Appendix F
Supporting Technical Reports

The following is a list of supporting technical reports that provide additional documentation and analysis in support of the Final EIS chapters:

1. Metropolitan Council, 2015, *Transportation Technical Report*
2. Metropolitan Council, 2015, *BLRT Traffic Operations Technical Memorandum*
3. Metropolitan Council, 2016, *Visual Quality Technical Report*
4. Metropolitan Council, 2015, *Economic Impacts of Bottineau LRT*
5. Metropolitan Council, 2016, *Preliminary Floodplain Impacts and Mitigation Strategies*
6. Metropolitan Council, 2016, *Wetlands Technical Report*
7. Metropolitan Council, 2015, *Modified Phase I Environmental Site Assessment*
8. Metropolitan Council, 2016, *Noise and Vibration Technical Report*
9. Metropolitan Council, 2016, *Biological Environment Technical Report*
10. Metropolitan Council, 2016, *Preliminary Stormwater Management Plan*
11. Metropolitan Council, 2016, *Financial Analysis in Support of the FEIS*

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Appendix F
Supporting Technical Reports

F.1 Transportation Technical Report

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Transportation Technical Report

Effects on Transit, Freight Rail Conditions, Pedestrians and Bicyclists, Parking, and Aviation

June 2016

Blue Line Extension Project Technical Report

METROPOLITAN COUNCIL

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1 Purpose of Technical Memorandum

The METRO Blue Line Light Rail Transit (BLRT) Extension project is proposed to be a light rail transit (LRT) line of about 13 miles with 11 new stations operating from downtown Minneapolis through the cities of Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. The proposed BLRT Extension project would be an extension of the METRO Blue Line (Hiawatha Corridor) and would also connect to the METRO Green Line in downtown Minneapolis (**Figure 1-1**).

This technical memorandum documents the effects of the No-Build Alternative and the proposed BLRT Extension project on transit conditions (**Section 2**), freight rail conditions (**Section 3**), pedestrians and bicyclists (**Section 4**), parking (**Section 5**), and aviation systems (**Section 6**). Vehicular traffic operations are documented in the *BLRT Traffic Operations Technical Memorandum* that is a separate report.

This technical memorandum focuses on the Draft Environmental Impact Statement (Draft EIS) LRT Alternative B-C-D1, as modified through the proposed BLRT Extension project development process. This alternative is identified as the proposed BLRT Extension project in the Final Environmental Impact Statement (Final EIS). For additional information about previous transportation analyses, see the *Bottineau Transitway Draft Environmental Impact Statement* (March 2014) and associated technical memoranda.

2 Transit Technical Analysis

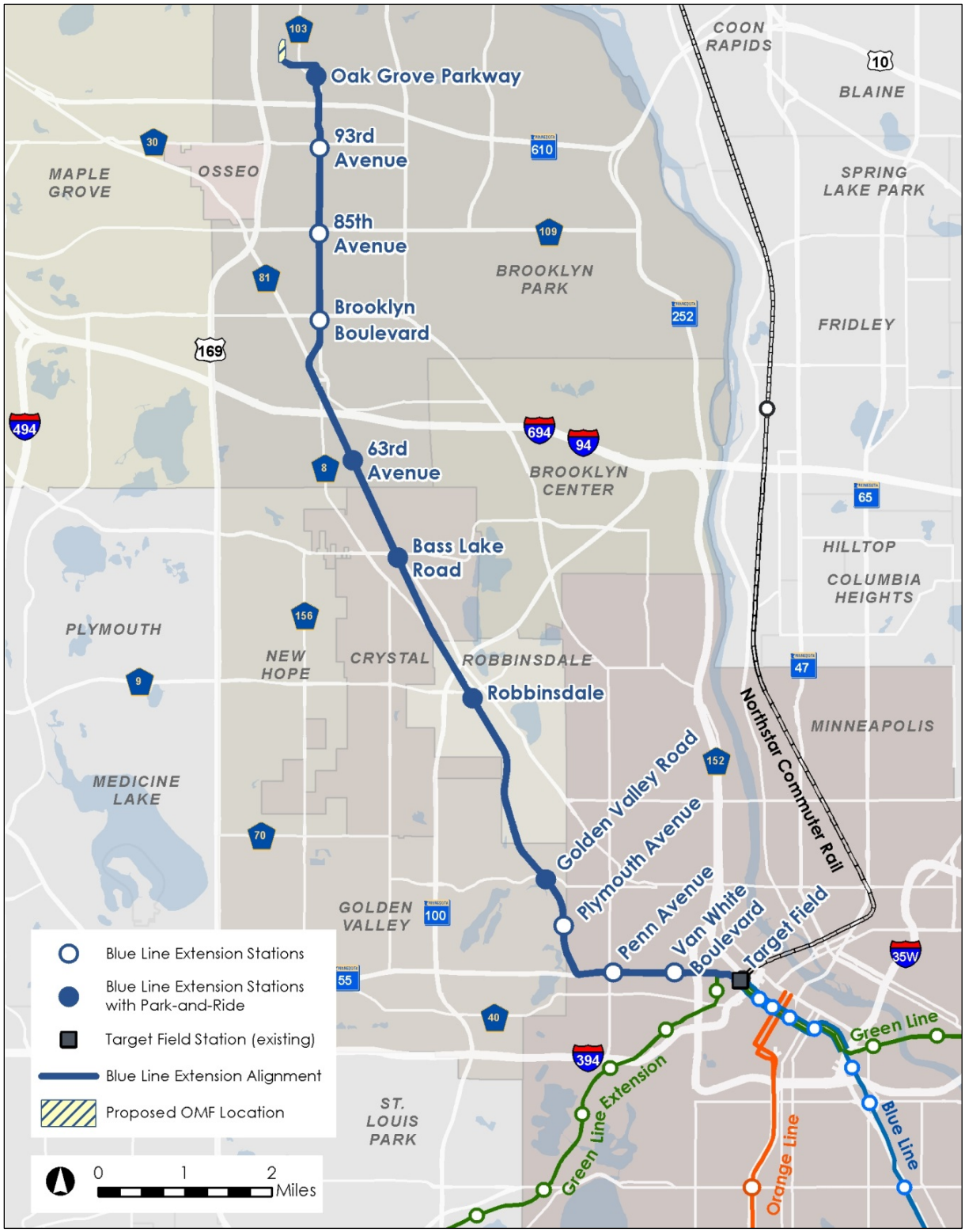
This section documents the travel demand modeling and preparation of 2040 ridership forecasts for both the No-Build Alternative and the proposed BLRT Extension project, as defined in the Final EIS for the proposed BLRT Extension project.

2.1 Methodology

The Metropolitan Council (Council) used its regional travel demand forecasting model to develop the transit ridership forecasts for the proposed BLRT Extension project. This model was developed using known travel behavior characteristics and assumptions about expected development, redevelopment, and transportation system changes. Detailed documentation regarding the model is available from the Council.

The Council compared the travel demand model to several key known travel measures to determine whether the model appropriately estimated travel changes caused by the transit alternatives. Validation data sources included the Council's 2010 On Board Transit Rider Survey and 2010 Household Interview Survey as well as transit ridership counts provided by Metro Transit.

Figure 1-1. Proposed BLRT Extension Project



2.2 Study Area

The study area for transit conditions is defined as the Metro Transit service area as defined in the travel demand model.

The travel demand model described above is designed to analyze the effects of a transit improvement on travel patterns in the entire Twin Cities Metropolitan Area and provides information at different levels of geographic detail. The travel demand model incorporates the entire region, which includes the seven-county Council planning area plus parts of 13 surrounding counties in Minnesota and western Wisconsin.

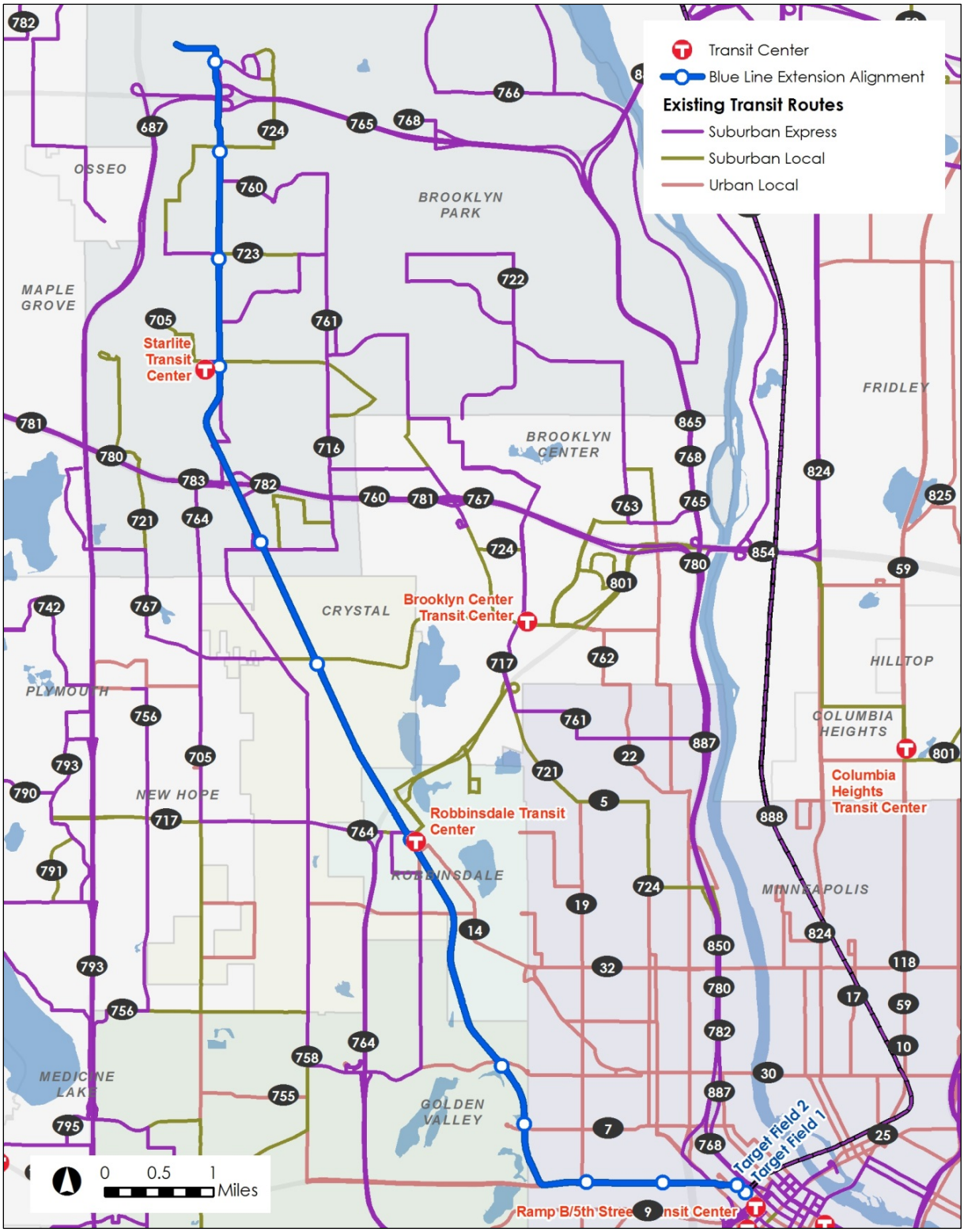
The Council expects the Twin Cities region to continue to develop between now and the proposed BLRT Extension project's horizon year of 2040. The travel demand model used development forecasts from the *Thrive MSP 2040* regional planning process of the Council. This process forecasts future population, households, and employment for the region, then allocates growth to local communities. Each local community allocates expected development patterns to smaller geographic units of the model known as Transportation Analysis Zones (TAZs).

The regional development and policy planning process is an ongoing effort. The development assumptions for the proposed BLRT Extension project reflect the *Thrive MSP 2040* forecasts as adopted by the Council on October 14, 2014.

2.3 Affected Environment

The transit service area for the proposed BLRT Extension project is generally defined by the Mississippi River to the north and east, Olson Memorial Highway (Trunk Highway [TH] 55) to the south, and US Highway 169 (US 169) to the west. The area is served by a network of urban and suburban local routes that make timed connections at three transit centers in the study area (Robbinsdale Transit Center, Brooklyn Center Transit Center, and Starlite Transit Center) as well as downtown Minneapolis (Target Field Station). The area is also served by express routes, most of which are oriented toward downtown Minneapolis and serve the peak-period ("rush hour") commuter travel market. Existing transit service in the area is depicted in **Figure 2-1**.

Figure 2-1. Existing Transit Service



2.3.1 Transportation System Assumptions (2040)

Besides future development, transit ridership forecasts reflect planned and programmed transportation system investments. Background assumptions are made as part of the No-Build Alternative, with specific changes made to reflect the proposed BLRT Extension project.

2.3.2 Regional Roadway System Assumptions

The 2040 regional travel demand model incorporates roadway system improvements identified in the fiscally constrained (current revenue) scenario of the Council's regional *Transportation Policy Plan* (*TPP*) adopted in January, 2015. In addition, programmed local or county roadway system improvements in the study area are also reflected in the model. Specific to the study area, the 2040 roadway system is assumed to include:

- Interstate Highway 494 (I-494) expansion to six lanes from Interstate Highway 394 (I-394) to Interstate Highway 94 (I-94)/Interstate Highway 694 (I-694)
- TH 610 extension to I-94 in Maple Grove
- Expansion of West Broadway Avenue (County State-Aid Highway [CSAH] 103) to four lanes between 85th Avenue North and 93rd Avenue North
- CSAH 81 reconstruction/expansion from north of 63rd Avenue North to north of CSAH 8 in Brooklyn Park
- I-94 auxiliary lane construction between the cities of St. Michael and Rogers

2.3.3 Regional Transit System Assumptions

The proposed BLRT Extension project would operate within the Twin Cities regional transit system. The adopted regional *2040 TPP* includes several improvements in its fully funded transit scenario (**Figure 2-2**). Near the proposed BLRT Extension project alignment, this includes the Green Line Extension, the Penn Avenue Arterial Bus Rapid Transit line (C Line), and the Chicago-Emerson-Fremont Avenue Arterial Bus Rapid Transit line (D Line).

The alternatives analyzed in the travel demand forecast model use the existing service as a base and include specific network modifications, beyond the regional transit system improvements referenced previously in **Section 2.3.2**, to form the basis for the transit ridership forecasts. Modifications to existing transit service for the modeled alternatives include changes in routing, frequency, and travel time. Network modifications are focused on providing an integrated "feeder" bus network to connect people to proposed BLRT Extension project stations. Bus networks and transit plans will continue to be refined as the proposed BLRT Extension project progresses; final bus network changes will be subject to a robust public involvement process in accordance with Title VI requirements.[1]

[1] Title VI of the Civil Rights Act of 1964 requires that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

Figure 2-2. 2040 Regional Transitway System

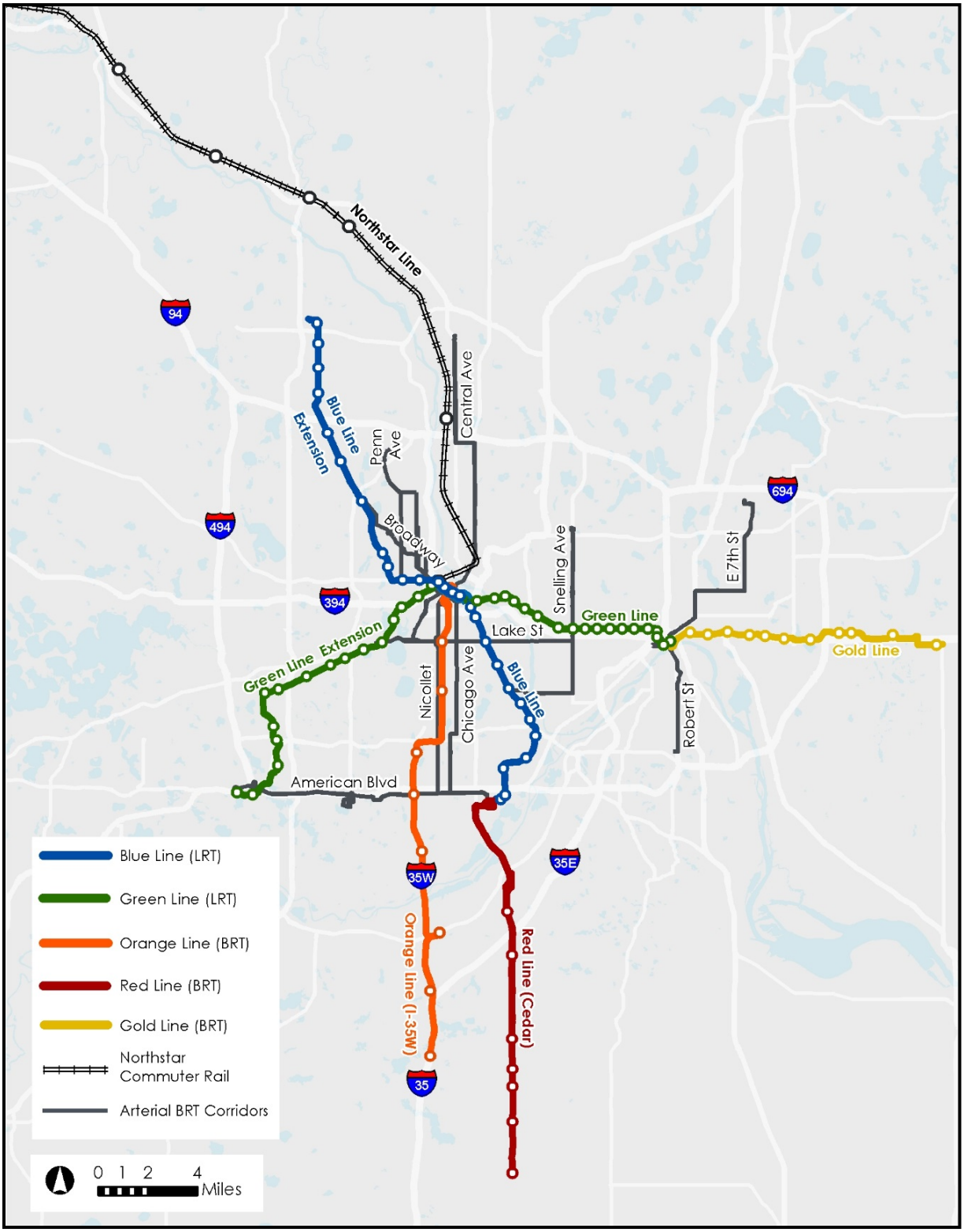


Table 2-1 identifies the bus and park-and-ride connections provided at each station. In addition, all stations are planned to have pedestrian and bicycle connections.

Table 2-1. Station Access Characteristics Using 2040 Bus Feeder Plan

LRT Station	Park-and-Ride	Transfer Routes
Van White Boulevard	No	19, 26, C-Line
Penn Avenue	No	19, 26, 755, C-Line
Plymouth Avenue	No	7
Golden Valley Road	Yes (100 spaces)	7, 30
Robbinsdale	Yes (550 spaces)	7, 14, 19, 30, 32, 56, 712, 716, 717, 746
Bass Lake Road	Yes (170 spaces)	721, 745
63rd Avenue	Yes (565 spaces)	716, 719
Brooklyn Boulevard	No	705, 720, 723, 724
85th Avenue	No	723, 724, 725
93rd Avenue	No	724
Oak Grove Parkway	Yes (850 spaces)	729, 765

Source: Blue Line Extension Travel Demand Model Estimates (September 2015)

2.3.4 No-Build Alternative Assumptions

The No-Build Alternative includes all funded regional transit improvements. In addition, local and express bus service in the study area reflects changes determined by Metro Transit in its *Regional 2015–2030 Service Improvement Plan* adopted by the Council in April 2015. In general, the plan assumes modest changes to transit service in the study area. The travel time differential between the Van White Boulevard and Penn Avenue stations reflects the anticipated bus service included in the Metro Transit *Regional 2015–2030 Service Improvement Plan*.

2.3.5 Proposed BLRT Extension Project Assumptions

The proposed BLRT Extension project includes the proposed BLRT Extension project LRT service plus modifications to the bus system to provide connecting service. The proposed BLRT Extension project includes 11 stations over the 13-mile proposed BLRT Extension project corridor.

Proposed BLRT Extension project service is assumed at 10-minute frequencies in the peak and off-peak periods. The estimated run time for the proposed BLRT Extension project is about 31 minutes, which reflects station dwell times, estimated signal delay, acceleration/deceleration, and estimated travel speeds. The forecasts are based on the run times in **Table 2-2**.

Table 2-2. End-to-End Travel Times for the No-Build Alternative and the Proposed BLRT Extension Project

BLRT Station	Transit Travel Times to Target Field Station in Minutes (Peak/Off-Peak)	
	No-Build Alternative	Proposed BLRT Extension Project
Van White Boulevard	12.8 / 17.7	4.3 / 4.3
Penn Avenue	11.8 / 11.8	6.5 / 6.5
Plymouth Avenue	38.1 / 38.1	8.8 / 8.8
Golden Valley Road	36.9 / 36.9	10.3 / 10.3
Robbinsdale	35.2 / 36.4	13.7 / 13.7
Bass Lake Road	46.8 / 58.1	16.6 / 16.6
63rd Avenue	64.1 / 65.3	18.8 / 18.8
Brooklyn Boulevard	63.6 / 63.4	23.7 / 23.7
85th Avenue	70.1 / 68.2	26.3 / 26.3
93rd Avenue	Not applicable[1]	29.0 / 29.0
Oak Grove Parkway	Not applicable[1]	31.0 / 31.0

Sources: Blue Line Extension Travel Demand Model Estimates (October 2015); METRO Blue Line Light Rail Extension LRT Travel Time Estimates (February 2015)

[1] No existing transit routes serve this station.

2.4 Environmental Consequences

2.4.1 Operating-Phase (Long-Term) Impacts

The Council estimated the transit trips forecasted for the No-Build Alternative and the proposed BLRT Extension project in terms of linked and unlinked passenger trips. A linked passenger trip includes segments of travel from point of origin to point of final destination as a single trip, regardless of transfers or intermediate stops. Because of this, the number of linked passenger trips provides an estimate of the number of people using the transit system. In contrast, an unlinked passenger trip counts each segment of an overall trip as a separate unlinked trip. Unlinked passenger trips represent the activity experienced by each route segment and travel mode. Therefore, the number of unlinked trips is greater than the number of linked trips. In presenting the analysis of transit patronage, both linked and unlinked passenger trips are reported to provide a comprehensive assessment of each alternative.

Table 2-3 summarizes the commonly used daily performance measures projected for year 2040 for both the No-Build Alternative and the proposed BLRT Extension project. Although the Council presumes that the proposed BLRT Extension project would be through-routed with the Blue Line (Hiawatha Light Rail Line), the ridership reported includes only those trips attributable to the new service, not existing Blue Line passengers. This includes those patrons boarding and/or alighting at Van White Boulevard and stations to the north and west (including those continuing on the Hiawatha segment of the line).

Table 2-3. Projected Transit System Performance Measures for the No-Build Alternative and Proposed BLRT Extension Project in 2040

Alternative	Performance Measure							
	Unlinked Transit Trips (Daily)					Linked Transit Trips (Daily)	Daily Passenger	
	Local Bus	Express Bus	Commuter Rail	LRT	Total		Miles	Hours
No-Build	367,800	78,400	Combined with Express Bus	124,400	570,600	351,700	2,878,400	153,000
Proposed BLRT Extension project	373,900	73,100	Combined with Express Bus	149,700	596,700	363,900	3,002,500	158,900

Source: Blue Line Extension Travel Demand Model Estimates (2015)

For the proposed BLRT Extension project, the total system-wide passenger miles are estimated to increase from 2,878,400 with the No-Build Alternative to 3,002,500 daily miles. Total system-wide transit ridership for the proposed BLRT Extension project is estimated to increase by 12,200 riders per day for linked trips and 26,100 per day for unlinked trips in comparison to the No-Build Alternative.

As shown in **Table 2-4**, in 2013, the regional vehicle-miles traveled (VMT) on the transportation network was about 81 million daily VMT for the major roadway and transit facilities in the Twin Cities region. The Council expects VMT to increase to about 102.9 million daily VMT by 2040 with the No-Build Alternative. Although VMT is expected to increase about 26 percent between 2013 and 2040, with the proposed BLRT Extension project in place, VMT would decrease slightly to 102.7 million daily VMT.

Likewise, regional vehicle-hours traveled (VHT) are forecasted to increase from about 2.5 million daily in 2013 to nearly 3.5 million hours daily in 2040. The proposed BLRT Extension project and the No-Build Alternative would have essentially the same VHT.

Transit passenger-miles traveled (PMT) are expected to increase from about 474 million annually in 2013 to about 861 million annually with the No-Build Alternative, and to about 898 million annually with the proposed BLRT Extension project. The average daily speeds for the regional roadway system were estimated by the Council based on the VMT and VHT totals (VMT/VHT).

Table 2-4. Regional System Performance Measures

Measure	2013	2040 No-Build Alternative	2040 Proposed BLRT Extension Project	Percent change from 2013 to:	
				2040 No-Build Alternative	2040 Proposed BLRT Extension Project
Daily VMT (in millions)	81.8	102.9	102.7	25.7%	25.6%
Daily VHT (in millions)	2.46	3.45	3.45	40.2%	40.2%
Annual transit PMT (in millions)	473.9	860.6	897.6	81.6%	89.4%
Average system speed (in mph)	33.3	29.8	29.8	–10.4%	–10.4%

Source: Blue Line Extension Travel Demand Model Estimates (2015)

In addition, even without the proposed BLRT Extension project, significant growth in regional transit ridership is forecasted to occur between 2013 and 2040 as a result of planned investment in the regional transit system, including additional LRT and highway and arterial bus rapid transit. These improvements are included in the No-Build Alternative. For the proposed BLRT Extension project, new transit trips are attributable only to those improvements associated with the proposed BLRT Extension project.

Table 2-5 shows the daily boardings for the proposed BLRT Extension project (for 2040) by station and mode of access. Walk mode of access includes trips that access the station by bicycle in addition to walk-up trips. Transfer mode of access includes all trips accessing the station by transferring from a bus route. The data show that over half of the ridership would access the proposed BLRT line via a transfer from another transit mode.

2.4.2 Construction-Phase (Short-Term) Impacts

2.4.2.1 No-Build Alternative

There would be no construction-phase impacts to transit from the No-Build Alternative.

2.4.2.2 Proposed BLRT Extension Project

Construction of the proposed BLRT Extension project would have intermittent impacts to bus operations on routes within the construction area. These impacts could include temporary stop relocations or closures, route detours, or suspensions of service on segments of routes operating on streets where the proposed BLRT Extension project is being constructed.

Table 2-5. Daily Boardings by Station and Mode of Access for the Proposed BLRT Extension Project in 2040

Station	2040 Daily Boardings[2]	2040 Productions[1]				2040 Attractions[1]		
		Total	Walk	Drive[3]	Transfers	Total	Walk	Transfers
Van White Boulevard	643	634	391	7	236	653	429	224
Penn Avenue	1,007	1,102	685	18	399	912	194	718
Plymouth Avenue	229	333	322	11	—	126	126	—
Golden Valley Road	905	1,305	525	229	551	505	211	294
Robbinsdale	3,517	5,032	986	1,220	2,826	2,001	290	1,711
Bass Lake Road	1,596	2,080	759	399	922	1,112	380	732
63rd Avenue	1,304	2,325	656	1,219	450	282	198	84
Brooklyn Boulevard	2,397	2,943	415	15	2,513	1,850	374	1,476
85th Avenue	2,181	1,862	312	16	1,534	2,500	1,683	817
93rd Avenue	357	243	132	6	105	471	366	105
Oak Grove Parkway	2,331	3,361	452	1,900	1,009	1,301	981	320
BLRT subtotal[4]	16,467	21,220	5,635	5,040	10,545	11,713	5,232	6,481
Percent by mode of access (based on productions)		100%	26.6%	23.8%	49.7%	100%	44.7%	55.3%
Boardings outside proposed BLRT Extension project area (Downtown and Hiawatha boardings and transfers), alighting within proposed BLRT Extension project area	10,392	5,639				15,146		
Total project boardings[5]	**26,859**	**26,859**				**26,859**		

Source: Blue Line Extension Travel Demand Model Estimates (2015)

[1] Production/attraction format: home trip end station shown for production boardings, non-home trip end station end shown for attractions; no drive access at attraction end of trip.

[2] True boardings (accessing train) per average weekday.

[3] Drive access includes both park-and-ride and passenger.

[4] Boardings and alightings add up to more than total project rides because some trips board and alight within the proposed BLRT Extension project corridor.

[5] Southbound boardings plus northbound alightings (production/attraction format).

2.5 Avoidance, Minimization, and/or Mitigation Measures

This section describes the measures that would be implemented to mitigate long-term and short-term transit impacts from the proposed BLRT Extension project. For each mitigation measure or set of associated mitigation measures, this section generally notes the anticipated impact or associated impacts that the mitigation measures would address.

2.5.1 Long-Term Mitigation Measures

No mitigation measures are warranted for long-term impacts to transit because there would be no long-term adverse impacts to transit service because the proposed BLRT Extension project would expand transit service. However, the proposed BLRT Extension project would affect fixed-route bus service. The Council would follow federal and local procedures for route modifications or suspension of transit service, which would include a Title VI analysis to determine how service changes would affect low-income and minority communities. This Title IV process would include community outreach for designing route changes, a public hearing for the proposed service changes, and ongoing outreach efforts to communicate service changes prior to implementation.

2.5.2 Short-Term Mitigation Measures

Specific mitigation measures for short-term impacts to bus service would be identified in the Construction Mitigation Plan, which includes a Construction Communication Plan and construction staging plan (staging plan) for implementation by the Council prior to and during construction. The purpose of the Construction Communication Plan would be to prepare Metro Transit riders, project-area residents, businesses, and commuters for what to expect during construction, listen to their concerns, and develop plans to minimize disruptive effects. Strategies could include:

- Issue construction updates and post them on the website for the proposed BLRT Extension project
- Provide advance notice of roadway closures, driveway closures, and utility shutoffs
- Conduct public meetings
- Establish a 24-hour construction hotline
- Prepare materials with information about construction
- Address property access issues
- Assign staff to serve as liaisons between the public and contractors during construction
- Post information at bus stops and regional transit centers (Robbinsdale Transit Center, Brooklyn Center Transit Center, and Starlite Transit Center) indicating temporary stop closures and/or detour details
- Publish information in advance of bus detours on Metro Transit's website and in its on-board information brochure

In addition, the Council would develop and implement a staging plan, which would be reviewed with the appropriate jurisdictions and railroads, and the contractor would be required to secure the

necessary permits and follow the staging plan, unless otherwise approved. Components of a staging plan include traffic management plans and a detailed construction timeline.

3 Freight Rail Conditions

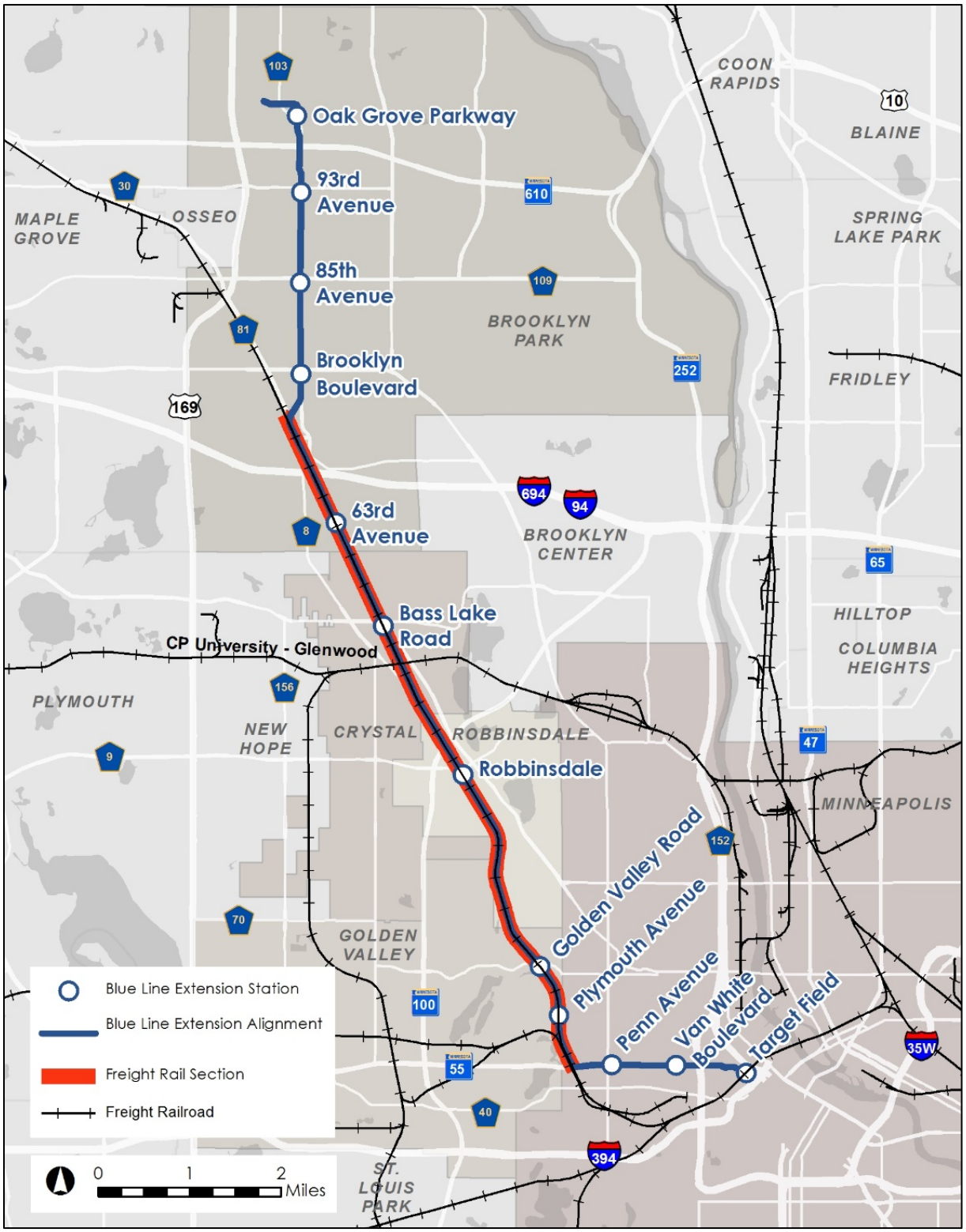
3.1 Methodology

The proposed BLRT Extension project design drawings and existing BNSF Railway (BNSF) track charts were used by the Council to identify the physical impacts of the proposed BLRT Extension project to freight rail infrastructure. The Council reviewed the requirements of Minnesota State Statute 219.46, BNSF, Canadian Pacific Railway (CP), the American Railway Engineering and Maintenance-of-Way Association (AREMA), and the Minnesota Department of Transportation (MnDOT) to determine vertical and horizontal clearance requirements for the freight rail track. Per Minnesota State Statute 219.46, subd. 2, a minimum of 14 feet horizontal separation is required between the rail track centerlines, which is a key issue in understanding where to locate LRT tracks in relation to freight rail tracks. Additional vertical and horizontal clearance requirements are presented in Minnesota Statute 219.46; the proposed BLRT Extension project design is being developed in accordance with these requirements.

3.2 Study Area

The study area for freight impacts is defined as about 7.8 miles of the BNSF right-of-way within the Monticello Subdivision located between Brooklyn Boulevard in Brooklyn Park (Mile Post [MP] 9.39) and Olson Memorial Highway in Minneapolis (MP 1.56). The width of the BNSF-owned right-of-way is generally 100 feet (about 50 feet on either side of the existing freight rail track). **Figure 3-1** illustrates the study area for determining freight rail impacts.

Figure 3-1. Freight Rail Study Area



3.3 Affected Environment

Within the study area, BNSF operates on one freight rail track generally located in the center of a 100-foot right-of-way that the railroad owns and maintains. BNSF operates about four to eight freight trains per week on this track. During peak operations in previous years, up to five trains per day operated in the BNSF rail corridor. Future freight operations could increase or decrease based on the needs of BNSF.

This portion of the BNSF system is located in "dark territory," which means that train movements are controlled by track warrants or train order operations, with train dispatchers issuing orders by radio communication with train engineers, not by train signals. This type of system allows only one train to be on a particular segment of the track at any given time. This segment of the rail corridor is Class II track and operates at a maximum speed of 25 miles per hour (mph) based on existing track conditions.

Between Brooklyn Boulevard and I-94, two siding tracks allow rail service to the Anchor Block site and the Atlas Cold Storage building. BNSF has not provided service to these sites for several years. Remnants of two other sidings are present in this area but do not appear to be functional.

CP has two tracks that come into contact with the BNSF rail line. One is located between Bass Lake Road and Corvallis Avenue and generally runs east-west. At this location, the BNSF track crosses the CP track perpendicularly with a diamond crossing. The second track is located at the south end of the proposed BLRT Extension project alignment just north of Olson Memorial Highway, where the CP track connects to the BNSF track with a crossover.

Between 36th Avenue North and Olson Memorial Highway, the freight rail track is located in a 100-foot right-of-way within an elevation that is lower than adjacent roadways and other land uses (a "trench"). In these areas are vegetated side slopes on either side of the track and no at-grade crossings. The track crosses under five bridge structures; these structures are located at Olson Memorial Highway, Plymouth Avenue, Theodore Wirth Parkway, Golden Valley Road, and 36th Avenue North.

The track located in the remaining segment of the proposed BLRT Extension project alignment, north of 36th Avenue, is generally at the same elevation as or higher than the adjacent roadways. Within this area are nine at-grade crossings (39½ Avenue, 41st Avenue, 42nd Avenue, 45½ Avenue, West Broadway Avenue, Corvallis Avenue, Bass Lake Road, 63rd Avenue, and 71st Avenue) with active warning devices provided at eight of them. Passive warning devices are provided at the 39½ Avenue at-grade crossing.[2]

[2] Under the proposed BLRT Extension project build condition, the 39½ Avenue at-grade crossing would be closed.

3.4 Environmental Consequences

3.4.1 Operating-Phase (Long-Term) Impacts

3.4.1.1 No-Build Alternative

There would be no operating-phase impacts to the freight rail corridor from the No-Build Alternative.

3.4.1.2 Proposed BLRT Extension Project

The proposed BLRT Extension project includes the construction of proposed LRT guideway in the eastern half of the BNSF right-of-way. In the Draft EIS, the Council proposed that a horizontal separation of at least 14 feet would be wide enough to allow a service road to be constructed between the LRT track and freight rail track, thereby allowing the Council and BNSF to perform maintenance on their respective tracks without affecting service on the other track. However, during preliminary engineering activities, the Council determined through coordination with BNSF that the preferred approach would be to reconstruct the freight rail track adjacent to the southbound (western) LRT track and construct a freight rail access road west of the freight rail track.

With the exception of the LRT crossings of the ponds north of Golden Valley Road and Grimes Pond, the approximate 7.8 mile section in the BNSF right-of-way would be divide to accommodate both the BNSF and LRT tracks. The BNSF track would be relocated about 15 feet to the west, thereby allowing BNSF to operate within the western 50 feet of the right-of-way while providing at least 25 feet of horizontal clearance from the LRT track centerline. The LRT tracks would operate in the eastern 50 feet of the existing right-of-way. The pond crossings would leave the BNSF track in its existing location and new LRT bridges would be constructed east of the freight rail embankment. Proposed BLRT Extension project construction would include a 12-foot-wide access road generally located west of the relocated BNSF track for the majority of the 7.8 miles of the proposed BLRT Extension project in the BNSF rail corridor, with the exception of the pond areas and bridges.

The proposed BLRT Extension project includes modifications to active warning devices and signals for at-grade crossings in order to accommodate the relocated BNSF and new LRT tracks. These modifications would include relocating existing active warning devices, such as gate arms, to accommodate the relocated BNSF and LRT tracks and installing new active warning devices, such as gate arms, where they are not currently provided. In addition, combined freight/LRT at-grade crossings would be designed to be ready for Federal Railroad Administration (FRA) Quiet Zones.[3]

The proposed BLRT Extension project would include fencing at LRT stations to provide additional separation between pedestrians using the LRT station platform and the freight rail operations.

[3] Quiet Zones are locations, at least one-half mile in length, where the routine sounding of horns has been eliminated because of safety improvements at at-grade crossings, including modifications to the streets, raised median barriers, four quadrant gates, and other improvements designed and implemented as a part of the BLRT Extension project and consistent with Quiet Zone readiness. Horns are sounded in emergency situations at these locations. Municipalities must apply to FRA for approval of Quiet Zones.

Although BNSF would be required to operate within the western 50 feet of its right-of-way, incorporating an access road would improve BNSF's overall accessibility to its track. The proposed BLRT Extension project would relocate the existing freight track but would not change the overall freight rail operational context.

Further discussion of the impacts and improvements needed to accommodate the relocated freight rail alignment is provided below. Unless otherwise noted, these impacts would not permanently affect freight rail operations.

Required Freight Rail Modifications

The 36th Avenue bridge, Golden Valley Road bridge, Theodore Wirth Parkway bridge, Plymouth Avenue bridge, and Olson Memorial Highway bridge (westbound lanes) would be reconstructed to accommodate the relocated freight rail track and LRT guideway. See **Table 3-2** for proposed modifications. In addition, the crossover connection between the BNSF freight rail alignment and the CP rail spur (just north of the Olson Memorial Highway bridge) would also need to be reconstructed.

The BNSF freight rail track would be relocated about 15 feet west of its current alignment. South of 71st Avenue, part of the BNSF right-of-way is less than 100 feet wide because of the 71st Avenue roadway configuration. This limited right-of-way could require installing a barrier between the existing roadway (back of sidewalk) and the freight rail track. Existing sidings that are located north of I-94 and south of Brooklyn Boulevard are currently out of service and in some cases are not connected to the existing freight track. The relocated freight track might need to reconnect these existing sidings, if BNSF would resume service to these customers would resume. The existing diamond crossing at the BNSF/CP at-grade intersection would require relocation as part of shifting the freight rail track. The segment of the rail corridor between 36th Avenue and Olson Memorial Highway is located within the "trench" described previously in **Section 3.3**. In some areas, retaining walls would replace the existing vegetated side slopes on either side of the BNSF right-of-way to accommodate the relocated freight rail track while reducing adjacent property impacts.

In three locations, the freight rail tracks would remain on the existing alignment and the LRT tracks would be constructed on a new bridge within the eastern 35 feet of the 100-foot-wide BNSF right-of-way. These three locations are at Grimes Pond adjacent to Sochacki Park south of 36th Avenue, at the ponds immediately north of Golden Valley Road, and at TH 100.

Table 3-1. Proposed BLRT Extension Project Bridge Modifications

Bridge Location	Proposed Improvements
Olson Memorial Highway	The north half of the Olson Memorial Highway bridge (westbound lanes) would be reconstructed to accommodate the transition of the LRT guideway out of the BNSF right-of-way into the median of Olson Memorial Highway. These bridge reconstruction impacts are not associated with relocating the freight rail track. No change to BNSF operations or maintenance requirements.
Plymouth Avenue	The bridge deck, piers, and abutments would be removed, and a new bridge would be constructed in the same location. Bridge piers would be spaced to allow the LRT tracks to pass through on the eastern half of the BNSF rail corridor, the reconstructed freight rail track and new access road to pass through on the western half of the BNSF rail corridor, and the reconstructed Theodore Wirth Regional Park (TWRP) trail and associated Bassett Creek channel reconstruction. The pier locations would need to accommodate a wider spacing between northbound and southbound LRT tracks to allow the Plymouth Avenue Station to be built in a center platform configuration. Bridge piers would be constructed to provide adequate crash protection based on current MnDOT and AREMA standards. No change to BNSF operations or maintenance requirements.
Theodore Wirth Parkway	The bridge deck, piers, and abutments would be removed, and a new bridge would be constructed in the same location. Bridge piers would be spaced to allow the LRT tracks to pass through on the eastern half of the BNSF rail corridor and the reconstructed freight rail track to pass through on the western half of the BNSF rail corridor. The pier locations would need to accommodate a wider spacing between northbound and southbound LRT tracks to allow the Golden Valley Road Station, which would be located directly north of the Theodore Wirth Parkway bridge, to be built in a center platform configuration. Bridge piers would be constructed to provide adequate crash protection based on current MnDOT and AREMA standards. No change to BNSF operations or maintenance requirements.
Golden Valley Road	The bridge deck, piers, and abutments would be removed, and a new bridge would be constructed in the same location. Bridge piers would be spaced to allow the LRT tracks to pass through on the eastern half of the BNSF rail corridor and the reconstructed freight rail track to pass through on the western half of the BNSF rail corridor. The pier locations would need to accommodate a wider spacing between northbound and southbound LRT tracks to allow the Golden Valley Road Station to be built in a center platform configuration. A portal would be created for a proposed trail connection between TWRP and Sochacki Park. Bridge piers would be constructed to provide adequate crash protection based on current MnDOT and AREMA standards. No change to BNSF operations or maintenance requirements.
36th Avenue	The bridge deck, piers, and abutments would be removed, and a new bridge would be constructed in the same location. Bridge piers would be spaced to allow the LRT tracks to pass through one portal on the eastern half of the BNSF rail corridor and the reconstructed freight rail track and access road to pass through another portal on the western half of the BNSF rail corridor. Bridge piers would be constructed to provide adequate crash protection based on current MnDOT and AREMA standards. No change to BNSF operations or maintenance requirements.

Corridor Protection

The proposed BLRT Extension project was examined by the Council to reduce risks in the event of a freight or LRT derailment. This review included examining technical reports, research papers, and treatments used on other corridors where freight rail and LRT operate jointly. LRT and freight rail located in a shared corridor is not an unusual occurrence in the United States. These are known as "Common Corridor Operations." The Council collected and documented information on these locations, including mitigation measures in place. Based on this research the following Light Rail Operators have Common Corridor Operations on portions of their lines: Port Authority Transit Corp (PATCO), Charlotte NC LYNX, Greater Cleveland Regional Transit Authority Blue and Green Lines, Dallas DART, Denver RTD, Jersey City NJT Hudson-Bergen LRT, Los Angeles LACMTA Green and Gold Lines, Sacramento CA, Sacramento RTD, St. Louis, Bi-State Development Agency, San Jose, VTA, Maryland Counties, Purple Line and Portland MAX Orange Line.

The Council contacted staff associated with these projects to identify the following common methods currently used or planned to be used after system build-out. Some of these projects and methods are still in development, but the following is a summary of these measures:

- Reliance on direct communication by internal radio systems and emergency telephone contact with the adjacent railway's dispatch center and vice-versa for notification of an accident that interferes with the other's operation
- Have established incident response protocols with the adjacent railway and first responders as part of their emergency preparedness programs
- Conduct emergency response exercises and drills as part of their training requirements. Many properties actively support "Operation Lifesaver" to reduce trespasser/transit rail accidents.
- Construct corridor-protection walls between freight and light rail
- Install intrusion detection devices in areas between freight and light rail

These methods are also planned to be used on the proposed BLRT Extension project and will be incorporated into the construction and management documents, as applicable.

The Metro Transit Light Rail Transit Design Criteria (Council, 2015), which includes design standards and specifications to provide security and/or enhance safety, includes safeguards to prevent LRT operational derailments including guardrails (i.e., a rail or other structure laid parallel with the running rails of the track to keep derailed wheels adjacent to the running rails of the track to keep derailed wheels adjacent to the running rails). In addition, the proposed BLRT Extension project includes a combination of horizontal separation, vertical separation, and physical means to provide safe operations. Three specific corridor-protection treatments are proposed:

- A ditch (used where the corridor width permits)
- A retained fill option where the LRT tracks would be at a higher grade than freight rail tracks
- A wall

Typical sections representing these corridor-protection options are shown in **Figures 3-2a through 3-2c**. In addition, where clearance between the centerline of the light rail tracks and the

centerline of the freight tracks is less than 50 feet, intrusion detection for possible freight derailment will be installed, where appropriate. These corridor-protection treatments were closely coordinated with BNSF.

Further, the design of the proposed BLRT Extension project will include safeguards in the catenary system to help minimize the possibility of sparking occurring in the overhead catenary wires. Electrical sparks, or arcing, occurs when there is a gap between the overhead contact wire and the vehicles pantograph. Numerous safeguards are included in the design of the proposed BLRT Extension project to address and minimize electrical sparking. Ice cutters will be utilized to maintain positive contact between the contact wire and pantograph during winter weather. Additionally, Metro Transit will regularly inspect pantographs for grooves along the pantograph's carbon strip (as it does on its existing light rail lines), which could cause arcing. Included in the design of the proposed BLRT Extension project to minimize arcing are contact wire gradients, which meet or exceed AREMA recommendations, staggering or zig-zags of the contact wire to ensure even wear, and overlaps between power sections. Finally, the design accounts for the Occupational Safety and Health Administration 10-foot zone of influence, and meets or exceeds National Electrical Safety Code requirements along the proposed shared light rail and freight rail corridor.

The Council's *Operations Emergency Management Plan* (*OEMP*) for light rail was developed to assist in identifying, responding to, and resolving emergency situations in an efficient, controlled and coordinated manner, including those related to the location of LRT and freight rail within the same corridor. The *OEMP* establishes the response process and responsibilities for departments and staff within Metro Transit, as well as outside agencies in the event of a rail emergency.

Figure 3-2a. Typical Railway Section – Ditch Corridor Protection

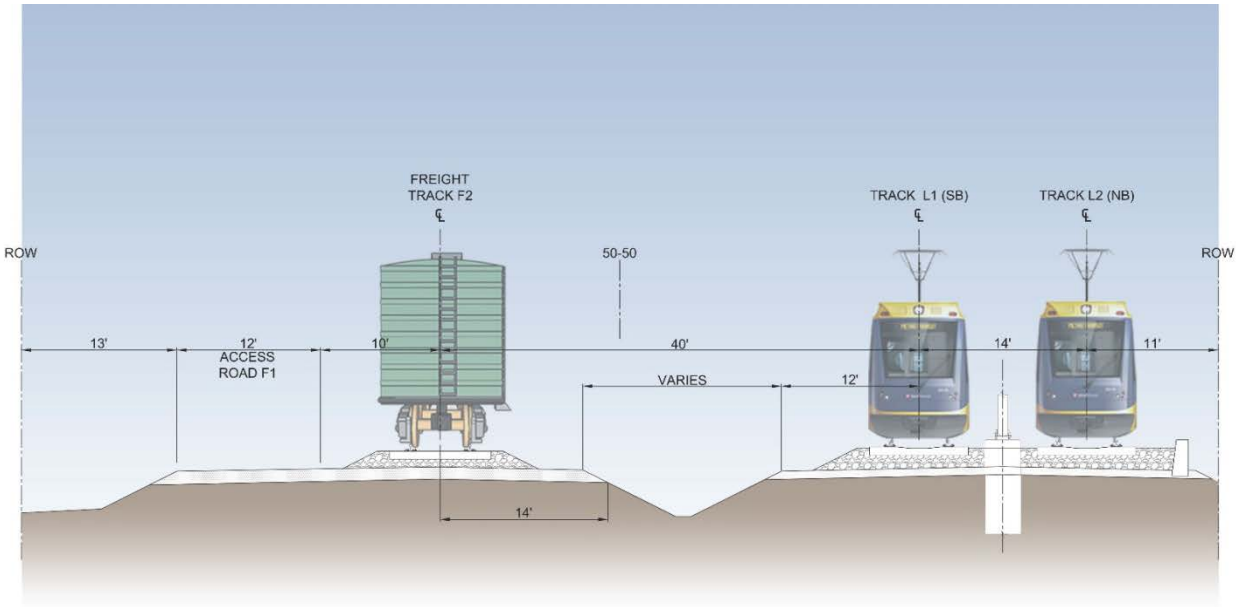


Figure 3-2b. Typical Railway Section – Retained Embankment Corridor Protection

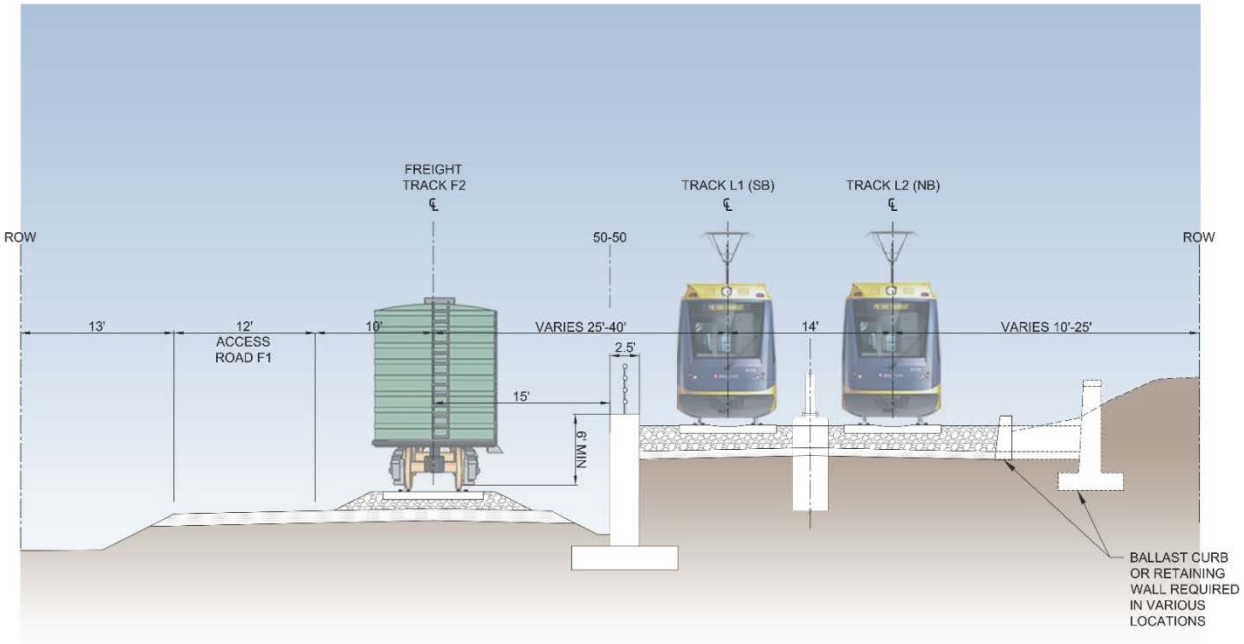
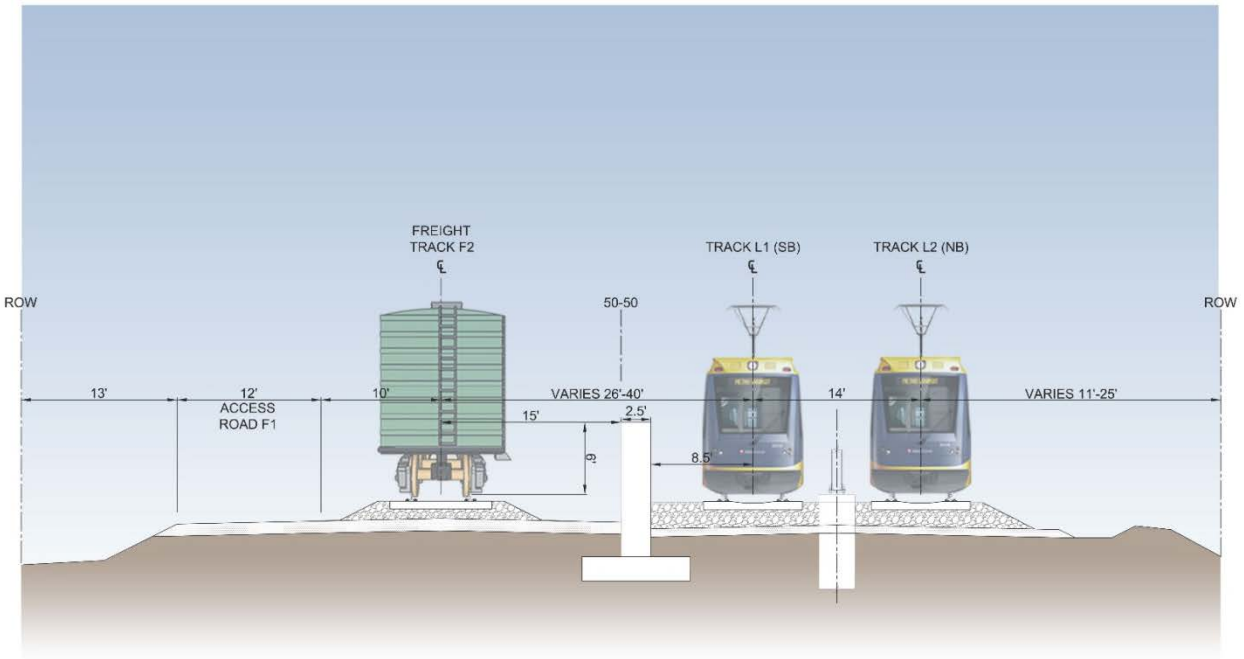


Figure 3-2c. Typical Railway Section – Wall Corridor Protection



In addition, the Council maintains an emergency preparedness exercise plan. The emergency preparedness exercise plan identifies emergency preparedness exercise, which will be carried out by the Fire Life Safety and Security Committee (FLSSC). In advance of operation of the proposed BLRT Extension project, a number of drills will be planned, conducted, and documented in the emergency preparedness exercise plan. Emergency preparedness training exercises will be designed to address areas such as rail equipment familiarization, situational awareness, passenger evacuation, coordination of functions, communications, and hands-on instruction. The FLSSC will coordinate training exercises with the Council and the freight railroad owners and operators, as appropriate. During normal revenue service, the FLSSC will coordinate training exercises to evaluate emergency preparedness. The exact nature of emergency preparedness exercises will be developed in coordination with the FLSSC prior to construction, but could include one tabletop and one full-scale emergency preparedness exercise, annually.

Traction Power Substations (TPSSs)

TPSS sites would generally be located on the east side of the proposed LRT track where possible, with a minimum horizontal clearance between the TPSSs and the LRT track centerline of 8 feet. Greater horizontal clearances, a minimum of 15 feet from the track centerline, would be required if the TPSS is located adjacent to the BNSF freight rail track. In most cases, the TPSS sites could be located on property adjacent to and outside of the existing rail corridor to avoid or reduce impacts to the freight rail tracks. Depending on the location of the TPSS site, utilities such as the Xcel Energy electrical service might need to cross under or over the freight rail tracks. Vertical and horizontal clearances, as required by the BNSF Utility Accommodation Policy (BNSF, May 2011), would be maintained for these utility crossings.

3.4.2 Construction-Phase (Short-Term) Impacts

3.4.2.1 No-Build Alternative

There would be no construction-phase impacts to freight rail are from the No-Build Alternative.

3.4.2.2 Proposed BLRT Extension Project

Construction activities to relocate the freight rail track required as part of constructing the LRT guideway would have limited effects on existing freight service in the BNSF rail corridor. Construction phasing would likely consist of constructing the new freight rail track adjacent to the existing track, shifting freight rail operations to the new freight rail track, and then removing the existing freight rail track to allow construction of the LRT guideway, thus minimizing disruptions to freight rail operations. Construction work would be done under the guidance of a BNSF flagging crew.

At the BNSF/CP diamond crossing, construction would be coordinated with both railroads to limit freight delays.

Construction activities associated with relocating the freight rail track would occur primarily within the existing BNSF right-of-way, with some temporary easements to accommodate construction outside the in-place rail right-of-way.

Construction activities could also cause temporary impacts to sidings if BNSF were to resume service to freight customers between I-94 and Brooklyn Boulevard. Temporary crossovers between the existing and relocated freight rail track would be required to facilitate construction phasing and maintain freight operations. Construction of these crossovers would occur in such a way as to minimize impacts to freight rail operations in the rail corridor.

The construction impacts associated with the No-Build Alternative and the proposed BLRT Extension project are summarized in **Table 3-3**.

Table 3-3. Construction Impacts on Freight Rail

Alternative	Total Freight Rail Impact[1]
No-Build Alternative	■ No impact
Proposed BLRT Extension project	■ Temporary impacts to freight rail customer sidings (if BNSF were to resume service within the rail corridor) resulting from constructing temporary crossovers between existing and relocated freight rail tracks ■ Temporary impacts due to reconstructing diamond crossover at CP/BNSF intersection north of Corvallis Avenue ■ Temporary impacts due to reconstructing CP/BNSF crossover connection north of Olson Memorial Highway

[1] No anticipated freight rail construction impacts are associated with the proposed park-and-rides or Operations and Maintenance Facility (OMF).

3.5 Avoidance, Minimization, and/or Mitigation Measures

This section describes the measures that would be implemented to mitigate the long-term and short-term impacts on freight transportation from the proposed BLRT Extension project. For each mitigation measure or set of associated mitigation measures, this section generally notes the anticipated impact or associated impacts that the mitigation measures would address.

3.5.1 Long-Term Mitigation Measures

No mitigation measures are warranted for long-term impacts to freight rail because the identified avoidance measures would prevent any adverse impacts. These measures include reconstructing the BNSF rail corridor including a service road that would provide BNSF with better access to its rail line. In addition, the existing freight rail track is jointed; this type of track generates noise and vibration as freight trains pass over the joints. The new freight rail track that would be constructed in the rail corridor would be continuously welded rail, which would eliminate the track joint–related noise and vibration.

In addition, as discussed in **Section 3.4.2.2**, corridor-protection elements would be included in the proposed BLRT Extension project design to reduce risks in the event of a freight or LRT derailment. Additional information regarding mitigation measures for long-term impacts to other environmental resources associated with freight rail is included in **Section 4.3 – Acquisitions and Displacements**; **Section 4.6 – Business Impacts**; and **Section 5.6 – Noise** (including train horn Quiet Zones).

3.5.2 Short-Term Mitigation Measures

Short-term impacts to freight rail operations resulting from construction activities could occur along the BNSF rail corridor and where the CP corridor intersects the proposed BLRT Extension project.

In order to mitigate short-term impacts to freight rail operations related to construction activities, the Council would develop and implement freight rail operation coordination plans. The purpose of these plans is to facilitate coordination between the Council and the affected freight railroads during construction activities affecting freight rail operations. As part of this effort, Council staff would also work with affected freight rail owners and operators to provide provisions in the construction contract to identify how the contractor would interact with the railroads. Further, Council staff would work with affected freight rail owners and operators to sequence construction to reduce effects on freight movements and to identify optimal periods for closing the rail service and reducing speeds. Dates and times for all stoppages would be determined through coordination with the railroad owners and operators.

During construction activities, flaggers would be used to allow freight rail operations to continue. The use of flaggers would require construction activities adjacent to active freight rail to halt while freight trains traverse the construction area.

4 Pedestrians and Bicyclists

4.1 Methodology

This section describes existing bicycle and pedestrian facilities and connections in the study area and the expected impacts of the No-Build Alternative and the proposed BLRT Extension project on these facilities. Non-motorized transportation facilities, including sidewalks, single- and multi-use trails, on-street bike facilities, and pedestrian bridges, are found throughout the study area. The Council identified facilities by reviewing trail and comprehensive plan maps, aerial photographs, and Station Area Planning documents; site visits; and discussions with stakeholders. Preliminary engineering drawings and construction limits were used to determine the number and severity of impacts. Physical encroachments onto existing facilities were identified and evaluated to avoid or minimize impacts.

Impacts to pedestrian and/or bicycle routes from the proposed BLRT Extension project crossing restrictions were identified by the Council and alternates were examined, with consideration for reasonable accessibility associated with the Americans with Disabilities Act (ADA) requirements.

The discussion of the proposed BLRT Extension project focuses on:

- Target Field Station connection area, especially the Olson Memorial Highway/7th Street intersection
- Olson Memorial Highway, especially the area between the I-94 bridge and Thomas Avenue and including the Van White Boulevard and Penn Avenue stations
- Plymouth Avenue Station area
- Golden Valley Road Station area
- Robbinsdale Station area
- Bass Lake Road Station area
- 63rd Avenue Station area
- Grade separation at Bottineau Boulevard (County Road 81) and 73rd Avenue, especially changes to Jolly Lane
- West Broadway Avenue, including the Brooklyn Boulevard, 85th Avenue, and 93rd Avenue stations
- Oak Grove Parkway Station area

The discussion includes a summary of effects on bicycle and pedestrian facilities in the study area with a focus on the proposed accessibility improvements at future station areas and on reconstructed intersections or crossings where existing bicycle and pedestrian access would change.

4.2 Study Area

The study area for impacts to pedestrians and bicyclists is defined as the limits of disturbance from the proposed BLRT Extension project, facilities near the proposed BLRT Extension project alignment, and alternate routes in the surrounding area. The study area for alternate routes varies based on the conditions of the surrounding bicycle/pedestrian network but generally includes alternate routes within ½ mile of the transitway and/or affected crossing.

4.3 Affected Environment

The extent and condition of existing pedestrian and bicycle facilities associated with the proposed BLRT Extension project ranges from intermittent facilities in the more suburban areas of the study area to complete sidewalk systems and on-street bicycle facilities in Minneapolis and the other more urban portions of the study area.

4.4 Environmental Consequences

4.4.1 Operating-Phase (Long-Term) Impacts

4.4.1.1 No-Build Alternative

There would be no operating-phase impacts to pedestrians or bicyclists from the No-Build Alternative. However, neither an opportunity to improve existing pedestrian and bicycle connections to other transportation resources in the area nor an opportunity to improve pedestrian and bicycle safety in the immediate study area would be realized.

4.4.1.2 Proposed BLRT Extension Project

The proposed BLRT Extension project would provide several long-term improvements to pedestrian and bicycle accessibility and safety. All LRT stations would provide safe access for pedestrian and bicycle traffic. Bicycle parking would be included at or near stations as space allows, with the type and location of parking to be determined by the Council as station design and site development progress.

The issue-resolution process conducted with Metro Transit, Hennepin County, and staff from the cities along the proposed BLRT Extension project alignment resulted in several modifications to the pedestrian and bicycle environment beyond that presented in the Draft EIS. These modifications are described in detail below and a summary of impacts resulting from these modifications is shown in **Table 4-1**.

Table 4-1. Summary of Impacts to Pedestrian and Bicycle Facilities

Location	Impact
Target Field Station connection and 7th Street North intersection design	Pedestrian and bicycle needs accommodated in design of Olson Memorial Highway and 7th Street North intersection, which includes dedicated bicycle lanes and enhanced pedestrian crossings
Olson Memorial Highway	Improved pedestrian safety and access to stations along Olson Memorial Highway; addition of traffic signal at Thomas Avenue intersection and three mid-block signalized pedestrian crossings; provisions for a cycle track on north side of Olson Memorial Highway
Plymouth Avenue Station	Improved pedestrian and bicycle access through reconstruction of sidewalks and bicycle lanes on Plymouth Avenue bridge; access to the Plymouth Avenue Station vertical circulation facility, as well as connecting to the existing trail west of the bridge; improvements to sidewalks along Plymouth Avenue to facilitate pedestrian movements between bus stop and passenger drop-off areas and station; existing TWRP trail would be relocated west out of its current location within BNSF right-of-way
Golden Valley Road Station area	Improved pedestrian and bicycle access at reconstructed Theodore Wirth Parkway and Golden Valley Road bridges; Theodore Wirth Parkway bridge trail would be widened to meet current design standards, and vertical circulation facilities to access the Golden Valley Road Station would be added; trailhead would be constructed the at Golden Valley Road Station park-and-ride; new trail connection under Golden Valley Road between TWRP and Sochacki Park
Robbinsdale Station area	Improved pedestrian access and safety through proposed pedestrian crossings at 41st Avenue/Noble Avenue and 42nd Avenue; proposed pedestrian crossings to provide ADA-compliant crossings of the freight rail and LRT tracks; improved pedestrian access though proposed LRT crossing at 45½ Avenue; bicyclists access to station via Crystal Lake Regional Trail; improve pedestrian safety through closing the existing informal (and prohibited) crossings of the BNSF track at Sochacki Park
Bass Lake Road Station area	Improved pedestrian access through proposed pedestrian bridge over Bottineau Boulevard and improved connections from trails and sidewalks to station and park-and-ride lot; bicyclists access to station via Crystal Lake Regional Trail; improved pedestrian crossings of the LRT tracks at West Broadway Avenue
63rd Avenue Station area	Improved pedestrian access and safety through improved connections along 63rd Avenue to reach the proposed station and a proposed grade-separated connection from the parking ramp; improved pedestrian access through at-grade pedestrian crossings of LRT/freight tracks at 71st Avenue; bicyclists access to station via Crystal Lake Regional Trail
Jolly Lane/75th Avenue area	Pedestrian and bicycle access would be maintained through reconstruction and realignment to accommodate proposed BLRT Extension project features

Table 4-1. Summary of Impacts to Pedestrian and Bicycle Facilities

Location	Impact
West Broadway Avenue station areas	Closing pedestrian crossing at West Broadway Avenue at commercial property about 400 feet north of Brooklyn Boulevard/West Broadway Avenue intersection with alternate crossing available within ⅛ mile; continuous trail facilities along both sides of West Broadway Avenue with proposed reconstruction of trails south of Candlewood Drive; improved bus stop and a secondary pedestrian access to station areas; pedestrian crossing at 84th Avenue and West Broadway Avenue would be closed with pedestrian crossing facilities provided at new signalized intersection at College Park Drive and West Broadway Avenue; secondary pedestrian access to station area provided by 92nd Avenue crossing; bicycle access to proposed LRT stations would use the same locations as those identified for pedestrians
Oak Grove Parkway Station area	Reconfigured roadway network would accommodate the proposed Oak Grove Parkway Station and park-and-ride; proposed transportation network would include provisions for sidewalks and bicycle trails

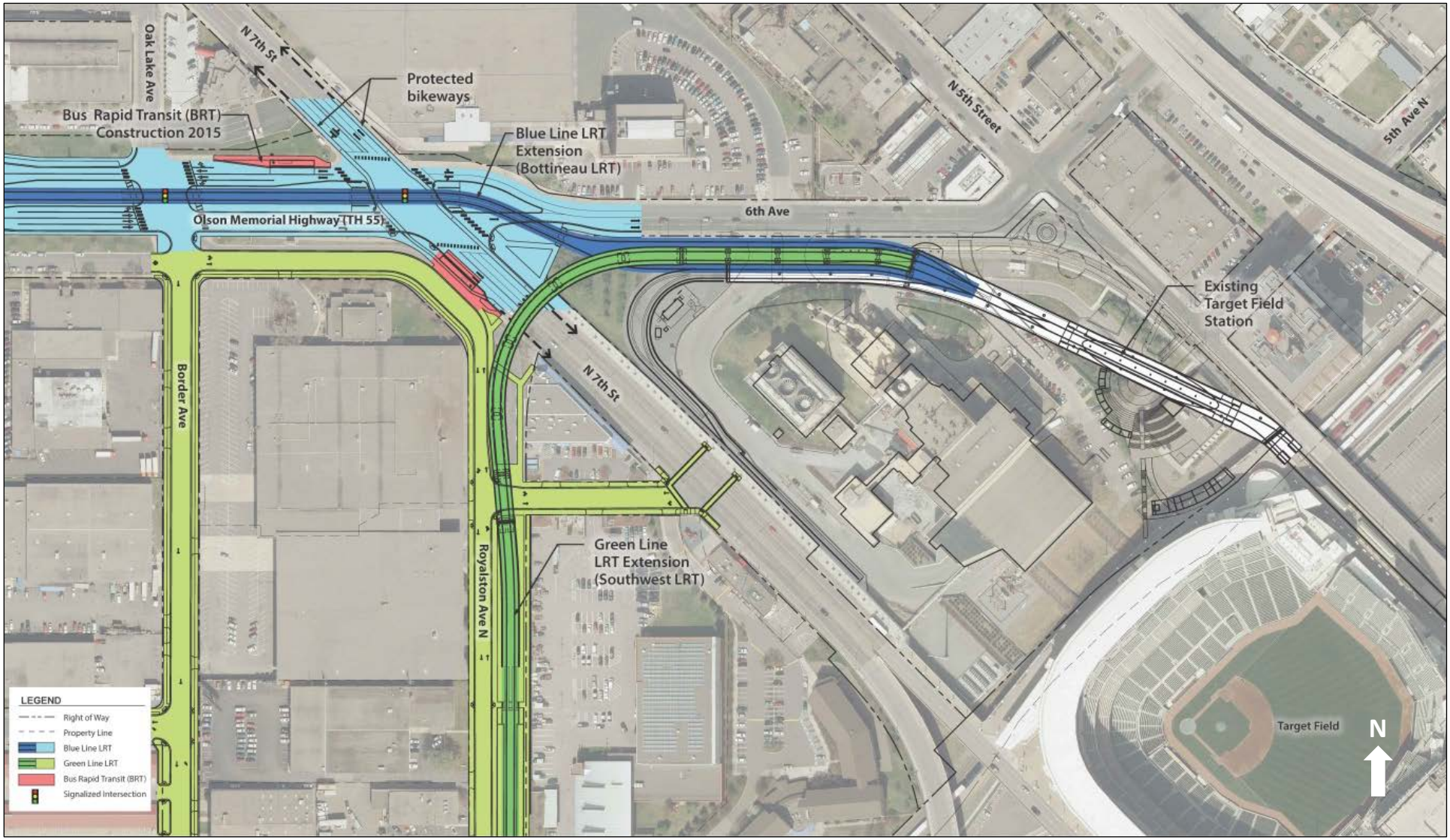
Target Field Station Connection and 7th Street Intersection Design

One of the issues identified for resolution through the early stages of proposed BLRT Extension project development was the LRT connection to the Target Field Station. The challenge was to find a way to address vehicle traffic through the intersection of Olson Memorial Highway and 7th Street North while accommodating pedestrians' and bicyclists' needs. Specific components of the pedestrian and bicycle improvements identified through the issues-resolution process include:

- Shortening the pedestrian crossing distance at each leg of the intersection
- Providing pedestrian refuge space at median crossings
- Accommodating northbound and southbound bicycle lanes in 7th Street North (bicycle lanes to be constructed as a component of the Green Line LRT Extension project)
- Creating perpendicular or near-perpendicular crossing paths at LRT tracks for bicycles and wheelchairs to prevent wheels from getting stuck in track channels
- Eliminating the free right-turn movement from northbound (northwest-bound) 7th Street North to eastbound 6th Avenue North

Figure 4-1 depicts the proposed BLRT Extension project's intersection layout at the Olson Memorial Highway/7th Street North intersection near the Target Field Station.

