

Appendix M –Technical Memorandum 1 - LRT 3C (11th/12th Sub-Alternative)



SOUTHWEST
transitway

green means go.

Southwest Transitway Draft Environmental Impact Statement (DEIS)

Scoping Technical Memorandum #1: Analysis of Alternative LRT 3C (11th/12th Sub-Alternative)

Prepared by
HDR Engineering, Inc.

January 2009



TABLE OF CONTENTS

1. BACKGROUND AND PURPOSE OF ANALYSIS..... 1

2. DESCRIPTION OF THE LRT 3C (11TH/12TH) SUB-ALTERNATIVE 2

3. ASSUMPTIONS 5

 3.1 Operating Assumptions Routing and Frequency..... 5

 3.2 Existing Condition Assumptions 5

4. EVALUATION 5

 4.1 Consistency with Regional and Local Planning..... 6

 4.2 Sound Engineering..... 7

 4.3 Performance..... 11

 4.4 Consistency with the Project Purpose and Need 13

5. CONCLUSIONS 14

 5.1 Consistency with Local and Regional Planning..... 14

 5.2 Sound Engineering..... 14

 5.3 Performance..... 14

 5.4 Purpose and Need Statement..... 14

6. RECOMMENDATION 14

LIST OF TABLES

Table 1: Comparative Travel Times (Minutes) – Excludes transfer time 12

Table 2: Capital Costs Comparison 13

LIST OF FIGURES

Figure 1: LRT 3C (11th/12th Sub-Alternative)..... 4

Figure 2: A visual analysis of the tunnel section 10

1. BACKGROUND AND PURPOSE OF ANALYSIS

During the National Environmental Policy Act/Minnesota Environmental Policy Act (NEPA/MEPA) Scoping process for the Southwest Transitway Project (the Project) Draft Environmental Impact Statement (DEIS), Minneapolis City Councilmember Ralph Remington submitted a sub-alternative to the LRT 3C Alternative that was identified in the Alternatives Analysis (AA) for further evaluation in the DEIS. Councilmember Remington's sub-alternative has been labeled LRT 3C (11th/12th Sub-Alternative).

This Technical Memorandum evaluates the LRT 3C (11th/12th Sub-Alternative) to determine if it is a reasonable alternative that warrants inclusion in the DEIS.

Federal regulations governing the preparation of Environmental Impact Statements dictate that "The draft EIS shall evaluate all reasonable alternatives to the action and discuss the reason why other alternatives which may have been considered were eliminated from detailed study" (23 CFR 771.123). According to 40 CFR §1502.14, the DEIS "includes all reasonable alternatives which are rigorously explored and objectively evaluated, as well as those other alternatives, which are eliminated from detailed study with a brief discussion of the reasons for eliminating them" (See also 46 Fed. Reg. 18026, question 1a).

The test of 'reasonableness' for alternatives is one that is determined with respect to Purpose and Need of the project. The Council on Environmental Quality (CEQ), the federal commission responsible for coordinating federal environmental efforts, establishes regulations that state "(w)hat constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in the case" (46 Fed. Reg. 18026, question 1b).

CEQ regulations further address reasonable alternatives as "those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (46 Fed. Reg. 18026, question 2b).

The U.S. Department of Transportation (USDOT) considers an alternative not feasible if it cannot be built as a matter of sound engineering judgment, and an alternative is not prudent if:

1. It compromises the project to a degree that it is unreasonable to proceed in light of its stated Purpose and Need;
2. It results in severe safety or operation problems;
3. After reasonable mitigation, it still causes severe social, economic, or environmental impacts, disruption to established communities, disproportionate impacts to minority or low income populations or severe impacts to environmental resources protected under other Federal statutes;
4. It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
5. It causes other unique problems or unusual factors; or
6. It involves multiple factors in paragraphs described above, that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude. (23 USC §771.135).

For purposes of this analysis, reasonable alternatives are those that:

- Are consistent with Regional and Local Planning
- Are based on sound engineering practices and are practical and feasible

- Perform as well or better than the LRT alternatives identified for inclusion in the Southwest Transitway DEIS
- Are consistent with the Purpose and Need for the Southwest Transitway

The proposed LRT 3C (11th/12th Sub-Alternative) will be evaluated on the criteria listed above to determine if it is a reasonable alternative and as such warrants inclusion in the Southwest Transitway DEIS.

2. DESCRIPTION OF THE LRT 3C (11TH/12TH) SUB-ALTERNATIVE

During the project Scoping comment period, Councilmember Remington submitted a letter containing a description of the sub-alternative to LRT 3C for evaluation (see Appendix B). Southwest Project Team staff met with aides to Councilmember Remington and Mayor R.T. Rybak as well as Minneapolis city planning and public works staff to refine the sub-alternative. The description of LRT 3C (11th/12th Sub-Alternative), a general routing diagram and conceptual alignment plans that resulted from this dialogue is contained in Figure 1.

The LRT 3C (11th/12th Sub-Alternative) would operate from Eden Prairie to downtown Minneapolis via the Opus/Golden Triangle area, the Hennepin County Regional Railroad Authority (HCRRA) property through Hopkins and St. Louis Park, and in the Midtown Corridor to the vicinity of Nicollet Avenue. At this point the sub-alternative would use either Blaisdell/LaSalle Avenues or 1st Avenue in a cut-and-cover tunnel from the Midtown Corridor to Franklin Avenue. North of Franklin the sub-alternative would operate on street to the vicinity of 11th/12th Street where it would turn west operating as a one-way pair¹ between Nicollet Mall and Royalston Avenue. At Royalston this sub-alternative would use the same routing as the LRT 1A and LRT 3A alternatives which interline with the Hiawatha LRT line on 5th Street through downtown Minneapolis.

Figure 1 illustrates a general routing diagram for LRT 3C (11th/12th Sub-Alternative) for the portion northeast of West Lake Street through downtown Minneapolis. Southwest of the West Lake Station the remainder of the alternative is assumed to be consistent with LRT 3C as described in the Southwest Transitway DEIS Scoping Information Booklet and is not described here.

For descriptive purposes only, the portion of the alignment from Midtown Corridor/Blaisdell through downtown Minneapolis was split into two segments: Segment 1 covers the area between the Midtown Corridor from Blaisdell to 1st Avenue and 12th Street from LaSalle Avenue to Nicollet Mall. Segment 2 covers the geographic area from Nicollet Mall and 11th/12th Streets to Royalston Avenue.

Segment A: Midtown Corridor/Blaisdell and 1st Avenue to Nicollet Mall/LaSalle and Nicollet Mall

The LRT 3C (11th/12th Sub-Alternative) would use the Midtown Corridor to either Blaisdell, Nicollet, or 1st Avenues. Running in a twin-track, bi-directional trackway in the Midtown Corridor, the LRT would turn north along one of these streets, entering cut-and-cover tunnel south of 28th Street. The shallow cut-and-cover tunnel would extend to Franklin Avenue. The LRT would emerge north of Franklin Avenue, running at street-grade and crossing over I-94 on either LaSalle Avenue or 1st Avenue. The bridge construction over I-94 has not been determined. Open-roof, below-grade stations would be located near 28th Street and near Franklin Avenue.

¹ A one-way pair or one-way couplet is a pair of parallel, one-way streets, usually separated by a city block, that carry traffic in opposite directions.

Under the LaSalle Avenue option, the LRT would continue north to 12th and 11th streets with a station between 12th and 13th Streets. Under the 1st Avenue option, the LRT would cross over I-94 and travel to 15th Street. Near 15th Street (through the “Meter Farm”²), the LRT would turn northwesterly to run on Nicollet Avenue. The LRT would continue north within the Nicollet Avenue right-of-way to 11th and 12th streets. A station would be located between 12th and 13th Streets on Nicollet Avenue.

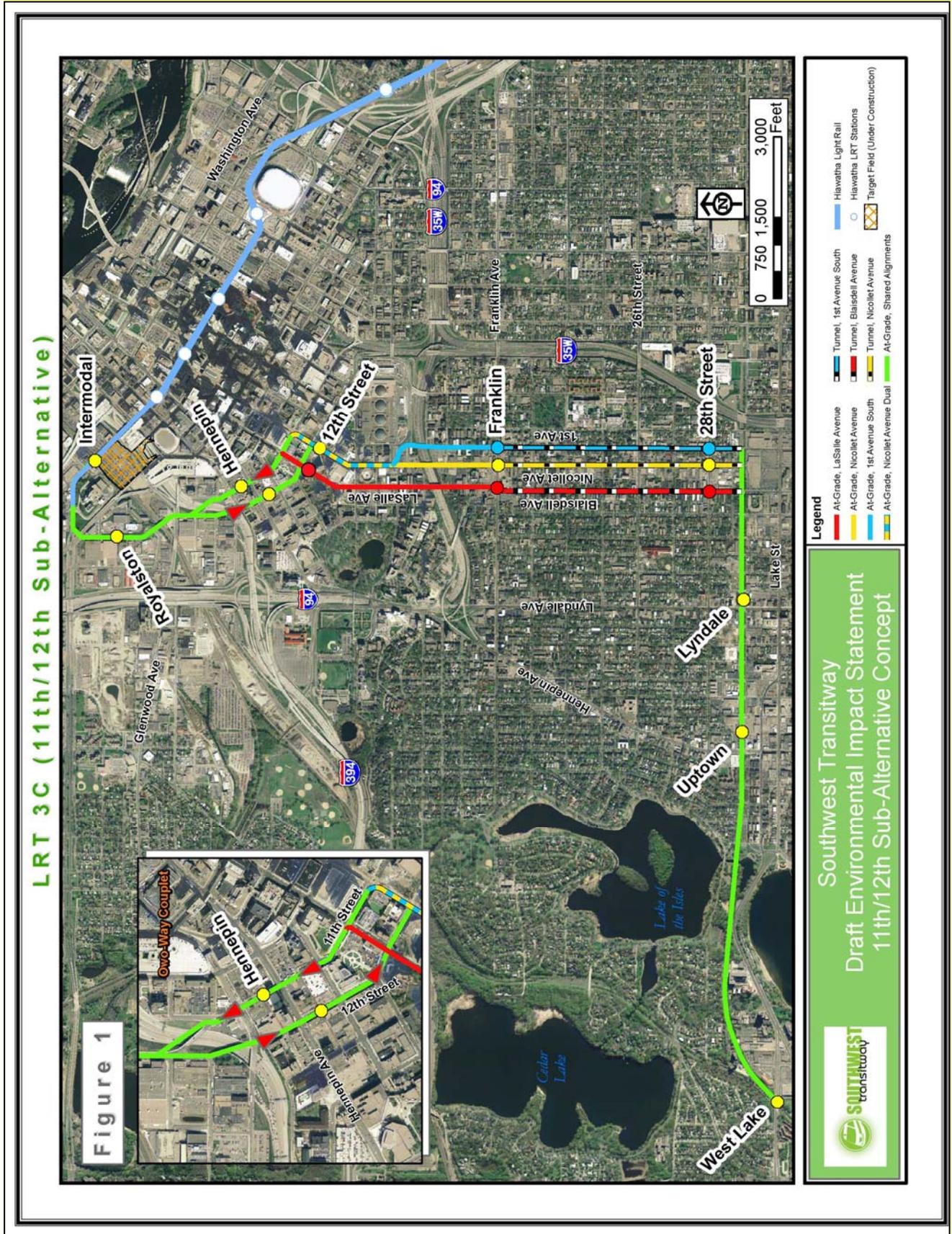
Segment B: Nicollet Mall and 11th/12th Streets to Royalston Avenue

