Platform
Corridor
TPSS - general location
Hiawatha Light Rail and Station
Map Location on Corridor
Data Sources: 2008 aerials, UMD, Metropolitan Council, MnDOT
Snelling Ave
Fairview Ave
Raymond Ave
Hamline
W University Ave
W Charles Ave
N Pascal St
N Snelling Ave
N Fairview Avenue Service Rd
Gilbert Ave
Cleveland Ave
Vandalia Ave
Pierce Butler Rte
N Hamline Ave
N Albert St
Holton St
N Simpson St
N Ashbury St
W Englewood Ave
W Minnehaha Ave
W Van Buren Ave
W Blair Ave
W Lafond Ave
W Thomas Ave
N Wheeler Ave
Clayland St
Tatum St
N Howell St
N Prior Ave
Charles Ave
Oakley Ave
Fercnia Ave
N Roy St
W Shields Ave
N Pierce St
N Aldine St
W Saint Anthony Ave
N Wheeler St
Beacon Ave
N Fairview Avenue Service Rd
W Territorial Rd
N Hampden Ave
Pusbury St
Myrtle Ave
Vandalia Ave
Montgomery St

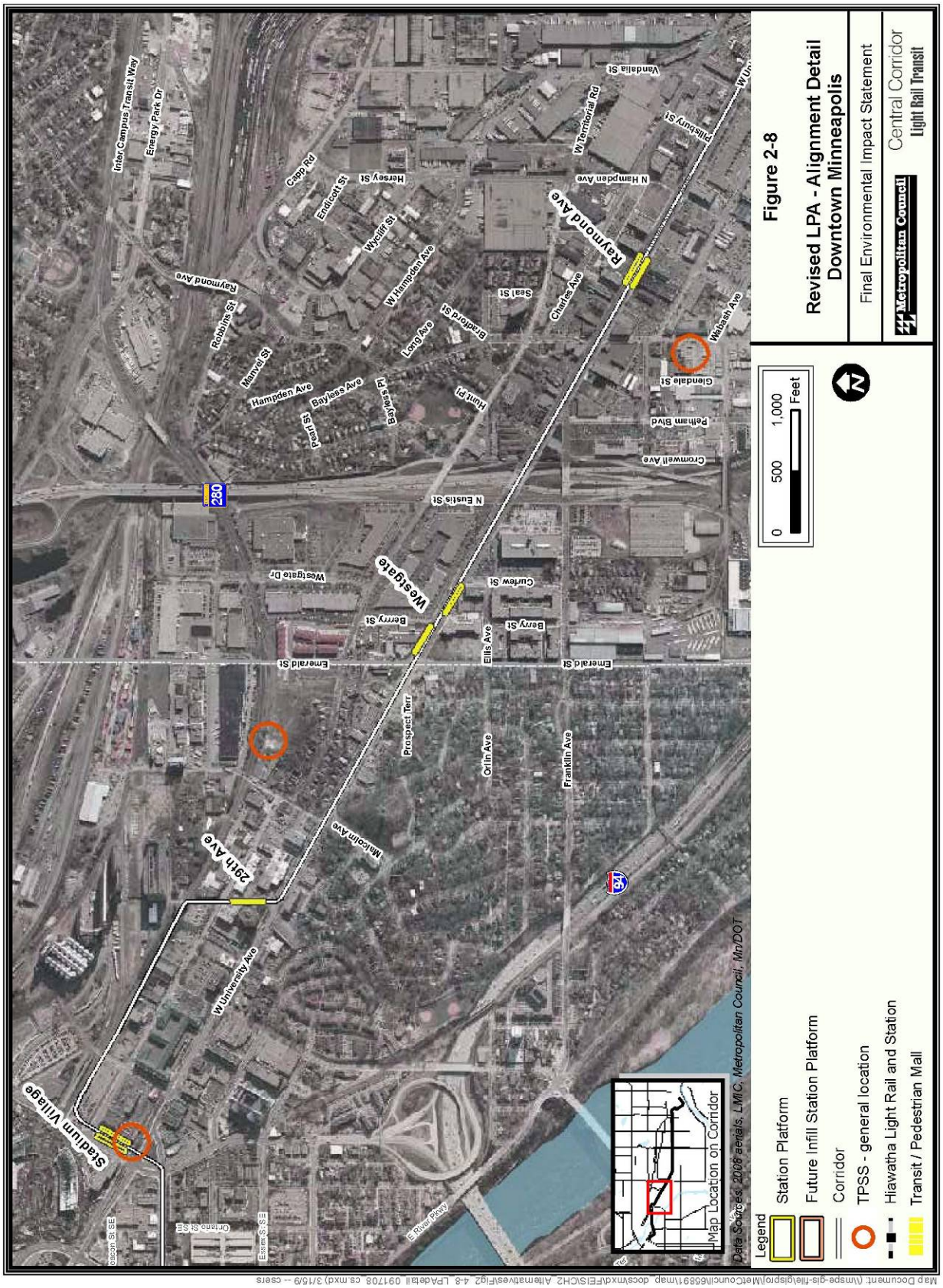


Figure 2-8
Revised LPA - Alignment Detail
Downtown Minneapolis
Final Environmental Impact Statement
Metropolitan Council
Central Corridor
Light Rail Transit
0
500
1,000
Feet
N
Legend
Station Platform
Future Infill Station Platform
Corridor
TPSS - general location
Hiawatha Light Rail and Station
Transit / Pedestrian Mall
Map Location on Corridor
Data Sources: 2008 aerials, LMIC, Metropolitan Council, MnDOT
Stadium Village
29th Ave
Westgate
Raymond Ave
Map Document: (\\mspe-gis-file\gisproj\MetCouncil\65891\map_docs\mxd\FEIS\CH2_Alternatives\Fig2_4-8_LPAdetail_091708_cs.mxd) 3/15/9 -- csers


Figure 2-8
Revised LPA - Alignment Detail
U of M: West Bank and East Bank
Final Environmental Impact Statement
Central Corridor
Light Rail Transit
Metropolitan Council
Mississippi River
East Bank
West Bank
Cedar-Riverside
Downtown East / Metrodome
0
500
1,000
Feet
Legend
Station Platform
Corridor
TPSS - general location
Hiawatha Light Rail and Station
Transit / Pedestrian Mall
Map Location on Corridor