Figure 4-1. Proposed Olson Memorial Highway / 7th Street North Intersection Layout



Olson Memorial Highway

Concern for pedestrian safety and access to stations along Olson Memorial Highway were key issues identified in multiple comments on the Draft EIS. Currently there are nine unmarked, unsignalized mid-block crossings in addition to six marked crossings at signalized intersections. Several of these crossings are not ADA-compliant. The city of Minneapolis, Hennepin County, MnDOT, and Metro Transit evaluated multiple options for Olson Memorial Highway that would balance the needs of motorists and other users. The results of extensive analysis and discussion were as follows:

- Maintain a six-lane roadway section to accommodate existing and future traffic volumes.
- Reduce lane widths to 11 feet (current widths are 12 feet and greater) to reduce pedestrian crossing length.
- Reduce the design speed and posted speed limit from 40 to 35 mph to provide a safer environment for pedestrians and bicyclists.
- Replace existing sidewalks on the north and south sides of Olson Memorial Highway. The current sidewalks are 5 feet wide and in poor condition with some gaps. New sidewalks would be 6 feet wide and continuous.
- Provide ADA-compliant pedestrian crossings at the following signalized intersections:
    - West Lyndale Avenue
    - Bryant Avenue
    - Van White Memorial Boulevard (also provides station access)
    - Humboldt Avenue
    - Morgan Avenue
    - Penn Avenue
    - Thomas Avenue
- Provide ADA-compliant signalized pedestrian crossings at the following three mid-block locations:
    - East of the Penn Avenue Station (also provides secondary access to the Penn Avenue Station)
    - James Avenue (between Humboldt and Morgan avenues)
    - Russell Avenue (also provides secondary access to the Van White Boulevard Station)
- Provide pedestrian refuge areas in the median.
- Provide space on the north side of Olson Memorial Highway for a 10-foot two-way cycle track (to be constructed by others) between Thomas Avenue and Van White Memorial Boulevard.
- Provide a multi-use trail on the north side of the reconstructed westbound Olson Memorial Highway bridge.

Figures 4-2, 4-3, and 4-4 depict proposed conceptual pedestrian crossing safety treatments and improvements along Olson Memorial Highway at signalized intersections and mid-block crossings and provisions for the proposed cycle track.

Figure 4-2. Conceptual Intersection Pedestrian Safety Improvements

Figure 4-3. Conceptual Mid-block Pedestrian Safety Improvements

Figure 4-4. Provisions for a Cycle Track on the North Side of Olson Memorial Highway

Plymouth Avenue Station

At the Plymouth Avenue Station, the Plymouth Avenue bridge would be reconstructed to accommodate the LRT and relocated freight rail tracks. Reconstruction is required because the existing bridge pier spacing would not allow the necessary freight, LRT, and LRT station configurations.

The Minneapolis Park and Recreation Board (MPRB) has requested that enhanced trail connections providing greater levels of connectivity with the regional trail system and the proposed Plymouth Avenue Station in this area as well, including a connection between Plymouth Avenue and the TWRP trail adjacent to Bassett Creek.

Pedestrian sidewalks and bicycle lanes in the shoulders on the bridge would be reconstructed and would provide access to the Plymouth Avenue Station vertical circulation facility as well as connecting to the existing trail west of the bridge. Additional improvements would be made to the sidewalks along Plymouth Avenue to the east to facilitate pedestrian movements between bus stop and passenger drop-off areas and the station. As part of this bridge reconstruction, the existing TWRP trail that runs parallel to Bassett Creek would be relocated to the west out of its current location within the BNSF right-of-way. (See **Section 5.3.4** of the Final EIS for a discussion of impacts to Bassett Creek.) Details of these design improvements have been coordinated with MPRB.

Figure 4-5 illustrates the planned bicycle and pedestrian accommodations at the proposed Plymouth Avenue Station.

Figure 4-5. Plymouth Avenue Station Area

Golden Valley Road Station Area

At the Golden Valley Road Station, both the Theodore Wirth Parkway bridge and the Golden Valley Road bridge would be reconstructed, including the existing pedestrian and bicycle facilities. The trail on the Theodore Wirth Parkway bridge would be widened to meet current design standards, and vertical circulation facilities to access the Golden Valley Road Station would be added to the Golden Valley Road bridge. A trailhead would be constructed at the eastern corner of the proposed Golden Valley Road Station park-and-ride. This trailhead would provide access to the existing Minneapolis Park and Recreation Board trail system and access to the proposed Bassett Creek Regional Trail that would be constructed by the Three Rivers Park District along Golden Valley Road.

The new Golden Valley Road bridge would be designed to accommodate a new trail connection under Golden Valley Road between TWRP and Sochacki Park.

The traffic operations analysis indicates that the Golden Valley Road/Theodore Wirth Parkway intersection would have approximately the same vehicular traffic level of service in 2040 with either the No-Build Alternative or the proposed BLRT Extension project (see the *BLRT Traffic Operations Technical Memorandum*, October 2015). However, the proximity of bicycle and pedestrian facilities and the addition of new trail connections with the proposed BLRT Extension project could require improving the intersection to enhance the safety of pedestrians and bicyclists. The Council will coordinate such improvements with the MPRB, the city of Golden Valley, and Hennepin County, along with other appropriate stakeholders.

Figure 4-6 illustrates the planned bicycle and pedestrian accommodations at the proposed Golden Valley Road Station.

Figure 4-6. Golden Valley Road Station Area

Robbinsdale Station Area

At the Robbinsdale Station, pedestrian crossings at 41st Avenue/Noble Avenue and at 42nd Avenue would be improved to provide safe access from the west side of the proposed BLRT Extension project alignment. A grade-separated crossing at 41st Avenue/Noble Avenue was considered by the Council but was rejected because of impacts to adjacent properties and potential security concerns. Pedestrian crossings would be constructed to provide ADA-compliant crossings of the freight rail and LRT tracks. Improvements to the 42nd Avenue/West Broadway Avenue intersection would maintain the existing pedestrian crossing alignment.

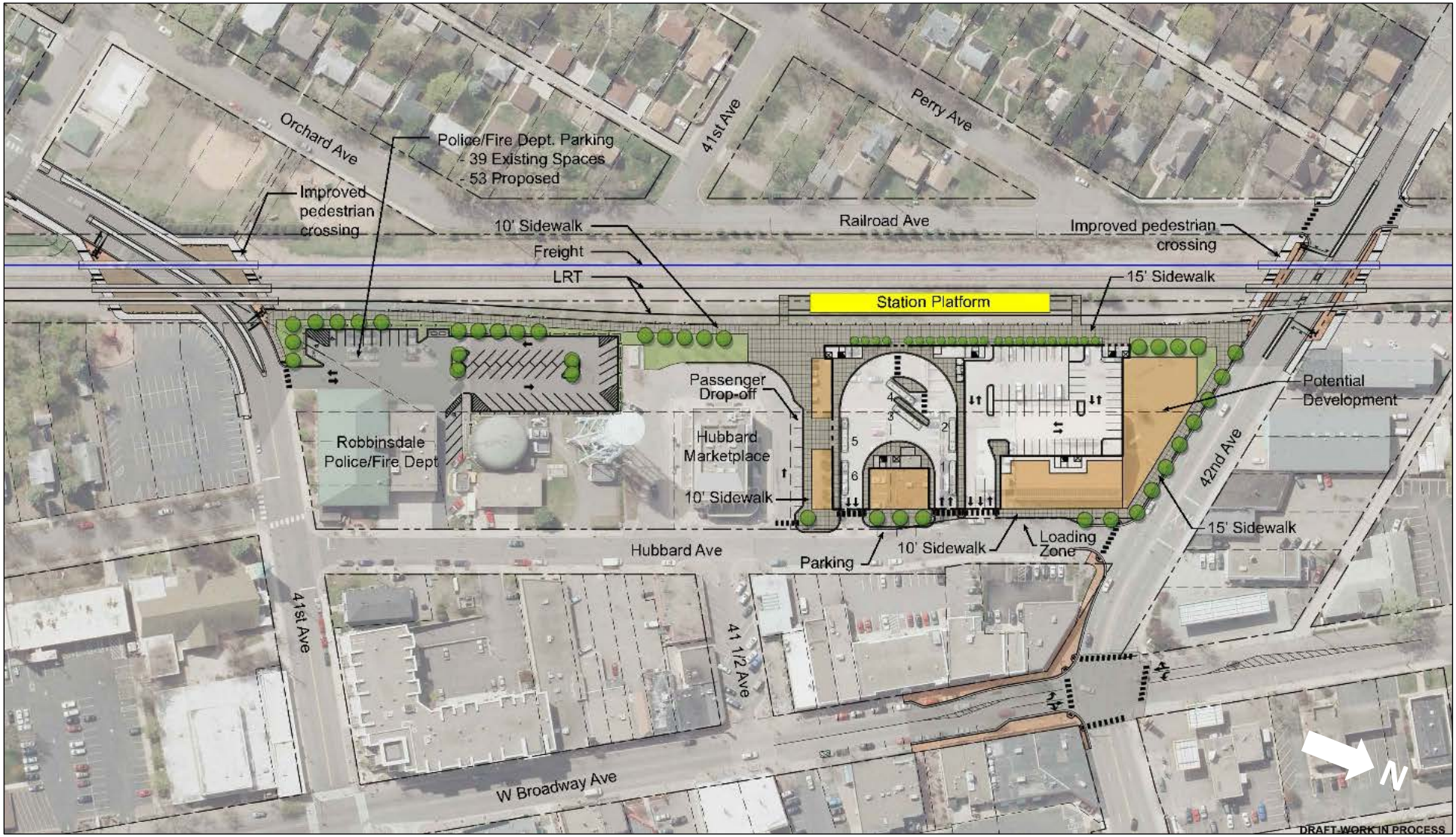
The Crystal Lake Regional Trail is located about 1,500 feet east of the Robbinsdale Station; cyclists would be able to access the station via 41st and 42nd avenues.

Existing pedestrian facilities would be improved at the proposed LRT crossing 45½ Avenue (about 1,300 feet north of TH 100). The proposed BLRT Extension project limits of disturbance would come within 10 feet of the existing trail in Lee Park but would not alter the trail itself.

Construction of the proposed BLRT Extension project would require closing the existing informal (and illegal) crossings of the BNSF track at Sochacki Park. Fences or other barriers to discourage pedestrian crossings would be necessary in these locations to preserve pedestrian safety near the LRT and freight tracks. Reconstructing the 36th Avenue bridge in this area (about ¾ mile south of the Robbinsdale Station) would also include restoring existing bicycle and pedestrian facilities.

Figure 4-7 illustrates the planned pedestrian accommodations at the proposed Robbinsdale Station.

Figure 4-7. Robbinsdale Station Area



Bass Lake Road Station Area

The proposed Bass Lake Road Station area provides a pedestrian bridge over Bottineau Boulevard and improved connections from trails and sidewalks along the south side of Bass Lake Road to reach the station. In addition, sidewalk connections would be provided or improved in the area of the proposed park-and-ride lot, including improved connections to Lakeland Avenue.

The Crystal Lake Regional Trail runs along the east side of Bottineau Boulevard; bicyclists and pedestrians would be able to use the existing crossing facilities at the Bass Lake Road intersection to connect to the Bass Lake Road Station.

South of Bass Lake Road, the proposed BLRT Extension project also includes improved pedestrian crossings of the LRT tracks at West Broadway Avenue (about 1 mile south of the Bass Lake Road Station) and Corvallis Avenue (about ⅔ mile south of the Bass Lake Road Station).

Figure 4-8 illustrates the planned bicycle and pedestrian accommodations at the proposed Bass Lake Road Station.

63rd Avenue Station Area

The proposed 63rd Avenue Station area provides improved connections along 63rd Avenue area stands to reach the station and a proposed grade-separated connection from the parking ramp to the station to provide a safe means of accessing the station platform directly from the parking ramp.

The Crystal Lake Regional Trail runs along the east side of Bottineau Boulevard; bicyclists would be able to use the existing crossing facilities at the 63rd Avenue intersection to connect to the station.

Improved at-grade pedestrian crossings of the LRT/freight rail alignment would also be provided at 71st Avenue (about 1¼ mile north of the 63rd Avenue Station).

Figure 4-9 illustrates the planned pedestrian accommodations at the proposed 63rd Avenue Station area.

Jolly Lane/75th Avenue Area

Just south of the Bottineau Boulevard/73rd Avenue intersection, the LRT alignment is proposed to transition from the BNSF rail corridor to a grade-separated crossing. The LRT would pass over both Bottineau Boulevard and 73rd Avenue and then descend to a run at grade in the center of West Broadway Avenue (see **Figure 4-10**). The introduction of the LRT alignment in the Jolly Lane area requires modifying roadway connections; the sidewalks in this area would be modified as well but would maintain pedestrian and bicycle connections to West Broadway Avenue.

The Crystal Lake Regional Trail currently ends at the I-94/I-694 interchange about ½ mile south of 73rd Avenue. Hennepin County is planning to improve Bottineau Boulevard in this area in 2017; the roadway corridor improvements would include extending the trail. At 73rd Avenue, the trail would go under the proposed LRT bridge built over Bottineau Boulevard.

Figure 4-8. Bass Lake Road Station Area

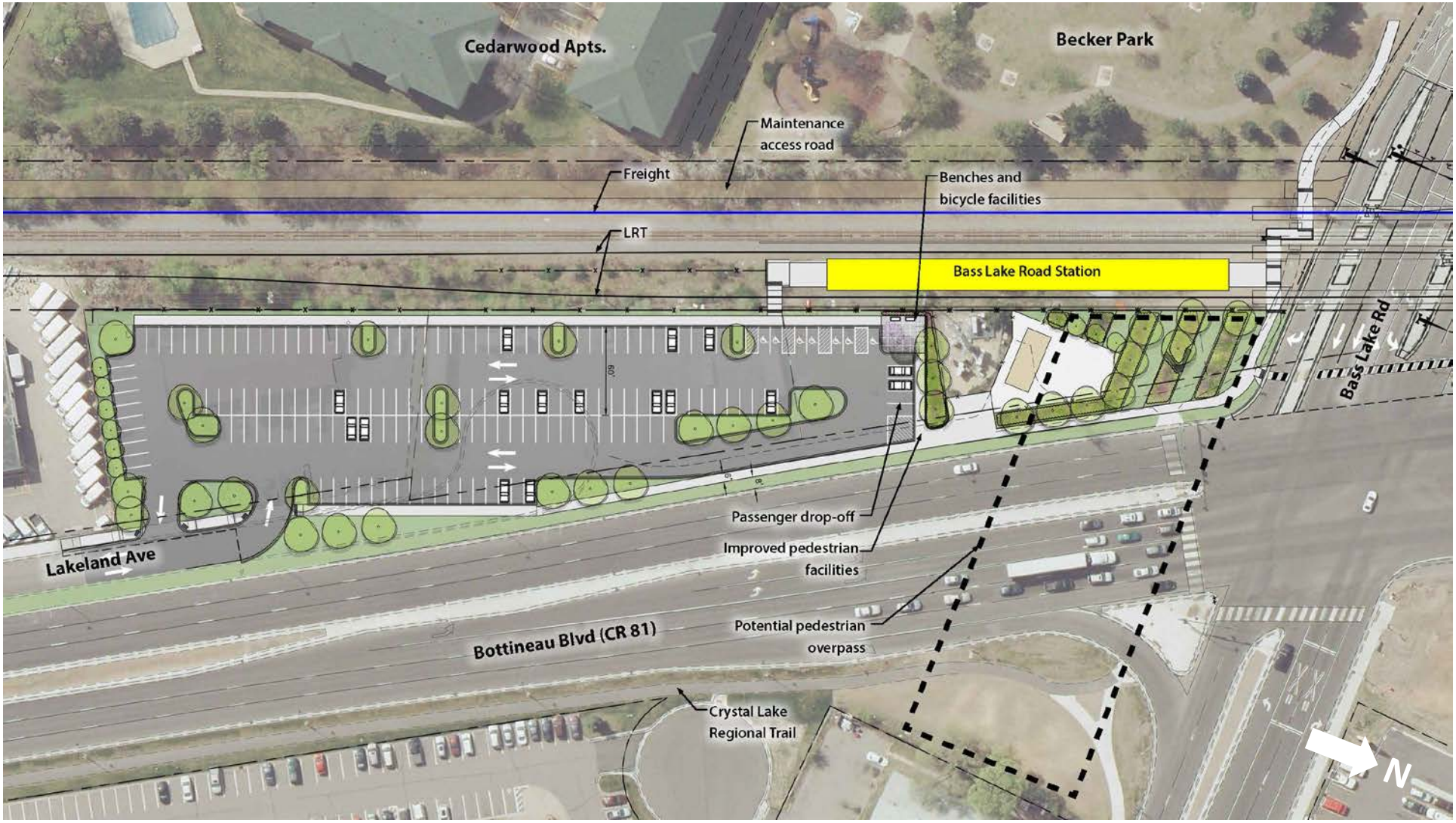


Figure 4-9. 63rd Avenue Station Area

Figure 4-10. Grade-Separated Crossing at 73rd Avenue and Jolly Lane/75th Avenue Area

West Broadway Avenue Station Area (including Brooklyn Boulevard, 85th Avenue, and 93rd Avenue Station Areas)

The proposed BLRT Extension project would require closing one pedestrian crossing of West Broadway Avenue in Brooklyn Park at a commercial property access about 400 feet north of the Brooklyn Boulevard/West Broadway Avenue intersection. An alternate crossing is available within ⅛ mile of the closed crossing.

The proposed BLRT Extension project and programmed improvements by other agencies would considerably enhance the non-motorized transportation environment in comparison to the No-Build Alternative. A continuous bicycle/pedestrian facility between Candlewood Drive and 93rd Avenue is included in the design plans for the West Broadway Avenue reconstruction project, which has been programmed independently of the proposed BLRT Extension project and would be completed by Hennepin County. The existing off-street trails on both sides of West Broadway Avenue north of 93rd Avenue would be crossed by the proposed LRT alignment in the vicinity of 94th Avenue, where the LRT alignment transitions from running alongside the center of West Broadway Avenue to the western side of the street in new right-of-way. Any direct impacts to the trails would be mitigated through trail reconstruction. Trails are proposed to be constructed south of Candlewood Drive along West Broadway to 75th Avenue. A new signalized crossing would be constructed at 75th Avenue.

Reconstruction of the trails south of Candlewood Drive would be completed as a component of the proposed BLRT Extension project, thereby providing continuous facilities along both sides of West Broadway Avenue.

Figures 4-11, 4-12, and 4-13 illustrate the planned bicycle and pedestrian accommodations at the proposed West Broadway Avenue Station areas at Brooklyn Boulevard, 85th Avenue North, and 93rd Avenue North. At the Brooklyn Boulevard Station, the 76th Avenue/West Broadway Avenue intersection would be improved, and would include bus stop access and a secondary access to the station. Improvements to the Brooklyn Boulevard/West Broadway Avenue intersection would provide safer pedestrian crossings by eliminating free right turns and would provide the primary access to the station.

Figure 4-11. Brooklyn Boulevard Station Area

Figure 4-12. 85th Avenue Station Area

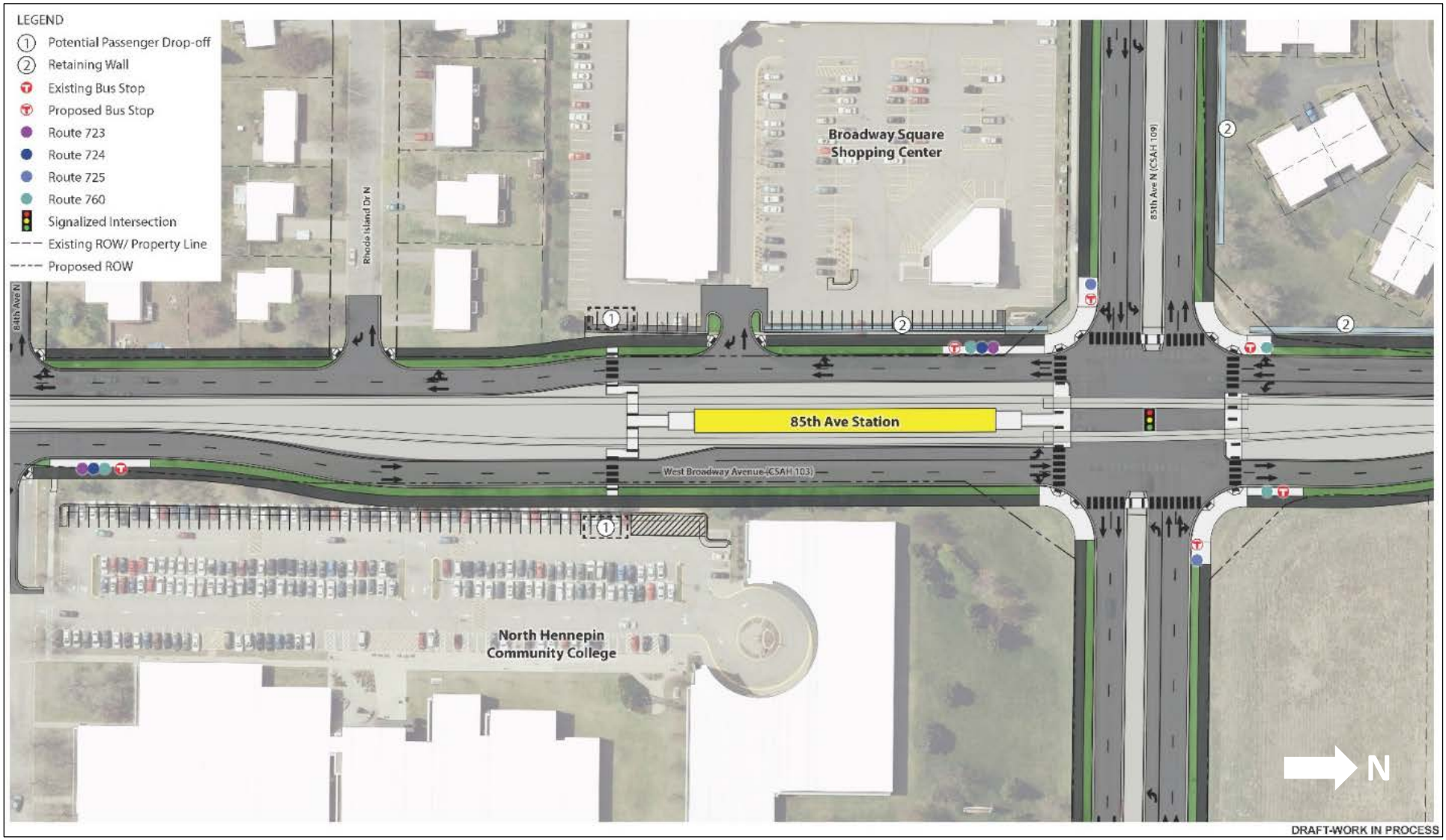
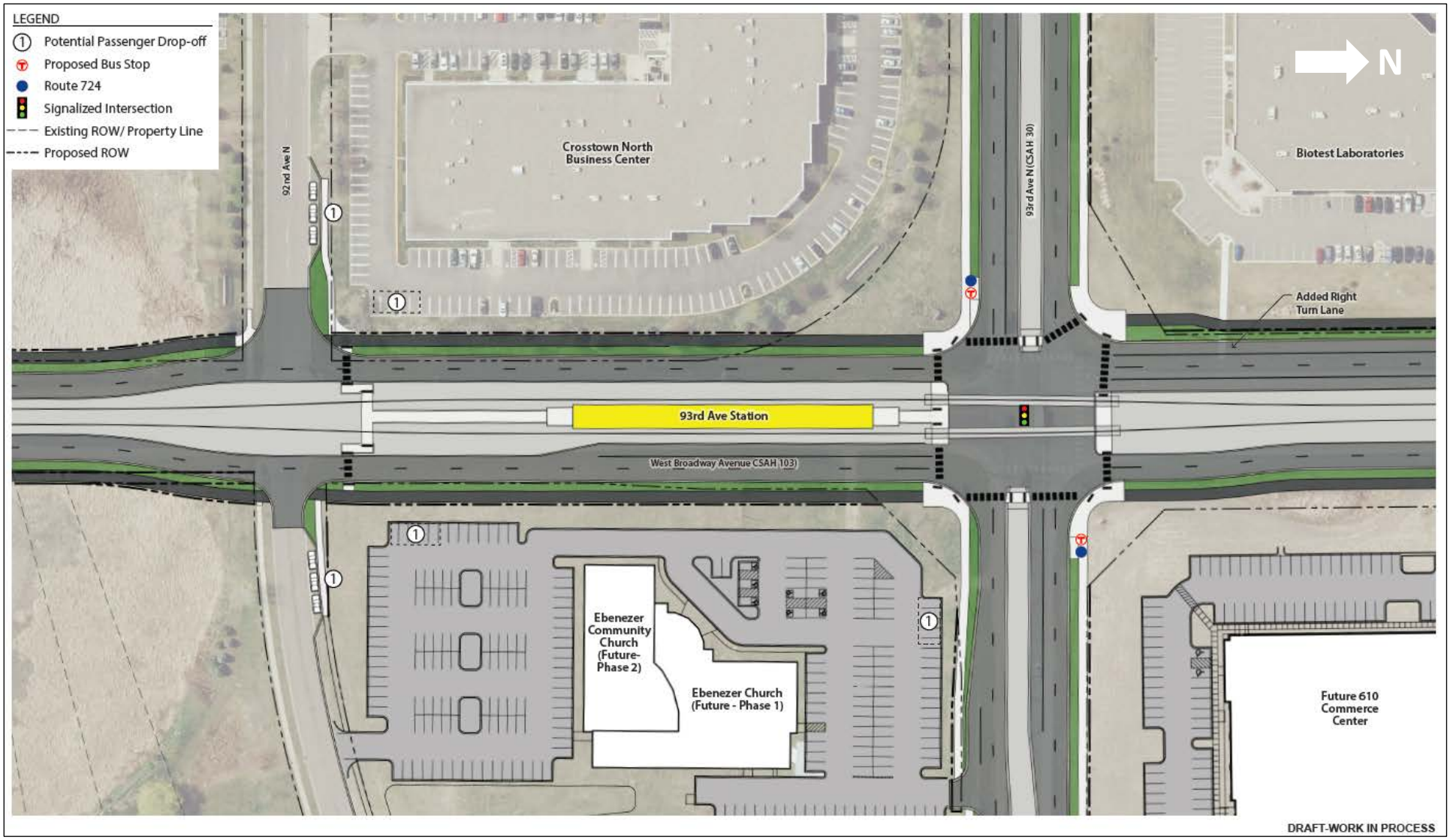


Figure 4-13. 93rd Avenue Station Area



In the area of the 85th Avenue Station, the pedestrian crossing at 84th Avenue and West Broadway Avenue would be closed. Pedestrian crossing facilities would be provided at a new signalized intersection at College Park Drive and West Broadway Avenue; this new intersection would provide full access to the North Hennepin Community College parking lot as well. Pedestrian access to the 85th Avenue Station would be from the 85th Avenue/West Broadway Avenue intersection as well as from a secondary access about 400 feet south of the intersection. The secondary access would also allow pedestrians to cross West Broadway Avenue.

Between the 85th Avenue and 93rd Avenue stations, improved pedestrian crossings of West Broadway Avenue would be located at the Maplebrook Parkway/West Broadway Avenue intersection and also at the Setzler Parkway/West Broadway intersection, where new, full-access signalized intersections would be constructed as part of the Hennepin County West Broadway Avenue reconstruction project.

Access to the 93rd Avenue Station would be provided at the improved 93rd Avenue/West Broadway Avenue intersection (also part of the Hennepin County West Broadway Avenue reconstruction project). Secondary access to the station would be provided by a crossing at 92nd Avenue; this crossing would be constructed as part of the proposed BLRT Extension project.

Bicycle access to LRT stations would use the same locations as those identified for pedestrians; the introduction of bicycle/pedestrian trails on either side of West Broadway Avenue (through the Hennepin County West Broadway Avenue reconstruction project) would further enhance bicycle access to BLRT.

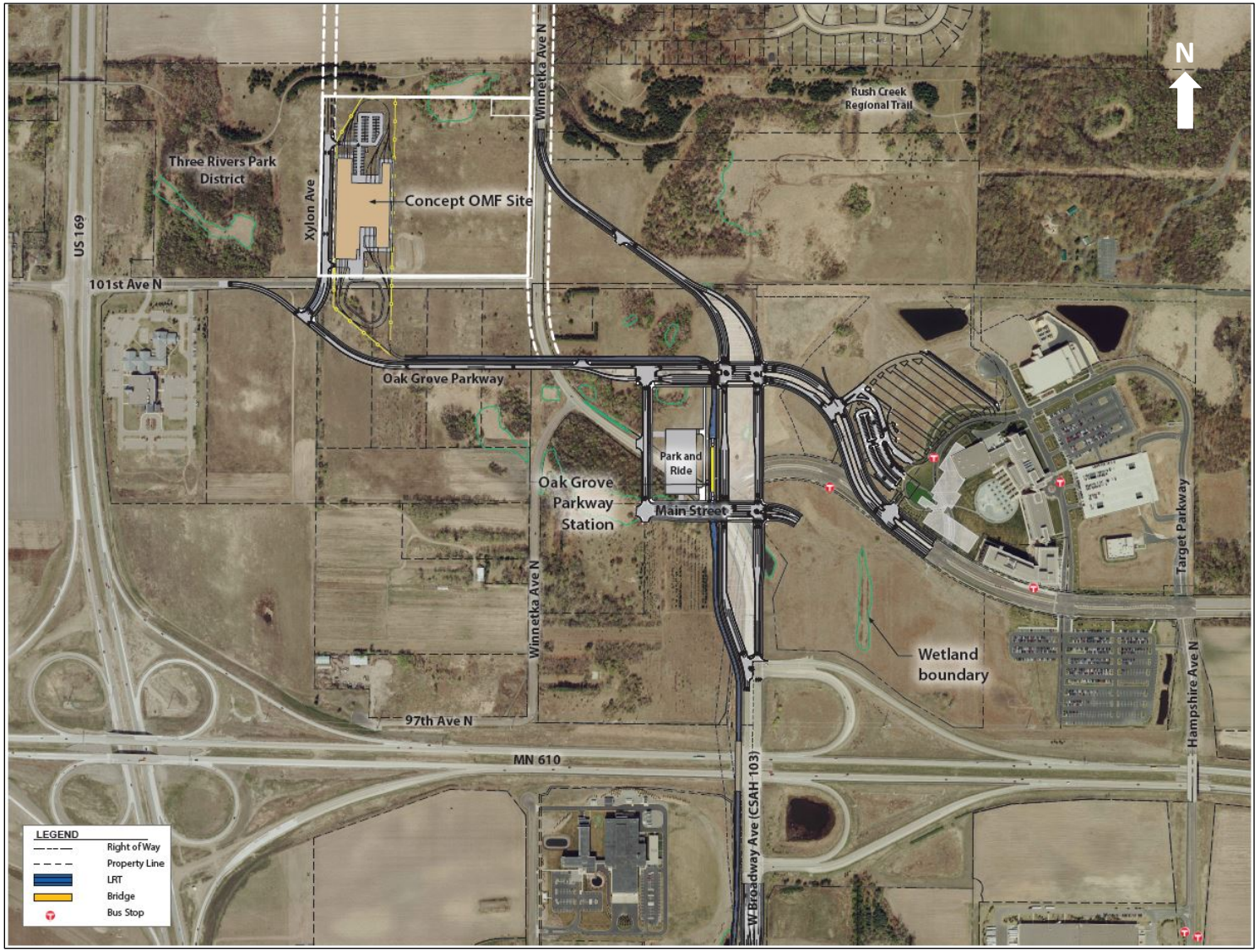
Oak Grove Parkway Station Area

Extensive discussions with the city of Brooklyn Park and Hennepin County resulted in a preliminary layout realigning West Broadway Avenue, Oak Grove Parkway, and 101st Avenue (see **Figure 4-14**). This proposed roadway layout incorporates the Oak Grove Parkway Station and park-and-ride into a transportation network that would accommodate proposed development in the area. The intent of the proposed transportation network is to create a walkable, bicycle-friendly environment; therefore, the appropriate provisions for sidewalks and bicycle trails would be incorporated into the final design for the proposed BLRT Extension project in this area. Provisions for future connections (by others) to the Rush Creek Regional Trail, located just north of the OMF, would be included.

TPSS

TPSS sites associated with the proposed BLRT Extension project would have little to no impact on existing bicycle and pedestrian facilities.

Figure 4-14. Oak Grove Parkway Station Area



4.4.2 Construction-Phase (Short-Term) Impacts

4.4.2.1 No-Build Alternative

There would be no construction-phase impacts to pedestrians or bicyclists from the No-Build Alternative.

4.4.2.2 Proposed BLRT Extension Project

For the proposed BLRT Extension project, the Council anticipates that temporary closures or detours would affect existing bicycle and pedestrian facilities. Construction traffic and debris such as excess dirt and gravel can also pose obstacles or issues for pedestrians and bicyclists. Safe access for non-motorized users as a result of detours, closures, and other inconveniences during the construction phase would be included by the Council in phasing plans.

4.5 Avoidance, Minimization, and/or Mitigation Measures

This section describes the measures that would be implemented to mitigate the long-term and short-term pedestrian and bicyclist impacts from the proposed BLRT Extension project. For each mitigation measure or set of associated mitigation measures, this section generally notes the anticipated impact or associated impacts that the mitigation measures would address.

4.5.1 Long-Term Mitigation Measures

No mitigation measures are warranted for long-term impacts to pedestrians and bicyclists because the identified avoidance measures would prevent any adverse impacts. As described in **Section 3.4**, the proposed BLRT Extension project includes a variety of pedestrian and bicyclist enhancements at station locations and at other LRT crossings.

4.5.2 Short-Term Mitigation Measures

The proposed BLRT Extension project would require short-term closures of sidewalks, trails, or roads (typically up to about 3 to 5 days), during which detour routes or facilities might not be provided.

Mitigation strategies to be taken in the event of temporary closures would be identified by the Council in the Construction Communication Plan, which would include a staging plan for implementation by the Council prior to and during construction. The purpose of the Construction Communication Plan is to prepare project-area residents, businesses, and commuters for construction; listen to their concerns; and develop plans to minimize disruptive effects. Strategies could include:

- Issuing and distributing regular construction updates
- Providing advance notice of roadway closures, driveway closures, and utility shutoffs
- Conducting public meetings
- Establishing a 24-hour construction hotline
- Preparing materials with information about construction
- Addressing property access issues
- Assigning staff to serve as liaisons between the public and contractors during construction

5 Parking

5.1 Methodology

This section describes parking in the study area and the effects of the No-Build Alternative and the proposed BLRT Extension project on the number and locations of parking spaces. The construction of LRT and associated modifications to roadway geometry would alter the supply of on-street and off-street parking. These changes could, in turn, reduce convenient access to businesses and residences.

Dedicated park-and-ride facilities have been identified by the Council as part of the proposed BLRT Extension project. All new park-and-ride facilities are not addressed as part of this impact assessment of existing parking conditions. See **Table 2-1** in **Section 2** for a summary of the locations and sizes of the proposed park-and-ride facilities, and see the *BLRT Traffic Operations Technical Report* for information regarding the effects of the proposed park-and-ride facilities on traffic.

The study area is characterized by highway facilities with no parking, arterial roads, local streets, frontage roads with some on-street parking, and off-street parking that serves commercial and institutional facilities.

The analysis in this section focuses on the impacts of the proposed BLRT Extension project on existing on-street and off-street parking. The Council reviewed the existing parking supply in the proposed BLRT Extension project corridor, which included reviewing aerial photographs and field

visits as well as project engineering drawings in order to assess the effects of changes in the parking supply.

5.2 Study Area

The study area for parking is defined as the proposed BLRT Extension project limits of disturbance.

5.3 Affected Environment

Vehicle parking in the study area is a combination of on-street parking and surface parking lots. Local jurisdictions have the authority to regulate parking, including introducing permit parking or other parking restrictions.

Almost all on-street parking is available to the public as either metered or unmetered spaces. There are some on-street parking spaces along certain frontage roads along Olson Memorial Highway and West Broadway at 42nd Avenue.

Off-street parking consists of a mix of public and private lots. Private off-street parking is restricted to authorized people. Off-street public parking spaces are available for commercial and retail businesses as well as park areas and facilities such as the TWRP Chalet parking lot. Other off-street parking facilities include parking lots for restaurants, churches, North Hennepin Community College, other public parks, and medical-related businesses. The public can use these parking lots only when they are using these facilities.

5.4 Environmental Consequences

5.4.1 Operating-Phase (Long-Term) Impacts

5.4.1.1 No-Build Alternative

There would be no operating-phase parking impacts from the No-Build Alternative.

5.4.1.2 Proposed BLRT Extension Project

Impacts to on-street and off-street parking resources were considered; the results of the analysis are shown in **Figure 5-1** and described below.

Olson Memorial Highway

Existing on-street parking would be affected by the proposed BLRT Extension project primarily on the frontage roads along Olson Memorial Highway. This impact would be caused by the configuration of the proposed reconstruction of the highway. As it developed the proposed BLRT Extension project, the Council tried to maintain frontage road connections and minimize the acquisition of right-of-way. Specifically, reconstructing the frontage roads on the north and south sides of Olson Memorial Highway would eliminate about 83 on-street parking spaces, as follows (see **Figure 5-1**):

- About 25 spaces along the frontage road on the north side of Olson Memorial Highway between Humboldt Avenue and Van White Memorial Boulevard
- About 50 spaces along the frontage road on the south side of Olson Memorial Highway between Knox Avenue North and the cul-de-sac west of Van White Boulevard
- About eight spaces along the frontage road on the north side of Olson Memorial Highway roughly one-half block east and west of Queen Avenue North

Robbinsdale Station Area

Several on-street parking spaces would also be eliminated on Hubbard Avenue and West Broadway Avenue near the Robbinsdale Station park-and-ride. Specific impacts include:

- About three spaces on the west side of Hubbard Avenue immediately south of 42nd Avenue
- About six spaces on the west side of West Broadway Avenue immediately south of 42nd Avenue
- City of Robbinsdale Police/Fire Department spaces west of the city buildings and east of the proposed BLRT Extension project alignment would be reconfigured. No net loss of spaces is anticipated.
- About 50 parking spaces would be eliminated from a parking lot for local businesses north of Hubbard Marketplace between 41st and 42nd avenues.
- Eleven diagonal parking spaces would be converted to five parallel parking spaces on the north side of the Hubbard Marketplace building.

As discussed in **Chapter 2** and shown in **Table 3.3-4** of the Final EIS, the proposed BLRT Extension project would include a 550-space park-and-ride facility for transit patrons adjacent to the Robbinsdale Station.

Figure 5-1. Parking Impacts

73rd Avenue/West Broadway Avenue Area

Off-street parking impacts would occur in the area just north of 73rd Avenue and west of West Broadway Avenue in Brooklyn Park. Impacts would include:

- Near 73rd Avenue, about 75 spaces would be eliminated from a retail center (7316 Lakeland Avenue) surface parking lot (about 20 percent of the existing parking lot). This reconfiguration is intended to accommodate the LRT alignment as it transitions from the BNSF rail corridor to West Broadway Avenue.
- At the eastern edge of the Target store (7535 West Broadway Avenue) parking lot, about 80 spaces would be eliminated to accommodate the reconstructed southbound lanes of West Broadway Avenue and the associated multipurpose trail. An additional 15 to 20 spaces would likely be lost at the southern edge of the parking lot as a result of reconfiguring the roadway connection between Jolly Lane and West Broadway Avenue. The total impact at this site would be up to 100 spaces lost out of about 1,200 spaces, or about 8 percent.

Oak Grove Parkway Station Area

Realigning Oak Grove Parkway on the east side of West Broadway Avenue north of TH 610 would require reconfiguring the Target North Campus parking lot. No net loss of spaces is anticipated.

Table 5-1 summarizes the number of parking spaces that would be eliminated by the proposed BLRT Extension project.

Table 5-1. Number of Parking Spaces Eliminated by the Proposed BLRT Extension Project

Alternative	Parking Spaces Eliminated		
	On-Street Spaces	Off-Street Spaces	Total Spaces
No-Build Alternative	0	0	0
Proposed BLRT Extension project	92	231	323

TPSS

The Council anticipates that TPSS sites would located on available parcels that are adjacent to the guideway and would not directly affect existing on-street or off-street parking.

5.4.2 Construction-Phase (Short-Term) Impacts

5.4.2.1 No-Build Alternative

There would be no construction-phase parking impacts from the No-Build Alternative.

5.4.2.2 Proposed BLRT Extension Project

On-street parking spaces could be temporarily removed at locations to facilitate construction of the proposed BLRT Extension project (for example, to facilitate truck movements or to provide a temporary truck loading zone). These potential temporary removals of on-street parking spaces would be identified as part of a construction staging plan prior to construction. At the Council's direction, the contractor would reduce the loss of parking spaces during construction to the extent possible.

5.5 Avoidance, Minimization, and/or Mitigation Measures

This section describes the measures that would be implemented to mitigate the long-term and short-term parking impacts from the proposed BLRT Extension project. For each mitigation measure or set of associated mitigation measures, this section generally notes the anticipated impact or associated impacts that the mitigation measures would address.

5.5.1 Long-Term Mitigation Measures

Where off-street parking spaces would be lost but buildings and businesses remain, the Council would compensate business owners for the loss of off-street parking spaces, including potential associated losses in business revenues. The Council would compensate property owners based on the terms of the purchase agreement between the Council and the property owner in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act). Refer to **Section 4.3 – Acquisitions and Displacements** of the Final EIS for additional information regarding the Uniform Act.

The Council would coordinate mitigation for the loss of on-street parking spaces with local jurisdictions (the cities of Minneapolis and Robbinsdale) to identify whether suitable replacement locations are necessary. In Minneapolis, the character of the proposed Olson Memorial Highway has been designed to facilitate multimodal transportation options with greater emphasis on transit, bicycle, and pedestrian modes. Furthermore, parking would remain on nearby streets and at off-street parking lots associated with the adjacent buildings. As a result, mitigating lost parking spaces might not be necessary. Similarly, the city of Robbinsdale is exploring transit-oriented development in the Robbinsdale Station area. This could preclude the need for parking mitigation or provide the opportunity for parking that is better integrated into planned development.

5.5.2 Short-Term Mitigation Measures

During construction, some on-street parking spaces could be removed to facilitate construction of the proposed BLRT Extension project and associated roadway and freight rail modifications (for example, to facilitate truck movement or provide a temporary truck loading zone). To address these

impacts, the Council would develop a Construction Mitigation Plan to address temporary parking loss during the construction of the proposed BLRT Extension project. Construction activities would be phased; therefore, many of the spaces lost during construction would be lost for only part of the construction phase.

6 Aviation

6.1 Methodology

According to the Federal Aviation Administration's (FAA) *Advisory Circular (AC 150/5300-13A*), a Runway Protection Zone (RPZ) is "an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground." RPZs are located at the end of each airport runway, and land use is typically controlled by the airport owner. Minnesota State Safety Zone areas overlay and extend beyond the federal RPZs. The most restrictive areas created by MnDOT regulations are called State Safety Zones A and B. The length of State Safety Zone A is typically two-thirds of the total runway length; State Safety Zone B is typically one-third of the total runway length and extends from State Safety Zone A. The Metropolitan Airports Commission (MAC) adopted an airport zoning ordinance applicable to Crystal Airport on August 25, 1952. This ordinance provides additional guidance on the use of property near Crystal Airport.

The FAA Office of Airports issued a memorandum on September 27, 2012, that presents interim guidance on land uses within RPZs. This memorandum clarifies what constitutes a compatible land use within an RPZ, as identified in *FAA Advisory Circular 150/5300-Change 17 (Airport Design)*. The memorandum states that "it is desirable to clear all objects from the RPZ," but the memorandum also acknowledges that "some uses are permitted" with conditions while other "land uses are prohibited." The memorandum also provides guidance on how to evaluate proposed land uses within an RPZ. The proposed BLRT Extension project is considered by FAA to be a local development (transportation facility) proposed in the RPZ (either new or reconfigured).

In accordance with the September 27, 2012, FAA policy guidance, FAA requested that the Council prepare an RPZ Alternatives Analysis (AA) specific to the proposed BLRT Extension project alignment that would encroach on the Crystal Airport RPZ for Runway 6L-24R. A small segment of the existing BNSF track currently passes through the corner of the Runway 6R-24L RPZ. Runway 6R-24L is a 2,102-foot turf runway and is scheduled to be decommissioned by MAC in the next 3 to 7 years. Because of the scheduled closure of Runway 6R-24L, the RPZ AA focuses on the Runway 6L-24R (Runway 6L) RPZ only.

On October 18, 2013, the Federal Transit Administration (FTA) submitted to FAA a Draft RPZ AA for its initial review and consideration. FAA provided written comments on November 12, 2013, and these comments were discussed at a coordination meeting among MAC, FAA, Hennepin County, and the Council. FTA updated the Draft RPZ AA to address FAA's initial comments and resubmitted the draft to FAA for its review on January 24, 2014. Someone held a subsequent meeting with FAA on February 4, 2014, to review the revised Draft RPZ AA with FAA. Based on the direction provided at the February 4 meeting, FTA submitted a revised RPZ AA to FAA on February 10, 2014.

The RPZ AA defines and evaluates several alternatives that address eliminating or minimizing the effect of the proposed LRT alignment on the Runway 6L RPZ. These alternatives include modifications to the LRT alignment vertically and horizontally, both within and outside the Runway 6L RPZ; modifications that shift the location of the RPZ; and operational alternatives that address the coexistence of aircraft and LRT simultaneously in the RPZ.

6.2 Study Area

The only aviation facility within the limits of disturbance of the proposed BLRT Extension project is Crystal Airport. The study area for aviation is defined as the area that is within the proposed BLRT Extension project limits of disturbance and within the Runway 6L RPZ and State Safety Zone A for Runway 6L but outside the Crystal Airport property boundary.

The size of the RPZ for Runway 6L is based on the design aircraft of the runway, which is a B-1 small aircraft. The RPZ, which is trapezoidal in shape with a 250-foot inner dimension and 450-foot outer dimension, is 1,000 feet long and contains 8.0 acres, 3.1 of which are not on airport property. State Safety Zone A contains 10.3 acres, 3.1 of which are not on airport property. State Safety Zone B contains 8.3 acres, none of which are on airport property or within the study area.

6.3 Affected Environment

Crystal Airport is one of seven airports owned and operated by MAC. The airport is designed for B-1 small aircraft. Based on FAA control tower counts, the total number of operations at Crystal Airport in 2014 was 49,550. The BNSF rail corridor, which runs parallel to Bottineau Boulevard and is about 3 to 4 feet higher in elevation than the adjacent ground west and east of the BNSF rail corridor, passes through the existing Runway 6L RPZ. The approximate length of the existing freight rail track within the RPZ is 435 feet. The land use in the portion of State Safety Zone A that is beyond Crystal Airport's property boundary is residential. State Safety Zone B is located beyond the limits of State Safety Zone A, outside the BNSF right-of-way and outside the proposed BLRT Extension project's identified limits of disturbance.

6.4 Environmental Consequences

6.4.1 Operating-Phase (Long-Term) Impacts

6.4.1.1 No-Build Alternative

The No-Build Alternative would not include any improvements within the RPZ; therefore, there would be no operating-phase aviation impacts from the No-Build Alternative.

6.4.1.2 Proposed BLRT Extension Project

With the proposed BLRT Extension project, the existing BNSF tracks would be relocated about 15 feet west of the current location, and two LRT tracks would be constructed immediately east of the BNSF tracks. All three tracks would be located within the existing 100-foot-wide BNSF right-of-way through the RPZ. The length of the northbound and southbound LRT tracks within the RPZ would be about 425 feeteach.

The proposed speed of the LRT at this location is about 55 mph. Therefore, the train would be in the RPZ for about 5 seconds per operation. The Council anticipates that trains would operate in this area about every 10 minutes throughout the day.

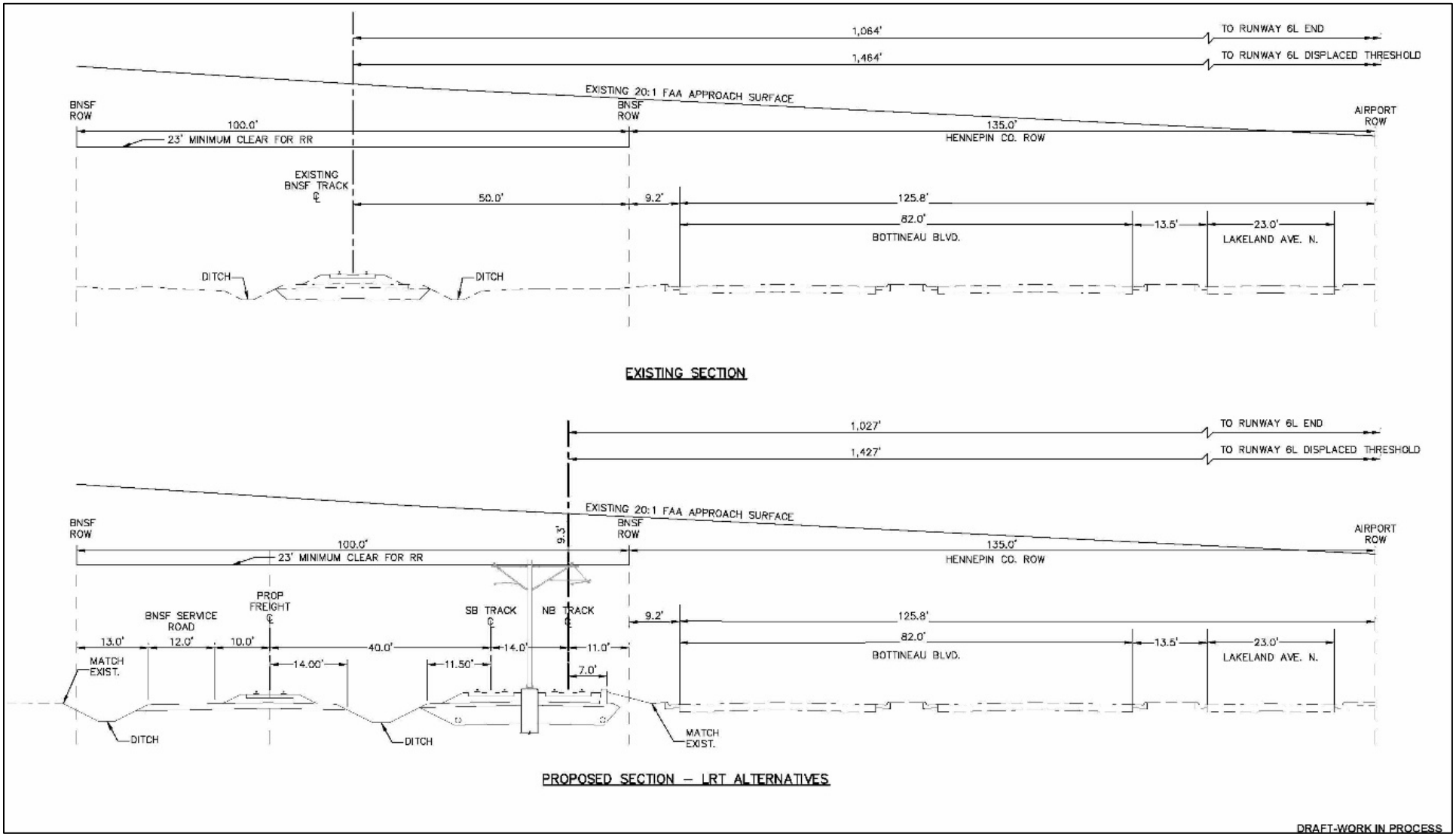
Airports define runways as having several imaginary surfaces, one of which is the approach surface, which is used as a boundary to determine whether an object would extend upward into navigable airspace. The height of the proposed BLRT Extension project's LRT vehicle is about 16 feet, or about 16.5 feet below Runway 6L's approach surface.

Overhead catenary system (OCS) poles about 23 feet 4 inches high would be located about 200 feet apart. The poles would be located to maximize the distance from the poles to the RPZ centerline. The Council anticipates that the poles could be located about 100 feet left and right of the extended runway centerline. Final OCS pole spacing and locations would be determined during the final design of the proposed BLRT Extension project.

The proposed BLRT Extension project would affect areas within the controlled activity area and the central portion of the RPZ.[4] The proposed LRT alignment would be within the existing 100-foot BNSF right-of-way, which is currently within the controlled activity area (17,860 square feet) and the central portion of the RPZ (25,470 square feet). During development of the proposed BLRT Extension project, the Council shifted the LRT alignment 10 feet to the east—still within the BNSF right-of-way, but slightly closer to the airport. **Figure 6-1** illustrates the impacts to the RPZ.

[4] The RPZ includes two areas: (1) the central portion, which is a rectangular area centered on the runway centerline, and (2) the controlled activity areas, which are triangular areas extending from the central portion that are narrower near the runway and wider farther from the runway.

Figure 6-1. Crystal Airport Runway Protection Zone and State Safety Zone Effects



6.4.2 Construction-Phase (Short-Term) Impacts

6.4.2.1 No-Build Alternative

The No-Build Alternative would not involve any improvements within the RPZ; therefore, there would be no construction-phase impacts on the aviation from the No-Build Alternative.

6.4.2.2 Proposed BLRT Extension Project

Construction of the proposed BLRT Extension project, including the overhead catenary system, would occur within the Runway 6L RPZ. Construction operations and phasing in the RPZ would be coordinated with MAC and FAA during the proposed BLRT Extension project's final design phase to mitigate these impacts. The Council would complete FAA's *Form 7460 – Notice of Proposed Construction or Alteration* during final design. The Council would consider the Form 7460 process complete if FAA were to issue a statement of no objection to the proposed activity.

Construction equipment height would be restricted within the runway approach surface. To discourage bird nesting, no open water would be allowed in the RPZ during construction.

6.5 Avoidance, Minimization, and/or Mitigation Measures

This section describes the measures that would be implemented to mitigate the long-term and short-term aviation impacts from the proposed BLRT Extension project. For each mitigation measure or set of associated mitigation measures, this section generally notes the anticipated impact or associated impacts that the mitigation measures would address.

As discussed in **Section 6.1**, an RPZ AA was performed, in conformance with the FAA memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, to identify the full range of alternatives that could avoid and/or minimize the effects of the proposed BLRT Extension project on the land use within the RPZ as well as mitigate the risks to people and property on the ground. The RPZ AA reviewed several alternatives to minimize impacts to the RPZ. The recommendation identified in the RPZ AA was that Alignment C, as defined in the Draft EIS locally preferred alternative, was the Preferred Alternative. FAA reviewed the findings and recommendations of the RPZ AA and stated in a letter dated November 24, 2014, that it concurred with the RPZ AA findings.

Because of the shift in the LRT alignment noted above in **Section 6.4.1.2**, the Metropolitan Council provided updated information regarding the position of the LRT catenary system to FAA on November 20, 2015, along with the Council's opinion that the shift in alignment would not alter the RPZ AA; FAA concurred with the Council's analysis in a letter dated December 28, 2015.

MAC is in the process of updating the Crystal Airport Layout Plan. An Airport Layout Plan is a planning tool that aviation authorities use to depict both existing facilities and planned development for an airport. The Crystal Airport Layout Plan identifies the boundaries and proposed additions that are owned or controlled by the Airport and planned to be used for airport purposes, existing and proposed airport facilities and structures, and the location of existing and proposed non-aviation areas within the airport boundaries. The proposed BLRT Extension project would modify the existing conditions within the RPZ.

Based on the decisions rendered by FAA through the RPZ AA and confirmed through FAA's issuance of a letter of no objection (Form 7460 application), the proposed BLRT Extension project would be included in the updated Crystal Airport Layout Plan.

7 References

Blue Line Extension Travel Demand Model Estimates (SRF Consulting Group, 2015)

METRO Blue Line Light Rail Extension LRT Travel Time Estimates (Feb 2015)

Americans with Disabilities Act (ADA) in www.ada.gov/2010ADAstandards_index.htm

Appendix F
Supporting Technical Reports

F.2 BLRT Traffic Operations Technical Memorandum

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METRO Blue Line LRT Extension (BLRT)
5514 West Broadway Avenue, Suite 200, Crystal, MN 55428 www.bluelineext.org

To:	Nick Landwer, P.E. Director of Design and Engineering, Blue Line LRT Extension Project
From:	JoNette Kuhnau, P.E., PTOE Traffic Engineering Task Lead, Kimley-Horn and Associates, Inc.
Date:	November 12, 2015
Subject:	BLRT Traffic Operations Technical Memorandum

1.0 Introduction

The Blue Line Light Rail Transit Extension (BLRT) project is proposed to be a 13-mile LRT project with 10 or 11 new stations that will operate from downtown Minneapolis through Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. The BLRT line will serve as an extension of the METRO Blue Line (Hiawatha Corridor) and will also connect to the METRO Green Line in downtown Minneapolis.

The traffic analysis presented in this memorandum is based on the project scope as presented to the Corridor Management Committee (CMC) through September 2015, and as shown in the BLRT Municipal Consent (MC) plans.

1.1 Purpose of Memorandum

This technical memorandum has been prepared in support of the BLRT project MC design and the Final Environmental Impact Statement (Final EIS). The objective of the traffic analysis is to define the scope of the project improvements and evaluate the potential traffic impacts of the project, including the following:

- Evaluate the project's impacts on traffic operations at existing and proposed intersections and at-grade rail crossings along or near the BLRT alignment.
- Identify proposed improvements to address operational issues identified in the traffic analysis.

The methodology, assumptions, and results of the analysis are presented in the following sections.

1.2 Study Areas

The location of the overall BLRT alignment is shown in **Figure 1**. The proposed BLRT guideway will be at-grade for most of its alignment and includes segments with the LRT operating in an exclusive guideway and semi-exclusive street-running operation. In the middle segments of the alignment, the LRT guideway operates adjacent to the BNSF Railway (BNSF) Monticello Subdivision, from approximately 73rd Avenue in Brooklyn Park to Trunk Highway (TH) 55 in Minneapolis. The locations of the intersections and at-grade crossings studied as part of the BLRT traffic analysis are shown in **Figures 2-6.** The analysis was broken into four segments based on the characteristics of the roadway and BLRT alignment, as shown in **Figure 1** and described below:

- Operations and Maintenance Facility (OMF) to TH 610 in Brooklyn Park – BLRT alignment side-running along County State Aid Highway (CSAH) 103 (West Broadway Avenue) and Oak Grove Parkway.

- TH 610 to CSAH 81 (Bottineau Boulevard)/73rd Avenue N intersection in Brooklyn Park – BLRT alignment generally center-running along CSAH 103 (West Broadway Avenue).
- CSAH 81 (Bottineau Boulevard)/73rd Avenue N intersection in Brooklyn Park to TH 55 (Olson Memorial Highway) in Minneapolis –BLRT alignment adjacent to the BNSF Monticello Subdivision freight rail alignment.
- TH 55 (Olson Memorial Highway) to Target Field Station in Minneapolis – BLRT alignment generally center-running along TH 55 (Olson Memorial Highway).

The alignment between 41st Avenue N in Robbinsdale and TH 55 (Olson Memorial Highway) in Minneapolis included only one intersection (Golden Valley Road/Theodore Wirth Parkway) in the traffic analysis because the BLRT alignment is generally grade separated from the roadway network through this area. The BLRT alignment crosses only one low-volume roadway (39 ½ Avenue N), and the crossing on 39 ½ Avenue N is a gated crossing with no nearby all-way stop or signalized intersections. The Golden Valley Road/Theodore Wirth Parkway intersection was included in the analysis based on the potential traffic impacts due to the proposed park-and-ride facility at the Golden Valley Road Station.

1.3 Data Collection

Multiple data elements were collected for each of the areas analyzed:

- 13-hour weekday counts at intersections including passenger vehicles, heavy vehicles, pedestrians, and bicycles
- Freight rail train lengths and crossing times
- On-site field survey to collect the following information:
    - Existing intersection geometry
    - Lane widths
    - Lane utilizations
    - Approximate peak hour queue lengths
    - Storage bay lengths to the nearest 10-ft increment
    - Approach speed limits
    - Traffic signal infrastructure, including emergency vehicle preemption
    - Relevant signage and pavement markings
- Timing and coordination plans for existing signalized intersections
- Bus routes, stops, and passenger loading/unloading

This data was used to assemble a comprehensive model of the existing conditions.

