METRO

Orange Line Bus Rapid Transit

Project Plan Update

Metro Transit
April 2014

DRAFT

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Cover photo courtesy of the Minnesota Department of Transportation.

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1 Background

METRO Orange Line is a planned bus rapid transit (BRT) line between Minneapolis, Richfield, Bloomington, and Burnsville. The Orange Line will benefit existing riders and attract new riders by improving transit access, service, and reliability on the I-35W corridor. Additionally, an identifiable, high-amenity brand will increase the visibility of transit and leverage service improvements.

All-day, frequent BRT service will complement local and express bus routes along I-35W, providing competitive running times for station-to-station trips and a new option for reverse-commute markets. Both BRT and express riders will benefit from stations, runningway technology, and service improvements. The Orange Line would provide 10-minute peak frequency and 15-minute off-peak frequency, at least 16 hours per day, seven days a week.

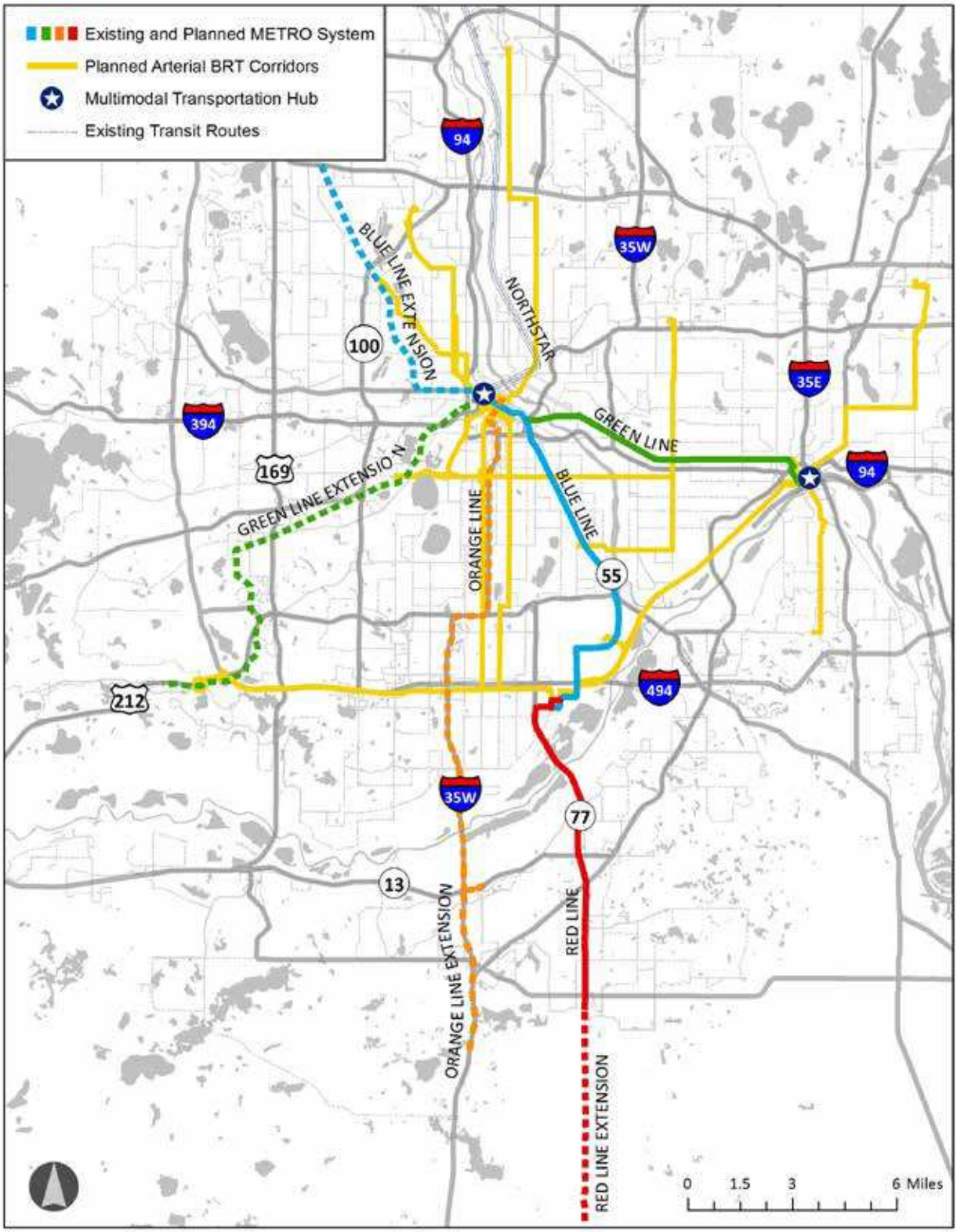
As a part of the METRO system, the Orange Line will connect people across the region to job centers, housing options, transit stations, and key destinations in the I-35W corridor. The Orange Line will improve access to 162,000 jobs and 64,000 residents, including 30,000 jobs and 40,000 residents outside of downtown Minneapolis. By providing a new transportation option and expanding accessibility, BRT service will also promote compact, walkable development in the station areas.

The I-35W corridor provides critical access into and through Downtown Minneapolis as well as job centers in Midtown Minneapolis, along the I-494 Corridor, and at suburban nodes. I-35W is a heavily-used transportation corridor, having carried approximately 210,000 daily vehicles and 14,000 daily transit riders in 2012. The Orange Line will build on incremental transit investments made over the past 40 years. Existing population and employment densities, income and auto deficiencies densities, access to critical transit connections, and expected growth justify continued improvement of station-to-station Orange Line service.[1]

Figure 1. Map of METRO Orange Line Alignment and Stations

1 METRO Orange Line Bus Rapid Transit Existing Conditions Report, *Section 1.3*

Figure 2. Map of Existing and Planned METRO System and Arterial BRT Corridors



2 Scope

1.1 Mode

Between 1992 and 2010, many transit alternatives and improvements were studied in the I-35W corridor[2], including:

- bus (no build);
- light rail transit in the I-35W median, or on the Soo Line Railroad corridor;
- high-occupancy vehicle lanes;
- transportation demand management strategies;
- improved feeder bus service;
- bus rapid transit;
- high-occupancy toll lanes; and
- express bus.

Following a MnDOT I-35W BRT study in 2005, incremental station investment begun in 2008 as part of two projects: freeway reconstruction in the Crosstown Commons area, and the Urban Partnership Agreement. The 46th Street and Downtown stations have been operational since 2010 and currently serve many I-35W express and limited-stop bus routes. The locally-preferred alternative for this corridor, Highway BRT, was adopted into the regional 2030 Transportation Policy Plan in 2010.

1.2 Stations

1.2.1 Downtown Stations: Operational

In downtown Minneapolis, Orange Line branding will be integrated into existing transit stop groups on Marquette Avenue and 2nd Avenue (MARQ2). Stop group assignments have not yet been determined, however, a pair of stations (northbound on 2nd Avenue and southbound on Marquette Avenue) is expected in the vicinity of 5th, 7th, 9th, and 11th Streets.

1.2.2 Lake Street Station: 60% Design

The planned Lake Street Station in Minneapolis is part of a major investment in roadway, bridge, transit and accessibility improvements for users. The two-story median station will be fully ADA accessible and provide a significant upgrade in comfort and safety over existing bus stops. It would also allow both Orange Line and express buses to access the station directly from the MnPASS lane, greatly increasing service levels and reliability at Lake Street. Parallel side platforms with passing lanes will allow multiple buses to move through the area without delay.

The 35W Lake Transit/Access Project includes a number of roadway design changes between I-94 and 32nd Street, as well as the construction of an online BRT station at Lake Street, a southbound managed lane from downtown Minneapolis to 42nd Street, conversion of the northbound priced dynamic shoulder lane to a full managed lane, and numerous streetscape local improvements. The project is being led by Hennepin County in partnership with the City of Minneapolis, Metropolitan Council, Metro Transit, and MnDOT.

2 METRO Orange Line Bus Rapid Transit Existing Conditions Report, Section 2.1, Table 4: Transit Alternatives Studied during Past Environmental Work in the I-35W Corridor.

Figure 3. Existing Route 535 Stop Groups and Potential Downtown Station Locations

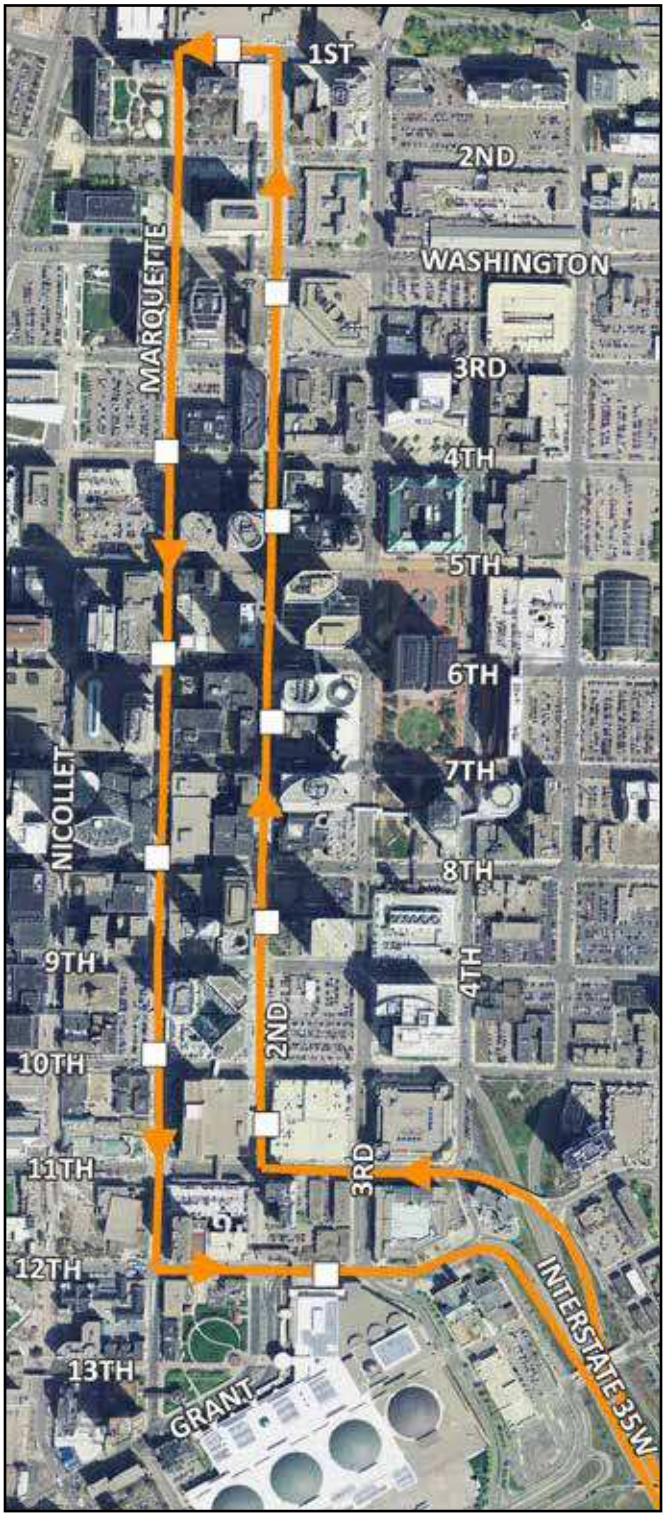
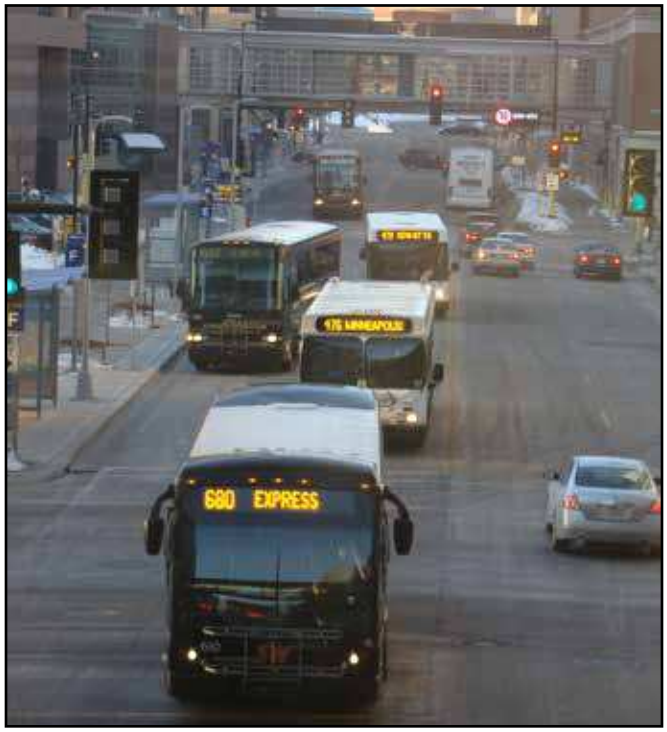


Figure 4. Photos of Existing MARQ2 Operations



A public engagement process has been underway for several years in the Lake Street area. A Project Advisory Committee (PAC), comprised of residents, business owners, community institutions and policy makers, meets monthly and advises partner agencies. The Lake Street BRT Station is moving into final design in 2014.

Short-term Improvements

The existing Lake Street bus stops on I-35W are some of the most austere and uncomfortable waiting areas in the system, plagued by a combination of issues: exposed conditions, freeway congestion and noise, deteriorating infrastructure, a lack of maintenance, and a significant reduction of northbound bus service in 2011.

Several near-term solutions should be coordinated to provide a clear path from the current conditions to the significant investment of Orange Line BRT.

- Install permanent trash receptacles.
- Replace the rider alert signage frequently. Inadequate materials create uncertainty for passengers using the station, and indicates abandonment of the stop.
- Refurbish the southbound shelter, or replace it with stock available elsewhere in the system. A larger, well lit shelter would provide greater security and separation from traffic.
- Coordinate MnDOT, City, and Metro Transit staff to visit the site and assess damaged infrastructure (e.g. fencing) and overgrown vegetation.
- Provide information on site about the 35 Lake Transit/Access Project and Orange Line planning to inform customers about long-term improvements, and to better engage transit riders in the planning process.
- Work with MnDOT to coordinate transit access to and through the area during construction.

Figure 5. Lake Street Station Preferred Platform Location and Connecting Bus Stops