FIGURE 2-9 UNIVERSITY AVENUE TYPICAL CROSS SECTION

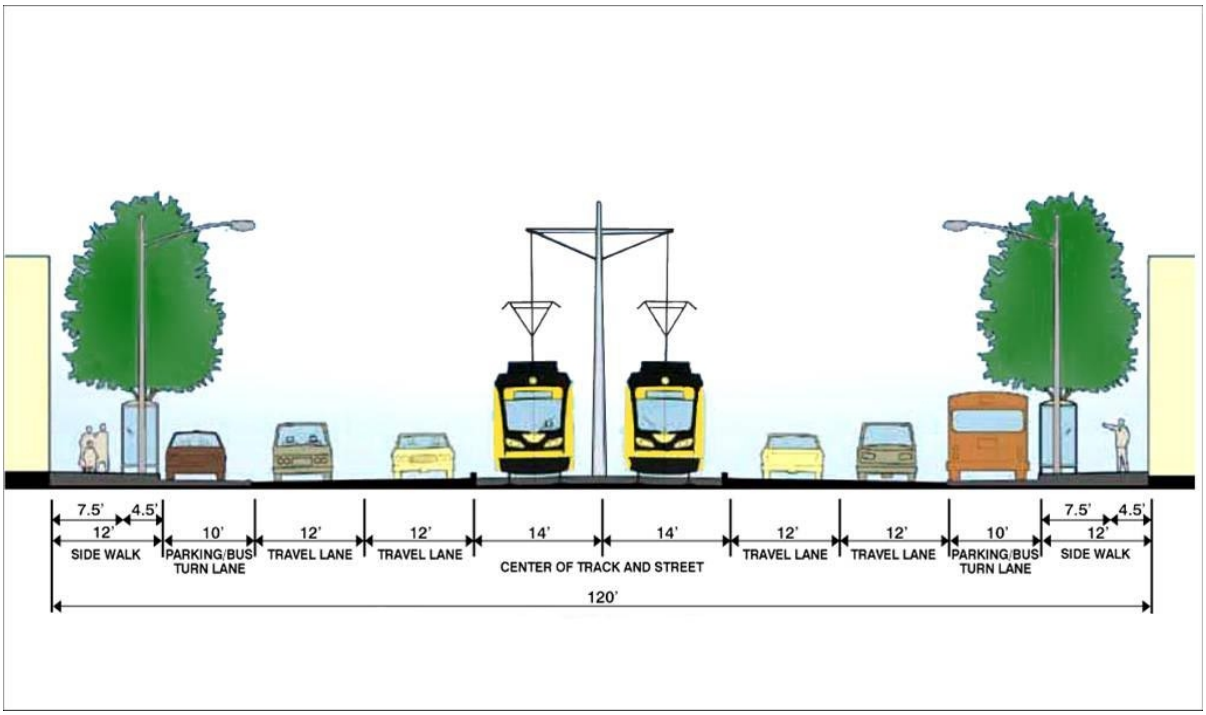
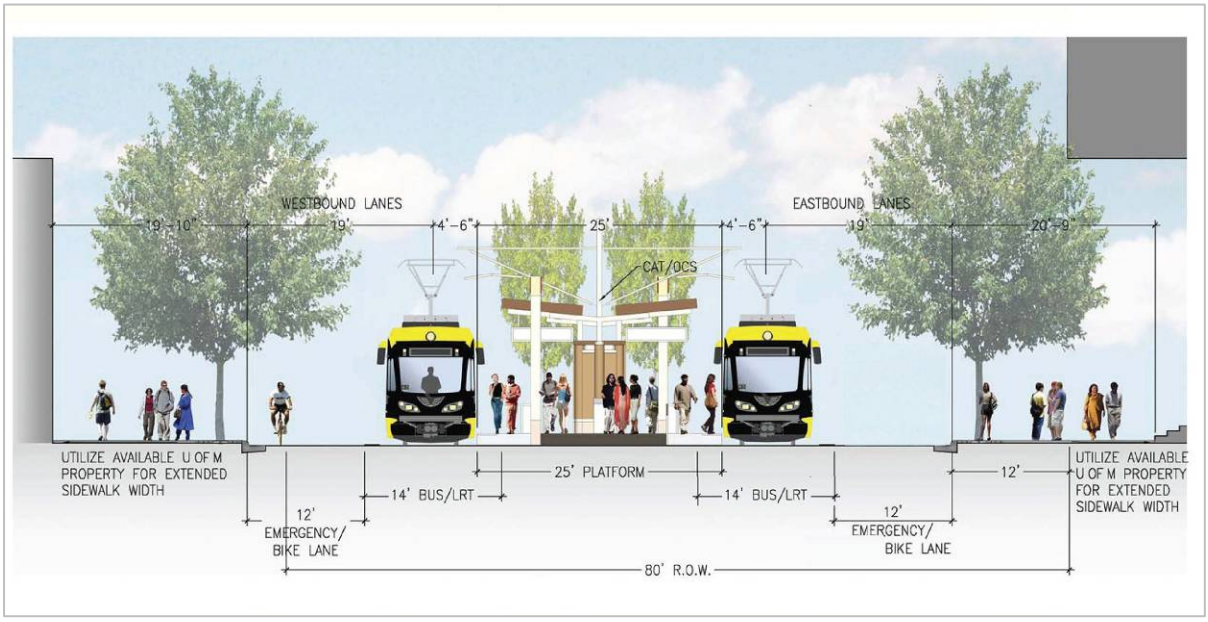


FIGURE 2-10 WASHINGTON AVENUE TRANSIT/PEDESTRIAN MALL TYPICAL CROSS SECTION



University/Prospect Park

The alignment will turn north from University Avenue at 29th Avenue SE and run along the east side of 29th Avenue for two blocks until it arrives at the U of M Transitway. It will run parallel to the U of M Transitway on the south side and proceed to 23rd Avenue and SE/Huron Boulevard near the TCF Bank Stadium. The alignment will turn to travel south/southwest along 23rd Avenue SE/Huron Boulevard across University Avenue, and then turn west to run down the center of Washington Avenue SE. The Preferred Alternative will run at-grade in the middle of Washington Avenue through the East Bank campus in a new transit/pedestrian mall extending from Walnut Street to Pleasant Street. The alignment will cross the Mississippi River using the existing Washington Avenue Bridge and then will cross over I-35W on a new structure.