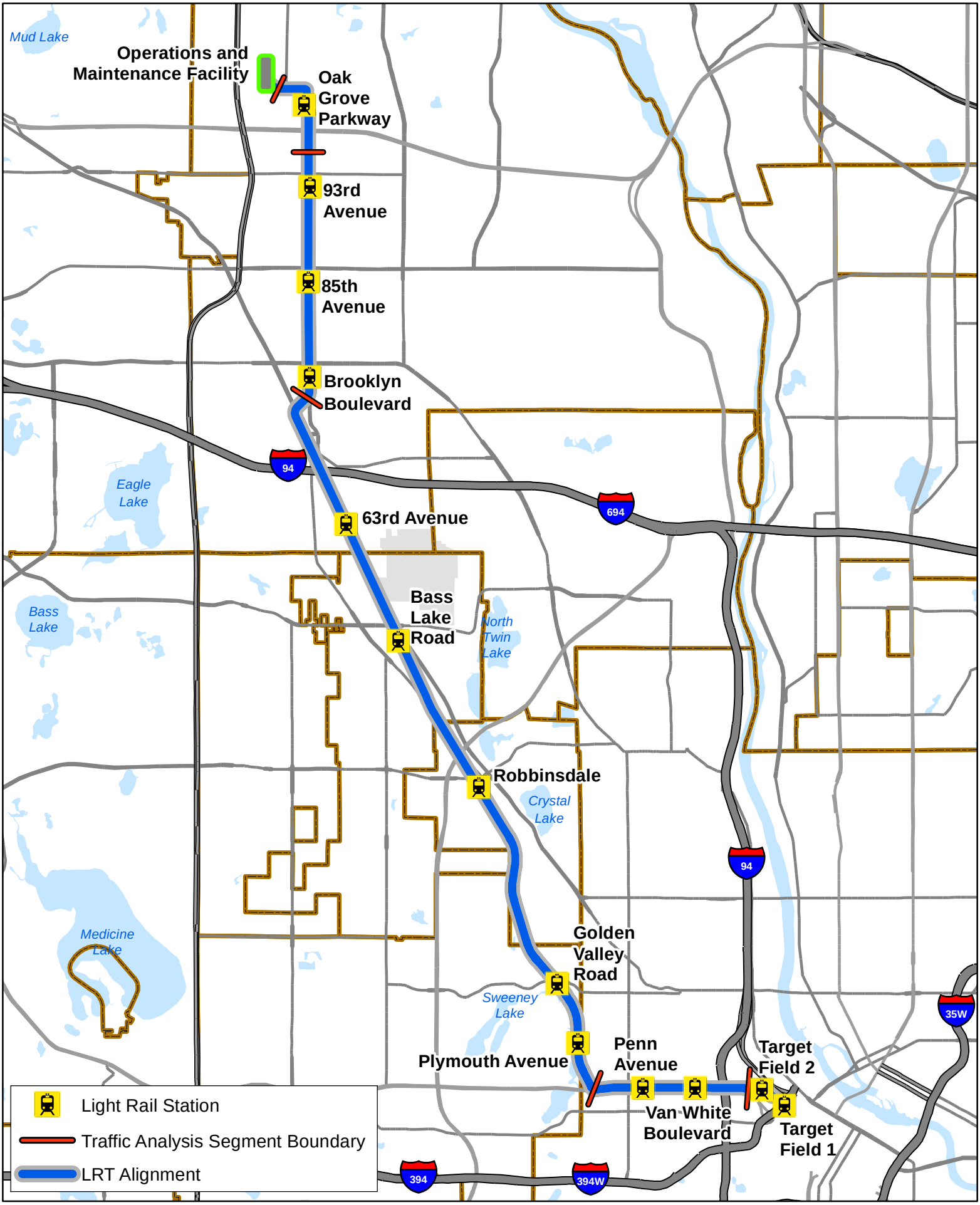


Figure 1. BLRT Project Study Area

0 0.5 1 Miles

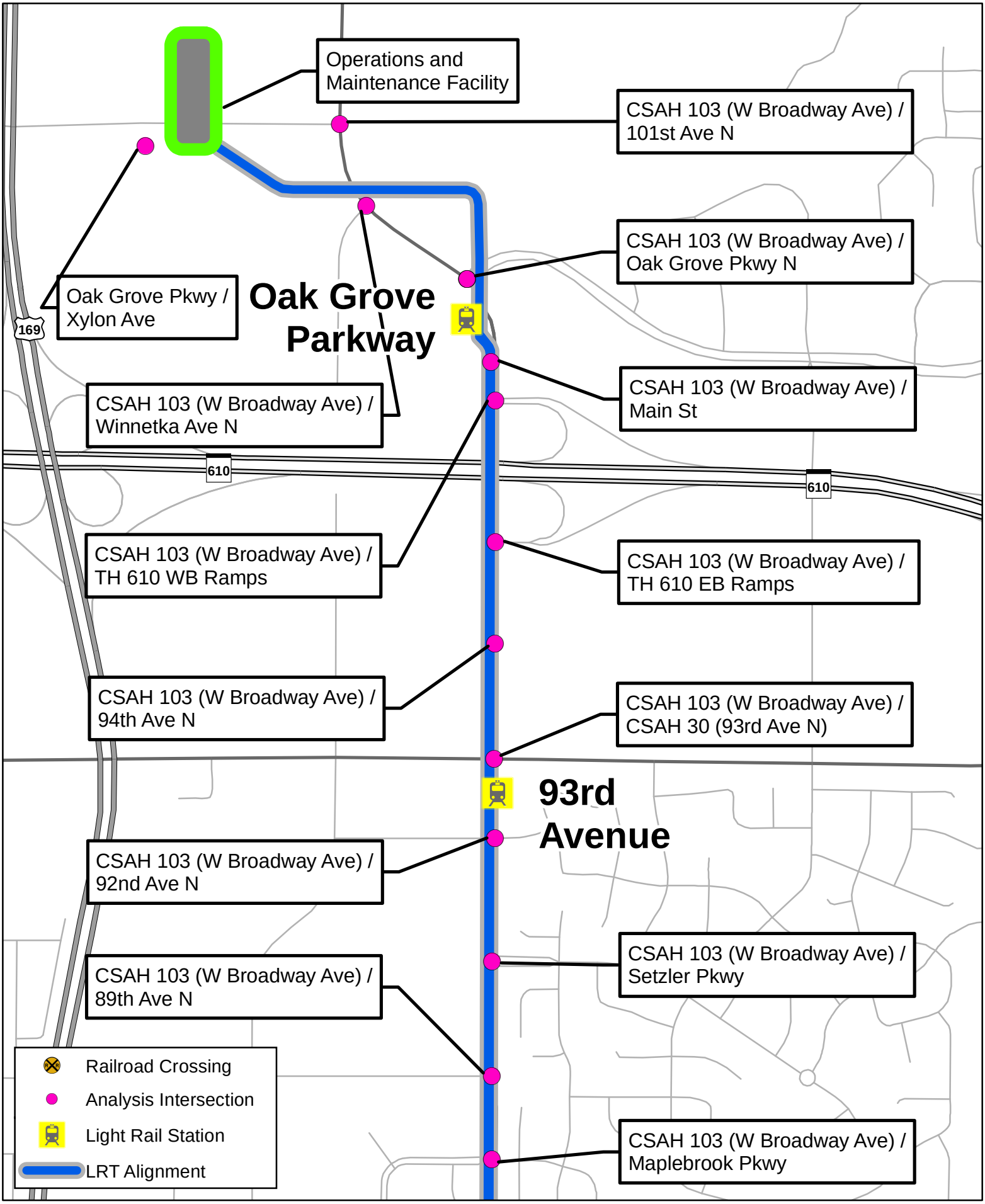


Figure 2. BLRT Traffic Analysis Intersections

0 0.1 0.2 Miles

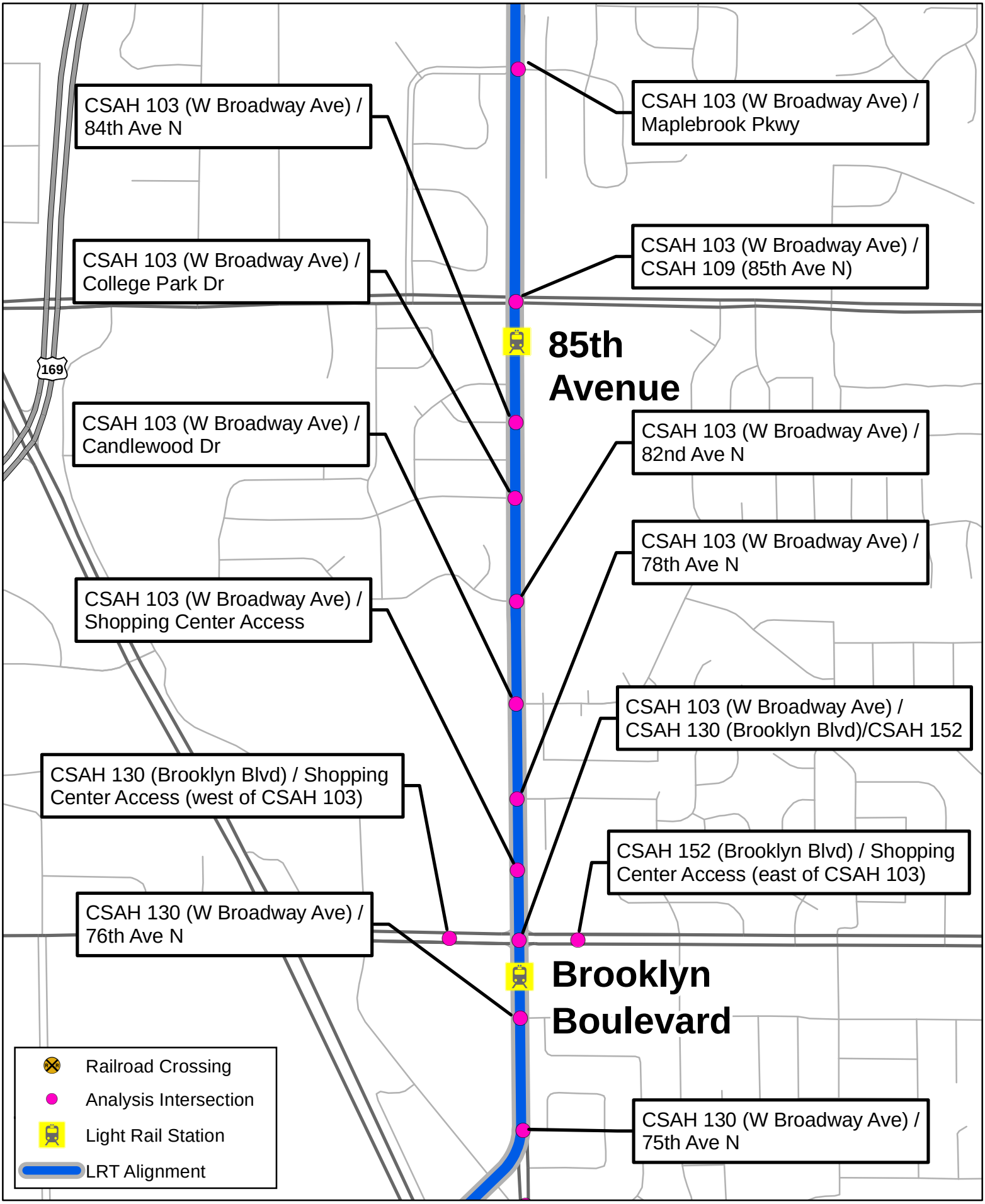


Figure 3. BLRT Traffic Analysis Intersections

0 0.1 0.2 Miles

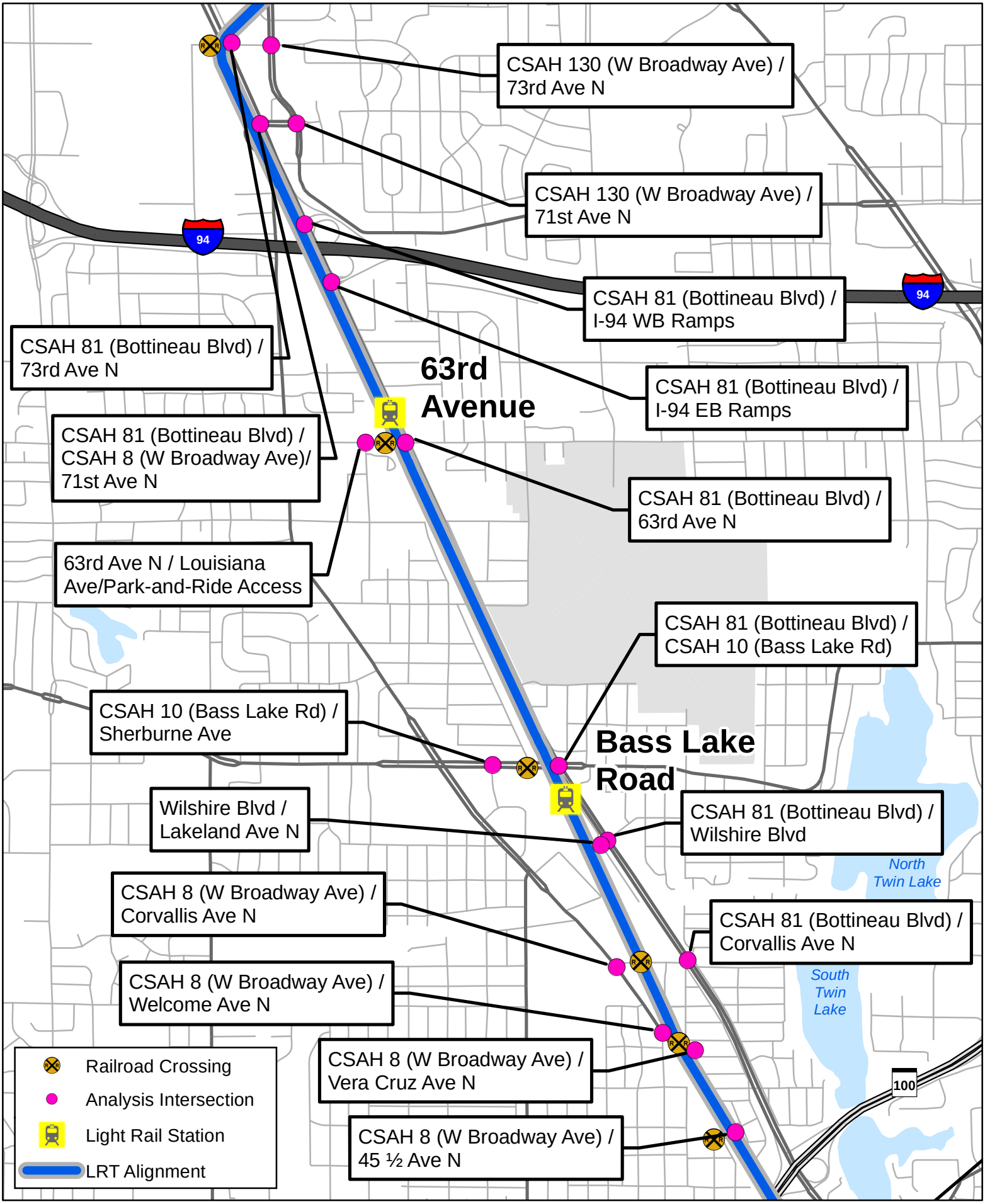


Figure 4. BLRT Traffic Analysis Intersections

0 0.2 0.4 Miles

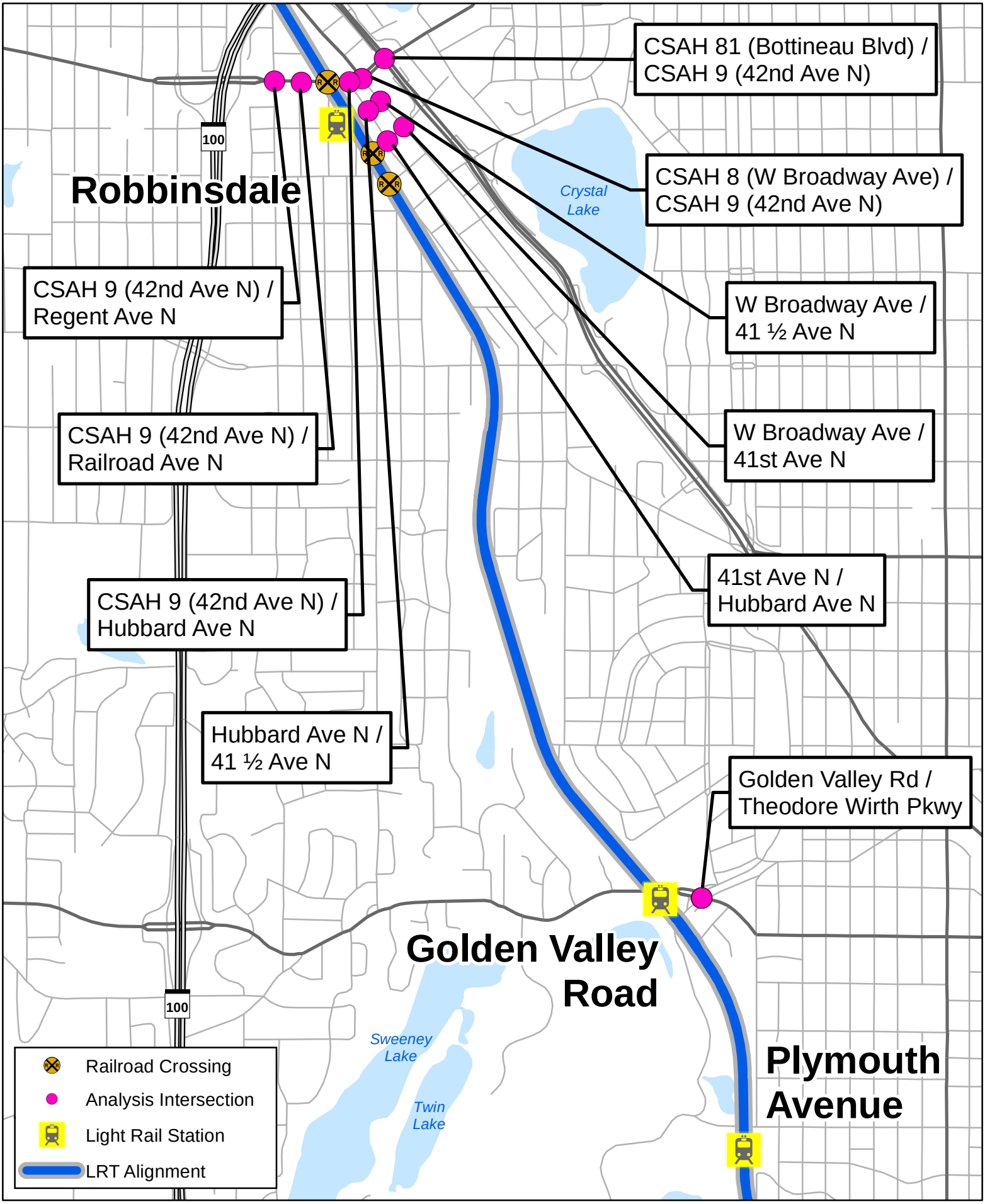


Figure 5. BLRT Traffic Analysis Intersections

0 0.2 0.4 Miles

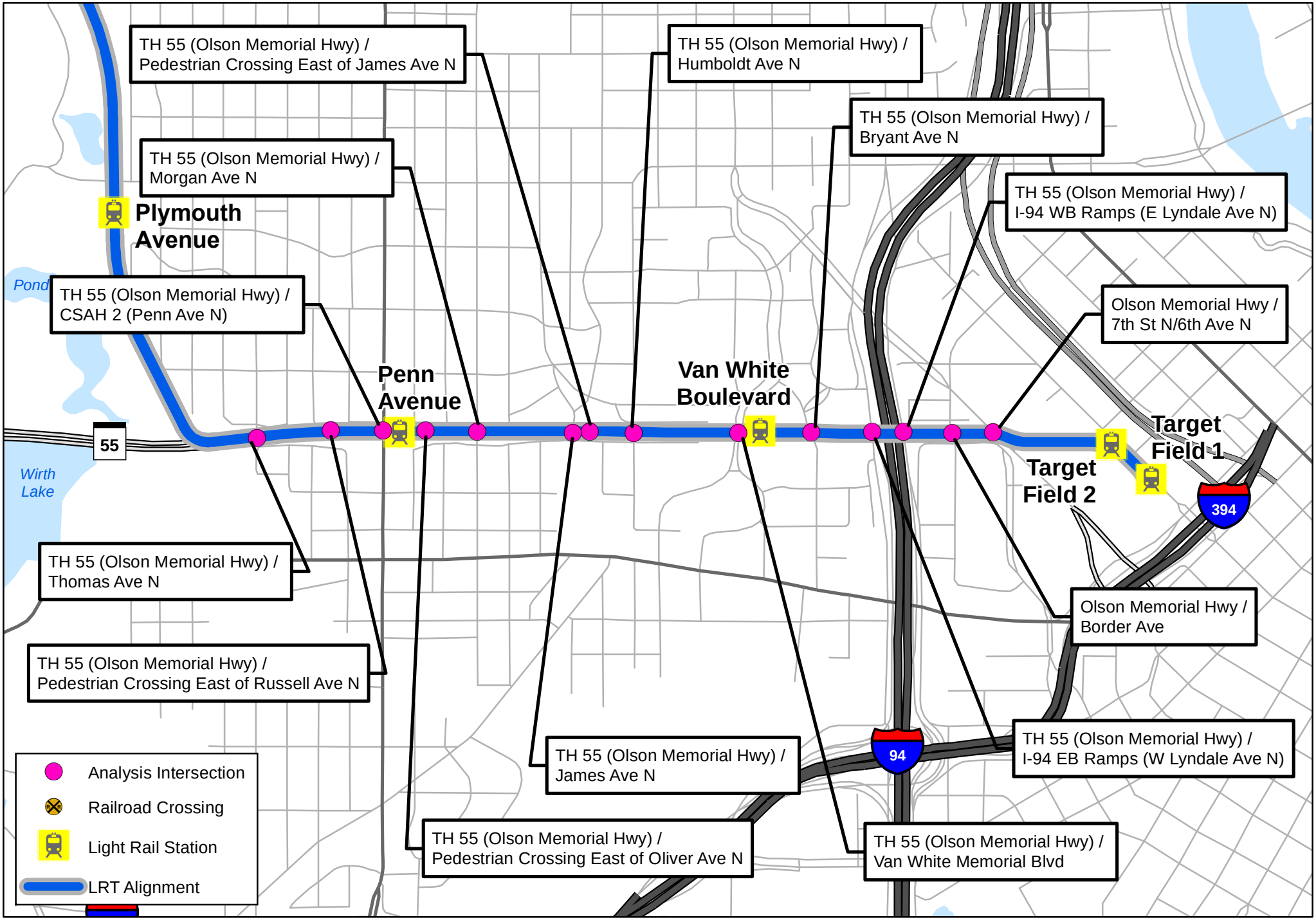


Figure 6. BLRT Traffic Analysis Intersections

0 0.2 0.4 Miles

2.0 Methodology

2.1 Key Intersections and At-Grade Crossings

To determine the impacts of the BLRT project on the local roadway network, a traffic operations analysis was conducted for signalized and unsignalized intersections within the vicinity of the new BLRT alignment or for intersections that would be expected to have increased traffic due to the BLRT stations, such as near park-and-ride facilities. The analysis area included signalized intersections with an LRT crossing in the intersection, the closest signalized or unsignalized intersections on both sides of an at-grade mid-block LRT crossing, and the intersections that provide access to a LRT station park-and-ride facility. At least two intersections were analyzed for each at-grade LRT crossing or park-and-ride facility. Additional intersections were analyzed based on their proximity to the crossing or park-and-ride facility and the potential for interaction with the crossing or park-and-ride facility. Grade separated crossings were not modeled because the LRT does not interact with pedestrian, bicycle, or vehicle traffic at these locations.

2.2 Forecast Traffic Volumes

The development of future year traffic forecasts for use in the simulation modeling was based on the preliminary 2040 socioeconomic data prepared by local communities and consistent with the Metropolitan Council's Thrive MSP 2040. This data was used as input to the Metropolitan Council's Regional Travel Demand Model. The outputs from the 2040 Regional Travel Demand Model were then compared to existing and historic traffic counts. This information, combined with the expected changes in land use and density, was utilized at a localized level to develop future year forecasts for each roadway segment within the project area. The traffic forecasting process is described in more detail in the *BLRT Traffic and Park-and-Ride Forecast Technical Memorandum* (2015).

2.3 Traffic Analysis Methodology

The approach to the traffic operations analysis is derived from the established methodologies documented in the 2010 *Highway Capacity Manual* (HCM). The HCM contains a series of analysis techniques for evaluating the operations of transportation facilities under specified conditions. The models for the BLRT analysis have been developed using VISSIM and Synchro/SimTraffic, software packages that implement the HCM methodologies. The inputs to the software include lane geometrics, traffic volumes, pedestrian/bicycle volumes, transit stations, freight and LRT alignments, freight and LRT volumes, intersection and grade crossing control devices, and signal phase and timing characteristics.

The outputs of the models are evaluated using the level of service thresholds as defined in the HCM, which are shown in **Table 2.1**. Based on standard practice in the traffic engineering industry, as well as guidance from the American Association of State Highway and Transportation Officials (AASHTO) and conformance with MnDOT practice, level of service D/E is considered to be the threshold of acceptable operations for an overall intersection in an urban or suburban area during peak hours.

The analysis periods included the highest hour of traffic volume during the weekday AM peak period (6:00-9:00 AM) and PM peak period (3:00-7:00 PM). The peak hour varied by intersection, but AM peak hours were generally identified as occurring between 7:00 AM and 8:30 AM and PM peak hours were generally identified as occurring between 4:30 PM and 5:45 PM.

Table 2.1. Intersection Level of Service Definitions

Level of Service	Signalized Intersection Delay (seconds per vehicle)	Unsignalized Intersection Delay (seconds per vehicle)
A	≤10	≤10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: Highway Capacity Manual 2010

2.4 Design Criteria and Assumptions

All full access intersections with the LRT guideway, where all vehicular movements are allowed across the guideway, were assumed to be signalized and/or controlled with automatic gates to provide safe movement of LRT and vehicles. All at-grade roadway/LRT crossings where LRT operates in the freight corridor were assumed to have automatic gates in accordance with the guidance and standards contained in the 2009 edition of the *Minnesota Manual on Uniform Traffic Control Devices* (MMUTCD). The operation of automatic gates was also based on the standards in the MUTCD, which includes:

- gate arms start lowering a minimum of 3 seconds after the flashing-light signals start to operate;
- gate arms shall reach the horizontal position at least 5 seconds before the arrival of the rail traffic;
- gate arms shall remain in the down position as long as the rail traffic occupies the grade crossing; and
- gate arms should ascend to the upright position in 12 seconds or less, once the rail traffic leaves the grade crossing.

For a typical LRT crossing, the time from the gates being activated until they return to the upright position is approximately 45 to 50 seconds.

Signalized intersections within 200 feet of an at-grade rail crossing were identified for interconnection to the rail crossing. At these locations, the signal is proposed to be preempted by the rail crossing, in order to provide for clearance of vehicle queues from the tracks prior to the gate arms being lowered.

2.5 Measures of Effectiveness

The measures of effectiveness used to evaluate the operations results and identify a project impact in need of improvement were based on intersection delay (level of service) and queuing.

The level of service (LOS) criteria used to identify a project impact and potential mitigation were as follows:

- Overall intersection LOS E or F in Build conditions, if No Build intersection LOS D or better
- Approach or movement LOS E or F in Build conditions, if the movement negatively impacts upstream operations and No Build approach or movement operated at LOS D or better

The criteria used to identify a queuing issue were as follows:

- 95th percentile queue length that exceeds storage length, and one of the following criteria is also met:
  - Average back-of-queue exceeds storage length
  - Movement operates at LOS E or LOS F
  - 95th percentile queue blocks upstream full-access intersection(s)
- 95th percentile queue length exceeds 500 feet on a stop-controlled approach

For locations where a queuing issue was identified, the need for mitigation was based on a comparison to the No Build conditions, the severity of the issue, the potential safety and operations implications at the study intersection, and the impact the queue had on the larger roadway network. Where the need for queue mitigation was identified based on these criteria, improvements were added to the Build modeling and have been incorporated into the BLRT project. These improvements are listed in Section 5.1, along with all improvements that have been identified to be built as part of the BLRT project.

3.0 Existing Conditions Analysis

The existing conditions models were developed to validate and calibrate the simulation models of the study areas, which were then used to model the future year conditions. The assumptions, methodology, and results of the existing conditions analysis are presented in the following sections.

3.1 Existing Conditions Assumptions

The existing conditions analysis was based on traffic volumes, roadway geometrics, rail crossing treatments, and signal operations as they existed in 2014 when the data collection was completed. The existing peak hour traffic volumes, which are based on the counts conducted in 2014, are provided in **Appendix A**. The geometrics and intersection control for the existing conditions are shown in the intersection layout tables provided in **Appendix B.**

The AM peak hour was calculated to be the highest volume hour between 7:00 AM and 8:30 AM and the PM peak hour was calculated to be the highest volume hour between 4:30 PM and 5:45 PM for all intersections, based on the turning movement data collected within the study area.

Existing information collected along the freight rail corridor shows that at most one train per day with less than 20 cars is expected on the BNSF Monticello Subdivision. The data collected in 2014 showed that trains typically travel through the corridor in the AM peak hour, between 7:30 and 8:00 AM. No freight trains have been observed during the PM peak hour.

3.2 Existing Conditions Traffic Modeling Results

The existing operations results are presented for each of the four modeling areas in the following sections.

3.2.1 OMF to TH 610

The results of the AM and PM peak hour analysis showed that all intersections currently operate at overall LOS D or better during the Existing peak hour scenarios. All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 3.1** below.

No queuing issues were identified in the Existing conditions.

The full table of existing conditions LOS and queuing analysis results can be found in **Appendix C.**

Table 3.1. OMF to TH 610 – Existing Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	AM Existing	PM Existing
CSAH 103 (W Broadway Ave)/ 101st Ave N*	0.3 A	3.1 A
CSAH 103 (W Broadway Ave)/ Winnetka Ave N*	0.2 A	0.9 A
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	10.0 A	18.9 B
CSAH 103 (W Broadway Ave)/ TH 610 WB Ramps	14.5 B	19.6 B
CSAH 103 (W Broadway Ave)/ TH 610 EB Ramps	11.7 B	13.5 B

*Side street stop-controlled intersection

3.2.2 TH 610 to CSAH 81 (Bottineau Boulevard)/73rd Avenue N

The results of the AM and PM peak hour analysis showed that all intersections currently operate at overall LOS D or better during the Existing peak hour scenarios. All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 3.2** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- CSAH 103 (West Broadway Avenue)/CSAH 30 (93rd Avenue N) – Eastbound left-turn

The queuing issue at CSAH 103 (West Broadway Avenue)/CSAH 30 (93rd Avenue N) is due to heavy demand for that movement in the PM peak and the single through lanes on the eastbound, westbound, and northbound approaches that limit the green time available for the eastbound left-turn movement.

The full table of existing conditions LOS and queuing analysis results can be found in **Appendix C.**

Table 3.2. TH 610 to CSAH 81/73rd Avenue N – Existing Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	AM Existing	PM Existing
CSAH 103 (W Broadway Ave)/ 94th Ave N*	1.8 A	1.8 A
CSAH 103 (W Broadway Ave)/	29.8	52.4

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	AM Existing	PM Existing
CSAH 30 (93rd Ave N)	C	D
CSAH 103 (W Broadway Ave)/ 92nd Ave N*	1.9 A	7.1 A
CSAH 103 (W Broadway Ave)/ Setzler Pkwy*	1.7 A	1.5 A
CSAH 103 (W Broadway Ave)/ 89th Ave N*	2.4 A	1.3 A
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy*	2.3 A	3.4 A
CSAH 103 (W Broadway Ave)/ CSAH 109 (85th Ave N)	31.1 C	26.6 C
CSAH 103 (W Broadway Ave)/ 84th Ave N	11.0 B	8.8 A
CSAH 103 (W Broadway Ave)/ College Park Dr*	0.6 A	0.5 A
CSAH 103 (W Broadway Ave)/ 82nd Ave N*	0.5 A	0.5 A
CSAH 103 (W Broadway Ave)/ Candlewood Dr*	1.8 A	2.3 A
CSAH 103 (W Broadway Ave)/ 78th Ave N*	0.3 A	0.7 A
CSAH 103 (W Broadway Ave)/ Shopping Center Access	5.2 A	13.0 B
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152	25.3 C	27.7 C
CSAH 130 (Brooklyn Blvd)/ Shopping Center Access (west of CSAH 103)	4.6 A	15.3 B
CSAH 152 (Brooklyn Blvd)/ Shopping Center Access (east of CSAH 103)*	0.9 A	1.7 A
CSAH 130 (W Broadway Ave)/ 76th Ave N	6.0 A	14.5 B
CSAH 130 (W Broadway Ave)/ 75th Ave N*	0.9 A	1.2 A
CSAH 130 (W Broadway Ave)/ 74th Ave N*	1.1 A	1.4 A
CSAH 130 (W Broadway Ave)/ 73rd Ave N	5.2 A	7.2 A

*Side street stop-controlled intersection

3.2.3 CSAH 81 (Bottineau Boulevard)/73rd Avenue N to TH 55 (Olson Memorial Highway)

The location and control of the existing freight rail crossings on the BNSF Monticello Subdivision within the BLRT project area are summarized in **Table 3.3** below.

Table 3.3. Existing Conditions Rail Crossing Treatments

Crossing Location	Existing Crossing Control
73rd Ave N	Flashers; preemption of CSAH 81 (Bottineau Blvd)/73rd Ave N traffic signal
CSAH 8 (W Broadway Ave)/ 71st Ave N	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 8 (W Broadway Ave)/ 71st Ave N traffic signal
I-94/I-694	Grade separated under I-94/I-694
63rd Ave N	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/63rd Ave N traffic signal
CSAH 10 (Bass Lake Rd)	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 10 (Bass Lake Rd) traffic signal
Corvallis Ave N	Flashers
CSAH 8 (W Broadway Ave)	Flashers
45½ Ave N	Flashers
TH 100	Grade separated over TH 100
CSAH 9 (42nd Ave N)	Flashers
41st Ave N	Flashers and automatic gates
39½ Ave N	Flashers and automatic gates

The data collected along the BNSF Monticello Subdivision in 2014 showed that trains typically travel through the corridor in the AM peak hour, between 7:30 and 8:00 AM. No freight trains have been observed during the PM peak hour. Therefore, the AM peak hour analysis was conducted both with and without a freight event. The assumed freight event was approximately one minute in duration, which is consistent with the existing freight activity in the corridor. No freight events were analyzed for the PM peak hour.

The results of the AM and PM peak hour analysis showed that all intersections currently operate at overall LOS D or better during the Existing peak hour scenarios, including a 20-car freight event in the AM peak hour. The Golden Valley Road/Theodore Wirth Parkway intersection was modeled in Synchro/SimTraffic because it does not have any nearby at-grade crossings with freight rail or proposed crossings with light rail transit (LRT). All other intersections were modeled in VISSIM based on the existing freight crossings and proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 3.4** below.

No queuing issues were identified in the Existing conditions.

The full table of existing conditions LOS and queuing analysis results can be found in **Appendix C.**

Table 3.4. CSAH 81/73rd Avenue N to TH 55 (Olson Memorial Highway) – Existing Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	AM Existing No Freight Event	AM Existing Freight Event	PM Existing
CSAH 81 (Bottineau Blvd)/ 73rd Ave N	9.5 A	10.0 A	18.1 B
CSAH 81 (Bottineau Blvd)/ CSAH 8 (W Broadway Ave)/ 71st Ave N	21.6 C	22.9 C	26.1 C
CSAH 130 (W Broadway Ave)/ 71st Ave N	7.6 A	7.5 A	15.6 B
CSAH 81 (Bottineau Blvd)/ I-94 WB Ramps	6.4 A	6.4 A	6.5 A
CSAH 81 (Bottineau Blvd)/ I-94 EB Ramps	26.9 C	26.9 C	35.1 D
CSAH 81 (Bottineau Blvd)/ 63rd Ave N	30.9 C	31.2 C	31.2 C
63rd Ave N/Louisiana Ave/ Park-and-Ride Access	1.7 A	1.7 A	1.9 A
CSAH 81 (Bottineau Blvd)/ CSAH 10 (Bass Lake Rd)	23.4 C	24.2 C	36.0 D
CSAH 10 (Bass Lake Rd)/ Sherburne Ave	6.1 A	6.0 A	17.4 B
CSAH 81 (Bottineau Blvd)/ Wilshire Blvd	10.7 B	11.8 B	13.8 B
Wilshire Blvd/Lakeland Ave N	2.1 A	2.1 A	5.5 A
CSAH 81 (Bottineau Blvd)/ Corvallis Ave N	11.9 B	13.0 B	16.2 B
CSAH 8 (W Broadway Ave)/ Corvallis Ave N*	2.3 A	2.6 A	3.5 A
CSAH 8 (W Broadway Ave)/ Welcome Ave N*	0.6 A	1.1 A	1.3 A
CSAH 8 (W Broadway Ave)/ Vera Cruz Ave N*	0.4 A	0.7 A	0.8 A
CSAH 8 (W Broadway Ave)/ 45 ½ Ave N	0.9 A	1.0 A	1.0 A
CSAH 8 (W Broadway Ave)/ CSAH 9 (42nd Ave N)	14.8 B	14.8 B	19.7 B
CSAH 81 (Bottineau Blvd)/ CSAH 9 (42nd Ave N)	23.0 C	22.9 C	26.5 C
CSAH 9 (42nd Ave N)/ Hubbard Ave*,1	0.6 A	0.7 A	1.4 A
CSAH 9 (42nd Ave N)/ Railroad Ave N	0.7 A	1.1 A	0.9 A

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	AM Existing No Freight Event	AM Existing Freight Event	PM Existing
CSAH 9 (42nd Ave N)/ Regent Ave N	2.1 A	2.1 A	1.7 A
W Broadway Ave/ 41 ½ Ave N*	8.8 A	8.8 A	12.3 B
Hubbard Ave/ 41 ½ Ave N*	3.6 A	3.7 A	3.1 A
Hubbard Ave/ 41st Ave N*	7.9 A	8.0 A	8.5 A
W Broadway Ave/ 41st Ave N*	7.8 A	7.8 A	10.0 A
Golden Valley Rd/ Theodore Wirth Pkwy**	8.8 A	N/A	16.0 C

*Side street stop-controlled intersection
** All-way stop-controlled intersection
[1] Left-turn movements limited to emergency vehicles and buses only.

3.2.4 TH 55 (Olson Memorial Highway) to Target Field Station

The results of the AM and PM peak hour analysis showed that all intersections currently operate at overall LOS D or better during the Existing peak hour scenarios, with the following exception:

- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) in the PM peak

All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 3.5** on the following page.

The poor LOS at the TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) intersection is due to the high traffic volumes and the current split phasing of the northbound and southbound approaches, which leads to inefficiencies at the intersection.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- TH 55 (Olson Memorial Highway)/Thomas Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) – Eastbound through and right-turn movements
- TH 55 (Olson Memorial Highway)/Morgan Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/Humboldt Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/Van White Memorial Boulevard – Northbound through and right-turn movements
- TH 55 (Olson Memorial Highway)/Bryant Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) – Southbound right-turn movement

The queuing issues on Thomas Avenue N, Morgan Avenue N, Humboldt Avenue N, Van White Memorial Boulevard, and Bryant Avenue N are all due to the location of the frontage road zero to 50 feet from the intersection with TH 55 (Olson Memorial Highway). This means that one to two vehicles queued at the stop bar would exceed the storage distance. However, these queues are not considered to be operational deficiencies because the approach volumes are generally low and do not cause operational or safety issues upstream.

The queues on TH 55 (Olson Memorial Highway) at CSAH 2 (Penn Avenue N) and on I-94 EB Ramps (W Lyndale Avenue N) at TH 55 (Olson Memorial Highway) are due to high volumes of traffic demand in peak hours. The queue on TH 55 (Olson Memorial Highway) at CSAH 2 (Penn Avenue N) has the potential to cause operational and safety issues due to the volume and speed of traffic on this approach. The queue on the southbound approach of TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) is a significant distance from the I-94 exit and in a lower-speed, signalized roadway segment (30 mph).

The full table of existing conditions LOS and queuing analysis results can be found in **Appendix C.**

Table 3.5. TH 55 (Olson Memorial Highway) to Target Field Station – Existing Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	AM Existing	PM Existing
TH 55 (Olson Memorial Hwy)/ Thomas Ave N*	2.8 A	8.3 A
TH 55 (Olson Memorial Hwy)/ CSAH 2 (Penn Ave N)	43.7 D	82.0 F
TH 55 (Olson Memorial Hwy)/ Morgan Ave N	7.2 A	7.8 A
TH 55 (Olson Memorial Hwy)/ James Ave N*	4.9 A	4.2 A
TH 55 (Olson Memorial Hwy)/ Humboldt Ave N	9.1 A	7.2 A
TH 55 (Olson Memorial Hwy)/ Van White Memorial Blvd	15.3 B	10.6 B
TH 55 (Olson Memorial Hwy)/ Bryant Ave N	8.6 A	8.1 A
TH 55 (Olson Memorial Hwy)/ I-94 EB Ramps (W Lyndale Ave N)	25.3 C	21.5 C
TH 55 (Olson Memorial Hwy)/ I-94 WB Ramps (E Lyndale Ave N)	23.8 C	28.9 C
Olson Memorial Hwy)/ Border Ave N	11.5 B	21.9 C
Olson Memorial Hwy)/ 7th St N/ 6th Ave N	27.2 C	30.5 C

*Side street stop-controlled intersection

3.3 Existing Conditions Traffic Modeling Summary

All intersections operate at overall LOS D or better in the AM and PM peak hour existing conditions, with the following exception:

- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) in the PM peak

The poor LOS at the TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) intersection is due to the high traffic volumes and the current split phasing of the northbound and southbound approaches, which leads to inefficiencies at the intersection.

4.0 No Build Analysis

The No Build modeling was conducted to identify the expected traffic operations at the Opening Year of the BLRT project (2021) and for the forecast horizon year (2040). The assumptions, methodology, and results of the No Build conditions analysis are presented in the following sections.

4.1 No Build Conditions Assumptions

Opening Year and 2040 forecast peak hour volumes were based on the forecast No Build daily traffic volumes developed for key roadway segments within the study area, as described in Section 2.2. The Opening Year forecast daily traffic volumes were developed assuming a constant rate of growth between the Existing and 2040 conditions. The turning movement volumes for No Build AM and PM peak in the Opening Year and 2040 conditions are provided in **Appendix A**.

The No Build analysis was based on the future year No Build traffic volumes, existing roadway geometrics and rail crossing treatments, and existing signal operations. Geometric improvements assumed in the No Build analysis are shown in the intersection layouts provided in **Appendix B**, and were based on projects that were completed since 2014 or are currently programmed:

- CSAH 81 (Bottineau Boulevard) from TH 100 to Wilshire Boulevard restriped from a four-lane roadway to a six-lane roadway, completed in 2015 by Hennepin County.
- C-Line arterial bus rapid transit (BRT) construction on CSAH 2 (Penn Avenue N) and TH 55 (Olson Memorial Highway) currently planned for 2017 by the Metropolitan Council.
- CSAH 81 (Bottineau Boulevard) reconstruction from a four-lane to a six-lane roadway from 63rd Avenue N to CSAH 8 (West Broadway Avenue)/71st Avenue N, currently planned for 2016-2018 by Hennepin County.
- CSAH 81 (Bottineau Boulevard) reconstruction from a four-lane to a six-lane roadway from CSAH 8 (W Broadway Avenue)/71st Avenue N to TH 169, currently planned for 2019 by Hennepin County.
- CSAH 103 (West Broadway Avenue) reconstruction from a two-lane to a four-lane roadway from 78th Avenue N to CSAH 30 (93rd Avenue N) currently planned for 2018-2020 by Hennepin County.

Hennepin County and the City of Brooklyn Park have not yet determined if a new traffic signal will be constructed at the CSAH 103 (West Broadway Avenue)/Maplebrook Parkway intersection as part of the CSAH 103 (West Broadway Avenue) reconstruction project. Therefore, scenarios have been modeled with the intersection as an unsignalized right-in/right-out intersection or a signalized full-access intersection.

The City of Brooklyn Park has been studying a new interchange at TH 169/101st Avenue N and this project is currently in the preliminary design phase. However, the new interchange has not been programmed and is not shown in the Metropolitan Council *2040 Transportation Policy Plan* (TPP). Due to the significant impacts that this interchange will have on roadway capacity and traffic flow in the area north of TH 610 and to better capture the expected impacts of the BLRT project, 2040 scenarios have been analyzed both with and without the new interchange.

For other regional improvements that were assumed in the regional travel demand model and the forecasting process, refer to *BLRT Traffic and Park-and-Ride Forecast Technical Memorandum* (2015).

No improvements were assumed at any of the existing rail crossings. Signal timing was assumed to be optimized in the Opening Year (2021) and 2040 analysis. The signal timings were optimized as part of the VISSIM simulation models. The CSAH 103 (West Broadway Avenue), CSAH 81 (Bottineau Boulevard), and TH 55 (Olson Memorial Highway) corridors were all assumed to operate with coordinated and interconnected signals. Pedestrian crossings of TH 55 (Olson Memorial Highway) were assumed to be timed for one-stage crossings similar to the existing operations.

The geometrics and intersection control for the No Build conditions are shown in the intersection layout tables provided in **Appendix B.**

4.2 No Build Conditions Traffic Modeling Results

The same four modeling areas created for the Existing conditions modeling were used for the No Build analysis. The No Build operations results are presented by modeling area in the following sections.

4.2.1 OMF to TH 610

The results of the Opening Year AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better in the No Build scenarios. The results of the 2040 AM and PM peak hour analysis showed that all intersections, which are listed below, would be expected to operate at overall LOS E or F in the No Build scenarios.

- CSAH 103 (West Broadway Avenue)/101st Avenue N in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/Winnetka Avenue N in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/TH 610 WB Ramps in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/TH 610 EB Ramps in the 2040 AM and PM peaks

All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 4.1** and **Table 4.2** below.

Movements for which queuing issues were identified in one or more of the 2040 scenarios were as follows:

- CSAH 103 (West Broadway Avenue)/Winnetka Avenue N – Northbound left-turn and through movements
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway – Northbound through movement; southbound left-turn and through movements; westbound left-turn and right-turn movements
- CSAH 103 (West Broadway Avenue)TH 610 WB Ramps – Northbound through movement; southbound left-turn movement; westbound left-turn and right-turn movements

The poor operations (delay and queuing) in the 2040 No Build scenarios are due to the intense development planned to occur in this area by 2040. Queues spill back between all intersections north of TH 610 and roadway capacity improvements would be needed to accommodate the forecast growth in traffic. However, there are not currently roadway improvement projects programmed in this area.

The full table of No Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 4.1. OMF to TH 610 – Opening Year No Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	Opening Year AM No Build Scenario 01[1]	Opening Year PM No Build Scenario 01[1]
CSAH 103 (W Broadway Ave)/ 101st Ave N*	0.6 A	5.4 A
CSAH 103 (W Broadway Ave)/ Winnetka Ave N*	0.3 A	0.9 A
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	20.6 C	27.9 C
CSAH 103 (W Broadway Ave)/ TH 610 WB Ramps	23.1 C	43.5 D
CSAH 103 (W Broadway Ave)/ TH 610 EB Ramps	18.7 B	17.5 B

* Side street stop-controlled intersection
[1] No Build Scenario 01 assumes no interchange at TH 169/101st Avenue N.

Table 4.2. OMF to TH 610 – 2040 No Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM No Build Scenario 01[1]	2040 AM No Build Scenario 02[2]	2040 PM No Build Scenario 01[1]	2040 PM No Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ 101st Ave N*	73.5 F	72.1 F	193.9 F	156.2 F
CSAH 103 (W Broadway Ave)/ Winnetka Ave N*	133.8 F	125.8 F	162.1 F	149.5 F
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	152.0 F	128.1 F	200+ F	200+ F
CSAH 103 (W Broadway Ave)/ TH 610 WB Ramps	200+ F	200+ F	200+ F	200+ F
CSAH 103 (W Broadway Ave)/ TH 610 EB Ramps	105.2 F	80.7 F	188.6 F	184.8 F

* Side street stop-controlled intersection
[1] No Build Scenario 01 assumes no interchange at TH 169/101st Avenue N.
[2] No Build Scenario 02 assumes a new full access interchange at TH 169/101st Avenue N.

4.2.2 TH 610 to CSAH 81 (Bottineau Boulevard)/73rd Avenue N

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the No Build peak hour scenarios, with the following exception:

- CSAH 103 (West Broadway Avenue)/CSAH 109 (85th Avenue N) in the 2040 PM peak

The poor LOS at the CSAH 103 (West Broadway Avenue)/CSAH 109 (85th Avenue N) in the 2040 PM peak was due to increased southbound u-turn traffic in Scenario 1 with a right-in/right-out access at Maplebrook Parkway.

Several of the intersections along CSAH 103 (West Broadway Avenue) south of TH 610 had better operations in the No Build conditions than in the Existing conditions, due to the planned CSAH 103 (W Broadway Avenue) roadway reconstruction.

All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 4.3** and **Table 4.4** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- CSAH 103 (West Broadway Avenue)/ CSAH 130 (Brooklyn Boulevard)/CSAH 152 – Eastbound left-turn movement

The eastbound left-turn queuing at CSAH 103 (West Broadway Avenue/CSAH 130 (Brooklyn Boulevard)/CSAH 152 occurs in the 2040 No Build PM peak was due to high vehicle traffic demand and protected-only phasing.

The full table of No Build conditions LOS and queuing analysis results can be found in **Appendix C.**

Table 4.3. TH 610 to CSAH 81/73rd Avenue N – Opening Year No Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM No Build Scenario 01[1]	Opening Year AM No Build Scenario 02[2]	Opening Year PM No Build Scenario 01[1]	Opening Year PM No Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ 94th Ave N*	2.0 A	2.0 A	1.9 A	2.0 A
CSAH 103 (W Broadway Ave)/ CSAH 30 (93rd Ave N)	27.0 C	26.6 C	31.6 C	32.0 C
CSAH 103 (W Broadway Ave)/ 92nd Ave N*	1.3 A	1.4 A	1.0 A	1.1 A
CSAH 103 (W Broadway Ave)/ Setzler Pkwy	14.2 B	10.0 A	13.9 B	18.0 B
CSAH 103 (W Broadway Ave)/ 89th Ave N*	0.6 A	0.8 A	0.7 A	0.7 A
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy[1,2]	1.0 A	7.6 A	1.0 A	8.8 A
CSAH 103 (W Broadway Ave)/	34.1	33.2	45.9	39.8

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM No Build Scenario 01[1]	Opening Year AM No Build Scenario 02[2]	Opening Year PM No Build Scenario 01[1]	Opening Year PM No Build Scenario 02[2]
CSAH 109 (85th Ave N)	C	C	D	D
CSAH 103 (W Broadway Ave)/ 84th Ave N*	0.6 A	0.6 A	1.3 A	1.2 A
CSAH 103 (W Broadway Ave)/ College Park Dr	7.7 A	6.6 A	13.7 B	13.4 B
CSAH 103 (W Broadway Ave)/ 82nd Ave N*	0.6 A	0.7 A	0.9 A	0.5 A
CSAH 103 (W Broadway Ave)/ Candlewood Dr	6.1 A	6.2 A	9.1 A	9.3 A
CSAH 103 (W Broadway Ave)/ 78th Ave N*	0.4 A	0.5 A	0.9 A	0.9 A
CSAH 103 (W Broadway Ave)/ Shopping Center Access	8.4 A	7.9 A	16.8 B	16.1 B
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152	25.2 C	23.8 C	35.3 D	42.5 D
CSAH 130 (Brooklyn Blvd)/ Shopping Center Access (west of CSAH 103)	8.9 A	7.8 A	20.6 C	20.2 C
CSAH 152 (Brooklyn Blvd)/ Shopping Center Access (east of CSAH 103)*	0.9 A	0.9 A	2.1 A	2.1 A
CSAH 130 (W Broadway Ave)/ 76th Ave N	13.6 B	13.0 B	25.4 C	22.4 C
CSAH 130 (W Broadway Ave)/ 75th Ave N*	1.4 A	1.2 A	1.8 A	1.4 A
CSAH 130 (W Broadway Ave)/ 74th Ave N*	1.6 A	1.3 A	1.6 A	1.6 A
CSAH 130 (W Broadway Ave)/ 73rd Ave N	10.6 B	11.5 B	10.8 B	10.8 B

*Side street stop-controlled intersection

[1] Scenario 01 assumes right-in/right-out access with side street stop control at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

[2] Scenario 02 assumes a full-access signalized intersection at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

Table 4.4. TH 610 to CSAH 81/73rd Avenue N – 2040 No Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM No Build Scenario 01[1]	2040 AM No Build Scenario 02[2]	2040 PM No Build Scenario 01[1]	2040 PM No Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ 94th Ave N*	2.7 A	2.6 A	2.7 A	2.8 A
CSAH 103 (W Broadway Ave)/ CSAH 30 (93rd Ave N)	32.6 C	32.1 C	37.4 D	37.3 D
CSAH 103 (W Broadway Ave)/ 92nd Ave N*	1.6 A	1.7 A	1.1 A	1.2 A
CSAH 103 (W Broadway Ave)/ Setzler Pkwy	15.9 B	10.4 B	13.9 B	18.8 B
CSAH 103 (W Broadway Ave)/ 89th Ave N*	0.9 A	0.9 A	0.8 A	0.8 A
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy[1,2]	1.1 A	8.5 A	1.2 A	9.6 A
CSAH 103 (W Broadway Ave)/ CSAH 109 (85th Ave N)	36.2 D	35.9 D	55.4 E	43.2 D
CSAH 103 (W Broadway Ave)/ 84th Ave N*	0.7 A	0.7 A	1.4 A	1.2 A
CSAH 103 (W Broadway Ave)/ College Park Dr	6.9 A	6.7 A	13.6 B	13.3 B
CSAH 103 (W Broadway Ave)/ 82nd Ave N*	0.7 A	0.7 A	0.8 A	0.6 A
CSAH 103 (W Broadway Ave)/ Candlewood Dr	6.2 A	6.3 A	9.0 A	8.8 A
CSAH 103 (W Broadway Ave)/ 78th Ave N*	0.6 A	0.6 A	0.9 A	0.9 A
CSAH 103 (W Broadway Ave)/ Shopping Center Access	8.5 A	8.3 A	17.0 B	16.7 B
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152	25.3 C	25.5 C	39.5 D	46.9 D
CSAH 130 (Brooklyn Blvd)/ Shopping Center Access (west of CSAH 103)	9.0 A	7.9 A	29.7 C	27.0 C
CSAH 152 (Brooklyn Blvd)/ Shopping Center Access (east of CSAH 103)*	0.9 A	0.9 A	2.3 A	2.3 A
CSAH 130 (W Broadway Ave)/ 76th Ave N	14.6 B	14.2 B	27.0 C	23.7 C
CSAH 130 (W Broadway Ave)/ 75th Ave N*	1.5 A	1.4 A	2.1 A	1.6 A
CSAH 130 (W Broadway Ave)/ 74th Ave N*	1.6 A	1.5 A	1.9 A	1.9 A
CSAH 130 (W Broadway Ave)/	13.0	13.0	13.0	12.6

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM No Build Scenario 01[1]	2040 AM No Build Scenario 02[2]	2040 PM No Build Scenario 01[1]	2040 PM No Build Scenario 02[2]
73rd Ave N	B	B	B	B

*Side street stop-controlled intersection

[1] Scenario 01 assumes right-in/right-out access with side street stop control at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

[2] Scenario 02 assumes a full-access signalized intersection at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

4.2.3 CSAH 81 (Bottineau Boulevard)/73rd Avenue N to TH 55 (Olson Memorial Highway)

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the No Build peak hour scenarios, including a 20-car (approximately one minute) freight event in the AM peak hour, with the following exceptions:

- Golden Valley Road/Theodore Wirth Parkway in the 2040 PM Peak

The Golden Valley Road/Theodore Wirth Parkway intersection was modeled in Synchro/SimTraffic because it does not have any nearby at-grade crossings with freight rail or proposed crossings with LRT. All other intersections were modeled in VISSIM based on the existing freight crossings and proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 4.5** and **Table 4.6** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- Golden Valley Road/Theodore Wirth Parkway – Eastbound approach queues exceeded 500 feet

Many of the intersections along CSAH 81 (Bottineau Boulevard) had better operations in the No Build conditions than in the Existing conditions, due to the planned reconstruction projects from 63rd Avenue N to TH 169, planned to occur prior to Opening Year, and the six-lane restriping from TH 100 to Wilshire Boulevard that occurred in 2015.

The all-way stop control at the Golden Valley Road/Theodore Wirth Parkway would be expected to operate poorly in the 2040 PM peak due to the forecast growth in area traffic volumes and the inefficiency of the all-way stop control. There are no improvements currently planned or programmed for this intersection.

The full table of No Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 4.5. CSAH 81/73rd Avenue N to TH 55 (Olson Memorial Highway) – Opening Year No Build Conditions Results

Intersection	Overall Intersection Average Delay and LOS		
	Opening Year AM No Build No Freight Event	Opening Year AM No Build Freight Event	Opening Year PM No Build
CSAH 81 (Bottineau Blvd)/ 73rd Ave N	9.6 A	10.2 B	14.8 B
CSAH 81 (Bottineau Blvd)/ CSAH 8 (W Broadway Ave)/ 71st Ave N	20.8 C	22.0 C	21.4 C
CSAH 130 (W Broadway Ave)/ 71st Ave N	7.6 A	7.3 A	15.8 B
CSAH 81 (Bottineau Blvd)/ I-94 WB Ramps	9.8 A	9.6 A	8.1 A
CSAH 81 (Bottineau Blvd)/ I-94 EB Ramps	21.6 C	21.2 C	26.7 C
CSAH 81 (Bottineau Blvd)/ 63rd Ave N	31.1 C	31.6 C	32.6 C
63rd Ave N/Louisiana Ave/ Park-and-Ride Access	1.6 A	1.6 A	2.0 A
CSAH 81 (Bottineau Blvd)/ CSAH 10 (Bass Lake Rd)	23.1 C	24.7 C	37.5 D
CSAH 10 (Bass Lake Rd)/ Sherburne Ave	6.0 A	6.1 A	18.4 B
CSAH 81 (Bottineau Blvd)/ Wilshire Blvd	11.0 B	11.8 B	14.7 B
Wilshire Blvd/Lakeland Ave N	1.8 A	1.9 A	4.7 A
CSAH 81 (Bottineau Blvd)/ Corvallis Ave N	8.5 A	9.0 A	13.9 B
CSAH 8 (W Broadway Ave)/ Corvallis Ave N*	2.3 A	2.7 A	3.7 A
CSAH 8 (W Broadway Ave)/ Welcome Ave N*	0.6 A	1.1 A	1.4 A
CSAH 8 (W Broadway Ave)/ Vera Cruz Ave N*	0.4 A	0.6 A	0.6 A
CSAH 8 (W Broadway Ave)/ 45 ½ Ave N	1.0 A	1.0 A	1.0 A
CSAH 8 (W Broadway Ave)/ CSAH 9 (42nd Ave N)	15.2 B	15.2 B	20.8 C
CSAH 81 (Bottineau Blvd)/ CSAH 9 (42nd Ave N)	23.5 C	23.4 C	26.7 C
CSAH 9 (42nd Ave N)/ Hubbard Ave*,1	0.7 A	0.8 A	1.7 A

Intersection	Overall Intersection Average Delay and LOS		
	Opening Year AM No Build No Freight Event	Opening Year AM No Build Freight Event	Opening Year PM No Build
CSAH 9 (42nd Ave N)/ Railroad Ave N	0.8 A	1.2 A	1.0 A
CSAH 9 (42nd Ave N)/ Regent Ave N	2.4 A	2.5 A	1.8 A
W Broadway Ave/ 41 ½ Ave N*	8.9 A	9.1 A	13.4 B
Hubbard Ave/ 41 ½ Ave N*	4.3 A	4.3 A	3.8 A
Hubbard Ave/ 41st Ave N*	8.0 A	8.0 A	8.5 A
W Broadway Ave/ 41st Ave N*	7.9 A	8.1 A	10.3 B
Golden Valley Rd/ Theodore Wirth Pkwy**	9.4 A	N/A	15.2 B

*Side street stop-controlled intersection
** All-way stop-controlled intersection
[1] Left-turn movements limited to emergency vehicles and buses only.

Table 4.6. CSAH 81/73rd Avenue N to TH 55 (Olson Memorial Highway) – 2040 No Build Conditions Results

Intersection	Overall Intersection Average Delay and LOS		
	2040 AM No Build No Freight Event	2040 AM No Build Freight Event	2040 PM No Build
CSAH 81 (Bottineau Blvd)/ 73rd Ave N	11.0 B	11.6 B	18.2 B
CSAH 81 (Bottineau Blvd)/ CSAH 8 (W Broadway Ave)/ 71st Ave N	20.2 C	21.6 C	22.3 C
CSAH 130 (W Broadway Ave)/ 71st Ave N	8.2 A	8.0 A	15.9 B
CSAH 81 (Bottineau Blvd)/ I-94 WB Ramps	9.5 A	9.4 A	8.0 A
CSAH 81 (Bottineau Blvd)/ I-94 EB Ramps	22.3 C	22.0 C	27.8 C
CSAH 81 (Bottineau Blvd)/ 63rd Ave N	33.2 C	33.5 C	34.2 C
63rd Ave N/Louisiana Ave/ Park-and-Ride Access	1.9 A	1.9 A	2.3 A

Intersection	Overall Intersection Average Delay and LOS		
	2040 AM No Build No Freight Event	2040 AM No Build Freight Event	2040 PM No Build
CSAH 81 (Bottineau Blvd)/ CSAH 10 (Bass Lake Rd)	24.9 C	26.1 C	41.9 D
CSAH 10 (Bass Lake Rd)/ Sherburne Ave	7.1 A	7.2 A	22.6 C
CSAH 81 (Bottineau Blvd)/ Wilshire Blvd	11.9 B	12.6 B	15.1 B
Wilshire Blvd/Lakeland Ave N	2.3 A	2.3 A	3.8 A
CSAH 81 (Bottineau Blvd)/ Corvallis Ave N	9.4 A	9.7 A	14.6 B
CSAH 8 (W Broadway Ave)/ Corvallis Ave N*	2.4 A	2.7 A	3.9 A
CSAH 8 (W Broadway Ave)/ Welcome Ave N*	0.8 A	1.3 A	1.5 A
CSAH 8 (W Broadway Ave)/ Vera Cruz Ave N*	0.5 A	0.7 A	0.6 A
CSAH 8 (W Broadway Ave)/ 45 ½ Ave N	1.0 A	1.1 A	1.2 A
CSAH 8 (W Broadway Ave)/ CSAH 9 (42nd Ave N)	15.7 B	16.0 B	22.1 C
CSAH 81 (Bottineau Blvd)/ CSAH 9 (42nd Ave N)	25.0 C	24.9 C	28.2 C
CSAH 9 (42nd Ave N)/ Hubbard Ave*,[1]	0.9 A	1.1 A	2.4 A
CSAH 9 (42nd Ave N)/ Railroad Ave N	0.9 A	1.3 A	1.4 A
CSAH 9 (42nd Ave N)/ Regent Ave N	2.5 A	2.5 A	2.3 A
W Broadway Ave/ 41 ½ Ave N*	9.3 A	9.4 A	14.5 B
Hubbard Ave/ 41 ½ Ave N*	4.2 A	4.2 A	3.5 A
Hubbard Ave/ 41st Ave N*	7.9 A	7.9 A	8.7 A
W Broadway Ave/ 41st Ave N*	8.2 A	8.2 A	11.4 B
Golden Valley Rd/ Theodore Wirth Pkwy**	10.5 B	N/A	42.0 E

*Side street stop-controlled intersection
** All-way stop-controlled intersection
[1] Left-turn movements limited to emergency vehicles and buses only.

4.2.4 TH 55 (Olson Memorial Highway) to Target Field Station

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the No Build peak hour scenarios, with the following exceptions:

- TH 55 (Olson Memorial Highway)/Thomas Avenue N in the 2040 AM and 2040 PM peaks
- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) in the Opening Year PM, 2040 AM, and 2040 PM peaks
- TH 55 (Olson Memorial Highway)/Morgan Avenue N in the 2040 PM peak

All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 4.7** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- TH 55 (Olson Memorial Highway)/Thomas Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) – Eastbound approach
- TH 55 (Olson Memorial Highway)/Morgan Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/Humboldt Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/Van White Memorial Boulevard – Northbound through and right-turn movements
- TH 55 (Olson Memorial Highway)/Bryant Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) – Southbound approach

The poor LOS at the TH 55 (Olson Memorial Highway)/Thomas Avenue N, TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N), and TH 55 (Olson Memorial Highway)/Morgan Avenue N intersections is due to the high traffic volumes and capacity constraints at the TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) intersection, which result in queues that spill back and cause delays at the upstream intersections in each direction on TH 55 (Olson Memorial Highway).

The queuing issues on Thomas Avenue N, Morgan Avenue N, Humboldt Avenue N, Van White Memorial Boulevard, and Bryant Avenue N are all due to the location of the frontage road zero to 50 feet from the intersection with TH 55 (Olson Memorial Highway). One to two vehicles queued at the stop bar would exceed the storage distance for these approaches. These issues were also noted in the Existing conditions analysis.

The queues on TH 55 (Olson Memorial Highway) at CSAH 2 (Penn Avenue N) and on I-94 EB Ramps (W Lyndale Avenue N) at TH 55 (Olson Memorial Highway) are due to high volumes of traffic demand in peak hours. The queue on eastbound TH 55 (Olson Memorial Highway) has the potential to cause operational and safety issues due to the volume and speed of traffic on this approach. The queue on the southbound approach of TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) is due to the high volume of traffic, but is a significant distance from the I-94 exit and in a lower speed roadway segment (30 mph). These issues were also noted in the Existing conditions analysis.

The full table of No Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 4.7. TH 55 (Olson Memorial Highway) to Target Field Station – Opening Year and 2040 No Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM No Build	2040 AM No Build	Opening Year PM No Build	2040 PM No Build
TH 55 (Olson Memorial Hwy)/ Thomas Ave N*	6.5 A	91.1 F	33.7 D	88.8 F
TH 55 (Olson Memorial Hwy)/ CSAH 2 (Penn Ave N)	52.3 D	80.6 F	102.1 F	130.8 F
TH 55 (Olson Memorial Hwy)/ Morgan Ave N	6.5 A	5.7 A	20.1 C	57.2 E
TH 55 (Olson Memorial Hwy)/ James Ave N*	5.2 A	3.7 A	4.2 A	4.2 A
TH 55 (Olson Memorial Hwy)/ Humboldt Ave N	10.8 B	14.0 B	8.5 A	19.2 B
TH 55 (Olson Memorial Hwy)/ Van White Memorial Blvd	14.5 B	12.1 B	9.3 A	13.9 B
TH 55 (Olson Memorial Hwy)/ Bryant Ave N	12.0 B	10.2 B	8.0 A	9.0 A
TH 55 (Olson Memorial Hwy)/ I-94 EB Ramps (W Lyndale Ave N)	34.8 C	43.3 D	21.1 C	24.6 C
TH 55 (Olson Memorial Hwy)/ I-94 WB Ramps (E Lyndale Ave N)	32.4 C	28.4 C	33.1 C	31.4 C
Olson Memorial Hwy)/ Border Ave N	17.0 B	11.7 B	24.4 C	33.1 C
Olson Memorial Hwy)/ 7th St N/ 6th Ave N	28.2 C	23.1 C	32.4 C	36.0 D

*Side street stop-controlled intersection

4.3 No Build Conditions Traffic Modeling Summary

All intersections would be expected to operate at overall LOS D or better in the Opening Year and 2040 No Build AM and PM peak conditions, with the following exceptions:

- CSAH 103 (West Broadway Avenue)/101st Avenue N in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/Winnetka Avenue N in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/TH 610 WB Ramps in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/TH 610 EB Ramps in the 2040 AM and PM peaks
- CSAH 103 (West Broadway Avenue)/CSAH 109 (85th Avenue N) in the 2040 PM peak scenario with no signal at Maplebrook Parkway
- Golden Valley Road/Theodore Wirth Parkway in the 2040 PM peak
- TH 55 (Olson Memorial Highway)/Thomas Avenue N in the 2040 AM and PM peaks

- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) in the Opening Year PM, 2040 AM, and 2040 PM peaks
- TH 55 (Olson Memorial Highway)/Morgan Avenue N in the 2040 PM peak

The poor operations (delay and queuing) in the area north of TH 610 in the 2040 No Build scenarios is due to the intense development planned to occur in this area by 2040. However, there have been no roadway improvement projects programmed to improve the roadway network in this area, and therefore the intersections are expected to operate over capacity.

The all-way stop control at the Golden Valley Road/Theodore Wirth Parkway would be expected to operate poorly in the 2040 PM peak due to the forecast growth in area traffic volumes and the inefficiency of the existing all-way stop control.

The poor LOS at the TH 55 (Olson Memorial Highway)/Thomas Avenue N, TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N), and TH 55 (Olson Memorial Highway)/Morgan Avenue N intersections is due to the high traffic volumes and capacity constraints at the TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) intersection, which results in queues that spill back and cause delays at the upstream intersections in each direction on TH 55 (Olson Memorial Highway).

Many of the intersections along CSAH 103 (West Broadway Avenue) and CSAH 81 (Bottineau Boulevard) had better operations in the No Build conditions than in the Existing conditions, due to the planned and already implemented corridor improvement projects.

5.0 Build Analysis

The Build modeling was conducted to identify the expected traffic operations at the Opening Year of the BLRT project (2021) and for the forecast horizon year (2040), with the LRT operating. The assumptions, methodology, and results of the Build conditions analysis are presented in the following sections.

5.1 Build Conditions Assumptions

Traffic volumes for the Build conditions were based on the same growth forecasts as the No Build conditions. At LRT stations, additional pedestrian volumes were incorporated into the modeling. Near park-and-ride facilities, additional vehicle traffic was added to the roadway network to account for traffic generated at these facilities. The modeled AM and PM peak hour Build turning movement volumes for the Opening Year (2021) and 2040 conditions are provided in **Appendix A.**

The location and size of park-and-ride facilities included in the traffic modeling are summarized in **Table 5.1**. The traffic analysis represents the total park-and-ride demand expected in 2040, as identified in the *BLRT Traffic and Park-and-Ride Forecast Technical Memorandum* (2015). The traffic analysis assumed the full 2040 demand for parking spaces in order to capture the full potential parking capacity of the site and produce a conservative analysis of the park-and-ride traffic impacts. The traffic analysis at the 63rd Avenue Station included an increased number of parking spaces, compared to what is currently proposed by the BLRT project, in order to model the expected traffic operations if the existing parking facility were to be expanded in the future to the site's full parking capacity.

Table 5.1. Park-and-Ride Facility Summary

Location	Number of Park-and-Ride Spaces Proposed	Number of Park-and-Ride Spaces Analyzed
Oak Grove Station	850	850
63rd Avenue Station	565	725
Bass Lake Road Station	170	170
Robbinsdale Station	550	550
Golden Valley Road Station	100	100

The control of each of the LRT crossings was identified based on the proximity to the freight rail alignment and adjacent signalized intersections. **Table 5.2** below displays the existing and proposed control of the freight and LRT crossings along the BLRT alignment.

Table 5.2. Build Conditions Rail Crossing Treatments

Crossing Location	Existing Freight Crossing Control	Proposed LRT and/or Freight Crossing Control
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	N/A – no freight crossings	LRT controlled by traffic signal (non-revenue track)
CSAH 103 (W Broadway Ave)/ Main St		LRT controlled by traffic signal with transit signal priority
TH 610		LRT grade separated over TH 610
CSAH 103 (W Broadway Ave)/ 94th Ave N		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ CSAH 30 (93rd Ave N)		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ Setzler Pkwy		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy[1]		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ CSAH 109 (85th Ave N)		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ College Park Dr		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ Candlewood Dr		LRT controlled by traffic signal with traffic signal priority
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152		LRT controlled by traffic signal with traffic signal priority
CSAH 130 (W Broadway Ave)/ 76th Ave N		LRT controlled by traffic signal with traffic signal priority
CSAH 130 (W Broadway Ave)/ 75th Ave N		LRT controlled by traffic signal with traffic signal priority

Crossing Location	Existing Freight Crossing Control	Proposed LRT and/or Freight Crossing Control
73rd Ave N	Flashers; preemption of CSAH 81 (Bottineau Blvd)/73rd Ave N traffic signal	Freight – flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/73rd Ave N traffic signal LRT – grade separated over CSAH 81 (Bottineau Blvd)
CSAH 8 (W Broadway Ave)/ 71st Ave N	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 8 (W Broadway Ave)/ 71st Ave N traffic signal	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 8 (W Broadway Ave)/ 71st Ave N traffic signal
I-94/I-694	Grade separated under I-94/I-694	Grade separated under I-94/I-694
63rd Ave N	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/63rd Ave N traffic signal	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/63rd Ave N traffic signal
CSAH 10 (Bass Lake Rd)	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 10 (Bass Lake Rd) traffic signal	Flashers and automatic gates; preemption of CSAH 81 (Bottineau Blvd)/CSAH 10 (Bass Lake Rd) traffic signal
Corvallis Ave N	Flashers	Flashers and automatic gates
CSAH 8 (W Broadway Ave)	Flashers	Flashers and automatic gates
45½ Ave N	Flashers	Flashers and automatic gates
TH 100	Grade separated over TH 100	Grade separated over TH 100
CSAH 9 (42nd Ave N)	Flashers	Flashers and automatic gates
41st Ave N	Flashers and automatic gates	Flashers and automatic gates
39½ Ave N	Flashers and automatic gates	Flashers and automatic gates
TH 55 (Olson Memorial Hwy)/ Thomas Ave N	N/A – no freight crossings	LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Pedestrian Crossing East of Russell Ave N		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ CSAH 2 (Penn Ave N)		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Pedestrian Crossing East of Oliver Ave N		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Morgan Ave N		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Pedestrian Crosswalk East of James Ave N		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Humboldt Ave N		LRT controlled by traffic signal with traffic signal priority

Crossing Location	Existing Freight Crossing Control	Proposed LRT and/or Freight Crossing Control
TH 55 (Olson Memorial Hwy)/ Van White Memorial Blvd	N/A – no freight crossings	LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ Bryant Ave N		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ I-94 EB Ramps (W Lyndale Ave N)		LRT controlled by traffic signal with traffic signal priority
TH 55 (Olson Memorial Hwy)/ I-94 WB Ramps (E Lyndale Ave N)		LRT controlled by traffic signal with traffic signal priority
Olson Memorial Hwy/ Border Ave		LRT controlled by traffic signal with traffic signal priority
Olson Memorial Hwy/ 7th St N/6th Ave N		LRT controlled by traffic signal with traffic signal priority

[1] LRT crossing only if intersection is signalized.

Several improvements were identified as part of the scope of the project in order to provide control of the LRT at intersections and to provide adequate infrastructure to accommodate buses, pedestrians, and park-and-ride traffic near stations. These project elements were incorporated into the Build conditions modeling and are shown in **Appendix B**. The significant infrastructure improvements and listed below:

- Reconstruct 101st Avenue N and Oak Grove Parkway to accommodate the needs of the BLRT OMF site.
- Reconstruct CSAH 103 (West Broadway Avenue) from TH 610 to north of Oak Grove Parkway to accommodate the desired location of the LRT alignment, station location, and park-and-ride parking structure.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/Main Street to provide a second access point to the park-and-ride facility.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/94th Avenue N to allow LRT to transition from side-running to center-running.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/75th Avenue N to allow LRT to transition from side-running to center-running.
- Install a new traffic signal at 63rd Avenue N/Louisiana Avenue to provide for pedestrian crossings of 63rd Avenue N and facilitate traffic exiting the park-and-ride facility.
- Reconfigure the CSAH 8 (West Broadway Avenue)/Vera Cruz Avenue N intersection to a roundabout, to continue to provide full access to the surrounding neighborhood, along with additional gates and medians at the rail crossing.
- Install a new traffic signal at TH 55 (Olson Memorial Highway)/Thomas Avenue N to maintain neighborhood access.
- Install new traffic signals on TH 55 (Olson Memorial Highway) at the proposed pedestrian crossings east of Russell Avenue N, east of Oliver Avenue N, and east of James Avenue N to maintain neighborhood pedestrian access. These pedestrian signals are assumed to operate as two-stage crossings due to the u-shaped geometry of the walkway as it crosses the LRT guideway.

Several new intersections were added to the analysis north of TH 610 for the Build conditions. The Oak Grove Parkway/Xylon Avenue intersection will provide access to the OMF and is proposed to operate with stop control on Xylon Avenue. The CSAH 103 (West Broadway Avenue)/Main Street intersection will provide access to the Oak Grove Station park-and-ride facility and is proposed to operate with signalized control. Due to the roadway reconfiguration in this area, the CSAH 103 (West Broadway

Avenue)/101st Avenue N and CSAH 103 (West Broadway Avenue)/Winnetka Avenue N intersections would no longer exist, and therefore were not included in the Build analysis. The CSAH 103 (West Broadway Avenue)/Oak Grove Parkway intersection has a non-revenue LRT crossing, which would include LRT movements only in and out of the OMF site. These movements would be limited in volumes and would occur outside of the peak hour periods.