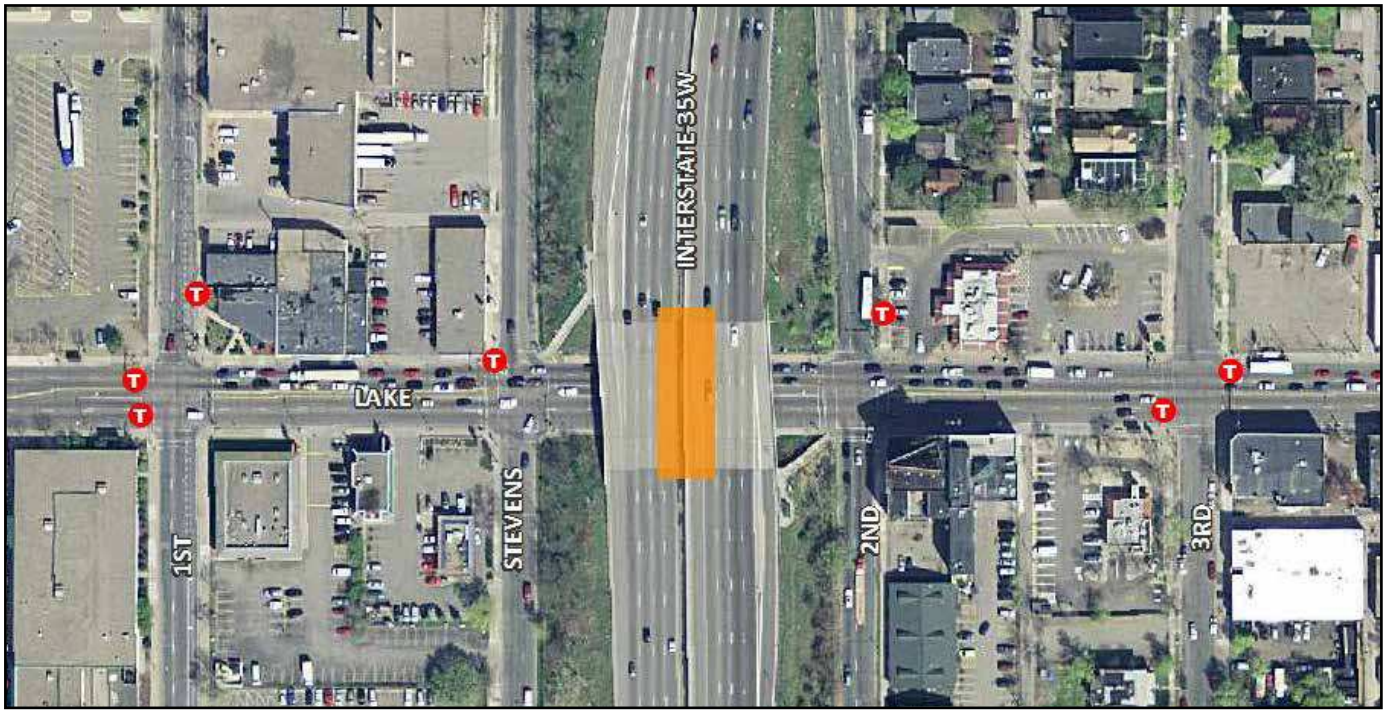


Figure 6. Plan of Lake Street Station Platforms from I-35W Level

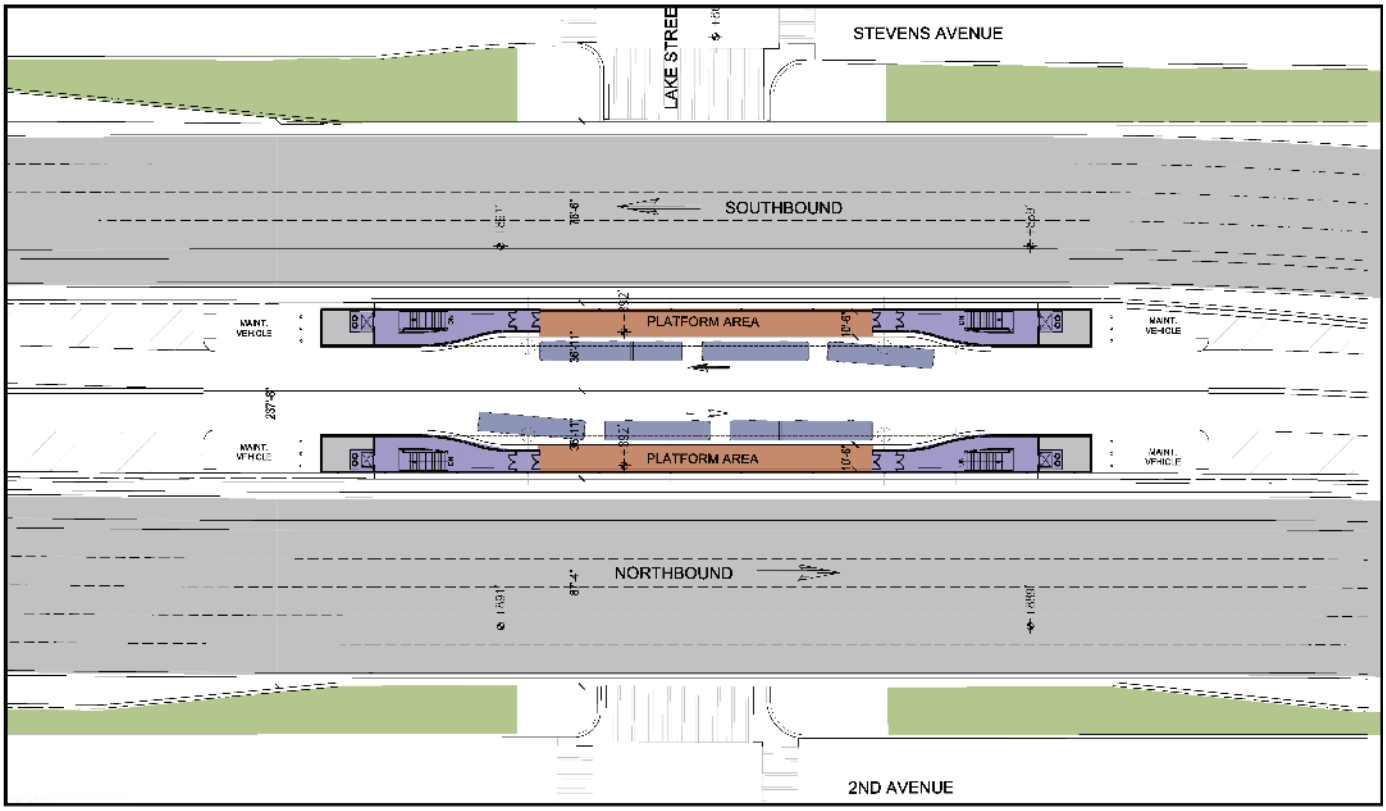


Figure 7. Rendering of Lake Street Station Plaza at Street Level

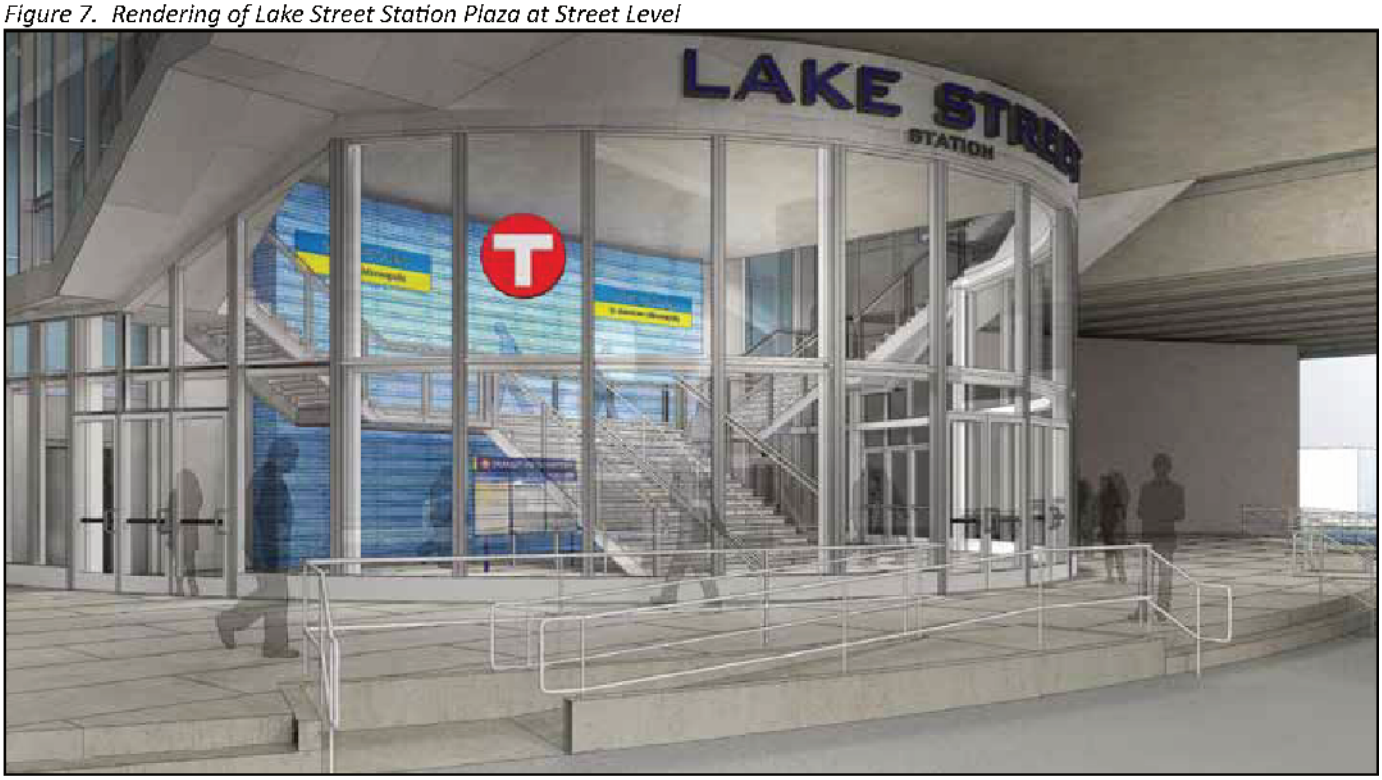


Figure 8. Rendering of Lake Street Station Platforms at I-35W Level

1.2.3 46th Street Station: Operational

46th Street Station in Minneapolis, which opened in 2010, was the first online BRT station to be constructed in the Twin Cities. Located between the northbound and southbound lanes of I-35W, the configuration allows buses to pick up and drop off customers without leaving the freeway. Customers will board Orange Line and express buses on the freeway level, and transfer to local buses on the 46th Street bridge.

Short-term Improvements

Because of the single cross-over platform design at 46th Street, buses are required to stop at gate arms before crossing into the 46th Street Station. The EMTRAC gate arm system is currently only installed on Metro Transit buses, and therefore limited service is provided to the station. Buses not equipped with EMTRAC experience a 45-second dwell penalty to enter the facility. In advance of Orange Line service, Metro Transit should revisit MVTA and Southwest Transit service to 46th Street Station, in part to bolster mid-day and reverse commute options for customers who currently wait up to 30 minutes for a Metro Transit bus while other providers bypass the station.

- Explore reducing dwell time for non-EMTRAC buses at the 46th Street gate arms. The current wait for these buses is 45 seconds, however, a reduction to 15 seconds could attract the other providers, which would in turn improve transit service and increase ridership at the 46th Street Station.

Figure 9. 46th Street Station Existing Platform Location and Connecting Bus Stops

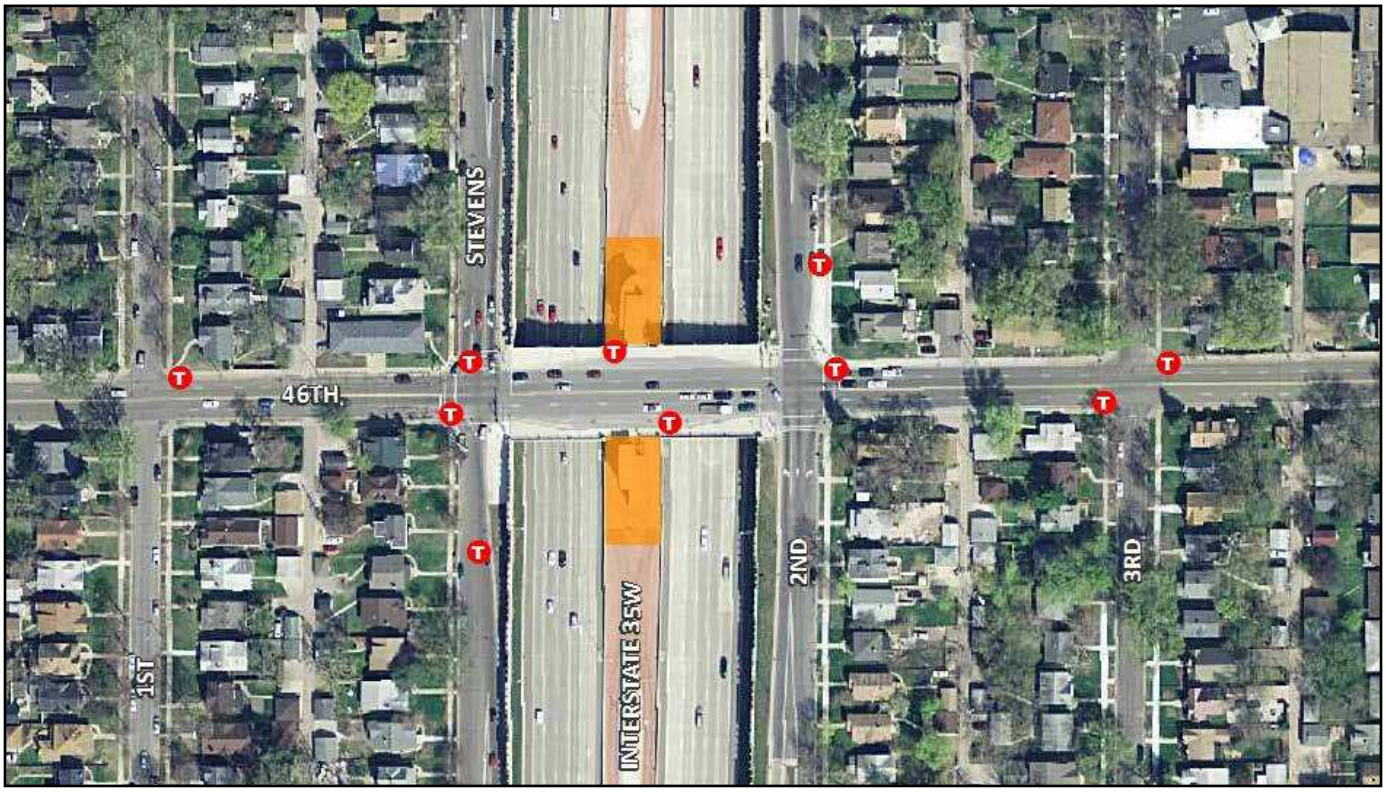


Figure 10. Aerial View of 46th Street Station

1.2.4 66th Street Station: Conceptual Design

The planned 66th Street Station in Richfield is a smaller neighborhood station that will cater to walking, biking and bus transfers. Due to the recent reconstruction of I-35W over 66th Street, the northbound and southbound platforms will be located on I-35W ramps instead of in median of the freeway. Long-term, when the bridge needs to be reconstructed, a 66th Street Orange Line station could be relocated to the I-35W median.

Four possible platform concepts were evaluated in 2013, two northbound and two southbound. Each site was compared using specific evaluation criteria found in Appendix A.

Concept	Description	Pros	Cons
A	Northbound Nearside 66th St on exit ramp	More pedestrian space, good visibility, existing 535 bus stop, land adjacent to the southeast quadrant is owned by City	Re-entry into traffic could be an issue, traffic stacking nearside
B	Northbound Farside 66th St on entrance ramp	Could reduce delay at signal	Farther from connecting service, less visible, constrained space for platform, less pedestrian space
C	Southbound Nearside 66th St on exit ramp	Good visibility, existing 535 bus stop	Re-entry into traffic could be an issue with stacking nearside, heavy southbound to westbound turn movement, most constrained site
D	Southbound Farside 66th St on entrance ramp	Could reduce delay at signal, eastbound to southbound free right turn produces fast-moving vehicle traffic	Farther from connecting service, less visible, constrained space for platform, less pedestrian space

Figure 11. 66th Street Alternatives for Platform Locations

Northbound Concept A and Southbound Concept D were found to be most suitable when comparing traffic movements and pedestrian access. The BRT station conceptual design and pedestrian needs will inform the 66th Street (County Road 53) roadway redesign, for which planning is currently underway.

Figure 12. 66th Street Station Preferred Platform Locations and Connecting Bus Stops