Downtown Minneapolis

West of the new crossing over I-35W, the Preferred Alternative will interline with the Hiawatha LRT, sharing alignment and five stations between the Downtown East/Metrodome Station and the Downtown Minneapolis Ballpark Station at 5th Street and 5th Avenue.

Guideway

The Preferred Alternative includes 10.9 miles of exclusive guideway (9.7 miles for Central Corridor LRT and 1.2 miles shared with existing Hiawatha LRT). LRVs are proposed to operate on standard gauge railroad embedded track. The proposed system would be double-tracked throughout, providing a separate track for eastbound and westbound trains. Generally, a cross-section of at-grade double tracks for the LRT alignment requires 28 feet of right-of-way. The minimum vertical clearance is approximately 14 feet from top of rail. Crossovers to allow trains to cross from the eastbound to the westbound tracks are proposed to be provided at regular intervals for special operations. Figures 2-9 and 2-10 illustrate typical sections of guideway at various locations along the alignment. Preliminary engineering drawings showing guideway and special track work are included in Appendix L.

Vehicles

The Preferred Alternative includes 31 LRVs. The LRVs proposed for the Central Corridor would be equivalent to the current six-axle, articulated LRVs used for the Hiawatha line. The vehicles are designed to operate independently or coupled and operated as multiple unit train sets.

Each vehicle incorporates cab controls and will be operable from either end of the car. Eight independent passenger doorways permit level boarding and alighting from low level platforms. Each LRV is 94 feet long and seats 66 passengers with room for an additional 64 to 130 standing passengers. Provisions for four ADA-accessible accommodations are provided on each vehicle, along with two hanging bicycle racks per car. Maximum operating speed is 55 miles per hour (mph). Vehicles include climatic controls and special provisions for the region's extreme operating temperatures.

Each LRV is independently powered from the overhead catenary system and collects 750-vdc power by means of a single pantograph located on each car roof. Traction power is fed to four alternating current (ac) motors located on each axle of the powered trucks. The center truck, under the articulated section, is not powered; however, friction and track braking are available and contribute to the overall dynamic and friction blended braking effort.

Stations

The Preferred Alternative includes a total of 20 stations. Of these stations, 15 are exclusive to Central Corridor and five will be shared with the Hiawatha Line. All proposed stations will have a uniform look and design and will be ADA-compliant.

Station platforms will include sufficient tangent to accommodate two-car trains initially and three-car trains in the future. Amenities will be standardized wherever possible, including shelters, platform features, and structural elements. Generally, a canopy will be built over a portion of each platform, and ticket vending machines and stored value indicators will be provided. Table 2-2 lists the stations, placement, facility type, and other station characteristics.

Table 2-2 Central Corridor LRT Station Characteristics

Station	Placement in Right-of-Way	Grade Alignment	Platform Access	Location
Multimodal Terminal		Shared Hiawatha Line Stations		
Warehouse District/Hennepin Ave				
Nicollet Mall				
Government Plaza				
Downtown East/Metrodome				
West Bank	In-Street	At-Grade	Center	East of Cedar Ave. Overpass
East Bank	In-Street (Transit/Ped Mall)	At-Grade	Center	Near-side Union St.
Stadium Village	Adjacent to 23rd Ave	At-Grade	Side	North side of University Ave.
29th Avenue	In-Street	At-Grade	Center	Between 4th St. & University Ave.
Westgate Drive	In-Street	At-Grade	Split Side	Far-side Berry St.
Raymond Avenue	In-Street	At-Grade	Side	Between Carleton St. & LaSalle St.
Fairview Avenue	In-Street	At-Grade	Side	East of Lynnhurst Ave.
Snelling Avenue	In-Street	At-Grade	Split Side	Far-side Snelling Ave.
Lexington Avenue	In-Street	At-Grade	Split Side	Far-side Lexington Ave.
Dale Street	In-Street	At-Grade	Split Side	Far-side Dale St.
Rice Street	In-Street	At-Grade	Side	East of Rice St.