Under the LRT 3C (11th/12th Sub-Alternative), the LRT would continue north from Segment A (described above) as a twin-track guideway on either LaSalle Avenue or Nicollet Avenue. The alignment would turn west on 11th and 12th streets as a one-way pair. The inbound LRT track would use 11th Street on a trackway adjacent to the right curb line. Between Harmon Place and I-394, one traffic lane would be removed to make space for the trackway, reducing the overall through lanes from three to two. A station would be located between Hennepin Avenue and Hawthorne Avenue on the north side of 11th Street. This station would require a strip of right-of-way to be purchased from the adjacent property, which is currently used as a surface parking lot. The single LRT track would continue northbound across 11th Street and cross I-394 using a new bridge located north of the current roadway bridge. The inbound LRT track would join the outbound LRT track in the landscaped area between I-394 and Royalston Avenue.

The outbound LRT track would use 12th Street on a trackway adjacent to the right curb line. A station would be located between Hennepin Avenue and Harmon Place on the south side of 12th Street. The single LRT track would continue across the I-394 off ramp to 12th Street and cross I-394 using a new bridge located south of the current roadway bridge. The outbound LRT track would then cross 12th Street to join the inbound LRT track alignment. The LRT tracks would cross Glenwood Avenue at grade and continue north on the east side of Royalston Avenue. A new LRT bridge would be required over the Burlington Northern Santa Fe (BNSF) Railroad tracks, parallel to Royalston Avenue. The LRT tracks would continue north and cross 7th Street at grade using grade crossing signals, and interlining with the Hiawatha LRT tail tracks on the south side of 6th Avenue.

² A parcel of land, owned by the City of Minneapolis, which is currently used as a metered parking lot.

Figure 1: LRT 3C (11th/12th Sub-Alternative)



3. ASSUMPTIONS

The following assumptions about transit operations and the existing conditions were made when evaluating the proposed LRT 3C (11th/12th Sub-Alternative).

3.1 OPERATING ASSUMPTIONS ROUTING AND FREQUENCY

It is assumed that the LRT 3C (11th/12th Sub-Alternative) would interline with the Hiawatha LRT line on 5th Street. This assumption was also made for the LRT1A and LRT3A alternatives. The LRT 3C (11th/12th Sub-Alternative) is assumed to operate the same hours and frequency as the Hiawatha LRT line, LRT 1A, LRT 3A and LRT 3C alternatives as documented in the Southwest Transitway Alternatives Analysis (AA).

3.2 EXISTING CONDITION ASSUMPTIONS

- Existing bridges over I-94 are assumed to be modified to accommodate LRT and not completely replaced;
- Each alignment includes a tunnel section beginning approximately at 28th Street and ending approximately at Franklin Avenue. Station platforms below grade with an open roof are located just beyond both ends of the tunnel. The tunnel and below-grade station configurations match those defined in the LRT C alignment in the AA for Nicollet Avenue;
- Right-of-way widths are based on field observations and GIS data, and are approximate values only;
- Each alignment seeks to minimize right-of-way acquisition. Where possible, proposed LRT trackway and lane configurations are designed to remain within existing street right-of-way;
- Blaisdell and LaSalle Avenue currently operate as one-way streets between the Midtown Corridor and Grant Street. 1st Avenue operates as a two-way street between the Midtown Corridor and Franklin Avenue, and as one-way street between Franklin Avenue and Grant Street. Blaisdell and LaSalle Avenues have two southbound lanes with parallel parking on both sides. 1st Avenue has two northbound lanes with parallel parking on both sides between Franklin Avenue and Grant Street;
- Vehicles would not be allowed to share the LRT tracks or cross the LRT tracks except at signalized intersection locations.
- The end-of-line of the Hiawatha is assumed to be as-built today with two sets of tail tracks; and
- The adopted *Access Minneapolis* plan includes the conversion of LaSalle Avenue and 1st Avenue North from one-way streets to two-way streets from downtown to Franklin Avenue. Both streets are also identified for the addition of bike lanes.

4. EVALUATION

To determine if the LRT 3C (11th/12th Sub-Alternative) is a reasonable alternative warranting inclusion in the DEIS the following criteria were applied:

1. Consistency with Regional and Local Planning defined as the Metropolitan Council's *2030 Transportation Policy Plan* (TPP), the Hennepin County *Transportation System Plan* (TSP), and the City of Minneapolis *Access Minneapolis* plan
2. Are of Sound Engineering Practices and are Practical and Feasible

3. Perform as well or better than the LRT alternatives identified for inclusion in the DEIS which are LRT 1A, LRT 3A, and LRT 3C
4. Consistency with the Purpose and Need Statement for the Southwest Transitway

4.1 CONSISTENCY WITH REGIONAL AND LOCAL PLANNING

For purposes of this analysis consistency with regional and local planning was defined as consistency with the Metropolitan Council's *2030 Transportation Policy Plan* (TPP) and the City of Minneapolis *Access Minneapolis* plan.

4.1.1 METROPOLITAN COUNCIL TRANSPORTATION POLICY PLAN

The TPP is the region's long-range plan for transportation, presenting the policies and plans of the Council to guide transportation improvements.³ The TPP calls for planning and investment in multi-modal transportation options, establishing greater connections between land use, transportation, and population density, making efficient use of the regional transportation system, focusing highway investments first on maintenance and second on slowing congestion, building transit ridership, and encouraging local communities to implement an integrated transportation network. The plan specifically identifies investments in transitways and enhancing transit ridership through transit supportive policies as a key component of the region's transportation system. Metropolitan Council adopted an update to the TPP (adopted on December 15, 2004) on January 14, 2009.

In general, the LRT 3C (11th/12th Sub-Alternative) appears consistent with the goals of the TPP of expanding transit service to double transit ridership by 2030. The LRT 3C (11th/12th Sub-Alternative) does provide a direct connection to the proposed downtown Minneapolis Intermodal Station which is consistent with the TPP policies to develop an integrated transit system. However, the LRT 3C (11th/12th Sub-Alternative) does recommend the use of Blaisdell and 1st Avenue which were not identified in the TPP for use as high frequency transitways.

4.1.2 ACCESS MINNEAPOLIS PLAN

The *Access Minneapolis* plan is the 10-year action plan for transportation improvements in the City of Minneapolis. The plan was adopted by the Minneapolis City Council on June 29, 2007.⁴ The section on transit identifies LRT, BRT, and other forms of mass transit as service modes the city plans to implement, and recognizes the importance of supporting transit with density through land use policies. Methods of improving transit efficiency and ridership include developing information for passengers at transit stops and evaluating the "frequency, span, and coverage of service on PTN (Primary Transit Network) corridors" (City of Minneapolis, 2007-8).

Nicollet Mall

The adopted *Access Minneapolis* plan includes plans for Nicollet Mall to allow bicycle traffic and to utilize a reconfigured Metro Transit bus service using diesel hybrid green buses with free fares for service along Nicollet Mall. Bus service on Nicollet Mall will be marketed as a free downtown shuttle, a goal of numerous organizations like the Downtown Council, Minneapolis Transportation Management Organization (TMO), and Building Owners and Managers Association (BOMA). The plan also calls

³ The *2030 Transportation Policy Plan* can be accessed online at <http://www.metrocouncil.org/planning/transportation/TPP/2008/index.htm>.

⁴ The *Access Minneapolis Plan* can be found online at: <http://www.ci.minneapolis.mn.us/public-works/trans-plan/ATPPProjects.asp>

for the return of bicycles on the Mall during the daytime. Currently, due to the high volume of buses, bicycles are prohibited from 6 a.m. to 6 p.m. on weekdays. Between Grant Avenue and 12th Street, the LRT 3C (11th/12th Sub-Alternative) may conflict with implementation of the plans for Nicollet Mall transit service and bicycle access.