In addition, some improvements were also identified as part of the Build project in order to provide overall LOS D or better operations at all intersections in the Build conditions. These project improvements included:

- Modify left-turn phasing on CSAH 130 (Brooklyn Boulevard)/CSAH 152 at CSAH 103 (West Broadway Avenue) from protected-only to protected/permissive.
- Modify signal phasing at CSAH 81 (Bottineau Boulevard)/CSAH 10 (Bass Lake Road) to provide a right-turn overlap phase on eastbound CSAH 10 (Bass Lake Road).
- Restripe Wilshire Boulevard at CSAH 81 (Bottineau Boulevard) to provide dual eastbound left-turn lanes and modify signal timing to accommodate park-and-ride traffic.
- Restripe CSAH 8 (West Broadway Avenue) at CSAH 9 (42nd Avenue N) to provide northbound and southbound left-turn lanes and modify the traffic signal to provide northbound, southbound, and westbound protected/permissive left-turn phasing to accommodate park-and-ride traffic.
- Modify CSAH 2 (Penn Avenue N) lane geometrics at TH 55 (Olson Memorial Highway) to better accommodate vehicle traffic.
- Modify southbound W Lyndale Avenue N geometrics to better accommodate vehicle traffic flow.

Hennepin County and the City of Brooklyn Park have not yet determined if a new traffic signal will be constructed at the CSAH 103 (West Broadway Avenue)/Maplebrook Parkway intersection as part of the CSAH 103 (West Broadway Avenue) reconstruction project. Therefore, scenarios have been modeled with the intersection as an unsignalized right-in/right-out intersection or a signalized full-access intersection.

The City of Brooklyn Park has been studying a new interchange at TH 169/101st Avenue N and this project is currently in the preliminary design phase. However, the new interchange has not been programmed and is not shown in the Metropolitan Council *2040 Transportation Policy Plan* (TPP). Due to the significant impacts that this interchange will have on roadway capacity and traffic flow in the area north of TH 610 and to better capture the expected impacts of the BLRT project, 2040 scenarios have been analyzed both with and without the new interchange.

Signal timing was assumed to be optimized in the Opening Year (2021) and 2040 Build analysis. The signal timings were optimized as part of the VISSIM and Synchro simulation models. The CSAH 103 (West Broadway Avenue), CSAH 81 (Bottineau Boulevard), and TH 55 (Olson Memorial Highway) corridors were all assumed to operate with coordinated and interconnected signals. Pedestrian crossings of TH 55 (Olson Memorial Highway) were assumed to be timed for one-stage crossings similar to the existing operations, with the exception of the three new pedestrian signals as noted previously.

The geometrics and intersection control for the Build conditions are shown in the intersection layout tables provided in **Appendix B.**

5.2 Build Conditions Traffic Modeling Results

The same modeling areas created for the Existing and No Build conditions modeling were used for the Build analysis. The Build operations results are presented by modeling area in the following sections.

5.2.1 OMF to TH 610

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the Build peak hour scenarios with the following exceptions:

- Oak Grove Parkway/Xylon Avenue in the 2040 AM peak in the scenario with an interchange at TH 169/101st Avenue N and in the 2040 PM peak for both scenarios
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway in the 2040 PM peak in the scenario with no interchange at TH 169/101st Avenue N
- CSAH 103 (West Broadway Avenue)/Main Street in the 2040 PM peak in the scenario with no interchange at TH 169/101st Avenue N

The Oak Grove Parkway/Xylon Avenue intersection was modeled in Synchro/SimTraffic because it does not have any nearby at-grade crossings with LRT. All other intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 5.3** and **Table 5.4** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- Oak Grove Parkway/Xylon Avenue – Northbound left-turn movement; southbound left-turn movement
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway – Eastbound right-turn movement; Westbound left-turn and right-turn movements (scenario with no interchange at TH 169/101st Avenue N))
- CSAH 103 (West Broadway Avenue)/Main Street – Eastbound through and right-turn movements (scenario with no interchange at TH 169/101st Avenue N))

All the intersections had better operations (delay and queuing) in the Build conditions than in the No Build conditions, due to the planned roadway construction completed as part of the BLRT project.

A future traffic signal is expected to be needed at the Oak Grove Parkway/Xylon Avenue intersection to accommodate future traffic volumes. The traffic signal is recommended to be constructed (by others) at the same time as the TH 169/101st Avenue N interchange or as development traffic warrants. The signal is not needed for the BLRT project or for LRT operations, and therefore is not proposed to be constructed as part of the BLRT project.

The poor operations (delay and queuing) at the CSAH 103 (West Broadway Avenue/Oak Grove Parkway and CSAH 103 (West Broadway Avenue)/Main Street intersections in the 2040 Build PM peak scenario without the TH 169/101st Avenue N interchange was due to the high traffic volumes, generated by future development, that all access the TH 610 interchange. The planned future interchange at TH 169/101st Avenue N would distribute this traffic demand between two interchanges and result in all intersections operating at overall LOS D or better during the peak periods. The operations issues noted in the Build conditions also occur in the No Build conditions to a greater degree, therefore no mitigation has been proposed.

The full table of Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 5.3. OMF to TH 610 – Opening Year Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS	
	Opening Year AM Build Scenario 01[1]	Opening Year PM Build Scenario 01[1]
Oak Grove Pkwy/Xylon Ave*	1.8 A	1.6 A
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	27.6 C	38.0 D
CSAH 103 (W Broadway Ave)/ Main St	18.7 B	12.5 B
CSAH 103 (W Broadway Ave)/ TH 610 WB Ramps	18.5 B	21.6 C
CSAH 103 (W Broadway Ave)/ TH 610 EB Ramps	16.7 B	16.0 B

* Side street stop-controlled intersection
[1] Build Scenario 01 assumes no interchange at TH 169/101st Avenue N.

Table 5.4. OMF to TH 610 – 2040 Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM Build Scenario 01[1]	2040 AM Build Scenario 02[2]	2040 PM Build Scenario 01[1]	2040 PM Build Scenario 02[2]
Oak Grove Pkwy/Xylon Ave*	22.0 C	85.7 F	74.9 E	91.5 F
CSAH 103 (W Broadway Ave)/ Oak Grove Pkwy	41.9 D	40.6 D	95.9 F	47.2 D
CSAH 103 (W Broadway Ave)/ Main St	41.2 D	38.7 C	62.6 E	34.5 C
CSAH 103 (W Broadway Ave)/ TH 610 WB Ramps	32.3 C	22.5 C	38.8 D	26.3 C
CSAH 103 (W Broadway Ave)/ TH 610 EB Ramps	24.3 C	21.0 C	28.2 C	26.1 C

* Side street stop-controlled intersection
[1] Build Scenario 01 assumes no interchange at TH 169/101st Avenue N.
[2] Build Scenario 02 assumes a new full access interchange at TH 169/101st Avenue N.

5.2.2 TH 610 to CSAH 81 (Bottineau Boulevard)/73rd Avenue N

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the Build peak hour scenarios. All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 5.5** and **Table 5.6** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- CSAH 103 (West Broadway Avenue)/Shopping Center Access – Eastbound right-turn movement
- CSAH 103 (West Broadway Avenue)/CSAH 130 (Brooklyn Boulevard)/CSAH 152 – Southbound left-turn movement

The two queuing issues identified are related, and are due to vehicle traffic demands and access control along CSAH 103 (West Broadway Avenue) in the 2040 Build PM peak. The conversion of the CSAH 103 (West Broadway Avenue)/Shopping Center Access to right-in/right-out in the Build conditions is expected to result in increased u-turn movements at the CSAH 103 (West Broadway Avenue)/CSAH 130 (Brooklyn Boulevard)/CSAH 152 intersection. The southbound left-turn lane at the CSAH 103 (West Broadway Avenue)/CSAH 130 (Brooklyn Boulevard)/CSAH 152 intersection will need to be designed with sufficient storage to accommodate these movements and limit or avoid impacts to the CSAH 103 (West Broadway Avenue)/Shopping Center Access intersection.

The full table of Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 5.5. TH 610 to CSAH 81/73rd Avenue N – Opening Year Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM Build Scenario 01[1]	Opening Year AM Build Scenario 02[2]	Opening Year PM Build Scenario 01[1]	Opening Year PM Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ 94th Ave N	10.8 B	10.8 B	9.5 A	9.9 A
CSAH 103 (W Broadway Ave)/ CSAH 30 (93rd Ave N)	39.4 D	38.4 D	37.2 D	35.8 D
CSAH 103 (W Broadway Ave)/ 92nd Ave N*	0.8 A	0.8 A	1.0 A	1.0 A
CSAH 103 (W Broadway Ave)/ Setzler Pkwy	14.4 B	10.4 B	20.1 C	18.8 B
CSAH 103 (W Broadway Ave)/ 89th Ave N*	0.7 A	0.7 A	0.7 A	0.8 A
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy[1,2]	0.9 A	8.0 A	1.0 A	10.0 A
CSAH 103 (W Broadway Ave)/ CSAH 109 (85th Ave N)	36.1 D	34.8 C	45.8 D	41.6 D
CSAH 103 (W Broadway Ave)/ 84th Ave N*	0.6 A	1.5 A	1.0 A	1.2 A
CSAH 103 (W Broadway Ave)/ College Park Dr	9.2 A	13.0 B	14.9 B	14.4 B
CSAH 103 (W Broadway Ave)/ 82nd Ave N*	0.7 A	0.8 A	0.6 A	0.6 A
CSAH 103 (W Broadway Ave)/ Candlewood Dr	9.2 A	9.3 A	13.7 B	13.7 B
CSAH 103 (W Broadway Ave)/ 78th Ave N*	0.4 A	0.4 A	0.6 A	0.6 A

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM Build Scenario 01[1]	Opening Year AM Build Scenario 02[2]	Opening Year PM Build Scenario 01[1]	Opening Year PM Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ Shopping Center Access*	1.7 A	1.4 A	4.1 A	3.8 A
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152	26.7 C	25.4 C	43.5 D	43.4 D
CSAH 130 (Brooklyn Blvd)/ Shopping Center Access (west of CSAH 103)	7.5 A	7.7 A	19.1 B	19.1 B
CSAH 152 (Brooklyn Blvd)/ Shopping Center Access (east of CSAH 103)*	0.7 A	0.7 A	2.2 A	2.3 A
CSAH 130 (W Broadway Ave)/ 76th Ave N	13.7 B	13.6 B	31.1 C	31.5 C
CSAH 130 (W Broadway Ave)/ 75th Ave N	15.1 B	14.4 B	24.3 C	24.8 C
CSAH 130 (W Broadway Ave)/ 74th Ave N*	0.7 A	0.8 A	0.9 A	0.9 A
CSAH 130 (W Broadway Ave)/ 73rd Ave N	10.5 B	10.6 B	9.8 A	9.8 A

*Side street stop-controlled intersection

[1] Scenario 01 assumes right-in/right-out access with side street stop control at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

[2] Scenario 02 assumes a full-access signalized intersection at CSAH 103 (W Broadway Avenue)/Maplebrook Parkway.

Table 5.6. TH 610 to CSAH 81/73rd Avenue N – 2040 Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM Build Scenario 01[1]	2040 AM Build Scenario 02[2]	2040 PM Build Scenario 01[1]	2040 PM Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ 94th Ave N	15.6 B	15.4 B	11.8 B	11.3 B
CSAH 103 (W Broadway Ave)/ CSAH 30 (93rd Ave N)	49.4 D	49.8 D	47.7 D	48.1 D
CSAH 103 (W Broadway Ave)/ 92nd Ave N*	0.9 A	1.0 A	1.4 A	1.2 A
CSAH 103 (W Broadway Ave)/ Setzler Pkwy	17.3 B	10.4 B	23.8 C	20.5 C
CSAH 103 (W Broadway Ave)/ 89th Ave N*	0.7 A	0.8 A	0.9 A	0.9 A

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	2040 AM Build Scenario 01[1]	2040 AM Build Scenario 02[2]	2040 PM Build Scenario 01[1]	2040 PM Build Scenario 02[2]
CSAH 103 (W Broadway Ave)/ Maplebrook Pkwy[1,2]	1.1 A	8.4 A	1.3 A	11.4 B
CSAH 103 (W Broadway Ave)/ CSAH 109 (85th Ave N)	37.6 D	36.0 D	50.1 D	44.3 D
CSAH 103 (W Broadway Ave)/ 84th Ave N*	0.7 A	0.8 A	1.4 A	1.5 A
CSAH 103 (W Broadway Ave)/ College Park Dr	7.3 A	8.0 A	15.7 B	16.2 B
CSAH 103 (W Broadway Ave)/ 82nd Ave N*	0.7 A	0.7 A	0.7 A	0.8 A
CSAH 103 (W Broadway Ave)/ Candlewood Dr	9.5 A	9.8 A	14.2 B	14.0 B
CSAH 103 (W Broadway Ave)/ 78th Ave N*	0.4 A	0.4 A	1.3 A	1.6 A
CSAH 103 (W Broadway Ave)/ Shopping Center Access*	1.6 A	1.6 A	15.0 C	19.8 C
CSAH 103 (W Broadway Ave)/ CSAH 130 (Brooklyn Blvd)/ CSAH 152	30.5 C	30.7 C	51.1 D	49.9 D
CSAH 130 (Brooklyn Blvd)/ Shopping Center Access (west of CSAH 103)	8.2 A	7.9 A	16.8 B	16.9 B
CSAH 152 (Brooklyn Blvd)/ Shopping Center Access (east of CSAH 103)*	0.8 A	0.8 A	2.5 A	2.6 A
CSAH 130 (W Broadway Ave)/ 76th Ave N	15.2 B	14.8 B	34.3 C	32.1 C
CSAH 130 (W Broadway Ave)/ 75th Ave N	16.4 B	15.3 B	25.2 C	25.4 C
CSAH 130 (W Broadway Ave)/ 74th Ave N*	1.0 A	1.0 A	1.2 A	1.3 A
CSAH 130 (W Broadway Ave)/ 73rd Ave N	12.2 B	12.4 B	12.2 B	11.8 B

*Side street stop-controlled intersection

[1] Scenario 01 assumes right-in/right-out access with side street stop control at CSAH 103 (West Broadway Avenue)/Maplebrook Parkway.

[2] Scenario 02 assumes a full-access signalized intersection at CSAH 103 (West Broadway Avenue)/Maplebrook Parkway.

5.2.3 CSAH 81 (Bottineau Boulevard)/73rd Avenue N to TH 55 (Olson Memorial Highway)

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the Build peak hour scenarios, including a 20-car freight event in the AM peak hour, with the following exceptions:

- Golden Valley Road/Theodore Wirth Parkway in the 2040 PM peak

The Golden Valley Road/Theodore Wirth Parkway intersection was modeled in Synchro/SimTraffic because it does not have any nearby at-grade crossings with freight rail or proposed crossings with LRT. All other intersections were modeled in VISSIM based on the existing freight crossings and proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 5.7** and **Table 5.8** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- CSAH 81 (Bottineau Boulevard)/Wilshire Boulevard – Eastbound left-turn movement
- Golden Valley Road/Theodore Wirth Parkway – Eastbound approach queue exceeded 500 feet

Many of the intersections along CSAH 81 (Bottineau Boulevard) had better operations in the Build conditions than in the Existing conditions, due to the planned reconstruction projects from 63rd Avenue N to TH 169, planned to occur before Opening Year, and the six-lane restriping from TH 100 to Wilshire Boulevard, which occurred in 2015.

The storage distance on Wilshire Boulevard between CSAH 81 (Bottineau Boulevard) and Lakeland Avenue N is limited to approximately 45 feet due to the location of the frontage road (Lakeland Avenue N). As a result, during the PM peak in the Build conditions, vehicles exiting the park-and-ride cause the eastbound left-turn queue to exceed this limited storage. Lakeland Avenue N is a dead end street north and south of Wilshire Boulevard and has very low traffic volumes, so the queues are not a concern relative to traffic operations or safety. However, to address concerns for access to the properties along Lakeland Avenue, the capacity of the eastbound left-turn movement is proposed to be improved through a combination of signal timing and lane restriping.

The all-way stop control at the Golden Valley Road/Theodore Wirth Parkway would be expected to operate poorly in the 2040 PM peak due to the forecast growth in area traffic volumes and the inefficiency of the existing all-way stop control. The operations issues noted in the Build conditions also occur in the No Build conditions to the same degree, and the park-and-ride would be expected to contribute two percent or less of the 2040 peak hour volumes. Therefore, no mitigation has been proposed for this intersection.

The full table of Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 5.7. CSAH 81/73rd Avenue N to TH 55 (Olson Memorial Highway) – Opening Year Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	Opening Year AM Build No Freight Event	Opening Year AM Build Freight Event	Opening Year Build PM
CSAH 81 (Bottineau Blvd)/ 73rd Ave N	14.3B	14.9 B	17.8 B
CSAH 81 (Bottineau Blvd)/ CSAH 8 (W Broadway Ave)/ 71st Ave N	30.0 C	31.6 C	31.4 C
CSAH 130 (W Broadway Ave)/	7.6	7.5	15.9

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	Opening Year AM Build No Freight Event	Opening Year AM Build Freight Event	Opening Year Build PM
71st Ave N	A	A	B
CSAH 81 (Bottineau Blvd)/ I-94 WB Ramps	11.1 B	10.5 B	8.6 A
CSAH 81 (Bottineau Blvd)/ I-94 EB Ramps	24.5 C	23.9 C	30.4 C
CSAH 81 (Bottineau Blvd)/ 63rd Ave N	35.8 D	36.6 D	35.4 D
63rd Ave N/Louisiana Ave/ Park-and-Ride Access	6.4 A	6.5 A	13.1 B
CSAH 81 (Bottineau Blvd)/ CSAH 10 (Bass Lake Rd)	30.4 C	33.2 C	45.2 D
CSAH 10 (Bass Lake Rd)/ Sherburne Ave	6.6 A	6.7 A	20.6 C
CSAH 81 (Bottineau Blvd)/ Wilshire Blvd	12.6 B	13.7 B	14.9 B
Wilshire Blvd/Lakeland Ave N	5.8 A	5.8 A	28.7 D
CSAH 81 (Bottineau Blvd)/ Corvallis Ave N	9.0 A	9.4 A	13.3 B
CSAH 8 (W Broadway Ave)/ Corvallis Ave N*	2.6 A	3.0 A	4.4 A
CSAH 8 (W Broadway Ave)/ Welcome Ave N*	2.0 A	2.6 A	2.0 A
CSAH 8 (W Broadway Ave)/ Vera Cruz Ave N*	0.6 A	0.7 A	2.9 A
CSAH 8 (W Broadway Ave)/ 45 ½ Ave N	1.5 A	1.5 A	1.4 A
CSAH 8 (W Broadway Ave)/ CSAH 9 (42nd Ave N)	18.6 B	18.6 B	18.5 B
CSAH 81 (Bottineau Blvd)/ CSAH 9 (42nd Ave N)	24.4 C	24.3 C	30.0 C
CSAH 9 (42nd Ave N)/ Hubbard Ave*,1	3.2 A	3.4 A	9.7 A
CSAH 9 (42nd Ave N)/ Railroad Ave N	1.7 A	2.4 A	1.9 A
CSAH 9 (42nd Ave N)/ Regent Ave N	2.4 A	2.4 A	2.0 A
W Broadway Ave/ 41 ½ Ave N*	10.1 B	10.2 B	18.9 C
Hubbard Ave/ 41 ½ Ave N*	5.7 A	5.8 A	26.4 D
Hubbard Ave/ 41st Ave N*	7.5	7.5	17.2

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	Opening Year AM Build No Freight Event	Opening Year AM Build Freight Event	Opening Year Build PM
	A	A	C
W Broadway Ave/ 41st Ave N*	8.4 A	8.6 A	16.3 C
Golden Valley Rd/ Theodore Wirth Pkwy**	11.5 B	N/A	19.4 C

*Side street stop-controlled intersection
** All-way stop-controlled intersection
[1] Left-turn movements limited to emergency vehicles and buses only.

Table 5.8. CSAH 81/73rd Avenue N to TH 55 (Olson Memorial Highway) – 2040 Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	2040 AM Build No Freight Event	2040 AM Build Freight Event	2040 PM Build
CSAH 81 (Bottineau Blvd)/ 73rd Ave N	17.5 B	18.0 B	19.8 B
CSAH 81 (Bottineau Blvd)/ CSAH 8 (W Broadway Ave)/ 71st Ave N	31.5 C	31.6 C	33.4 C
CSAH 130 (W Broadway Ave)/ 71st Ave N	8.5 A	8.2 A	16.5 B
CSAH 81 (Bottineau Blvd)/ I-94 WB Ramps	11.0 B	10.6 B	8.7 A
CSAH 81 (Bottineau Blvd)/ I-94 EB Ramps	26.5 C	25.9 C	33.6 C
CSAH 81 (Bottineau Blvd)/ 63rd Ave N	37.2 D	38.9 D	36.6 D
63rd Ave N/Louisiana Ave/ Park-and-Ride Access	6.9 A	7.0 A	13.5 B
CSAH 81 (Bottineau Blvd)/ CSAH 10 (Bass Lake Rd)	32.4 C	33.9 C	53.7 D
CSAH 10 (Bass Lake Rd)/ Sherburne Ave	7.8 A	7.9 A	24.8 C
CSAH 81 (Bottineau Blvd)/ Wilshire Blvd	14.1 B	14.8 B	16.2 B
Wilshire Blvd/Lakeland Ave	5.8 A	5.8 A	29.3 D
CSAH 81 (Bottineau Blvd)/ Corvallis Ave N	9.8 A	9.7 A	14.6 B

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS		
	2040 AM Build No Freight Event	2040 AM Build Freight Event	2040 PM Build
CSAH 8 (W Broadway Ave)/ Corvallis Ave N*	2.7 A	3.0 A	4.6 A
CSAH 8 (W Broadway Ave)/ Welcome Ave N*	2.0 A	2.6 A	2.2 A
CSAH 8 (W Broadway Ave)/ Vera Cruz Ave N*	0.7 A	0.8 A	3.1 A
CSAH 8 (W Broadway Ave)/ 45 ½ Ave N	1.6 A	1.7 A	1.6 A
CSAH 8 (W Broadway Ave)/ CSAH 9 (42nd Ave N)	19.8 B	19.8 B	20.5 C
CSAH 81 (Bottineau Blvd)/ CSAH 9 (42nd Ave N)	25.3 C	25.2 C	32.0 C
CSAH 9 (42nd Ave N)/ Hubbard Ave*,[1]	3.5 A	3.8 A	10.8 B
CSAH 9 (42nd Ave N)/ Railroad Ave N	2.0 A	2.7 A	2.1 A
CSAH 9 (42nd Ave N)/ Regent Ave N	2.6 A	2.6 A	2.5 A
W Broadway Ave/ 41 ½ Ave N*	10.6 B	10.7 B	23.8 C
Hubbard Ave/ 41 ½ Ave N*	5.9 A	5.9 A	26.8 D
Hubbard Ave/ 41st Ave N*	8.1 A	8.1 A	17.1 C
W Broadway Ave/ 41st Ave N*	8.7 A	8.6 A	17.1 C
Golden Valley Rd/ Theodore Wirth Pkwy**	12.8 B	N/A	42.5 E

*Side street stop-controlled intersection
** All-way stop-controlled intersection
[1] Left-turn movements limited to emergency vehicles and buses only.

5.2.4 TH 55 (Olson Memorial Highway) to Target Field Station

The results of the Opening Year and 2040 AM and PM peak hour analysis showed that all intersections would be expected to operate at overall LOS D or better during the Build peak hour scenarios, with the following exceptions:

- TH 55 (Olson Memorial Highway)/Thomas Avenue N in the 2040 AM peak
- Olson Memorial Highway)/7th Street N/6th Avenue N in the 2040 PM peak

All intersections were modeled in VISSIM based on the proposed future at-grade LRT crossings. The overall intersection results are shown in **Table 5.9** below.

Movements for which queuing issues were identified in one or more scenarios were as follows:

- TH 55 (Olson Memorial Highway)/Thomas Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) – Southbound left-turn movement
- TH 55 (Olson Memorial Highway)/Morgan Avenue N – Southbound approach
- TH 55 (Olson Memorial Highway)/Humboldt Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/Van White Memorial Boulevard – Northbound through and right-turn movements
- TH 55 (Olson Memorial Highway)/Bryant Avenue N – Northbound approach
- TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) – Southbound approach

The poor LOS at the TH 55 (Olson Memorial Highway)/Thomas Avenue N intersections is due to the high traffic volumes at the TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) intersection. During the AM peak when eastbound traffic volumes are heaviest, queues can spill back on TH 55 (Olson Memorial Highway) and impact the upstream intersection at TH 55 (Olson Memorial Highway)/Thomas Avenue N. The queues and delays on TH 55 (Olson Memorial Highway) are less severe in the Build conditions than in the No Build conditions due to intersection and signal timing improvements associated with the BLRT project, therefore no additional improvements are proposed.

The LOS E operations at the Olson Memorial Highway/7th Street N/6th Avenue N intersection in the 2040 PM peak is due to growth in traffic volumes at the intersection, the LRT alignment through the intersection that results in complex traffic signal phasing, and the roadway geometrics at the intersection. The intersection has many competing needs: C-Line arterial BRT stations; bus access to the adjacent Metro Transit Heywood Garage; pedestrian access to the adjacent Target Field Station; City of Minneapolis planned future protected bikeway on 7th Street N; and buildings immediately adjacent to the right-of-way in two quadrants. During the design development process, several roadway improvements including additional left-turn and through lanes were identified and modeled, and these roadway improvements would maintain LOS D or better operations at the intersection in 2040 peak hours in the Build conditions. However, these roadway improvements would result in longer crossings for pedestrians and bicyclists, were perceived to make the intersection less friendly for transit users, and would reduce the available space for the planned protected bikeway on 7th Street N. The BLRT project stakeholders, including the City of Minneapolis, Metro Transit, and Hennepin County, evaluated the competing needs of all modes at the intersection and recommended that roadway capacity improvements not be implemented at the intersection due to the negative impacts on other modes. Therefore roadway improvements are not proposed to maintain LOS D or better operations at this intersection in the 2040 Build PM peak conditions.

The southbound left-turn queue at TH 55 (Olson Memorial Highway)/CSAH 2 (Penn Avenue N) occurs in the 2040 Build PM peak only and is due to the relatively short 100-foot turn lane. The length of the turn lane was limited to 100 feet in order to minimize impacts to on-street parking and adjacent boulevard space. The queue would be accommodated within the taper distance of the turn lane, and therefore this is not considered to be an issue that is in need of further improvements.

The queuing issues on Thomas Avenue N, Morgan Avenue N, Humboldt Avenue N, Van White Memorial Boulevard, and Bryant Avenue N are all due to the location of the frontage road zero to 50 feet from the intersection with TH 55 (Olson Memorial Highway). One to two vehicles queued at the stop bar would exceed the storage distance for these approaches. These issues were also noted in the Existing and No Build conditions analysis and occur on low volume approaches. Therefore, no mitigation is proposed to address these queues.

The queue on the southbound approach of the TH 55 (Olson Memorial Highway)/I-94 EB Ramps (W Lyndale Avenue N) intersection is due to the high volume of traffic, but is a significant distance from the I-94 exit and in a lower speed roadway segment (30 mph). This issue was noted in the Existing and No Build conditions analysis also, and does not change significantly in the Build conditions. Therefore no additional improvements are proposed.

The full table of Build conditions LOS and queuing analysis results can be found in **Appendix C**.

Table 5.9. TH 55 (Olson Memorial Highway) to Target Field Station – Opening Year and 2040 Build Conditions Results

Intersection	Overall Intersection Average Delay (seconds/vehicle) and LOS			
	Opening Year AM Build	2040 AM Build	Opening Year PM Build	2040 PM Build
TH 55 (Olson Memorial Hwy)/ Thomas Ave N	12.0 B	65.3 E	10.9 B	21.8 C
TH 55 (Olson Memorial Hwy)/ Pedestrian Crossing East of Russell Ave N	9.5 A	22.4 C	4.6 A	11.5 B
TH 55 (Olson Memorial Hwy)/ CSAH 2 (Penn Ave N)	44.3 D	50.4 D	43.1 D	51.1 D
TH 55 (Olson Memorial Hwy)/ Pedestrian Crossing East of Oliver Ave N	6.5 A	6.5 A	7.3 A	8.0 A
TH 55 (Olson Memorial Hwy)/ Morgan Ave N	13.3 B	13.5 B	16.4 B	22.9 C
TH 55 (Olson Memorial Hwy)/ James Ave N*	6.1 A	6.6 A	5.2 A	3.6 A
TH 55 (Olson Memorial Hwy)/ Pedestrian Crossing East of James Ave N	1.3 A	1.3 A	1.2 A	1.2 A
TH 55 (Olson Memorial Hwy)/ Humboldt Ave N	22.6 C	24.5 C	22.6 C	20.3 C
TH 55 (Olson Memorial Hwy)/ Van White Memorial Blvd	26.5 C	31.5 C	33.3 C	36.3 D
TH 55 (Olson Memorial Hwy)/ Bryant Ave N	17.4 B	19.2 B	17.3 B	22.8 C
TH 55 (Olson Memorial Hwy)/ I-94 EB Ramps (W Lyndale Ave N)	34.1 C	54.9 D	29.1 C	32.3 C
TH 55 (Olson Memorial Hwy)/ I-94 WB Ramps (E Lyndale Ave N)	37.1 D	42.2 D	39.4 C	46.7 D
Olson Memorial Hwy)/ Border Ave N	23.6 C	24.0 C	32.3 C	34.4 C
Olson Memorial Hwy)/ 7th St N/ 6th Ave N	45.0 D	46.6 D	43.6 D	64.8 E

*Side street stop-controlled intersection

5.3 Build Conditions Traffic Modeling Summary

Several improvements were identified as part of the scope of the project in order to provide control of the LRT at intersections and to provide adequate infrastructure to accommodate buses, pedestrians, and park-and-ride traffic near stations. These project elements were incorporated into the Build conditions modeling and included:

- Reconstruct 101st Avenue N and Oak Grove Parkway to accommodate the needs of the BLRT OMF site.
- Reconstruct CSAH 103 (West Broadway Avenue) from TH 610 to north of Oak Grove Parkway to accommodate the desired location of the LRT alignment, station location, and park-and-ride parking structure.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/Main Street to provide a second access point to the park-and-ride facility.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/94th Avenue N to allow LRT to transition from side-running to center-running.
- Install a new traffic signal at CSAH 103 (West Broadway Avenue)/75th Avenue N to allow LRT to transition from side-running to center-running.
- Install a new traffic signal at 63rd Avenue N/Louisiana Avenue to provide for pedestrian crossings of 63rd Avenue N and facilitate traffic exiting the park-and-ride facility.
- Reconfigure the CSAH 8 (West Broadway Avenue)/Vera Cruz Avenue N intersection to a roundabout, to continue to provide full access to the surrounding neighborhood, along with additional gates and medians at the rail crossing.
- Install a new traffic signal at TH 55 (Olson Memorial Highway)/Thomas Avenue N to maintain neighborhood access.
- Install new traffic signals on TH 55 (Olson Memorial Highway) at the proposed pedestrian crossings east of Russell Avenue N, east of Oliver Avenue N, and east of James Avenue N to maintain neighborhood pedestrian access. These pedestrian signals are assumed to operate as two-stage crossings due to the u-shaped geometry of the walkway as it crosses the LRT guideway.

In addition, some improvements were also identified as part of the Build project in order to provide overall LOS D or better operations or to manage park-and-ride queuing at all intersections in the Build conditions. These project improvements included:

- Modify left-turn phasing on CSAH 130 (Brooklyn Boulevard)/CSAH 152 at CSAH 103 (West Broadway Avenue) from protected-only to protected/permissive.
- Modify signal phasing at CSAH 81 (Bottineau Boulevard)/CSAH 10 (Bass Lake Road) to provide a right-turn overlap phase on eastbound CSAH 10 (Bass Lake Road).
- Restripe Wilshire Boulevard at CSAH 81 (Bottineau Boulevard) to provide dual eastbound left-turn lanes and modify signal timing to accommodate park-and-ride traffic.
- Restripe CSAH 8 (West Broadway Avenue) at CSAH 9 (42nd Avenue N) to provide northbound and southbound left-turn lanes and modify the traffic signal to provide northbound, southbound, and westbound protected/permissive left-turn phasing to accommodate park-and-ride traffic.
- Modify CSAH 2 (Penn Avenue N) lane geometrics at TH 55 (Olson Memorial Highway) to better accommodate vehicle traffic.
- Modify southbound W Lyndale Avenue N geometrics to better accommodate vehicle traffic flow.

Signal timings in the Build conditions were optimized as part of the VISSIM simulation models. The CSAH 103 (West Broadway Avenue), CSAH 81 (Bottineau Boulevard), and TH 55 (Olson Memorial Highway) corridors were all assumed to operate with coordinated and interconnected signals. Pedestrian crossings of TH 55 (Olson Memorial Highway) were assumed to be timed for one-stage crossings similar to the existing operations, with the exception of the three new pedestrian signals as noted previously.

With these improvements, all intersections would be expected to operate at overall LOS D or better in the Opening Year and 2040 Build AM and PM peak conditions, with the following exceptions:

- Oak Grove Parkway/Xylon Avenue in the 2040 AM and PM peak
- CSAH 103 (West Broadway Avenue)/Oak Grove Parkway in the 2040 PM peak in the scenario with no interchange at TH 169/101st Avenue N
- CSAH 103 (West Broadway Avenue)/Main Street in the 2040 PM peak in the scenario with no interchange at TH 169/101st Avenue N
- Golden Valley Road/Theodore Wirth Parkway in 2040 PM peak
- TH 55 (Olson Memorial Highway)/Thomas Avenue N in the 2040 AM peak
- Olson Memorial Highway)/7th Street N/6th Avenue N in the 2040 PM peak

A future traffic signal is expected to be needed at the Oak Grove Parkway/Xylon Avenue intersection to accommodate 2040 development-generated traffic volumes. The traffic signal is recommended to be constructed (by others) at the same time as the TH 169/101st Avenue N interchange or as development traffic warrants.

The poor operations (delay and queuing) at the CSAH 103 (West Broadway Avenue/Oak Grove Parkway and CSAH 103 (West Broadway Avenue)/Main Street intersections in the 2040 Build PM peak scenarios without the TH 169/101st Avenue N interchange are due to the high development-generated traffic volumes all accessing the TH 610 interchange. The planned future interchange at TH 169/101st Avenue N would distribute this traffic demand between two interchanges and result in all intersections operating at overall LOS D or better during the peak periods. The operations issues noted in the Build conditions also occurred in the No Build conditions to a greater degree, therefore no mitigation has been proposed as part of the BLRT project.

The all-way stop control at the Golden Valley Road/Theodore Wirth Parkway would be expected to operate poorly in the 2040 PM peak due to the forecast growth in area traffic volumes and the inefficiency of the existing all-way stop control. The operations issues noted in the Build conditions also occur in the No Build conditions to the same degree, and the park-and-ride would be expected to contribute two percent or less of the 2040 peak hour volumes. Therefore, no mitigation has been proposed for this intersection.

The poor LOS at the TH 55 (Olson Memorial Highway)/Thomas Avenue N intersections is due to the high eastbound traffic volumes in the AM peak. The operations in the 2040 Build conditions are expected to be better than in the 2040 No Build conditions due to the improvements associated with the BLRT project, therefore no additional improvements are proposed.

The LOS E operations at the Olson Memorial Highway/7th Street N/6th Avenue N intersection in the 2040 PM peak is due to growth in traffic volumes at the intersection, the LRT alignment through the intersection that results in changes to the traffic signal phasing, and the roadway geometrics at the intersection. The BLRT stakeholders, in evaluating the competing needs of all modes at the intersection, recommended that roadway capacity improvements not be implemented at the intersection due to the corresponding negative impacts on other modes, including pedestrians, bicyclists, and buses.

Overall, there are fewer failing intersections in the Build conditions than in the No Build conditions due to the improvements made as part of the BLRT project. In addition, all the intersections with LOS E or F were due to an issue that also existed in the No Build conditions, or stakeholders determined that the traffic mitigation measures would have significant negative impacts on other modes. Therefore, no traffic mitigation measures, other than those described above, are proposed for the BLRT project.

Appendix A: Peak Hour Traffic Volumes

2014 AM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N	3	99	-	-	577	1	8	-	6	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	3	101	-	-	582	1	1	-	5	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	-	89	542	88	499	-	-	-	-	35	-	15
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	454	66	38	496	-	-	-	-	512	-	177
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	142	190	167	841	-	-	-	-	132	-	378
CSAH 103 (W Broadway Ave) / 94th Ave N	63	282	-	-	842	131	50	-	94	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	54	190	25	27	599	310	114	152	26	72	244	41
CSAH 103 (W Broadway Ave) / 92nd Ave N	11	242	0	4	611	82	5	1	4	12	3	22
CSAH 103 (W Broadway Ave) / Setzler Pkwy	15	200	15	20	580	27	5	0	4	62	0	48
CSAH 103 (W Broadway Ave) / 89th Ave N	5	219	-	-	598	48	11	-	8	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	5	175	9	3	589	14	34	3	17	46	5	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	54	117	60	65	491	96	39	305	115	181	415	33
CSAH 103 (W Broadway Ave) / 84th Ave N	2	220	57	139	647	1	3	0	5	15	0	8
CSAH 103 (W Broadway Ave) / College Park Dr	8	277	-	-	661	6	2	-	40	-	-	-
CSAH 103 (W Broadway Ave) / 82nd Ave N	11	357	-	-	696	5	3	-	38	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	-	345	22	16	718	-	-	-	-	87	-	23
CSAH 103 (W Broadway Ave) / 78th Ave N	0	341	3	11	793	1	0	0	1	7	0	26
CSAH 103 (W Broadway Ave) / Shopping Center Access	21	311	14	10	775	16	22	0	7	11	0	11
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	33	144	38	61	454	278	111	246	20	65	342	91
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	39	4	47	7	0	7	16	323	47	28	610	16
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	5	0	1	4	0	8	10	320	6	3	479	13
CSAH 130 (W Broadway Ave) / 76th Ave N	26	168	16	26	442	79	15	5	12	13	19	32
CSAH 130 (W Broadway Ave) / 75th Ave N	17	201	8	4	462	1	1	3	14	33	7	8
CSAH 130 (W Broadway Ave) / 74th Ave N	32	221	2	0	503	6	4	3	59	10	1	1
CSAH 130 (W Broadway Ave) / 73rd Ave N	16	200	9	10	501	61	36	11	10	17	29	19
CSAH 81 (Bottineau Blvd) / 73rd Ave N	39	697	26	10	1251	68	16	18	26	33	46	22
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	65	669	141	47	1130	133	66	77	33	349	200	27
CSAH 130 (W Broadway Ave) / 71st Ave N	125	65	1	9	72	425	151	9	105	0	26	2
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	470	210	118	1395	-	-	-	-	116	-	406
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	622	141	470	1041	-	-	-	-	357	-	58
CSAH 81 (Bottineau Blvd) / 63rd Ave N	47	524	69	104	1218	76	77	124	116	232	204	162
63rd Ave N / Louisiana Ave/Park-and-Ride Access	4	0	73	3	0	1	9	241	4	62	261	4
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	177	523	31	59	1284	224	66	172	294	113	290	52
CSAH 10 (Bass Lake Rd) / Sherburne Ave	6	1	68	0	1	0	0	463	11	83	606	1
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	17	663	79	63	1605	24	10	5	17	218	20	59
Wilshire Blvd / Lakeland Ave N	-	0	16	16	0	-	-	-	-	31	-	30
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	56	704	7	8	1777	56	30	8	112	32	22	26
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	80	26	124	134	-	-	-	-	34	-	100
CSAH 8 (W Broadway Ave) / Welcome Ave N	14	95	-	-	153	15	11	-	11	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	9	-	8	5	159	-	-	102	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	7	93	-	-	160	8	14	-	23	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	68	51	20	73	70	40	28	339	70	31	303	21
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	150	405	17	47	682	75	65	149	163	29	130	47
CSAH 9 (42nd Ave N) / Hubbard Ave	8 [1]	0 [1]	11	1 [1]	0 [1]	8	1 [1]	425	23	2 [1]	408	1
CSAH 9 (42nd Ave N) / Railroad Ave N	8	1	5	5	1	6	11	447	10	2	422	18
CSAH 9 (42nd Ave N) / Regent Ave N	113	1	32	8	0	13	6	414	48	17	398	1
W Broadway Ave / 41 ½ Ave N	5	139	-	-	153	18	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	14	-	-	21	-	-	-	-	18	-	5
41st Ave N / Hubbard Ave	6	9	17	22	24	10	8	60	1	13	65	14
W Broadway Ave / 41st Ave N	8	101	22	11	108	34	28	51	20	22	50	10
Golden Valley Rd / Theodore Wirth Pkwy	16	57	6	37	262	361	127	180	131	6	128	18
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	43	29	2007	-	-	889	12
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	39	128	60	99	104	83	132	1814	106	75	779	122
TH 55 (Olson Memorial Hwy) / Morgan Ave N	10	2	30	27	19	13	6	1948	19	50	953	2
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	50	-	50	34	1971	-	-	955	51
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	14	19	27	40	6	10	31	1972	18	82	982	57
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	14	19	20	71	22	36	24	1955	60	19	1071	14
TH 55 (Olson Memorial Hwy) / Bryant Ave N	4	2	32	5	4	27	6	2019	21	65	1073	22
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	286	374	410	-	1219	837	145	750	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	572	386	264	-	-	-	179	1109	-	-	323	22
Olson Memorial Hwy / Border Ave	22	29	37	3	106	129	265	988	120	4	194	6
Olson Memorial Hwy / 7th St N/6th Ave N	76	182	64	49	802	8	-	419	609	40	120	40

[1] Movement allowed by buses and emergency vehicles only

2014 PM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N	3	592	-	-	204	1	163	-	15	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	5	594	-	-	218	1	1	-	8	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	-	480	175	40	186	-	-	-	-	582	-	119
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	493	162	333	435	-	-	-	-	281	-	162
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	444	545	168	548	-	-	-	-	113	-	211
CSAH 103 (W Broadway Ave) / 94th Ave N	65	878	-	-	579	82	110	-	91	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	26	577	74	78	383	209	298	222	47	53	132	68
CSAH 103 (W Broadway Ave) / 92nd Ave N	8	609	5	17	455	11	64	0	32	4	0	4
CSAH 103 (W Broadway Ave) / Setzler Pkwy	2	572	58	44	445	2	26	1	10	26	0	24
CSAH 103 (W Broadway Ave) / 89th Ave N	8	582	-	-	462	19	50	-	29	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	14	554	51	12	446	33	26	6	9	24	2	10
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	131	437	338	70	310	99	138	707	160	142	393	44
CSAH 103 (W Broadway Ave) / 84th Ave N	6	809	47	87	521	4	6	0	4	72	2	91
CSAH 103 (W Broadway Ave) / College Park Dr	52	855	-	-	592	5	7	-	33	-	-	-
CSAH 103 (W Broadway Ave) / 82nd Ave N	32	939	-	-	622	3	7	-	19	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	-	951	113	27	614	-	-	-	-	63	-	20
CSAH 103 (W Broadway Ave) / 78th Ave N	11	1033	15	31	638	8	3	0	5	8	1	28
CSAH 103 (W Broadway Ave) / Shopping Center Access	55	885	77	35	543	73	100	12	44	46	12	74
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	85	491	157	121	312	200	371	532	58	135	582	155
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	81	26	146	43	22	55	65	772	116	129	693	45
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	8	0	11	41	0	39	30	760	20	11	825	38
CSAH 130 (W Broadway Ave) / 76th Ave N	63	526	84	88	311	161	141	43	50	43	58	66
CSAH 130 (W Broadway Ave) / 75th Ave N	56	655	29	16	385	3	2	9	60	14	7	16
CSAH 130 (W Broadway Ave) / 74th Ave N	64	731	7	4	449	6	6	3	140	4	3	3
CSAH 130 (W Broadway Ave) / 73rd Ave N	37	682	33	40	492	61	92	25	19	17	30	28
CSAH 81 (Bottineau Blvd) / 73rd Ave N	50	1523	55	21	651	43	117	57	72	50	42	36
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	48	1380	409	48	636	90	183	240	55	274	144	66
CSAH 130 (W Broadway Ave) / 71st Ave N	178	199	5	18	224	289	528	19	150	2	17	10
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	1239	495	122	845	-	-	-	-	150	-	600
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	1579	220	369	626	-	-	-	-	216	-	155
CSAH 81 (Bottineau Blvd) / 63rd Ave N	73	1452	253	129	637	76	127	249	63	164	221	220
63rd Ave N / Louisiana Ave/Park-and-Ride Access	3	0	112	5	0	9	3	322	12	82	284	4
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	332	1401	129	70	622	172	300	471	318	90	342	77
CSAH 10 (Bass Lake Rd) / Sherburne Ave	11	0	207	28	4	17	23	853	19	70	760	15
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	26	1723	260	77	920	36	37	7	29	115	7	105
Wilshire Blvd / Lakeland Ave N	-	0	37	36	0	-	-	-	-	35	-	34
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	142	1917	23	26	976	62	75	25	85	11	12	17
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	252	38	147	219	-	-	-	-	52	-	164
CSAH 8 (W Broadway Ave) / Welcome Ave N	55	237	-	-	198	73	53	-	27	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	20	-	6	14	211	-	-	286	14
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	19	284	-	-	217	14	16	-	9	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	104	150	42	40	142	44	63	470	114	38	335	90
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	274	779	51	94	580	69	103	275	225	22	120	72
CSAH 9 (42nd Ave N) / Hubbard Ave	13 [1]	0 [1]	25	0 [1]	0 [1]	7	40 [1]	622	40	2 [1]	475	6
CSAH 9 (42nd Ave N) / Railroad Ave N	5	2	6	9	2	6	9	665	18	13	504	11
CSAH 9 (42nd Ave N) / Regent Ave N	69	3	19	9	2	19	11	649	95	24	458	9
W Broadway Ave / 41 ½ Ave N	15	296	-	-	275	19	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	18	-	-	42	-	-	-	-	14	-	20
41st Ave N / Hubbard Ave	6	4	10	28	24	10	17	130	5	10	85	17
W Broadway Ave / 41st Ave N	11	182	33	48	192	35	63	85	20	37	66	51
Golden Valley Rd / Theodore Wirth Pkwy	95	189	10	22	92	187	321	171	33	2	189	39
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	42	-	34	74	1738	-	-	1380	34
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	89	201	66	111	143	114	196	1458	126	87	1211	159
TH 55 (Olson Memorial Hwy) / Morgan Ave N	25	14	35	22	34	9	18	1601	16	49	1423	3
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	38	-	43	37	1621	-	-	1432	4
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	14	16	42	27	19	17	26	1617	16	33	1405	18
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	28	39	25	71	38	53	66	1560	60	32	1375	7
TH 55 (Olson Memorial Hwy) / Bryant Ave N	32	13	64	12	6	20	19	1608	29	45	1362	29
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	183	371	223	-	909	775	253	1213	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	375	694	127	-	-	-	262	718	-	-	1091	81
Olson Memorial Hwy / Border Ave	146	82	12	9	91	290	255	542	48	13	736	15
Olson Memorial Hwy / 7th St N/6th Ave N	319	468	42	47	262	27	-	336	225	52	418	49

[1] Movement allowed by buses and emergency vehicles only

2021 No Build AM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N	15	120	-	-	665	5	10	-	20	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	5	135	-	-	685	5	5	-	5	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	-	120	685	115	575	-	-	-	-	45	-	20
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	580	95	50	640	-	-	-	-	540	-	225
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	180	210	240	940	-	-	-	-	140	-	495
CSAH 103 (W Broadway Ave) / 94th Ave N	70	335	-	-	930	150	55	-	95	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	80	210	30	50	640	335	120	180	25	80	280	70
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	285	5	-	675	100	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Setzler Pkwy	20	225	15	35	625	30	5	5	30	65	5	50
CSAH 103 (W Broadway Ave) / 89th Ave N	-	260	-	-	645	55	-	-	20	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	5	200	10	15	635	15	35	5	20	50	5	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	55	135	60	70	535	105	40	310	115	185	425	35
CSAH 103 (W Broadway Ave) / 84th Ave N	-	245	60	-	840	5	-	-	5	-	-	10
CSAH 103 (W Broadway Ave) / College Park Dr	20	300	75	145	695	5	5	5	40	15	5	5
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	395	-	-	745	15	-	-	40	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	5 [1]	365	20	20	765	-	-	-	-	90	-	25
CSAH 103 (W Broadway Ave) / 78th Ave N	-	365	15	-	850	5	-	-	5	-	-	35
CSAH 103 (W Broadway Ave) / Shopping Center Access	20	335	15	20	825	15	20	5	5	10	5	10
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	30	155	40	65	485	295	115	250	20	65	345	95
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	40	5	45	5	5	5	15	335	50	30	630	15
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	5	5	5	5	5	10	15	340	5	5	490	15
CSAH 130 (W Broadway Ave) / 76th Ave N	30	180	20	25	460	80	15	5	10	15	20	35
CSAH 130 (W Broadway Ave) / 75th Ave N	15	220	10	5	490	5	5	5	15	35	5	10
CSAH 130 (W Broadway Ave) / 74th Ave N	35	240	5	5	530	5	5	5	60	10	5	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	20	215	10	10	530	65	40	10	10	20	30	20
CSAH 81 (Bottineau Blvd) / 73rd Ave N	45	770	30	10	1350	65	15	20	30	40	50	25
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	65	740	150	55	1225	140	75	80	30	370	210	35
CSAH 130 (W Broadway Ave) / 71st Ave N	130	70	5	10	75	455	165	10	110	5	25	5
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	535	225	120	1505	-	-	-	-	120	-	420
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	700	150	485	1140	-	-	-	-	375	-	60
CSAH 81 (Bottineau Blvd) / 63rd Ave N	50	585	75	115	1315	85	85	130	120	240	210	180
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	75	5	5	5	10	250	5	65	270	5
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	180	575	30	65	1360	245	75	180	305	115	300	55
CSAH 10 (Bass Lake Rd) / Sherburne Ave	5	5	75	5	5	5	5	485	10	90	635	5
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	20	715	85	65	1690	25	10	5	20	225	20	60
Wilshire Blvd / Lakeland Ave N	-	5	15	15	5	-	-	-	-	30	-	30
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	55	755	10	10	1860	60	35	10	115	30	25	30
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	90	30	130	140	-	-	-	-	35	-	105
CSAH 8 (W Broadway Ave) / Welcome Ave N	10	110	-	-	160	15	10	-	10	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	10	-	10	5	165	-	-	110	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	10	100	-	-	165	10	15	-	25	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	70	55	20	80	75	40	30	355	70	35	320	25
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	160	420	15	50	700	80	70	155	170	30	135	50
CSAH 9 (42nd Ave N) / Hubbard Ave	10 [2]	0 [2]	10	5 [2]	0 [2]	10	5 [2]	440	25	5 [2]	425	5
CSAH 9 (42nd Ave N) / Railroad Ave N	10	5	5	5	5	5	10	465	10	5	440	20
CSAH 9 (42nd Ave N) / Regent Ave N	115	5	35	10	5	15	5	430	50	20	415	5
W Broadway Ave / 41 ½ Ave N	5	145	-	-	160	20	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	15	-	-	20	-	-	-	-	20	-	5
41st Ave N / Hubbard Ave	5	10	20	25	25	10	10	60	5	15	65	15
W Broadway Ave / 41st Ave N	10	110	25	10	110	35	30	55	20	25	50	10
Golden Valley Rd / Theodore Wirth Pkwy	15	60	5	40	270	370	130	185	135	5	130	20
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	45	30	2085	-	-	935	15
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	40	135	65	105	110	85	135	1880	110	80	820	125
TH 55 (Olson Memorial Hwy) / Morgan Ave N	10	5	30	30	20	15	5	2020	20	50	1000	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	50	-	50	35	2045	-	-	1005	55
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	25	30	45	10	15	45	2030	25	90	1020	60
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	15	20	20	75	25	35	25	2015	60	20	1120	15
TH 55 (Olson Memorial Hwy) / Bryant Ave N	5	5	35	5	5	30	5	2085	20	70	1120	25
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	305	390	420	-	1280	845	160	795	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	590	400	290	-	-	-	180	1175	-	-	365	25
Olson Memorial Hwy / Border Ave	25	30	40	5	115	135	270	1070	125	5	230	5
Olson Memorial Hwy / 7th St N/6th Ave N	80	190	70	60	825	10	-	480	635	45	155	50

[1] U-turn volume

[2] Movement allowed by buses and emergency vehicles only

2021 No Build PM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N	5	680	-	-	235	5	190	-	35	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	5	690	-	-	270	5	5	-	10	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	-	555	220	50	230	-	-	-	-	730	-	140
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	650	175	420	600	-	-	-	-	295	-	200
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	545	540	260	640	-	-	-	-	120	-	280
CSAH 103 (W Broadway Ave) / 94th Ave N	70	970	-	-	665	95	115	-	95	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	40	615	85	120	415	230	320	250	45	60	155	105
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	730	25	-	515	20	-	-	100	-	-	10
CSAH 103 (W Broadway Ave) / Setzler Pkwy	55	615	60	135	480	5	25	5	10	30	5	25
CSAH 103 (W Broadway Ave) / 89th Ave N	-	720	-	-	545	25	-	-	85	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	15	595	55	10	490	35	25	5	10	30	5	10
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	135	470	350	75	345	105	145	720	165	150	400	45
CSAH 103 (W Broadway Ave) / 84th Ave N	-	885	50	-	660	5	-	-	5	-	-	80
CSAH 103 (W Broadway Ave) / College Park Dr	95	910	35	90	570	5	15	5	35	75	5	15
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	1035	-	-	675	35	-	-	25	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	20 [1]	1005	120	35	665	-	-	-	-	65	-	20
CSAH 103 (W Broadway Ave) / 78th Ave N	-	1110	45	-	700	20	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Shopping Center Access	55	940	80	70	590	75	105	10	45	45	10	75
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	90	520	175	130	340	215	390	540	60	145	595	165
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	80	25	150	45	25	55	65	800	120	130	720	50
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	10	5	10	40	5	40	30	790	20	10	855	40
CSAH 130 (W Broadway Ave) / 76th Ave N	65	565	85	90	340	170	150	45	50	45	60	70
CSAH 130 (W Broadway Ave) / 75th Ave N	60	700	30	15	415	5	5	10	60	15	5	15
CSAH 130 (W Broadway Ave) / 74th Ave N	70	780	10	5	485	5	5	5	145	5	5	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	45	725	35	40	525	70	105	25	20	20	35	30
CSAH 81 (Bottineau Blvd) / 73rd Ave N	55	1635	65	20	725	45	120	60	80	60	45	40
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	50	1480	425	60	705	100	195	250	55	290	150	75
CSAH 130 (W Broadway Ave) / 71st Ave N	180	210	5	20	240	315	565	20	150	5	15	10
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	1340	520	125	925	-	-	-	-	160	-	615
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	1700	230	380	705	-	-	-	-	230	-	160
CSAH 81 (Bottineau Blvd) / 63rd Ave N	80	1555	265	145	710	85	135	255	65	170	230	240
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	115	5	5	10	5	335	10	90	295	5
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	340	1495	135	75	680	190	325	485	330	95	355	80
CSAH 10 (Bass Lake Rd) / Sherburne Ave	10	5	225	30	5	20	25	885	20	80	790	15
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	25	1820	270	80	990	35	40	5	30	120	5	110
Wilshire Blvd / Lakeland Ave N	-	5	40	35	5	-	-	-	-	35	-	35
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	145	2020	25	30	1045	70	80	25	85	10	15	20
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	265	40	150	230	-	-	-	-	55	-	170
CSAH 8 (W Broadway Ave) / Welcome Ave N	55	250	-	-	210	75	55	-	30	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	15	-	5	15	225	-	-	300	15
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	20	295	-	-	225	15	15	-	10	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	105	155	45	45	150	45	65	495	115	40	355	95
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	290	800	50	95	600	75	110	285	235	25	130	75
CSAH 9 (42nd Ave N) / Hubbard Ave	15 [2]	0 [2]	25	0 [2]	0 [2]	10	5 [2]	645	40	5 [2]	495	5
CSAH 9 (42nd Ave N) / Railroad Ave N	5	5	5	10	5	5	10	690	20	15	525	10
CSAH 9 (42nd Ave N) / Regent Ave N	70	5	20	10	5	20	10	670	100	25	475	10
W Broadway Ave / 41 ½ Ave N	15	305	-	-	285	20	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	20	-	-	45	-	-	-	-	15	-	20
41st Ave N / Hubbard Ave	5	5	10	35	30	15	20	135	5	10	90	20
W Broadway Ave / 41st Ave N	10	200	35	50	200	35	70	90	20	40	70	55
Golden Valley Rd / Theodore Wirth Pkwy	100	195	10	20	95	190	330	175	35	5	195	40
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	35	75	1810	-	-	1450	35
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	95	210	70	115	150	125	200	1520	130	90	1270	165
TH 55 (Olson Memorial Hwy) / Morgan Ave N	25	15	35	25	35	10	15	1670	20	50	1490	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	40	-	45	40	1690	-	-	1500	5
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	20	45	30	25	25	35	1675	25	25	1460	20
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	30	40	25	75	40	55	65	1615	65	30	1425	10
TH 55 (Olson Memorial Hwy) / Bryant Ave N	35	15	65	15	5	20	20	1665	35	45	1410	30
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	195	390	225	-	960	785	275	1260	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	375	725	145	-	-	-	270	765	-	-	1165	100
Olson Memorial Hwy / Border Ave	150	90	15	10	100	295	255	605	50	15	815	20
Olson Memorial Hwy / 7th St N/6th Ave N	330	485	45	55	270	30	-	395	235	60	485	55

[1] U-turn volume

[2] Movement allowed by buses and emergency vehicles only

2040 No Build AM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N (No Build01) [1]	340	265	-	-	965	115	105	-	335	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N (No Build01) [1]	575	380	-	-	1085	215	225	-	815	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (No Build01) [1]	-	815	770	385	1515	-	-	-	-	120	-	140
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (No Build01) [1]	-	1065	80	595	1040	-	-	-	-	610	-	520
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (No Build01) [1]	-	345	200	500	1150	-	-	-	-	210	-	800
CSAH 103 / 101st Ave N (No Build02) [2]	395	195	-	-	810	115	75	-	400	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N (No Build02) [2]	520	435	-	-	1020	190	155	-	650	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (No Build02) [2]	-	815	770	385	1285	-	-	-	-	120	-	140
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (No Build02) [2]	-	1065	80	435	970	-	-	-	-	610	-	520
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (No Build02) [2]	-	345	200	430	1150	-	-	-	-	210	-	800
CSAH 103 (W Broadway Ave) / 94th Ave N	80	475	-	-	1160	200	70	-	100	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	85	270	45	110	750	405	140	255	25	105	380	145
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	360	10	-	800	115	-	-	15	-	-	40
CSAH 103 (W Broadway Ave) / Setzler Pkwy	20	290	20	45	740	30	5	5	30	70	5	60
CSAH 103 (W Broadway Ave) / 89th Ave N	-	335	-	-	765	55	-	-	30	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	5	270	10	15	765	15	40	5	30	70	10	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	60	190	70	80	660	125	50	330	130	200	445	45
CSAH 103 (W Broadway Ave) / 84th Ave N	-	315	65	-	990	5	-	-	5	-	-	5
CSAH 103 (W Broadway Ave) / College Park Dr	25	370	70	155	830	10	5	5	45	20	5	5
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	465	-	-	880	20	-	-	45	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	10 [3]	435	25	20	905	-	-	-	-	95	-	25
CSAH 103 (W Broadway Ave) / 78th Ave N	-	430	15	-	1005	5	-	-	5	-	-	35
CSAH 103 (W Broadway Ave) / Shopping Center Access	20	400	15	50	965	20	20	5	5	10	5	10
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	35	195	45	80	560	340	130	265	20	70	355	115
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	40	5	45	10	5	10	20	360	55	25	680	20
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	5	5	10	10	5	10	15	370	5	5	520	15
CSAH 130 (W Broadway Ave) / 76th Ave N	35	215	30	30	525	90	20	10	15	15	25	35
CSAH 130 (W Broadway Ave) / 75th Ave N	20	270	10	5	570	5	5	5	15	35	5	10
CSAH 130 (W Broadway Ave) / 74th Ave N	40	300	5	5	615	5	5	5	70	15	5	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	25	265	10	10	610	80	55	15	15	20	35	20
CSAH 81 (Bottineau Blvd) / 73rd Ave N	60	955	45	10	1605	65	15	25	40	55	55	25
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	55	925	165	80	1450	165	90	90	20	405	225	50
CSAH 130 (W Broadway Ave) / 71st Ave N	130	85	5	10	90	525	210	10	115	5	30	5
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	690	265	125	1755	-	-	-	-	140	-	460
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	885	180	520	1375	-	-	-	-	425	-	70
CSAH 81 (Bottineau Blvd) / 63rd Ave N	65	740	90	145	1550	100	105	145	130	255	230	220
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	85	10	5	5	15	285	5	75	315	10
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	200	720	35	70	1570	295	105	205	330	115	325	70
CSAH 10 (Bass Lake Rd) / Sherburne Ave	10	5	95	5	5	5	5	545	15	110	705	5
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	25	875	100	75	1915	25	10	5	20	245	20	70
Wilshire Blvd / Lakeland Ave N	-	5	20	20	5	-	-	-	-	35	-	35
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	55	915	10	10	2095	75	45	10	120	35	25	40
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	95	35	140	155	-	-	-	-	45	-	115
CSAH 8 (W Broadway Ave) / Welcome Ave N	15	115	-	-	185	15	15	-	5	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	5	-	10	5	195	-	-	125	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	10	110	-	-	180	10	15	-	30	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	70	60	25	90	80	40	30	390	75	40	360	30
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	180	455	20	50	750	90	80	175	190	30	155	50
CSAH 9 (42nd Ave N) / Hubbard Ave	10 [4]	0 [4]	10	5 [4]	0 [4]	10	5 [4]	485	25	5 [4]	470	5
CSAH 9 (42nd Ave N) / Railroad Ave N	10	5	5	5	5	5	10	510	10	5	485	20
CSAH 9 (42nd Ave N) / Regent Ave N	125	5	40	10	5	15	5	470	55	20	455	5
W Broadway Ave / 41 ½ Ave N	5	160	-	-	175	20	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	15	-	-	25	-	-	-	-	20	-	5
41st Ave N / Hubbard Ave	5	10	20	25	25	10	10	70	5	15	75	15
W Broadway Ave / 41st Ave N	10	115	25	15	125	40	30	60	25	25	55	10
Golden Valley Rd / Theodore Wirth Pkwy	20	65	5	40	290	400	140	200	145	5	145	20
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	50	-	55	35	2290	-	-	1065	15
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	45	145	70	115	120	100	150	2060	125	85	935	140
TH 55 (Olson Memorial Hwy) / Morgan Ave N	10	5	35	30	20	15	5	2220	20	60	1130	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	60	-	55	35	2250	-	-	1135	60
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	35	45	30	55	20	30	75	2185	50	105	1130	65
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	15	25	25	85	25	35	25	2180	65	25	1245	20
TH 55 (Olson Memorial Hwy) / Bryant Ave N	5	5	40	5	5	30	5	2265	20	75	1255	25
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	350	440	440	-	1445	865	195	915	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	630	440	355	-	-	-	185	1350	-	-	480	35
Olson Memorial Hwy / Border Ave	30	35	55	5	125	155	280	1290	135	10	335	10
Olson Memorial Hwy / 7th St N/6th Ave N	95	210	90	80	895	10	-	650	700	60	245	75

[1] No Build01 assumes no interchange at TH 169/101st Avenue N

[2] No Build02 assumes a full access interchange at TH 169/101st Avenue N

[3] U-turn volume

[4] Movement allowed by buses and emergency vehicles only

2040 No Build PM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
CSAH 103 / 101st Ave N (No Build01) [1]	390	845	-	-	390	135	235	-	550	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N (No Build01) [1]	715	950	-	-	700	240	285	-	1000	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (No Build01) [1]	-	1330	320	350	1350	-	-	-	-	935	-	335
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (No Build01) [1]	-	1140	165	1275	1010	-	-	-	-	285	-	510
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (No Build01) [1]	-	605	750	570	725	-	-	-	-	300	-	700
CSAH 103 / 101st Ave N (No Build02) [2]	405	825	-	-	370	135	215	-	500	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N (No Build02) [2]	640	1000	-	-	655	215	230	-	800	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (No Build02) [2]	-	1255	320	350	1105	-	-	-	-	880	-	385
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (No Build02) [2]	-	1065	165	995	990	-	-	-	-	285	-	510
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (No Build02) [2]	-	605	750	550	725	-	-	-	-	300	-	625
CSAH 103 (W Broadway Ave) / 94th Ave N	75	1225	-	-	900	125	130	-	110	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	40	715	105	225	500	285	380	335	45	85	215	205
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	855	25	-	625	25	-	-	110	-	-	10
CSAH 103 (W Broadway Ave) / Setzler Pkwy	80	725	65	150	580	5	30	5	5	30	5	30
CSAH 103 (W Broadway Ave) / 89th Ave N	-	870	-	-	670	30	-	-	100	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	20	705	60	60	610	35	30	10	15	35	5	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	155	570	385	85	450	130	165	745	190	170	425	50
CSAH 103 (W Broadway Ave) / 84th Ave N	-	1060	50	-	805	5	-	-	5	-	-	50
CSAH 103 (W Broadway Ave) / College Park Dr	105	1050	30	100	700	10	15	5	30	80	5	50
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	1185	-	-	810	40	-	-	30	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	25 [3]	1160	130	40	800	-	-	-	-	75	-	20
CSAH 103 (W Broadway Ave) / 78th Ave N	-	1275	50	-	875	25	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Shopping Center Access	60	1095	80	80	725	85	110	10	45	50	10	85
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	105	595	215	155	410	250	445	565	60	165	625	195
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	80	25	165	50	25	65	75	855	125	140	775	65
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	10	5	15	45	5	35	35	880	25	15	935	45
CSAH 130 (W Broadway Ave) / 76th Ave N	70	670	95	105	340	190	165	45	60	50	60	80
CSAH 130 (W Broadway Ave) / 75th Ave N	70	820	40	15	500	5	5	10	70	20	5	15
CSAH 130 (W Broadway Ave) / 74th Ave N	80	915	10	5	580	5	5	5	160	5	5	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	60	845	40	40	625	85	135	35	30	20	40	30
CSAH 81 (Bottineau Blvd) / 73rd Ave N	70	1935	90	25	970	40	15	25	40	95	55	45
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	45	1760	475	85	900	125	225	270	50	325	165	110
CSAH 130 (W Broadway Ave) / 71st Ave N	190	245	5	20	280	395	660	20	145	5	20	15
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	1615	590	130	1145	-	-	-	-	195	-	665
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	2035	255	420	920	-	-	-	-	265	-	165
CSAH 81 (Bottineau Blvd) / 63rd Ave N	90	1835	300	185	900	105	165	280	75	195	250	290
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	130	10	5	15	5	375	10	105	330	10
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	370	1745	150	95	845	230	385	530	365	110	395	95
CSAH 10 (Bass Lake Rd) / Sherburne Ave	15	5	275	35	5	20	30	970	25	100	870	20
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	30	2095	290	90	1185	40	40	5	35	135	5	125
Wilshire Blvd / Lakeland Ave N	-	5	40	40	5	-	-	-	-	40	-	40
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	145	2295	25	35	1230	85	100	30	90	15	15	25
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	285	50	165	260	-	-	-	-	65	-	180
CSAH 8 (W Broadway Ave) / Welcome Ave N	60	275	-	-	240	85	60	-	30	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	-	-	-	20	-	5	15	255	-	-	330	15
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	25	325	-	-	255	20	20	-	15	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	105	175	55	50	170	50	65	555	115	50	405	110
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	330	865	55	105	655	85	120	315	260	25	150	85
CSAH 9 (42nd Ave N) / Hubbard Ave	15 [4]	0 [4]	25	0 [4]	0 [4]	10	5 [4]	705	40	5 [4]	550	5
CSAH 9 (42nd Ave N) / Railroad Ave N	5	5	5	10	5	5	10	760	20	15	585	10
CSAH 9 (42nd Ave N) / Regent Ave N	80	5	25	10	5	20	10	735	105	30	530	10
W Broadway Ave / 41 ½ Ave N	15	335	-	-	305	25	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	20	-	-	50	-	-	-	-	15	-	25
41st Ave N / Hubbard Ave	5	5	10	40	30	15	20	150	5	10	95	20
W Broadway Ave / 41st Ave N	15	220	40	55	210	40	70	105	25	40	75	60
Golden Valley Rd / Theodore Wirth Pkwy	105	210	10	25	100	205	360	190	35	5	215	45
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	45	90	2000	-	-	1635	35
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	105	230	75	130	165	145	215	1685	145	100	1420	180
TH 55 (Olson Memorial Hwy) / Morgan Ave N	30	15	40	25	40	10	20	1855	20	55	1660	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	45	-	45	45	1880	-	-	1675	10
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	35	35	50	30	40	40	55	1825	40	30	1610	20
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	30	50	30	85	45	55	75	1765	70	40	1570	10
TH 55 (Olson Memorial Hwy) / Bryant Ave N	35	15	75	15	5	20	20	1825	35	50	1560	35
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	230	435	230	-	1110	805	340	1415	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	375	805	190	-	-	-	295	915	-	-	1380	135
Olson Memorial Hwy / Border Ave	165	110	20	15	125	310	265	785	55	20	1040	25
Olson Memorial Hwy / 7th St N/6th Ave N	360	525	60	80	295	35	-	560	265	75	690	80