Station	Placement in Right-of-Way	Grade Alignment	Platform Access	Location
Capitol East	In-Street	At-Grade	Side	Between 14th St. & Columbus Ave.
10th Street	In-Street	At-Grade	Side	Between 11th St. & 10th St.
4th and Cedar streets	Off-Street (Block Diagonal)	At-Grade	Side	Between 5th St. & Minnesota St.
St. Paul Union Depot	In-Street	At-Grade	Dual Split	Between Sibley St. & Wacouta St.

Source: Metropolitan Council Engineering Services Consultant, September 2008

Future Infill Stations

Below grade infrastructure to allow for later construction of three future infill stations at Hamline Avenue, Victoria Street, and Western Avenue is also proposed as part of the LPA.

During public comment periods and community forums for both the AA/DEIS and the SDEIS, community members expressed concerns regarding planned changes in frequency to the Route 16 bus operating on University Avenue. In addition to changes in service frequency, residents, businesses, and neighborhood organizations also expressed concerns regarding the spacing of stations, particularly for residents between Rice Street and Lexington Parkway in St. Paul.

In addressing these concerns, the SDEIS examined the social, economic, and environmental impacts of constructing three additional stations at Hamline Avenue, Victoria Street, and Western Avenue in the City of St. Paul. Analysis of the impacts to ridership on the Central Corridor LRT was conducted. The analysis determined that the addition of these stations would not result in ridership gains, but rather a loss of overall ridership due mostly to the increase in overall travel time. This ridership analysis is provided in Appendix J of the FEIS. In response to community concerns, the Metropolitan Council has committed funding as part of the Preferred Alternative for the construction of the below-ground infrastructure for these future infill stations to be constructed once funding is identified. The Metropolitan Council intends to construct these stations, which will allow enhanced access to the surrounding neighborhoods and community. The methodology for this analysis was consistent with the guidelines of the FTA Circular 4702.1A, “Title VI and Title VI-Dependent Guidelines for FTA Recipients,” and is also consistent with analysis of service change impacts routinely completed by the Metropolitan Council when changes in transit service are proposed.

The anticipated platform configuration for these stations would be split-side. The Hamline Avenue Station would have a westbound platform between Albert Street and Hamline Avenue and an eastbound platform between Syndicate Street and Hamline Avenue. The Victoria Street Station would have a westbound platform between Milton Street and Victoria Street and an eastbound platform between Avon Street and Victoria Street. The Western Avenue Station would have a westbound platform between Arundel Street and Western Avenue and an eastbound platform between Farrington Street and Western Avenue.

Fare Collection

Fare collection will be provided and done using current Metro Transit design and operations systems.

Power System

The Preferred Alternative includes 13 TPSS. Twelve TPSS are proposed at regular intervals along the proposed LRT line and one at the OMF in downtown St. Paul. The TPSS would generally be single-story buildings approximately 40 feet by 20 feet on about a 4,000-square foot limited access site. TPSS do not generate electricity; rather, they convert existing electrical current to an appropriate type (AC to DC) to power LRT vehicles. The power is then distributed to the trains through an OCS. Figure 2-3 through Figure 2-8 show proposed TPSS locations.

Traffic and Train Control

Active devices, including traffic signals, railroad-type flashers, and bells were proposed to control traffic at locations where the Preferred Alternative would cross public streets. In low-speed areas, including downtowns, intersection traffic signals would be used. Traffic and pedestrian signals, signs, and markings would generally be in accordance with the current MUTCD.

Ten signal bungalows are proposed as part of the Preferred Alternative. These facilities are small sheds that hold the equipment to operate and monitor the signals that regulate train movement on the alignment. Signal bungalows need to be placed near special trackwork, such as turnouts and crossing diamonds, to minimize installation costs and power demand and to reduce power losses. Most will be located in obscured areas and in underutilized parking lots.

Operations and Maintenance Facility

The OMF proposed for the Preferred Alternative would be located entirely within an existing building known as Diamond Products. This building was built in 1969 by the Gillette Company as a facility to manufacture personal care products and has been vacant since 2005. The Diamond Products site is bounded by East Prince Street on the south, Broadway Street on the west, East 5th Street on the north, and North Lafayette Road on the east. The CCLRT OMF will take a portion of this site, namely the southern portion of the existing Diamond Products building, which is a one-story structure. The OMF will re-use this building, retrofitting it to serve the purposes of an LRT operations and maintenance facility.