Figure 13. Conceptual Design for Northbound Platform at 66th Street Station

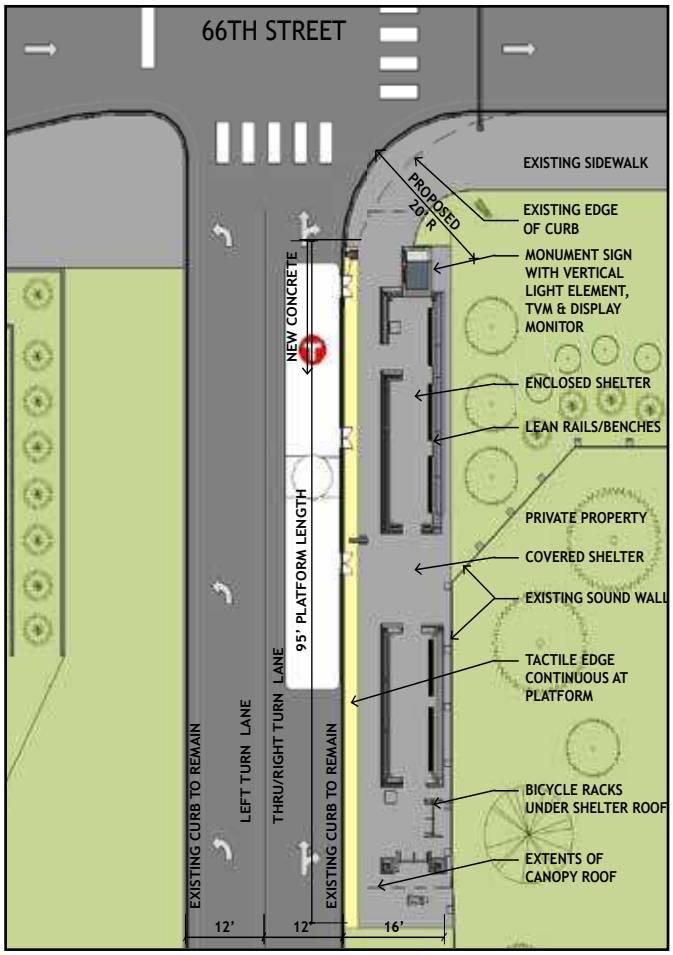


Figure 14. Conceptual Design for Southbound Platform at 66th Street Station

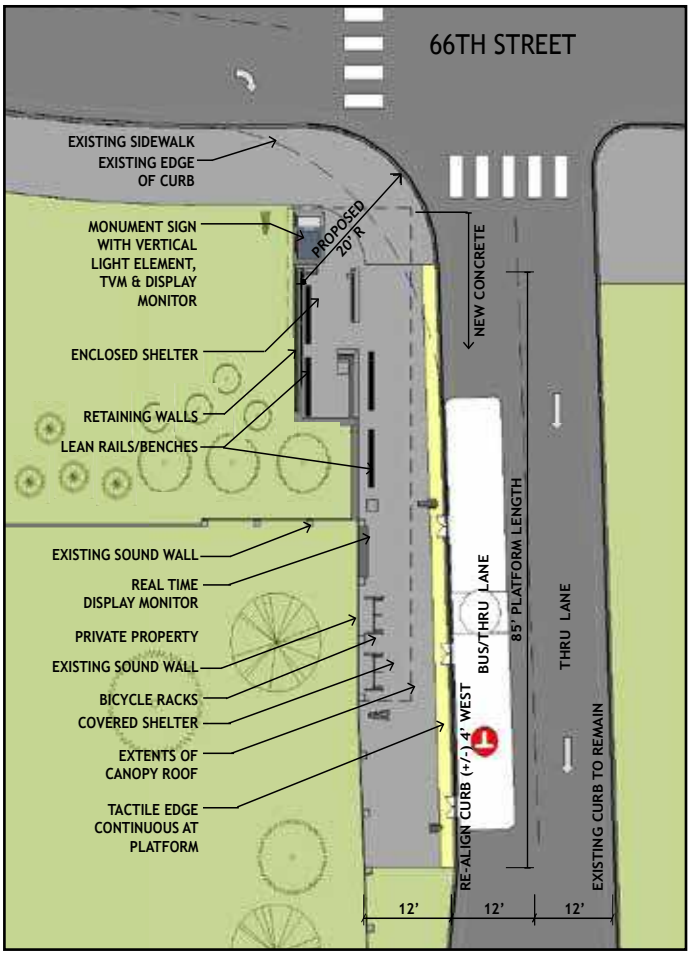


Figure 15. Conceptual Elevations for Northbound Platform at 66th Street Station

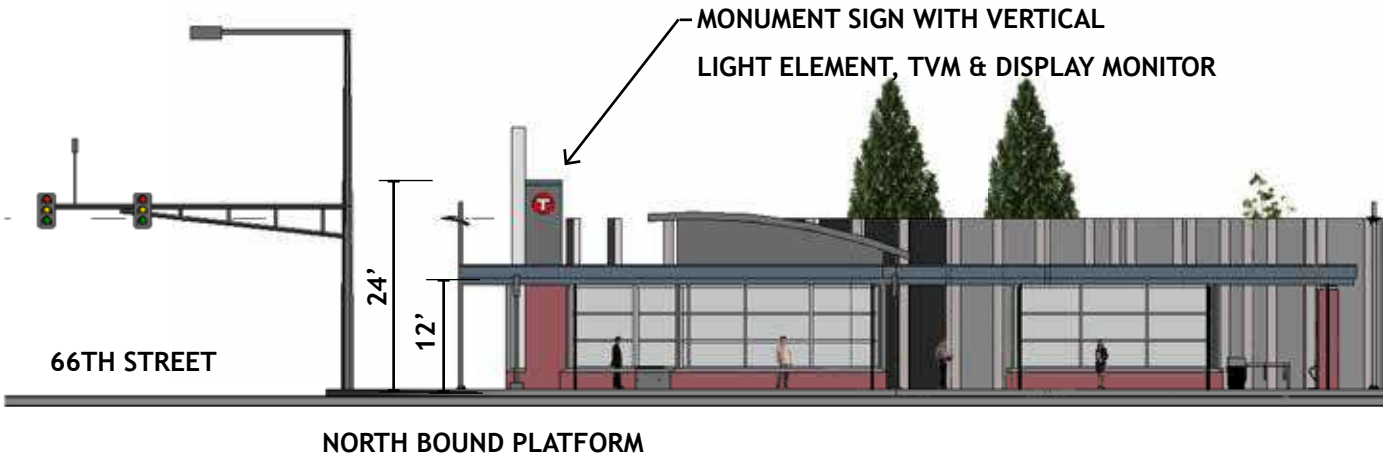
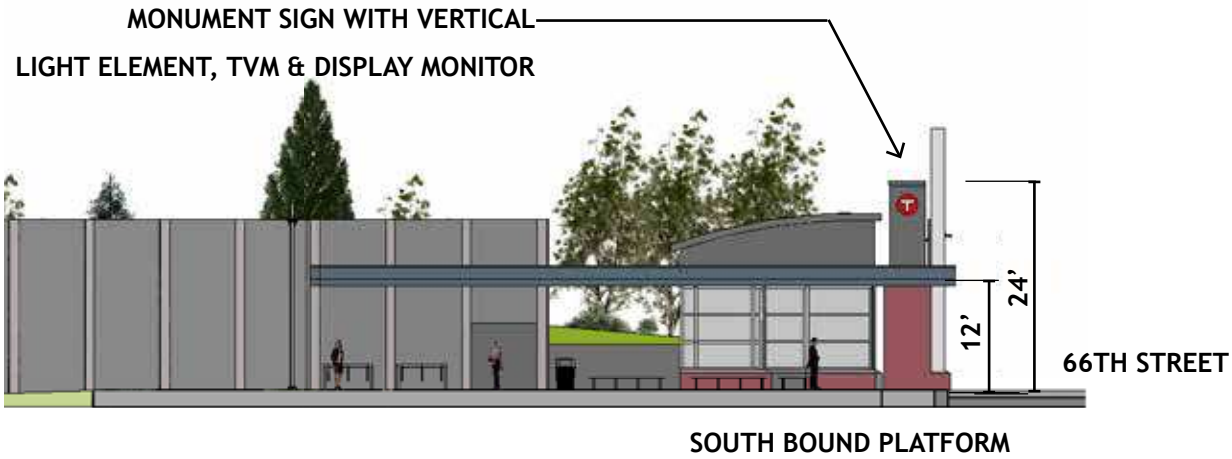


Figure 16. Conceptual Elevations for Southbound Platform at 66th Street Station



1.2.5 76th Street and American Boulevard Stations: Planning

Station improvements for the American Boulevard area are integrated into planning for the larger I-494/35W interchange design. The existing Knox Avenue park-and-ride lot in Richfield, built on MnDOT right-of-way needed for the planned interchange, will be relocated and replaced with a new parking ramp near the American Boulevard station. The 2013 process for station planning was completed as part of the I-494/35W Interchange Vision Layout Development led by MnDOT.

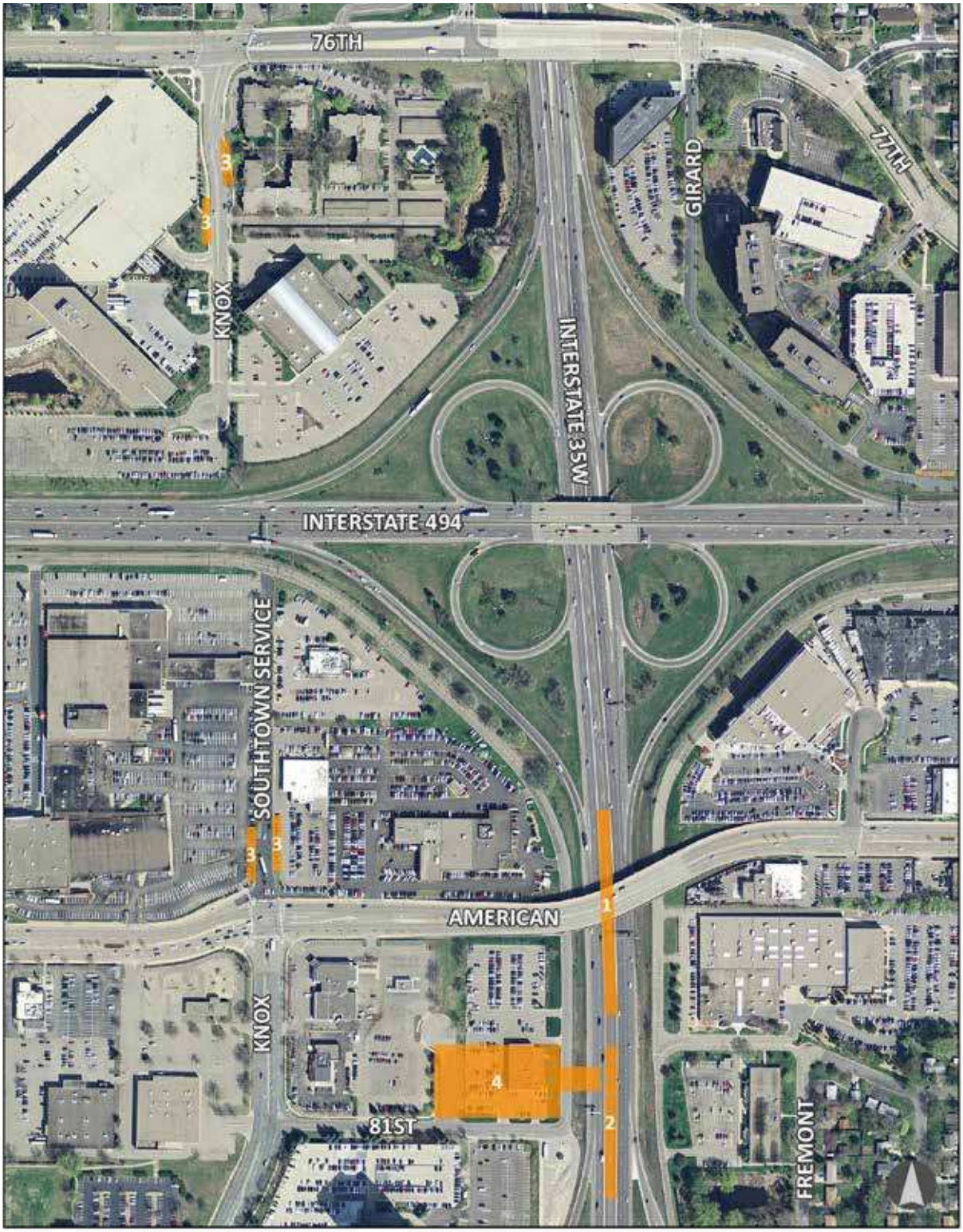
The 494/35W Technical Advisory Committee (TAC) first reviewed three preliminary concepts developed during prior interchange planning in 2010. Based on this prior work, the TAC further refined concepts, as well as adding new locations and designs that were not previously considered. Four options, shown in the table below, were then studied based on agreed-upon evaluation criteria in three categories: transit station design, bus operations, and transit rider benefit.

The ratings were based on a simple relative comparison of positive, neutral and negative impacts to the defined evaluation criteria. A copy of the criteria and evaluation matrix is included in Appendix A. The TAC group compared these ratings, discussed individual variations, and reached consensus on relative benefit and impact of each concept. Concepts 1A, 3A, and 3B were selected to be developed in further detail.

These three detailed concepts considered two different approaches to the Orange Line alignment. In the first option, the Orange Line would stay on I-35W, stopping at a new two-story median station, similar to the existing BRT station

Concept	Description	Pros	Cons
1	1A: Median Station on I-35W under edge of American Boulevard Bridge 1B: Median Station on I-35W centered under American Boulevard Bridge 1C: Median Station over I-35W, at American Boulevard level	Efficient bus operations, good station visibility from freeway, eliminates vertical circulation between stations (1C), could be used by other I-35W transit providers and routes	Noise levels on freeway platforms, requires major roadway widening and bridge modification, vertical circulation towers needed, difficult peak merge movement to 66th Street shoulder station, Richfield is not served by a station at American
2	Median Station on I-35W at 81st Street	Efficient bus operations, good station visibility from freeway, no bridge modification needed at American, could be used by other I-35W transit providers and routes	Noise levels on freeway platforms, requires major roadway widening, vertical circulation towers needed, Richfield is not served by a station at 81st, long transit transfer distance between Orange Line and American Boulevard, dependent on a parking facility close adjacent to I-35W, requires a new skyway to connect to parking facility and local streets

Figure 17. American Boulevard Alternatives for Platform Locations



Concept	Description	Pros	Cons
3	3A: Two Knox Avenue stations, using 76th and 82nd Streets 3B: Two Knox Avenue stations, using 76th Street and a T-ramp into the American Boulevard Bridge	Good station visibility from local streets, at-grade waiting areas, shorter walk distances to major destinations, two stations increase housing and jobs within ½ mile walkshed, brings transit closer to heart of Penn American District, no bridge modification or ROW needed at American and I-35W (3A), Richfield is better served by transit, improved transfers and reduced operational cost for crosstown routes, multiple options for parking facility location, opportunity to add new pedestrian/bike connection across I-494	Requires ROW through Southtown property, requires major roadway widening and bridge modification (3B), merge still needed from 98th to T-ramp northbound (3B), requires relocation of 42" water main between American and I-494, longer travel times for Orange Line, reduces development benefits east of 35W
4	Combined parking structure and station west of I-35W at 81st Street, with T-ramp into station	Direct transit access from I-35W to parking structure, transit station and park and ride are collocated, eliminates need for separate vertical circulation, could be used by other I-35W transit providers and routes	Requires major roadway widening and bridge modification, long transit transfer distance between Orange Line and American Boulevard, dependent on a parking facility close adjacent to I-35W, difficult peak merge movement to 66th Street shoulder station, Richfield is not served by a station south of American

on I-35W at 46th Street. The other options would bring the Orange Line to two sidewalk-adjacent stations along the alignment of Knox Avenue through Southtown, via either 82nd Street and 76th Street (Concept 3A) or a center-running transit ramp to American Boulevard (3B). The 3A/3B "Knox Alignment" would require establishing new right of way between American Boulevard and I-494, and connecting Knox Avenue under I-494 to Richfield. This configuration allows for stations in both Bloomington and Richfield, and the underpass would accommodate bicycles and pedestrians in addition to transit, providing a new regional link across the highway and better connecting jobs, housing, and redevelopment areas.

Options 1A, 3A, and 3B were studied in further detail to better understand qualities like pedestrian infrastructure, transit service and operability, access to destinations and housing, integration with planned redevelopment, and cost. 3B was eliminated during this process due to much higher estimated costs without clear benefits over option 3A. Additional information on the evaluation of these three alternatives is available in Appendix A.

Figure 18. Comparison of Options 1A, 3A, and 3B

	Concept 3A	Concept 1A
BRT Travel Time between 98th and 66th	9 – 11 min (45-55% faster than Route 535)	7 – 8 min (52-58% faster than Route 535)
Housing & Jobs within ½ Mile of station(s)	12,800 Residents 13,100 Jobs	4,600 Residents 8,300 Jobs
Street operations	Transit priority and coordination of signals is needed. Request removal of "no right turn on red" at 76th St exit	Northbound merge from American to 66th is not possible during the AM Peak (1.25 miles)
Service implications for connecting routes	Route 540 stays on 76th Street, Route 542 stays on American Boulevard	Route 540 bends south to American Boulevard for one mile to intersect station
Preliminary estimates for transit costs	$30M	$36M

The I-494/35W Interchange TAC recommended Option 3A to move forward for the further study, informing the interchange design and the location of a future park-and-ride facility. Routing the Orange Line via Knox Avenue, using 76th and 82nd Street, provides a better opportunity to integrate frequent, reliable transit into a growing neighborhood. The two-station configuration provides several benefits to the corridor:

- Enhancing the transit customer experience. Each site would provide comfortable, sidewalk-adjacent stations, with opportunities for landscaping, public art, bicycle parking, transit connections, and enhanced streetscape.
- Putting transit where people want to be. Knox Avenue maximizes walk access to major destinations and housing, and minimizes impacts to existing transit riders by providing stations on both sides of I-494.
- Integrating transit into existing and planned development. Because of concurrent roadway, transitway, and land use planning, there is a rare opportunity to proactively place the stations in proximity more developable land and existing development. This maximizes the long-term land use benefits of having a station and builds on strong existing ridership.
- Eliminating long-term operational issues. Even under current congestion, merging from a median station at American Boulevard to a shoulder station at 66th Street has been deemed operationally infeasible, particularly in the AM peak period. This maneuver would require Orange Line service reductions to American Boulevard or to 66th Street during the busiest part of the day.
- Reducing capital, maintenance, and operating cost. Option 3A is less costly than both Options 1A and 3B, while still vastly improving transit service and access. Connecting east-west bus routes are able to run simplified, gridded routes, reducing bus operating costs and passenger delay. Street-level stations eliminate the need for elevators, stairs, and skyways, reducing annual maintenance needs and costs.
- Expanding options for meeting park and ride demand. Two stations widen the search area for locating a park-and-ride facility, and increase opportunities for joint development or shared-use parking.

Concurrent Land Use Planning

The Knox Avenue alignment builds on city planning focused on the long-term redevelopment of the Penn American District, and area along American Boulevard primarily between Penn Avenue and I-35W. With its favorable location in the region, the Penn American area developed as a retail shopping hub more than 40 years ago during the first phase of suburban growth in the Twin Cities. Shifts in the economy and changing market preferences, along with the prevalence of aging buildings and large amounts of land devoted to parking in the District, present significant opportunities for redevelopment.

A district plan was adopted by the City of Bloomington in January 2014, helping the District meet its potential by defining a clear vision to guide redevelopment and investments in public infrastructure. Key elements of the Penn American vision include:

- Adding new, pedestrian-friendly streets and creating smaller development blocks as redevelopment occurs;
- Increasing development intensity and diversifying the mix of land uses;
- Improving the quality and character of buildings and public spaces;
- Increasing mobility through targeted improvements to roads, bikeways, and sidewalks; and
- Leveraging the proposed substantial investments in transit and transportation infrastructure.

Figure 19. 76th Street Station Preferred Platform Locations and Connecting Bus Stops

Figure 20. American Boulevard Station Preferred Platform Locations and Connecting Bus Stops

1.2.6 98th Street Station: Conceptual Design

98th Street Station in Bloomington is informed by a preliminary station design that was developed in 2011. This original design assumed that the southbound platform would be located on Dupont Avenue South at 98th Street, about 1,700 feet from the planned northbound platform at South Bloomington Transit Center. A concentrated design effort in 2013 provided additional guidance on whether this original design is feasible, if additional components were needed, or if alternate locations for the designed southbound platform should be considered. Eight alternatives were studied for northbound and southbound platform locations.