[1] No Build01 assumes no interchange at TH 169/101st Avenue N

[2] No Build02 assumes a full access interchange at TH 169/101st Avenue N

[3] U-turn volume

[4] Movement allowed by buses and emergency vehicles only

2021 Build AM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Oak Grove Pkwy / Xylon Ave	10	5	5	30	5	50	80	245	15	5	125	40
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	50	100	655	55	580	45	10	55	25	25	20	10
CSAH 103 (W Broadway Ave) / Main St	55	800	30	5	605	35	5	5	5	20	10	5
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	645	95	50	640	-	-	-	-	540	-	240
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	190	210	240	940	-	-	-	-	140	-	550
CSAH 103 (W Broadway Ave) / 94th Ave N	70	345	-	-	930	150	55	-	95	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	80	215	30	50	640	335	130	180	25	85	280	70
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	290	10	-	665	100	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Setzler Pkwy	20	225	15	40	625	30	5	5	5	65	5	55
CSAH 103 (W Broadway Ave) / 89th Ave N	-	260	-	-	645	55	-	-	20	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	5	200	10	15	635	15	35	5	20	50	10	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	55	135	60	70	535	105	40	310	115	185	425	35
CSAH 103 (W Broadway Ave) / 84th Ave N	-	240	60	-	835	5	-	-	5	-	-	10
CSAH 103 (W Broadway Ave) / College Park Dr	20	295	20	145	705	5	5	5	40	5	5	5
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	390	-	-	745	15	-	-	40	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	40 [1]	365	25	20	765	-	-	-	-	95	-	20
CSAH 103 (W Broadway Ave) / 78th Ave N	-	395	15	-	890	5	-	-	5	-	-	35
CSAH 103 (W Broadway Ave) / Shopping Center Access	-	400	25	-	850	40	-	-	30	-	-	20
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	30	160	40	110	490	290	115	250	15	70	345	95
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	40	5	40	5	5	5	15	335	50	25	630	20
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	5	5	5	5	5	10	15	335	5	5	490	15
CSAH 130 (W Broadway Ave) / 76th Ave N	30	180	20	25	480	80	15	5	10	15	20	35
CSAH 130 (W Broadway Ave) / 75th Ave N	55	215	10	5	490	10	5	5	80	35	10	10
CSAH 130 (W Broadway Ave) / 74th Ave N	-	270	5	5	600	-	-	-	-	20	-	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	20	215	10	10	535	70	40	15	10	20	35	20
CSAH 81 (Bottineau Blvd) / 73rd Ave N	45	685	35	10	1200	70	20	25	45	40	50	30
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	65	655	155	55	1100	130	75	70	40	395	205	30
CSAH 130 (W Broadway Ave) / 71st Ave N	130	80	5	10	85	475	165	10	105	5	25	5
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	545	235	120	1575	-	-	-	-	145	-	420
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	720	150	485	1235	-	-	-	-	460	-	60
CSAH 81 (Bottineau Blvd) / 63rd Ave N	60	585	75	115	1315	265	105	140	120	240	275	180
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	75	35	5	20	120	250	5	65	270	260
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	190	575	30	65	1365	245	75	180	375	120	300	55
CSAH 10 (Bass Lake Rd) / Sherburne Ave	5	5	85	5	5	5	5	545	10	90	645	5
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	20	715	85	65	1690	105	20	5	20	225	20	60
Wilshire Blvd / Lakeland Ave N	-	5	15	25	5	-	-	-	-	30	-	110
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	55	755	10	10	1860	60	35	10	115	30	25	30
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	90	30	130	140	-	-	-	-	35	-	105
CSAH 8 (W Broadway Ave) / Welcome Ave N	10	110	-	-	160	15	10	-	10	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	110	5	5	5	10	10	5	5	165	5	5	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	10	100	-	-	165	10	15	-	35	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	85	55	20	80	85	40	30	365	70	95	320	25
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	160	420	15	50	700	105	75	160	170	30	170	50
CSAH 9 (42nd Ave N) / Hubbard Ave	10 [2]	0 [2]	10	5 [2]	0 [2]	10	5 [2]	440	25	5 [2]	425	5
CSAH 9 (42nd Ave N) / Railroad Ave N	-	-	5	-	-	5	-	595	10	-	455	20
CSAH 9 (42nd Ave N) / Regent Ave N	115	5	35	10	5	15	5	560	50	20	430	5
W Broadway Ave / 41 ½ Ave N	40	160	-	-	160	90	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	50	-	-	40	-	-	-	-	20	-	110
41st Ave N / Hubbard Ave	5	10	20	40	25	15	45	60	5	15	65	15
W Broadway Ave / 41st Ave N	10	145	25	10	110	35	45	55	25	25	50	10
Golden Valley Rd / Theodore Wirth Pkwy	30	60	5	40	270	375	130	185	135	5	140	20
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	45	30	2085	-	-	935	15
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave N	-	-	-	-	-	-	-	2130	-	-	950	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	40	135	65	105	110	85	135	1880	110	80	820	125
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	-	-	-	-	-	-	-	2050	-	-	1025	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	10	5	30	30	20	15	5	2020	20	50	1000	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	-	-	50	-	2080	-	-	1005	55
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave N	-	-	-	-	-	-	-	2080	-	-	1060	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	25	30	95	10	15	75	1980	25	90	1020	60
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	15	20	20	75	25	35	25	2015	60	20	1120	15
TH 55 (Olson Memorial Hwy) / Bryant Ave N	5	5	35	5	5	30	5	2085	20	70	1120	25
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	305	390	420	-	1280	845	160	795	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	590	400	290	-	-	-	180	1175	-	-	365	25
Olson Memorial Hwy / Border Ave	25	30	40	5	115	135	270	1070	125	5	230	5
Olson Memorial Hwy / 7th St N/6th Ave N	80	190	70	60	825	10	-	480	635	45	155	50

[1] U-turn volume

[2] Movement allowed by buses and emergency vehicles only

2021 Build PM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Oak Grove Pkwy / Xylon Ave	10	5	5	25	10	55	45	200	10	10	205	50
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	10	570	215	25	190	5	230	30	45	700	70	65
CSAH 103 (W Broadway Ave) / Main St	5	770	10	5	955	5	20	5	50	30	5	5
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	-	655	175	475	620	-	-	-	-	295	-	205
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	-	545	540	255	650	-	-	-	-	120	-	285
CSAH 103 (W Broadway Ave) / 94th Ave N	70	970	-	-	675	95	115	-	95	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	40	615	85	120	420	235	320	250	45	65	150	105
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	730	25	-	520	20	-	-	100	-	-	10
CSAH 103 (W Broadway Ave) / Setzler Pkwy	10	615	60	140	480	5	25	5	10	30	5	25
CSAH 103 (W Broadway Ave) / 89th Ave N	-	685	-	-	500	25	-	-	85	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	15	595	55	60	490	35	25	5	10	30	5	10
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	135	470	350	75	345	105	145	720	165	145	400	45
CSAH 103 (W Broadway Ave) / 84th Ave N	-	880	50	-	655	5	-	-	5	-	-	80
CSAH 103 (W Broadway Ave) / College Park Dr	95	905	35	90	565	5	15	5	35	75	5	15
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	1025	-	-	665	35	-	-	20	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	135 [1]	1010	120	35	660	-	-	-	-	65	-	15
CSAH 103 (W Broadway Ave) / 78th Ave N	-	1220	45	-	815	20	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Shopping Center Access	-	1180	125	-	660	145	-	-	160	-	-	135
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	85	530	175	315	345	205	390	535	60	145	590	165
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	80	25	145	45	25	55	65	800	120	120	720	50
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	15	5	15	45	5	40	35	800	25	25	845	40
CSAH 130 (W Broadway Ave) / 76th Ave N	65	565	85	90	340	170	150	45	50	45	60	70
CSAH 130 (W Broadway Ave) / 75th Ave N	135	700	35	15	410	10	10	10	210	15	10	15
CSAH 130 (W Broadway Ave) / 74th Ave N	-	850	10	5	630	-	-	-	-	15	-	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	45	725	35	40	525	70	105	30	20	20	35	30
CSAH 81 (Bottineau Blvd) / 73rd Ave N	50	1650	65	25	785	45	120	60	80	60	45	40
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	55	1500	445	60	770	95	195	235	55	285	150	75
CSAH 130 (W Broadway Ave) / 71st Ave N	175	225	10	15	235	315	575	20	145	5	25	10
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	1405	600	125	935	-	-	-	-	165	-	615
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	1845	245	380	720	-	-	-	-	245	-	160
CSAH 81 (Bottineau Blvd) / 63rd Ave N	80	1555	265	145	710	115	295	310	70	170	240	240
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	115	225	5	110	25	335	10	90	295	45
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	400	1500	140	75	680	190	325	485	340	95	355	80
CSAH 10 (Bass Lake Rd) / Sherburne Ave	10	5	225	30	5	20	25	895	20	90	840	15
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	25	1820	270	80	990	45	110	5	30	120	5	110
Wilshire Blvd / Lakeland Ave N	-	5	40	105	5	-	-	-	-	35	-	45
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	145	2020	25	30	1045	70	80	25	85	10	15	20
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	265	40	150	230	-	-	-	-	55	-	170
CSAH 8 (W Broadway Ave) / Welcome Ave N	55	250	-	-	210	75	55	-	30	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	300	15	5	5	15	5	15	5	225	5	5	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	30	295	-	-	225	15	15	-	10	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	220	155	45	45	150	45	75	545	115	50	355	95
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	290	800	50	95	600	80	130	315	235	25	135	75
CSAH 9 (42nd Ave N) / Hubbard Ave	15 [2]	0 [2]	25	0 [2]	0 [2]	10	5 [2]	645	40	5 [2]	610	5
CSAH 9 (42nd Ave N) / Railroad Ave N	-	-	5	-	-	5	-	710	20	-	640	10
CSAH 9 (42nd Ave N) / Regent Ave N	70	5	20	10	5	20	10	690	100	25	590	10
W Broadway Ave / 41 ½ Ave N	20	420	-	-	285	30	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	25	-	-	220	-	-	-	-	15	-	35
41st Ave N / Hubbard Ave	5	5	10	180	30	45	25	135	5	10	90	20
W Broadway Ave / 41st Ave N	10	205	35	50	200	35	185	90	50	40	70	55
Golden Valley Rd / Theodore Wirth Pkwy	100	195	10	20	95	190	335	185	50	5	195	40
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	45	-	35	75	1810	-	-	1450	35
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave N	-	-	-	-	-	-	-	1855	-	-	1485	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	95	210	70	115	150	125	200	1520	130	90	1270	165
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	-	-	-	-	-	-	-	1705	-	-	1525	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	25	15	35	25	35	10	15	1670	20	50	1490	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	-	-	45	-	1730	-	-	1500	5
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave N	-	-	-	-	-	-	-	1730	-	-	1505	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	20	45	70	25	25	70	1635	25	25	1460	20
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	30	40	25	75	40	55	65	1615	65	30	1425	10
TH 55 (Olson Memorial Hwy) / Bryant Ave N	35	15	65	15	5	20	20	1665	35	45	1410	30
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	195	390	225	-	960	785	275	1260	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	375	725	145	-	-	-	270	765	-	-	1165	100
Olson Memorial Hwy / Border Ave	150	90	15	10	100	295	255	605	50	15	815	20
Olson Memorial Hwy / 7th St N/6th Ave N	330	485	45	55	270	30	-	395	235	60	485	55

[1] U-turn volume

[2] Movement allowed by buses and emergency vehicles only

2040 Build AM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Oak Grove Pkwy / Xylon Ave (Build01) [1]	85	50	45	70	25	130	195	410	140	70	205	100
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (Build01) [1]	455	110	750	50	765	115	35	165	485	40	155	10
CSAH 103 (W Broadway Ave) / Main St (Build01) [1]	285	1265	85	5	1185	105	45	155	365	55	145	5
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (Build01) [1]	-	1005	80	535	1070	-	-	-	-	575	-	630
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (Build01) [1]	-	250	310	465	1185	-	-	-	-	180	-	835
Oak Grove Pkwy / Xylon Ave (Build02) [2]	265	55	70	55	30	195	205	545	465	105	265	80
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (Build02) [2]	415	110	750	50	765	115	35	80	360	40	75	10
CSAH 103 (W Broadway Ave) / Main St (Build02) [2]	195	1225	85	5	1060	105	45	155	95	55	145	0
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (Build02) [2]	-	970	80	140	1070	-	-	-	-	575	-	535
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (Build02) [2]	-	250	310	465	1185	-	-	-	-	180	-	800
CSAH 103 (W Broadway Ave) / 94th Ave N	80	490	-	-	1165	200	70	-	100	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	85	275	45	110	750	405	150	255	25	110	380	145
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	365	15	-	790	115	-	-	15	-	-	40
CSAH 103 (W Broadway Ave) / Setzler Pkwy	20	290	20	50	740	30	5	5	5	70	5	60
CSAH 103 (W Broadway Ave) / 89th Ave N	-	335	-	-	765	55	-	-	30	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	5	270	10	15	765	15	40	5	30	70	10	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	60	190	70	80	660	125	50	330	125	200	445	45
CSAH 103 (W Broadway Ave) / 84th Ave N	-	310	65	-	990	5	-	-	5	-	-	5
CSAH 103 (W Broadway Ave) / College Park Dr	25	365	70	155	830	10	5	5	45	20	5	5
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	455	-	-	885	20	-	-	45	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	40 [3]	435	25	20	905	-	-	-	-	100	-	25
CSAH 103 (W Broadway Ave) / 78th Ave N	-	465	15	-	1040	5	-	-	5	-	-	35
CSAH 103 (W Broadway Ave) / Shopping Center Access	-	470	25	-	995	40	-	-	30	-	-	20
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	30	195	45	130	570	335	130	260	15	70	355	115
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	40	5	40	10	5	10	20	360	55	20	680	20
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	5	5	10	10	5	10	15	370	5	5	520	15
CSAH 130 (W Broadway Ave) / 76th Ave N	35	215	30	30	560	90	20	10	15	15	25	35
CSAH 130 (W Broadway Ave) / 75th Ave N	65	270	10	5	570	10	5	5	90	40	10	10
CSAH 130 (W Broadway Ave) / 74th Ave N	-	335	10	5	695	-	-	-	-	20	-	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	25	265	10	10	615	80	55	15	15	20	40	20
CSAH 81 (Bottineau Blvd) / 73rd Ave N	60	845	50	10	1415	70	20	25	60	55	55	30
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	65	820	170	75	1300	155	90	80	40	445	225	45
CSAH 130 (W Broadway Ave) / 71st Ave N	135	95	5	10	95	550	205	10	115	5	30	5
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	700	275	125	1825	-	-	-	-	165	-	460
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	905	180	520	1470	-	-	-	-	510	-	70
CSAH 81 (Bottineau Blvd) / 63rd Ave N	65	740	90	145	1550	280	125	155	130	255	295	220
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	85	40	5	20	125	285	5	75	315	265
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	200	720	35	70	1575	295	105	205	400	120	325	70
CSAH 10 (Bass Lake Rd) / Sherburne Ave	10	5	105	5	5	5	5	605	15	110	715	5
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	25	875	100	75	1915	105	20	5	20	245	20	70
Wilshire Blvd / Lakeland Ave N	-	5	20	30	5	-	-	-	-	35	-	115
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	55	915	10	10	2095	75	45	10	120	35	25	40
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	95	35	140	155	-	-	-	-	45	-	115
CSAH 8 (W Broadway Ave) / Welcome Ave N	15	115	-	-	185	15	15	-	5	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	125	5	5	5	5	10	5	5	195	5	5	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	10	110	-	-	180	10	15	-	40	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	85	60	25	90	90	40	30	400	75	100	360	30
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	180	455	20	50	750	115	85	180	190	30	190	50
CSAH 9 (42nd Ave N) / Hubbard Ave	10 [4]	0 [4]	10	5 [4]	0 [4]	10	5 [4]	485	25	5 [4]	470	5
CSAH 9 (42nd Ave N) / Railroad Ave N	-	-	5	-	-	5	-	640	10	-	500	20
CSAH 9 (42nd Ave N) / Regent Ave N	125	5	40	10	5	15	5	600	55	20	470	5
W Broadway Ave / 41 ½ Ave N	40	175	-	-	175	90	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	50	-	-	45	-	-	-	-	20	-	110
41st Ave N / Hubbard Ave	5	10	20	40	25	15	45	70	5	15	75	15
W Broadway Ave / 41st Ave N	10	150	25	15	125	40	45	60	30	25	55	10
Golden Valley Rd / Theodore Wirth Pkwy	30	65	5	40	290	405	145	205	150	5	155	20
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	55	-	55	40	2500	-	-	1230	20
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave N	-	-	-	-	-	-	-	2555	-	-	1250	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	70	165	60	100	130	145	205	2190	160	75	1035	125
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	-	-	-	-	-	-	-	2350	-	-	1235	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	10	5	35	30	20	15	10	2315	25	60	1210	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	-	-	65	-	2380	-	-	1210	65
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave N	-	-	-	-	-	-	-	2380	-	-	1275	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	25	30	100	10	15	85	2270	25	90	1240	65
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	15	25	20	80	25	45	30	2300	70	20	1335	15
TH 55 (Olson Memorial Hwy) / Bryant Ave N	10	5	35	5	5	35	15	2345	40	65	1325	25
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	320	410	485	-	1440	945	165	930	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	650	420	285	-	-	-	210	1310	-	-	445	30
Olson Memorial Hwy / Border Ave	25	30	45	5	115	145	280	1195	120	5	305	10
Olson Memorial Hwy / 7th St N/6th Ave N	125	230	90	55	885	10	-	505	740	50	185	45

[1] Build01 assumes no interchange at TH 169/101st Avenue N.
[2] Build02 assumes a full access interchange is constructed at TH 169/101st Avenue N.
[3] U-turn volume
[4] Movement allowed by buses and emergency vehicles only

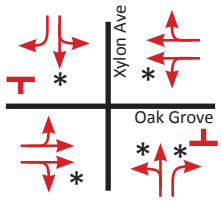
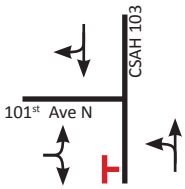
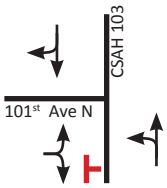
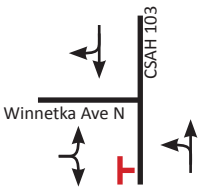
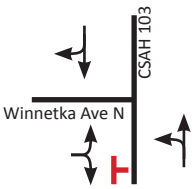
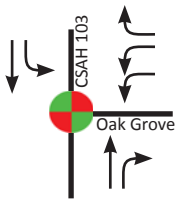
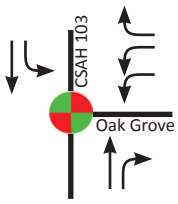
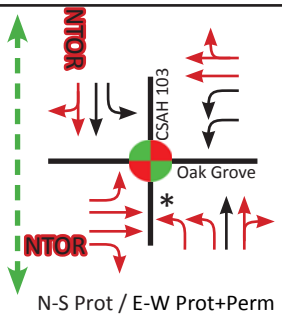
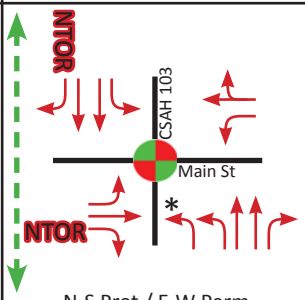
2040 Build PM Peak Hour Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Oak Grove Pkwy / Xylon Ave (Build01) [1]	115	65	60	90	35	175	155	330	110	120	340	170
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (Build01) [1]	485	730	235	25	250	60	135	220	580	780	205	70
CSAH 103 (W Broadway Ave) / Main St (Build01) [1]	215	1350	25	5	1615	45	95	205	580	85	225	5
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (Build01) [1]	-	1140	210	1335	945	-	-	-	-	280	-	450
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (Build01) [1]	-	615	740	380	820	-	-	-	-	215	-	735
Oak Grove Pkwy / Xylon Ave (Build02) [2]	355	70	95	70	40	260	160	435	370	175	445	135
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy (Build02) [2]	430	730	235	25	250	60	135	115	420	780	100	70
CSAH 103 (W Broadway Ave) / Main St (Build02) [2]	95	1295	25	5	1455	45	95	205	220	85	225	5
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps (Build02) [2]	-	965	210	815	945	-	-	-	-	280	-	450
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps (Build02) [2]	-	615	740	380	820	-	-	-	-	215	-	560
CSAH 103 (W Broadway Ave) / 94th Ave N	75	1225	-	-	910	125	130	-	110	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	40	715	105	225	505	290	385	335	45	90	215	205
CSAH 103 (W Broadway Ave) / 92nd Ave N	-	855	30	-	630	25	-	-	110	-	-	10
CSAH 103 (W Broadway Ave) / Setzler Pkwy	10	725	65	160	580	5	30	5	10	30	5	30
CSAH 103 (W Broadway Ave) / 89th Ave N	-	805	-	-	605	30	-	-	100	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	20	705	60	60	610	35	30	10	15	35	10	15
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	150	570	385	85	450	130	165	745	190	165	425	50
CSAH 103 (W Broadway Ave) / 84th Ave N	-	1060	50	-	800	5	-	-	5	-	-	50
CSAH 103 (W Broadway Ave) / College Park Dr	105	1050	30	100	700	10	15	5	30	80	5	50
CSAH 103 (W Broadway Ave) / 82nd Ave N	-	1180	-	-	805	40	-	-	20	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	140 [3]	1160	135	40	800	-	-	-	-	75	-	15
CSAH 103 (W Broadway Ave) / 78th Ave N	-	1390	50	-	965	25	-	-	10	-	-	40
CSAH 103 (W Broadway Ave) / Shopping Center Access	-	1350	135	-	805	155	-	-	165	-	-	145
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	100	605	220	360	415	245	440	565	60	165	620	195
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	80	30	155	50	30	65	75	855	125	125	775	65
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)	15	5	20	50	5	35	45	895	35	30	925	45
CSAH 130 (W Broadway Ave) / 76th Ave N	70	675	95	105	415	190	165	45	60	50	60	80
CSAH 130 (W Broadway Ave) / 75th Ave N	155	820	40	15	495	10	10	10	235	20	10	15
CSAH 130 (W Broadway Ave) / 74th Ave N	-	1000	15	5	740	-	-	-	-	15	-	5
CSAH 130 (W Broadway Ave) / 73rd Ave N	60	845	40	40	620	85	135	35	30	20	40	30
CSAH 81 (Bottineau Blvd) / 73rd Ave N	65	1945	90	30	985	50	120	75	105	85	55	45
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	55	1775	495	85	965	120	225	255	55	320	160	105
CSAH 130 (W Broadway Ave) / 71st Ave N	180	265	10	20	275	380	670	20	145	5	25	10
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	-	1680	670	130	1155	-	-	-	-	200	-	665
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	-	2180	270	420	935	-	-	-	-	280	-	165
CSAH 81 (Bottineau Blvd) / 63rd Ave N	90	1835	300	185	900	135	325	335	80	195	260	290
63rd Ave N / Louisiana Ave/Park-and-Ride Access	5	5	130	230	5	115	25	375	10	105	330	50
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	430	1750	155	95	845	230	385	530	375	110	395	95
CSAH 10 (Bass Lake Rd) / Sherburne Ave	15	5	275	35	5	20	30	980	25	110	920	20
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	30	2095	290	90	1185	50	110	5	35	135	5	125
Wilshire Blvd / Lakeland Ave N	-	5	40	110	5	-	-	-	-	40	-	50
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	145	2295	25	35	1230	85	100	30	90	15	15	25
CSAH 8 (W Broadway Ave) / Corvallis Ave N	-	285	50	165	260	-	-	-	-	65	-	180
CSAH 8 (W Broadway Ave) / Welcome Ave N	60	275	-	-	240	85	60	-	30	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	330	15	5	5	20	5	15	5	255	5	5	5
CSAH 8 (W Broadway Ave) / 45 ½ Ave N	35	325	-	-	255	20	20	-	15	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	220	175	55	50	170	50	75	605	115	60	405	110
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	330	865	55	105	655	90	140	345	260	25	155	85
CSAH 9 (42nd Ave N) / Hubbard Ave	15 [4]	0 [4]	25	0 [4]	0 [4]	10	5 [4]	705	40	5 [4]	665	5
CSAH 9 (42nd Ave N) / Railroad Ave N	-	-	5	-	-	5	-	780	20	-	700	10
CSAH 9 (42nd Ave N) / Regent Ave N	80	5	25	10	5	20	10	755	105	30	645	10
W Broadway Ave / 41 ½ Ave N	20	450	-	-	305	35	-	-	-	-	-	-
Hubbard Ave / 41 ½ Ave N	-	25	-	-	225	-	-	-	-	15	-	40
41st Ave N / Hubbard Ave	5	5	10	185	30	45	25	150	5	10	95	20
W Broadway Ave / 41st Ave N	15	225	40	55	210	40	185	105	55	40	75	60
Golden Valley Rd / Theodore Wirth Pkwy	110	210	10	25	100	205	365	200	50	5	215	45
TH 55 (Olson Memorial Hwy) / Thomas Ave N	-	-	-	60	-	50	105	2220	-	-	1820	40
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave N	-	-	-	-	-	-	-	2280	-	-	1860	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	145	250	70	115	185	190	295	1795	190	90	1525	155
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	-	-	-	-	-	-	-	1980	-	-	1770	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	30	15	40	25	40	10	40	1920	20	60	1730	5
TH 55 (Olson Memorial Hwy) / James Ave N	-	-	-	-	-	55	-	1985	-	-	1740	5
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave N	-	-	-	-	-	-	-	1985	-	-	1745	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	20	20	45	75	25	25	75	1895	15	40	1700	20
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	35	45	25	80	45	65	90	1865	60	40	1660	10
TH 55 (Olson Memorial Hwy) / Bryant Ave N	50	15	65	15	10	30	30	1895	45	50	1630	35
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	-	-	-	209	411	270	-	1105	870	285	1445	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	420	760	140	-	-	-	310	880	-	-	1310	100
Olson Memorial Hwy / Border Ave	150	90	15	10	100	315	275	695	50	20	945	20
Olson Memorial Hwy / 7th St N/6th Ave N	405	520	55	55	300	30	-	440	280	70	550	55

[1] Build01 assumes no interchange at TH 169/101st Avenue N
[2] Build02 assumes a full access interchange at TH 169/101st Avenue N
[3] U-turn volume
[4] Movement allowed by buses and emergency vehicles only

Appendix B: Intersection Layout Tables

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
Oak Grove Pkwy / Xylon Ave	N/A	N/A		*Additional lanes and movements in 2040 only
CSAH 103 (W Broadway Ave) / 101st Ave N			N/A	
CSAH 103 (W Broadway Ave) / Winnetka Ave N			N/A	
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	 S Prot / W Perm	 S Prot / W Perm	 N-S Prot / E-W Prot+Perm	Non-revenue crossing NTOR only when LRT approaching *Second NB LT lane in 2040 only
CSAH 103 (W Broadway Ave) / Main St	N/A	N/A	 N-S Prot / E-W Perm	*Second NB LT lane in 2040 only

Legend

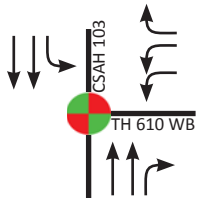
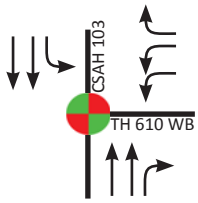
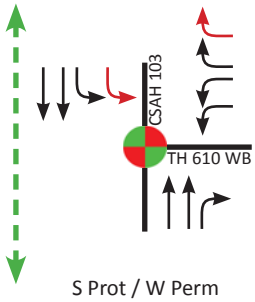
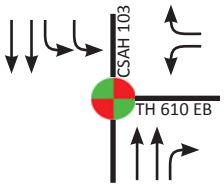
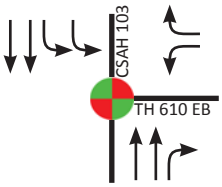
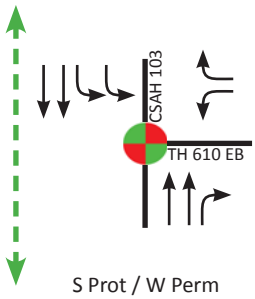
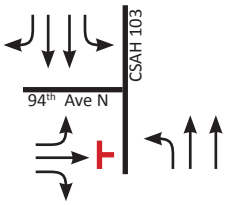
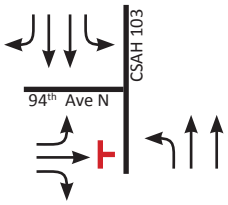
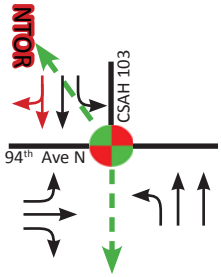
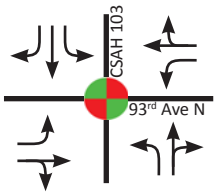
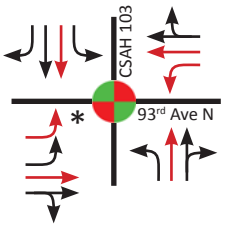
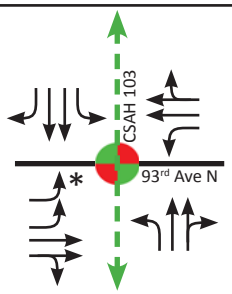
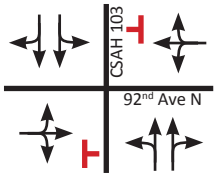
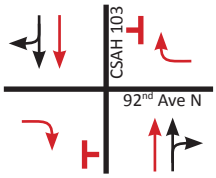
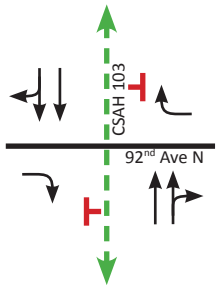
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	 S Prot / W Perm	 S Prot / W Perm	 S Prot / W Perm	
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	 S Prot / W Perm	 S Prot / W Perm	 S Prot / W Perm	
CSAH 103 (W Broadway Ave) / 94th Ave N			 N-S Prot / E-W Perm	NTOR only when LRT approaching
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	*Second EB LT lane in 2040 only
CSAH 103 (W Broadway Ave) / 92nd Ave N				

Legend

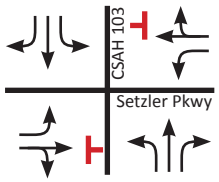
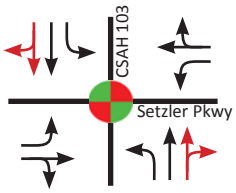
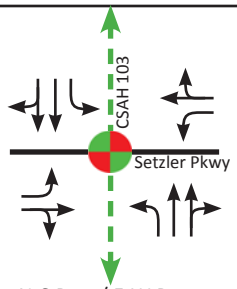
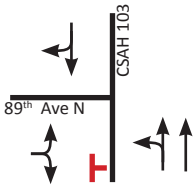
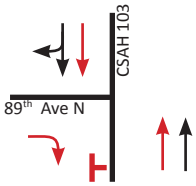
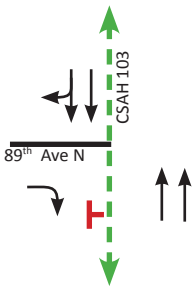
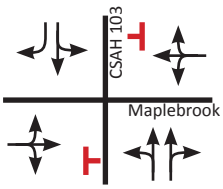
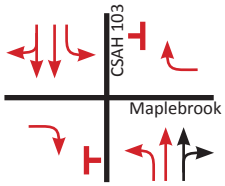
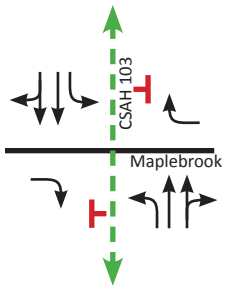
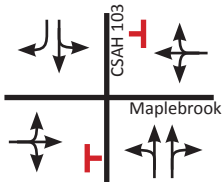
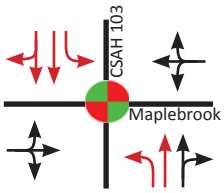
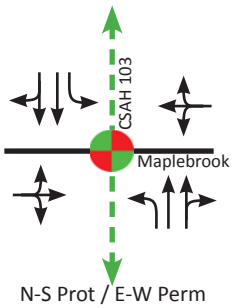
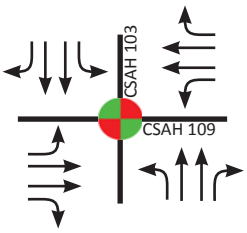
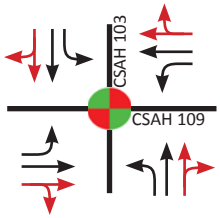
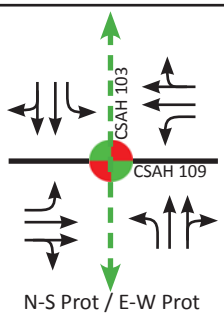
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 103 (W Broadway Ave) / Setzler Pkwy		 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	
CSAH 103 (W Broadway Ave) / 89th Ave N				
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy				No Build 01 Build 01 Scenarios
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy		 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	No Build 02 Build 02 Scenarios
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	

Legend

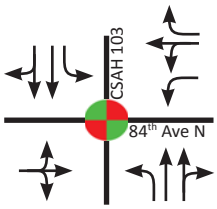
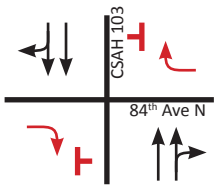
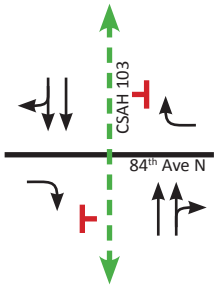
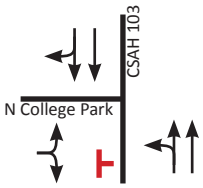
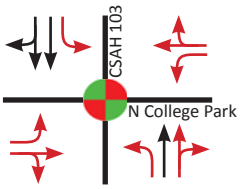
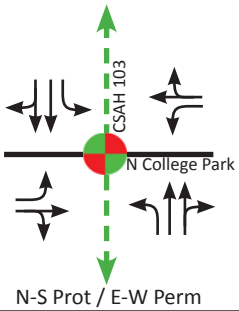
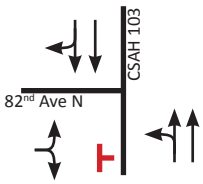
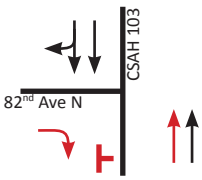
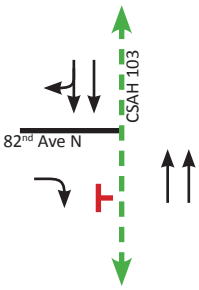
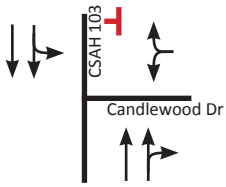
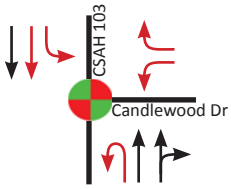
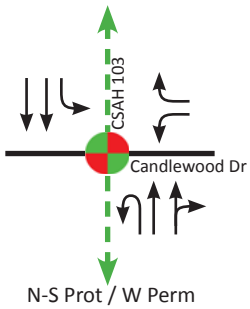
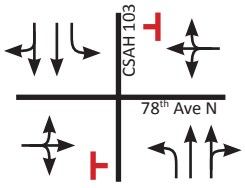
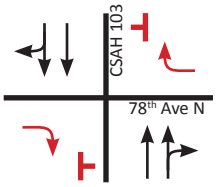
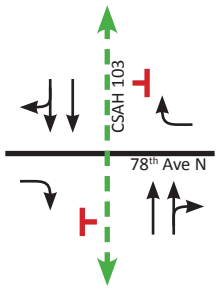
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 103 (W Broadway Ave) / 84th Ave N	 N-S Prot / E-W Perm			
CSAH 103 (W Broadway Ave) / College Park Dr		 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	
CSAH 103 (W Broadway Ave) / 82nd Ave N				
CSAH 103 (W Broadway Ave) / Candlewood Dr		 N-S Prot / W Perm	 N-S Prot / W Perm	
CSAH 103 (W Broadway Ave) / 78th Ave N				

Legend

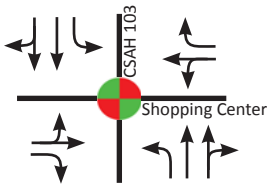
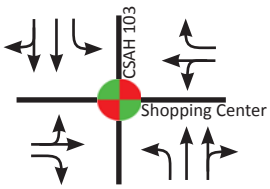
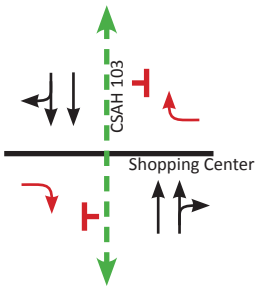
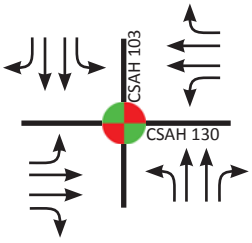
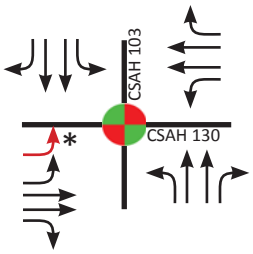
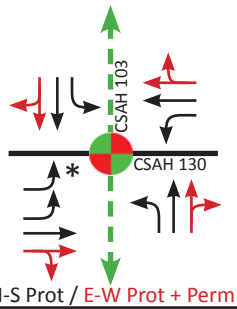
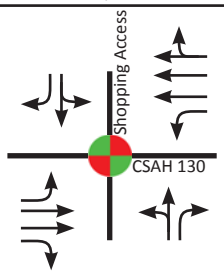
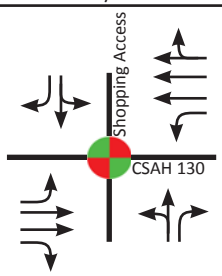
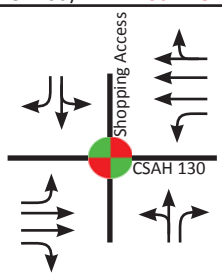
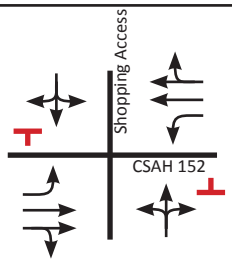
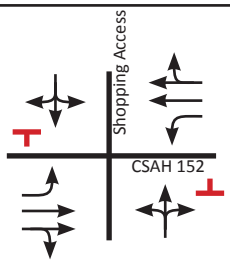
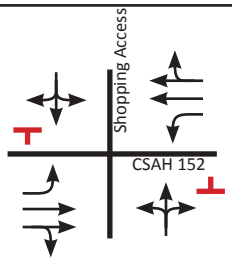
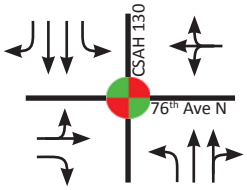
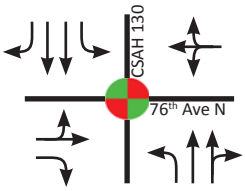
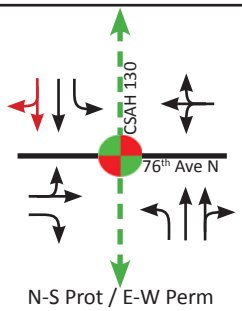
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 103 (W Broadway Ave) / Shopping Center Access	 N-S Prot / E-W Perm	 N-S Prot / E-W Perm		
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd)/CSAH 152	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot + Perm	*Second EB LT lane in 2040 only
CSAH 130 (Brooklyn Blvd) / Shopping Center Access (west of CSAH 103)	 N-S Perm / E-W Prot	 N-S Perm / E-W Prot	 N-S Perm / E-W Prot	
CSAH 152 (Brooklyn Blvd) / Shopping Center Access (east of CSAH 103)				
CSAH 130 (W Broadway Ave) / 76th Ave N	 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	

Legend

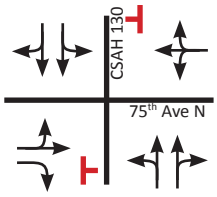
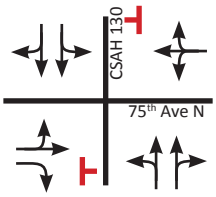
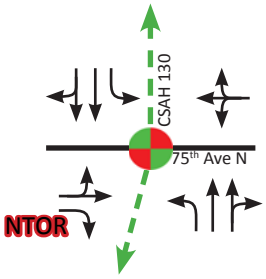
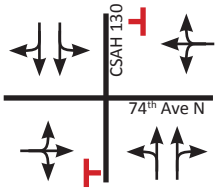
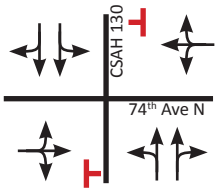
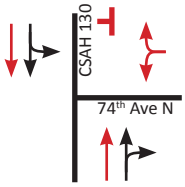
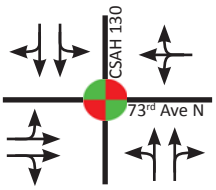
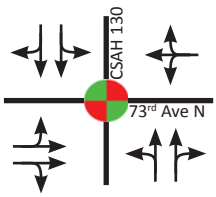
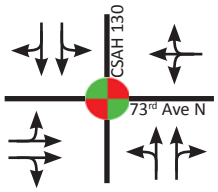
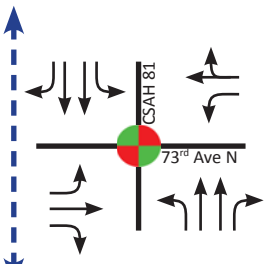
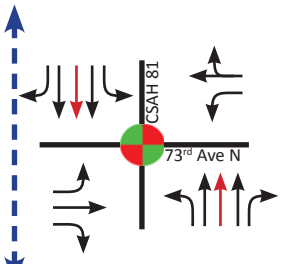
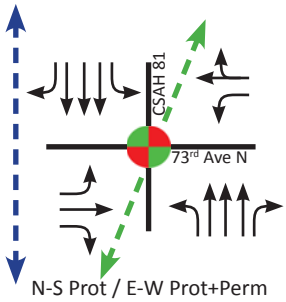
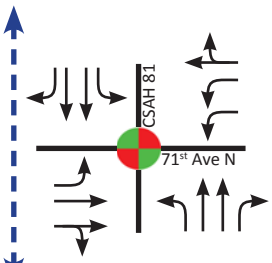
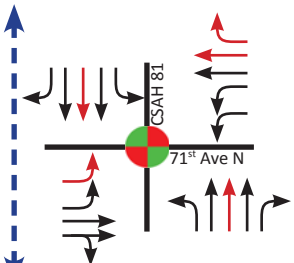
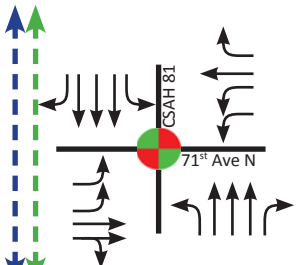
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 130 (W Broadway Ave) / 75th Ave N			 N-S Prot / E-W Perm	NTOR only when LRT approaching
CSAH 130 (W Broadway Ave) / 74th Ave N				
CSAH 130 (W Broadway Ave) / 73rd Ave N	 N-S Perm / E-W Perm	 N-S Perm / E-W Perm	 N-S Perm / E-W Perm	
CSAH 81 (Bottineau Blvd) / 73rd Ave N	 N-S Prot / E-W Prot+Perm	 N-S Prot / E-W Prot+Perm	 N-S Prot / E-W Prot+Perm	LRT grade separated over CSAH 81
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave)/71st Ave N	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	

Legend

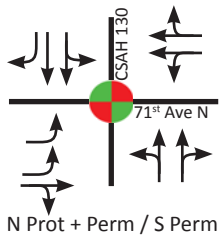
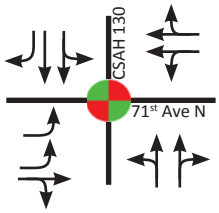
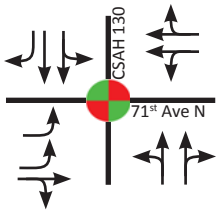
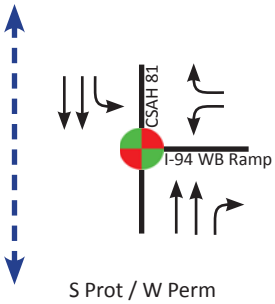
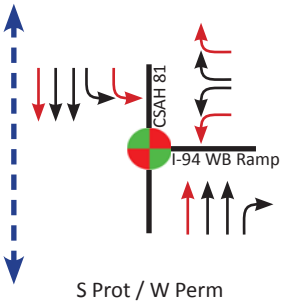
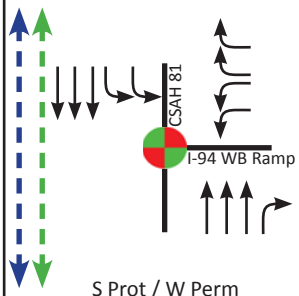
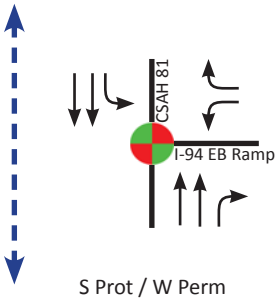
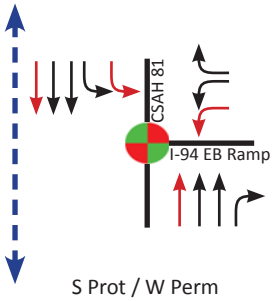
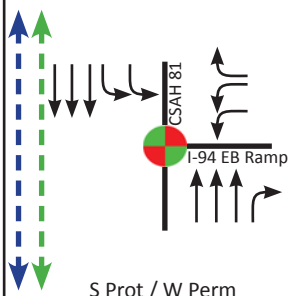
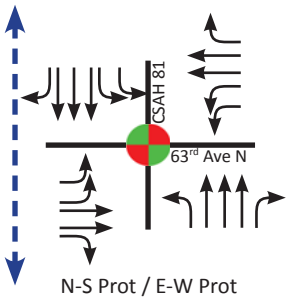
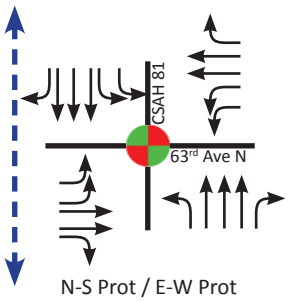
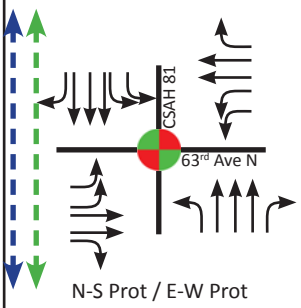
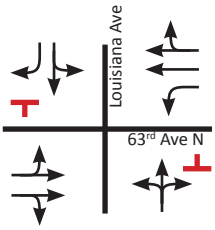
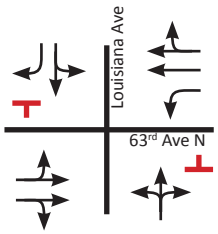
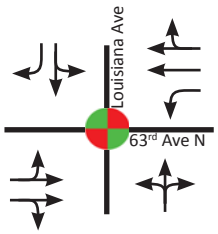
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 130 (W Broadway Ave) / 71st Ave N	 N Prot + Perm / S Perm W Perm/ E Prot	 N Prot + Perm / S Perm W Perm/ E Prot	 N Prot + Perm / S Perm W Perm/ E Prot	
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	 S Prot / W Perm	 S Prot / W Perm	 S Prot / W Perm	
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	 S Prot / W Perm	 S Prot / W Perm	 S Prot / W Perm	
CSAH 81 (Bottineau Blvd) / 63rd Ave N	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	
63rd Ave N / Louisiana Ave/ Park-and-Ride Access			 N-S Perm / E-W Perm	

Legend

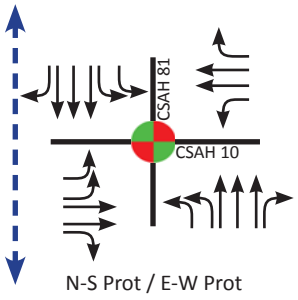
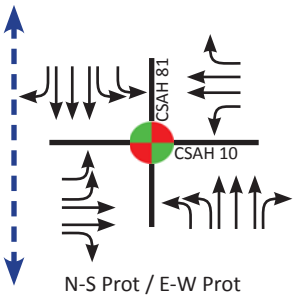
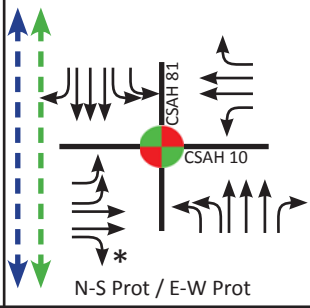
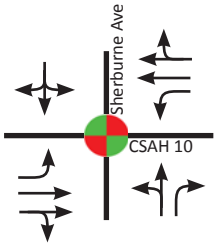
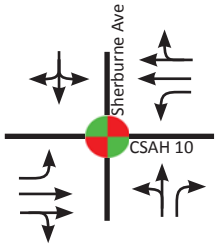
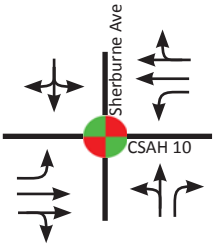
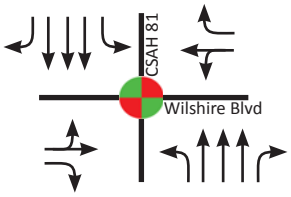
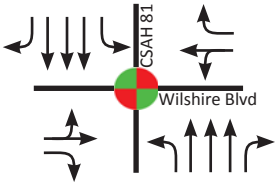
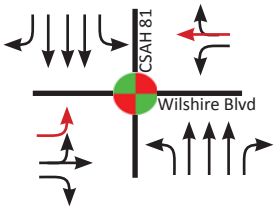
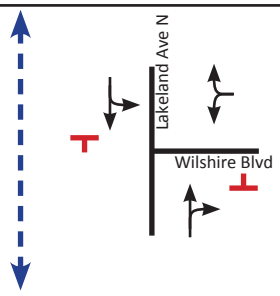
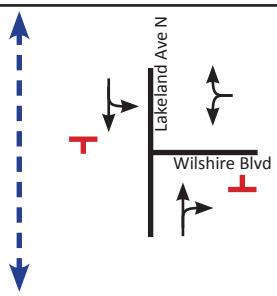
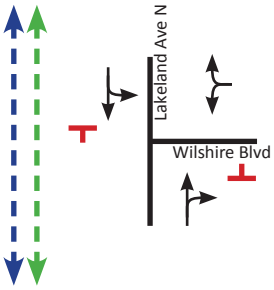
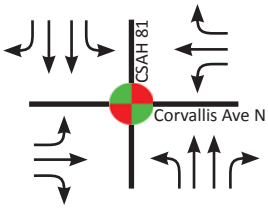
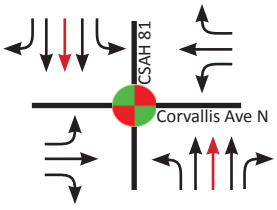
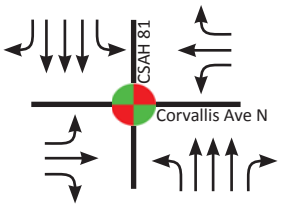
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	 N-S Prot / E-W Prot	*EB RT overlap phase
CSAH 10 (Bass Lake Rd) / Sherburne Ave	 N-S Perm / E-W Prot	 N-S Perm / E-W Prot	 N-S Perm / E-W Prot	
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	 N-S Prot / E-W Perm	
Wilshire Blvd / Lakeland Ave N				
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	 N-S Prot/ E-W Prot+Perm	 N-S Prot/ E-W Prot+Perm	 N-S Prot/ E-W Prot+Perm	

Legend

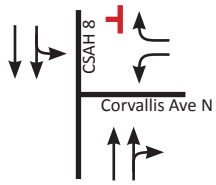
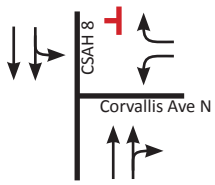
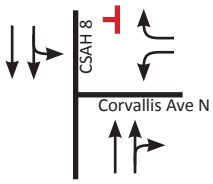
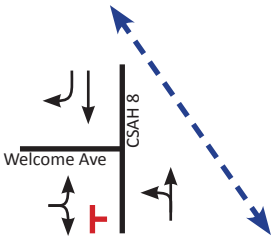
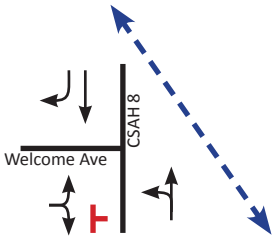
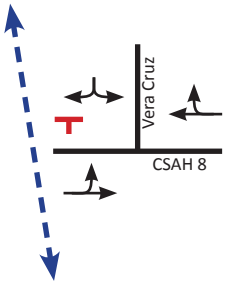
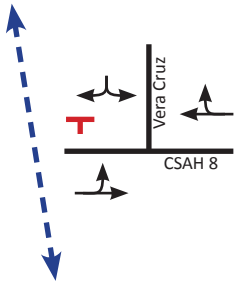
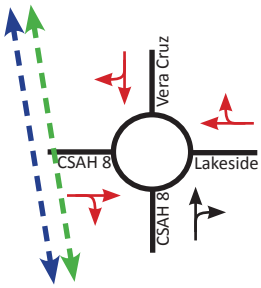
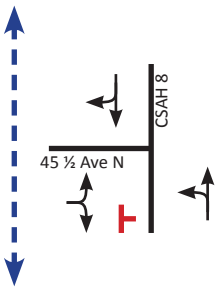
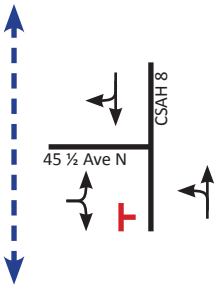
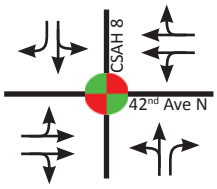
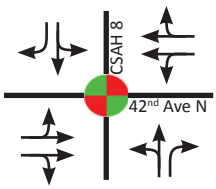
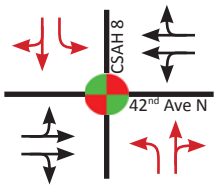
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 8 (W Broadway Ave) / Corvallis Ave N				
CSAH 8 (W Broadway Ave) / Welcome Ave N				
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N				Intersection converted to a roundabout in Build conditions
CSAH 8 (W Broadway Ave) / 45 ½ Ave N				
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	 N-S Perm / E-W Perm	 N-S Perm / E-W Perm	 N-S Prot+Perm / E Perm / W Prot+Perm	

Legend

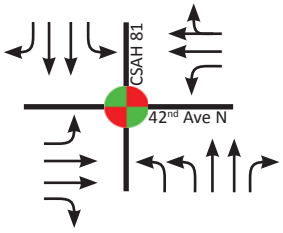
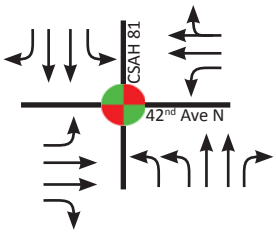
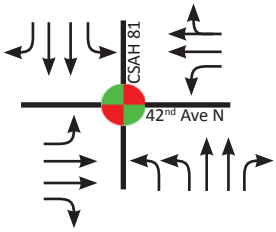
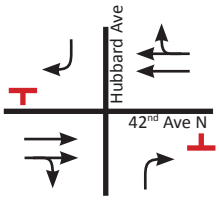
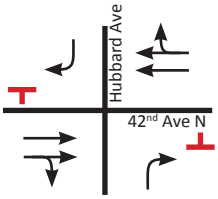
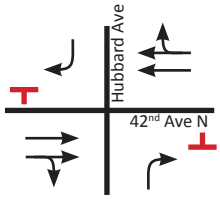
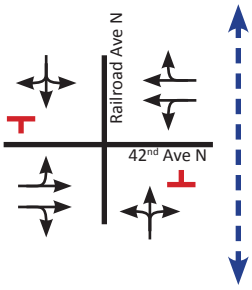
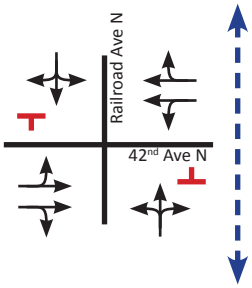
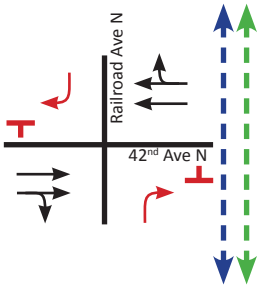
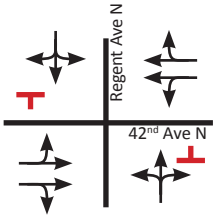
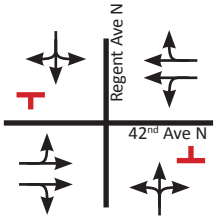
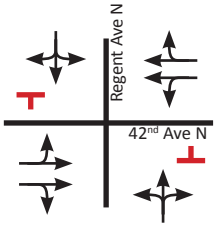
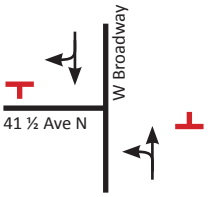
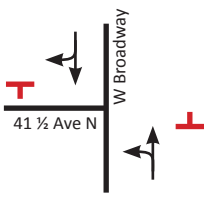
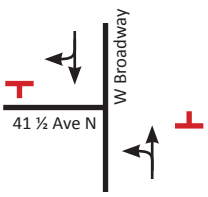
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	 N-S Prot/ E-W Prot	 N-S Prot/ E-W Prot	 N-S Prot/ E-W Prot	
CSAH 9 (42nd Ave N) / Hubbard Ave	* 	* 	* 	*Left turns allowed by buses and emergency vehicles only
CSAH 9 (42nd Ave N) / Railroad Ave N				
CSAH 9 (42nd Ave N) / Regent Ave N				
W Broadway Ave / 41 ½ Ave N				

Legend

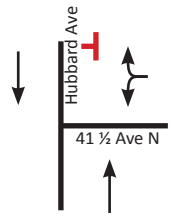
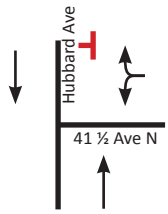
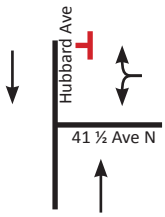
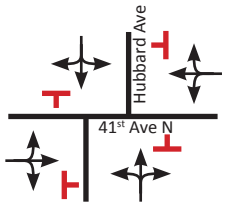
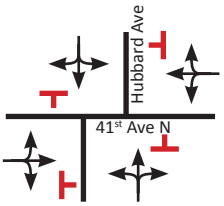
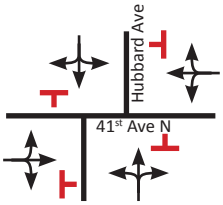
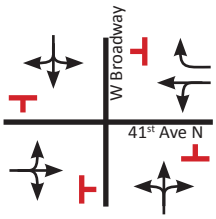
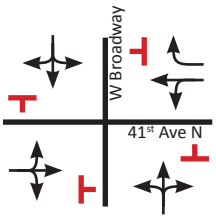
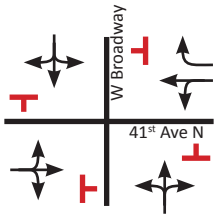
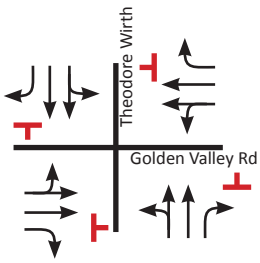
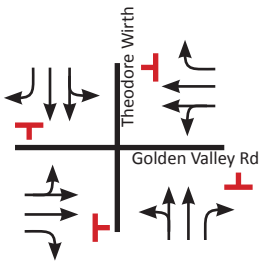
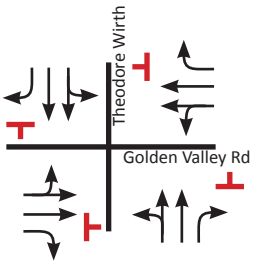
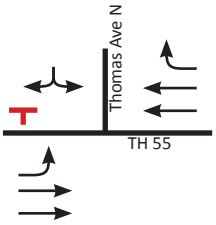
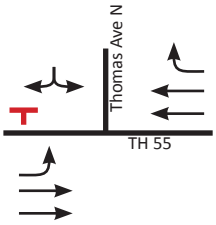
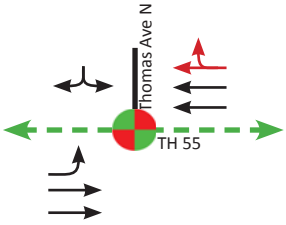
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
Hubbard Ave / 41 ½ Ave N				
41st Ave N / Hubbard Ave				
W Broadway Ave / 41st Ave N				
Golden Valley Rd / Theodore Wirth Pkwy				
TH 55 (Olson Memorial Hwy) / Thomas Ave N			 E Prot	

Legend

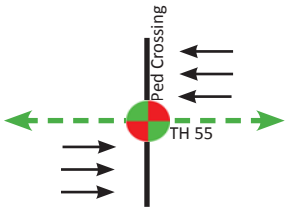
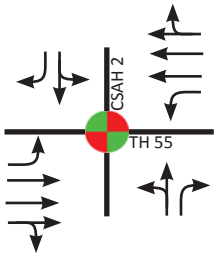
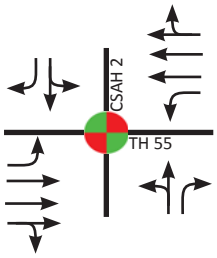
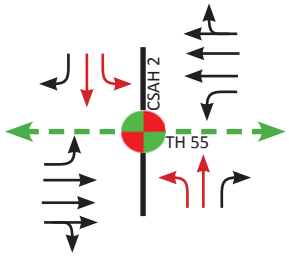
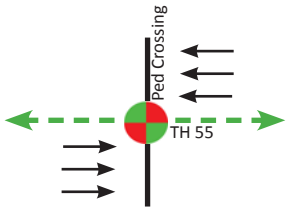
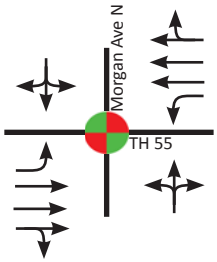
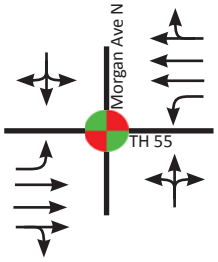
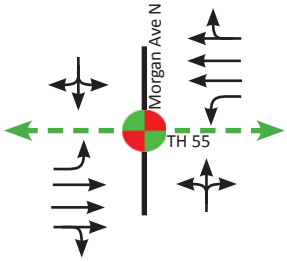
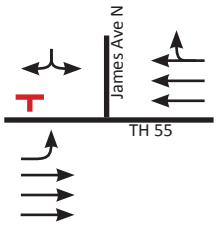
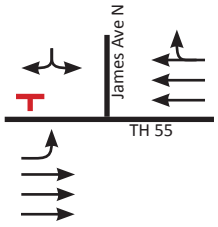
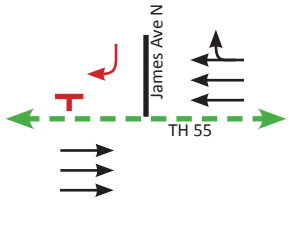
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave N	N/A	N/A		
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	 N-S Split / E-W Prot+Perm	 N-S Split / E-W Prot+Perm	 N-S Prot+Perm / E-W Prot	
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	N/A	N/A		
TH 55 (Olson Memorial Hwy) / Morgan Ave N	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot	
TH 55 (Olson Memorial Hwy) / James Ave N				

Legend

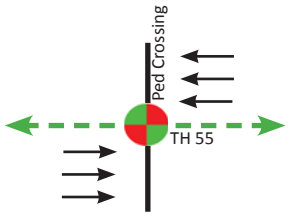
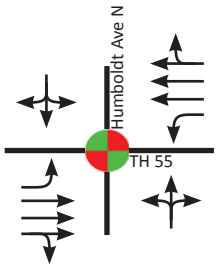
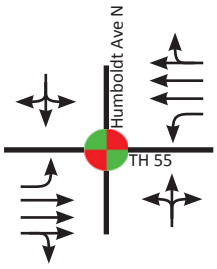
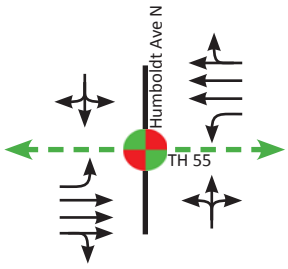
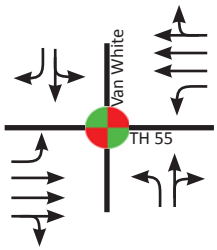
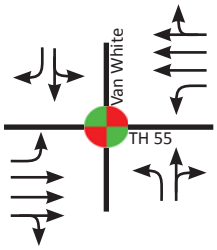
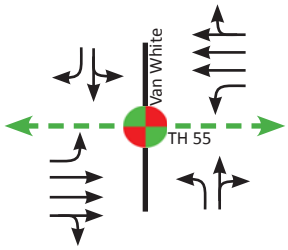
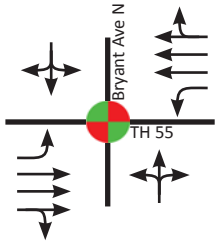
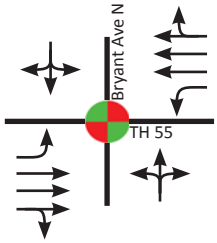
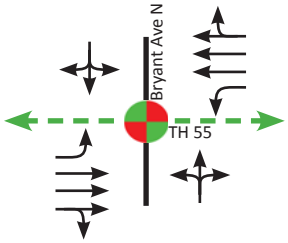
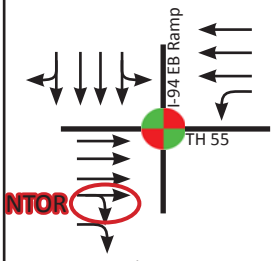
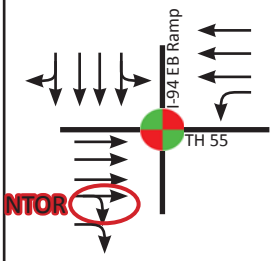
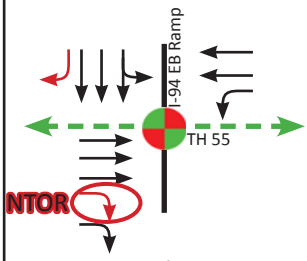
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave N	N/A	N/A		
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot	
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot	
TH 55 (Olson Memorial Hwy) / Bryant Ave N	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot	
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	 S Perm / W Prot+Perm	 S Perm / W Prot+Perm	 S Perm / W Prot	

Legend

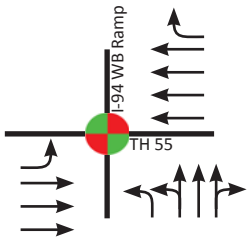
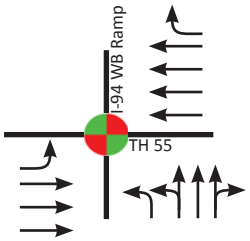
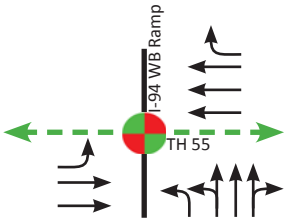
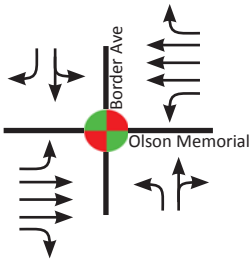
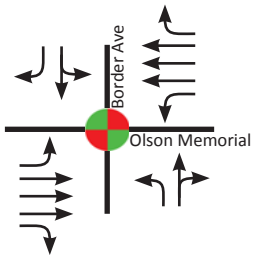
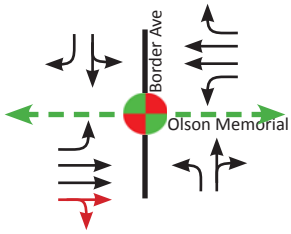
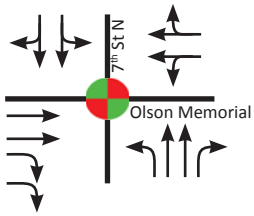
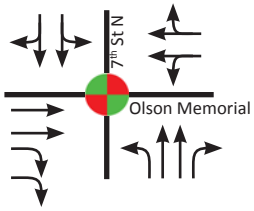
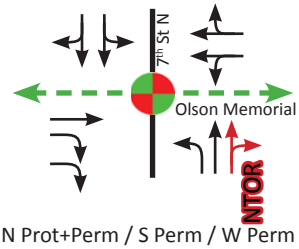
Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

Lane Use
Lane Use Change
No Turn on Red NTOR
Perm = Permissive Left-Turn Phase

LRT
Freight Rail
Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase

N
W E
S

BLRT Intersection Layout Table

Intersection	Existing	No Build	Build	Notes
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	 N Perm / E Prot+Perm	 N Perm / E Prot+Perm	 N Perm / E Prot	
Olson Memorial Hwy / Border Ave	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot+Perm	 N-S Perm / E-W Prot	
Olson Memorial Hwy / 7th St N/6th Ave N	 N Prot+Perm / S Perm / W Perm	 N Prot+Perm / S Perm / W Perm	 N Prot+Perm / S Perm / W Perm	NTOR only when LRT approaching

Legend

Traffic Signal
Stop Control
N = NB Approach
S = SB Approach
E = EB Approach
W = WB Approach

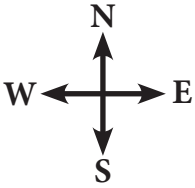
Lane Use
Lane Use Change

No Turn on Red NTOR

Perm = Permissive Left-Turn Phase

LRT
Freight Rail

Prot = Protected Left-Turn Phase
Prot+Perm = Protected/ Permissive Left-Turn Phase



Appendix C: Traffic Analysis Detailed Results

AM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021						2040											
		Existing Condition			No Build01			Build01			No Build01			No Build02			Build01			Build02		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
Oak Grove Pkwy / Xylon Ave	NB	--	--	--	--	--	--	A	A	1.8	--	--	--	--	--	--	F	C	22.0	F	F	85.7
	EB	--			--			A			--			--			A			A		
	SB	--			--			A			--			--			C			F		
	WB	--			--			A			--			--			A			A		
CSAH 103 (W Broadway Ave) / 101st Ave N	NB	A	A	0.3	A	A	0.6	--	--	--	C	F	73.5	C	F	72.1	--	--	--	--	--	--
	EB	A			A			--			F			F			--			--		
	SB	A			A			--			A			A			--			--		
	WB	--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Winnetka Ave N	NB	A	A	0.2	A	A	0.3	--	--	--	F	F	133.8	F	F	125.8	--	--	--	--	--	--
	EB	A			A			--			F			F			--			--		
	SB	A			A			--			A			A			--			--		
	WB	--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	NB	B	B	10.0	C	C	20.6	C	C	27.6	F	F	152.0	F	F	128.1	D	D	41.9	D	D	40.6
	EB	--			--			C			--			--			C			C		
	SB	A			B			C			C			C			C			C		
	WB	C			D			D			F			F			D			D		
CSAH 103 (W Broadway Ave) / Main St	NB	--	--	--	--	--	--	B	B	18.7	--	--	--	--	--	--	D	D	41.2	D	D	38.7
	EB	--			--			D			--			--			D			D		
	SB	--			--			C			--			--			C			C		
	WB	--			--			E			--			--			E			E		
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	NB	B	B	14.5	C	C	23.1	A	B	18.5	F	F	288.6	F	F	207.7	D	C	32.3	B	C	22.5
	EB	--			--			--			--			--			--			--		
	SB	B			B			B			E			D			C			B		
	WB	B			C			C			F			F			C			C		
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	NB	A	B	11.7	A	B	18.7	B	B	16.7	C	F	105.2	B	F	80.7	B	C	24.3	B	C	21.0
	EB	--			--			--			--			--			--			--		
	SB	B			B			B			C			C			C			C		
	WB	B			C			B			F			F			C			C		

Analysis Notes:

No Build01/Build01: Assumes no interchange at Hwy 169 and 101st Ave N

No Build02/Build02: Assumes a full access interchange at Hwy 169 and 101st Ave N

AM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021												2040											
		Existing Condition			No Build01			No Build02			Build01			Build02			No Build01			No Build02			Build01			Build02		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
CSAH 103 (W Broadway Ave) / 94th Ave N	NB	A	A	1.8	A	A	2.0	A	A	2.0	A	B	10.8	A	B	10.8	A	A	2.7	A	A	2.6	A	B	15.6	A	B	15.4
	EB	A			A			A			B			B			B			B			C			C		
	SB	A			A			A			B			B			A			A			B			B		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	NB	C	C	29.8	C	C	27.0	C	C	26.6	C	D	39.4	C	D	38.4	C	C	32.6	C	C	32.1	D	D	49.4	D	D	49.8
	EB	D			C			C			D			D			C			C			D			D		
	SB	C			C			C			D			D			C			C			D			D		
	WB	D			C			C			D			D			C			C			D			D		
CSAH 103 (W Broadway Ave) / 92nd Ave N	NB	A	A	1.9	A	A	1.3	A	A	1.4	A	A	0.8	A	A	0.8	A	A	1.6	A	A	1.7	A	A	0.9	A	A	1.0
	EB	A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 103 (W Broadway Ave) / Setzler Pkwy	NB	A	A	1.7	B	B	14.2	A	A	10.0	B	B	14.4	A	B	10.4	B	B	15.9	A	B	10.4	C	B	17.3	A	B	10.4
	EB	A			C			C			C			C			C			C			C			C		
	SB	A			A			A			A			A			B			A			B			A		
	WB	A			C			C			C			C			C			C			C			C		
CSAH 103 (W Broadway Ave) / 89th Ave N	NB	A	A	2.4	A	A	0.6	A	A	0.8	A	A	0.7	A	A	0.7	A	A	0.9	A	A	0.9	A	A	0.7	A	A	0.8
	EB	B			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	NB	A	A	2.3	A	A	1.0	A	A	7.6	A	A	0.9	A	A	8.0	A	A	1.1	A	A	8.5	A	A	1.1	A	A	8.4
	EB	B			A			D			A			D			A			D			A			D		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			D			A			D			A			D			A			D		
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	NB	C	C	31.1	B	C	34.1	B	C	33.2	C	D	36.1	C	C	34.8	C	D	36.2	C	D	35.9	C	D	37.6	C	D	36.0
	EB	C			D			D			C			C			D			D			D			C		
	SB	D			D			D			D			D			D			D			D			D		
	WB	C			C			C			C			C			C			C			D			D		
CSAH 103 (W Broadway Ave) / 84th Ave N	NB	A	B	11.0	A	A	0.6	A	A	0.6	A	A	0.6	A	A	1.5	A	A	0.7	A	A	0.7	A	A	0.7	A	A	0.8
	EB	B			--			B			A			A			A			A			--			A		
	SB	B			A			A			A			A			A			A			A			A		
	WB	D			A			A			A			A			A			A			--			A		
CSAH 103 (W Broadway Ave) / College Park Dr	NB	A	A	0.6	B	A	7.7	A	A	6.6	A	A	9.2	A	B	13.0	A	A	6.9	A	A	6.7	A	A	7.3	B	A	8.0
	EB	A			B			B			A			A			A			A			B			B		
	SB	A			A			A			A			B			A			A			A			A		
	WB	--			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 82nd Ave N	NB	A	A	0.5	A	A	0.6	A	A	0.7	A	A	0.7	A	A	0.8	A	A	0.7	A	A	0.7	A	A	0.7	A	A	0.7
	EB	A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Candlewood Dr	NB	A	A	1.8	A	A	6.1	A	A	6.2	A	A	9.2	A	A	9.3	A	A	6.2	A	A	6.3	A	A	9.5	A	A	9.8
	EB	--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			A			A			A			A			A		
	WB	C			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 78th Ave N	NB	A	A	0.3	A	A	0.4	A	A	0.5	A	A	0.4	A	A	0.4	A	A	0.6	A	A	0.6	A	A	0.4	A	A	0.4
	EB	A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 103 (W Broadway Ave) / Shopping Center Access	NB	A	A	5.2	A	A	8.4	A	A	7.9	A	A	1.7	A	A	1.4	A	A	8.5	A	A	8.3	A	A	1.6	A	A	1.6
	EB	D			D			D			A			A			D			D			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	D			D			C			A			A			C			C			A			A		
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd/CSAH 152)	NB	C	C	25.3	C	C	25.2	C	C	23.8	C	C	26.7	C	C	25.4	C	C	25.3	C	C	25.5	C	C	30.5	C	C	30.7
	EB	C			C			D			C			C			C			D			C			C		
	SB	B			B			B			--			--			C			B			--			--		
	WB	C			C			C			C			C			C			C			C			C		
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (west of CSAH 103)	NB	B	A	4.6	C	A	8.9	C	A	7.8	C	A	7.5	C	A	7.7	C	A	9.0	C	A	7.9	C	A	8.2	C	A	7.9
	EB	A			A			A			A			A			A			A			A			A		
	SB	B			D			C			C			C			C			C			C			C		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (east of CSAH 103)	NB	A	A	0.9	A	A	0.9	A	A	0.9	A	A	0.7	A	A	0.7	A	A	0.9	A	A	0.9	A	A	0.8	A	A	0.8
	EB	A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 130 (W Broadway Ave) / 76th Ave N	NB	A	A	6.0	B	B	13.6	B	B	13.0	B	B	13.7	B	B	13.6	B	B	14.6	B	B	14.2	B	B	15.2	B	B	14.8
	EB	C			C			D			D			D			C			C			D			D		
	SB	A			B			B			A			A			B			B			B			B		
	WB	C			D			C			D			D			D			D			D			D		
CSAH 130 (W Broadway Ave) / 75th Ave N	NB	A	A	0.9	A	A	1.4	A	A	1.2	B	B	15.1	B	B	14.4	A	A	1.5	A	A	1.4	B	B	16.4	B	B	15.3
	EB	A			A			A			B			B			A			A			A			A		
	SB	A			A			A			B			B			A			A			B			B		
	WB	A			A			A			D			D			A			A			D			D		
CSAH 130 (W Broadway Ave) / 74th Ave N	NB	A	A	1.1	A	A	1.6	A	A	1.3	A	A	0.7	A	A	0.8	A	A	1.6	A	A	1.5	A	A	1.0	A	A	1.0
	EB	A			A			A			--			--			A			A			--			--		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 130 (W Broadway Ave) / 73rd Ave N	NB	A	A	5.2	A	B	10.6	A	B	11.5	A	B	10.5	A	B	10.6	A	B	13.0	A	B	13.0	A	B	12.2	A	B	12.4
	EB	C			B			C			C			C			C			C			C			C		
	SB	A			B			B			A			A			B			B			B			B		
	WB	B			C			C			C			D			D			D			C			C		

Analysis Notes:
No Build01/Build01: Right-in/Right-out at CSAH 103 (W Broadway Ave)/Maplebrook Parkway
No Build02/Build02: Full-access signalized intersection at CSAH 103 (W Broadway Ave)/Maplebrook Parkway

AM Level of Service and Intersection Delay

Scenario		2014						Opening Year 2021												2040											
		Existing No Freight Event			Existing Freight Event			No Build No Freight Event			No Build Freight Event			Build No Freight Event			Build Freight Event			No Build No Freight Event			No Build Freight Event			Build No Freight Event			Build Freight Event		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
CSAH 81 (Bottineau Blvd) / 73rd Ave N	NB	A	A	9.5	A	A	10.0	A	A	9.6	A	B	10.2	A	B	14.3	B	B	14.9	A	B	11.0	A	B	11.6	B	B	17.5	B	B	18.0
	EB	C			C			C			C			D			D			C			C			D			D		
	SB	A			A			A			A			B			B			B			B			B			B		
	WB	D			D			D			D			D			D			D			D			D			D		
CSAH 81 (Bottineau Blvd) / 71st Ave N	NB	B	C	21.6	B	C	22.9	B	C	20.8	B	C	22.0	B	C	30.0	B	C	31.6	B	C	20.2	B	C	21.6	B	C	31.5	B	C	31.6
	EB	D			D			D			D			D			D			D			E			D			D		
	SB	B			B			B			B			C			C			B			B			C			C		
	WB	D			D			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 71st Ave N	NB	A	A	7.6	A	A	7.5	A	A	7.6	A	A	7.3	A	A	7.6	A	A	7.5	A	A	8.2	A	A	8.0	A	A	8.5	A	A	8.2
	EB	B			B			B			B			B			B			B			B			B			B		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	D			D			C			C			C			C			C			D			C			C		
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	NB	A	A	6.4	A	A	6.4	B	A	9.8	B	A	9.6	B	B	11.1	B	B	10.5	B	A	9.5	B	A	9.4	B	B	11.0	B	B	10.6
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	B			B			B			B			B			B			B			B			B			B		
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	NB	D	C	26.9	D	C	26.9	C	C	21.6	C	C	21.2	C	C	24.5	C	C	23.9	C	C	22.3	C	C	22.0	C	C	26.5	C	C	25.9
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	B			B			B			B			B			B			B			B			B			B		
	WB	D			D			D			D			D			D			D			D			D			D		
CSAH 81 (Bottineau Blvd) / 63rd Ave N	NB	B	C	30.9	B	C	31.2	B	C	31.1	B	C	31.6	C	D	35.8	C	D	36.6	C	C	33.2	C	C	33.5	C	D	37.2	C	D	38.9
	EB	C			C			D			D			C			C			D			D			C			C		
	SB	C			C			C			C			D			D			C			C			D			D		
	WB	D			D			D			D			D			D			D			D			D			D		
63rd Ave N / Louisiana Ave / Park-and-Ride Access	NB	A	A	1.7	A	A	1.7	A	A	1.6	A	A	1.6	A	A	6.4	A	A	6.5	A	A	1.9	A	A	1.9	A	A	6.9	A	A	7.0
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	B			B			B			B			D			D			B			A			D			D		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	NB	B	C	23.4	B	C	24.2	B	C	23.1	B	C	24.7	C	C	30.4	C	C	33.2	B	C	24.9	B	C	26.1	C	C	32.4	C	C	33.9
	EB	C			C			C			C			C			C			C			C			C			C		
	SB	C			C			C			C			C			C			C			C			C			C		
	WB	C			C			C			C			D			D			C			C			D			D		
CSAH 10 (Bass Lake Rd) / Sherburne Ave	NB	A	A	6.1	A	A	6.0	A	A	6.0	A	A	6.1	A	A	6.6	A	A	6.7	A	A	7.1	A	A	7.2	A	A	7.8	A	A	7.9
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	NB	B	B	10.7	B	B	11.8	B	B	11.0	B	B	11.8	B	B	12.6	B	B	13.7	B	B	11.9	B	B	12.6	B	B	14.1	B	B	14.8
	EB	B			B			B			B			C			C			B			B			C			C		
	SB	A			A			A			A			A			B			A			A			B			B		
	WB	C			C			C			C			C			C			C			C			C			C		
Wilshire Blvd / Lakeland Ave N	NB	A	A	2.1	A	A	2.1	A	A	1.8	A	A	1.9	A	A	5.8	A	A	5.8	A	A	2.3	A	A	2.3	A	A	5.8	A	A	5.8
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			E			E			A			A			E			E		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	NB	B	B	11.9	B	C	13.0	A	A	8.5	B	B	9.0	B	B	9.0	B	B	9.4	B	B	9.4	B	B	9.7	B	B	9.8	B	B	9.7
	EB	B			C			B			B			B			B			B			B			B			B		
	SB	B			B			A			A			A			A			A			A			A			A		
	WB	C			C			C			C			C			C			C			C			C			C		
CSAH 8 (W Broadway Ave) / Corvallis Ave N	NB	A	A	2.3	A	A	2.6	A	A	2.3	A	A	2.7	A	A	2.6	A	A	3.0	A	A	2.4	A	A	2.7	A	A	2.7	A	A	3.0
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 8 (W Broadway Ave) / Welcome Ave N	NB	A	A	0.6	A	A	1.1	A	A	0.6	A	A	1.1	A	A	2.0	A	A	2.6	A	A	0.8	A	A	1.3	A	A	2.0	A	A	2.6
	EB	--			--			--			--			A			A			--			--			A			--		
	SB	A			A			A			A			--			--			A			A			--			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	NB	--	A	0.4	--	A	0.7	--	A	0.4	--	A	0.6	--	A	0.6	--	A	0.7	--	A	0.5	--	A	0.7	--	A	0.7	--	A	0.8
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 8 (W Broadway Ave) / 45½ Ave N	NB	A	A	0.9	A	A	1.0	A	A	1.0	A	A	1.0	A	A	1.5	A	A	1.5	A	A	1.0	A	A	1.1	A	A	1.6	A	A	1.7
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	--			--			--			--			--			--			--			--			--			--		
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	NB	D	B	14.8	D	B	14.8	C	B	15.2	C	B	15.2	C	B	18.6	C	B	18.6	C	B	15.7	C	B	16.0	C	B	19.8	C	B	19.8
	EB	A			A			A			A			B			B			A			A			B			B		
	SB	C			C			C			C			D			D			C			C			D			D		
	WB	A			A			B			B			B			B			B			B			B			B		
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	NB	C	C	23.0	C	C	22.9	C	C	23.5	C	C	23.4	C	C	24.4	C	C	24.3	C	C	25.0	C	C	24.9	C	C	25.3	C	C	25.2
	EB	C			C			C			C			C			C			C			C			C			C		
	SB	B			B			C			C			C			C			C			C			C			C		
	WB	D			D			D			D			D			D			D			D			D			D		
CSAH 9 (42nd Ave N) / Hubbard Ave[1]	NB	A	A	0.6	A	A	0.7	B	A	0.7	B	A	0.8	D	A	3.2	D	A	3.4	B	A	0.9	A	A	1.1	E	A	3.5	E	A	3.8
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 9 (42nd Ave N) / Railroad Ave N	NB	B	A	0.7	B	A	1.1	A	A	0.8	A	A	1.2	B	A	1.7	B	A	2.4	B	A	0.9	B	A	1.3	C	A	2.0	D	A	2.7
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 9 (42nd Ave N) / Regent Ave N	NB	B	A	2.1	B	A	2.1	B	A	2.4	B	A	2.5	C	A	2.4	C	A	2.4	B	A	2.5	B	A	2.5	C	A	2.7	C	A	2.7
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 8 (W Broadway Ave) / 41 1/2 Ave N	NB	A	A	8.8	A	A	8.8	A	A	8.9	A	A	9.1	A	B	10.1	A	B	10.2	A	A	9.3	A	A	9.4	A	B	10.6	A	B	10.7
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			B			B			A			B			B			B		
	WB	--			--			--			--			--			--			--			--			--			--		
Hubbard Ave / 41 1/2 Ave N	NB	A	A	3.6	A	A	3.7	A	A	4.3	A	A	4.3	A	A	5.7	A	A	5.8	A	A	4.2	A	A	4.2	A	A	5.9	A	A	5.9
	EB	--			--			--			--			--			--			--			--			--			--		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
41st Ave N/ Hubbard Ave	NB	A	A	7.9	A	A	8.0	A	A	8.0	A	A	8.0	A	A	7.5	A	A	7.5	A	A	7.9	A	A	7.9	A	A	8.1	A	A	8.1
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
CSAH 8 (W Broadway Ave) / 41st Ave N	NB	A	A	7.8	A	A	7.8	A	A	7.9	A	A	8.1	A	A	8.4	A	A	8.6	A	A	8.2	A	A	8.2	A	A	8.7	A	A	8.6
	EB	A			A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A			A		
Golden Valley Rd / Theodore Wirth Pkwy	NB	A	A	8.8	--	--	--	A	A	9.4	--	--	--	A	B	11.5	--	--	--	A	B	10.5	--	--	--	A	B	12.8	--	--	--
	EB	A			--			A			--			A			--			B			--			A			--		
	SB	A			--			A			--			B			--			B			--			C			--		
	WB	A			--			A			--			B			--			A			--			B			--		

Analysis Notes:
[1] All left turns and NB and SB through movements are restricted to emergency vehicles and buses.

AM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021						2040					
		Existing Conditions			No Build			Build			No Build			Build		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter
TH 55 (Olson Memorial Hwy) / Thomas Ave N	EB	A	A	2.8	A	A	6.5	B	B	12.0	F	F	91.1	F	E	65.3
	SB	C			F			D			F			D		
	WB	A			A			B			A			B		
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave	EB	-	-	-	-	-	-	B	A	9.5	-	-	-	C	C	22.4
	WB	-			-			A			-			A		
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	NB	D	D	43.7	D	D	52.3	D	D	44.3	D	F	80.6	E	D	50.4
	EB	D			E			D			F			D		
	SB	D			D			D			D			D		
	WB	C			C			D			D			D		
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	EB	-	-	-	-	-	-	A	A	6.5	-	-	-	A	A	6.5
	WB	-			-			A			-			A		
TH 55 (Olson Memorial Hwy) / Morgan Ave N	NB	C	A	7.2	D	A	6.5	C	B	13.3	C	A	5.7	D	B	13.5
	EB	A			A			B			A			B		
	SB	D			D			D			D			D		
	WB	B			A			B			A			B		
TH 55 (Olson Memorial Hwy) / James Ave N	EB	A	A	4.9	A	A	5.2	-	A	6.1	A	A	3.7	-	A	6.6
	SB	C			C			A			C			A		
	WB	A			A			A			A			A		
TH 55 (Olson Memorial Hwy) / Pedestrain Crossing East of James Ave	EB	-	-	-	-	-	-	A	A	1.3	-	-	-	A	A	1.3
	WB	-			-			A			-			A		
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	NB	D	A	9.1	D	B	10.8	D	C	22.6	D	B	14.0	D	C	24.5
	EB	A			B			C			A			C		
	SB	D			D			D			D			D		
	WB	A			A			B			B			C		
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	NB	D	B	15.3	D	B	14.5	D	C	26.5	D	B	12.1	D	C	31.5
	EB	B			B			C			B			D		
	SB	D			D			D			D			D		
	WB	A			A			B			A			B		
TH 55 (Olson Memorial Hwy) / Bryant Ave N	NB	C	A	8.6	C	B	12.0	D	B	17.4	C	B	10.2	D	B	19.2
	EB	B			B			B			B			C		
	SB	C			C			C			B			C		
	WB	A			A			B			A			B		
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	EB	A	C	25.3	C	C	34.8	C	C	34.1	B	D	43.3	C	D	54.9
	SB	E			E			D			F			F		
	WB	B			B			B			B			B		
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	NB	D	C	23.8	D	C	32.4	E	D	37.1	C	C	28.4	E	D	42.2
	EB	B			C			B			B			B		
	WB	C			D			D			E			D		
Olson Memorial Hwy / Border Ave	NB	D	B	11.5	D	B	17.0	D	C	23.6	D	B	11.7	E	C	24.0
	EB	A			B			C			A			C		
	SB	C			C			C			C			C		
	WB	B			B			B			A			B		
Olson Memorial Hwy / 7th St N/6th Ave N	NB	C	C	27.2	C	C	28.2	D	D	45.0	C	C	23.1	D	D	46.6
	EB	B			B			B			B			B		
	SB	D			D			D			C			D		
	WB	C			C			D			D			D		

PM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021						2040											
		Existing Condition			No Build01			Build01			No Build01			No Build02			Build01			Build02		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
Oak Grove Pkwy / Xylon Ave	NB	--	--	--	--	--	--	A	A	1.6	--	--	--	--	--	--	F	F	91.5	F	F	74.9
	EB	--			--			A			--			--			A			A		
	SB	--			--			A			--			--			F			F		
	WB	--			--			A			--			--			A			A		
CSAH 103 (W Broadway Ave) / 101st Ave N	NB	A	A	3.1	A	A	5.4	--	--	--	A	F	193.9	A	F	156.2	--	--	--	--	--	--
	EB	B			D			--			F			F			--			--		
	SB	A			A			--			F			F			--			--		
	WB	--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Winnetka Ave N	NB	A	A	0.9	A	A	0.9	--	--	--	C	F	162.1	C	F	149.5	--	--	--	--	--	--
	EB	A			A			--			F			F			--			--		
	SB	A			A			--			F			F			--			--		
	WB	--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	NB	B	B	18.9	B	C	27.9	C	D	38.0	F	F	234.2	F	F	213.1	E	F	95.9	D	D	47.2
	EB	--			--			D			--			--			F			C		
	SB	B			C			C			F			F			E			D		
	WB	C			D			D			F			F			F			D		
CSAH 103 (W Broadway Ave) / Main St	NB	--	--	--	--	--	--	A	B	12.5	--	--	--	--	--	--	C	E	62.6	B	C	34.5
	EB	--			--			D			--			--			F			E		
	SB	--			--			B			--			--			E			C		
	WB	--			--			E			--			--			F			F		
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	NB	B	B	19.6	C	D	43.5	C	C	21.6	F	F	284.7	F	F	286.6	D	D	38.8	C	C	26.3
	EB	--			--			--			--			--			--			--		
	SB	C			E			B			F			F			D			B		
	WB	C			D			C			F			F			C			C		
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	NB	B	B	13.5	B	B	17.5	B	B	16.0	F	F	188.6	F	F	184.8	C	C	28.2	C	C	26.1
	EB	--			--			--			--			--			--			--		
	SB	B			B			B			C			C			C			C		
	WB	B			C			B			F			F			C			C		

Analysis Notes:

No Build01/Build01: Assumes no interchange at Hwy 169 and 101st Ave N

No Build02/Build02: Assumes a full access interchange at Hwy 169 and 101st Ave N

PM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021												2040											
		Existing Condition			No Build01			No Build02			Build01			Build02			No Build01			No Build02			Build01			Build02		
Intersection	Appr	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters	LOS by Appr	LOS by Inters	Avg. Delay (sec/veh) by Inters
CSAH 103 (W Broadway Ave) / 94th Ave N	NB	A	A	1.8	A	A	1.9	A	A	2.0	A	A	9.5	A	A	9.9	A	A	2.7	A	A	2.8	A	B	11.8	A	B	11.3
	EB	A			B			B			B			B			C			C			C			C		
	SB	A			A			A			B			B			A			A			B			B		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	NB	D	D	52.4	C	C	31.6	C	C	32.0	D	D	37.2	C	D	35.8	D	D	37.4	D	D	37.3	D	D	47.7	D	D	48.1
	EB	F			D			D			D			D			D			D			E			E		
	SB	C			C			C			C			C			C			C			D			D		
	WB	D			D			C			D			D			D			C			D			D		
CSAH 103 (W Broadway Ave) / 92nd Ave N	NB	A	A	7.1	A	A	1.0	A	A	1.1	A	A	1.0	A	A	1.0	A	A	1.1	A	A	1.2	A	A	1.4	A	A	1.2
	EB	E			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	B			A			A			A			A			A			A			A			A		
CSAH 103 (W Broadway Ave) / Setzler Pkwy	NB	A	A	1.5	A	B	13.9	B	B	18.0	B	C	20.1	B	B	18.8	A	B	13.9	B	B	18.8	C	C	23.8	B	C	20.5
	EB	A			D			D			D			D			D			D			D			D		
	SB	A			B			B			B			B			B			B			C			B		
	WB	A			C			D			D			D			C			D			D			D		
CSAH 103 (W Broadway Ave) / 89th Ave N	NB	A	A	1.3	A	A	0.7	A	A	0.7	A	A	0.7	A	A	0.8	A	A	0.8	A	A	0.8	A	A	0.9	A	A	0.9
	EB	B			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	NB	A	A	3.4	A	A	1.0	A	A	8.8	A	A	1.0	A	B	10.0	A	A	1.2	A	A	9.8	A	A	1.3	A	B	11.4
	EB	A			A			D			A			D			A			D			A			D		
	SB	A			A			B			A			B			A			B			A			B		
	WB	A			A			D			A			D			A			D			A			D		
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	NB	C	C	26.6	D	D	45.9	D	D	39.8	D	D	45.8	D	D	41.6	D	E	55.4	D	D	43.2	D	D	50.1	D	D	44.3
	EB	C			D			D			D			D			E			D			D			D		
	SB	D			E			D			D			D			E			D			D			D		
	WB	C			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 84th Ave N	NB	A	A	8.8	A	A	1.3	A	A	1.2	A	A	1.0	A	A	1.2	A	A	1.4	A	A	1.2	A	A	1.4	A	A	1.5
	EB	C			A			A			A			A			A			A			A			A		
	SB	B			A			A			A			A			A			A			A			A		
	WB	C			A			A			A			A			A			A			A			A		
CSAH 103 (W Broadway Ave) / College Park Dr	NB	A	A	0.5	A	B	13.7	B	B	13.4	B	B	14.9	A	B	14.4	B	B	13.6	B	B	13.3	B	B	15.7	B	B	16.2
	EB	A			B			B			B			B			B			B			B			B		
	SB	A			B			B			B			B			B			B			B			B		
	WB	--			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 82nd Ave N	NB	A	A	0.5	A	A	0.9	A	A	0.5	A	A	0.6	A	A	0.6	A	A	0.8	A	A	0.6	A	A	0.7	A	A	0.8
	EB	A			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	--			--			--			--			--			--			--			--			--		
CSAH 103 (W Broadway Ave) / Candlewood Dr	NB	A	A	2.3	A	A	9.1	A	A	9.3	B	B	13.7	B	B	13.7	A	A	9.0	A	A	8.8	B	B	14.2	B	B	14.0
	EB	--			--			--			--			--			--			--			--			--		
	SB	A			A			A			B			B			A			A			B			B		
	WB	E			D			D			D			D			D			D			D			D		
CSAH 103 (W Broadway Ave) / 78th Ave N	NB	A	A	0.7	A	A	0.9	A	A	0.9	A	A	0.6	A	A	0.6	A	A	0.9	A	A	0.9	A	A	1.3	A	A	1.6
	EB	B			A			A			A			A			A			A			A			A		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 103 (W Broadway Ave) / Shopping Center Access	NB	A	B	13.0	B	B	16.8	B	B	16.1	A	A	4.1	A	A	3.8	B	B	17.0	B	B	16.7	A	C	15.0	A	C	19.8
	EB	D			D			D			B			B			D			D			F			F		
	SB	B			B			B			A			A			B			B			D			E		
	WB	C			C			C			A			A			C			C			A			A		
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd/CSAH 152)	NB	C	C	27.7	C	D	35.3	D	D	42.5	D	D	43.5	D	D	43.4	C	D	39.5	D	D	46.9	E	D	51.1	D	D	49.9
	EB	C			D			D			D			D			E			E			D			D		
	SB	C			C			C			D			D			C			C			E			E		
	WB	C			D			D			D			D			D			D			D			D		
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (west of CSAH 103)	NB	C	B	15.3	C	C	20.6	C	C	20.2	C	B	19.1	C	B	19.1	C	C	29.7	C	C	27.0	C	B	16.8	C	B	16.9
	EB	B			C			B			B			B			D			C			B			B		
	SB	C			C			C			C			C			C			C			C			C		
	WB	B			B			B			B			B			B			C			B			B		
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (east of CSAH 103)	NB	A	A	1.7	A	A	2.1	A	A	2.1	A	A	2.2	A	A	2.3	A	A	2.3	A	A	2.3	B	A	2.5	B	A	2.6
	EB	A			A			A			A			A			A			A			A			A		
	SB	B			B			B			B			B			B			B			C			C		
	WB	A			A			A			A			A			A			A			A			A		
CSAH 130 (W Broadway Ave) / 76th Ave N	NB	B	B	14.5	C	C	25.4	C	C	22.4	C	C	31.1	C	C	31.5	C	C	27.0	C	C	23.7	D	C	34.3	C	C	32.1
	EB	C			D			D			D			D			D			D			E			D		
	SB	A			B			B			B			B			B			B			B			B		
	WB	C			D			C			D			D			D			C			D			D		
CSAH 130 (W Broadway Ave) / 75th Ave N	NB	A	A	1.2	A	A	1.8	A	A	1.4	C	C	24.3	C	C	24.8	A	A	2.1	A	A	1.6	C	C	25.2	C	C	25.4
	EB	A			A			A			B			B			A			A			B			B		
	SB	A			A			A			D			D			A			A			D			D		
	WB	A			A			A			D			D			B			B			D			D		
CSAH 130 (W Broadway Ave) / 74th Ave N	NB	A	A	1.4	A	A	1.6	A	A	1.6	A	A	0.9	A	A	0.9	A	A	1.9	A	A	1.9	A	A	1.2	A	A	1.3
	EB	A			A			A			--			--			A			A			--			--		
	SB	A			A			A			A			A			A			A			A			A		
	WB	A			B			B			B			B			B			C			B			B		
CSAH 130 (W Broadway Ave) / 73rd Ave N	NB	A	A	7.2	A	B	10.8	A	B	10.8	A	A	9.8	A	A	9.8	B	B	13.0	A	B	12.6	A	B	12.2	A	B	11.8
	EB	C			D			D			D			D			D			C			D			D		
	SB	A			A			A			A			A			A			A			A			A		
	WB	C			C			C			D			D			C			C			D			D		

Analysis Notes:

No Build01/Build01: Right-in/Right-out at CSAH 103 (W Broadway Ave)/Maplebrook Parkway

No Build02/Build02: Full-access signalized intersection at CSAH 103 (W Broadway Ave)/Maplebrook Parkway

PM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021						2040					
		Existing Condition			No Build			Build			No Build			Build		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
CSAH 81 (Bottineau Blvd) / 73rd Ave N	NB	B	B	18.1	B	B	14.8	B	B	17.8	B	B	18.2	B	B	19.8
	EB	C			D			D			D			C		
	SB	B			B			B			B			C		
	WB	D			D			D			D			C		
CSAH 81 (Bottineau Blvd) / 71st Ave N	NB	B	C	26.1	B	C	21.4	B	C	31.4	B	C	22.3	C	C	33.4
	EB	E			D			D			D			D		
	SB	B			B			B			B			C		
	WB	E			D			D			D			D		
CSAH 103 (W Broadway Ave) / 71st Ave N	NB	C	B	15.6	C	B	15.8	C	B	15.9	C	B	15.9	C	B	16.5
	EB	B			B			B			B			B		
	SB	B			B			B			B			B		
	WB	E			E			D			D			D		
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	NB	A	A	6.5	A	A	8.1	A	A	8.6	A	A	8.0	A	A	8.7
	EB	--			--			--			--			--		
	SB	A			A			A			A			A		
	WB	A			B			B			C			B		
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	NB	D	D	35.1	C	C	26.7	D	C	30.4	C	C	27.8	D	C	33.6
	EB	--			--			--			--			--		
	SB	B			B			B			B			B		
	WB	D			C			D			D			D		
CSAH 81 (Bottineau Blvd) / 63rd Ave N	NB	C	C	31.2	C	C	32.6	C	D	35.4	C	C	34.2	C	D	36.6
	EB	D			D			D			D			D		
	SB	C			C			C			C			C		
	WB	D			D			D			D			D		
63rd Ave N / Louisiana Ave / Park-and-Ride Access	NB	A	A	1.9	A	A	2.0	A	B	13.1	A	A	2.3	A	B	13.5
	EB	A			A			A			A			A		
	SB	A			A			C			A			C		
	WB	A			A			A			A			B		
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	NB	D	D	36.0	D	D	37.5	D	D	45.2	D	D	41.9	E	D	53.7
	EB	C			D			D			D			D		
	SB	C			C			D			D			D		
	WB	D			D			D			D			D		
CSAH 10 (Bass Lake Rd) / Sherburne Ave	NB	A	B	17.4	B	B	18.4	B	C	20.6	B	C	22.6	B	C	24.8
	EB	C			C			C			C			C		
	SB	B			B			B			B			B		
	WB	B			B			B			B			C		
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	NB	B	B	13.8	B	B	14.7	B	B	14.9	B	B	15.1	B	B	16.2
	EB	C			C			B			B			C		
	SB	B			B			B			B			B		
	WB	C			C			C			C			C		
Wilshire Blvd / Lakeland Ave N	NB	A	A	5.5	A	A	4.7	C	D	28.7	A	A	3.8	C	D	29.3
	EB	--			--			--			--			--		
	SB	B			A			F			A			F		
	WB	A			A			A			A			A		
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	NB	B	B	16.2	B	B	13.9	B	B	13.3	B	B	14.6	B	B	14.6
	EB	C			C			C			C			C		
	SB	B			B			B			B			B		
	WB	D			C			C			C			C		
CSAH 8 (W Broadway Ave) / Corvallis Ave N	NB	A	A	3.5	A	A	3.7	A	A	4.4	A	A	3.9	A	A	4.6
	EB	--			--			--			--			--		
	SB	A			A			A			A			A		
	WB	B			B			B			B			C		
CSAH 8 (W Broadway Ave) / Welcome Ave N	NB	A	A	1.3	A	A	1.4	A	A	2.0	A	A	1.5	A	A	2.2
	EB	A			A			A			A			A		
	SB	--			--			--			--			--		
	WB	A			A			A			A			A		
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	NB	--	A	0.8	--	A	0.6	--	A	2.9	--	A	0.6	--	A	3.1
	EB	A			A			A			A			A		
	SB	A			A			A			A			A		
	WB	A			A			A			A			A		
CSAH 8 (W Broadway Ave) / 45½ Ave N	NB	A	A	1.0	A	A	1.0	A	A	1.4	A	A	1.2	A	A	1.6
	EB	A			A			A			A			A		
	SB	A			A			A			A			A		
	WB	--			--			--			--			--		
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	NB	D	B	19.7	D	C	20.8	C	B	18.5	D	C	22.1	C	C	20.5
	EB	A			A			B			A			B		
	SB	D			D			C			D			D		
	WB	B			B			A			B			B		
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	NB	C	C	26.5	C	C	26.7	C	C	30.0	C	C	28.2	C	C	32.0
	EB	C			C			C			C			C		
	SB	C			C			C			C			C		
	WB	D			D			D			D			D		
CSAH 9 (42nd Ave N) / Hubbard Ave[1]	NB	A	A	1.4	B	A	1.7	F	A	9.7	C	A	2.4	F	B	10.8
	EB	A			A			A			A			A		
	SB	A			A			A			A			A		
	WB	A			A			A			A			A		
CSAH 9 (42nd Ave N) / Railroad Ave N	NB	C	A	0.9	C	A	1.0	C	A	1.9	C	A	1.4	C	A	2.1
	EB	A			A			A			A			A		
	SB	A			B			A			B			A		
	WB	A			A			A			A			A		
CSAH 9 (42nd Ave N) / Regent Ave N	NB	B	A	1.7	C	A	1.8	C	A	2.0	C	A	2.3	C	A	2.5
	EB	A			A			A			A			A		
	SB	A			A			A			A			A		
	WB	A			A			A			A			A		
CSAH 8 (W Broadway Ave) / 41 1/2 Ave N	NB	B	B	12.3	B	B	13.4	C	C	18.9	B	B	14.5	D	C	23.8
	EB	--			--			--			--			--		
	SB	B			B			C			B			C		
	WB	--			--			--			--			--		
Hubbard Ave / 41 1/2 Ave N	NB	A	A	3.1	A	A	3.8	A	D	26.4	A	A	3.5	A	D	26.8
	EB	--			--			--			--			--		
	SB	A			A			E			A			E		
	WB	A			A			A			A			A		
41st Ave N / Hubbard Ave	NB	A	A	8.5	A	A	8.5	A	C	17.2	A	A	8.7	A	C	17.1
	EB	A			A			B			A			B		
	SB	A			A			D			A			D		
	WB	A			A			B			A			A		
CSAH 8 (W Broadway Ave) / 41st Ave N	NB	B	B	10.0	B	B	10.3	B	C	16.3	B	B	11.4	B	C	17.1
	EB	A			A			C			A			D		
	SB	B			B			B			B			B		
	WB	A			A			B			A			A		
Golden Valley Rd / Theodore Wirth Pkwy	NB	B	C	16.0	B	C	15.2	C	C	19.4	C	E	42.0	C	E	42.5
	EB	C			C			D			F			F		
	SB	A			A			A			A			A		
	WB	B			B			B			C			C		

Analysis Notes:

[1] All left turns and NB and SB through movements are restricted to emergency vehicles and buses.

PM Level of Service and Intersection Delay

Scenario		2014			Opening Year 2021						2040					
		Existing Conditions			No Build			Build			No Build			Build		
Intersection	Appr	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)	LOS		Avg. Delay (sec/veh)
		by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter	by Appr	by Inter	by Inter
TH 55 (Olson Memorial Hwy) / Thomas Ave N	EB	A	A	8.3	F	D	33.7	A	B	10.9	F	F	88.8	C	C	21.8
	SB	F			F			D			F			E		
	WB	A			A			B			A			B		
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave	EB	-	-	-	-	-	-	A	A	4.6	-	-	-	A	B	11.5
	WB	-			-			A			-			B		
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	NB	D	F	82.0	D	F	102.1	E	D	43.1	E	F	130.8	E	D	51.1
	EB	F			F			D			F			D		
	SB	D			D			D			E			E		
	WB	E			F			D			F			D		
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	EB	-	-	-	-	-	-	A	A	7.3	-	-	-	A	A	8.0
	WB	-			-			A			-			A		
TH 55 (Olson Memorial Hwy) / Morgan Ave N	NB	D	A	7.8	D	C	20.1	D	B	16.4	E	E	57.2	D	C	22.9
	EB	A			A			A			A			B		
	SB	D			E			D			E			D		
	WB	B			D			C			F			C		
TH 55 (Olson Memorial Hwy) / James Ave N	EB	A	A	4.2	A	A	4.2	-	A	5.2	A	A	4.2	-	A	3.6
	SB	B			C			A			D			B		
	WB	A			A			A			E			A		
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave	EB	-	-	-	-	-	-	A	A	1.2	-	-	-	A	A	1.2
	WB	-			-			A			-			A		
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	NB	D	A	7.2	D	A	8.5	D	C	22.6	D	B	19.2	D	C	20.3
	EB	A			B			C			A			C		
	SB	D			D			D			D			D		
	WB	A			A			B			C			B		
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	NB	D	B	10.6	D	A	9.3	D	C	33.3	D	B	13.9	D	D	36.3
	EB	B			A			D			B			D		
	SB	D			D			D			D			D		
	WB	A			A			C			A			B		
TH 55 (Olson Memorial Hwy) / Bryant Ave N	NB	D	A	8.1	D	A	8.0	D	B	17.3	D	A	9.0	E	C	22.8
	EB	A			A			B			B			C		
	SB	C			D			C			D			D		
	WB	A			A			B			A			B		
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	EB	C	C	21.5	B	C	21.1	C	C	29.1	C	C	24.6	D	C	32.3
	SB	D			D			E			E			D		
	WB	B			B			B			A			B		
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	NB	D	C	28.9	D	C	33.1	E	D	39.4	D	C	31.4	F	D	46.7
	EB	B			B			B			B			B		
	WB	C			C			C			D			D		
Olson Memorial Hwy / Border Ave	NB	E	C	21.9	E	C	24.4	E	C	32.3	F	C	33.1	F	C	34.4
	EB	A			B			C			C			D		
	SB	C			C			C			C			C		
	WB	B			B			C			C			C		
Olson Memorial Hwy / 7th St N/6th Ave N	NB	C	C	30.5	D	C	32.4	E	D	43.6	D	D	36.0	E	E	64.8
	EB	B			B			A			C			C		
	SB	E			E			E			E			F		
	WB	C			C			D			D			E		

Storage Length

Scenario		2014			Opening Year 2021						2040											
		Existing Condition			No Build01			Build01			No Build01			No Build02			Build01			Build02		
Intersection	Appr	Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)		
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
Oak Grove Pkwy / Xylon Ave	NB	-	-	-	-	-	-	250	1000	1000	-	-	-	-	-	-	250	1000	1000	250	1000	1000
	EB	-	-	-	-	-	-	1250	1250	1250	-	-	-	-	-	-	1250	1250	1250	1250	1250	1250
	SB	-	-	-	-	-	-	250	400	400	-	-	-	-	-	-	250	400	400	250	400	400
	WB	-	-	-	-	-	-	1400	1400	1400	-	-	-	-	-	-	1400	1400	1400	1400	1400	1400
CSAH 103 (W Broadway Ave) / 101st Ave N	NB	725	725	-	725	725	-	-	-	-	725	725	-	725	725	-	-	-	-	-	-	-
	EB	2600	-	2600	2600	-	2600	-	-	-	2600	-	2600	2600	-	2600	-	-	-	-	-	-
	SB	-	2400	2400	-	2400	2400	-	-	-	-	2400	2400	-	2400	2400	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	NB	900	900	-	900	900	-	-	-	-	900	900	-	900	900	-	-	-	-	-	-	-
	EB	3000	-	3000	3000	-	3000	-	-	-	3000	-	3000	3000	-	3000	-	-	-	-	-	-
	SB	-	725	-	-	725	-	-	-	-	-	725	-	-	725	-	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	NB	-	950	350	-	950	350	340	700	700	-	950	350	-	950	350	340	700	700	340	700	700
	EB	-	-	-	-	-	-	320	450	300	-	-	-	-	-	-	320	450	300	320	450	300
	SB	250	900	-	250	900	-	310	950	950	250	900	-	250	900	-	310	950	950	310	950	950
	WB	315	-	720	315	-	720	350	720	720	315	-	720	315	-	720	350	720	720	350	720	720
CSAH 103 (W Broadway Ave) / Main St	NB	-	-	-	-	-	-	410	830	320	-	-	-	-	-	-	410	830	320	410	830	320
	EB	-	-	-	-	-	-	210	380	380	-	-	-	-	-	-	210	380	380	210	380	380
	SB	-	-	-	-	-	-	370	700	370	-	-	-	-	-	-	370	700	370	370	700	370
	WB	-	-	-	-	-	-	205	650	650	-	-	-	-	-	-	205	650	650	205	650	650
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	NB	-	800	375	-	800	375	-	800	375	-	800	375	-	800	375	-	800	375	-	800	375
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	460	1045	-	460	1045	-	460	1045	-	460	1045	-	460	1045	-	460	1045	-	460	1045	-
	WB	560	-	560	560	-	560	560	-	560	560	-	560	560	-	560	560	-	560	560	-	560
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	NB	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-
	EB	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65
	SB	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Analysis Notes:

No Build01/Build01: Assumes no interchange at Hwy 169 and 101st Ave N

No Build02/Build02: Assumes a full access interchange at Hwy 169 and 101st Ave N

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Storage Length

Scenario		2014			Opening Year 2021															2040											
		Existing Condition			No Build01			No Build02			Build01			Build02			No Build01			No Build02			Build01			Build02					
Intersection	Appr	Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)					
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT			
CSAH 103 (W Broadway Ave) / 94th Ave N	NB	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-	350	785	-			
	EB	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65	80	-	65			
	SB	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380	-	800	380			
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	NB	225	600	600	225	600	600	225	600	600	225	600	600	225	600	600	225	600	600	225	600	600	225	600	600	225	600	600			
	EB	215	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220	360	1220	1220			
	SB	375	785	785	375	785	785	375	785	785	375	785	785	375	785	785	375	785	785	375	785	785	375	785	785	375	785	785			
	WB	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220	290	1220	1220			
CSAH 103 (W Broadway Ave) / 92nd Ave N	NB	950	950	220	-	950	220	-	950	220	-	950	220	-	950	220	-	950	220	-	950	220	-	950	220	-	950	220			
	EB	1250	1250	1250	-	-	1250	-	-	1250	-	-	1250	-	-	1250	-	-	1250	-	-	1250	-	-	1250	-	-	1250			
	SB	600	600	140	-	600	140	-	600	140	-	600	140	-	600	140	-	600	140	-	600	140	-	600	140	-	600	140			
	WB	430	430	430	-	-	430	-	-	430	-	-	430	-	-	430	-	-	430	-	-	430	-	-	430	-	-	430			
CSAH 103 (W Broadway Ave) / Setzler Pkwy	NB	195	870	350	350	870	870	350	870	870	350	870	870	350	870	870	350	870	870	350	870	870	350	870	870	350	870	870			
	EB	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275			
	SB	250	950	250	350	950	950	350	950	950	350	950	950	350	950	950	350	950	950	350	950	950	350	950	950	350	950	950			
	WB	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275			
CSAH 103 (W Broadway Ave) / 89th Ave N	NB	650	650	-	-	650	-	-	650	-	-	650	-	-	650	-	-	650	-	-	650	-	-	650	-	-	650	-			
	EB	1900	-	1900	-	-	1900	-	-	1900	-	-	1900	-	-	1900	-	-	1900	-	-	1900	-	-	1900	-	-	1900			
	SB	-	870	870	870	870	870	870	870	870	-	870	870	-	870	870	-	870	870	-	870	870	-	870	870	-	870	870			
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	NB	1110	1110	215	-	1110	1110	330	1110	1110	-	1110	1110	330	1110	1110	-	1110	1110	330	1110	1110	-	1110	1110	330	1110	1110			
	EB	260	260	260	-	-	260	260	260	260	-	-	260	260	260	260	-	-	260	260	260	260	-	-	260	260	260	260			
	SB	650	650	150	-	650	650	330	650	650	-	650	650	330	650	650	-	650	650	330	650	650	-	650	650	330	650	650			
	WB	170	170	170	-	-	170	170	170	170	-	-	170	170	170	170	-	-	170	170	170	170	-	-	170	170	170	170			
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	NB	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270			
	EB	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375			
	SB	360	645	645	360	645	645	360	645	645	360	645	645	360	645	645	360	645	645	360	645	645	360	645	645	360	645	645			
	WB	440	1000	725	440	1000	725	440	1000	725	440	1000	725	440	1000	725	440	1000	725	440	1000	725	440	1000	1000	440	1000	1000			
CSAH 103 (W Broadway Ave) / 84th Ave N	NB	400	250	250	-	250	250	-	250	250	-	250	250	-	250	250	-	250	250	-	250	250	-	250	250	-	250	250			
	EB	640	640	640	-	-	640	-	-	640	-	-	640	-	-	640	-	-	640	-	-	640	-	-	640	-	-	640			
	SB	265	265	265	-	265	265	-	265	265	-	265	265	-	265	265	-	265	265	-	265	265	-	265	265	-	265	265			
	WB	115	115	115	-	-	115	-	-	115	-	-	115	-	-	115	-	-	115	-	-	115	-	-	115	-	-	115			
CSAH 103 (W Broadway Ave) / College Park Dr	NB	800	800	-	250	800	800	250	800	800	250	800	800	250	800	800	250	800	800	250	800	800	250	800	800	250	800	800			
	EB	760	-	760	150	760	760	150	760	760	150	760	760	150	760	760	150	760	760	150	760	760	150	760	760	150	760	760			
	SB	-	265	265	350	265	265	350	265	265	350	265	265	350	265	265	350	265	265	350	265	265	350	265	265	350	265	265			
	WB	-	-	-	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150			
CSAH 103 (W Broadway Ave) / 82nd Ave N	NB	815	815	-	-	815	-	-	815	-	-	815	-	-	815	-	-	815	-	-	815	-	-	815	-	-	815	-			
	EB	300	-	300	-	-	300	-	-	300	-	-	300	-	-	300	-	-	300	-	-	300	-	-	300	-	-	300			
	SB	-	800	800	-	800	800	-	800	800	-	800	800	-	800	800	-	800	800	-	800	800	-	800	800	-	800	800			
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CSAH 103 (W Broadway Ave) / Candlewood Dr	NB	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715			
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	SB	815	815	-	250	815	-	250	815	-	250	815	-	250	815	-	250	815	-	250	815	-	250	815	-	250	815	-			
	WB	150	-	150	150	-	150	150	-	150	150	-	150	150	-	150	150	-	150	150	-	150	150	-	150	150	-	150			
CSAH 103 (W Broadway Ave) / 78th Ave N	NB	300	540	540	-	540	540	-	540	540	-	540	540	-	540	540	-	540	540	-	540	540	-	540	540	-	540	540			
	EB	450	450	450	-	-	450	-	-	450	-	-	450	-	-	450	-	-	450	-	-	450	-	-	450	-	-	450			
	SB	200	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715	-	715	715			
	WB	175	175	175	-	-	175	-	-	175	-	-	175	-	-	175	-	-	175	-	-	175	-	-	175	-	-	175			
CSAH 103 (W Broadway Ave) / Shopping Center Access	NB	200	450	450	200	450	450	200	450	450	-	450	450	-	450	450	200	450	450	200	450	450	-	450	450	-	450	450			
	EB	40	40	40	40	40	40	40	40	40	-	-	40	-	-	40	40	40	40	40	40	40	-	-	40	-	-	40			
	SB	200	540	540	200	540	540	200	540	540	-	540	540	-	540	540	200	540	540	200	540	540	-	540	540	-	540	540			
	WB	40	40	40	40	40	40	40	40	40	-	-	40	-	-	40	40	40	40	40	40	40	-	-	40	-	-	40			
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd/CSAH 152)	NB	390	570	500	390	570	500	390	570	500	390	570	500	390	570	500	390	570	500	390	570	500	390	570	570	390	570	570			
	EB	350	500	575	350	500	575	350	500	575	350	500	575	350	500	575	350	500	575	350	500	575	350	500	500	350	500	500			
	SB	225	450	475	225	450	475	225	450	475	310	450	475	310	450	475	225	450	475	225	450	475	310	450	450	310	450	450			
	WB	330	515	490	330	515	490	330	515	490	330	515	490	330	515	490	330	515	490	330	515	490	330	515	515	330	515	515			
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (west of CSAH 103)	NB	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215			
	EB	240	600	215	240	600	215	240	600	215	240	600	215	240	600	215	240	600	215	240	600	215	240	600	215	240	600	215			
	SB	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190			
	WB	115	490	290	115	490	290	115	490	290	115	490	290	115	490	290	115	490	290	115	490	290	115	490	290	115	490	290			
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (east of CSAH 103)	NB	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70			
	EB	160	515	515	160	515	515	160	515	515	160	515	515	160	515	515	160	515	515	160	515	515	160	515	515	160	515	515			
	SB	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150			
	WB	240	660	660	240	660	660	240	660	660	240	660	660	240	660	660	240	660	660	240	660	660	240	660	660	240	660	660			
CSAH 130 (W Broadway Ave) / 76th Ave N	NB	215	880	880	215	880	880	215	880	880	215	880	880	215	880	880	215	880	880	215	880	880	215	880	880	215	880	880			
	EB	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175			
	SB	150	570	240	150	570	240	150	570	240	150	570	240	150	570	240	150	570	240	150	570	240	150	570	240	150	570	240			
	WB	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130			
CSAH 130 (W Broadway Ave) / 75th Ave N	NB	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265	265			
	EB	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200			
	SB	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880			
	WB	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150			
CSAH 130 (W Broadway Ave) / 74th Ave N	NB	250	250	250	250	250	250	250	250	250	250	250	-	250	250	-	250	250	250	250	250	250	250	250	-	250	250	-			
	EB	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	-	1320	1320	-	1320	1320	1320	1320	1320	1320	1320	1320	-	1320	1320	-	1320			
	SB	265	265	265	265	265	265	265	265	265	-	265	265	-	265	265	265	265	265	265	265	265	-	265	265	-	265	265			
	WB	910	910	910	910	910	910	910	910	910	-	-	-	-	-	-	910	910	910	910	910	910	-	-	-	-	-	-			
CSAH 130 (W Broadway Ave) / 73rd Ave N	NB	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800			
	EB	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600			
	SB	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250			
	WB	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490	490			

Analysis Notes:

No Build01/Build01: Right-in/Right-out at CSAH 103 (W Broadway Ave)/Maplebrook Parkway

No Build02/Build02: Full-access signalized intersection at CSAH 103 (W Broadway Ave)/Maplebrook Parkway

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Storage Length

Scenario		2014						Opening Year 2021												2040											
		Existing No Freight Event			Existing Freight Event			No Build No Freight Event			No Build Freight Event			Build No Freight Event			Build Freight Event			No Build No Freight Event			No Build Freight Event			Build No Freight Event			Build Freight Event		
Intersection	Appr	Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)		
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
CSAH 81 (Bottineau Blvd) / 73rd Ave N	NB	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375	470	1325	375
	EB	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530	230	440	530
	SB	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360	390	2800	360
	WB	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640	315	640	640
CSAH 81 (Bottineau Blvd) / 71st Ave N	NB	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360	265	960	360
	EB	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970	315	970	970
	SB	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315	330	1315	315
	WB	480	480	480	480	480	480	480	480	125	480	480	125	480	480	125	480	480	125	480	480	125	480	480	125	480	480	125	480	480	125
CSAH 103 (W Broadway Ave) / 71st Ave N	NB	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575
	EB	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460	425	460	460
	SB	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440	420	420	440
	WB	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	NB	-	1040	500	-	1040	500	-	1040	650	-	1040	650	-	1040	650	-	1040	650	-	1040	650	-	1040	650	-	1040	650	-	1040	650
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	235	1825	-	235	1825	-	350	1825	-	350	1825	-	350	1825	-	350	1825	-	350	1825	-	350	1825	-	350	1825	-	350	1825	-
	WB	375	-	850	375	-	850	375	-	300	375	-	300	375	-	300	375	-	300	375	-	300	375	-	300	375	-	300	375	-	300
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	NB	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360	-	2780	360
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	525	1060	-	525	1060	-	650	1060	-	650	1060	-	650	1060	-	650	1060	-	650	1060	-	650	1060	-	650	1060	-	650	1060	-
	WB	140	-	300	140	-	300	300	-	300	300	-	300	300	-	300	300	-	300	300	-	300	300	-	300	300	-	300	300	-	300
CSAH 81 (Bottineau Blvd) / 63rd Ave N	NB	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420	390	4460	420
	EB	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450	300	560	450
	SB	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330	450	2715	330
	WB	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380	330	515	380
63rd Ave N / Louisiana Ave / Park-and-Ride Access	NB	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	EB	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230
	SB	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
	WB	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475	215	475	475
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	NB	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320	380	1300	320
	EB	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440	400	400	440
	SB	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470	460	5700	470
	WB	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310	275	380	310
CSAH 10 (Bass Lake Rd) / Sherburne Ave	NB	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630
	EB	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720	215	720	720
	SB	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	WB	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500	325	500	500
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	NB	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300
	EB	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80
	SB	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190
	WB	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
Wilshire Blvd / Lakeland Ave N	NB	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300	400	2250	300
	EB	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80	45	45	80
	SB	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190	400	1300	190
	WB	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	NB	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330	500	2300	330
	EB	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275	90	275	275
	SB	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530	375	2260	530
	WB	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
CSAH 8 (W Broadway Ave) / Corvallis Ave N	NB	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700	-	700	700
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-	1560	1560	-
	WB	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80	1030	-	80
CSAH 8 (W Broadway Ave) / Welcome Ave N	NB	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-
	EB	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210
	SB	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70
	WB	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	50	-	-	-	-	-	-	-	-	50	-	-	50	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	NB	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-
	EB	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210
	SB	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSAH 8 (W Broadway Ave) / 45½ Ave N	NB	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-	390	390	-
	EB	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210	210	-	210
	SB	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70	-	70	70
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	NB	330	330	60	330	330	60	330	330	60	330	330	60	100	330	330	100	330	330	330	330	60	330	330	60	100	330	330	100	330	330
	EB	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	SB	345	345	345	345	345	345	345	345	345	345	345	345	150	345	345	150	345	345	345	345	345	345	345	345	150	345	345	150	345	345
	WB	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	NB	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175	360	725	175
	EB	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
	SB	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150	260	730	150
	WB	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
CSAH 9 (42nd Ave N) / Hubbard Ave[1]	NB	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345	-	-	345
	EB	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200	-	200	200
	SB	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30	-	-	30
	WB	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90	-	90	90
CSAH 9 (42nd Ave N) / Railroad Ave N	NB	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
	EB	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
	SB	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
	WB	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
CSAH 9 (42nd Ave N) / Regent Ave N	NB	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
	EB	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415
	SB	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
	WB	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
CSAH 8 (W Broadway Ave) / 41 1/2 Ave N	NB	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-	410	410	-
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325	-	325	325
	WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hubbard Ave / 41 1/2 Ave N	NB	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-	-	415	-
	EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SB	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-	-	420	-
	WB	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175	175	-	175
41st Ave N / Hubbard Ave	NB	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
	EB	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
	SB	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	WB	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
CSAH 8 (W Broadway Ave) / 41st Ave N	NB	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
	EB	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
	SB	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420
	WB	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
Golden Valley Rd / Theodore Wirth Pkwy	NB	3010	3010	160	-	-	-	3010	3010	160	-	-	-	3010	3010	160	-	-	-	3010	3010	160	-	-	-	3010	3010	160	-	-	-
	EB	1145	1145	230	-	-	-	1145	1145	230	-	-	-	430	430	230	-	-	-	1145	1145	230	-	-	-	430	430	230	-	-	-
	SB	240	240	75	-	-	-	240	240	75	-	-	-	240	240	75	-	-	-	240	240	75	-	-	-	240	240	75	-	-	-
	WB	375	375	200	-	-	-	375	375	200	-	-	-	375	375	200	-	-	-	375	375	200	-	-	-	375	375	200	-	-	-

Analysis Notes:

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

[1] All left turns and NB and SB through movements are restricted to emergency vehicles and buses.

Storage Length

Scenario		2014			Opening Year 2021						2040					
		Existing Conditions			No Build			Build			No Build			Build		
Intersection	Appr	Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)			Effective Storage Distance (feet)		
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
TH 55 (Olson Memorial Hwy) / Thomas Ave N	EB	225	3785	-	225	3785	-	225	3785	-	225	3785	-	225	3785	-
	SB	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
	WB	-	280	280	-	280	280	-	280	280	-	280	280	-	280	280
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave	EB	-	-	-	-	-	-	-	620	-	-	-	-	-	620	-
	WB	-	-	-	-	-	-	-	630	-	-	-	-	-	630	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	NB	510	510	115	510	510	115	135	510	115	510	510	115	135	510	115
	EB	260	605	605	260	605	605	320	605	605	260	605	605	320	605	605
	SB	490	490	75	490	490	75	95	490	75	490	490	75	95	490	75
	WB	280	885	885	280	885	885	305	885	885	280	885	885	305	885	885
TH 55 (Olson Memorial Hwy) / Pedestrian Crosssing East of Oliver Ave	EB	-	-	-	-	-	-	-	450	-	-	-	-	-	450	-
	WB	-	-	-	-	-	-	-	440	-	-	-	-	-	440	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	NB	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	EB	240	880	880	240	880	880	255	880	880	240	880	880	255	880	880
	SB	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	WB	265	935	935	265	935	935	305	1545	1545	265	935	935	305	1545	1545
TH 55 (Olson Memorial Hwy) / James Ave N	NB	270	925	-	270	925	-	-	-	-	270	925	-	-	-	-
	EB	270	925	-	270	925	-	-	-	-	270	925	-	-	-	-
	WB	-	565	565	-	565	565	-	565	565	-	565	565	-	565	565
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave	EB	-	-	-	-	-	-	-	1005	-	-	-	-	-	1005	-
	WB	-	-	-	-	-	-	-	530	-	-	-	-	-	530	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	NB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EB	245	560	560	245	560	560	305	1540	1540	245	560	560	305	1540	1540
	SB	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
	WB	270	970	970	270	970	970	295	970	970	270	970	970	295	970	970
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	NB	90	0	0	90	0	0	90	0	0	90	0	0	90	0	0
	EB	265	965	965	265	965	965	300	965	965	265	965	965	300	965	965
	SB	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165
	WB	200	610	610	200	610	610	200	610	610	200	610	610	200	610	610
TH 55 (Olson Memorial Hwy) / Bryant Ave N	NB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EB	205	615	615	205	615	615	105	615	615	205	615	615	105	615	615
	SB	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	WB	275	535	535	275	535	535	100	535	535	275	535	535	100	535	535
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	EB	-	505	365	-	505	365	-	505	260	-	505	365	-	505	260
	SB	380	380	235	380	380	235	380	380	235	380	380	235	380	380	235
	WB	165	205	-	165	205	-	220	220	-	165	205	-	220	220	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	NB	375	790	790	375	790	790	375	790	790	375	790	790	375	790	790
	EB	185	200	-	185	200	-	225	200	-	185	200	-	225	200	-
	WB	-	425	120	-	425	120	-	425	165	-	425	120	-	425	165
Olson Memorial Hwy / Border Ave	NB	865	865	865	865	865	865	865	865	865	865	865	865	865	865	865
	EB	110	425	130	110	425	130	405	425	215	110	425	130	405	425	215
	SB	335	335	45	335	335	45	335	335	45	335	335	45	335	335	45
	WB	165	300	115	165	300	115	140	300	115	165	300	115	140	300	115
Olson Memorial Hwy / 7th St N/6th Ave N	NB	235	565	90	235	565	90	460	565	-	235	565	90	460	565	-
	EB	-	330	340	-	330	340	-	305	310	-	330	340	-	305	310
	SB	460	460	460	460	460	460	460	460	460	460	460	460	460	460	460
	WB	1075	1075	115	1075	1075	115	1075	1075	-	1075	1075	115	1075	1075	-

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Queuing Issues

		Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage							Identified as Issue?		Mitigation Proposed?	
				2014	2021		2040							
				Existing Conditions	No Build01	Build01	No Build01	No Build02	Build01	Build02				
Intersection	**Appr**													
Oak Grove Pkwy / Xylon Ave	**NB**	Left-Turn	AM						X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	A traffic signal should be built in conjunction with the interchange or with future development, when warranted. Need for the signal is due to future development traffic.
			PM						X	X				
	EB	-									-	-	-	-
	SB	Left-Turn	AM							X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	A traffic signal should be built in conjunction with the interchange or with future development, when warranted. Need for the signal is due to future development traffic.
			PM						X	X				
	WB	-									-	-	-	-
CSAH 103 (W Broadway Ave) / 101st Ave N	**NB**	-									-	-	-	-
	EB	-									-	-	-	-
	SB	-									-	-	-	-
	WB	-									-	-	-	-
CSAH 103 (W Broadway Ave) / Winnetka Ave N	**NB**	Left-Turn / Through	AM				X	X			Yes	Queues spill back through upstream intersections.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM											
	EB	-									-	-	-	-
	SB	-									-	-	-	-
	WB	-									-	-	-	-
CSAH 103 (W Broadway Ave) / Oak Grove Pkwy	**NB**	Through	AM				X	X			Yes	Queues spill back through upstream intersections.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM											
	EB	Right-Turn	AM								Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Queues are due to future development traffic. Queues would be reduced with construction of the interchange at TH 169/101st Avenue N.
			PM						X					
	SB	Left-Turn / Through	AM								Yes	Queues spill back through upstream intersections.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM				X	X						
	WB	Left-Turn / Right-Turn	AM				X	X			Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurred in No Build conditions. Build conditions are improved compared to No Build conditions.
			PM				X	X	X					
CSAH 103 (W Broadway Ave) / Main St	**NB**	-									-	-	-	-
	EB	Through / Right-Turn	AM								Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Queues are due to future development traffic. Queues would be reduced with construction of the interchange at TH 169/101st Avenue N.
			PM						X					
	SB	-									-	-	-	-
	WB	-									-	-	-	-
CSAH 103 (W Broadway Ave) / TH 610 WB Ramps	**NB**	Through	AM				X	X			Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM				X	X						
	EB	-									-	-	-	-
	SB	Left-Turn	AM								No	Queues spill back through upstream intersections.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM				X	X						
	WB	Left-Turn / Right-Turn	AM				X	X			No	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	The proposed Build roadway network will accommodate the expected future traffic volumes.
			PM				X	X						
CSAH 103 (W Broadway Ave) / TH 610 EB Ramps	**NB**	-									-	-	-	-
	EB	-									-	-	-	-
	SB	-									-	-	-	-
	WB	-									-	-	-	-

Analysis Notes:

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Queuing Issues

Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage: 2014 Existing Conditions	2021 No Build01	2021 No Build02	2021 Build01	2021 Build02	2040 No Build01	2040 No Build02	2040 Build01	2040 Build02	Identified as Issue?		Mitigation Proposed?	
CSAH 103 (W Broadway Ave) / 94th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 30 (93rd Ave N)	NB	-											-	-	-	-
	EB	Left-Turn	AM										Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issue only occurs in the Existing Conditions scenario and will be improved by the CSAH 103 reconstruction project.
			PM	X												
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / 92nd Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / Setzler Pkwy	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / 89th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / Maplebrook Pkwy	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 109 (85th Ave N)	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / 84th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / College Park Dr	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / 82nd Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / Candlewood Dr	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / 78th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / Shopping Center Access	NB	-											-	-	-	-
	EB	Right-Turn	AM										Yes	Average back of queue exceeds storage length and the movement	No	Issue occurs as a result of the southbound left-turn/U-turn queue at CSAH 103
			PM								X	X				
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 103 (W Broadway Ave) / CSAH 130 (Brooklyn Blvd/CSAH 152)	NB	-											-	-	-	-
	EB	Left-Turn	AM										Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issue occurs in No Build scenarios only. Protected/permissive left-turn phasins is proposed in the Build scenarios, which reduces the queue.
			PM						X	X						
	SB	Left-Turn/ U-Turn	AM										Yes	Movement operates at LOS E or worse and the average back of queue exceeds the storage length.	No	Issue occurs as a result of the eastbound left-turns at the CSAH 103 (W Broadway Ave)/Shopping Center intersection being redirected to this intersection as a result of the intersection becoming a right-in/right-out in the Build scenarios. These vehicles may choose to exit the shopping center using the access on Brooklyn Boulevard, which would reduce the number of vehicles making this movement. The southbound left-turn/U-turn turn bay length will be designed to reduce the amount of time the queue spills back into the through lanes.
			PM								X	X				
	WB	-											-	-	-	-
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (west of CSAH 103)	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 130 (Brooklyn Blvd/CSAH 152) / Shopping Center Access (east of CSAH 103)	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 130 (W Broadway Ave) / 76th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 130 (W Broadway Ave) / 75th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 130 (W Broadway Ave) / 74th Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-
CSAH 130 (W Broadway Ave) / 73rd Ave N	NB	-											-	-	-	-
	EB	-											-	-	-	-
	SB	-											-	-	-	-
	WB	-											-	-	-	-

Analysis Notes:

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Queuing Issues

Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage: 2014 Existing No Feight Event	2014 Existing Freight Event	2021 No Build No Freight Event	2021 No Build Freight Event	2021 Build No Freight Event	2021 Build Freight Event	2040 No Build No Freight Event	2040 No Build Freight Event	2040 Build No Freight Event	2040 Build Freight Event	Identified as Issue?		Mitigation Proposed?	
CSAH 81 (Bottineau Blvd) / 73rd Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / CSAH 8 (W Broadway Ave) / 71st Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 130 (W Broadway Ave) / 71st Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / I-94 WB Ramps	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / I-94 EB Ramps	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	Left-Turn	AM	X										No	Average back of queue does not exceed storage length and the movement does not operate at LOS E or worse.	No	Does not impact upstream traffic. The storage length for this movement will also be increased in the future as part of the CSAH 103 reconstruction project.
			PM														
CSAH 81 (Bottineau Blvd) / 63rd Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
63rd Ave N / Louisiana Ave / Park-and-Ride Access	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	Left-Turn	AM											No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queue does not cause operational or safety issues and clears each signal cycle.
			PM					X				X					
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / CSAH 10 (Bass Lake Rd)	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 10 (Bass Lake Rd) / Sherburne Ave	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / Wilshire Blvd	NB	-												-	-	-	-
	EB	Left/ Through	AM											Yes	95th percentile queues can impact upstream interection.	Yes	Restriping and signal timing changes will be made to increase capacity for EB left-turn.
			PM									X					
	SB	-												-	-	-	-
	WB	-												-	-	-	-
Wilshire Blvd / Lakeland Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / Corvallis Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / Welcome Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / Vera Cruz Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / 45½ Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / CSAH 9 (42nd Ave N)	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 81 (Bottineau Blvd) / CSAH 9 (42nd Ave N)	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 9 (42nd Ave N) / Hubbard Ave N[1]	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 9 (42nd Ave N) / Regent Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / 41½ Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
Hubbard Ave / 41½ Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
41st Ave N / Hubbard Ave	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
CSAH 8 (W Broadway Ave) / 41st Ave N	NB	-												-	-	-	-
	EB	-												-	-	-	-
	SB	-												-	-	-	-
	WB	-												-	-	-	-
Golden Valley Rd / Theodore Wirth Pkwy	NB	-												-	-	-	-
	EB	Left/ Through	AM											Yes	Average back of queue exceeds 500 feet and movement operates at LOS F.	No	Issue occurs in No Build scenario and the project does not cause a significant change.
			PM							X		X					
	SB	-												-	-	-	-
	WB	-												-	-	-	-

Analysis Notes:

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Queuing Issues

-

		Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?		Mitigation Proposed?	
				2014	2021		2040					
				Existing Conditions	No Build02	Build	No Build	Build				
Intersection	Appr											
TH 55 (Olson Memorial Hwy) / Thomas Ave N	EB	-	-	-	-	-	-	-	-	-	-	-
	SB	Left-Turn/ Right-Turn	AM		X		X		Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM	X	X		X	X				
	WB											
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Russell Ave	EB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / CSAH 2 (Penn Ave N)	NB								-	-	-	-
	EB	Left-Turn	AM						Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs only in Existing and No Build conditions. Build project improvements reduce the queuing.
			PM		X		X					
		Through/ Right-turn	AM		X		X		Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	
			PM	X	X		X					
	SB	Left-Turn	AM						Yes	Movement operates at LOS E or worse but average back of queue does not exceed storage length.	No	Build project includes creation of a left-turn lane. Length of the turn lane has been limited to minimize impacts on parking and adjacent property.
			PM					X				
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of Oliver Ave N	EB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Morgan Ave N	NB	-	-						-	-	-	-
	EB	-	-						-	-	-	-
	SB	Left-turn/ Through/ Right-Turn	AM	X	X	X	X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM	X	X	X	X	X				
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / James Ave N	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Pedestrian Crossing East of James Ave	EB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Humboldt Ave N	NB	Left-turn/ Through/ Right-Turn	AM	X	X	X	X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM	X	X	X	X	X				
	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Van White Memorial Blvd	NB	Through/ Right-turn	AM	X	X	X	X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM	X	X	X	X	X				
	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / Bryant Ave N	NB	Left-turn/ Through/ Right-Turn	AM	X	X	X	X	X		Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM	X	X	X	X	X				
	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / I-94 EB Ramps (W Lyndale Ave N)	EB	-	-						-	-	-	-
	SB	Left-Turn	AM		X			X	Yes	Average back of queue does not exceed storage length but movement operates at LOS E or worse.	No	Issue occurs in Existing and No Build conditions, and the Build conditions do not cause a significant change.
			PM									
		Through	AM		X		X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	
			PM									
		Right-Turn	AM	X	X		X	X	Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	
			PM									
	WB	-	-						-	-	-	-
TH 55 (Olson Memorial Hwy) / I-94 WB Ramps (E Lyndale Ave N)	NB	-	-						-	-	-	-
	EB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
Olson Memorial Hwy / Border Ave	NB	-	-						-	-	-	-
	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-
Olson Memorial Hwy / 7th St N/6th Ave N	NB	-	-						-	-	-	-
	EB	-	-						-	-	-	-
	SB	-	-						-	-	-	-
	WB	-	-						-	-	-	-

Storage Length for through lanes is measured to the nearest upstream full access public intersection, unless otherwise noted.

Appendix F
Supporting Technical Reports

F.3 Visual Quality Technical Report

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Visual Quality Technical Report

June 2016

Blue Line Extension Project Technical Report

METROPOLITAN COUNCIL

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Executive Summary

This Visual Quality Technical Report has been prepared in support of the Final Environmental Impact Statement (Final EIS) for the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project. The proposed BLRT Extension project is located in Hennepin County, Minnesota, extending approximately 13 miles from downtown Minneapolis to the northwest serving north Minneapolis and the suburbs of Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. The light rail transit (LRT) is anticipated to serve a broader area to the northwest, including the communities of New Hope, Brooklyn Center, Maple Grove, Osseo, Champlin, and Dayton.