In addition to changes on Nicollet Mall, bus service in downtown Minneapolis will soon be concentrated on Marquette and 2nd Avenues, where dual contra-flow⁵ bus lanes are currently being constructed as part of the Urban Partnership Agreement (UPA). These transit corridors will provide enhanced access to local, express, and commuter buses traveling through downtown and using the entrance and exit ramps to I-35W. The consolidation of bus service to these streets will result in the relocation of the current bus routes using Nicollet Mall, with upwards of 80 buses per hour during peak periods serving these streets. The plans for this project are outlined in the *Access Minneapolis* plan. The LRT 3C (11th/12th Sub-Alternative) is not anticipated to conflict with this operational change.

Bicycle Lanes

The adopted *Access Minneapolis* plan includes the conversion of Blaisdell/LaSalle Avenue and 1st Avenue South from one-way operations to two-way operations from North of Franklin Avenue to their termination points downtown. The plan also proposes the installation of bicycle lanes along Blaisdell and 1st Avenues. In addition, the plan specifies the re-striping of the bicycle lane on 11th Street to a standard width. The LRT 3C (11th/12th Sub-Alternative) may complicate implementation of some of the bicycle lane plans as specified in the adopted *Access Minneapolis* Plan.

4.2 SOUND ENGINEERING

For purposes of this analysis engineering issues including traffic impacts, new structures, right-of-way, parking, bicycle lanes, bridge impacts and access impacts were evaluated.

4.2.1 ACCESS ISSUES

Number of Travel Lanes

While initial plans call for the train to be located in a shallow cut-and-cover tunnel between the Midtown Corridor and Franklin Avenue, both the Blaisdell and 1st Avenue options on Segment A would travel under and eventually on roadways classified as collectors⁶. To remain within or as close to existing right-of-way as possible, both Blaisdell and 1st Avenues are assumed to feature a twin-track LRT guideway flanked by a single traffic lane in each direction. Implementing the LRT 3C (11th/12th Sub-Alternative) would reduce the number of travel lanes on Blaisdell/LaSalle and 1st Avenue and will reduce their capacity for automobile traffic.

Along Segment B, 11th and 12th streets are classified as B-minor collectors.⁷ Implementing the LRT 3C (11th/12th Sub-Alternative) assumes a single-track LRT

⁵ A reversible lane (called a counterflow lane or contra flow lane in transport engineering nomenclature) is a lane in which traffic may travel in either direction, depending on certain conditions. Typically, it is meant to improve traffic flow during rush hours.

⁶ The functional classification "collector" street means that the road typically provides for citywide trips and property access. Collectors in urban areas connect neighborhoods and minor business concentrations, and frequently connect to minor arterials. The streets serve short trips (1-4 miles), have parking restricted as necessary, carry between 1,000–15,000 vehicles per day, and have posted speed limits of 30-40 mph (30 mph in Minneapolis), with 60-150 feet for right-of-way.

⁷ Minor collectors have the same general design criteria as other collectors (see footnote 6). B-minor collector streets, as with other minor collectors, typically feed into other collectors, or connect to minor arterials.

guideway replacing at least one traffic lane on both 11th and 12th streets, which will reduce their capacity for automobile traffic.

In the Segment B, where the LRT turns from either Nicollet or LaSalle Avenues onto 11th or 12th Streets from outside-lane to outside-lane would result in a full red intersection whenever a train moves through the intersection, which may have implications for the transit vehicles operating on Nicollet Mall and the traffic on 11th and 12th Streets.

Driveway/Parking Ramp Access

In Segment B, on there are no driveways between Nicollet Avenue and Harmon Place on the north side of 11th Street, but a loading/unloading lane between LaSalle Avenue and Harmon Place that would be cut off by the LRT trackway. There are several alleys and driveways between blocks on 11th and 12th Streets that would be cut off by LRT trackway. In order to maintain access, allowing vehicles to cross the trackway or installing a frontage road would be required.

4.2.2 BIKE LANE

As discussed above in Section 4.2.2, If the LRT 3C (11th/12th Sub-Alternative) is implemented, some of the bicycle lane plans specified in the adopted *Access Minneapolis* Plan would be inconsistent.

In Segment B, on 11th and 12th Streets the remaining lane configuration, including the bicycle lane, would require modification within the remaining curb-to-curb width. The LRT track on 11th Street may affect implementation of the *Access Minneapolis* plan to widen the 11th Street bike lane to standard width.

4.2.3 ON-STREET PARKING

To remain within the existing right-of-way, the twin-track LRT guideway would likely eliminate both parallel parking lanes on Blaisdell, LaSalle, and 1st Avenue. The single LRT guideway on the 11th and 12th Street pair would remove one lane of parallel parking along the right curb line of each street. Implementing the LRT 3C (11th/12th Sub-Alternative) would reduce the number of on-street parking spaces in downtown Minneapolis.

4.2.4 RIGHT-OF-WAY IMPACTS

A segment of LaSalle Avenue, north of Groveland Avenue, has a right-of-way width of approximately 60 feet. This is not sufficient to accommodate a twin track LRT guideway, two lanes of vehicle traffic, and sidewalks. The LRT 3 C (11th/12th Sub-Alternative) in this area is likely to require significant right-of-way acquisition.

In Segment B, the turning movement from Nicollet Mall onto 12th Street would utilize a minimum-radius (100') track curve, which requires additional right-of-way (from Peavey Plaza) to be purchased and reconstruction of the curb, sidewalk and ramps. It does not appear the curves will affect existing buildings.

4.2.5 TRAFFIC ISSUES

Below-Grade Station Platforms

The open-air, below-grade station platforms in Segment A would consume the full width of each street right-of-way between 29th Street and 28th Street and between 22nd Street and Franklin Avenue. This configuration would require the closure of the street to vehicle traffic within that block. The closure of either street would disrupt the operation of the one-way pair. It is likely that the other remaining street (either Blaisdell or 1st Avenue) would convert to a two-way street.

I-394

The LRT tracks in Segment 2 would affect traffic operations at the I-394 interchange entrance and exit ramps off of 12th Street. LRT tracks would require separate grade crossing signals and gates, which require all traffic to stop on both sides of the freeway. Implementing the LRT 3C (11th/12th Sub-Alternative) would require additional study of the traffic operations and intersection geometry as well as discussions with the Federal Highway Administration (FHWA). See Appendix A.

4.2.6 POTENTIAL CONSTRUCTION IMPACTS

The tunnel underneath either Blaisdell or 1st Avenue would likely be constructed using cut-and-cover techniques. This method would be severely disruptive to the adjacent residences and businesses along these streets, likely requiring full closure of segments of the roadway for extended periods of time.

4.2.7 BRIDGES

Midtown Corridor

Both the Blaisdell and 1st Avenue options in Segment A would impact the existing roadway bridges over the Midtown Corridor. These bridges serve traffic traveling north and south from Lake Street to downtown Minneapolis. The LRT guideway would transition from the Midtown Corridor onto either Blaisdell Avenue or 1st Avenue South below street-grade in order to enter the tunnel south of 28th Street. It is likely the existing bridges for both Blaisdell and 1st Avenue over the Midtown Corridor would have to be reconstructed to preserve north-south access to Lake Street. Additionally, the option on Blaisdell Avenue would affect southbound traffic flow at 28th Street. Currently, Nicollet Avenue becomes one-way southbound south of 28th Street. Southbound traffic then uses 29th Street heading west to Blaisdell Avenue to continue traveling south towards Lake Street. This is due to Nicollet Avenue ending at the Midtown Corridor. The LRT transition from the Midtown Corridor onto Blaisdell Avenue as described above and the reduction of southbound travel lanes on Blaisdell Avenue would affect this traffic movement. The LRT 3C (11th/12th Sub-Alternative) is likely to have circulation and traffic impacts for Blaisdell and 1st Avenue between 28th and Lake Street.

I-94

Both the Blaisdell/LaSalle and 1st Avenue Segment A options would require partial reconstruction of the existing roadway bridges over I-94. The existing LaSalle and 1st Avenue bridges are not wide enough to accommodate a twin-track LRT guideway, two lanes of roadway, and sidewalks. A conceptual structural analysis of the bridges recommended that their concrete decks and select girders be replaced to handle LRT loading. See Appendix B. The LRT 3C (11th/12th Sub-Alternative) is likely to require modifications to the existing I-94 bridges.

New Structures

In Segment B, the LRT 3C (11th/12th Sub-Alternative) would require two new LRT bridge crossings over I-394. The new structures would require piers to be set in the median and side slopes of the freeway. Continuing northward, the LRT could run alongside Royalston Avenue north of Glenwood Avenue, which would avoid the reconstruction of Royalston Avenue.

4.2.8 NICOLLET MALL

The LRT 3C (11th/12th Sub-Alternative), running on Nicollet Avenue would impact approximately two blocks of Nicollet Mall, between Grant and 11th Street. The trackway and station at 13th Street would require reconstruction of the curb lines, through lanes, and sidewalk. The LRT 3C (11th/12th Sub-Alternative) may complicate and/or conflict with the plan contained in the *Access Minneapolis* plan to reinstate bicycle traffic and transit operations.

4.2.9 LORING PARK GREENWAY

In Segment B, the option on LaSalle Avenue would run underneath the Loring Park Greenway underpass in a short tunnel section. A visual analysis and cursory measurements of the tunnel section revealed that the curb-to-curb width varies between 43 to 45 feet, with adjacent sidewalks ranging in width from 7 to 14 feet. Reconstruction of the curb lines would likely be necessary to accommodate two LRT tracks and one lane in each direction. The visual analysis also revealed that there is likely adequate clearance for an LRT trackway and OCS mounted to the tunnel roof.

Figure 2: A visual analysis of the tunnel section



Photo Source: Google Earth, 2009

4.2.12 SKYWAY SYSTEM

In Segment B, the LRT trackway would cross under a pedestrian skyway near Harmon Place. The overhead catenary system (OCS) for the trackway would need to be attached to the underside of the skyway.