Figure 21. 98th Street Alternatives for Platform Location

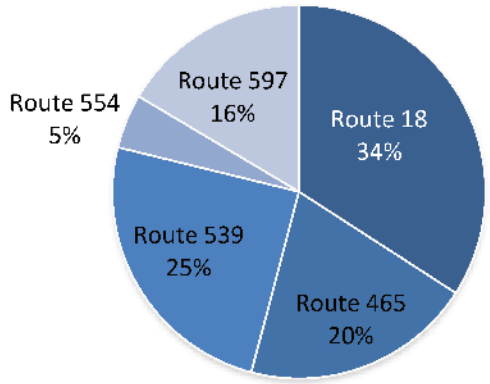
Concept and Description		Pros	Cons
A	Northbound, nearside inline 98th Street	Quick access for buses, adjacent to existing station, short transfer distance, eliminates pedestrian-vehicle conflicts, easier to maintain adjacent to transit center, personal safety/visibility	Future interchange design may require relocating station, need to add direct pedestrian access to 98th
B	Northbound, shoulder online 35W	Quick access for buses, eliminates pedestrian-vehicle conflicts	Grade issues, vertical circulation and skyway needed to SBTC, future interchange design may require relocating station

Concept and Description		Pros	Cons
C	Southbound, farside inline Dupont Ave	Access to HOV on ramp for buses, faster transfers to westbound buses (Normandale College), faster through-travel for transit riders going to Burnsville, riders still have option of going directly to SBTC on express routes	Distance from SBTC and park and ride, no visual ties to transit center, not legible as part of a north/south pair, impact on adjacent residential property, minimal space for station platform, multiple difficult pedestrian crossings to access station
D	Southbound, inline 98th Street between Dupont and 35W	Faster through-travel for transit riders going to Burnsville, riders still have option of going directly to SBTC on express routes, some visual tie to SBTC	Distance from SBTC and park and ride, not legible as part of a north/south pair, left turn from exit ramp into far right lane of 98th, adjacent to side of building, no HOV advantage at on ramp, high PM peak traffic eastbound on 98th, multiple difficult pedestrian crossings to access station, more difficult transfer to westbound transit
E	Southbound, nearside inline exit ramp	Access to HOV on ramp for buses, faster transfers to westbound buses (Normandale College), faster through-travel for transit riders going to Burnsville, riders still have option of going directly to SBTC on express routes, some visual tie to SBTC	Distance from SBTC and park and ride, not legible as part of a north/south pair, fast-moving traffic turning right onto 98th, multiple difficult pedestrian crossings to access station, requires the most roadway modification of the ramp and 98th
F	Southbound, farside inline on ramp	Faster through-travel for transit riders going to Burnsville, riders still have option of going directly to SBTC on express routes, some visual tie to SBTC	Grade issues, distance from SBTC and park and ride, not legible as part of a north/south pair, left turn from exit ramp into far right lane of 98th, no HOV advantage at on ramp, high PM peak traffic eastbound on 98th, multiple difficult pedestrian crossings to access station, more difficult transfer to westbound transit and 98th Street destinations, potential right of way issues
G	Southbound, shoulder online 35W	Quick access for buses, eliminates pedestrian-vehicle conflicts	Grade issues, vertical circulation and skyway needed to SBTC, more difficult transfer to westbound transit and 98th Street destinations, potential right of way issues
H	Southbound, nearside inline 98th Street	Route is similar to existing 465, eliminates pedestrian-vehicle conflicts, creates a single transit hub with direct access to bus transfers, easier to maintain adjacent to transit center, legible as part of a north/south pair, personal safety/ visibility, brings riders directly back to park-and-ride, best access to 98th/ Lyndale destinations, relatively low cost to add onto to northbound platform	Longest time penalty for riders going through to Burnsville, multiple turns to get into station, combined northbound/southbound platform may confuse riders, traffic signal delay

The Orange Line is not proposed to serve Normandale College directly, but rather connect to improved cross-town bus service to increase overall transit access, via either the American Boulevard or 98th Street station, or both. It is critical that 98th Street Station planning carefully consider this connection because 17% of all daily 535 trips in 2012 began or ended at Normandale College. Additionally, express routes 597 and 465 complement service in the southern portion of the proposed route, especially at South Bloomington Transit Center, where important connections to local buses are made.

Various ridership benefits and impacts were weighed and evaluated by a subset of the Orange Line Technical Advisory Committee. Ratings were based on a simple relative comparison of positive, neutral and negative impacts to the defined evaluation criteria. A copy of the criteria and evaluation matrix is included in Appendix A. The group compared these ratings, discussed individual variations, and reached consensus on relative benefit and impact of each concept. Overall, Concept A and H were preferred in the evaluation because they provide the safest and most legible environment for passengers making bus transfers and walking to destinations, and because of the proximity to the existing transit center and park and ride. A recent transit rider survey reinforced the desire to create a single transit hub, with strong connections to local and express routes:

Which other routes do you use at 98th Street Station?



Most Important for 98th Street Station Design

- *Ease of transfer to other routes*
- *Speed of service to Burnsville*
- *Close proximity to park and ride*

Least Important for 98th Street Station Design

- *Bike parking and pedestrian infrastructure*
- *Convenient to walk to destinations east of 35W*
- *Ease of transfer to Normandale College*

Short-term Improvements

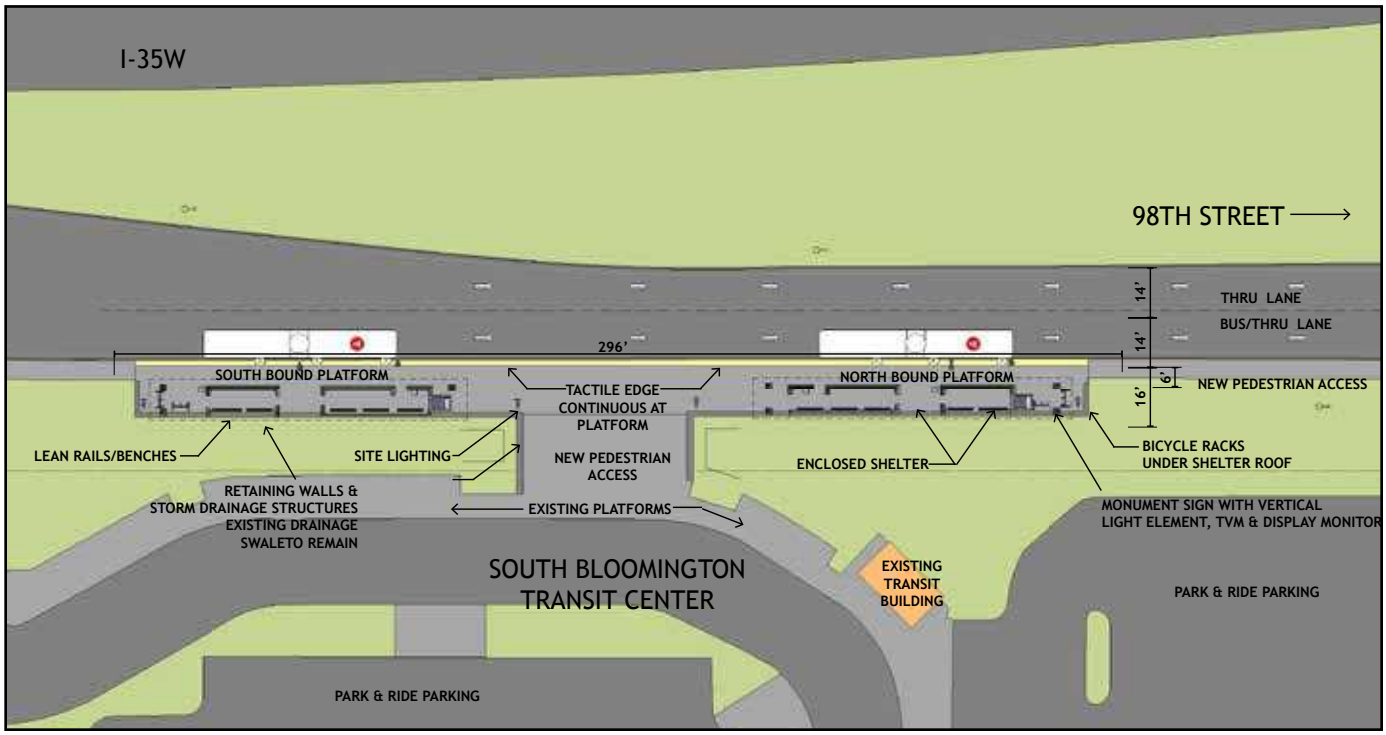
The park-and-ride facility at South Bloomington Transit Center is over capacity during the school year, with commuter vehicles regularly spilling into commercial and institutional areas adjacent to the site[3]. SBTC has popular express service to downtown Minneapolis and the University of Minnesota, and parking demand has quickly outstripped the available spaces. While the development of an American Boulevard park-and-ride facility should help relieve broader parking demand in South Bloomington long-term, user complaints and illegal parking have become commonplace, accelerating the need to find near-term solutions at this station. During the 2013 conceptual design work, additional issues were raised, including changing assumptions about the design of a future interchange, the status and possible restrictions on the transit center parcel[4], future land use intensification, and bicycle and pedestrian connections across I-35W. To provide coordinated and comprehensive transportation and land use planning, a 98th Street Station Area Plan should be developed.

3 2013 Annual Regional Park-and-Ride System Report. 201 vehicles were counted at South Bloomington, a facility with only 195 designated parking spaces.

4 The park and ride was purchased with the Right-of-way Acquisition Loan Fund (RALF) to landbank for a proposed full interchange at 98th Street. Because MnDOT is unable to purchase highway right-of-way until a road is programmed for construction, many acres which will are needed for future road right-of-way have been lost to development. To address this, the 1982 Minnesota legislature established a revolving loan fund program to acquire undeveloped property threatened by development that is located within an officially-mapped metropolitan highway right-of-way. The transit center was proposed as an interim use until which time that the interchange is reconstructed and an online bus station can be constructed.

Figure 22. 98th Street Station Platform Location and Connecting Bus Stops

Figure 23. Conceptual Design for Northbound and Southbound Platform at 98th Street Station



1.2.7 Burnsville Transit Station: Conceptual Design

Burnsville Transit Station, owned and operated by MVTA, is a high-quality, existing station and park-and-ride facility that provides key connections to the south metro. It is the largest park and ride along I-35W South, and the third largest in the regional park and ride system. Bus loading and layover space at Burnsville Transit Station is currently at a premium, with additional services planned. Design work is needed as part of the Orange Line project to explore options for accommodating BRT.

Two locations are being considered to serve as a BRT station in Burnsville: expanding Burnsville Transit Station by adding an Orange Line platform, or providing new transit station capacity at the southwest corner of Nicollet Avenue and Highway 13. The latter site, referred to as the "Travelers Trail" site, is a surface parking lot on MnDOT right of way that predates the opening of Burnsville Transit Station. The Travelers Trail site has a limited-use permit that restricts it to be used only for transit purposes, making it undevelopable for other land uses.

Working closely with MVTA, City of Burnsville, Dakota County, and MnDOT, Metro Transit will evaluate both sites in detail in 2014 to find the best fit for short- and long-term needs. Evaluation criteria will include factors like transit vehicle capacity, layover needs, ridership, existing and anticipated bus trip volumes, park-and-ride demand, pedestrian and vehicle access, ability to connect to local and complementary I-35W routes, transit access and circulation, physical and operational constraints, and opportunities for shared infrastructure and maintenance.

In 2014, a preferred location will be chosen and conceptual design will be completed. This design plan will identify the layout of the station area, including shelters, platforms and loading area, layover area, technology components, roadway changes, and impacts to pedestrian, bike, vehicle, and transit circulation.

Figure 24. Possible sites for Burnsville Transit Station Gate Expansion

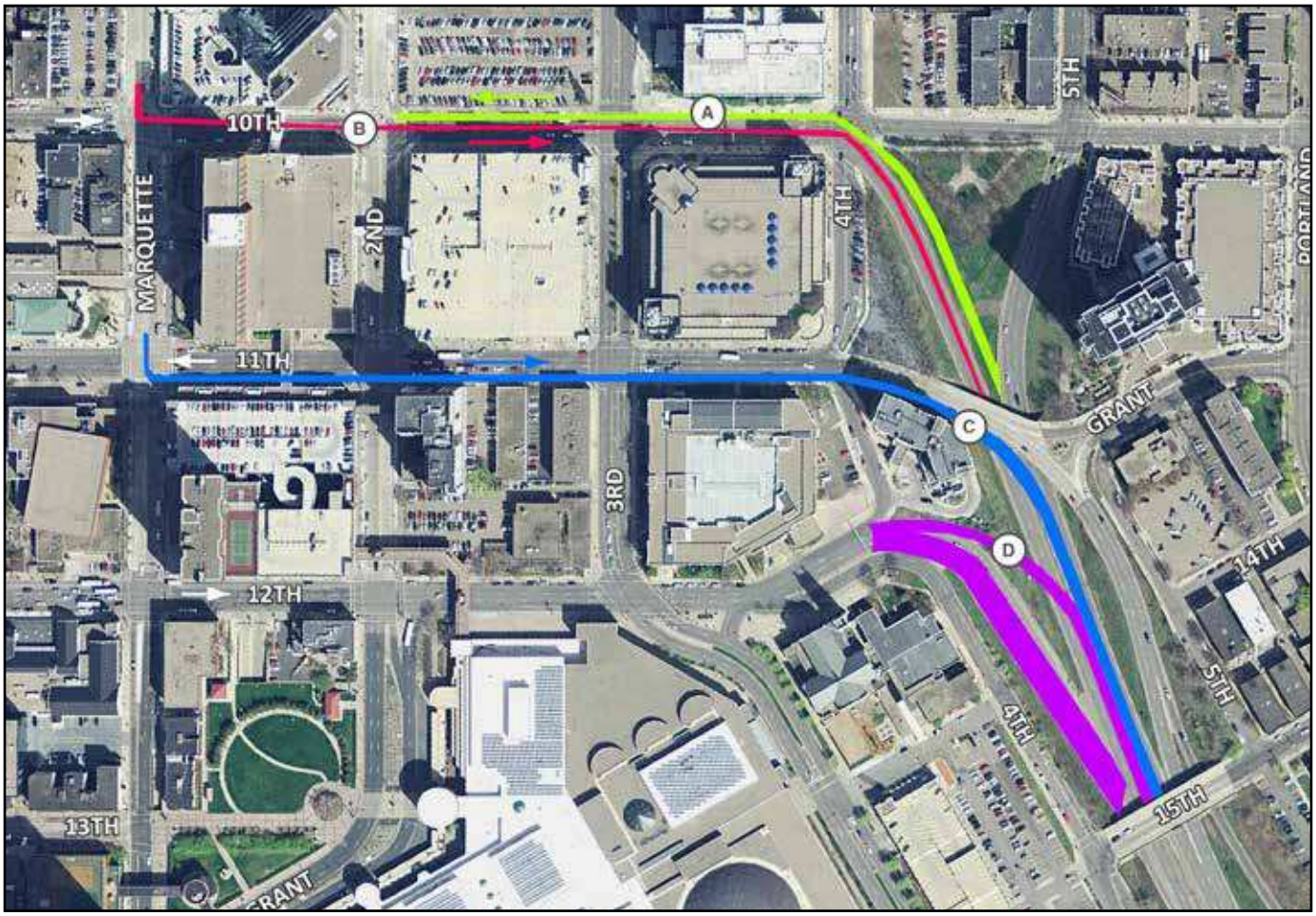
1.3 Guideway

1.3.1 Downtown

Orange Line will use the transit advantages on Marquette Avenue and 2nd Avenue (MARQ2) in downtown Minneapolis, providing faster service and the ability to move more people through downtown at peak times. In 2009, Marquette Avenue and 2nd Avenue South were reconstructed to provide side-by-side bus-only lanes and accommodate 80% of express bus trips in downtown Minneapolis.

In accordance with the Access Minneapolis Downtown Action Plan, several improvements between I-35W and MARQ2 are currently under study. Metro Transit, the City of Minneapolis, MnDOT are exploring the feasibility of extending the I-35W managed lane into downtown both northbound and southbound, providing a more seamless, reliable connection between the freeway and the local street network. BRT access should connect to MARQ2 as directly as possible, and may require changes to striping, signals and/or ramps in the area bounded by 10th Street, 12th Street, Marquette Avenue and Portland Avenue. At a minimum these changes would provide speed and reliability improvements for Orange Line buses, but they could potentially provide benefit to other MARQ2 buses as well. A preferred concept and planning-level design will be produced in 2014.

Figure 25. Concepts for Connecting MARQ2 and I-35W Transit Advantages



Concept	Description	Pros	Cons
A	Northbound, 10th Street bus-only exit ramp into intersection with 10th Street bus-only westbound contraflow lane	Bus stays in managed lane into downtown, green space is on existing right of way, minimal grading needed, no parking impacted, no structure needed, tie into 4th/10th signal, redistributes transit on street with lower AADT (8,700 at 2nd Ave)	Impacts edge of green space, signal work needed at 4th and 3rd, requires 10th St contraflow lane, need to relocate or shift bike lane between 2nd and 4th, two curb cuts on north side of 10th between 2nd and 3rd for surface parking lot, eliminates southern stops on MARQ2
B	Southbound, 10th Street assignment of HOV to center lane into HOV entrance ramp	Puts bus in center managed lane, eliminates conflict of southbound left-turning buses on Marquette Ave and northbound right-turning buses off 1st Ave, no signal work needed, no parking impacted, explore removing HOV ramp at 12th and replace with general purpose entrance ramp, redistributes transit on street with lower AADT (8,700 at 2nd Ave)	Eliminates southern stops on MARQ2, some general purpose traffic will need to be reassigned to 12th St
C	Southbound, 11th Street flyover bus-only entrance ramp with 11th Street bus-only eastbound contraflow lane	Puts bus in center managed lane, eliminates conflict of southbound left-turning buses on Marquette Ave and northbound right-turning buses off 1st Ave	Bridge costs for 11th and Flyover, may need to modify bridge, reduces length of HOV lane on I-35W, signal work needed, reduces 10th Street capacity – may require 10th entrance ramp to merge into one lane at point of flyovers southbound, parking, hotel loading, and cab stand impacts, eliminates southern stops on MARQ2, segment has highest AADT of 3 streets (19,400 at 2nd Ave and 29,200 at 3rd Ave)
D	Southbound, 12th Street flyover HOV entrance ramp and 12th Street general purpose entrance ramp	Puts bus and HOV in center managed lane, keeps existing MARQ2 pattern and stops, may be enough ROW to make 10th St general purpose entrance 2 lanes, minimal grading needed to convert existing HOV to general purpose, lower AADT than 11th St (7,900 to 10,300 between Marquette and I-35W)	Bridge costs for flyover, may require 10th entrance ramp to merge into 1 lane at point of flyovers southbound, Southbound left-turning buses on Marquette Ave still conflict with northbound right-turning buses off 1st Ave, explore moving northbound 1st Ave buses to Grant St

1.3.2 I-35W

The Orange Line alignment will use a combination of managed lanes, bus-only shoulders, dedicated transit guideway, HOV ramp bypass lanes, and short segments of mixed traffic.