The purpose of the proposed BLRT Extension project is to provide transit service which will satisfy the long-term regional mobility and accessibility needs for businesses and the traveling public. The proposed BLRT Extension project is needed to effectively address long-term regional transit mobility and local accessibility needs while providing efficient, travel-time competitive transit service that supports economic development goals and objectives of local, regional, and statewide plans.

The methodology used to evaluate aesthetics and visual quality impacts of the proposed BLRT Extension project is based on the federal guidelines provided in the Federal Highway Administration (FHWA) Guidelines for the Visual Impact Assessment of Highway Projects (FHWA, 2015), which outlines the four phases used to assess visual impacts: establishment; inventory; analysis; and mitigation.

For the purposes of this visual and aesthetics resource analysis, the proposed BLRT Extension project corridor was divided into four landscape units (Minneapolis, Golden Valley, Robbinsdale/ Crystal, and Brooklyn Park). Potential aesthetic impacts resulting from implementation of the proposed BLRT Extension project were determined based on direct field observation from multiple vantage points; evaluation of existing visual character; and review of BLRT Extension project plans and features. Visual impact assessment was based on direct field observation from multiple vantage points, including from neighboring properties and roadways; evaluation of existing visual character; and review of proposed BLRT Extension project plans and features. Visual impact assessment was also based on photographic documentation of several key views of the proposed BLRT Extension project corridor.

This resulting aesthetics and visual resources analysis focuses on proposed BLRT Extension project features that would have direct impacts on the proposed BLRT Extension project corridor by changing the character of the existing visual quality of the landscape. The analysis concluded that the proposed BLRT Extension project would not result in a substantial change to the visual character of the corridor as a whole, and neutral effects on visual quality are anticipated to result from project implementation along most segments. However, adverse effects on visual quality would occur in some areas, such as where the existing vegetated center median of Olson Memorial Highway (Trunk Highway 55) would be modified or removed. Additionally, adverse effects on visual quality would occur in areas where recreational and residential uses are located along or in the vicinity of the proposed BLRT Extension project corridor. At locations where adverse visual effects are anticipated, transitway elements added to the rail corridor may be visually screened or softened using landscaping where adequate space permits, and in general, the loss of vegetation

would be replaced with vegetation of a similar type where feasible. Where new physical features of the transitway are introduced, strategies to screen or soften the view would be implemented.

Neutral impacts are anticipated as a result of station and traction power substation (TPSS) construction. Stations would be designed to be aesthetically attractive and to complement their surroundings. Additionally, TPSSs would be designed to be compatible with their surroundings, and may incorporate landscaping and/or other built features such as walls or fencing to minimize visual intrusion as appropriate. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems, which could alter the visual quality and character of the view for sensitive view groups. Coordination with stakeholders would continue throughout the proposed BLRT Extension project design process for stations and also to address the siting of TPSSs to maintain neutral visual impacts. This process many include development of additional visual screening as required. To further minimize visual quality impacts of TPSS siting, the siting would be customized for each location based on the context of each facility in relation to adjacent properties and resources.

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1 Introduction

1.1 Project Background

This Visual Quality Technical Report has been prepared in support of the Final Environmental Impact Statement (Final EIS) for the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project. The purpose of the proposed BLRT Extension project is to provide transit service which will satisfy the long-term regional mobility and accessibility needs for businesses and the traveling public. The proposed BLRT Extension project is needed to effectively address long-term regional transit mobility and local accessibility needs while providing efficient, travel-time competitive transit service that supports economic development goals and objectives of local, regional, and statewide plans.

The Draft Environmental Impact Statement (Draft EIS) was completed in 2014 (March). In support of the Draft EIS, the *Bottineau Transitway Technical Report: Visual Quality* (September 2012) was prepared to analyze the project alternatives under consideration in the Draft EIS. The objective of this Final EIS Visual Quality Technical Report is to evaluate the proposed BLRT Extension project's potential effects on visual quality within the study area for the proposed BLRT Extension project, including:

- The effect of the proposed BLRT Extension project on the character of the natural visual features of the study area;
- The effect of the proposed BLRT Extension project on the character of the built visual features of the study area; and
- The effect of the proposed BLRT Extension project as visually perceived by the affected population in the study area.

1.2 Definition of Terms

1.2.1 Visual Features

The term *visual features* refers to the components of the natural, built, or project environments that are capable of being seen, as described in further detail below.

- **Natural Visual Features** include the land, water, vegetation, and animals that compose the natural environment. Although natural features may have been altered or imported by people, features which are primarily geological or biological in origin are considered natural.
- **Built Visual Features** include the buildings, structures, and artifacts that compose the surrounding built environment, also known as the cultural environment. These are features which were constructed by people.
- **Project Visual Features** include the geometrics, structures, and fixtures that compose the project environment. These are the constructed features which would be placed in the environment as part of the proposed BLRT Extension project.

1.2.2 Visual Quality

The term *visual quality* refers to what viewers like and dislike about the visual features that compose a particular scene. Visual quality is inherently subjective—different viewers may evaluate visual features differently. In general, people respond favorably to scenes that create a sense of perceived harmony, order, and coherence.

Based on the developed urban and suburban context of the proposed BLRT Extension project study area, specific features were identified as *higher-quality visual features* when they exemplified one of the following characteristics:

- A remnant natural feature exemplary of pre-settlement conditions;
- A visually distinct natural or built feature that stands out from the surroundings and which contributes physically and symbolically in a positive way to the overall community's visual quality; or
- A natural or built feature that is an integral component of the broader physical pattern of the community and is generally regarded positively.

1.2.3 Affected Population

The term *affected population* is defined as the viewers who occupy land adjacent to the proposed BLRT Extension project—in either the long or short terms. These people can be characterized by their association with a specific adjacent land-use, including residential, commercial, industrial, agricultural, recreational, and institutional parcels. An example of a long-term viewer would be a homeowner with property along the transitway. An example of a short-term viewer would be a runner using a trail in a park adjacent to the transitway.

1.2.4 General Visual Context

The term *general visual context* is the appearance of the nearby surroundings from the vantage point of a person from ground level; i.e., as one would perceive it from a car, train, bus, bicycle, or on foot. The proposed BLRT Extension project passes through developed urban and suburban areas with a wide range of development patterns. In **Section 4.2 – Landscape Units and Viewshed**, a brief description of the general visual context of each area is provided as a basis for understanding the identified effects on specific visual features.

2 Assessment Methodology

The methodology used to evaluate aesthetics and visual quality impacts is based on the Federal Highway Administration's (FHWA) *Guidelines for the Visual Impact Assessment of Highway Projects* (January 2015), which outlines the four phases used to assess visual impacts. The four phases are establishment, inventory, analysis, and mitigation, as described in detail below.

- **Establishment:** The primary purpose of the establishment phase is to define the study area. The establishment phase is documented in **Chapter 3 – Proposed BLRT Extension Project Location and Description**, which defines the proposed BLRT Extension project's visual character, and **Chapter 4 – Existing Conditions**, which defines the proposed BLRT Extension project's study area, including viewsheds and landscape units.
- **Inventory:** The purpose of the inventory phase is to examine visual quality, or the relationship between viewers and their environment. The inventory phase is documented in **Chapter 4 – Existing Conditions**, which describes the affected environment and visual quality of the study area.
- **Analysis:** The purpose of the analysis phase is to evaluate impacts on visual quality. The analysis phase is documented in **Chapter 5 – Visual Impact Assessment**, which assesses the changes to visual quality as a result of the proposed BLRT Extension project implementation, including a review of project features as seen from several key views.
- **Mitigation:** The purpose of the mitigation phase is to define the mitigation and enhancement efforts to be included in proposed BLRT Extension project design. The mitigation phase is documented in **Chapter 6 – Conclusions and Recommendations**, which outlines the mitigation measures to be implemented during proposed BLRT Extension project construction and operation.

2.1 Visual Character and Quality

The visual impacts of a proposed project are determined by assessing the visual resource changes that would occur as the result of the project and by predicting viewer response to those changes. Visual resource change is the sum of the change in visual character and the change in visual quality. This change can be determined by assessing the compatibility of the proposed project with the visual character of the existing landscape, and then comparing the visual quality of the existing resources with projected visual quality after implementation of the proposed project.

Visual character is descriptive and non-evaluative, which means it is based on defined attributes that are neither good nor bad themselves. A change in visual character cannot be described as having good or bad attributes until it is compared with the viewer response to that change. Both natural and artificial landscape features contribute to the visual character of an area or view.

Visual quality is the value viewers place on the existing visual character of the affected environment based on their visual preferences. FHWA outlines the following three aspects of visual perception, which determine the visual quality of a particular scene.

- When viewing the components of a scene's natural environment, viewers inherently evaluate the natural harmony of the existing scene, determining if the composition is harmonious or inharmonious.
- When viewing the components of the cultural environment, viewers evaluate the scene's cultural order, determining if the composition is orderly or disorderly.
- When viewing the project environment, viewers evaluate the coherence of the project components, determining if the project's composition is coherent or incoherent.

According to FHWA guidelines, people typically perceive the landscape from or to a linear transportation feature as a composition, and the more the composition meets their visual preferences and expectations, the more they like it. The more they like it, the more memorable, or vivid, it becomes. Therefore, it is useful to evaluate whether the new composition will be as vivid as the existing one, and whether the improvements have enhanced or detracted from the original scene.

2.1.1 Viewer Groups

The population affected by the proposed project is referred to as viewers. Viewer response is composed of two elements: viewer sensitivity and viewer exposure. These elements combine to form a method of predicting how a viewer might react to visual changes brought about by a project. Viewer sensitivity is defined both as the viewers' concern for scenic quality and the viewers' response to change in the visual resources that make up the view. Viewer exposure is typically assessed by measuring the number of viewers exposed to the resource change, the type of viewer activity, the duration of the view, the speed at which the viewer moves, and the position of the viewer.

Low viewer sensitivity results when there are few viewers who experience a defined view, or when they may be less focused on the view, such as a freeway commuter on the freeway. Low viewer sensitivity is also related to viewer expectations resulting from what viewers are used to seeing along the corridor. For example, because a portion of the proposed BLRT Extension project corridor has historically been a rail corridor, viewers are accustomed to seeing rail as a dominant visual feature in the landscape in those areas. High viewer sensitivity results when there are many viewers who have a view of frequent or long duration. High viewer sensitivity is also related to familiarity with a view, such as when viewing a resource from a residence, a recreational site, or a commute route. For example, recreational and residential viewers tend to have extended viewing periods and may be more concerned about changes in views.

The study area for the proposed BLRT Extension project includes several types of viewer groups, such as light rail transit (LRT) users, roadway users, pedestrians, residents, workers, and recreational users, as described in further detail below.

- **LRT users:** LRT users include both occasional and frequent (e.g., commuters) passengers on rail lines utilizing the proposed BLRT Extension project corridor. Single views for LRT users are typically of short duration. LRT users who frequently travel a route generally possess low to moderate visual sensitivity to their surroundings, as the passing landscape becomes familiar. Also, LRT users may be less focused on the passing views and more focused on activities such as reading or use of electronic devices.
- **Roadway Users:** Roadway users include both routine (e.g., commuters) and occasional (e.g., recreational) travelers through the proposed BLRT Extension project corridor. Roadway users travel at varying speeds due to differences in the mode of transportation used (vehicles, bicycles, etc.), topography of the route, the traveler's familiarity with the route, and roadway and weather conditions. Single views for roadway users are typically of short duration. Roadway users are generally assumed to have moderate levels of sensitivity due to the typically short-term exposure to changes. Roadway users who frequently travel a route generally possess low to moderate visual sensitivity to their surroundings, as the passing landscape becomes familiar. Also, roadway users may be less focused on the passing views and more focused on roadway conditions.
- **Parkway Users:** The study area for the proposed BLRT Extension project also includes a unique category of roadway users: Grand Rounds Users, which are a combination of the routine (e.g., commuters) and occasional (e.g., recreational) travelers described above. The Grand Rounds National Scenic Byway, a linked series of park areas in Minneapolis, is part of the Federal Highway Administration's National Scenic Byways Program,[1] According to the Minneapolis Park and Recreation Board, Grand Rounds users are not truly "roadway users" because the Grand Rounds was developed and is managed as a pleasure-driving loop with a focus on scenic attributes; speeds are slower and the intended experience is park-like, and not transportation-focused. Yet these users are also not just "recreational users" because they are not seeking the same natural experience.
- **Pedestrians:** Pedestrians include individuals who are traveling on foot along or in the vicinity of the proposed BLRT Extension project corridor. Pedestrians may include individuals traveling to and from residences, schools, places of employment, retail centers, transportation facilities, etc. Pedestrians are generally assumed to have higher levels of viewer sensitivity due to the typically long-term exposure to changes in the environment.
- **Residents:** Residents include individuals whose homes are located along or in the vicinity of the proposed BLRT Extension project corridor. Residential viewers are generally assumed to have higher levels of viewer sensitivity due to a concern for their home environment and typically long-term exposure to changes in that environment. Residents may have moderately high viewer sensitivity because they are likely to place a high value on their local visual resources and to be more sensitive to changes in views.

[1] The US Department of Transportation, Federal Highway Administration oversees the National Scenic Byways Program, which helps recognize, preserve and enhance selected roads throughout the US National Scenic Byways are recognized based on one or more archaeological, cultural, historic, natural, recreational, and/or scenic qualities. The Grand Rounds National Scenic Byway is eligible for the National Register of Historic Places.

- **Business Owners:** Business owners include individuals whose business and/or work activities are located along or in the vicinity of the proposed BLRT Extension project corridor. Business owners are generally assumed to have lower levels of viewer sensitivity to a work environment. Viewer sensitivity is moderate among business owners, as they are typically less focused on the visual resources surrounding their business, and therefore are less sensitive to changes in views. However, depending on the nature of the business, some business owners may place a higher value on the visual resources surrounding their business, especially if the business is focused on the use or enjoyment of a natural or peaceful setting.
- **Workers:** Workers include individuals whose place of employment or work activities are located along or in the vicinity of the proposed BLRT Extension project corridor. Workers are generally assumed to have lower levels of viewer sensitivity to a work environment, as they are typically less focused on the visual resources surrounding their workplace, and therefore are less sensitive to changes in views.
- **Recreational Users:** The proposed BLRT Extension project corridor passes through or near several park and trail areas, and recreational users in these areas may include walkers/joggers, bikers, and nature viewers. Recreational viewers are generally assumed to have higher levels of viewer sensitivity due to a particularly focused interest in scenic quality. Viewer sensitivity is moderately high among recreational users because they are more likely to place a high value on the natural environment and to be more sensitive to changes in views.

2.1.2 Levels of Visual Impact

According to FHWA guidelines, impacts are defined as either changes to the environment, measured by the compatibility of the impact, or changes to viewers, measured by sensitivity to the impact. Together, the compatibility and sensitivity determine the degree of the impact, which is defined as a beneficial, adverse, or neutral change to visual quality. For example, a project may benefit visual quality by enhancing visual resources and/or views and improving the experience of visual quality. Similarly, a project may adversely affect visual quality by degrading visual resources or obstructing or altering desired views.

2.1.3 Assessing Visual Change

The visual impacts of the proposed BLRT Extension project were determined by evaluating the changes to existing visual resources that would occur as a result of the proposed BLRT Extension project implementation, and assessing the anticipated viewer response to those changes. Aesthetic impacts resulting from the proposed BLRT Extension project implementation were determined based on direct field observation from multiple vantage points, including from neighboring properties and roadways; evaluation of existing visual character; and review of proposed BLRT Extension project plans and features. Visual impact assessment was also based on photographic documentation of several key views of the proposed BLRT Extension project corridor. Key views are described in future detail below in **Chapter 5 – Visual Impact Assessment**. Key views represent specific locations within a landscape unit from which the proposed BLRT Extension project would be visible. Within the landscape unit, key views are used to characterize the existing visual conditions and to represent examples of visual character and visual quality. They are also used to determine impacts by demonstrating how the proposed BLRT Extension project would change views within the landscape unit.

3 Proposed BLRT Extension Project Location and Description

3.1 Proposed BLRT Extension Project Location

The proposed BLRT Extension project is located in Hennepin County, Minnesota, extending approximately 13 miles from downtown Minneapolis to the northwest, serving north Minneapolis and the suburbs of Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. **Figure 1** illustrates the proposed BLRT Extension project area. Key transportation facilities within the proposed BLRT Extension project area include Interstate Highway 94 (I-94), Olson Memorial Highway (Trunk Highway [TH] 55), TH 100, TH 610, Bottineau Boulevard (County Road 81), West Broadway Avenue (County State-Aid Highway [CSAH] 103), the BNSF Railway (BNSF) corridor, the Canadian Pacific Railway (CP) corridor, and Crystal Airport.

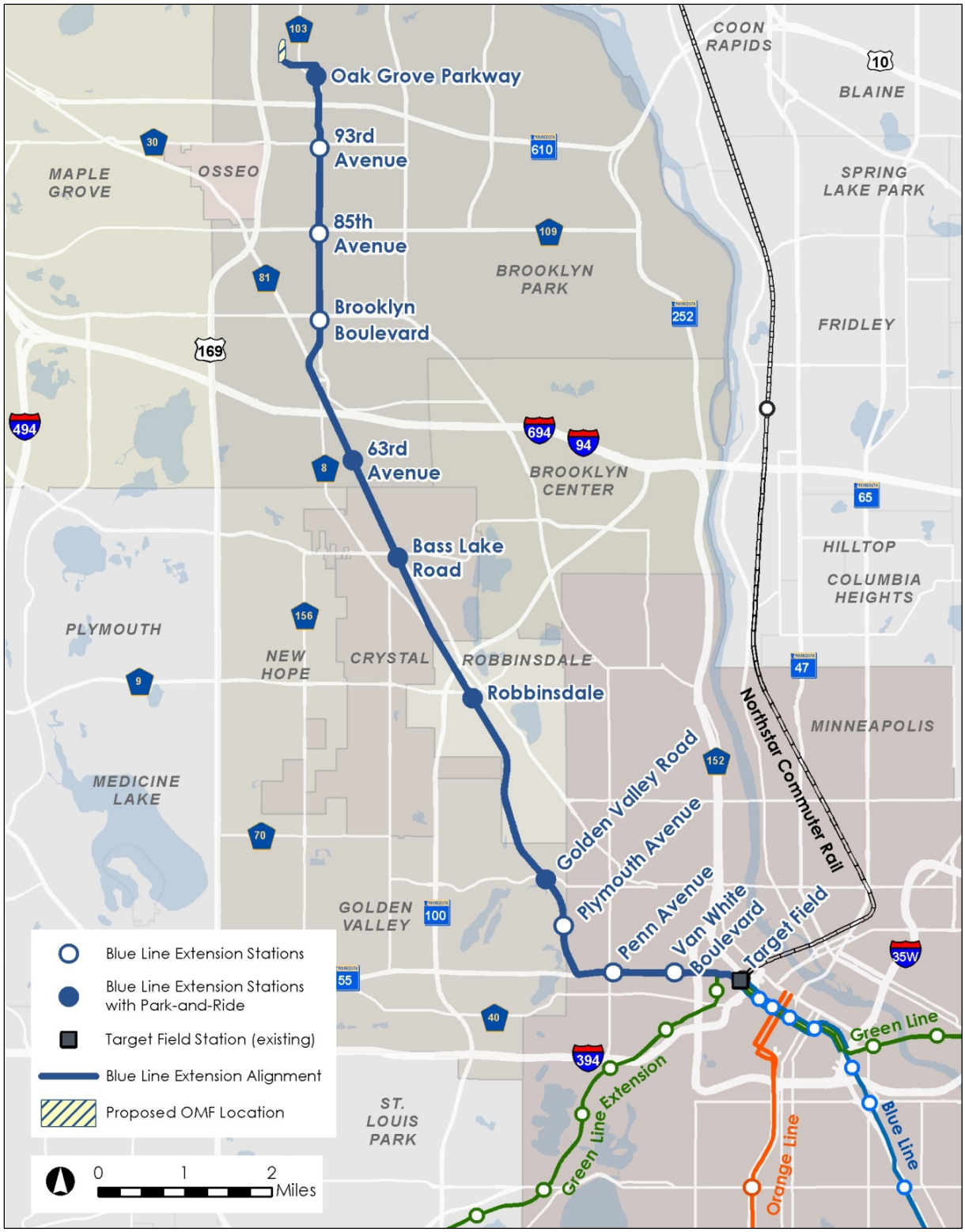
3.2 Proposed BLRT Extension Project Setting

The character of the area surrounding the proposed BLRT Extension project transitions from downtown Minneapolis to a moderately dense urban setting in north Minneapolis and then to a less dense suburban setting starting in the cities of Golden Valley, Robbinsdale, and Crystal, and extending through the City of Brooklyn Park at the north end of the corridor. The proposed BLRT Extension project area includes a variety of land use patterns that have been influenced by the transportation-oriented history of the corridor. Low-density, auto-oriented land uses have heavily influenced existing development patterns in the corridor, which primarily reflect highway-oriented regulations and traditional suburban development forms. Additionally, the presence of the existing railway lines influenced the development patterns and settings in much of the proposed BLRT Extension project corridor (e.g., development set back from the railroad right-of-way).

Much of the proposed BLRT Extension project area, in particular the Golden Valley area, includes substantial park setting along the proposed BLRT Extension project corridor. These areas are primarily located to the west of downtown Minneapolis, between the intersection of Olson Memorial Highway with Theodore Wirth Regional Park and continuing through Golden Valley.

Existing development in north Minneapolis and Robbinsdale reflects the history of West Broadway Avenue as a commercial streetcar corridor, with strips of auto-oriented commercial activity developed more recently. Residential neighborhoods are located along the proposed BLRT Extension project in the cities of Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. In Brooklyn Park south of 73rd Avenue and in northern Crystal, development adjacent to the proposed BLRT Extension project includes highway-oriented commercial activity and the Crystal Airport. In the City of Brooklyn Park north of 73rd Avenue, development adjacent to West Broadway Avenue includes mixed commercial and retail, commercial office/corporate campus (Target North Campus), residential, and institutional use (North Hennepin Community College and Hennepin County Library under construction). Several activity centers are located along the corridor, including downtown Minneapolis, Theodore Wirth Regional Park, downtown Robbinsdale, the Crystal Shopping Center, the City of Brooklyn Park commercial strip, and North Hennepin Community College. In addition, large commercial developments with substantial employment concentrations are anticipated by 2040 in the City of Brooklyn Park (surrounding the Target North Campus north of TH 610).

Figure 1. Proposed BLRT Extension Project



3.3 Proposed BLRT Extension Project Description

The proposed BLRT Extension project corridor begins at the Target Field Station in downtown Minneapolis and follows Olson Memorial Highway to just west of Thomas Avenue where it enters the BNSF rail corridor. Adjacent to the freight rail tracks, it continues in the rail corridor through the cities of Golden Valley, Robbinsdale, Crystal, and enters the City of Brooklyn Park. In portions of the Golden Valley area, the existing freight rail tracks would be relocated. As a result, in some areas, the new freight rail tracks would be closer to the corridor's parks. The corridor then crosses Bottineau Boulevard at 73rd Avenue to West Broadway Avenue and terminates just north of TH 610 near the Target North Campus.

The proposed BLRT Extension project includes seven new LRT bridges: a 350-foot-long crossing of the Hennepin Energy Recovery Center (HERC) driveway, a 700-foot-long crossing of the ponds immediately north of Golden Valley Road, a 1,250-foot-long crossing of Grimes Pond in Robbinsdale, a 375-foot-long bridge over TH 100, a 1,250-foot-long bridge over the CP rail tracks, a 925-foot-long bridge over the 73rd Avenue/Bottineau Boulevard intersection, and a 300-foot-long bridge over TH 610.

In addition, five roadway bridges would be reconstructed: a 375-foot-long Olson Memorial Highway bridge over the BNSF rail corridor, a 375-foot-long Plymouth Avenue bridge, a 120-foot-long Theodore Wirth Parkway bridge, a 215-foot-long Golden Valley Road bridge, and a 110-foot-long 36th Street bridge. Three additional bridges would require modifications to accommodate LRT: the Olson Memorial Highway bridge over I-94 in the City of Minneapolis, the eastbound Olson Memorial Highway bridge over the BNSF rail corridor, and the Interstate Highway 694 (I-694) bridge over the BNSF rail corridor in the City of Brooklyn Park.

The general elements of the proposed transitway system are the stations, the Operations and Maintenance Facility (OMF), the traction power substations (TPSSs), fare collection, trackway, vehicles, train control, operating frequencies, and noise walls proposed to mitigate noise impacts. These features are summarized below.

- **Stations** – The proposed BLRT Extension project includes 11 new stations at Van White Boulevard, Penn Avenue, Plymouth Avenue, Golden Valley Road, Robbinsdale Road, Bass Lake Road, 63rd Avenue, Brooklyn Boulevard, 85th Avenue, 93rd Avenue, and Oak Grove Parkway. The Golden Valley Road and Plymouth Avenue stations include vertical circulation (elevator) to allow passengers to access the station platforms. The 63rd Avenue Station includes a pedestrian overpass of the rail lines to provide better rider access between the parking ramp and the LRT platform. It is anticipated that station features would also include passenger information displays, lighting, and security systems.
- **Operations and Maintenance Facility** – The OMF site would be located at the north end of the proposed BLRT Extension project corridor in Brooklyn Park. The OMF site was selected based on its proximity to the end of the line, adequate space for the special trackwork required between the mainline track and the facility, and adequate property for the facility (about 10.8 acres). The OMF site would be occupied by a storage and maintenance building that is about 163,000 square feet (SF), surface parking for employees and visitors, trackwork, and

open space. The facility would include areas to store, service, and maintain up to 30 light rail vehicles (LRVs), vehicle washing and cleaning equipment, and office space to accommodate staff who would report for work at this facility. The facility would be equipped to perform daily cleaning and repair activities on the LRVs as they enter and leave revenue service. Scheduled service and maintenance inspections also would be performed in this facility. It is anticipated that OMF features would also include lighting and security systems.

- **Traction Power Substations** –A total of 17 potential TPSS locations have been identified along the proposed BLRT Extension project corridor. The TPSS locations are represented by areas with a 300-foot diameter. These areas would be refined through more-detailed engineering to minimize impacts to surrounding properties and resources and to balance safety, reliability, cost, and operational efficiencies. TPSS sites, once located, would be about 4,000 SF and able to accommodate a single-story building about 40 feet by 20 feet. Access to the building must also be accommodated. It is anticipated that most TPSS sites would be located within existing transportation right-of-way.
- **Fare-Collection System** – A self-service, proof-of-payment fare-collection system was assumed for the proposed BLRT Extension project, consistent with that used on the other regional transitways today. A proof-of-payment fare-collection system minimizes the right-of-way needed for each station.
- **Trackway** – LRVs would operate on standard-gauge rail. The proposed system would be double-tracked throughout to provide separate tracks for northbound and southbound trains. Crossovers to allow trains to cross from the northbound to the southbound tracks would be provided at regular intervals for special operations or emergencies. Typically, the trackway in the BNSF rail corridor would be ballasted track separate from the freight rail track. Alignments in streets would be either ballasted or embedded depending on the location and the context of the street.
- **Vehicles** – The conceptual engineering to support the Final EIS assumes the following LRV characteristics:
  - Articulated train cars could operate in either directional and could be operated as a single-unit or multi-unit train.
  - Cars would be designed for use with an overhead catenary system.
  - Each car would have 66 seats and capacity for 160 passengers (sitting and standing).
  - Two- to three-car trains would operate at speeds up to 55 miles per hour (mph).
  - Cars would be fully compatible with Americans with Disabilities Act (ADA) standards.
- **Train Control** – An operator would occupy each train and would have control over acceleration and braking as well as operating the passenger doors. Automated systems would inform the operator of various train and transitway operating conditions and would manage traffic signal priority, activation of crossing gates, and track switch operations.
- **Operating Frequencies** – The Final EIS assumes that trains would operate at 10-minute frequencies for weekday operations.

- **Noise Walls** – The proposed BLRT Extension project would also include the construction of noise walls in locations where such features have been determined feasible to mitigate for noise impacts. The proposed noise walls are located primarily in the more dense residential sections of the cities of Robbinsdale and Crystal. Noise wall design details would be refined during final project design activities, but it is anticipated that noise walls may be a maximum of 8 feet tall.

4 Existing Conditions

4.1 Study Area

The study area is defined as the right-of-way for the proposed BLRT Extension project corridor and the adjacent properties with a visual connection to the transitway, which include residential, commercial, and park properties. In select instances, the extent of analysis was expanded to account for specific features that were visible by field observation along the proposed transitway as a result of topography, physical scale, architectural distinction, or other considerations.

The study area includes a diverse array of development patterns, parks and natural areas, railroads, highways, and local roadways. A summary of the general visual context and a listing of identified higher-quality and unique visual features are provided below.

4.2 Landscape Units and Viewshed

A landscape unit is a portion of the regional landscape. These units are commonly used to divide long linear projects into logical geographic entities for assessment purposes. Landscape units generally are made up of areas with similar visual characteristics, although smaller locations within each landscape unit may differ from the overall unit's character. For the purposes of this visual quality analysis, the study area is divided into four landscape units: Minneapolis, Golden Valley, Robbinsdale/Crystal, and Brooklyn Park. The limits of the four landscape units are shown in **Figure 2**, and are described in detail below, in the discussion of each landscape unit.

A viewshed is a subset of a landscape unit; this subset is comprised of all the surface areas visible from an observer's viewpoint. The limits of a viewshed are defined as the visual limits of the views located from the proposed BLRT Extension project. The viewshed also includes the locations of viewers likely to be affected by visual changes resulting from the addition of proposed BLRT Extension project features. The study area for the proposed BLRT Extension project includes the areas that could potentially have views of the proposed BLRT Extension project features and the areas which LRT users could potentially view as they travel through the landscape.

4.2.1 Minneapolis Landscape Unit

The Minneapolis Landscape Unit is bound by Target Field to the east, and by the Minneapolis/ Golden Valley city limits to the west (see **Figure 2**).

Figure 2. Landscape Units

4.2.1.1 General Visual Context

The Minneapolis Landscape Unit runs along Olson Memorial Highway between downtown Minneapolis and the Golden Valley city limits. In the vicinity of Target Field in downtown Minneapolis, 7th Street branches into one-way outbound 7th Street and one-way inbound 10th Street. Northeast of the Target Field Station at 5th Avenue, 6th Avenue realigns to the street grid of the North Loop section of downtown. The taller buildings of downtown Minneapolis are visible in the near distance. Between Target Field and I-94, industrial and civic buildings line the route, and there is little greenery. The intersection of Olson Memorial Highway, 6th Avenue, and 7th Street is a skewed configuration and a visually challenging area to navigate. Along Olson Memorial Highway between I-94 and the bridge over the BNSF rail corridor, homes in the adjacent residential neighborhoods generally face inward to the local streets and do not face Olson Memorial Highway directly. Some multi-family residential buildings ranging from two to six stories do have some units facing the highway. On the south side of Olson Memorial Highway, Harrison Park includes ball fields and a community center building. Additionally, several civic buildings and spaces have prominent locations.

As part of the *Minneapolis Near Northside Master Plan* (May 2000), Olson Memorial Highway was envisioned as a "gateway" corridor, in that it passes through the center of the Master Plan area and is being redesigned to create a formalized green gateway to downtown Minneapolis. The redesigned roadway would also contribute to a safer, enhanced pedestrian environment. The plan also acknowledged the redesign would permit future implementation of LRT within the median island. Since the plan's adoption, a number of improvements have been implemented, including new boulevard and median tree plantings to complement the mature trees along the south frontage road.

4.2.1.2 Higher-Quality Visual Features

Section 1.1.1.2 – Visual Quality outlines the characteristics that a feature would exemplify in order to be considered a "higher-quality visual feature." Based on the developed urban and suburban context of the study area, the following features of the Minneapolis Landscape Unit were identified as higher-quality visual features:

- Ford Building
  - Located at the northeast corner of the intersection of 5th Street and 5th Avenue, the recently redeveloped historic ten-story building has a brick façade with large window openings and a recently renovated primary entrance oriented towards the parking lot off 5th Avenue.
- HERC site landscaping
  - Located at the southeast corner of 6th Avenue and 7th Street, this landscaped area stands out because there is very little other vegetation in the vicinity.
- Metro Transit headquarters
  - Located at the corner of 6th Avenue and 7th Street, the five-story modern building has a brick, metal, and glass façade.

- Boulevard and median trees along Olson Memorial Highway west of I-94
  - Linear rows of trees frame the roadway corridor. They are a mixture of mature and newly planted trees, which reinforces the city's desired "gateway" character for the roadway.
- Sumner Library
  - Located at the northwest corner of Olson Memorial Highway and Van White Memorial Boulevard, the historic two-story building, on the National Register of Historic Places, has prominent gabled roof peaks and a brick façade that faces Olson Memorial Highway.
- Seed Academy and Wayman African Methodist Episcopal (AME) Church
  - Located on the north side of Olson Memorial Highway east of Humboldt Avenue, the historic, multi-purpose building has a two-story brick façade with a mosaic appearance.
- Zion Baptist Church
  - Located on the north side of Olson Memorial Highway just west of Logan Avenue, the building is a modern three-story brick and glass structure.
- Floyd B. Olson Memorial Statue
  - Located on the south side of the Olson Memorial Highway just east of the Penn Avenue intersection, a small plaza surrounds an approximately 10-foot-tall historic figural stone sculpture of Floyd B. Olson, Minnesota's 22nd Governor from 1931 to 1936.
- Harrison Neighborhood gateway sculptures
  - Located on the south side of Olson Memorial Highway at the Penn Avenue intersection, these artistic gateway features are approximately ten feet tall and are topped with figural sculptures of children and colorful symbols.

4.2.2 Golden Valley Landscape Unit

The Golden Valley Landscape Unit is generally bound by the Minneapolis/Golden Valley city limits to the east, and by the Golden Valley/Robbinsdale city limits to the north; however, this landscape unit also includes the southern portion of the City of Robbinsdale (see **Figure 2**).

4.2.2.1 General Visual Context

The Golden Valley Landscape Unit runs along the edge of the Minneapolis and Golden Valley city limits, in the eastern 50 feet of the total 100-foot-wide BNSF right-of-way alongside the BNSF tracks. At the Olson Memorial Highway bridges over the BNSF right-of-way, the transitway would shift away from the center median of Olson Memorial Highway and turn north under westbound Olson Memorial Highway and continue northward along the Golden Valley and Minneapolis city limits. Through 36th Avenue, the transitway would be depressed in relation to the surroundings with wooded embankments on both sides. Adjacent land uses primarily include residential neighborhoods and public parkland.

While some of the residential areas are secluded from the rail corridor by wider vegetative buffers, others are in closer proximity or have less vegetative buffer such as along the eastern edge on Indiana Avenue, Kewanee Way, parts of Xerxes Avenue, and the area near the transition to/from

Olson Memorial Highway. Along the western edge of the rail corridor, a linear natural area is comprised of a series of parks that are a natural retreat from the surrounding urban and suburban development including Sochacki Park,[2] South Halifax Park, Glenview Terrace/Valley View Park, and Theodore Wirth Regional Park and Golf Course. Each is described in more detail below. Within Theodore Wirth Regional Park, Bassett Creek meanders through a patchwork of forested areas at the edge of the golf course as it heads south toward Bassett Lake and Olson Memorial Highway.

The railroad right-of-way is also a primary utility corridor. A power substation is located adjacent to the BNSF right-of-way near 34th Avenue. Power lines run along the east or west, or in some areas both, sides of the railroad corridor along the entire length of this landscape unit. The presence of the railroad and utilities through this generally green area environment indicates the natural area has been previously disturbed. However, much of the green area is an intentionally designed landscape by Theodore Wirth, as referenced in the Theodore Wirth Regional Park Cultural Landscape Study prepared by The 106 Group in 2015.

4.2.2.2 Higher-Quality Visual Features

Based on the developed urban and suburban context of the study area, the following features of the Golden Valley Landscape Unit were identified as higher-quality visual features:

- Plymouth Avenue bridge over Bassett Creek and the BNSF rail corridor
  - This bridge was designed with tall slender arching piers, an architectural railing, and decorative lighting. It serves as a gateway feature approaching Theodore Wirth Regional Park on Plymouth Avenue from the east and affords a good vantage point down to the creek from the sidewalk.
- Theodore Wirth Regional Park and Golf Course
  - At 759 acres, Theodore Wirth Regional Park is the largest park in the City of Minneapolis parks system and provides a diverse assortment of recreational opportunities. The park includes two golf courses, Wirth Lake, Birch Pond, and other amenities. Wirth Lake, located in a portion of the park to the south of Olson Memorial Highway, includes a beach area, a boardwalk across the northern portion of the lake, and also offers a variety of water recreation activities. The golf course comprises most of the park area adjacent to the proposed transitway. It is a mixture of open spaces for the tees, fairways, and greens bordered by densely wooded areas. The terrain is varied, ranging from flat in some areas to steeply sloped in others. The wooded area between the BNSF rail corridor and Theodore Wirth Parkway between Golden Valley Road and Plymouth Avenue forms a visual buffer from the active use areas of the park.

[2] In this technical report, the term *Sochacki Park* refers to the park resource managed jointly by the cities of Golden Valley and Robbinsdale, and the Three Rivers Park District. Sochacki Park consists of the former Sochacki Park located in the City of Robbinsdale, and the former Rice Lake Park and former Mary Hills Nature Area located in the City of Golden Valley.

- Bassett Creek and Bassett Lake
  - Bassett Creek flows along the eastern edge of Theodore Wirth Regional Park within the park boundaries, and is partially set within a vegetated area with a mixture of open spaces for the tees. It follows a meandering route that borders several golf holes. In some locations, views of the creek from the course are wide open, and in others the creek is secluded in dense vegetation. Connected with the creek, Bassett Lake is a wider body of water located within Theodore Wirth Regional Park on the north side of Olson Memorial Highway.
- Theodore Wirth Parkway
  - Theodore Wirth Parkway passes through Theodore Wirth Regional Park and crosses over the BNSF right-of-way near Golden Valley Road. It is part of the Grand Rounds National Scenic Byway, which was created for the purpose of scenic pleasure driving. The Grand Rounds was, and is envisioned, designed, and maintained as a facility with high visual quality. This feature is also described in the Theodore Wirth Regional Park Cultural Landscape Study noted above.
- Sochacki Park and South Halifax Park
  - These parks, although under different municipal jurisdictions, are adjacent to each other along the west side of the BNSF right-of-way. They are all densely wooded with a network of paved and unpaved trails.
- Glenview Terrace/Valley View Park
  - Glenview Terrace/Valley View Park is located east of the BNSF rail corridor north of Theodore Wirth Parkway. Near the railroad, it is densely wooded. Moving further east, it transitions to mowed lawn and has tennis courts and a playground.

4.2.3 Robbinsdale/Crystal Landscape Unit

The Robbinsdale/Crystal Landscape Unit is bound by the Golden Valley/Robbinsdale city limits to the south, and by the Crystal/Brooklyn Park city limits to the north (see **Figure 2**).

4.2.3.1 General Visual Context

In the Robbinsdale/Crystal Landscape Unit, the transitway would generally follow the BNSF rail corridor. In some locations, the route would parallel a primary roadway. In other locations, it would be more secluded, running behind commercial and residential areas. South of 36th Avenue, the transitway would pass by Walter Sochacki Park, park situated outside the west embankment of the BNSF right-of-way. Near 36th Avenue, the railroad right-of-way is depressed with steep side slopes to allow clearance under the 36th Avenue bridge. In the segment between 36th Avenue and Noble Avenue, the transitway would be aligned at a skew from the neighborhood street grid, so vantage points would vary. At the edges of the railroad right-of-way, continuous chain link fencing restricts access.

Between Noble/41st Avenue and 42nd Avenue, the transitway would pass along the west edge of downtown Robbinsdale's commercial area. Downtown Robbinsdale is an area primarily comprised of single-story storefront buildings and an enhanced streetscape with brick pavers, decorative

lighting, and other features. Along the edges of the railroad right-of-way, rows of tree cover provide some visual buffer for adjacent residential properties and continuous chain link fencing restricts access. Several neighborhood-scale parks are located adjacent to the transitway in this landscape unit, including Becker Park, Triangle Park, and Lee Park. These parks are characterized by mowed lawn with some tree cover at the edges. Moving north, the transitway would cross over TH 100 and run adjacent to West Broadway Avenue, a lower speed two-lane county roadway. Between TH 100 and 47th Avenue, a handful of mature trees are in a grass median between the railroad and West Broadway Avenue.

The development pattern in this area is comprised of single-story commercial buildings oriented towards Bottineau Boulevard. The transitway would parallel Bottineau Boulevard, a multi-lane divided-median county highway. Along the edges of the railroad right-of-way, rows of tree cover provide some visual buffer for adjacent residential properties. The railroad right-of-way is also a primary utility corridor and includes overhead utility lines and poles.

4.2.3.2 Higher-Quality Visual Features

Based on the developed urban and suburban context of the study area, the following features of the Robbinsdale/Crystal Landscape Unit were identified as higher-quality visual features:

- Sacred Heart Catholic Church
  - Located at the intersection of Hubbard Avenue and 40th Avenue, the prominent church spire rises vertically above all other buildings in the vicinity. Constructed of limestone, the building conveys a strong presence that visually anchors the southern end of downtown Robbinsdale.
- Historic Robbinsdale Public Library
  - Located south of 42nd Avenue and west of the BNSF right-of-way, a single-story library building, on the National Register of Historic Places, houses the Robbinsdale Historical Society and is residential in scale.
- West Broadway Avenue and BNSF railroad bridges over TH 100
  - The West Broadway Avenue and BNSF railroad bridges over TH 100 were designed and constructed in accordance with the Minnesota Department of Transportation's (MnDOT) TH 100 aesthetic design guidelines developed for bridges and other features throughout the corridor.
- Green boulevard on west side of West Broadway Avenue between 47th Avenue and TH 100
  - Mature trees in informal groupings are dispersed throughout a lawn area separating the roadway and railroad.
- Bottineau Boulevard Bridge over CP rail corridor
  - As part of the Bottineau Boulevard Roadway Reconstruction, a new bridge with aesthetic treatments and long approaches supported by retaining walls was constructed.

- City of Crystal gateway area
  - As part of the Bottineau Boulevard Roadway Reconstruction, an architectural gateway monument, landscaping, and decorative lighting were installed at the southwest corner of Bottineau Boulevard and Bass Lake Road to call attention to the entrance to the City of Crystal's primary commercial area to the west. Street trees, landscaping, and decorative lighting extend in both directions along both Bass Lake Road and Bottineau Boulevard.

4.2.4 Brooklyn Park Landscape Unit

The Brooklyn Park Landscape Unit: The landscape unit is bound by the Crystal/Brooklyn Park city limits to the south, and by the OMF to the north (see **Figure 2**).

4.2.4.1 General Visual Context

At the southern end of the Brooklyn Park Landscape Unit, the route would pass under I-94; the development pattern in that vicinity is comprised of single-story commercial buildings oriented towards Bottineau Boulevard.

South of TH 610, the adjacent land use transitions from agricultural to a mix of single-story commercial and light-industrial buildings and single-family residential neighborhoods. The commercial areas have front yards characterized by mowed lawn, trees, and stormwater treatment ponds. The homes face away from West Broadway Avenue, and fences and landscaping visually separate backyards from the roadway. North Hennepin Community College, located in the southeast corner of the West Broadway Avenue and 85th Avenue intersection is comprised of one and two-story buildings organized around a central green space. The perimeter of the campus is dominated by surface parking lots, with two ball fields and a mowed lawn located south of the college.

North of TH 610 up to 101st Avenue, open field agricultural land is the predominant land use with some remnant woodland and grassland areas. The recently constructed Target North Campus with its multi-story buildings is located along Oak Grove Parkway east of West Broadway Avenue and has landscaped grounds characterized by mowed lawn and trees. Future redevelopment with higher-intensity land use is envisioned for the area, which would likely bring a more suburban development pattern with new streets, buildings, parking, and landscaping.

4.2.4.2 Higher-Quality Visual Features

Based on the developed urban and suburban context of the study area, the following features of the Brooklyn Park Landscape Unit were identified as higher-quality visual features:

- I-94 bridge over the BNSF rail corridor and Bottineau Boulevard
  - The I-94 bridge was designed and constructed with aesthetic enhancements that are unique to this bridge and not a consistent theme throughout the I-94 corridor.
- Shingle Creek
  - Views of Shingle Creek where it crosses West Broadway Avenue north of Candlewood Drive soften the predominantly built appearance of the area. East of West Broadway Avenue, the creek is located in a residential area, and has a natural meandering shape edged by tree cover. To the west, the creek is located in a commercial area, has been straightened and there is little tree cover.
- West Broadway Avenue Bridge over TH 610
  - The West Broadway Avenue bridge over TH 610 was designed and constructed in accordance with MnDOT's TH 610 aesthetic design guidelines developed for bridges and other features throughout the corridor.
- Rush Creek Regional Trail
  - The Rush Creek Regional Trail is approximately 10 miles of paved trail linking Elm Creek Park Reserve to Coon Rapids Dam Regional Park. The trail is popular for its wider-than-average trail corridor, which allows the trail alignment to weave gradually, incorporating significant variety in the landscape. The trail is located adjacent to large mowed turf in some areas, and wooded and dense vegetation in other areas.

5 Visual Impact Assessment

5.1 Introduction

As described in **Section 2.1.3 – Assessing Visual Change**, the visual impacts of the proposed BLRT Extension project were determined by evaluating the changes to existing visual resources that would occur as a result of the proposed BLRT Extension project implementation, and assessing the anticipated viewer response to those changes. Visual impact assessment was based on direct field observation from multiple vantage points, including from neighboring properties and roadways; evaluation of existing visual character; and review of proposed BLRT Extension project plans and features. Visual impact assessment was also based on photographic documentation of several key views of the proposed BLRT Extension project corridor.

5.2 Key Views

Visual impact assessment included an evaluation of photographic documentation of several key views of the proposed BLRT Extension project corridor. Key views were selected at critical viewpoints, along commonly traveled routes, or at other likely observation points to document the existing conditions of the study area. For some locations, both an existing condition photograph and a simulated condition drawing are provided. Simulation vantage points were selected to provide representative public views from which the proposed BLRT Extension project components that would be most visible to the various types of sensitive receptors that are anticipated to be located within the landscape units identified for the proposed BLRT Extension project. These locations are noted as key view point (KVP) followed by a figure number.

Analysis of aesthetic impacts resulting from the proposed BLRT Extension project implementation included an evaluation of both the photographic documentation of key views of the proposed BLRT Extension project, as well as the simulation condition drawings which illustrate the proposed BLRT Extension project components from 23 KVP locations. For some KVP locations, more than one view was provided (for example, KVP-7 and KVP-7a), resulting in a total of 27 simulations. KVP locations were selected based on the sensitivity of the resource (e.g., to support the historic resources Section 106 consultation process) or locations of key vertical features of the proposed BLRT Extension project that could potentially change the visual character or views of an affected area.

Each of the 20 KVPs is included on a location map, which consists of a series of aerial photographs depicting the location and direction of each KVP. Each KVP is then represented with a "before the proposed BLRT Extension project" existing condition photograph and a computer-generated sketch-up simulation of the conceptual "after the proposed BLRT Extension project" condition. The computer-generated sketch-up simulations were prepared using digital photographs and computer modeling procedures to represent the visual changes that would result from implementation of the proposed BLRT Extension project. The KVP location maps and photographs are provided in **Appendix A** of this report.

Additional key views were evaluated at three of the locations proposed for noise walls. These locations are noted as noise wall (NW) followed by a figure number. Each of the three NWs is

included on a location map, which consists of an aerial photograph depicting the location and direction of each NW. The NW location map and photographs are provided in **Appendix A** of this report.

5.3 Visual Impact Assessment

The following sections describe the anticipated changes in visual quality and character, within each landscape unit and for each KVP or NW where applicable, as a result of the proposed BLRT Extension project implementation. As described above in **Section 4.2 – Landscape Units and Viewshed**, the proposed BLRT Extension project would pass through four landscape units, for which 23 KVPs were analyzed. It is important to note when assessing KVPs, that seasonal changes and weather patterns typical of the proposed BLRT Extension project area would produce variations to vegetation and ground cover. In order to represent an accurate long-term view of the proposed BLRT Extension project area, in addition to representation of new proposed BLRT Extension project features, visual simulations for the proposed BLRT Extension project represented a simulation of established vegetation. Thus, in the short term, proposed BLRT Extension project features may be more visible when vegetation is young, and, in the long term, proposed BLRT Extension project features may be less visible when vegetation is mature. Therefore, depending upon the timeframe of the view, both seasonal and vegetation variations could result in altered views than those represented in each existing condition and simulated photograph.

5.3.1 No-Build Alternative

The No-Build Alternative reflects existing and committed improvements to the regional transit network for the horizon year of 2040, not including the proposed BLRT Extension project. The No-Build Alternative is based on the Metropolitan Council's (Council) *Thrive MSP 2040 Transportation Policy Plan* (*2040 TPP*). Under the No-Build Alternative, there would be no alteration of the visual quality and character of the proposed BLRT Extension project corridor. Therefore, there would be no visual effects and no mitigation would be required.

5.3.2 BLRT Extension Project Operational Impacts

Overview

Anticipated visual effects during operation of the proposed BLRT Extension project would generally be consistent with existing, similar features, and the proposed BLRT Extension project would not substantially obstruct proposed BLRT Extension project area views or substantially alter the existing visual character of the proposed BLRT Extension project corridor. Additional discussion of operational impacts on the higher-quality visual features identified in **Section 4.2** and other prominent visual features of each of the four landscape units is provided below. A summary of KVP and NW analysis (photographic and simulation analysis) by landscape unit is provided below in **Table 5-1**. A summary of impacts resulting from the addition of primary proposed BLRT Extension project features, as well as impacts on existing higher-quality visual features is provided below in **Table 5-2**.

Table 1. Summary of Photographic Documentation

Landscape Unit	Designation and Description of View	Degree of Visual Change in Quality and Character	Level of Visual Sensitivity
Minneapolis	OMH 1 (view to the west toward Penn Avenue, from center Olson Memorial Highway median)	Altered	Moderate
	KVP 1 (view to the east toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Lake Boardwalk)	Not substantially altered	High
	KVP 2 (view to the east-southeast toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Park Trail)	Altered	High
Golden Valley	KVP 3 (view to the northwest toward the existing BNSF tracks and proposed LRT tracks, from Farwell Avenue and Xerxes Avenue North)	Not substantially altered	Moderately high
	KVP 4a (view to the west toward the proposed Plymouth Avenue Station and bridge, from Plymouth Avenue North and Washburn Avenue North)	Altered	Moderately high
	KVP 4b (view to the south toward the existing BNSF tracks and proposed LRT tracks, from the Plymouth Avenue North bridge)	Altered	Moderate
	KVP 4c (view to the north toward the proposed Plymouth Avenue Station, from the Plymouth Avenue bridge)	Substantially altered	Moderate
	KVP 5 (view to the southeast toward the proposed Plymouth Avenue Station and bridge, from the Theodore Wirth Regional Park Chalet)	Altered	High
	KVP 6a (view to the north toward the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course)	Not substantially altered	High
	KVP 6b (view to the northeast toward Bassett Creek and the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course)	Altered	High
	KVP 7 (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway near the intersection of Zenith Avenue)	Not substantially altered	Moderately high
	KVP 8 (view to the west toward the proposed Golden Valley Road Station, from Golden Valley Road and Theodore Wirth Parkway)	Altered	High
	KVP 8a (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway at Golden Valley Road)	Altered	Moderately high

Table 1. Summary of Photographic Documentation

Landscape Unit	Designation and Description of View	Degree of Visual Change in Quality and Character	Level of Visual Sensitivity
Robbinsdale/ Crystal	KVP 9 (view to the northwest toward downtown Robbinsdale, from 41st Avenue and Hubbard Avenue)	Not substantially altered	Moderate
	KVP 10 (view to the north toward the proposed Robbinsdale Station, from 41st Avenue)	Not substantially altered	Moderate
	KVP 11 (view to the east toward the proposed Robbinsdale Station, from 42nd Avenue)	Not substantially altered	Moderate
	KVP 12 (view to the southeast toward the proposed wall and fence, from the adjacent residential alley)	Altered	Moderately high
	KVP 21 (view to the southeast toward the proposed Bass Lake Road station and pedestrian bridge, from Bottineau Boulevard)	Altered for visual quality; not substantially altered for visual character	Moderate
	KVP 22 (view to the northwest toward the proposed Bass Lake Road station and pedestrian bridge, from the southeast quadrant of the Bass Lake Road/Bottineau Boulevard intersection)	Altered for visual quality; not substantially altered for visual character	Moderate
	KVP 23 (view to the northeast toward the proposed Bass Lake Road pedestrian bridge, from the southwest quadrant of the Bass Lake Road/Bottineau Boulevard intersection)	Altered for visual quality; not substantially altered for visual character	Moderate
Brooklyn Park	KVP 13 (view to the south toward the proposed 63rd Avenue Station, from the trail adjacent to Bottineau Boulevard)	Altered for visual quality; not substantially altered for visual character	Moderate
	KVP 14 (view to the southeast toward the proposed 63rd Avenue Station, from the adjacent neighborhood west of 63rd Avenue)	Altered	Moderately high
	KVP 15 (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from Bottineau Boulevard 81 at 71st Avenue)	Altered for visual quality; not substantially altered for visual character	Moderate
	KVP 16 (view to the northeast toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from 71st Avenue)	Not substantially altered	Moderate
	KVP 17 (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from the southeast corner of Bottineau Boulevard and 71st Avenue)	Altered for visual quality; not substantially altered for visual character	Moderate

Table 1. Summary of Photographic Documentation

Landscape Unit	Designation and Description of View	Degree of Visual Change in Quality and Character	Level of Visual Sensitivity
	KVP 18 (view to the south toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from Bottineau Boulevard at 73rd Avenue)	Altered for visual quality; not substantially altered for visual character	Moderate
	KVP 19 (view to the east toward the proposed OMF, from 101st Avenue)	Substantially altered	Moderate
	KVP 20 (view to the southwest toward the proposed OMF, from Rush Creek Regional Trail)	Substantially altered	Moderately high

For each view described in the table, **Appendix A** includes a "before BLRT Extension project" existing condition photograph and a computer-generated sketch-up simulation of the conceptual "after BLRT Extension project" condition.

Table 2. Summary of Impacts from Primary Project Visual Features and to Higher-Quality Visual Features

Landscape Unit	Description of View, Higher-Quality Visual Feature, or Primary Project Visual Feature	Photographic Documentation[1]	Level of Impact
Minneapolis	OMH 1 (view to the west toward Penn Avenue, from center Olson Memorial Highway median)	OMH 1	Adverse
	KVP 1 (view to the east toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Lake Boardwalk)	KVP 1	Neutral
	KVP 2 (view to the east-southeast toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Park Trail)	KVP 2	Adverse
	Ford Building	Not applicable	Neutral
	HERC Landscaping	Not applicable	Neutral
	Metro Transit Headquarters	Not applicable	Neutral
	Boulevard and median trees along Olson Memorial Highway west of I-94	See photographic documentation of OMH 1 above	Adverse
	Sumner Library	Not applicable	Neutral
	Seed Academy and Wayman AME Church	Not applicable	Neutral
	Zion Baptist Church	Not applicable	Neutral
	Floyd B. Olson Memorial	Not applicable	Neutral
	Harrison Neighborhood gateway sculptures	Not applicable	Neutral
Golden Valley	KVP 3 (view to the northwest toward the existing BNSF tracks and proposed LRT tracks, from Farwell Avenue and Xerxes Avenue North)	KVP 3	Neutral
	KVP 4a (view to the west toward the proposed Plymouth Avenue Station and bridge, from Plymouth Avenue North and Washburn Avenue North)	KVP 4a	Adverse
	KVP 4b (view to the south toward the existing BNSF tracks and proposed LRT tracks, from the Plymouth Avenue North bridge)	KVP 4b	Adverse
	KVP 4c (view to the north toward the proposed Plymouth Avenue Station, from the Plymouth Avenue bridge)	KVP 4c	Adverse
	KVP 5 (view to the southeast toward the proposed Plymouth Avenue Station and bridge, from the Theodore Wirth Regional Park Chalet)	KVP 5	Adverse
	KVP 6a (view to the north toward the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course)	KVP 6a	Neutral

Table 2. Summary of Impacts from Primary Project Visual Features and to Higher-Quality Visual Features

Landscape Unit	Description of View, Higher-Quality Visual Feature, or Primary Project Visual Feature	Photographic Documentation[1]	Level of Impact
	KVP 6b (view to the northeast toward Bassett Creek and the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course)	KVP 6b	Adverse
	KVP 7 (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway near the intersection of Zenith Avenue)	KVP 7	Neutral
	KVP 8 (view to the west toward the proposed Golden Valley Road Station, from Golden Valley Road and Theodore Wirth Parkway)	KVP 8	Adverse
	KVP 8a (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway at Golden Valley Road)	KVP 8a	Adverse
	NW 1a (view to the northwest toward the proposed noise barrier on the east side of the alignment roughly across from the extent of Sochacki Park (the former Mary Hills Nature Area portion)	NW 1a	Potentially adverse
	NW 1b (view to the southeast toward the proposed noise barrier on the east side of the alignment roughly across from the extent of Sochacki Park (the former Mary Hills Nature Area portion)	NW 1b	Potentially adverse
	Plymouth Avenue bridge over Bassett Creek and BNSF rail corridor	See photographic documentation of KVPs 4a, 4b, 4c, and 5 above.	Neutral
	Theodore Wirth Regional Park and Golf Course	See photographic documentation of KVPs 5, 6a, and 6b above.	Adverse
	Bassett Creek and Bassett Creek Lagoons	Not applicable	Adverse
	Theodore Wirth Parkway	See photographic documentation of KVPs 7, 8, and 8a above.	Neutral
	Glenview Terrace/Valley View Park	Not applicable	Neutral
	Sochacki Park and South Halifax Park	Not applicable	Adverse

Table 2. Summary of Impacts from Primary Project Visual Features and to Higher-Quality Visual Features

Landscape Unit	Description of View, Higher-Quality Visual Feature, or Primary Project Visual Feature	Photographic Documentation[1]	Level of Impact
Robbinsdale/ Crystal	KVP 9 (view to the northwest toward downtown Robbinsdale, from 41st Avenue and Hubbard Avenue)	KVP 9	Neutral
	KVP 10 (view to the north toward the proposed Robbinsdale Station, from 41st Avenue)	KVP 10	Neutral
	KVP 11 (view to the east toward the proposed Robbinsdale Station, from 42nd Avenue)	KVP 11	Adverse
	KVP 12 (view to the southeast toward the proposed wall and fence, from the adjacent residential alley)	KVP 12	Adverse
	KVP 21 (view to the southeast toward the proposed Bass Lake Road Station and pedestrian bridge, from Bottineau Boulevard)	KVP 21	Adverse
	KVP 22 (view to the northwest toward the proposed Bass Lake Road Station and pedestrian bridge, from the southeast quadrant of the Bass Lake Road/Bottineau Boulevard intersection)	KVP 22	Adverse
	KVP 23 (view to the northeast toward the proposed Bass Lake Road pedestrian bridge, from the southwest quadrant of the Bass Lake Road/Bottineau Boulevard intersection)	KVP 23	Adverse
	NW 2a (view to the northwest toward the proposed noise barrier from 36th Avenue to 41st Avenue on the east side, and from 36th Avenue to the southern border of Lee Park on the west side)	NW 2a	Neutral (east) or potentially adverse (west)
	NW 2b (view to the southeast toward the proposed noise barrier from 36th Avenue to 41st Avenue on the east side)	NW 2b	Neutral
	NW 3a (view to the northwest toward the proposed noise barrier from West Broadway Avenue to Corvallis Avenue on the east side)	NW 3a	Neutral
	NW 3b (view to the southeast toward the proposed noise barrier toward from West Broadway Avenue to Corvallis Avenue on the east side)	NW 3b	Neutral
	Bass Lake Road pedestrian overpass	See photographic documentation of KVPs 21, 22, and 23 above.	Adverse
	Sacred Heart Catholic Church	Not applicable	Neutral
	Historic Robbinsdale Public Library	Not applicable	Neutral

Table 2. Summary of Impacts from Primary Project Visual Features and to Higher-Quality Visual Features

Landscape Unit	Description of View, Higher-Quality Visual Feature, or Primary Project Visual Feature	Photographic Documentation[1]	Level of Impact
	West Broadway Avenue and BNSF rail bridges over TH 100	Not applicable	Neutral
	Green boulevard on west side of West Broadway Avenue between 47th Avenue and TH 100	Not applicable	Adverse
	Bottineau Boulevard bridge over CP rail corridor	Not applicable	Neutral
	City of Crystal gateway area	Not applicable	Neutral
	Residential neighborhood between Bass Lake Road and 63rd Avenue	See **Appendix A**	Adverse
Brooklyn Park	KVP 13 (view to the south toward the proposed 63rd Avenue Station, from the trail adjacent to Bottineau Boulevard)	KVP 13	Adverse
	KVP 14 (view to the southeast toward the proposed 63rd Avenue Station, from the adjacent neighborhood west of 63rd Avenue)	KVP 14	Adverse
	KVP 15 (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from Bottineau Boulevard 81 at 71st Avenue)	KVP 15	Adverse
	KVP 16 (view to the northeast toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from 71st Avenue)	KVP 16	Neutral
	KVP 17 (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from the southeast corner of Bottineau Boulevard and 71st Avenue)	KVP 17	Adverse
	KVP 18 (view to the south toward the proposed 73rd Avenue/Bottineau Boulevard bridge, from Bottineau Boulevard at 73rd Avenue)	KVP 18	Adverse
	KVP 19 (view to the east toward the proposed OMF, from 101st Avenue)	KVP 19	Adverse
	KVP 20 (view to the southwest toward the proposed OMF, from Rush Creek Regional Trail)	KVP 20	Adverse
	63rd Avenue park-and-ride	See photographic documentation of KVPs 13 and 14 above.	Adverse
	73rd Avenue/Bottineau Boulevard bridge	See photographic documentation of KVPs 15, 16, 17, and 18 above.	Adverse
	OMF	See photographic documentation of KVPs 19 and 20 above.	Adverse

Table 2. Summary of Impacts from Primary Project Visual Features and to Higher-Quality Visual Features

Landscape Unit	Description of View, Higher-Quality Visual Feature, or Primary Project Visual Feature	Photographic Documentation[1]	Level of Impact
	I-694 bridge over BNSF rail corridor and Bottineau Boulevard	Not applicable	Neutral
	Shingle Creek	Not applicable	Neutral
	West Broadway Avenue bridge over TH 610	Not applicable	Neutral
	Rush Creek Regional Trail	Not applicable	Adverse

[1] A summary of photographic documentation locations is presented in **Table 4.5-1** of the Final EIS for locations where a current condition photograph and a simulation exist. These photographs, simulations, and other photographic documentation can be found in **Appendix F – Visual Quality Technical Report** of the Final EIS.

"Not applicable" indicates that photographic documentation was not developed for that particular feature.

Minneapolis Landscape Unit

Primary Proposed BLRT Extension Project Visual Features

Stations

The following proposed BLRT Extension project stations are proposed within the Minneapolis Landscape Unit.

- Van White Boulevard
- Penn Avenue

Bridges and Structures

The following proposed BLRT Extension project bridges and structures are proposed within the Minneapolis Landscape Unit.

- New bridge crossing HERC driveway
- Modified Olson Memorial Highway bridge over I-94
- Reconstructed Olson Memorial Highway bridge over the BNSF rail corridor (see description of KVPs 1 and 2 below)

Photographic Documentation

The Minneapolis Landscape Unit includes KVPs 1 and 2, as described in detail below. KVP location maps and photographs are provided in **Appendix A** of this report. A separate location map is provided in **Appendix A** for the Olson Memorial Highway photograph and sketch-up, designated as OMH 1.

- **OMH 1** (view to the west toward Penn Avenue, from center Olson Memorial Highway median) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on its status as a heavily traveled corridor. In the simulated view from OMH 1, median trees have been removed for the transitway alignment. However, though these trees would be removed from the corridor, some would be relocated to other park properties. Tree relocation would depend on the condition and age of the tree, and other factors. The proposed BLRT Extension project would alter the visual quality and character at this location; however, trees at the highway edges remain and continue to support the "gateway" appearance of the corridor.
- **KVP 1** (view to the east toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Lake Boardwalk) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 1, the new proposed BLRT Extension project features that would be most visible are the reconstructed Olson Memorial Highway bridge over the BNSF rail corridor, the overhead catenary system, and passing LRVs. However, these features could be difficult for viewers to see based on the distance and the surrounding vegetation. The proposed BLRT

Extension project would not substantially alter the visual quality or character at this location and would not obstruct views. The proposed BLRT Extension project would not preclude continued recreational use at this location.

- **KVP 2** (view to the east-southeast toward the Olson Memorial Highway bridge over the BNSF rail corridor, from the Wirth Park Trail) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 2, the new proposed BLRT Extension project features that would be most visible are the new track, the overhead catenary system, and passing LRVs. These new features would be of similar elevation to the existing BNSF rail corridor and may be difficult for viewers to see based on the surrounding vegetation, though it is important to note that seasonal changes in vegetation may result in increased visibility of the new features. These new features would be noticeable but would appear as a consistent linear feature alongside the existing BNSF tracks. However, existing Xcel Energy transmission poles are proposed to be relocated from the east, behind existing screening, to the west, closer to the adjacent park. Therefore, based on the increased frequency in passing vehicles, the additional overhead wires, and the relocation of the existing Xcel Energy power lines, the proposed BLRT Extension project would alter the visual quality and character at this location, but would not preclude continued recreational use.

Summary of Visual Impacts

In the Minneapolis Landscape Unit, the transitway would run along Olson Memorial Highway, a highway that currently accommodates a relatively high amount of traffic. Although Olson Memorial Highway is envisioned as a "gateway" corridor to downtown Minneapolis, the *Minneapolis Near Northside Master Plan* envisioned that LRT could be accommodated within the median without sacrificing the overall desired character of the corridor. The construction of the transitway within the existing median would alter its existing green character, which is considered a "higher-quality visual feature," resulting in adverse impacts on visual quality in that location. Impacts on "higher-quality visual features" are described in further detail below. Considering the existing industrial character of the visual context east of I-94 approaching downtown, it is anticipated that neutral visual effects would occur in that area.

Neutral impacts are anticipated as a result of station and TPSS construction, as these features would be designed to complement their surroundings, with variations in design that are consistent with the context of each station and TPSS location. TPSS features are introduced in **Section 3.3 – Proposed BLRT Extension Project Description**, which includes the size and siting considerations. Coordination with stakeholders, including the Minneapolis Park and Recreation Board, would continue throughout the proposed BLRT Extension project design process to address the siting of TPSSs and to maintain neutral visual impacts, including additional visual screening as required. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems, which could alter the visual quality and character of the view for sensitive viewer groups.

Impacts on the resources identified in **Section 4 – Existing Conditions** as "higher-quality visual features" are described in detail below. Visual impacts to these resources as a result of the

proposed BLRT Extension project implementation would generally be neutral. However, where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of proposed BLRT Extension project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **Ford Building:** Visual impacts to the Ford Building would be neutral because the Hiawatha LRT alignment already passes the building along 5th Street.
- **HERC site landscaping:** Visual impacts to the HERC site landscaping would be neutral. The transitway would run parallel to 6th Avenue in a widened right-of-way which would require partial removal of planter wall, trees, and the lawn area at the southeast corner of 6th Avenue and 7th Street.
- **Metro Transit headquarters:** Visual impacts to the Metro Transit's building would be neutral since it is already located along a busy highway and serves as a transit vehicle service and storage site.
- **Boulevard and median trees along Olson Memorial Highway west of I-94:** Visual impacts to the Olson Memorial Highway center median would be adverse, as trees would need to be removed for the transitway alignment. After the transitway is constructed in the center median, there would not be adequate space for new trees alongside it. However, as noted above, trees at the highway edges would remain and continue to support the "gateway" appearance of the corridor. Additionally, some trees would be relocated to other park properties, depending on the condition and age of the tree, and other factors.
- **Sumner Library:** Visual impacts to the library would be neutral since it is already located along a highly used roadway.
- **Seed Academy and Wayman AME Church:** Visual impacts to the school and church would be neutral since the use of church sanctuaries is typically inward-focused and because the site is already located along a highly used roadway.
- **Zion Baptist Church:** Visual impacts to church would be neutral since it is visually buffered by the north frontage road along Olson Memorial Highway. Use of church sanctuaries is typically inward-focused, and it is already located along a highly used roadway.
- **Floyd B. Olson Memorial Statue:** Visual impacts to the memorial would be neutral since the transitway turns onto Olson Memorial Highway and does not conflict with its siting.
- **Harrison Neighborhood gateway sculptures:** Visual impacts to the sculptures would be neutral since the transitway turns onto Olson Memorial Highway and does not conflict with their siting.

Golden Valley Landscape Unit

Primary Proposed BLRT Extension Project Visual Features

Stations

The following proposed BLRT Extension project stations are proposed within the Golden Valley Landscape Unit.

- Plymouth Avenue (see description of KVP 4a and 5 below)
- Golden Valley Road (includes park-and-ride; see description of KVPs 6a, 6b, 8, and 8a below)

Bridges and Structures

The following proposed BLRT Extension project bridges and structures are proposed within the Golden Valley Landscape Unit.

- Reconstructed Plymouth Avenue bridge (see description of KVPs 4a and 4b below)
- Reconstructed Theodore Wirth Parkway bridge (see description of KVPs 7 and 8a below)
- Reconstructed Golden Valley Road bridge (see description of KVPs 7 and 8a below)
- New bridge crossing Golden Valley Road ponds
- New bridge crossing Grimes Pond
- Reconstructed 36th Avenue bridge
- Noise walls on the east side of the Plymouth Avenue Station, the east side of the alignment roughly across from the southern extent of Sochacki Park (the former Mary Hills Nature Area – see description of NW 1a and NW 1b below), and the east side of the alignment from just north of South Halifax Park to 36th Avenue North, with a gap at the Xcel Energy substation. Photographs of proposed noise wall locations are provided in **Appendix A**.

Photographic Documentation

The Golden Valley Landscape Unit includes KVPs 3 through 8a, as described in detail below. KVP location maps and photographs are provided in **Appendix A** of this report. The Golden Valley Landscape Unit also includes NW 1a, and NW 1b. Photographs of proposed noise wall locations are provided in **Appendix A** of this report.