4.3 PERFORMANCE

For purposes of this analysis, the LRT 3C (11th/12th Sub-Alternative) was evaluated on how it would perform compared to the alternatives recommended from the Alternatives Analysis (AA) for inclusion in the DEIS. For purposes of this analysis performance measures included estimated travel times, and estimated capital costs (year 2015).

4.3.1 TRAVEL TIMES

When compared to LRT 3C, the LRT 3C (11th/12th Sub-Alternative) is expected to provide faster travel times for passengers destined to the Warehouse District or the Downtown Minneapolis Intermodal Station. The longer travel time on the LRT 3C alternative occurs primarily when passengers destined for the Warehouse District and/or the Downtown Minneapolis Intermodal Station would be required to transfer from a Southwest LRT train terminating at 4th Street and the Nicollet Mall to a Hiawatha and/or Central LRT train at the 5th Street and Nicollet Mall station. For those Southwest LRT passengers destined to locations between 13th Street and 4th Street along Nicollet Mall, their travel times will be longer as they are required to either walk to their destinations or transfer to a bus on Nicollet Mall. For those Southwest LRT passengers continuing along the Hiawatha and/or Central LRT lines, they will have a one-seat ride, but longer travel times due to the longer routing to their destinations.

When compared to LRT 1A and LRT 3A, the LRT 3C (11th/12th Sub-Alternative) would provide slower travel times for passengers destined to the Downtown Minneapolis Intermodal Station and the Warehouse District. Table 1 outlines comparative travel times between the alignment alternatives.

Table 1: Comparative Travel Times (Minutes) – Excludes transfer time

Station	Minutes each LRT Alternative			Notes
	LRT 1A/3A	LRT 3C	LRT 3C (11 th /12 th Sub-Alternative)	
FROM: West Lake Station				
TO: Nicollet Mall/5 th St. (Hiawatha Line Station)	12.9	13.8	16.7	A assume 1-3 A + Hiawatha interline at Intermodal. C assume w/ walk to Nicollet Mall Station.
TO: Government Plaza (Hiawatha Line Station)	14.9	17.7	18.7	A assume 1-3 A + Hiawatha interline at Intermodal. C assume w/ walk to Nicollet Mall Station, transfer to Hiawatha LRT.
TO Metrodome (Hiawatha Station)	17.9	20.7	21.7	A assume 1-3 A + Hiawatha interline at Intermodal. C assume w/ walk to Nicollet Mall Station, transfer to Hiawatha LRT.

Travel Time Information Calculated by Parsons-Brinkerhoff, 2008

The 1st Avenue option in Segment A would have a longer travel time between the Midtown Corridor and 11th Street than Blaisdell Avenue due to the track alignment S-curve at 15th Street. The alignment jog would require LRT speeds to be reduced while negotiating the S-curve.

4.3.2 CAPITAL COSTS (2015)

Capital cost estimate for the LRT 3C (11th/12th Sub-Alternative) was prepared using the same methodology used to prepare the cost estimates for the AA. Capital costs for LRT 3C were used as the base cost upon which the costs associated with not constructing the Nicollet Mall portion of the alignment were deducted. The costs of constructing the LRT 3C (11th/12th Sub-Alternative) alignment from Nicollet Avenue to the Downtown Intermodal Station were added to estimate the total cost of this alternative.

Stated in 2015 dollars, the LRT 3C (11th/12th Sub-Alternative) costs \$71 million, or 5.1 percent more than LRT 3C. The primary contributing factors for the difference in costs are:

- Reduced costs for not reconstructing Nicollet Mall;
- An increase of total guideway length of approximately 4,000 feet associated with the one-way couplet;
- A split station on the one-way couplet;
- New structures to cross I-394; and
- Additional right-of-way.

Table 2: Capital Costs Comparison

Capital Costs SCC	Alternative LRT 3C*	LRT 3C (11th/12th Sub-Alternative)*
Guideway/Track	267,482	285,455
Stations	77,284	78,714
Support Facilities	64,430	64,430
Site Work	181,627	167,113
Systems	171,375	174,769
Subtotal Construction	762,198	770,482
ROW	62,875	64,875
Vehicles	154,021	154,021
Professional Services	192,658	192,620
Subtotal Construction	1,171,752	1,181,998
Unallocated Contingency	234,351	295,500
Total	\$ 1,406,103	\$ 1,477,498

*2015 dollars (thousands)

4.4 CONSISTENCY WITH THE PROJECT PURPOSE AND NEED

For purposes of this analysis, the LRT 3C (11th/12th Sub-Alternative) was evaluated on how likely it was to meet the stated purpose and need for the Southwest Transitway as documented in the Southwest Transitway Alternatives Analysis (AA).

The Purpose and Need for the Southwest Transitway Project, defined in the AA prepared by the Hennepin County Regional Railroad Authority, identified several goals and objectives for the transitway corridor, including improvements to mobility, creating a competitive travel option, and enhancing the reverse commute options for travelers between downtown Minneapolis and Eden Prairie. During the AA, the Southwest Policy Advisory Committee (PAC) developed five goals the Southwest Transitway must achieve in order to fulfill the purpose and need for the project. The five goals included:

1. Improve Mobility;
2. Provide a cost-effective, efficient travel option;
3. Protect the environment;
4. Preserve and protect the quality of life in the study area and the region; and
5. Support economic development.

The goals were prioritized with any proposed alternative required to fulfill goals 1 and 2 before being evaluated on goals 3, 4, and 5. If an alternative did not demonstrate the ability to satisfy goals 1 and 2, it was dismissed from further consideration. The same process was applied to LRT 3C (11th/12th Sub-Alternative).

Improve Mobility

The Purpose and Need statement identifies North Loop, Harrison, Bryn Mawr and Kenwood neighborhood as in need of better transit service. These areas are currently underserved by the number of bus routes and span of hours of service. Travel times from these neighborhoods to primary destinations are extremely long via due to the circuitous nature of the roadway network that buses have to follow. Therefore, to affectively achieve the first goal for the Project this mobility issue should be addressed.

The LRT 3C (11th/12th Sub-Alternative), would provide an interlined connection to the Hiawatha and Central Corridor LRT lines. The interlined connection increases mobility of LRT system riders by allowing non-stop connections from the Southwest Transitway destinations to either Hiawatha or Central Corridor destinations. This needs to be weighed against the potential decline in mobility for those Southwest LRT passengers destined for locations along Nicollet Mall between 11th/12th street and 4th/5th streets.

In general, it appears this alternative is consistent with the project Purpose and Need statement, but more analysis is required to definitely state consistency.

5. CONCLUSIONS

5.1 CONSISTENCY WITH LOCAL AND REGIONAL PLANNING

The LRT 3C (11th/12th Sub-Alternative) would likely be consistent with the intended policy objectives of both the Metropolitan Council's TPP and the *Access Minneapolis* plan. However, the addition of LRT on Nicollet Avenue may complicate specific aspects of the plan, including the establishment of a shuttle bus service on Nicollet Mall and stripping bicycle lanes on Blaisdell/LaSalle Avenue and 1st Avenue South from North of Franklin Avenue. Additional analysis of these impacts is warranted.

5.2 SOUND ENGINEERING

The LRT 3C (11th/12th Sub-Alternative) alignment would likely result in several engineering configuration issues beyond those previously identified for the Nicollet Avenue portion of the alignment. Most notably, these include the construction of a new LRT bridge structure over I-394, impacts to transit and/or non-motorized operations on Nicollet Avenue and Nicollet Mall, impacts to intersection geometry and land acquisitions for LRT right-of-way, enhancements to bridges spanning the Midtown Corridor, and traffic impacts including travel lanes and parking. Further analysis of these impacts is warranted.

5.3 PERFORMANCE

While ridership projections have been made for the current LRT 3C alternative using Nicollet Mall in downtown Minneapolis, ridership projections are inconclusive at this time for the LRT 3C (11th/12th Sub-Alternative). Preliminary cost estimates suggest that the LRT 3C (11th/12th Sub-Alternative), would add an additional \$71 million dollars to the Project's total cost. Further evaluation of the LRT 3C (11th/12th Sub-Alternative) performance based on ridership and capital costs is warranted.

5.4 PURPOSE AND NEED STATEMENT

In general, it appears the LRT 3C (11th/12th Sub-Alternative) is consistent with the Southwest Transitway Purpose and Need statement, but more analysis is required to definitely state consistency.

6. RECOMMENDATION

Based upon the analysis contained in this Technical Memorandum, the Southwest Project Team recommended that only the portion of the LRT 3C (11th/12th Sub-Alternative) included as Segment B from Grant Ave. to the Downtown Intermodal Station be included in the DEIS process. The Blaisdell/LaSalle and 1st Avenue options under Segment A were recommended for exclusion from the DEIS for the following reasons:

- Blaisdell and 1st Avenue were not identified in the TPP for use as high frequency transitways.

- Blaisdell and 1st Avenue options on Segment A would reduce the number of travel lanes and thus reduce their capacity for automobile traffic.
- To remain within the existing right-of-way, the LRT guideway would likely eliminate both parallel parking lanes on Blaisdell, LaSalle, and 1st Avenue.
- The tunnel underneath either Blaisdell or 1st Avenue would likely be constructed using cut-and-cover techniques, which would be severely disruptive to the adjacent residences and businesses along these streets, likely requiring full closure of segments of the roadway for extended periods of time.
- Both the Blaisdell and 1st Avenue options in Segment A would impact the existing roadway bridges over the Midtown Corridor.
- Both the Blaisdell/LaSalle and 1st Avenue Segment A options would require partial reconstruction of the existing roadway bridges over I-94.

On Thursday, January 15, 2009, the Southwest Technical Advisory Committee (TAC) voted unanimously to retain the LRT 3C (11th/12th Sub-Alternative) Segment A only for evaluation in the SW DEIS.