Center-running Managed Lanes

North of the 66th Street, METRO Orange Line buses will use center-running MnPASS lanes, which help maintain traffic flow, reduce congestion and give a safe, reliable commute to those riding transit, traveling in a carpool or vanpool, or using a MnPASS transponder. The priced high-occupancy lanes exist on I-35W from Highway 13 to approximately 22nd Street northbound, and 42nd Street to Highway 13 southbound. As noted above, Metro Transit, the City of Minneapolis, MnDOT are studying the extension of managed lanes to connect into downtown Minneapolis.

One major gap in the I-35W managed lane system, between downtown and 42nd Street southbound, is being planned by MnDOT for implementation with the Orange Line and the 35 Lake Transit/Access Project. This pavement reclamation project will also convert the northbound priced-dynamic shoulder lane into a full managed lane.

Bus-only Shoulders

South of 46th Street, all Orange Line stations are located either on the outside shoulder or in offline locations. The transitway will use a combination of bus-only shoulders and high-occupancy vehicle bypass ramps through this section of the project to maintain reliability.

With more than three times the number of miles than all other metro areas combined, the Twin Cities is a leader in the use of bus-only shoulders. While a cost-effective way for buses to avoid traffic, there are certain conditions under which operators may chose not to use the shoulder. Operators consider the following factors when deciding whether to use a bus-only shoulder:

- Road conditions. Sinking drain covers, potholes or other road defects can interrupt use;
- Weather. Heavy snow, slush and ice must be adequately cleared to allow for safe operations;
- Obstructions. Road debris, stalled motorists and construction vehicles are unavoidable obstacles that prevent buses from using shoulders;
- Traffic. Bus-only shoulders may only be used when traffic has slowed to less than 35 miles per hour (the maximum speed is 15 miles per hour greater than traffic, with a maximum speed of 35 miles per hour); and
- Other vehicles. Extra-wide vehicles in mixed-traffic can prevent the use of bus-only shoulders because of clearance issues. Emergency vehicles also take priority.

Between 98th Street and 82nd Street, bus shoulders do not yet exist. Bridge piers at certain locations may prevent expansion of the shoulder without significant grade changes and retaining walls. However, over time City of Bloomington has acquired land adjacent to both sides of I-35W for future expansion needs. Additional discussion is needed with the City and MnDOT to understand the long-term needs for transit advantages in this area should congestion grow enough to make the merge to and from the managed lane infeasible. Between the Minnesota River Bridge and 98th Street Station, traveling northbound, there is an existing climbing lane for truck traffic that should be studied to accommodate transit if a bus-only shoulder is pursued.

River Bridge Crossing

MnDOT is advancing the engineering for the I-35W Minnesota River Bridge replacement project in preparation for a spring

of 2017 letting. High-level scoping done in 2014 should aim to preserve and enhance transit advantages for Orange Line buses and express buses. Both a center-running managed lane and an outside bus shoulder should be included in the design of the planned bridge.

1.3.3 76th Street, Knox Avenue, and 82nd Street

Southbound from 66th Street, the Orange Line will use the bus-only shoulder and exit at 76th Street. Buses will turn right onto 76th and left onto Knox Avenue, and continue down to 82nd Street where it re-enters I-35W.

Northbound from 98th Street, buses will use either the managed lane or a future bus-only shoulder to exit at 82nd Street, turning left onto 82nd Street and right onto Knox Avenue. Buses will then turn right onto 76th Street and left onto I-35W, using the HOV ramp bypass to enter the bus-only shoulder.

The cross-section of Knox Avenue between American Boulevard and 76th Street will be designed in detail this year, working to minimize property and access impacts to existing development. It will include, at a minimum, a dedicated transit guideway as well as a new bicycle and pedestrian connection across I-494. Working with the Cities of Richfield and Bloomington, Metro Transit will determine the interest and feasibility of other improvements for this new underpass, including the potential to add general purpose travel lanes or streetscape enhancements.

This routing is similar to the current Route 535, which utilizes 76th, Knox Avenue, and 82nd Street. Because of the dedicated guideway and new Knox Avenue right of way, the Orange Line will pass through seven fewer traffic signals than the 535, resulting in a time savings of between 45% and 55% for BRT through this area.

1.3.4 98th Street

Southbound buses will travel via I-35W to 98th Street, Aldrich Avenue, 99th Street, and Bloomington Freeway Road to new Orange Line platform. Leaving the station, buses will turn left onto 98th Street to loop directly into southbound I-35W. This route is similar to how Route 465 currently operates.

Northbound, buses will exit at 98th Street directly to the

Figure 26. Knox Avenue Routing

Figure 27. 98th Street Routing

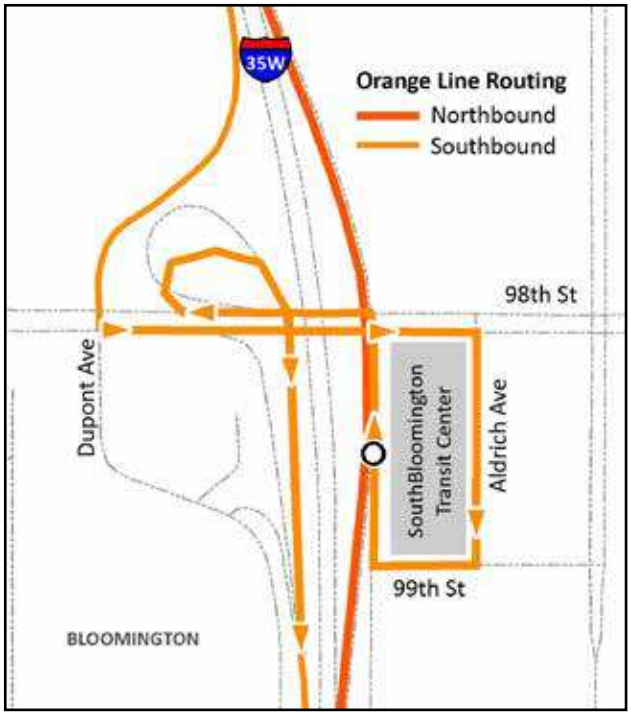
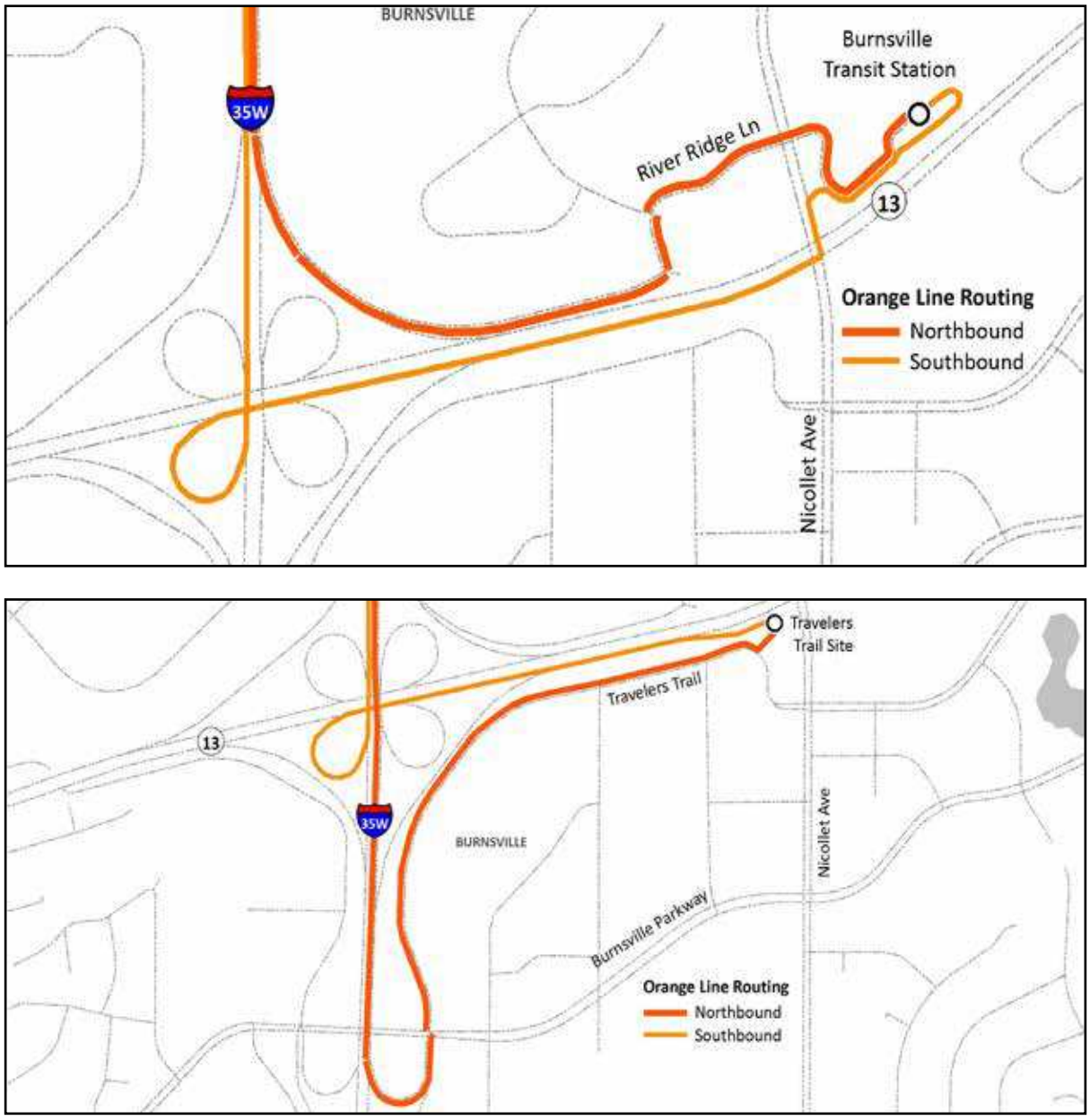


Figure 28. Burnsville Routing for Site Alternatives



same Orange Line platform, then re-enter northbound I-35W. A HOV ramp bypass entrance is available northbound.

1.3.5 Highway 13 and Nicollet Avenue

Routing will be determined in 2014 with the evaluation and selection of a preferred platform location in Burnsville. Two options are shown above.

1.4 Right of Way Needs

1.4.1 Knox Avenue Guideway and Park and Ride

Knox Avenue is a public street in Richfield north of I-494, and in Bloomington south of American Boulevard. The alignment of Knox Avenue between American and I-494 was never platted. It is a privately-owned service drive for the Southtown shopping center. Metro Transit currently uses this service drive to reach bus stops within the property. Approximately two acres (900 linear feet) are needed to establish a publicly-owned transitway along the Knox Avenue alignment between American Boulevard and I-494.

The planned park-and-ride facility near American Boulevard will be studied in more detail during 2014. Metro Transit will be developing a list of preferred locations for approximately 500 parking spaces to meet previous park-and-ride demand forecasts and mitigate parking lost through interchange construction. This analysis will also evaluate other support facility needs such as driver facilities or bus turnaround and layover needs, and work with property owners to understand interest and viability of a joint development venture.

The combination of the transitway and park-and-ride facility are expected to impact 1 to 3 parcels of private property, depending on design, placement, and property owner interest in joint development or joint use.

1.4.2 Lake Street Station

A portion of the right of way needed to build the 35 Lake Transit Access Project (highway and transit components) will be assumed by the Orange Line. Exact parcel acquisition will be identified in the project's environmental assessment, which includes the Lake Street Station in its scope.

1.5 Technology

Orange Line BRT will build on previous technology infrastructure along the corridor. Technology has affected all aspects of a passenger's trip, such as updated information about the availability of parking at park- and-rides, next-bus arrival information, estimated travel times, web-based trip planning tools, real-time transit information, and rechargeable fare cards.

Real-time Information

Next-bus arrival information is currently available on monitors and annunciators on 2nd Avenue and Marquette Avenues downtown, as well as at the 46th Street Station and South Bloomington Transit Center. Visual and audio real-time information will be added at all remaining Orange Line platforms.

Transit riders are also able to access the information using NexTrip online, on a mobile device, or by phone.

Transit Signal Priority

Transit Signal Priority (TSP) is planned in areas where the Orange Line will intersect general purpose traffic. In coordination with the Cities of Richfield and Bloomington, Hennepin County, and MnDOT, Metro Transit will pursue

TSP or other transit advantages in the following areas:

- Various downtown locations, depending on preferred routing from I-35W to MARQ2;
- Northbound and southbound at 66th Street from the exit ramps;
- Removal of the "no right on red" restriction southbound at 76th Street from the exit ramp;
- Northbound and southbound at American Boulevard;
- Westbound on 82nd Street from the exit ramp and westbound (coordinated signals);
- Eastbound on 76th Street between Knox Avenue and the I-35W entrance ramp (coordinated signals);
- Southbound left-turn at 98th Street from the exit ramp and eastbound signal on 98th Street;
- Southbound ramp-meter dump on entrance ramp from 98th Street to I-35W; and
- Northbound at I-35W and Burnsville Parkway, if Travelers Trail is chosen as preferred site.

1.6 Fare Collection

The Orange Line will have entirely off-board fare collection, with full ticket vending machines and fare validation at every station platform. Marquette Avenue southbound stops will also receive off-board ticket vending machines. No ticket vending machines are required at northbound stations on 2nd Avenue, since almost all riders get off at these points, with very few boardings.

1.7 Branding and Marketing

The Orange Line vehicles, signage, wayfinding, and station platforms will include the regional METRO branding. Exterior design and color scheme will be consistent with METRO Red, Blue, and Green Lines, which are easily distinguishable from local and express routes serving those stations.

Figure 29. METRO Blue Line Ticket Vending Machine

Figure 30. METRO Red Line Vehicle Branding

3 Service Planning

1.1 Garage and Terminals

The Orange Line is planned to operate out of the planned expansion at Heywood Garage at 560 Sixth Avenue North in Minneapolis, and will begin its trip at the downtown terminal on 1st Street South just west of 2nd Avenue South in Minneapolis. The southern terminus for all trips is the Burnsville Transit Station area.

1.2 Run Time and Frequency

An Orange Line trip is estimated at about 35 to 40 minutes one way, 70 to 80 minutes roundtrip. A route map and connecting service is shown in Figure 31. The following assumptions have been made for this preliminary level of corridor service planning:

- 10-minute frequency during peak hours to enable easy transfers;
- 15-minute frequency in off-peak hours and all day on weekends;
- Fare collection will be done entirely off-board with roving fare inspection to minimize dwell times at stations;
- Riders can board at any of three doors; and
- Sixty-foot, articulated buses will be used to maximize passenger capacity.

1.3 Service Structure

All Orange Line trips will run between 2nd Avenue and 2nd Street in Minneapolis and Burnsville Transit Station, stopping at every station. There will be no “short line” routes, deviations, or branches.

Much of the connecting service in the corridor already provides frequent, convenient feeder service to planned Orange Line stations, however, some service restructuring and improvements will be needed in Richfield and Bloomington to improve crosstown routing. These recommended changes replace branches of the current Route 535, as well as making operations more efficient. All new crosstown service proposed is within the same budget saved by replacing Route 535 operations. Detailed maps of these proposed route changes are shown in Appendix B.

1.4 Fleet

The Orange Line is expected to require nine sixty-foot articulated BRT buses at peak times. Eleven buses will be purchased to provide two spares for this unique subfleet.

1.5 Ridership

Based on preliminary ridership forecasting completed in 2011, and updated with 2012 service and facilities planning, the estimated 2030 daily ridership for Metro Orange Line is 10,100. The 2030 daily ridership for all other remaining I-35W express routes is approximately 10,500 riders, for a total of 20,600 daily transit riders that benefiting from BRT guideway and station improvements.

To reflect recent service planning, Metro Transit will prepare new ridership forecasts in 2014, with the intention to use this forecasting as part of a Small Starts evaluation.