Features and functions required at the OMF include:

- Storage yard for the fleet of the Central Corridor LRT vehicles
- Train make-up yard dispatch
- Circulation and lead tracks
- Service and inspections shops, interior and exterior cleaning, light maintenance, and repairs
- Support facilities such as parts storage, building mechanical and electrical space, administration and records offices, employee locker and wash rooms, conference and training rooms, and lunch and vending rooms
- Parking for employees and visitors.

Accessibility

The Preferred Alternative would be ADA-compliant. The LRVs would be fully accessible with level boarding from accessible platforms and include provisions for wheelchair space on all cars.

2.2.3.2 LPA Operating Assumptions

Conceptual operating plans and assumptions were developed for the Preferred Alternative. These assumptions are necessary to develop required system components/elements and capital and operating costs. Operating assumptions are described below.

Service Levels

The Preferred Alternative is proposed to operate seven days a week from approximately 5:00 a.m. to 1:00 a.m. This operating plan assumes 7.5-minute service frequencies during weekday peak periods and 10-minute service in the midday. Early morning and evening service would be at 15-minute frequencies and late-night service would be at 30-minute frequencies. Service headways by time of day for the Central Corridor Preferred Alternative will be consistent with those operated on the Hiawatha Line.

Operating Requirements

Typical weekday, Saturday, and Sunday LRT schedules were developed using proposed service frequencies, hours of service, and LRT travel time estimates, to determine daily and annual revenue train hours and miles. The Central Corridor Preferred Alternative stations, facilities, and propulsion systems are being planned for up to three-car trains. The Preferred Alternative, however, is proposed to initially operate with two-car trains.

Table 2-3 presents the peak and fleet car requirements and estimates of annual revenue train hours, car hours, and car miles for the Central Corridor LRT operating plan. On weekdays, 13 two-car trains are required for peak service, for a total of 26 peak cars. On weekends, nine two-car trains are required, for a total of 18 cars in peak weekend service. Applying a 20 percent spare ratio (20 percent of fleet requirement is offline) to the weekday maximum of 26 cars, a total of 31 train cars would be required.

Table 2-3 LRT Service Operating Requirements

Day	Service Statistic	LRT Operating Plan
Weekday	Train Hours[a]	43,639
	Car Hours[b]	87,278
	Car Miles[c]	1,224,653
	Peak Cars[d]	26
	Fleet Cars[e]	31
Saturday	Train Hours	7,810
	Car Hours	15,619
	Car Miles	224,091
	Peak Cars	18
Sunday	Train Hours	8,538
	Car Hours	17,075
	Car Miles	244,973
	Peak Cars	18
Total	**Train Hours**	**59,986**
	Car Hours	**119,972**
	Car Miles	**1,693,717**
	Peak Cars	**26**
	Fleet Cars	**31**

Source: Metropolitan Council Engineering Services Consultant, September 2008

[a] Train Hours assumes – describes total number of hours of operation for each train set or consist (coupled vehicles) for a specific day

[b] Car Hours – describes total number of hours of operation for a specific day for all cars in the fleet

[c] Car Miles – describes total number of vehicle miles traveled for a specific day for all cars in the fleet

[d] Peak Cars – describes maximum LRT vehicles used during peak operation

[e] Fleet Cars – describes entire fleet size for the Preferred Alternative including spares

Integration with Hiawatha LRT Line

When the Central Corridor LRT line becomes operational, the combined Central and Hiawatha Corridors peak period service frequency will become 3.75 minutes inbound and 3.75 minutes outbound (along common rail segment), resulting in a combined inbound and outbound service frequency at each crossing intersection in downtown Minneapolis of approximately 1.88 minutes. Because the Hiawatha and Central Corridor are envisioned to operate with the same headways, inbound and outbound trains in downtown Minneapolis will be spaced evenly (every other train is from the same LRT line) to achieve maximum transit service benefits to the downtown Minneapolis area.