On Wednesday, January 21, 2009, the Southwest Policy Advisory Committee (PAC) voted unanimously to accept the Southwest TAC recommendation amending it to reinstate the portion of the Blaisdell/LaSalle option between Midtown Corridor and Franklin and the 1st Avenue option included in Segment B and to forward the Southwest DEIS Scoping Summary Report to the HCRRA.

On Tuesday, January 27, 2009, the HCRRA voted unanimously to accept the Southwest DEIS Scoping Summary Report.

List of Appendices

Appendix A – Traffic Engineering Memorandum

Appendix B – Conceptual Structural Evaluation

Appendix C – Maps of LRT 3C Alternative and Conceptual Alignment Plans

Appendix D – Alternatives to be Studied in DEIS

APPENDIX "A"
TRAFFIC ENGINEERING MEMO

Blaisdell Avenue/1st Avenue South

Blaisdell Avenue (LaSalle Avenue north of Franklin Avenue) and 1st Avenue South are one-way pairs that are classified as collectors. According to the criteria set forth in the Metropolitan Council Transportation Policy Plan, collectors in urban areas connect neighborhoods and minor business concentrations, and typically connect to minor arterials. They serve short trips (1-4 miles), have parking restricted as necessary, carry between 1,000-15,000 vehicles per day, posted speed limits of 30-40 mph (30 mph in Minneapolis), with 60-150 feet for right-of-way.

Blaisdell Avenue carries 7,400 vehicles per day. The segment north of Franklin Avenue, (LaSalle Avenue) also carries 7,400 vehicles per day. Blaisdell/LaSalle Avenue has 2-lanes of southbound one-way traffic with parking on both sides between Franklin Avenue and Grant Street. It switches to 2-lanes in each direction from Grant Street until it terminates at 8th Street.

1st Avenue South carries 5,500 vehicles per day. 1st Avenue South has two northbound thru lanes with parking on both sides between Franklin Avenue and where it terminates at Grant Street.

If Blaisdell Avenue and/or 1st Avenue South were converted to accommodate two LRT tracks running down the center with one traffic lane in each direction, the capacity of the roadways would be reduced. Highway Capacity Manual and ITE guidelines indicate 2-lane collectors operate at a level of service (LOS) “C” with a volume of 10,000 vehicles per day and at LOS “D” with a volume of 13,000 vehicles per day.

The reduction in capacity on Blaisdell/LaSalle Avenue and 1st Avenue South would likely have a negative impact on the LOS. The current daily volumes of fewer than 10,000 vehicles using two lanes of travel would indicate a LOS of “A” or B”. Reducing the number of lanes from two thru lanes in one direction to one lane in each direction may reduce the LOS; however it is unlikely it would fall below LOS “D”, which is acceptable for operations in an urban area.

Nicollet Avenue

Nicollet Avenue is classified as a B-minor arterial. According to the criteria set forth in the Metropolitan Council Transportation Policy Plan, B-minor arterial collectors in urban areas connect neighborhoods and minor business concentrations, and typically connect to principal and minor arterials. They serve medium-to-short trips (2-6 miles), have parking restricted as necessary, and carry between 5,000-30,000 vehicles per day, posted speed limits of 35-45 mph, average travel speeds of 15 mph during peak periods, with 60-150 feet for right-of-way. There are no criteria based on the number of lanes. B-minor arterials are less important to regional travel than A-minor arterials, and do not qualify for federal funding.

Nicollet Avenue currently carries 8,600 vehicles per day. If Nicollet Avenue were converted to accommodate two LRT tracks running down the center with one lane in each direction (with turning lanes at intersections), the capacity of the roadway would be reduced. According to Highway Capacity Manual and ITE guidelines, a 2-lane collector with left turn lanes at intersections operates at LOS “C” with a volume of 10,000 vehicles per day and at LOS “D” with a volume of 13,000 vehicles per day.

11th Street/12th Street

11th Street and 12th Street are one-way pairs that are classified as B-minor collectors. These streets serve the I-35W/TH 65 and I-394 ramps on the south side of downtown. Both streets have three thru lanes with metered parking on both sides. 11th Avenue carries 8,100 to 18,100 vehicles per day. 12th Street carries 4,600 to 9,300 vehicles per day.

Implementation of the 11th Street/12th Street option would require the removal of one lane of traffic on 11th Street and 12th Street, with possible reductions to on-street parking. The daily volume of 18,100 vehicles on 12th Street between Hennepin Avenue and 1st Avenue North indicate this section currently operates at LOS “F”, which is considered deficient for urban areas. The removal of a though lane would not improve the situation.

The 11th Street/12th Street option would reduce the capacity and have a negative impact on the LOS for 11th Street. The current daily volumes of fewer than 10,000 vehicles using three lanes of travel would indicate a LOS of “A” or B”. Reducing the number of lanes from two thru lanes in one direction to one lane in each direction would likely reduce the LOS; however it is unlikely it would fall below LOS “D”, which is acceptable for operations in an urban area.

Access

The 11th Street/12th Street option would require modifications to access to and from Nicollet Avenue, Blaisdell/LaSalle Avenue, and 1st Avenue South along several locations. Using the access criteria adopted for the Central Corridor LRT project, vehicles will not be able to cross over the fixed guideway, except at signalized intersections located approximately ¼ mile apart. Access at unsignalized intersections would be restricted to right-in, right-out access only. Application of these criteria to Nicollet Avenue, Blaisdell/LaSalle Avenue, and 1st Avenue South would result in the elimination of access across these streets from the following locations:

- 14th Street
- Oak Grove Street (LaSalle only)
- Groveland Avenue/19th Street

This action would also require the removal of traffic signals at Groveland Avenue and LaSalle Avenue, and Groveland/19th Street and Nicollet Avenue. The loss of access from the locations mentioned above may pose challenges to drivers that need access to locations along these streets. Many of these streets are one-way, requiring the navigation of more circuitous routes to reach these destinations, and thus additional travel delay.

Pedestrians would be able to cross Blaisdell/LaSalle Avenue, Nicollet Avenue, and 1st Avenue South at every intersection.

Parking

The current on-street parking along Nicollet Avenue, Blaisdell/LaSalle Avenue, and 1st Avenue South appears to be heavily utilized. The implementation of an alignment option along any of these streets would require the removal of on-street parking along certain areas to accommodate space for left-turn lanes. Parking spaces would have to be removed to accommodate left-turn lanes at Grant Street, 15th Avenue, and Franklin Avenue under any of these alternatives. Parking spaces would have to be removed at 18th Street to accommodate left-turn lanes under the Nicollet Avenue and 1st Avenue South alternatives.

On-street parking will also be reduced to accommodate station platforms. The metered on-street parking along 11th Street and 12th Street is heavily utilized. All on-street parking would be removed on the south side of 12th Street between Hennepin Avenue and Harmon Place, and on the north side of 11th Street between Hawthorne Avenue and Hennepin Avenue. Parking would also be eliminated near the vicinity of the Royalston Station platform. On Nicollet Avenue, Blaisdell/LaSalle Avenue, and 1st Avenue South, on-street parking would be eliminated along a half-block of parking north and south of Franklin Avenue, and an entire block between 12th Street and 13th Street.

These actions would result in the removal of nearly 50% of the on-street parking along Nicollet Avenue, Blaisdell/LaSalle Avenue, and 1st Avenue South. The reduction in available parking could pose potential quality-of-life issues for local residents, businesses, and institutions, especially those that have on-street parking as their only option. The loss of on-street parking may result in additional off-street parking land uses, and/or additional parking restrictions for the area.

Other

The Access Minneapolis plan proposes the conversion of Blaisdell/LaSalle Avenue and 1st Avenue South from one-way operations to two-way operations from North of Franklin Avenue to their termination points downtown. The plan also proposes the installation of bicycle lanes along 1st Avenue South and Blaisdell Avenue. Implementation of alignment options on these routes would eliminate the possibility of adding bicycle lanes.

It is important to note that both Blaisdell/LaSalle Avenue and 1st Avenue South have signal timing controllers set up for one-way operations. Dual tracks running down the

center of these streets requires signal timing to accommodate two-way operations, regardless of the configuration of roadway traffic. Converting signal controllers and systems to accommodate two-way operations will result in an overall loss of efficiency and capacity.

APPENDIX "B"
CONCEPTUAL STRUCTURAL EVALUATION

APPENDIX "B"
CONCEPTUAL STRUCTURAL EVALUATION

Nash, Terry

From: Elabbady, Mona N.
Sent: Saturday, December 06, 2008 10:22 AM
To: Phemister, Walter; Nash, Terry
Subject: FW: SW Transit - Nicollet Avenue Bridge
Follow Up Flag: Follow up
Flag Status: Yellow

From: Werner, Christopher E.
Sent: Friday, December 05, 2008 4:54 PM
To: Elabbady, Mona N.
Cc: Stuber, Cory R.; Lang, Todd A.
Subject: SW Transit - Nicollet Avenue Bridge

Mona:

I've completed a conceptual-level analysis of the existing Nicollet Avenue bridge girders and would say that they should be adequate for re-use under the LRT configuration. The girders in Spans 2 & 3 are overstressed, but I believe that will be reduced when a more refined structural model is analyzed. The software I've used is good for this level of analysis, but it isn't equipped to handle the intricacies of mixed traffic types (vehicular and LRT) or some of the specialized loads attributed to the LRT trains. So for more concrete results, we would need to run a more sophisticated analysis.

As far as the structure is concerned, you should plan to definitely replace the concrete deck. If the refined analysis shows that the girders are indeed overstressed, the deck could be thickened and/or beams could be added to help distribute the LRT loading. However, I do not think you need to plan to replace all of the girders.

My calculations have not gone through a QC review, but I don't anticipate that anything would change significantly once they've been reviewed.