Figure 31. METRO Orange Line Concept Route Map and Connecting Service

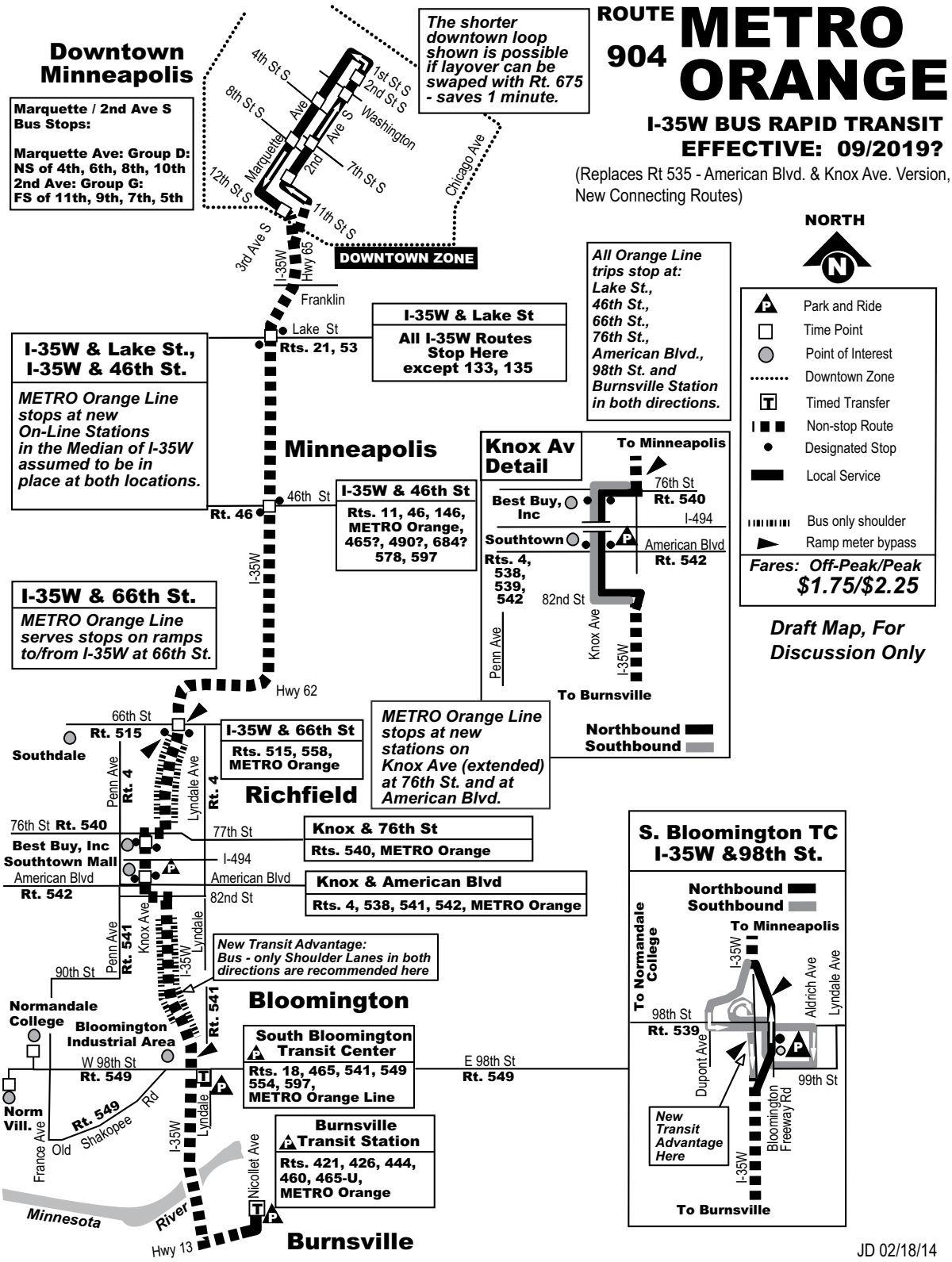


Figure 32. METRO Orange Line Estimated Northbound Run Times

Rt. 904-Orange Line-Proposed - Via Knox Ave.				DRAFT 1	**NODE - NODE MILES, RUNNING TIMES**							
NORTHBOUND					**AM PEAK**	Average	**MIDDAY**	Average	**PM PEAK**	Average	**NIGHT**	Average
NODE	TO	**NODE**	**VIA**	**MILES**	**RUN TIME**	Speed	**RUN TIME**	Speed	**RUN TIME**	Speed	**RUN TIME**	Speed
BTS	*	SBTC	Nicollet Ave, Hwy 13, I-35W No., 98th St. Exit	4.24	**7**	36.3	**7**	36.3	**7**	36.3	**7**	36.3
SBTC		KNAM	I-35W North, 82nd St. Exit, 82nd, Knox Ave	2.65	**5**	31.8	**4**	39.8	**5**	31.8	**4**	39.8
KNAM		KN76	Knox Ave.	0.42	**1**	25.2	**1**	25.2	**1**	25.2	**1**	25.2
KN76		66ST	76th St., I-35W North, 66th St. Exit	1.54	**3**	30.8	**3**	30.8	**3**	30.8	**3**	30.8
66ST		46ST	I-35W North, I-35W HOT Lane, Bus Lane	3.36	**5**	40.3	**5**	40.3	**5**	40.3	**4**	50.4
46ST		I3LA	I-35W North, I-35W HOT Lane, Bus Lane	2.00	**3**	40.0	**3**	40.0	**3**	40.0	**3**	40.0
LAKE ST		2A11	I-35W North, 11th St.	1.80	**5**	21.6	**4**	27.0	**5**	21.6	**4**	27.0
2A11		7S2A	2nd Ave S	0.31	**2**	9.3	**2**	9.3	**2**	9.3	**2**	9.3
7S2A	*	2S2S	2nd Ave S., 2nd St.	0.54	**4**	8.1	**3**	10.8	**4**	8.1	**3**	10.8
Layover Points *												
			TOTAL Route =	**16.86**	**35**	28.9	**32**	31.6	**35**	28.9	**31**	32.6

NODE NAMES:	
BTS	Burnsville Transit Station (Nicollet Ave north of Hwy. 13)
SBTC	South Bloomington Transit Center (I-35W North Exit at 98th St.)
KNAM	Knox Ave.at American Blvd.
KN76	Knox Ave. at 76th St.
66ST	I-35W at 66th St. (On Exit Ramp.)
46ST	I-35W at 46th St. (On Bus Lane off High Occupancy Toll or HOT Lane.)
LAKE ST	I-35W at Lake St. (On Bus Lane off High Occupancy Toll or HOT Lane.)
2A11	2nd Ave S. at 11th - 10thSt.
7S2A	2nd Ave S Bus Lane at 7th St. S.
2S2S	2nd Ave S at 2nd St S. (Downtown Terminal)

Running times assume Transit Signal Priority for buses and proof of payment (POP) off-vehicle fare collection.

Last Updated:	10/3/13	John Dillery	Scenario w/all trips operate Minneapolis - Burnsville

Figure 33. METRO Orange Line Estimated Southbound Run Times

Rt. 904-Orange Line -Proposed - Via Knox Ave.				DRAFT 1	NODE - NODE MILES, ESTIMATED RUNNING TIMES							
SOUTHBOUND					AM PEAK	Average	MIDDAY	Average	PM PEAK	Average	NIGHT	Average
NODE	TO	NODE	VIA	MILES	RUN TIME	Speed	RUN TIME	Speed	RUN TIME	Speed	RUN TIME	Speed
2ST 2AVS	*	MARQ 4ST	2nd Ave S, 1st St., Marquette Ave.	0.51	**3**	10.2	**3**	10.2	**4**	7.7	**3**	10.2
MARQ 4ST		MARQ 8ST	Marquette Ave.	0.32	**2**	9.6	**2**	9.6	**2**	9.6	**2**	9.6
MARQ 8ST		12ST 3AVS	Marquette Ave, 12th St.	0.48	**4**	7.2	**3**	9.6	**4**	7.2	**3**	9.6
123A		LAKE ST	12th St., I-35W South	1.65	**3**	33.0	**3**	33.0	**3**	33.0	**3**	33.0
LAKE ST		46ST	I-35W South, I-35W HOT Lane, Bus Lane	2.00	**3**	40.0	**3**	40.0	**3**	40.0	**3**	40.0
46ST		66ST	I-35W South, 66th St. Exit.	3.38	**5**	40.6	**5**	40.6	**5**	40.6	**4**	50.7
66ST		KN76	I-35W South, 76th St. Exit, 76th St., Knox Ave.	1.37	**3**	27.4	**3**	27.4	**3**	27.4	**3**	27.4
KN76		KNAM	Knox Ave.	0.42	**1**	25.2	**1**	25.2	**1**	25.2	**1**	25.2
KNAM		SBTC	Knox Ave., 82nd St., I-35W South, 98th St. Exit, 98th St., , Aldrich Ave., T Center	2.83	**6**	28.3	**6**	28.3	**7**	24.3	**6**	28.3
SBTC	*	BTS	99th St., Bloomington Freeway Rd., 98th St., I-35W So, Hwy. 13, Nicollet Ave.	4.71	**10**	28.3	**10**	28.3	**10**	28.3	**10**	28.3
Layover Points *			**TOTAL Route =**	**17.67**	**40**	26.5	**39**	27.2	**42**	25.2	**38**	27.9

NODE NAMES:	
2S2S	2nd Ave S at 2nd St S. (Downtown Terminal)
MA8S	Marquette Ave. & 8th St. S
123A	12th St. & 3rd Ave S.
LAKE ST	I-35W & Lake St. (On Bus Lane off the median of I-35W.)
46ST	I-35W & 46th St. (On Bus Lane off High Occupancy Toll or HOT Lane.)
66ST	I-35W & 66th St. (On Exit Ramp.)
KN76	Knox Ave. at 76th St.
KNAM	Knox Ave.at American Blvd.
SBTC	South Bloomington Transit Center (I-35W & 98th St.)
BTS	Burnsville Transit Station (Nicollet Ave north of Hwy. 13)

Running times assume Transit Signal Priority for buses and proof of payment (POP) off-vehicle fare collection.

Note: connecting bus service between SBTC and Normandale College is assumed to be as frequent as Route 535 (in 2013) for very convenient service. Normandale College has often generated 20% of total rides on Route 535.

Last Updated:	10/3/13	John Dillery

Scenario w/all trips operate Minneapolis - Burnsville

4 Budget and Funding

1.1 Capital and Operating Costs

Capital costs are shown in Figure 36, and are calculated for the anticipated mid-year of construction activities, 2017. Estimated operating costs are shown below in year-of-expenditure dollars.

Figure 34. METRO Orange Line Estimated Operating Costs

Total Orange Line Operating Costs	2019	2020	2021	2022	2023
Metropolitan Council	$2,267,856	$2,250,921	$2,257,566	$2,262,396	$2,265,291
Farebox Revenues	$2,053,398	$2,242,673	$2,441,835	$2,651,318	$2,871,577
Counties Transit Improvement Board	$2,267,856	$2,250,921	$2,257,566	$2,262,396	$2,265,291
Total Orange Line Operating Revenues	$6,589,110	$6,744,514	$6,956,967	$7,176,111	$7,402,158

1.2 Funding Distribution

The following sources are anticipated for capital project funding.

- 50% Federal Small Starts or other programs;
- 30% Local transit sales tax, distributed through the Counties Transit Improvement Board;
- 10% State or Metropolitan Council; and
- 10% Hennepin and Dakota Counties.

Operating funds are expected to include a mix of Metropolitan Council (via the Motor Vehicle Sales Tax), Counties Transit Improvement Board (via the local transit sales tax), and farebox revenues.

Figure 35. METRO Orange Line Proposed Funding Distribution

Total Orange Line Operating Costs	2019	2020	2021	2022	2023
Metropolitan Council	$2,267,856	$2,250,921	$2,257,566	$2,262,396	$2,265,291
Farebox Revenues	$2,053,398	$2,242,673	$2,441,835	$2,651,318	$2,871,577
Counties Transit Improvement Board	$2,267,856	$2,250,921	$2,257,566	$2,262,396	$2,265,291
Total Orange Line Operating Revenues	$6,589,110	$6,744,514	$6,956,967	$7,176,111	$7,402,158

Figure 36. METRO Orange Line Estimated Capital Costs

Standard Cost Categories	Description	Total Cost Estimate for Orange Line Project
10 GUIDEWAY & TRACK ELEMENTS (route miles)		
10.01 Guideway: At-grade exclusive right-of-way	Knox Ave guideway between American and 76th, bus-only exit ramp into Downtown Minneapolis, Lake St pavement	$6,170,000
10.04 Guideway: Aerial structure	Transit station bridge over Lake Street, managed lane flyover out from Downtown Minneapolis, Interstate bridges over Knox Avenue guideway	$23,520,000
10.08 Guideway: Retained cut or fill	Retaining walls	$10,770,000
TOTAL COST BY STANDARD COST CATEGORY 10		**$40,460,000**
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)		
20.01 At-grade station, stop, shelter, mall, terminal, platform	66th St, 98th St, American Blvd, and 76th St stations, and gate expansion at Burnsville Transit Station	$8,420,000
20.02 Aerial station, stop, shelter, mall, terminal, platform	Lake Street grade-separated station	$13,700,000
20.06 Automobile parking multi-story structure	American Blvd park and ride facility	$7,000,000
20.07 Elevators, escalators		inc.
TOTAL COST BY STANDARD COST CATEGORY 20		**$29,120,000**
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS		
30.04 Storage or Maintenance of Way Building	Heywood Garage expansion for BRT fleet	$3,760,000
TOTAL COST BY STANDARD COST CATEGORY 30		**$3,760,000**
40 SITEWORK & SPECIAL CONDITIONS		
40.01 Demolition, Clearing, Earthwork	66th and 98th Street stations	$400,000
40.02 Site Utilities, Utility Relocation	Major utility relocation at Lake Street and under the Knox Avenue guideway, minor utilities elsewhere	$7,260,000
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	Drainge/stormwater management for Lake St and Knox Ave Stations	$11,620,000
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		
40.05 Site structures including retaining walls, sound walls	66th and 98th Street stations	$60,000
40.06 Pedestrian / bike access and accommodation, landscaping	1% of construction budget assumed for enhancements	$755,300
40.07 Automobile, bus, van accessways including roads, parking lots	66th and 98th Street stations	$280,000
40.08 Temporary Facilities and other indirect costs during construction	66th and 98th Street stations, traffic management for Knox Avenue	$2,860,000
TOTAL COST BY STANDARD COST CATEGORY 40		**$23,235,300**
50 SYSTEMS		
50.02 Traffic signals and crossing protection		$70,000
50.05 Communications		$120,000
50.06 Fare collection system and equipment	TVMs for MARQ2 (6), 46th (2), 66th (2), 98th (2), American (2), 76th (2)	$1,320,000
50.07 Central Control		$680,000
TOTAL COST BY STANDARD COST CATEGORY 50		**$2,190,000**
Construction Subtotal (10 - 50)		**$98,765,300**
60 ROW, LAND, EXISTING IMPROVEMENTS		
60.01 Purchase or lease of real estate	ROW acquisition for American Boulevard Park & Ride, Knox Avenue guideway, and	$16,420,000
TOTAL COST BY STANDARD COST CATEGORY 60		**$16,420,000**
70 VEHICLES (number)		
70.04 Bus	11 Articulated BRT buses (9 peak buses & 2 spares)	$9,840,000
TOTAL COST BY STANDARD COST CATEGORY 70		**$9,840,000**
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)		
80.01 Preliminary Engineering		$2,766,293
80.02 Final Design		$3,219,000
80.03 Project Management for Design and Construction		$1,732,000
80.04 Construction Administration & Management		$3,230,000
80.05 Professional Liability and other Non-Construction Insurance		$1,620,000
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		$755,000
80.07 Surveys, Testing, Investigation, Inspection		$1,870,000
80.08 Start up		inc.
TOTAL COST BY STANDARD COST CATEGORY 80		**$15,192,293**
Subtotal (60 - 80)		**$41,452,293**
Subtotal (10 - 80)		**$140,217,593**
90 UNALLOCATED CONTINGENCY		**$10,480,000**
Subtotal (10 - 90)		**$150,697,593**
100 FINANCE CHARGES		
Total Project Cost (10 - 100)		**$150,697,593**

5 Schedule

The project is currently in the pre-project development phase, although some individual station work has been advanced more quickly to meet specific deadlines for MnDOT bridge and roadway reconstruction. For example, the Lake Street Station is currently under 60% design and is moving into final design in 2014.

The following timeline is anticipated for METRO Orange Line implementation:

- Pre-Project Development: early 2014
- Apply to the Federal Small Starts Program: mid-2014
- Project Development: 2014-2015
- Engineering: 2015-2016
- Construction: 2016-2019
- Open for Service: late 2019

6 Environmental Process

The I-35W corridor has a long history of integrated transit investment, and the Orange Line planning reflects additional opportunities to implement transit improvements in coordination with upcoming roadway and bridge projects.

Environmental impacts and benefits related to Lake Street Station infrastructure are being considered under the larger scope of the 35 Lake Transit Access Project, which includes roadway, transit, and bridge improvements along I-35W from 46th Street to I-94. The Federal Highway Administration (FHWA), in cooperation with MnDOT, is preparing an Environmental Assessment (EA) for the 35 Lake project, and FHWA has requested that the Federal Transit Administration (FTA) become a Cooperating Agency. The service impacts and benefits of the Lake Street Station will be considered under the scope of the Orange Line environmental process.

Similarly, design for the I-494/35W Interchange has been closely coordinated with BRT planning. Originally, a median station was envisioned at American Boulevard, and it was expected that this station would follow a parallel process to the EA approach at Lake Street. However, as station planning progressed in 2013, the preferred configuration evolved from one median freeway station to two at-grade neighborhood stations, with the capital-intensive investments shifting from the center of I-35W to Knox Avenue and the proposed underpass at I-494. Due to the preferred design and the current lack of funding to begin environmental work on the interchange, the infrastructure of these two stations and the Knox Avenue guideway should be included under the scope of the Orange Line document rather than coordinated through an interchange document. Design and construction phasing will continue to be closely coordinated with MnDOT and FHWA.

Upon adoption, this Project Plan Update will provide the basis for Metro Transit to transmit a formal project description to FTA. FTA will review the project scope, previous planning, public engagement and decision-making processes to date, and potential environmental impacts, and propose a National Environmental Protection Act (NEPA) Class of Action for environmental documentation.

7 Agency Partners

Metro Transit is the transit authority and a service of the Metropolitan Council, the Twin Cities' metropolitan planning organization. Metro Transit is the project lead for planning, project development, engineering, and design. Metro Transit will also be the operator of the line. Metro Transit and Metropolitan Council own and operate the existing downtown stations, 46th Street Station, South Bloomington Transit Center and Heywood Garage.

Minnesota Department of Transportation (MnDOT) is closely involved in the engineering and construction of highway BRT in the corridor, as well as a project lead for both the 35 Lake Transit Access Project and I-494/35W Interchange Vision Layout. MnDOT owns and operates I-35W and State Highway 13, as well as and associated ramps, signals, and right of way.

Minnesota Valley Transit Authority (MVTA) is the public transportation agency for Apple Valley, Burnsville, Eagan, Rosemount, and Savage. MVTA also owns and operates Burnsville Transit Station, as well as operating service on many I-35W express routes.

Hennepin County is the current lead for 60% design of the Lake Street Transit Station, and 85% of the Orange Line alignment runs through Hennepin County. Lake Street, 98th Street, and 66th Street are all Hennepin County Roads. Hennepin County Regional Rail Authority was established as a separate political entity to plan, design and implement light rail transit in Hennepin County, but has been heavily involved in the planning of bus rapid transit as well.

Dakota County contains 15% of the Orange Line alignment. The Dakota County Regional Railroad Authority was formed to plan, acquire, construct and operate railroads, including light rail transit. In addition to LRT, the Regional Railroad Authority oversees the continuing development and implementation of METRO Red Line bus rapid transit in the Cedar Avenue Corridor.

The Cities of Minneapolis, Richfield, Bloomington, Burnsville are critical partners in station design, service planning, and land use planning. They also own and maintain the following local street segments that are part of the Orange Line alignment: Marquette and 2nd Avenue (Minneapolis), 76th Street and Knox Avenue (Richfield), Knox Avenue, 82nd Street, Aldrich Avenue, 99th Street, and Bloomington Ferry Road (Bloomington), and Nicollet Avenue (Burnsville).

The Counties Transit Improvement Board (CTIB) is comprised of five counties: Anoka, Dakota, Hennepin, Ramsey and Washington. The board has utilized a quarter-cent sales tax and a motor vehicle sales tax, permitted by the Legislature, to invest in and advance transit projects by awarding annual capital and operating grants. The Board works in collaboration with the Metropolitan Council and Carver and Scott counties.

All partners participate in the technical advisory and policy advisory committees for the Orange Line project.

METRO Orange Line BRT Project Plan Appendices

Appendix A: Stations

Appendix B: Service Planning

1.1 Evaluation Criteria for 66th Street Platform Options

Transit Station Criteria

- Construction Cost – Comparative cost of roadway components, any TSP, and transit stations.
- Travel time — Minimize travel time for buses traveling station to station, and the length of the route.
- Neighborhood Compatibility – The transit station footprint fit within existing noise walls.
- Proximity to Local Streets – Minimize distance to cross streets and connecting bus service.
- Visibility –Visible to transit and automobile users from 66th Street.

Bus Operations Criteria

- Bus Travel Time – Must be reliable, stay on schedule, and meet rider expectations.
- Maintenance – Design minimizes specialized maintenance at the station, and simplifies frequent, year-round maintenance.

Transit User Criteria

- Transfer time – Amount of time to complete a transfer from a local bus to station platform, and vice versa.
- Personal Safety – Potential conflict points/crossings for pedestrians and vehicles, visibility into and out of the station, minimizing isolation, and preventing obscured sight lines.
- Legibility – Stations are legible to those that are new to transit.
- Trip time – Minimize travel time impacts on existing transit riders.

1.2 Evaluation Criteria for American Boulevard Platform Options

Transit Station Criteria

- Freeway Traffic Operations and Speed – Impact on freeway operations, and the ability of buses to reach mainline speeds.
- Construction Cost – Comparative cost of roadway components and transit station.
- Competitive for Funding – Design positions the projects to compete for available funding from a variety of sources, including federal transit dollars.
- Travel time — Minimize travel time for buses traveling station to station, and the length of the route.
- Roadway Compatibility — The transit station location and footprint are compatible with future interchange concepts and phasing.
- Proximity to Local Streets – Minimize distance to cross streets and connecting bus service.
- Land Use — Location is consistent with the City's land use plan/development plans, and is proximate to land with redevelopment potential.
- Expandability – Ability to expand/relocate the transit facility to accommodate future transit growth.
- Right-of-Way Required – Estimated impact/magnitude of additional right-of-way required for facility, and

costs associated.

- Access – Improves transit access for transit-dependent people.
- Affordable Housing – Improves access to affordable housing.
- Visibility –Visible to transit and automobile users, from local streets and the highway.
- Development potential — Minimize impact on development, and maximize development potential.

Bus Operations Criteria

- Bus Travel Time – Must be reliable, stay on schedule, and meet rider expectations.
- Bus Transfer Complexity – The number of potential conflict points and delays between different service providers using the transit station.
- Special Operations – The existence of special maneuvers or traffic operations.
- Coordination with Other Transit Providers– A station platform that can be accessed and used by other transit services (e.g. MVTA).
- Maintenance – Design minimizes specialized maintenance at the station, and simplifies frequent, year-round maintenance.
- Route Structure — Optimize bus route structures to avoid loops and reduce transfers.

Transit Rider User Criteria

- Proximity to Destinations – Location of the transit station must be in proximity to riders' actual origins and destinations within this area (housing, shopping, and employment).
- Transfer time – Amount of time to complete a transfer from a local bus from a bus stop to station platform.
- Personal Safety – Potential conflict points/crossings for pedestrians and vehicles, visibility into and out of the station, minimizing isolation, and preventing obscured sight lines.
- Legibility – Stations are legible to those that are new to transit.
- Amenities – Ability to provide station enhancements, like pedestrian amenities, bicycle parking, landscaping, and public art.
- Trip time – Minimize impacts on existing transit riders.

1.3 Evaluation Criteria for 98th Street Platform Options

Transit Station Criteria

- Freeway Traffic Operations and Speed – Impact on freeway operations and the ability of buses merge into and out of guideway.
- Construction Cost – Comparative cost of roadway components and transit station.
- Travel time — Minimize travel time for buses traveling station to station, and the length of the route.
- Roadway Compatibility– The transit station location and footprint are compatible with existing roadway,

turning movements, and traffic flow.

- Proximity to Local Streets – Minimize distance to cross streets and connecting bus service.
- Expandability – Ability to expand or relocate the transit facility to accommodate future transit growth.
- Property Impacts –Additional right-of-way required for facility, and costs associated.
- Visibility –Visible to transit and automobile users, from local streets and the highway.

Bus Operations Criteria

- Bus Travel Time – Must be reliable, stay on schedule, and meet rider expectations.
- Bus Transfer Complexity – The number of potential conflict points and delays between different service providers using the transit station
- Special Operations – The existence of special maneuvers or traffic operations.
- Coordination with Other Transit Providers– A station platform that can be accessed and used by other transit services if desired (e.g. MVTA).
- Maintenance – Design minimizes specialized maintenance at the station, and simplifies frequent, year-round maintenance.
- Route Structure — Optimize bus route structures to avoid loops and reduce transfers.

Transit User Criteria

- Transfer time – Amount of time to complete a transfer from a local bus to station platform, and vice versa.
- Personal Safety – Potential conflict points/crossings for pedestrians and vehicles, visibility into and out of the station, minimizing isolation, and preventing obscured sight lines.
- Legibility – Stations are legible to those that are new to transit.
- Trip time – Minimize travel time impacts on existing transit riders.

1.4 Evaluation of Three Options for American Boulevard Area

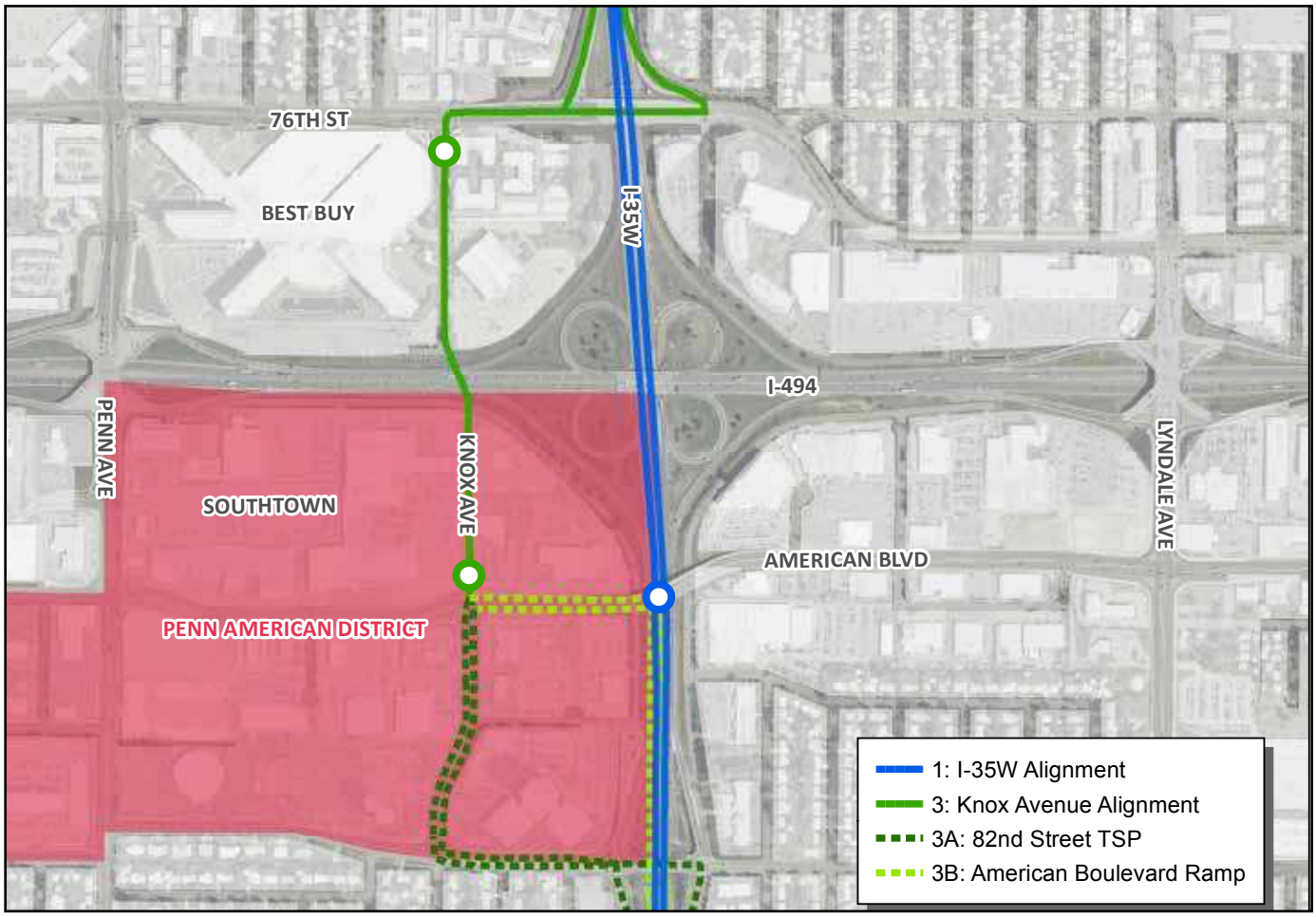
Service Impacts Analysis

DATE: March 19, 2014
TO: I-494/35W Vision Layout TAC
FROM: Kate Christopherson & Christina Morrison, BRT/Small Starts Project Office
SUBJECT: Service Impacts Analysis of American Boulevard Station Alternatives

Background

Three locations were evaluated for METRO Orange Line's American Boulevard Station. The first alternative is an online station on I-35W below the American Boulevard bridge. The second alternative is an online station at 81st Street. The third alternative would consist of two offline at-grade stations at Knox Avenue and American Boulevard, and at Knox Avenue and 76th Street. Because the second alternative is not being recommended for further study, only the first and third alternatives are detailed in this Service Impacts Analysis.

Figure 1. American Boulevard Station Location and Alignment Alternatives



Service

The Orange Line is expected to replace the limited-stop Route 535, operating at 15-minute frequency all-day, and providing roughly 130 trips per day in this area. Some trips on I-35W express routes (e.g. Route 467) may use the station depending on station location and further transit market analysis. Metro Transit's local and express routes will likely be restructured to support Orange Line service opening in this area.

MVTA does not currently serve this vicinity and expects to continue to run about 150 trips per day through this area (460, 464, and 465), with around one-third of those trips serving an American Boulevard Orange Line Station. Number of trips serving this station could change based on exact station location, alignment, travel time, and funding.

Speed

The biggest service advantage of building an online station at I-35W and American Boulevard is speed. The bus would not have pass through traffic signals in this alternative, however, run times should be further refined with field checks to determine the feasibility of merge patterns from the shoulder at 98th Street, to an online station at American, and back to the shoulder at 66th Street.

Moving the station to a Knox Avenue alignment and adding a 76th Street station adds run time to the Orange Line. Transit Signal Priority (TSP) or a dedicated transit ramp to American Boulevard can help minimize the time penalty.

In Alternative 3A, the northbound bus would exit I-35W on 82nd Street, turn left on 82nd, and turn right on Knox to stop at the Knox/American intersection. Knox Avenue would be extended under I-494 in order to connect to Richfield. BRT would stop at Knox/76th before turning right onto 76th Street and exiting back on to I-35W. Without transit-signal priority (TSP), Metro Transit estimates this route would take 11 minutes. Because only three of the seven signals would benefit from TSP, there is minimal reduction of delay with TSP.

In Alternative 3B, the northbound bus uses a center-running T-Ramp, exiting directly onto American Boulevard using a transit-only signal. The Orange Line would then turn left on American Boulevard and right onto Knox, stopping on the north side of the intersection. With or without TSP, this variation is estimated to take about 8 minutes. As with Alternative 1, feasibility of merge patterns should be checked in the field.

Table 1. Estimated Run Times (in Minutes), Northbound during peak hour[1]

	Without TSP	With TSP	No. of Signals	Travel Distance	Average Speed	% faster than Route 535
Route 535 (existing)	18:00	-	14	5.7 mi	19 mph	-
Alternative 1	5:30	-	0	4.1 mi	44 mph	72% faster
Alternative 3A	11:15	11:00	7	4.7 mi	25 mph	38% faster
Alternative 3B	8:00	8:00	4	4.6 mi	33 mph	56% faster

Pedestrian Access

Although there are 4,623 residents and 8,118 employees within one-half mile of Alternative 1 (see Table 2), there is little pedestrian infrastructure. Pedestrians can access Southtown Shopping Center, Genesee Apartments, Southtown Office Center, five auto dealerships, Extended Stay America Hotel, REI, and residential homes south of 82nd Street (shown in blue on Figure 2). Best Buy Headquarters and other destinations north of I-494 would not be accessible.

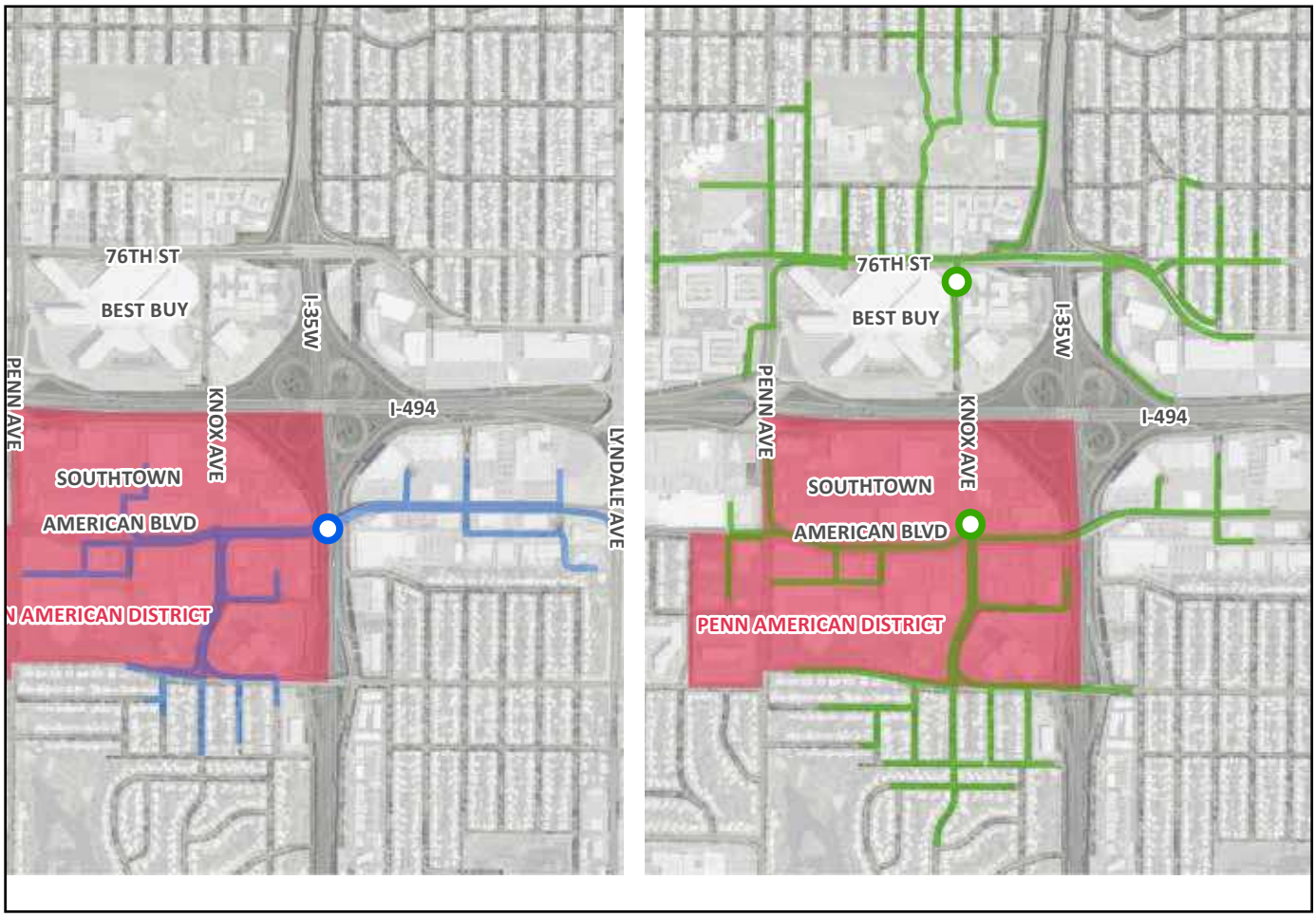
Alternative 3 greatly improves pedestrian access. Adding a second station and moving the stations off the I-35W alignment brings about 8,172 additional residents and 4,990 additional employees within a half mile walk of the Orange Line. In addition to the businesses, institutions, and residences in Alternative 1, Best Buy Headquarters, Minnesota School of Business, US Bank, Penn Avenue businesses, and residential areas in Richfield are accessible in Alternative 3 (shown in green below).