Please let me know if this is the kind of information you were looking for or if you have any questions.

Thanks,

Christopher E. Werner, PE

Bridge Engineer

HDR ONE COMPANY | *Many Solutions*

701 Xenia Avenue South | Suite 600 | Minneapolis, MN 55416

Direct: 763-278-5918 | Main: 763-591-5400

Fax: 763-591-5411 | Email: Christopher.Werner@hdrinc.com

www.hdrinc.com

Nash, Terry

From: Elabbady, Mona N.
Sent: Tuesday, December 16, 2008 5:14 PM
To: Phemister, Walter; Nash, Terry
Subject: FW: SW Transit - 1st Avenue Bridge
Follow Up Flag: Follow up
Flag Status: Yellow

From: Werner, Christopher E.
Sent: Tuesday, December 16, 2008 4:00 PM
To: Elabbady, Mona N.
Cc: Stuber, Cory R.; Lang, Todd A.
Subject: SW Transit - 1st Avenue Bridge

Mona:

I've completed the conceptual analysis of the 1st Avenue Bridge. The same caveats about the complexity of the analysis on Nicollet Avenue apply to 1st Avenue. Additionally, the recommendations for all of these bridges are subject to the existing structure condition as well.

The existing girders in spans 1 and 2 of the 1st Avenue Bridge appear to be adequate to support the LRT loading, but the girders in span 3 are not. I recommend that you plan, at a minimum, to replace the entire deck and the girders in span 3 and perform a more refined analysis as the project progresses.

Also, with all of the bridges, I would recommend that any additional structure modifications that may be required (i.e. thicker deck) be evaluated at the time of further analysis.

Cory will be reviewing my calculations for QC next week, but I don't anticipate significant changes. Please let me know if you have any questions or need anything else.

Thanks,

Christopher E. Werner, PE

Bridge Engineer

HDR ONE COMPANY | *Many Solutions*

701 Xenia Avenue South | Suite 600 | Minneapolis, MN 55416

Direct: 763-278-5918 | Main: 763-591-5400

Fax: 763-591-5411 | Email: Christopher.Werner@hdrinc.com

www.hdrinc.com

APPENDIX C
MAP OF LRT 3C ALTERNATIVE AND CONCEPTUAL ALIGNMENT PLANS

LRT 3C Alternative

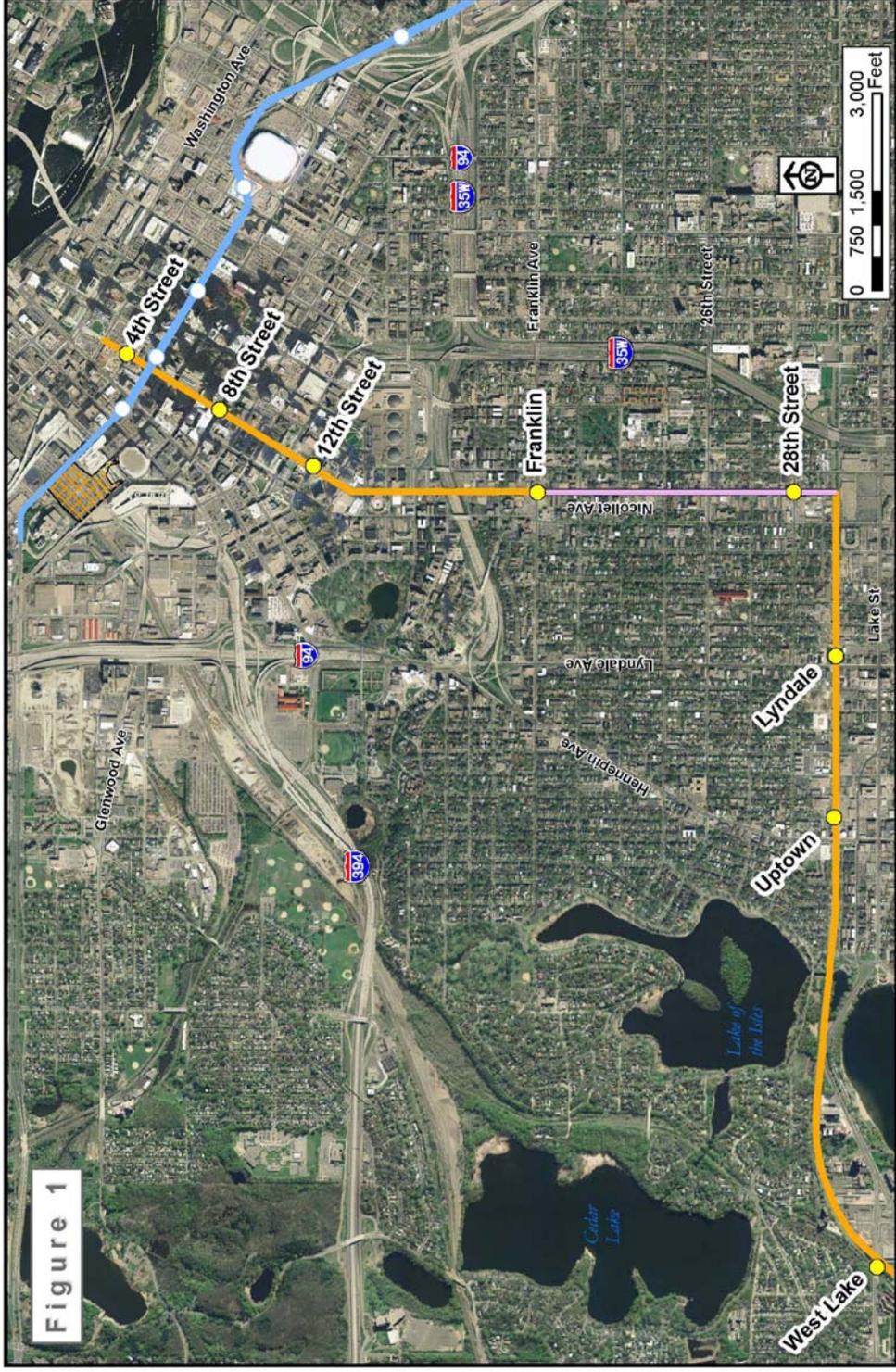


Figure 1



SOUTHWEST
transitway

Southwest Transitway
Draft Environmental Impact Statement
11th/12th Street Concept

Legend

- Route 3C
- Route 3C Tunnel Alignment
- Hawatha Light Rail
- Hawatha Extension (Under Construction)
- Proposed Station Locations
- Hawatha LRT Stations
- Target Field (Under Construction)

APPENDIX C

LEGEND

	EXISTING CURB		RETAINING WALL
	PROPOSED CURB		RETAINING WALL IN TUNNEL
	EXISTING RIGHT OF WAY		TRACKWAY IN TUNNEL
	PROPOSED RIGHT OF WAY		PROPOSED TRACK
	PROPOSED PAINT		FUTURE BOTTINEAU
	PROPOSED TRACK - TANGENT		IMPACTED PROPERTY
	PROPOSED TRACK - CURVE		PROPERTY WITHOUT ACCESS
	EXISTING TRACK		
	PROPOSED STATION		
	STATION ENTRY		
	EXISTING STATION		



1	01/14/09					
NO	DATE	BY	CKD	APPR	REVISION	
FILE						

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

HDR

HDR ENGINEERING, INC.

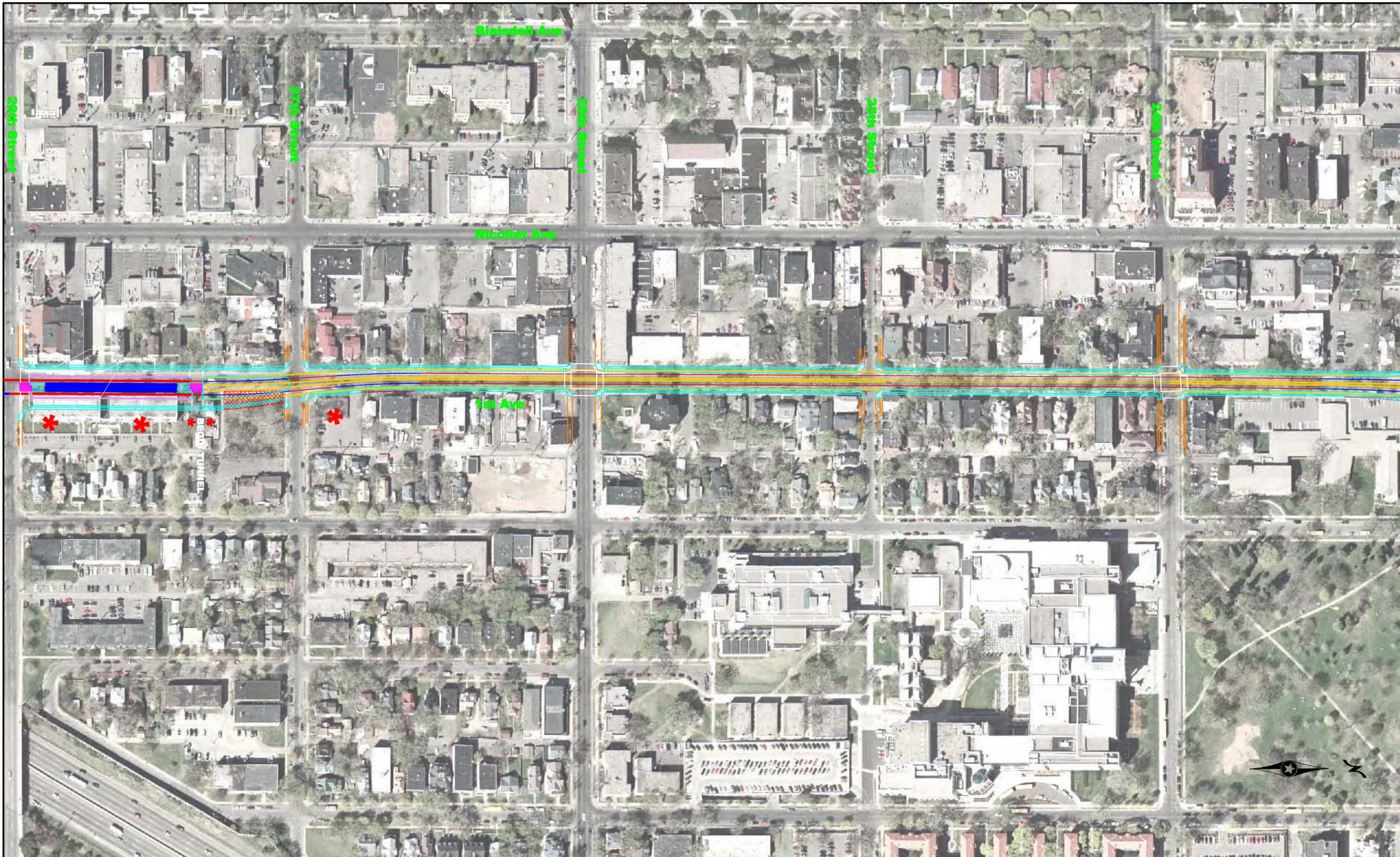


DRAWN BY
DESIGNED BY
CHECKED BY
COMM. NO.

SOUTHWEST TRANSITWAY CONCEPTUAL DESIGN

3C SUB-ALTERNATIVE

SHEET
0
OF
5



1	01/14/09				
NO	DATE	BY	CKD	APPR	REVISION
FILE					

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

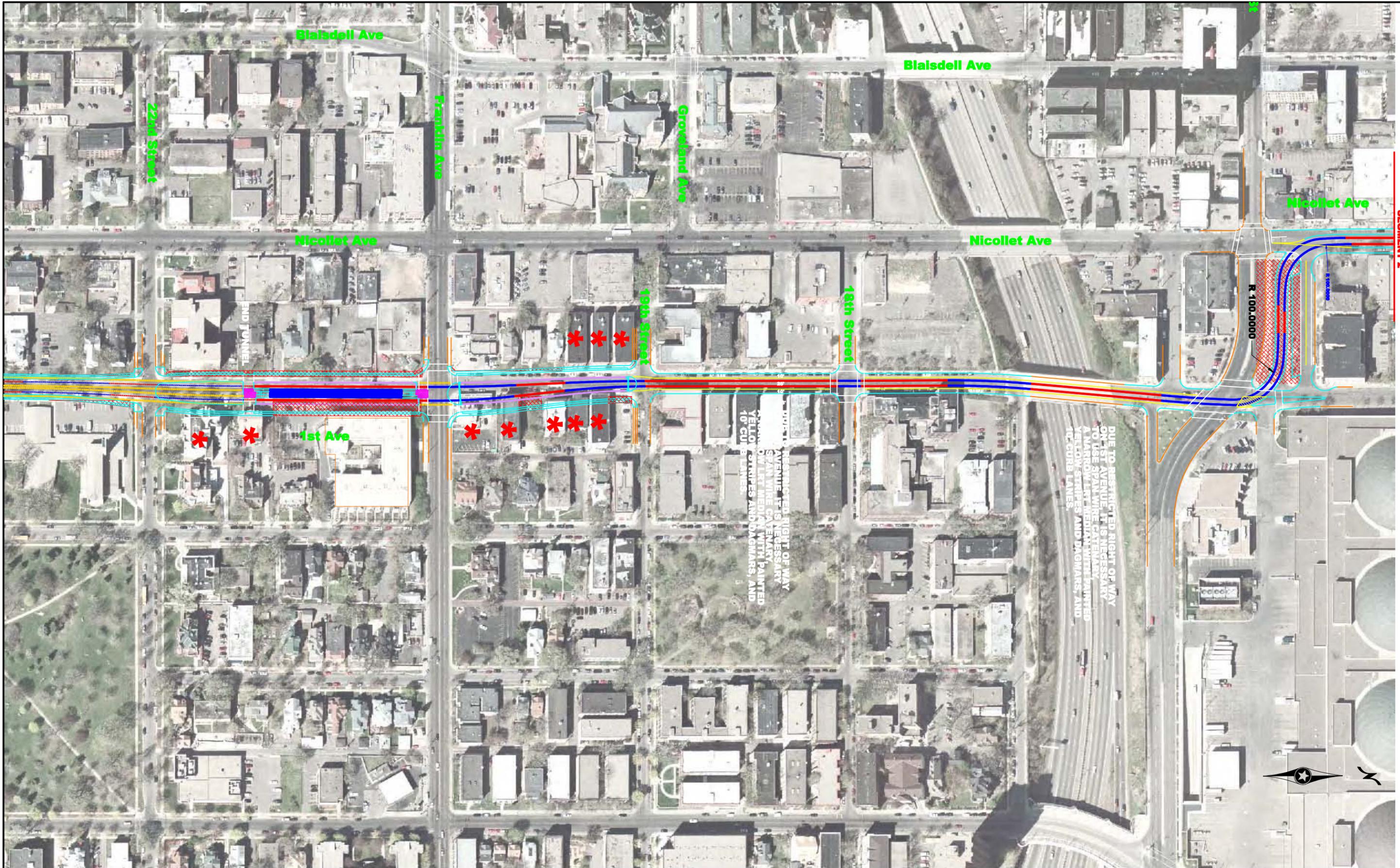


DRAWN BY
DESIGNED BY
CHECKED BY
COMM. NO.

SOUTHWEST TRANSITWAY CONCEPTUAL DESIGN
3C SUB-ALTERNATIVE
SEGMENT 1

SHEET
2
OF
5

USER#
DATE#
DATE#
DATE#
DATE#



MATCHLINE
SEGMENT 2

DUE TO RESTRICTED RIGHT OF WAY
 ON ST AVENUE, IT IS NECESSARY
 TO USE SPAN WIRE CABLES
 A NARROW LANE MESH WITH PAINTED
 YELLOW STRIPES AND DAGMARS, AND
 10' CURB LANES.

R 100.0000



1	01/14/09				
NO	DATE	BY	CKD	APPR	REVISION
FILE					

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

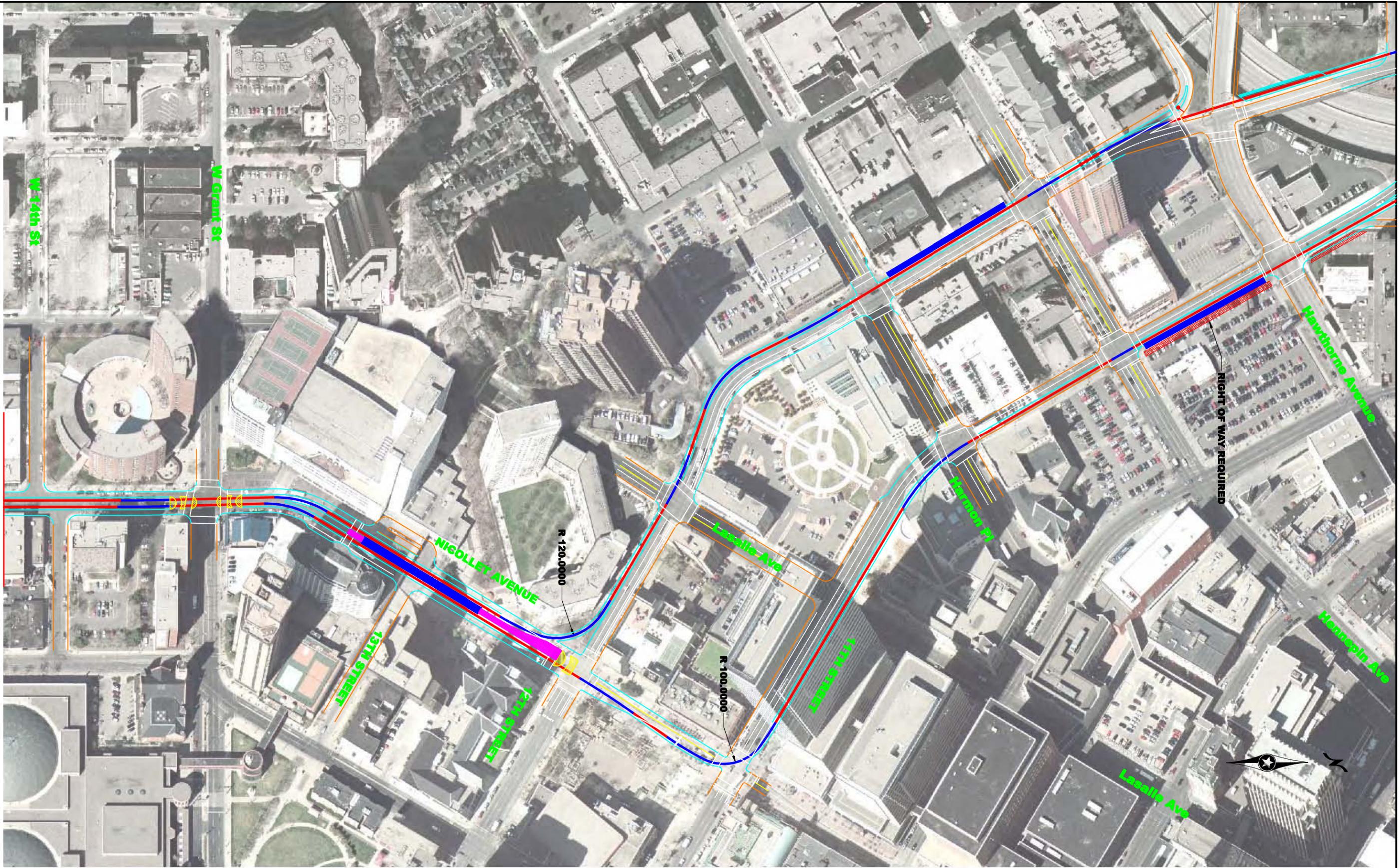


DRAWN BY	
DESIGNED BY	
CHECKED BY	
COMM. NO.	