Table 2. Existing Residents and Jobs within Half-Mile of Stations in Alternatives 1 and 3[2]

	Alternative 1	Alternative 3
Residents	4,623	12,795
Jobs	8,118	13,108

1 Assumptions: Existing travel time based on schedule; 20-second dwell time for bus at Orange Line station(s); 10% time savings with TSP, per signal; times rounded to nearest 15 seconds; I-35W east and west ramps (at 76th and 82nd) are coordinated; American Boulevard signal is coordinated east-west. Regional Transitway Guidelines state that BRT should be at least 20% faster than existing service.
2 Source: 2011 ACS Five-Year Survey and Longitudinal Employer-Household Dynamics (LEHD)

Figure 2. Half-mile walkshed from stations, using existing sidewalks



Another measure of access is to calculate the total planned trip time for bus riders, combining Orange Line travel time and walk time to their destination. This factor is particularly important in a highway BRT corridor, where destinations are not located immediately adjacent to the station. Under Alternative 1, the Orange Line trip to American Boulevard is faster, but walk distances to major destinations are longer. Table 3 estimates some of these combined trip lengths. Alternatives 3A and 3B have different travel times depending which Orange Line station is closer to the destination (American Boulevard or 76th Street). For example, a trip from 98th Street Station to Best Buy would take about 23½ minutes using Alternative 1, or 10 minutes with Alternative 3A.

Table 3. Net Access to Sample Destinations, in minutes of travel

	Transit time	Walk time					
	98th St to OL Station	Best Buy	Kohl's	MN School of Business	Genesee Apts	GN Resound	HOM
Alternative 1	3:30	19:00	10:00	25:00	10:00	17:00	7:00
Alternative 3A	8:00 – 9:00	1:00	6:00	5:00	6:00	15:00	10:00
Alternative 3B	3:30 – 5:00	1:00	6:00	5:00	6:00	15:00	10:00

Impacts to Existing Riders

Orange Line service should improve transit access for existing riders in the I-494/35W area, while attracting new riders. Table 4 shows Route 535 boardings at bus stops within a half mile of the proposed station locations.

Table 4. Bus stop boardings on Route 535 within Half-Mile of Stations in Alternatives 1 and 3[3]

	Alternative 1	**Alternative 3**
Northbound	26	419
Southbound	11	40
TOTAL	**37**	**459**

In the area near 76th Street, Knox Avenue, and Penn Avenue in Richfield, the proposed relocation of the station and park-and-ride to American Boulevard and I-35W could impact a large number of existing northbound boardings. Of these, it can be assumed that about 150 boardings are riders that have driven to the park-and-ride,[4] and the remaining people walk or bike to the stop, or transfer from another bus.

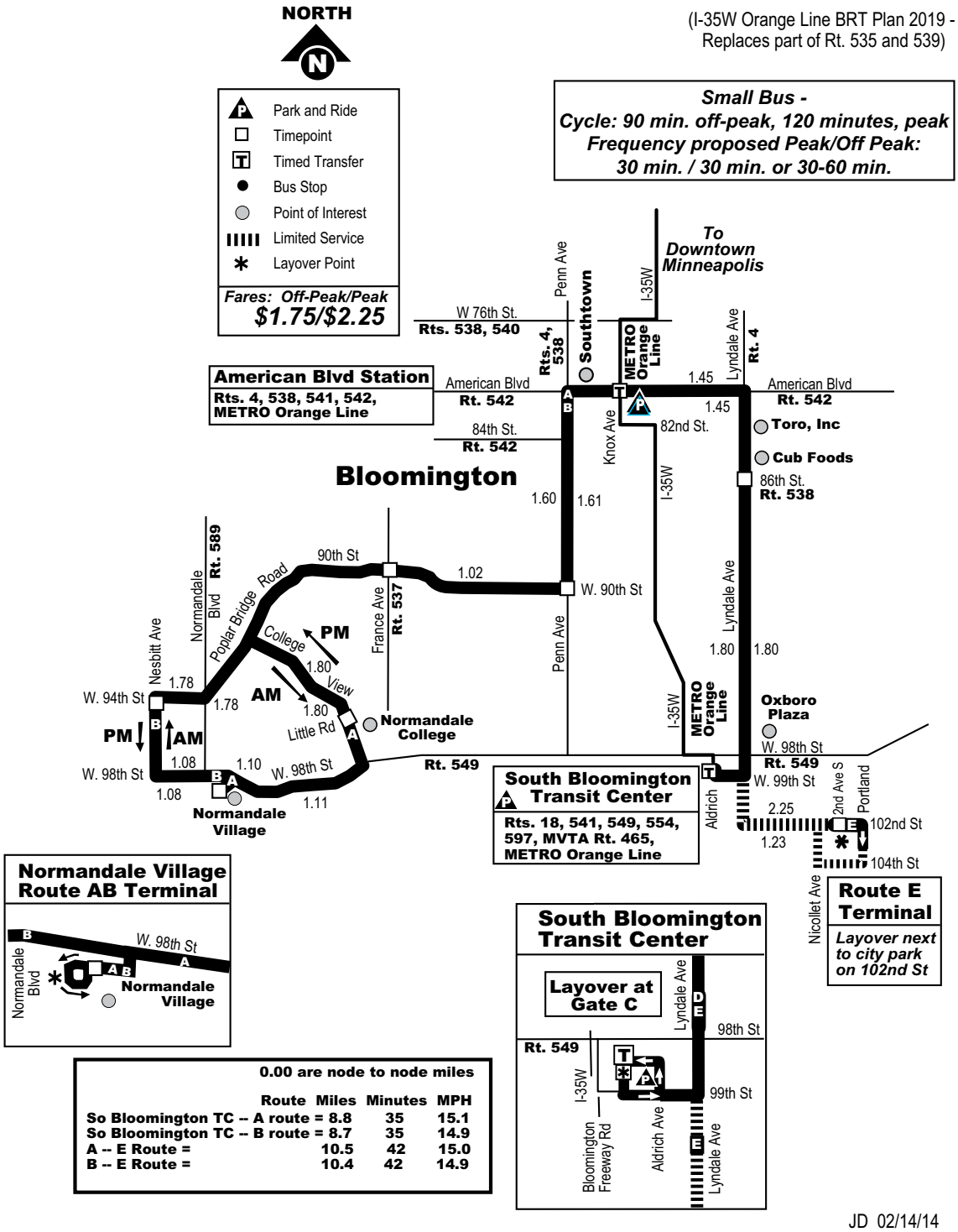
3 Source: September 2012 Metro Transit data
4 Knox Avenue parking utilization information from Metro Transit's 2012 Annual Regional Park-and-Ride System Report.

Concept for Discussion Only
Operated by ?

Route 541

EFFECTIVE: 2019?

(I-35W Orange Line BRT Plan 2019 - Replaces part of Rt. 535 and 539)



0.00 are node to node miles

Route	Miles	Minutes	MPH
So Bloomington TC -- A route =	8.8	35	15.1
So Bloomington TC -- B route =	8.7	35	14.9
A -- E Route =	10.5	42	15.0
B -- E Route =	10.4	42	14.9

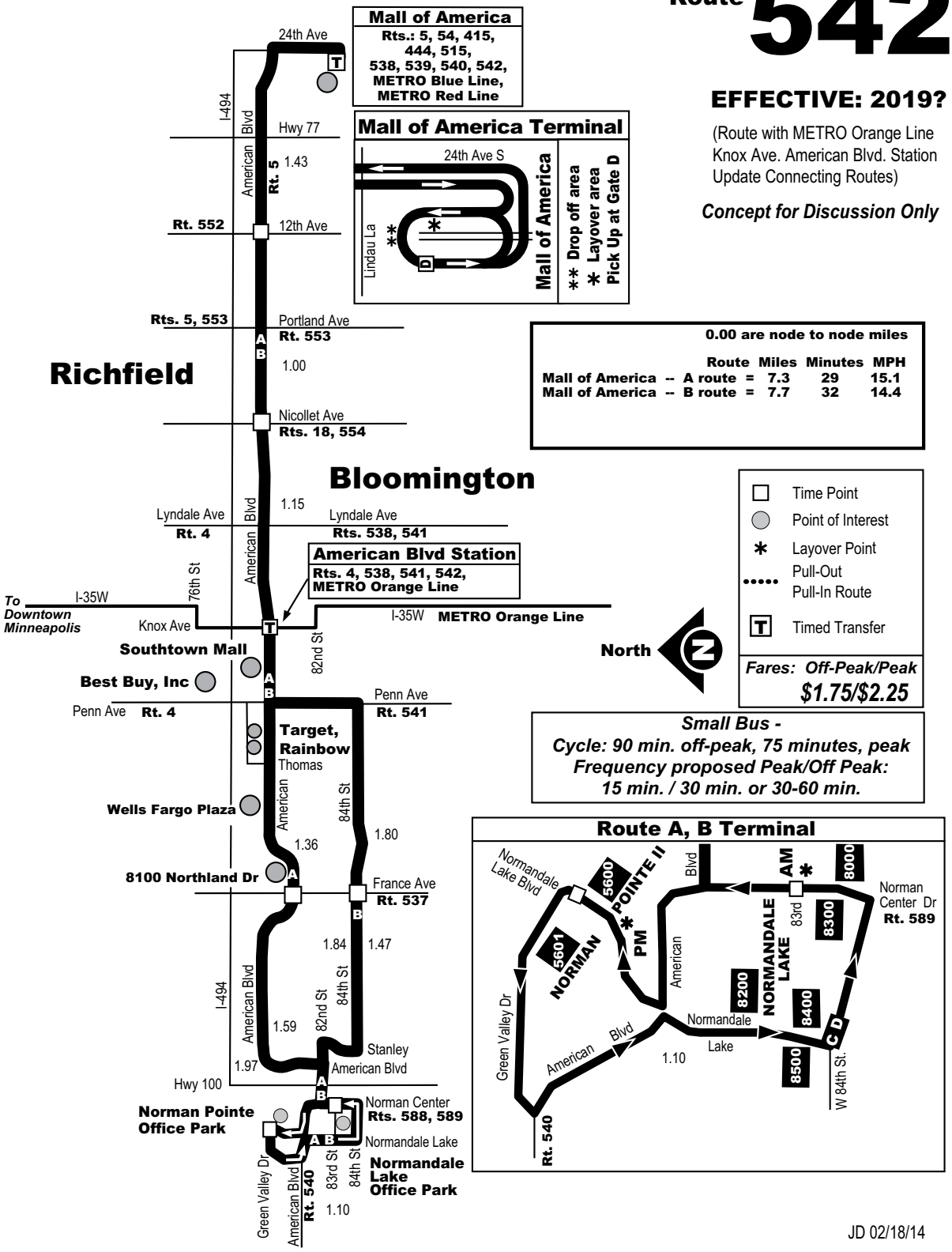
JD 02/14/14

Route 542

EFFECTIVE: 2019?

(Route with METRO Orange Line Knox Ave. American Blvd. Station Update Connecting Routes)

Concept for Discussion Only



0.00 are node to node miles

	Route	Miles	Minutes	MPH
Mall of America -- A route =		7.3	29	15.1
Mall of America -- B route =		7.7	32	14.4

- Time Point
- Point of Interest
- * Layover Point
- Pull-Out / Pull-In Route
- T Timed Transfer

Fares: Off-Peak/Peak
$1.75/$2.25

Small Bus -
Cycle: 90 min. off-peak, 75 minutes, peak
Frequency proposed Peak/Off Peak:
15 min. / 30 min. or 30-60 min.

JD 02/18/14

METRO

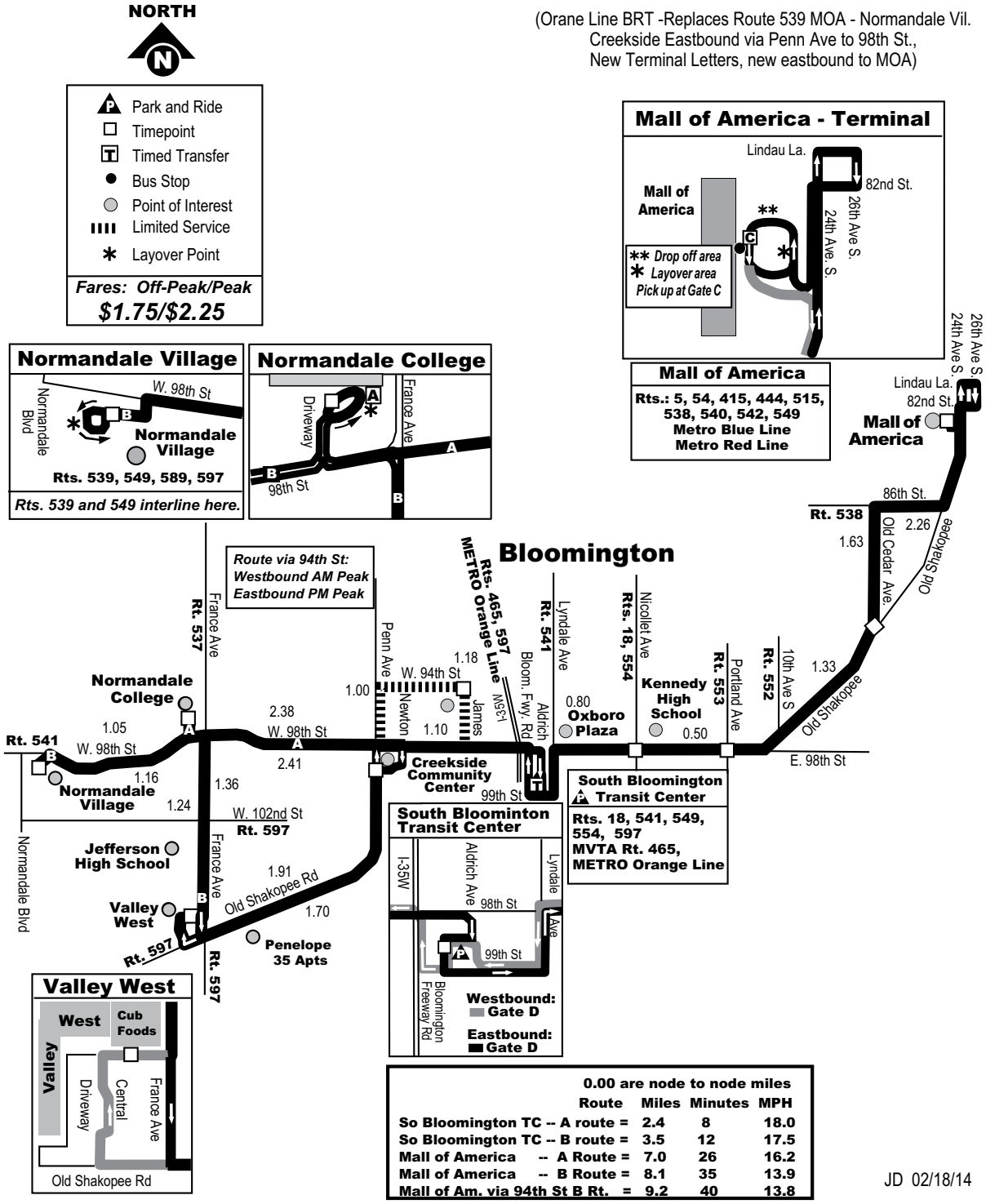
Concept for Discussion Only

Route 549

Operated by ?

EFFECTIVE: 2019?

(Orane Line BRT -Replaces Route 539 MOA - Normandale Vil.
Creekside Eastbound via Penn Ave to 98th St.,
New Terminal Letters, new eastbound to MOA)



0.00 are node to node miles			
Route	Miles	Minutes	MPH
So Bloomington TC -- A route =	2.4	8	18.0
So Bloomington TC -- B route =	3.5	12	17.5
Mall of America -- A Route =	7.0	26	16.2
Mall of America -- B Route =	8.1	35	13.9
Mall of Am. via 94th St B Rt. =	9.2	40	13.8