SOUTHWEST TRANSITWAY CONCEPTUAL DESIGN
3C SUB-ALTERNATIVE
SEGMENT 1

SHEET
3
OF
5

USER
 TIME
 DATE
 PEN
 FILE



1	01/14/09				
NO	DATE	BY	CKD	APPR	REVISION
FILE					

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

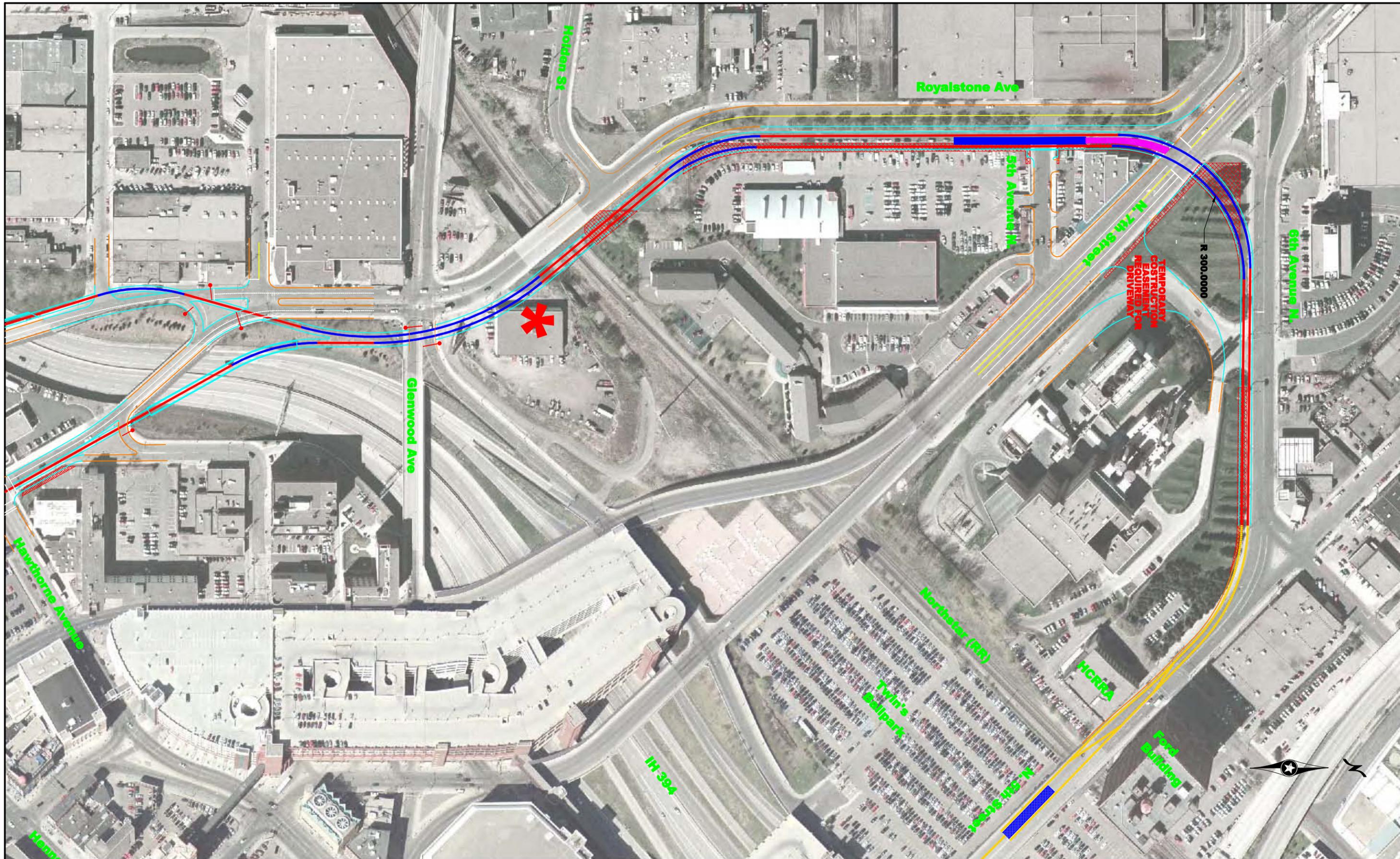


DRAWN BY	
DESIGNED BY	
CHECKED BY	
COMM. NO.	

SOUTHWEST TRANSITWAY CONCEPTUAL DESIGN
3C SUB-ALTERNATIVE
SEGMENT 2

SHEET
4
OF
5

USER:
DATE:
PEN:
SCALE:



1	01/14/09				
NO	DATE	BY	CKD	APPR	REVISION
FILE					

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION



DRAWN BY	
DESIGNED BY	
CHECKED BY	
COMM. NO.	

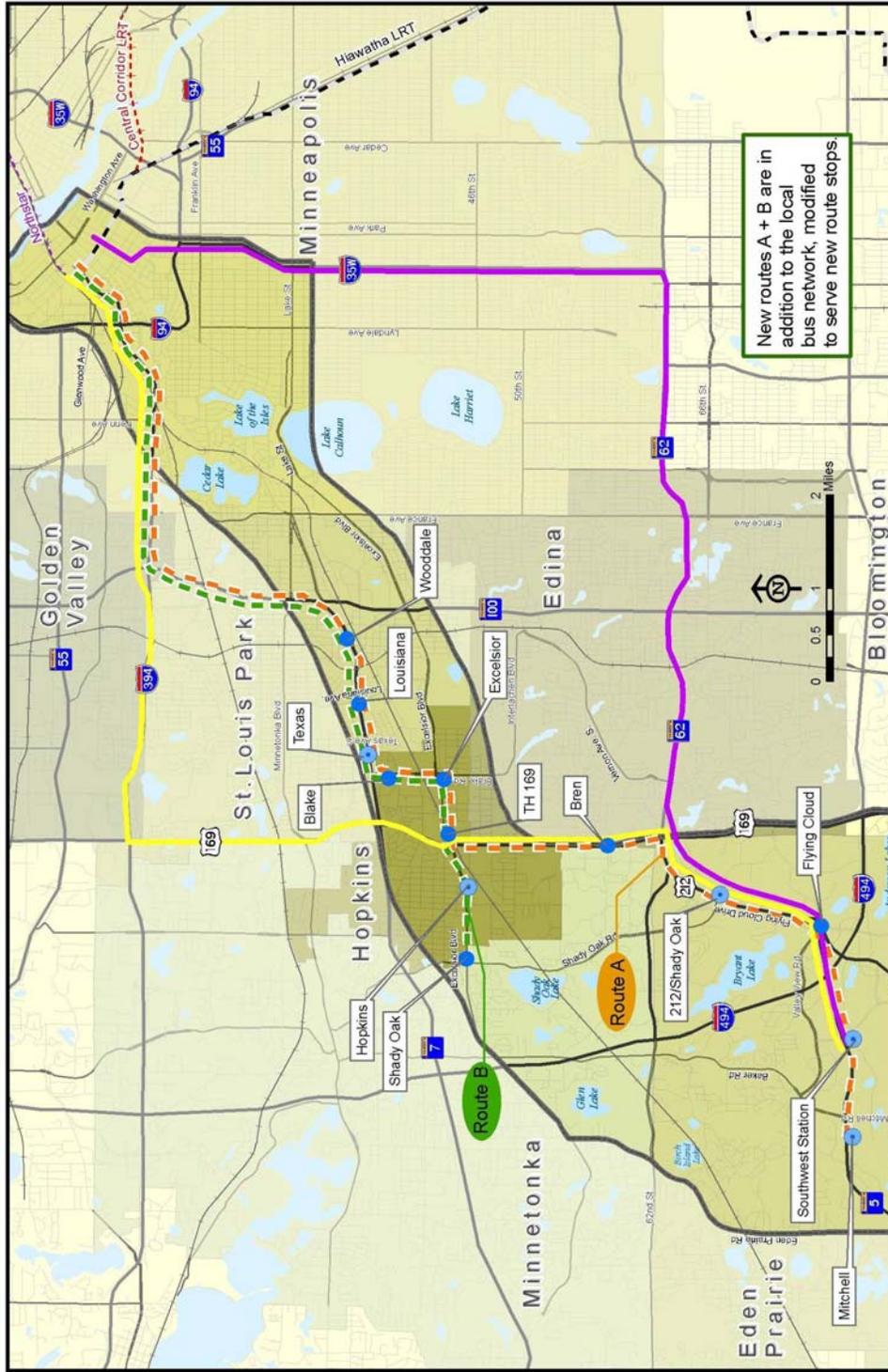
SOUTHWEST TRANSITWAY CONCEPTUAL DESIGN
3C SUB-ALTERNATIVE
SEGMENT 2

SHEET
5
OF
5

USER:
DATE:
PEN:
FILE:

APPENDIX D
ALTERNATIVES TO BE STUDIED IN THE DEIS

Enhanced Bus Alternative



New routes A + B are in addition to the local bus network, modified to serve new route stops.

- Legend**
- Bus Stop with Park & Ride Lot
 - Bus Stop Location
 - Study Area
 - Hiawatha LRT
 - Central Corridor LRT
 - Northstar Commuter Rail
 - Route A Limited Stop (New)
 - Route B Limited Stop (New)
 - SouthWest Express Bus via I-394 (Existing)
 - SouthWest Express Bus via I-35W (Existing)

Southwest Transitway
Draft Environmental Impact Statement