- **KVP 3** (view to the northwest toward the existing BNSF tracks and proposed LRT tracks, from Farwell Avenue and Xerxes Avenue North) represents the changes to the viewshed as seen by roadway users, pedestrians, and residents. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the residential nature of land uses at this location. In the simulated view from KVP 3, the new proposed BLRT Extension project features that would be most visible are the overhead catenary system. These new features would also be of similar elevation to the existing BNSF rail corridor, and may be difficult for viewers to see based on the surrounding vegetation. Additionally, the overhead catenary system would be a consistent feature alongside existing overhead power lines. The proposed BLRT Extension project would not substantially alter the visual quality or character at this location.

- **KVP 4a** (view to the west toward the proposed Plymouth Avenue Station and bridge, from Plymouth Avenue North and Washburn Avenue North) represents the changes to the viewshed as seen by roadway users, pedestrians, and residents. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the residential nature of land uses at this location. In the simulated view from KVP 4a, the vertical circulation structure adjacent to the Plymouth Avenue Station would be highly visible. These new features would be noticeable, but would be partially shielded by the existing bridge structure and vegetation. The proposed BLRT Extension project would alter the visual quality and character at this location.
- **KVP 4b** (view to the south toward the existing BNSF tracks and proposed LRT tracks, from the Plymouth Avenue North bridge) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 4b, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. Although the new features would noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. However, with the addition of multiple overhead lines to the corridor, and the relocation of existing power lines from the east to the west, adjacent to the park, the view toward the green space of the park would be altered. Further, as stated above, the Plymouth Avenue Bridge has an important role in setting the visual character for the park itself. Although the altered viewshed would be at a lower elevation than the viewer, the proposed BLRT Extension project would alter the visual quality and character at this location.
- **KVP 4c** (view to the north toward the proposed Plymouth Avenue Station, from the Plymouth Avenue bridge) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 4c, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. Although the new features would noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. In addition, the station and the vertical circulation structure adjacent to the station would be highly visible, substantially altering the visual quality and character at this location.
- **KVP 5** (view to the southeast toward the proposed Plymouth Avenue Station and bridge, from the Theodore Wirth Regional Park Chalet) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 5, the new proposed BLRT Extension project features that would be most visible would be the overhead catenary system and portions of the new Plymouth Avenue Station. These new features would be noticeable, but may be difficult for viewers to see based on the surrounding vegetation. However, as described above, seasonal changes and weather patterns typical of the proposed BLRT Extension project area would produce variations to

vegetation and ground cover. The proposed BLRT Extension project would alter the visual quality and character at this location, but would not preclude continued recreational use.

- **KVP 6a** (view to the north toward the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 6a, the new proposed BLRT Extension project features may be noticeable, but may be difficult for viewers to see based on the surrounding vegetation. The proposed BLRT Extension project would not substantially alter the visual quality or character at this location. The proposed BLRT Extension project would not preclude continued recreational use at this location.
- **KVP 6b** (view to the northeast toward Bassett Creek and the proposed Golden Valley Road Station, from the Theodore Wirth Regional Park Golf Course) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 6b, the new proposed BLRT Extension project features that would be most visible would be the overhead catenary system and passing LRVs. These new features would be noticeable, but may be difficult for viewers to see based on the surrounding vegetation. However, as described above, seasonal changes and weather patterns typical of the proposed BLRT Extension project area would produce variations to vegetation and ground cover. The proposed BLRT Extension project would alter the visual quality and character at this location, but would not preclude continued recreational use.
- **KVP 7** (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway near the intersection of Zenith Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the presence of sensitive land uses (residential, church, etc.) at this location. Additionally, viewer sensitivity at this location would also be due to the presence of the Grand Rounds, which offers opportunities for scenic pleasure driving, as described above. In the simulated view from KVP 7, the new Golden Valley Road Station and park-and-ride would generally not be visible based on the lower elevation of the station, the terraced design of the parking lot, and the existing vegetation. The proposed BLRT Extension project would not substantially alter the visual quality or character at this location.
- **KVP 8** (view to the west toward the proposed Golden Valley Road Station, from Golden Valley Road and Theodore Wirth Parkway) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a high sensitivity based on the presence of sensitive land uses (residential, church, etc.) at this location, as well as the presence of the Grand Rounds. In the simulated view from KVP 8, the pedestrian access and upper levels of the terraced parking lot would be visible. The proposed BLRT Extension project would alter the visual quality and character at this location.

- **KVP 8a** (view to the west toward the proposed Golden Valley Road Station, from Theodore Wirth Parkway at Golden Valley Road) represents the changes to the viewshed as seen by roadway users, pedestrians, and recreational users, which at this location would include bicyclists on the Grand Rounds trail and nature enthusiasts accessing the existing park triangle. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the presence of sensitive land uses (residential, church, etc.) at this location. In the simulated view from KVP 8a, the pedestrian access and upper levels of the terraced parking lot would be visible. The proposed BLRT Extension project would alter the visual quality and character at this location.
- **NW 1a** (view to the northwest toward the proposed noise wall on the east side of the alignment roughly across from the southern extent of Sochacki Park) represents the location of a proposed noise wall, which would be located adjacent to the Kewanee Way residences. For this segment of the proposed noise wall, existing residences are located on both the west and east sides of Kewanee Way. While the addition of the noise wall would mainly be for the purpose of sound insulation, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences. However, the addition of the noise wall at this location would result in a potentially adverse visual effect by precluding views across the alignment toward the southern extent of Sochacki Park. The proposed BLRT Extension project would alter the visual quality and character at this location, especially for residents, pedestrians, and roadway users.
- **NW 1b** (view to the southeast toward the proposed noise wall on the east side of the alignment roughly across from the southern extent of Sochacki Park) represents the location of a proposed noise wall, which would be located adjacent to the Kewanee Way residences. For this segment of the proposed noise wall, existing residences are located along the east side of Kewanee Way. While the addition of the noise wall would mainly be for the purpose of sound insulation, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences. However, the addition of the noise wall at this location would result in a potentially adverse visual effect by precluding views across the alignment toward the southern extent of Sochacki Park. The proposed BLRT Extension project would alter the visual quality and character at this location, especially for residents, pedestrians, and roadway users.

Summary of Visual Impacts

In the Golden Valley Landscape Unit, the corridor utilizes the existing BNSF right-of-way between 34th Avenue and Olson Memorial Highway. The transitway would closely parallel the existing railway and, as such, would be an addition to an existing transportation corridor. Thus the addition of LRT to this corridor would be compatible with the existing land use. The implementation of LRT would bring an increased frequency of vehicles passing through the area. Impacts on visual quality would range from neutral to adverse because in some locations, the tracks would be in a depressed cut section and shielded by the topography and vegetation. However, in other instances, residential and park areas on both the east and west sides of the corridor, which are considered "higher-quality visual features" as described below, have an increased visual connection based on close

proximity and varying degrees of openness of existing vegetation. Both temporary and permanent impacts on the vegetation along the BNSF right-of-way may alter the views and amount of screening of adjacent neighborhoods and parks. At locations where adverse visual effects are anticipated, transitway elements added to the rail corridor may be visually screened or softened using landscaping where adequate space permits.

Neutral impacts are anticipated as a result of station and TPSS construction, as these features would be designed to complement their surroundings, with variations in design that are consistent with the context of each station and TPSS location. TPSS features are introduced in **Section 3.3 – Proposed BLRT Extension Project Description**, which includes the size and siting considerations. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems, which could alter the visual quality and character of the view for sensitive view groups. Coordination with stakeholders, including the Minneapolis Park and Recreation Board, would continue throughout the proposed BLRT Extension project design process to address the siting of TPSSs and to maintain neutral visual impacts, including additional visual screening as required.

Impacts on the resources identified above in **Section 4 – Existing Conditions** as "higher-quality visual features" are described in detail below. Visual impacts to these resources as a result of proposed BLRT Extension project implementation would generally be neutral. However, where visual impact would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of proposed BLRT Extension project Facilities), outlined below in **Section 6.2**, would help to reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **Plymouth Avenue bridge over Bassett Creek and BNSF rail corridor:** The bridge would be reconstructed to make space for the transitway. Reconstructed features would include a new deck and piers. However, the bridge would be reconstructed in a manner such that the key visual elements would remain essentially the same as the existing elements, with the exception of the pier spacing. In order to accommodate the new LRT tracks, an area below the bridge would be altered from a paved slope to a clear opening with infill walls added to two of the existing arched piers for crash protection and to retain grade. This modification would only be visible from the pedestrian trail west of the BNSF track and would be unnoticeable from Plymouth Avenue above. Therefore, visual impacts to the bridge would be neutral.
- **Theodore Wirth Regional Park and Golf Course:** Visual impacts to Theodore Wirth Regional Park and Golf Course would be adverse, since views to the BNSF right-of-way may be opened up by grading and vegetation thinning for the transitway. The additional features, including the catenary wires, support poles, tracks, TPSS, and light rail vehicles, would add visual intrusions to the perceived "natural" character of the park, beyond the existing railroad and overhead utilities.
- **Bassett Creek and Bassett Lake:** Visual impacts to Bassett Creek and Bassett Lake would be adverse. The additional features of the transitway, as listed above in the description of impacts

on Theodore Wirth Regional Park, would add visual intrusions to the perceived "natural" character of the parks beyond the existing railroad and overhead utilities.

- **Theodore Wirth Parkway:** Visual impacts to Theodore Wirth Parkway would be neutral since it passes over the transitway on a bridge for only a short distance. Some views to the BNSF right-of-way may be opened up in the approaches by grading and vegetation thinning for the transitway, but would be peripheral to the immediate scenery adjacent to the Parkway.
- **Glenview Terrace/Valley View Park:** Visual impacts to Glenview Terrace/Valley View Park would be neutral. As noted above, a new bridge would cross the Golden Valley Road Ponds at the western border of the park. The presence of wetlands in the BNSF right-of-way adjacent to the park would prevent cutting into side slopes and minimize removal of trees. The active uses of the park are well-buffered by a wooded area.
- **Sochacki Park and South Halifax Park:** Visual impacts to these parks would be adverse. The additional features of the transitway, as listed above in the description of impacts on Theodore Wirth Regional Park, would add visual intrusions to the perceived "natural" character of these parks beyond the existing railroad and overhead utilities. Also, as noted above, a new bridge would cross Grimes Pond adjacent to the existing BNSF embankment, which would remain as is and continue to be utilized for freight. Refer to **Chapter 8 – Amended Draft Section 4(f) and 6(f) Evaluation** for further discussion of impacts to Sochacki Park, along with associated mitigation commitments to reduce impacts on these parks.

Robbinsdale/Crystal Landscape Unit

Primary Proposed BLRT Extension Project Visual Features

Stations

The following proposed BLRT Extension project stations are proposed within the Robbinsdale/ Crystal Landscape Unit.

- Robbinsdale (includes park-and-ride; see description of KVPs 10, and 11 below)
- Bass Lake Road (includes park-and-ride)

Bridges and Structures

The following proposed BLRT Extension project bridges and structures are proposed within the Robbinsdale/Crystal Landscape Unit.

- New bridge over TH 100
- New bridge over the CP rail corridor
- New pedestrian bridge at Bass Lake Road (see description of KVPs 21, 22, and 23 below)
- Noise walls from 36th Avenue to 41st Avenue, from 45½ Avenue to West Broadway Avenue, and from West Broadway Avenue to Corvallis Avenue on the east side (see description of NW 2a, NW 2b, NW 3a, and NW 3b below). Noise walls from 36th Avenue to the southern border of Lee Park, from the northern border of Lee Park to near 41st/Noble Avenue, and along

the Robbinsdale Station area on the west side (see description of NW 2a and NW 2b below). Photographs of proposed noise wall locations are provided in **Appendix A** of this report.

Photographic Documentation

The Robbinsdale/Crystal Landscape Unit includes KVPs 9 through 12 and KVP 21 through 23, as described below. KVP location maps and photographs are provided in **Appendix A** of this report. The Robbinsdale/Crystal Landscape Unit also includes NW 2a, NW 2b, NW 3a, and NW 3b. Photographs of proposed noise wall locations are provided in **Appendix A** of this report.

- **KVP 9** (view to the northwest toward downtown Robbinsdale, from 41st Avenue and Hubbard Avenue) represents the changes to the viewshed as seen by roadway users, pedestrians, business owners, and workers. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the varied land uses (residential, church, retail, commercial, transportation, etc.) at this location. In the simulated view from KVP 9, the new proposed BLRT Extension project features that would be most visible would be the overhead catenary system and passing LRVs. These new features would be noticeable, but may be partially shielded by existing structures. The proposed BLRT Extension project would not substantially alter the visual quality or character at this location.
- **KVP 10** (view to the north toward the proposed Robbinsdale Station, from 41st Avenue) represents the changes to the viewshed as seen by roadway users, pedestrians, business owners, and workers. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the varied land uses (residential, church, retail, commercial, transportation, etc.) at this location. In the simulated view from KVP 10, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. These new features would also be of similar elevation to the existing BNSF rail corridor, and although the new features would noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. Additionally, the new Robbinsdale Station and park-and-ride structure would be highly visible; however, based on the presence of other prominent visual features, would not substantially alter the visual quality or character at this location.
- **KVP 11** (view to the east toward the proposed Robbinsdale Station, from 42nd Avenue) represents the changes to the viewshed as seen by roadway users, pedestrians, business owners, and workers. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the varied land uses (residential, retail, commercial, transportation, etc.) at this location. In the simulated view from KVP 11, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. These new features would also be of similar elevation to the existing BNSF rail corridor, and although the new features would noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. Additionally, the new Robbinsdale Station and park-and-ride structure would be highly visible; however, based on the presence of other prominent visual features, would not substantially alter the visual quality or character at this location.

- **KVP 12** (view to the southeast toward the proposed wall and fence, from the adjacent residential alley) represents the changes to the viewshed as seen by roadway users, pedestrians, and residents. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the residential nature of land uses at this location. In the simulated view from KVP 12, the new proposed BLRT Extension project features that would be most visible would be the new wall and fence, which would be associated with the new bridge over TH 100. These new features would be highly visible; however, an existing BNSF bridge is located adjacent to the proposed bridge. Viewer groups at this location are partially shielded from views of BNSF operations by existing vegetation, which would be replaced by the proposed wall and fence. The new proposed BLRT Extension project features would alter the visual quality and character at this location.
- **KVP 21** (view to the southeast toward the proposed Bass Lake Road station and pedestrian bridge, from Bottineau Boulevard) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 21, the new proposed BLRT Extension project features that would be most visible would be the new station and pedestrian bridge, which would be highly visible and would alter the visual quality at this location. However, the new station and pedestrian overpass would not substantially alter the visual character based on its location adjacent to an existing and highly used roadway.
- **KVP 22** (view to the northwest toward the proposed Bass Lake Road station and pedestrian bridge, from the southeast quadrant of the Bass Lake Road/Bottineau Boulevard intersection) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 22, the new proposed BLRT Extension project features that would be most visible would be the new station and pedestrian bridge, which would be highly visible and would alter the visual quality at this location. However, the new station and pedestrian overpass would not substantially alter the visual character based on its location adjacent to an existing and highly used roadway.
- **KVP 23** (view to the northeast toward the proposed Bass Lake Road pedestrian bridge, from the southwest quadrant of the Bass Lake Road/Bottineau Boulevard intersection) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 23, the new proposed BLRT Extension project features that would be most visible would be the new pedestrian bridge, which would be highly visible and would alter the visual quality at this location. However, the new pedestrian overpass would not substantially alter the visual character based on its location adjacent to an existing and highly used roadway.

- **NW 2a** (view to the northwest toward the proposed noise walls from 36th Avenue to 41st Avenue on the east side, and from 36th Avenue to the southern border of Lee Park on the west side) represents the location of a proposed noise wall, which would be located adjacent to the June Avenue North residences on the west side and the Indiana Avenue North residences on the east side. While the addition of the noise wall would mainly be for the purpose of sound insulation, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences, especially those on June Avenue North, which have less of a vegetation buffer than those on Indiana Avenue North. The addition of the noise wall at this location would result in a potentially adverse visual effect for June Avenue North residences by precluding views across the alignment toward the existing vegetation buffer, but would result in a neutral visual effect for Indiana Avenue North residences due to the presence of the existing vegetation buffer. The proposed BLRT Extension project would alter the visual quality and character at this location, especially for residents and pedestrians.
- **NW 2b** (view to the southeast toward the proposed noise walls from 36th Avenue to 41st Avenue on the east side) represents the location of a proposed noise wall, which would be located adjacent to the Indiana Avenue North residences. While the addition of the noise wall would mainly be for the purpose of sound insulation, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences. The addition of the noise wall at this location would result in a neutral visual effect for Indiana Avenue North residences due to the presence of an existing vegetation buffer. The proposed BLRT Extension project would alter the visual quality and character at this location, especially for residents and pedestrians.
- **NW 3a** (view to the northwest toward the proposed noise wall from West Broadway Avenue to Corvallis Avenue on the east side) represents the location of a proposed noise wall, which would be located adjacent to the Welcome Avenue North and Fairview Avenue North residences. While the addition of the noise wall would mainly be for the purpose of sound insulation, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences. The addition of the noise wall at this location would result in a neutral visual effect for Welcome Avenue North and Fairview Avenue North residences due to the presence of an existing vegetation buffer. The proposed BLRT Extension project would alter the visual quality and character at this location, especially for residents and pedestrians.
- **NW 3b** (view to the southeast toward the proposed noise wall toward from West Broadway Avenue to Corvallis Avenue on the east side) represents the location of a proposed noise wall, which would be located adjacent to West Broadway Avenue. While the addition of the noise wall would mainly be for the purpose of sound insulation for the residential area to the east of West Broadway Avenue, a noise wall at this location would also provide visual screening and privacy from the existing rail and proposed LRT alignment for the existing residences. The addition of the noise wall at this location would result in a neutral visual effect due to the presence of West Broadway Avenue, which provides a buffer between the residential area and the existing rail and proposed LRT alignment. The proposed BLRT Extension project would

alter the visual quality and character at this location, especially for residents, pedestrians, and roadway users.

Summary of Visual Impacts

In the Robbinsdale/Crystal Landscape Unit, the corridor utilizes the existing BNSF right-of-way. Impacts on visual quality would generally be neutral because the transitway would closely parallel the existing railroad and, as such, would be a modification to an existing dedicated rail corridor rather than the introduction of a new rail corridor. The implementation of LRT would bring an increased frequency of vehicles passing through the area, and the effects to visual quality would generally be neutral. At locations where adverse visual effects are anticipated, including where sensitive receptors are located adjacent to the corridor, as described in further detail below, transitway elements added to the rail corridor may be visually screened or softened using landscaping where adequate space permits.

Where sensitive receptors are located adjacent to the corridor, visual intrusions would result from the increased frequency of vehicles passing through the area, the introduction of new sources of light from LRT vehicles and stations, and the altered viewshed for residents viewing the LRT corridor and vehicles. In addition, the ability for LRT users to view the residential land uses from passing LRT vehicles could also constitute a visual intrusion. For example, in the City of Crystal between the proposed Bass Lake Road Station and the proposed 63rd Avenue Station, many existing residences already have a partial or full view of the existing rail corridor. Existing vegetation provides visual screening of the existing BNSF rail corridor, and would also provide visual screening of the proposed LRT vehicles. However, in order to construct the proposed LRT alignment, vegetation removal, such as tree clearing, is proposed for portions of the BNSF right-of-way. Therefore, visual intrusions for sensitive receptors at these locations would also result from the removal of vegetation, and impacts on visual quality would be adverse.

To help visualize the proposed changes, especially in areas of thick vegetation and thin (or no) vegetation, **Appendix A** includes "before BLRT Extension project" existing condition photographs and computer-generated sketch-up simulation of the conceptual "after BLRT Extension project" conditions. For those areas located outside of the BNSF right-of-way, coordination with the city of Crystal has been initiated, and would continue throughout the proposed BLRT Extension project design process, to address the need for revegetation and/or landscaping and other aesthetic treatments to soften or offset the visual effects of tree clearing. Further, where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

For the majority of the LRT alignment, the trackway would generally be level with adjacent land uses. However, at some locations, such as the new bridges over the CP rail corridor and TPH 100, the trackway would be elevated and would result in similar visual intrusions to adjacent sensitive receptors (residential land uses) as described above. However, where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and

Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

Neutral impacts are anticipated as a result of station and TPSS construction, as these features would be designed to complement their surroundings, with variations in design that are consistent with the context of each station and TPSS location. TPSS features are introduced in **Section 3.3 – Proposed BLRT Extension Project Description**, which includes the size and siting considerations. Coordination with stakeholders would continue throughout the proposed BLRT Extension project design process to address the siting of TPSSs and to maintain neutral visual impacts, including additional visual screening as required. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems, which could alter the visual quality and character of the view for sensitive viewer groups.

Some proposed BLRT Extension project features within the Robbinsdale/Crystal landscape unit would result in adverse effects to visual quality, as described below. Where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **Bass Lake Road pedestrian overpass:** The new grade separated pedestrian crossing at Bass Lake Road would be a prominent visual feature, altering the viewshed at this location and resulting in adverse effects to visual quality. However, the new structure would not be out of character with the varied land uses (retail, commercial, transportation, etc.) at this location.

Impacts on the resources identified above in **Section 4 – Existing Conditions** as "higher-quality visual features" are described in detail below. Visual impacts to these resources as a result of the proposed BLRT Extension project implementation would generally be neutral. However, where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **Sacred Heart Catholic Church:** Visual impacts on the church would be neutral since the transitway infrastructure would run within the existing BNSF right-of-way and would not alter views of the building.
- **Historic Robbinsdale Public Library:** Visual impacts on the library would be neutral since the transitway infrastructure would run within the existing BNSF right-of-way and would not alter views of the building.
- **West Broadway Avenue and BNSF Railroad bridges over TH 100:** The reconstructed BNSF railroad bridge would be in the same location but widened to accommodate the transitway, and it would be designed to be consistent with the TH 100 aesthetic guidelines. Visual effects would be neutral.

- **Green boulevard on west side of West Broadway Avenue between 47th Avenue and TH 100:** The construction of the transitway would require the removal of some mature trees and reduce the width of the green space separating the roadway and railroad. Visual effects would be adverse.
- **Bottineau Boulevard Bridge over CP rail corridor:** Visual impacts on the bridge would be neutral. It would not be physically impacted, and since the new bridge for the transitway over the railroad would be separated visually by commercial development, there would be minimal visual influence between them.
- **City of Crystal gateway area:** Visual impacts on the gateway area would be neutral. The gateway sign and landscaping are near the intersection corner and would not be in conflict with the station location.

Brooklyn Park Landscape Unit

Primary Proposed BLRT Extension Project Visual Features

Stations

The following proposed BLRT Extension project stations are proposed within the Brooklyn Park Landscape Unit.

- 63rd Avenue (includes park-and-ride; see description of KVPs 13 and 14 below)
- Brooklyn Boulevard
- 85th Avenue
- 93rd Avenue
- Oak Grove Parkway (includes park-and-ride)

Bridges and Structures

The following proposed BLRT Extension project bridges and structures are proposed within the Brooklyn Park Landscape Unit.

- New pedestrian overpass at 63rd Avenue Station connected to parking garage (see description of KVPs 13 and 14 below)
- New bridge over 73rd Avenue/Bottineau Boulevard intersection (see description of KVPs 15, 16, 17, and 18 below)
- Modified I-694 bridge over the BNSF rail corridor
- New bridge over TH 610
- New OMF (see description of KVPs 19 and 20 below)

Photographic Documentation

Photographic Documentation

The Brooklyn Park Landscape Unit includes KVPs 13 through 20, as described below. KVP location maps and photographs are provided in **Appendix A** of this report.

- **KVP 13** (view to the south toward the proposed 63rd Avenue Station, from the trail adjacent to Bottineau Boulevard) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 13, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. These new features would also be of similar elevation to the existing BNSF rail corridor, and although the new features would be noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. Additionally, the new 63rd Avenue Station and park-and-ride with pedestrian overpass structure would be highly visible and would alter the visual quality at this location. However, the new station and park-and-ride would not substantially alter the visual character based on its location adjacent to an existing and highly used roadway.
- **KVP 14** (view to the southeast toward the proposed 63rd Avenue Station, from the adjacent neighborhood west of 63rd Avenue) represents the changes to the viewshed as seen by roadway users, pedestrians, and residents. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderately high sensitivity based on the residential nature of land uses at this location. In the simulated view from KVP 14, the new proposed BLRT Extension project feature that would be most visible would be the 63rd Avenue park-and-ride structure. Although partially shielded by existing residential structures and vegetation, this new feature would be highly visible, and would alter the visual quality and character at this location.
- **KVP 15** (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard Bridge, from Bottineau Boulevard at 71st Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 15, the new proposed BLRT Extension project features that would be most visible would be the new 73rd Avenue/Bottineau Boulevard bridge. This new feature would be highly visible and would alter the visual quality at this location. However, the new bridge would not substantially alter the visual character based on its location over an existing and highly used roadway.
- **KVP 16** (view to the northeast toward the proposed 73rd Avenue/Bottineau Boulevard Bridge, from 71st Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 16,

the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. Although the new features would noticeable, they would appear as a consistent linear feature alongside the existing BNSF tracks. The new proposed BLRT Extension project features would not substantially alter the visual quality and character at this location.

- **KVP 17** (view to the north toward the proposed 73rd Avenue/Bottineau Boulevard Bridge, from the southeast corner of Bottineau Boulevard and 71st Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 17, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. Additionally, the new 73rd Avenue/Bottineau Boulevard bridge would be a prominent visual feature at this location. These new features would be highly visible and would alter the visual quality at this location. However, the new bridge would not substantially alter the visual character based on its location over an existing and highly used roadway.
- **KVP 18** (view to the south toward the proposed 73rd Avenue/Bottineau Boulevard Bridge, from Bottineau Boulevard at 73rd Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the transportation-related nature of land uses at this location. In the simulated view from KVP 18, the new proposed BLRT Extension project features that would be most visible would be the new track, overhead catenary system, and passing LRVs. Additionally, the new 73rd Avenue/Bottineau Boulevard bridge would be a prominent visual feature at this location. These new features would be highly visible, and would alter the visual quality at this location. However, the new bridge would not substantially alter the visual character based on its location over an existing and highly used roadway.
- **KVP 19** (view to the east toward the proposed OMF, from 101st Avenue) represents the changes to the viewshed as seen by roadway users and pedestrians. Views at this location would typically be of both short and long duration, depending on the viewer group, and viewers would have a moderate sensitivity based on the rural and transportation-related nature of land uses at this location. In the simulated view from KVP 19, the new proposed BLRT Extension project features that would be most visible would be the new OMF, which would be a prominent visual feature altering the viewshed at this location. The new facility would introduce a large structure to an otherwise minimally developed area, resulting in a substantial alteration of the visual quality and character, as well as a partial obstruction of long distance views.
- **KVP 20** (view to the southwest toward the proposed OMF, from Rush Creek Regional Trail) represents the changes to the viewshed as seen by recreational users. Views at this location would typically be of long duration, and viewers would have a moderately high sensitivity based on the recreational nature of land uses at this location. In the simulated view from KVP 20, which would be a prominent visual feature altering the viewshed at this location. The new

facility would introduce a large structure to an otherwise minimally developed area, resulting in a substantial alteration of the visual quality and character, as well as a partial obstruction of views. However, the proposed BLRT Extension project would not preclude continued recreational use at this location.

Summary of Visual Impacts

In the Brooklyn Park Landscape Unit, the corridor utilizes the existing right-of-way of West Broadway Avenue. For much of the corridor, the transitway would be located in the center of the roadway and would have neutral effects to visual quality.

For the majority of the LRT alignment, the trackway would generally be level with adjacent land uses. However, at some locations, such as the new bridge over 73rd Avenue/Bottineau Boulevard intersection, the trackway would be elevated resulting in potential visual intrusions to adjacent sensitive receptors (residential land uses). Visual intrusions for sensitive receptors at these locations would result from both the altered viewshed for residents viewing the LRT corridor and vehicles, and the ability for LRT users to view the residential land uses from passing LRT vehicles. However, where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

Neutral impacts are anticipated as a result of station and TPSS construction, as these features would be designed to complement their surroundings, with variations in design that are consistent with the context of each station and TPSS location. TPSS features are introduced in **Section 3.3 – Proposed BLRT Extension Project Description**, which includes the size and siting considerations. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems, which could alter the visual quality and character of the view for sensitive viewer groups. Coordination with stakeholders would continue throughout the proposed BLRT Extension project design process for proposed stations and also to address the siting of TPSSs to maintain neutral visual impacts. This process may include the development of additional visual screening as required.

Some proposed BLRT Extension project features within the Brooklyn Park landscape unit would result in adverse effects to visual quality, as described below. Where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of Proposed BLRT Extension Project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **63rd Avenue Park-and-ride/Pedestrian Bridge and Overpass:** The new 63rd Avenue park-and-ride and overpass would be prominent visual features, altering the viewshed at this location and resulting in adverse effects to visual quality. However, the new structure would not be out of character with the varied land uses (retail, commercial, transportation, etc.) at this location.

- **73rd Avenue/Bottineau Bridge:** While the proposed BLRT Extension project was designed to minimize impacts on land uses/private property, the new 73rd Avenue/Bottineau bridge would result in the acquisition of commercial property to the south of the Brooklyn Boulevard Station. The new bridge would be a prominent visual feature, altering the viewshed at this location and resulting in adverse effects to visual quality. However, the new bridge would not be out of character with the varied land uses (retail, commercial, transportation, etc.) at this location.
- **OMF:** The new OMF would be a prominent visual feature, altering the viewshed at this location. The new facility would introduce a large structure to an otherwise minimally developed area. Further, the new OMF would alter views for recreational users, and would result in adverse effects to visual quality. However, the new OMF and related proposed BLRT Extension project elements, including landscaping and visual screening, would be designed in coordination with the city of Brooklyn Park and the Three Rivers Park District, and in accordance with local zoning ordinances.

Impacts on the resources identified above in **Section 4 – Existing Conditions** as "higher-quality visual features" are described in detail below. Visual impacts to these resources as a result of proposed BLRT Extension project implementation would generally be neutral. Where visual impacts would be adverse, implementation of Mitigation Measure 1 (Minimize Operational Night Lighting) and Mitigation Measure 2 (Visual Screening of proposed BLRT Extension project Facilities), outlined below in **Section 6.2**, would help to further reduce the impacts of operation of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

- **I-694 bridge over the BNSF rail corridor and Bottineau Boulevard:** Since only minor modifications to the piers of the I-694 bridge are required, visual impacts on this resource would be neutral.
- **Shingle Creek:** Visual impacts on Shingle Creek would be neutral. The only transitway features in the vicinity would be the tracks and catenary in the center median of the roadway, and they would not visually interrupt clear views to the creek.
- **West Broadway Avenue Bridge over TH 610:** Visual effects on the bridge would be neutral. The new transitway bridge that would parallel the West Broadway Avenue Bridge over TH 610 would block views of the West Broadway Avenue bridge, and the transitway bridge would be designed to be consistent with the TH 610 aesthetic guidelines.
- **Rush Creek Regional Trail:** Visual effects on the trail would be adverse. As described above, the new OMF would be a prominent visual feature, introducing a large structure to an otherwise minimally developed area. The presence of the OMF would alter views for recreational users of this existing trail.

5.3.2.2 Construction Impacts

Anticipated visual effects during construction of the proposed BLRT Extension project would be similar to the appearance of typical roadway projects including the temporary presence of heavy equipment, traffic control measures, and construction activities. Areas where construction activities for proposed BLRT Extension project features would be particularly noticeable to sensitive viewer groups include:

- The reconstruction of the Olson Memorial Highway Bridge over I-94 to create adequate width for the transitway would be highly visible to travelers along I-94 and Olson Memorial Highway.
- Users of Theodore Wirth Regional Park, Sochacki Park and South Halifax Park would likely perceive construction activity as undesirable and not consistent with their anticipated recreational experience. The reconstruction of the westbound Olson Memorial Highway bridge over the BNSF rail corridor and depressed transitway with retaining walls curving onto Olson Memorial Highway would be highly visible to travelers along Olson Memorial Highway. Additionally, there may be temporary grading for the construction of retaining walls or other features that would affect slopes and vegetation.
- The reconstruction of the BNSF bridge over TH 100 to create adequate width for the transitway would be highly visible to travelers along northbound TH 100. Where the transitway passes along residential neighborhoods, the construction activity would likely be perceived as more visually disruptive to these typically peaceful residential settings.
- The construction of the new bridge for the transitway over TH 610 would be highly visible to travelers along eastbound TH 610.

In general, the potential short-term impacts that would occur during proposed BLRT Extension project construction would be associated with construction staging areas; concrete and form installation; removal of some of the existing vegetation; lights and glare from construction areas; and generation of dust and debris in the proposed BLRT Extension project area, as described in further detail below.

Temporary construction activities are anticipated to include partial or complete road and lane closures, vehicle and pedestrian detours, construction material deliveries, and transport of construction equipment. In general, construction staging areas would be located adjacent to the existing BNSF rail corridor and proposed BLRT Extension project corridor, where the presence of construction equipment and earthmoving activities are not anticipated to be visually intrusive and would be compatible with the surrounding landscape. Where the transitway passes along recreation areas and residential neighborhoods, construction activities, such as grading, vegetation removal, and lighting of work areas, would likely be perceived as visually disruptive to those typically more peaceful residential settings.

Construction impacts would be temporary, and construction staging areas would be restored to pre-project conditions after construction is completed. At locations where higher visual effects are anticipated, the loss of existing vegetation on side slopes for grading or access purposes would be replaced to the extent feasible. Implementation of Mitigation Measure 3 (Minimize Visual Disruption from Construction Activities), outlined below in **Section 6.2**, would help to further

reduce the impacts of construction of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

6 Conclusions and Recommendations

6.1 Overview of Evaluation Results

The proposed BLRT Extension project implementation would not result in a substantial change to the visual character of the corridor as a whole. Neutral visual effects are anticipated to result from the proposed BLRT Extension project implementation along most segments. However, adverse visual effects would occur in some areas, such as where partial residential acquisitions would be required and where the existing vegetated center median of Olson Memorial Highway would be modified or removed. Additionally, adverse visual effects to visual quality would occur in areas where recreational and residential uses are located along or in the vicinity of the proposed BLRT Extension project corridor.

At locations where adverse visual effects are anticipated, transitway elements added to the rail corridor may be visually screened or softened using landscaping where adequate space permits, and the loss of existing vegetation on side slopes for grading or access purposes would be replaced to the extent feasible. Several local plans address aesthetic and visual resources in the proposed BLRT Extension project area, and applicable policies include the establishment of design and landscape guidelines. The Minneapolis Park and Recreation Board, the Three Rivers Park District, the Sochacki Park Joint Powers Board, and the affected communities would be involved in the selection of landscape treatments that would be consistent with applicable local policies and that would be compatible with the character of the parks and surrounding neighborhoods. In general, lost vegetation for disturbed areas outside of the BNSF right-of-way would be replaced with vegetation of a similar type where feasible, and where new physical features of the transitway are introduced, efforts would be made to screen or soften the view.

Neutral impacts are anticipated as a result of station and TPSS construction. Stations would be designed to be aesthetically attractive and to complement their surroundings. However, it is anticipated that station features would also include passenger information displays, lighting, and security systems. Coordination with stakeholders would continue throughout the proposed BLRT Extension project design process for proposed stations. Additionally, TPSS facilities would be designed to complement their surroundings, and would incorporate landscaping features to minimize visual intrusion as appropriate. To further minimize visual quality impacts of TPSS siting, the siting would be customized for each location based on the context of each facility in relation to adjacent properties and resources. Coordination with stakeholders would continue throughout the proposed BLRT Extension project design process for proposed TPSSs.

6.2 Mitigation Measures

Implementation of Mitigation Measures 1 through 3, outlined below, would help to further reduce the impacts of operation and construction of the proposed BLRT Extension project on sensitive viewer groups in the proposed BLRT Extension project area.

6.2.1 Operational Mitigation Measures

Mitigation Measure 1: Minimize Operational Night Lighting

To minimize impacts on sensitive receptors resulting from nighttime operational lighting, to the extent feasible and consistent with safety and security, all permanent exterior lighting would be designed and installed so that (a) the lighting does not cause excessive reflected glare and (b) illumination of the proposed BLRT Extension project and its immediate vicinity is minimized.

Mitigation Measure 2: Visual Screening of Proposed BLRT Extension Project Facilities

To the extent feasible, proposed BLRT Extension project facilities have been sited to avoid locations in proximity to residences, parks, or other sensitive visual receptors. Where avoidance is not feasible, or where higher visual or privacy effects are anticipated to result from the introduction of new physical features of the transitway, such as where the vertical distance of the LRT alignment is higher than adjacent residences, efforts would be made to screen or soften the view using landscaping or walls where adequate space permits. Landscape treatments would be selected for consistency with applicable local policies, consideration for agency maintenance budgets and manpower, and for compatibility with the character of the parks and surrounding neighborhoods.

The Council has prepared design guidelines for key structures throughout the proposed light rail alignment, focusing on bridges and retaining walls. Those guidelines are included within the *Visual Quality Guidelines for Key Structures* (Council, 2015). These guidelines were developed by the Council, reflecting various coordinating efforts with affected local jurisdictions. The guidelines have been used by the Council in the advancement of the proposed BLRT Extension project's design and development. The guidelines have and will help to ensure a consistent aesthetic element for key structures throughout the proposed BLRT Extension project alignment, while allowing for some flexibility in wall treatments.

6.2.2 Construction Period Mitigation Measures

Mitigation Measure 3: Minimize Visual Disruption from Construction Activities

Follow the Council's design guidelines to address construction impacts where appropriate and practical; these include:

- Locate staging areas in places where their visibility will be minimal and provide temporary construction screens or barriers to limit views into them from nearby residential areas, community facilities, recreational areas and trails, or other public open spaces from which they will be seen by visually sensitive viewers
- Use construction methods that minimize the need to remove vegetation to accommodate construction activities
- Shield light sources used in nighttime construction to reduce lighting impacts for residential areas
- Restore areas disturbed during construction

7 References

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2015 (January). Guidelines for the Visual Impact Assessment of Highway Projects.

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2014 (April). Bottineau Transitway Draft Environmental Impact Statement.

USDOT, FTA and Hennepin County Regional Railroad Authority, Metropolitan Council
2012 (September). Bottineau Transitway Technical Report Visual Quality.

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Appendix A Key View Location Maps and Photographs

Appendix A Key View Location Maps and Photographs

- FEIS Design Documents: Sketchup Views
- Olson Memorial Highway Median: Sketchup View
- Proposed Noise Wall Location Photographs
- Vegetation Review

FEIS Design Documents - Sketchup Views

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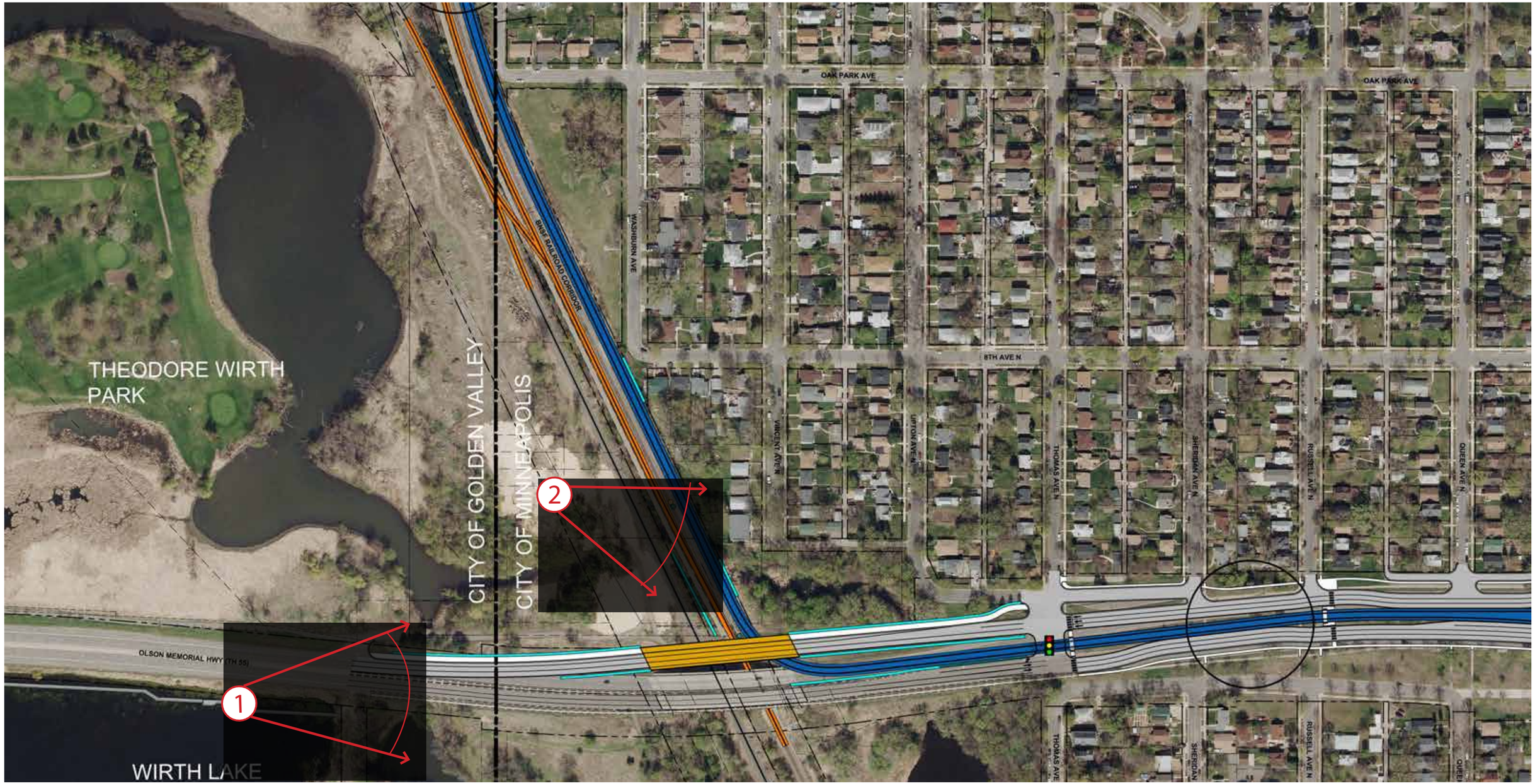

LEGEND

LRT TRACK AREA	SIDEWALK	EXISTING RIGHT OF WAY
FREIGHT TRACK AREA	TRAIL	PROPERTY LINE
STATION PLATFORM	ROADWAY	APPROX. LOCATION OF TRACTION POWER SUBSTATION (TPSS)
RETAINING WALL	FREIGHT ACCESS ROAD	APPROX. SIZE OF TPSS FINAL LOCATION TBD
BRIDGE		

DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT

BLUE LINE LRT EXTENSION

FEIS DESIGN DOCUMENTS
SKETCHUP VIEWS
CITY OF MINNEAPOLIS
VIEW LOCATION PLANS

11/20/2015

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VIEW LOCATION PLANS

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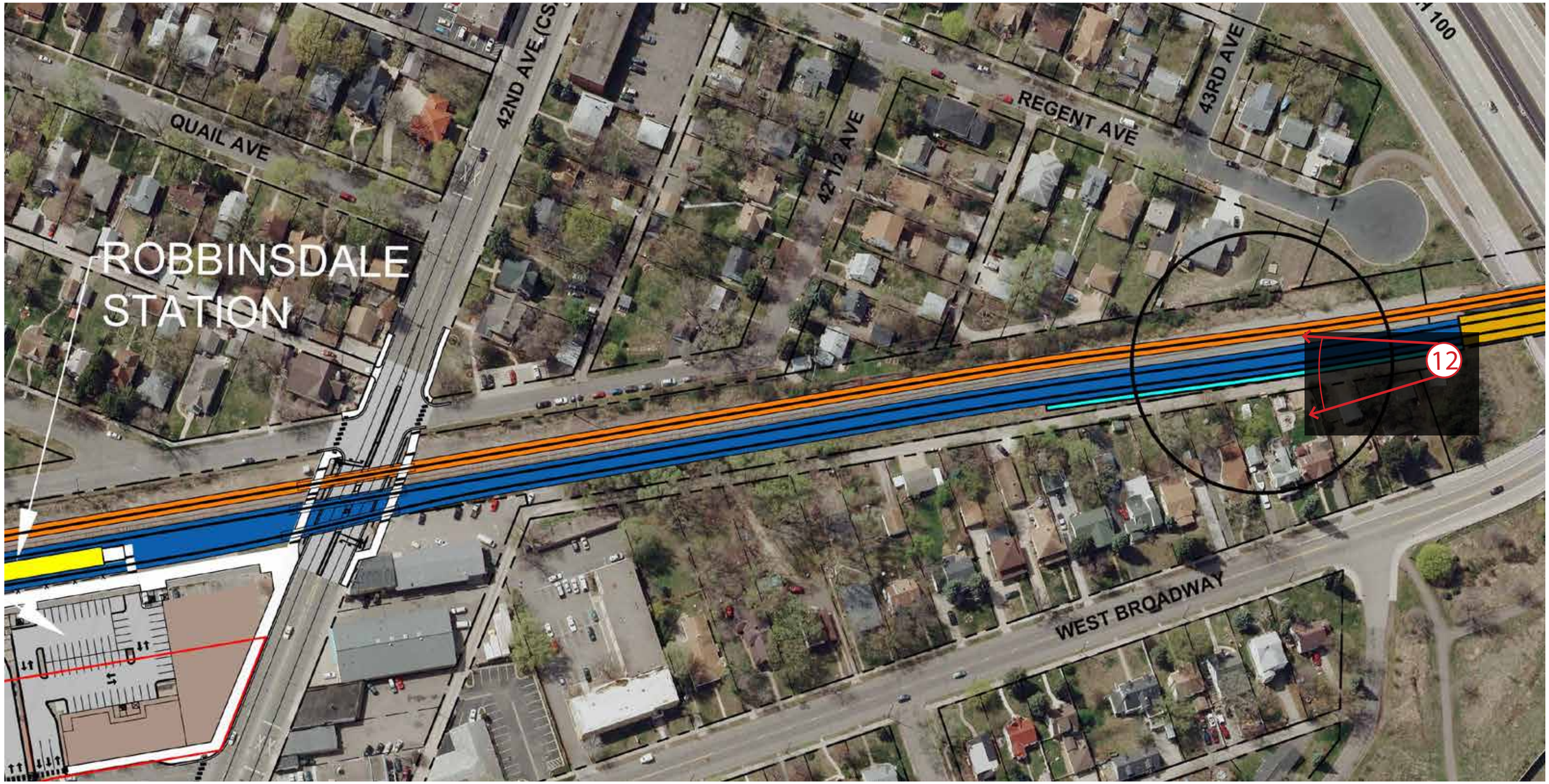

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LRT TRACK AREA	SIDEWALK	EXISTING RIGHT OF WAY
FREIGHT TRACK AREA	TRAIL	PROPERTY LINE
STATION PLATFORM	ROADWAY	APPROX. LOCATION OF TRACTION POWER SUBSTATION (TPSS)
RETAINING WALL	FREIGHT ACCESS ROAD	APPROX. SIZE OF TPSS FINAL LOCATION TBD
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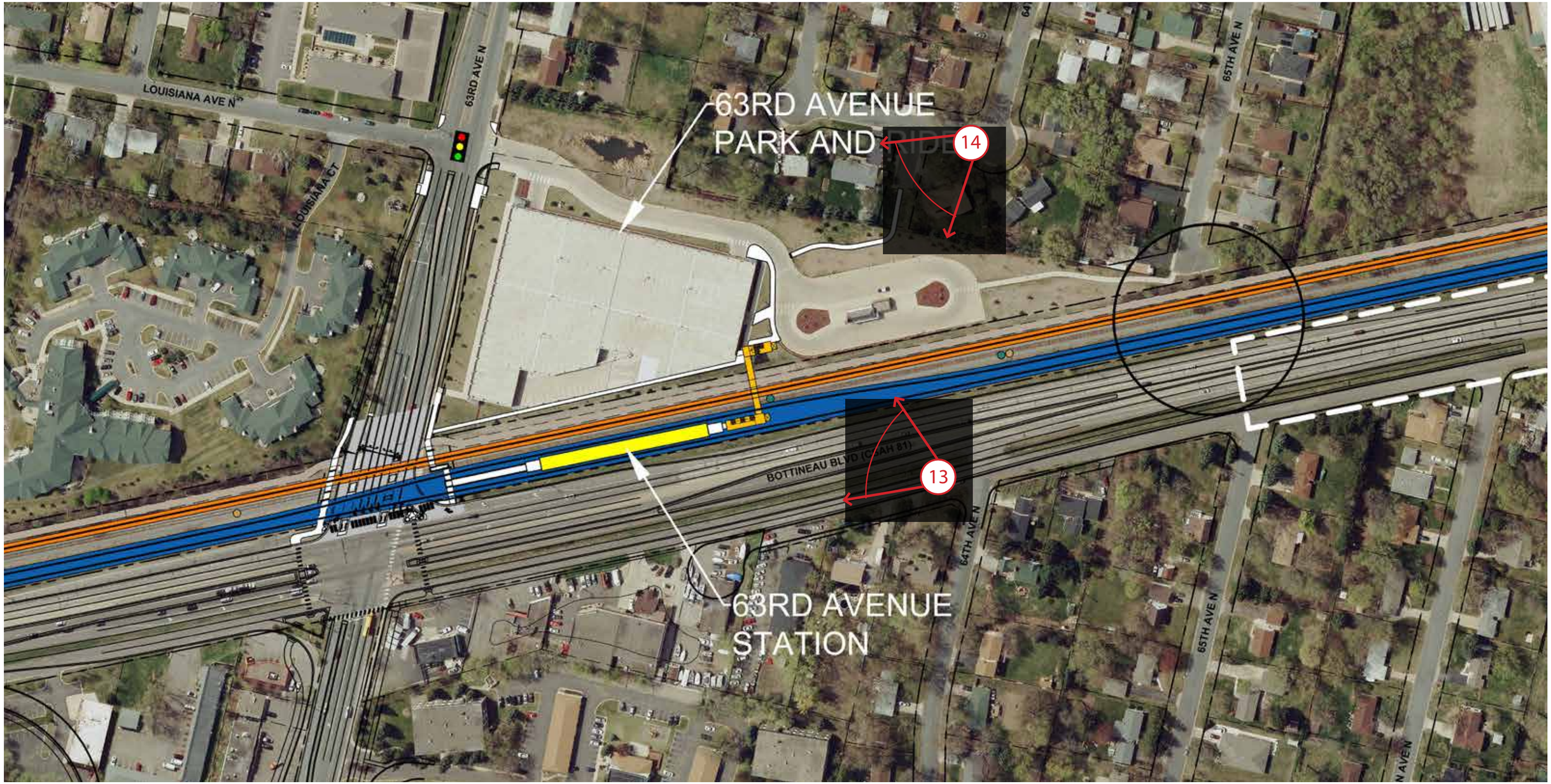

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LRT TRACK AREA	SIDEWALK	EXISTING RIGHT OF WAY
FREIGHT TRACK AREA	TRAIL	PROPERTY LINE
STATION PLATFORM	ROADWAY	APPROX. LOCATION OF TRACTION POWER SUBSTATION (TPSS)
RETAINING WALL	FREIGHT ACCESS ROAD	APPROX. SIZE OF TPSS FINAL LOCATION TBD
BRIDGE		

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BLUE LINE LRT EXTENSION

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CITY OF BROOKLYN PARK
VIEW LOCATION PLANS

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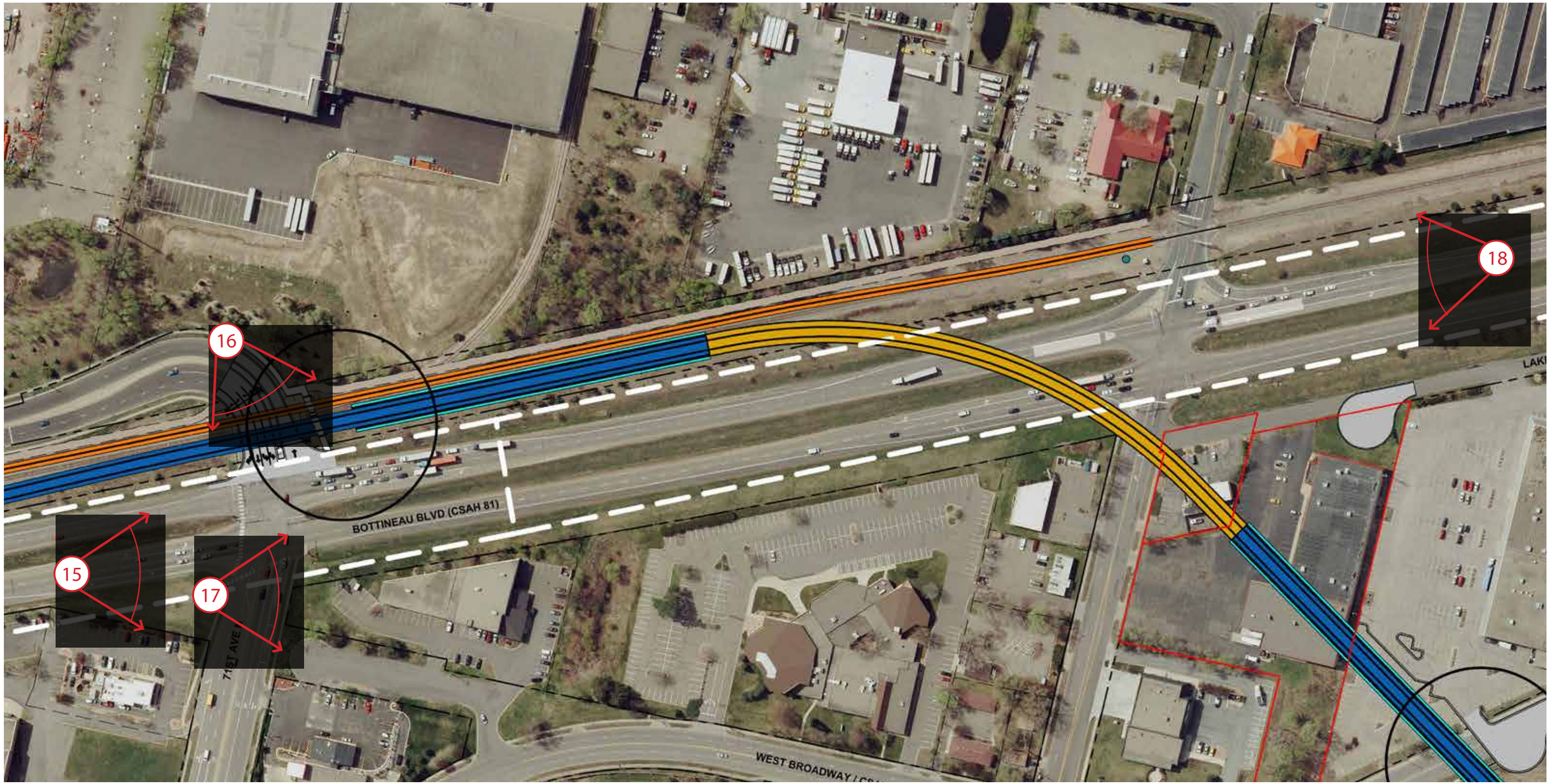

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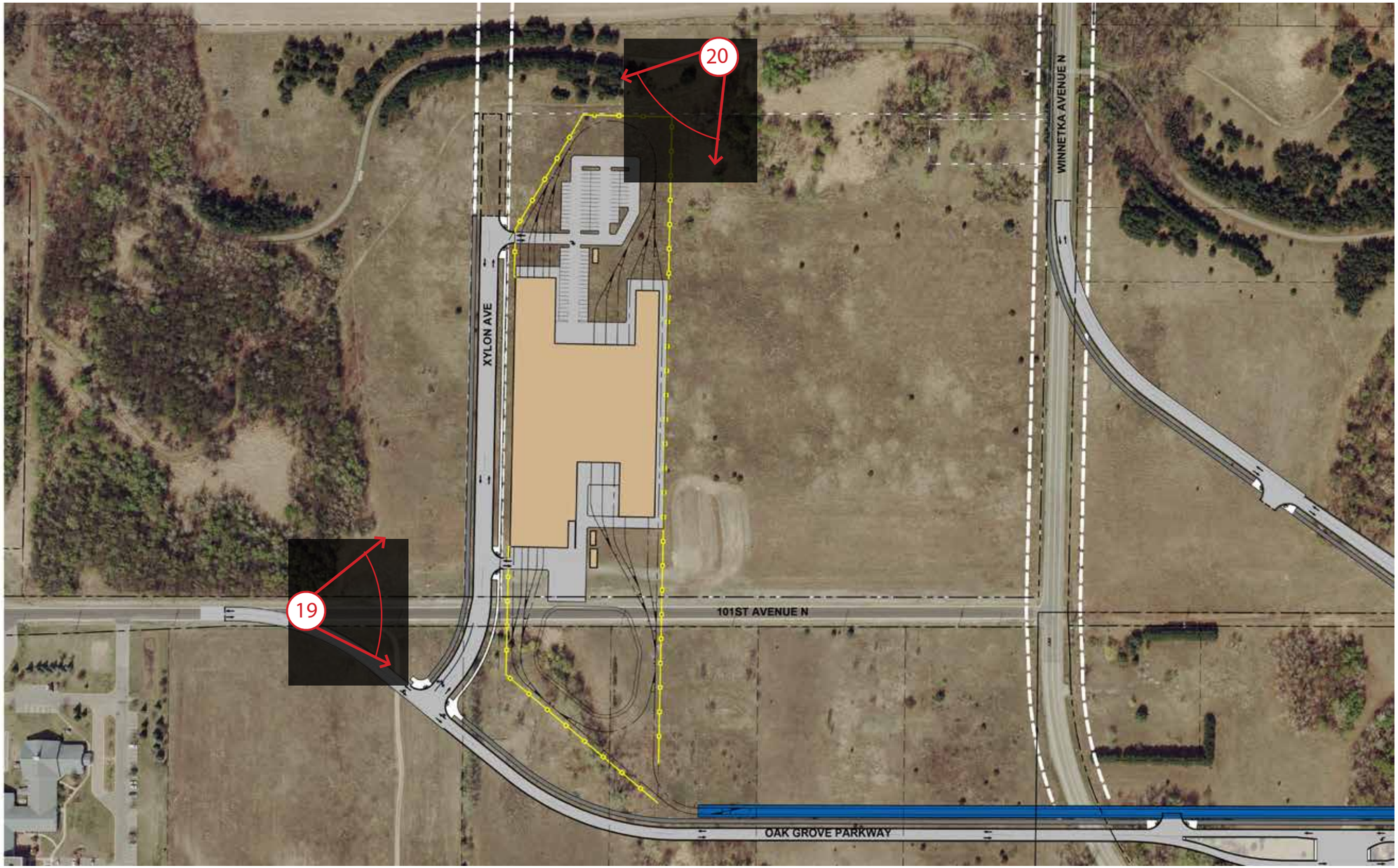

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VIEW LOCATION PLANS

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BLUE LINE LRT EXTENSION

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CITY OF GOLDEN VALLEY
VIEW FROM WIRTH LAKE BOARDWALK

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VIEW FROM WIRTH LAKE BOARDWALK

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CITY OF GOLDEN VALLEY
VIEW OF WIRTH PARK TRAIL

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VIEW FROM XERXES AND FARWELL AVENUE

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VIEW WEST FROM PLYMOUTH AVENUE

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VIEW WEST FROM PLYMOUTH AVENUE

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VIEW SOUTH FROM PLYMOUTH AVENUE BRIDGE

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VIEW SOUTH FROM PLYMOUTH AVENUE BRIDGE

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BLUE LINE LRT EXTENSION

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VIEW NORTH FROM PLYMOUTH AVENUE BRIDGE

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VIEW FROM THEODORE WIRTH PARK CHALET

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VIEW FROM THEODORE WIRTH PARK CHALET

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CITY OF GOLDEN VALLEY
VIEW NORTH FROM THEODORE WIRTH PARK GOLF COURSE

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VIEW NORTH FROM THEODORE WIRTH PARK GOLF COURSE

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CITY OF GOLDEN VALLEY
VIEW SOUTH FROM THEODORE WIRTH PARKWAY

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VIEW SOUTH FROM THEODORE WIRTH PARKWAY

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CITY OF GOLDEN VALLEY
VIEW WEST AT GOLDEN VALLEY ROAD AND THEODORE WIRTH PARKWAY

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CITY OF GOLDEN VALLEY
VIEW WEST AT GOLDEN VALLEY ROAD AND THEODORE WIRTH PARKWAY

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VIEW SOUTH FROM THEODORE WIRTH PARKWAY

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CITY OF ROBBINSDALE
VIEW FROM 41ST AVENUE AND HUBBARD AVENUE

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CITY OF ROBBINSDALE
VIEW FROM 41ST AVENUE AND HUBBARD AVENUE

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CITY OF ROBBINSDALE
VIEW NORTHEAST FROM 41ST AVENUE

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CITY OF ROBBINSDALE
VIEW NORTHEAST FROM 41ST AVENUE

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CITY OF ROBBINSDALE
VIEW EAST ALONG 42ND AVENUE

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CITY OF ROBBINSDALE
VIEW EAST ALONG 42ND AVENUE

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CITY OF ROBBINSDALE
VIEW SOUTHEAST FROM RESIDENTIAL ALLEY

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CITY OF ROBBINSDALE
VIEW SOUTHEAST FROM RESIDENTIAL ALLEY

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CITY OF BROOKLYN PARK
VIEW FROM TRAIL LOOKING SOUTH TOWARDS 63RD AVENUE

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CITY OF BROOKLYN PARK
VIEW FROM TRAIL LOOKING SOUTH TOWARDS 63RD AVENUE

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PROPOSED

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CITY OF BROOKLYN PARK
VIEW FROM NEIGHBORHOOD WEST OF 63RD AVENUE STATION

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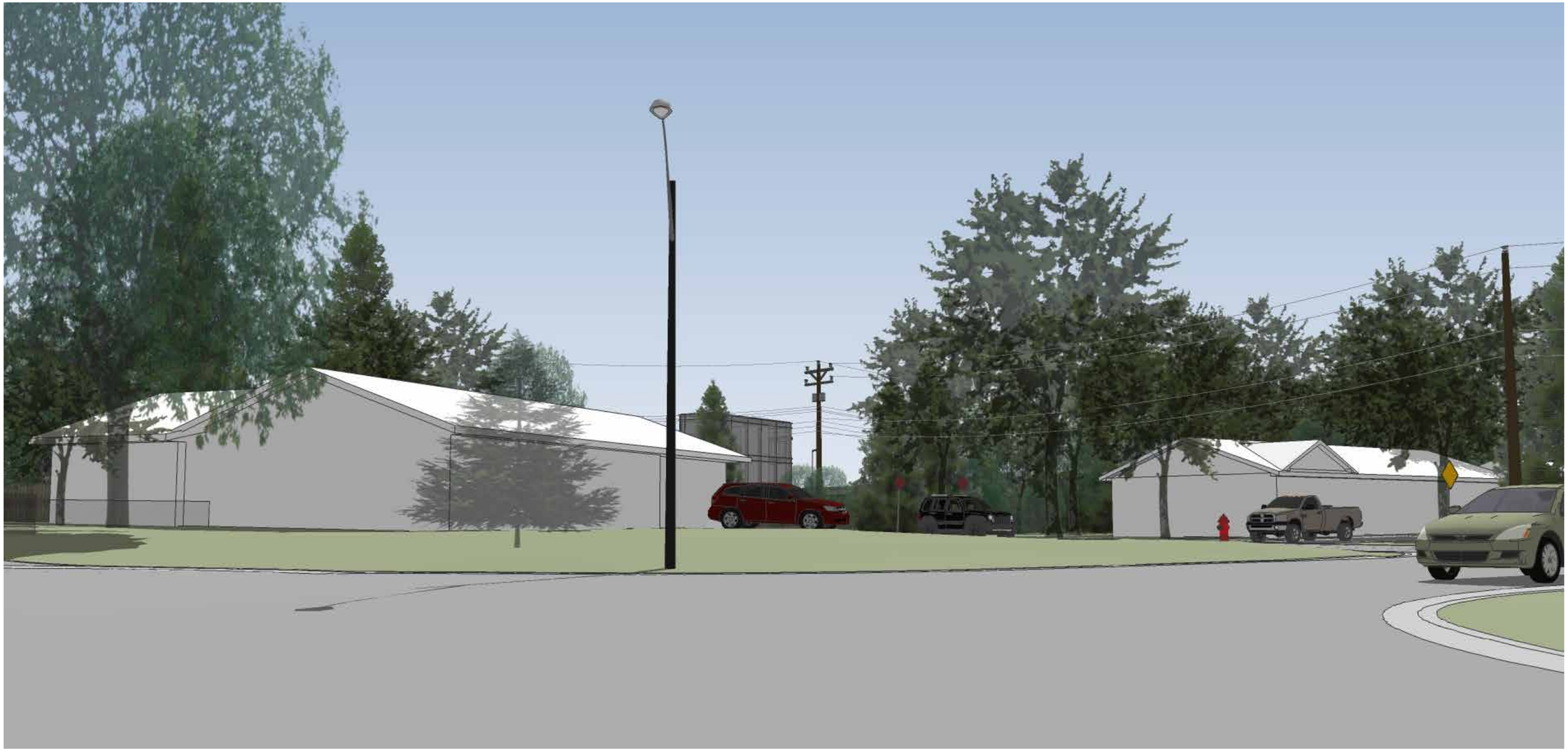

CITY OF BROOKLYN PARK
VIEW FROM NEIGHBORHOOD WEST OF 63RD AVENUE STATION

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CITY OF BROOKLYN PARK
VIEW FROM BOTTINEAU BLVD / CR-81 AT 71ST AVENUE LOOKING NORTH

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CITY OF BROOKLYN PARK
VIEW FROM BOTTINEAU BLVD / CR-81 AT 71ST AVENUE LOOKING NORTH

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CITY OF BROOKLYN PARK
VIEW FROM 71ST AVENUE LOOKING EAST

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CITY OF BROOKLYN PARK
VIEW FROM 71ST AVENUE LOOKING EAST

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CITY OF BROOKLYN PARK
VIEW FROM SOUTHEAST CORNER OF BOTTINEAU BLVD / CR-81 AND 71ST AVENUE

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CITY OF BROOKLYN PARK
VIEW FROM SOUTHEAST CORNER OF BOTTINEAU BLVD / CR-81 AND 71ST AVENUE

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CITY OF BROOKLYN PARK
VIEW FROM BOTTINEAU BLVD / CR-81 AT 73RD AVENUE LOOKING SOUTH

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CITY OF BROOKLYN PARK
VIEW FROM BOTTINEAU BLVD / CR-81 AT 73RD AVENUE LOOKING SOUTH

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CITY OF BROOKLYN PARK
VIEW FROM 101ST AVENUE N LOOKING EAST

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CITY OF BROOKLYN PARK
VIEW FROM 101ST AVENUE N LOOKING EAST

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CITY OF BROOKLYN PARK
VIEW FROM RUSH CREEK REGIONAL TRAIL

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CITY OF BROOKLYN PARK
VIEW FROM RUSH CREEK REGIONAL TRAIL

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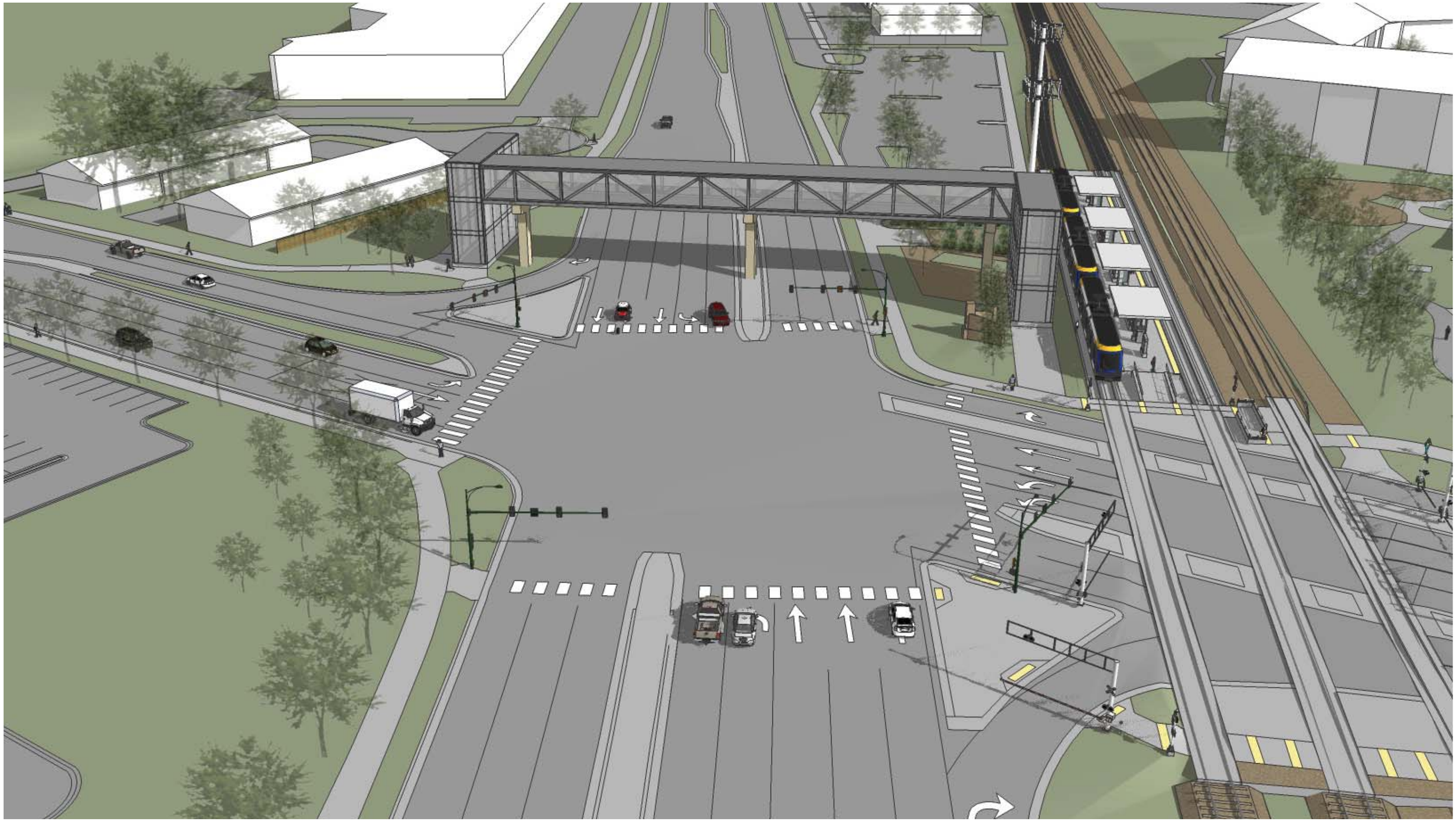
DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	21 EXISTING	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE



DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	21 PROPOSED	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	22 EXISTING	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	22 PROPOSED	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

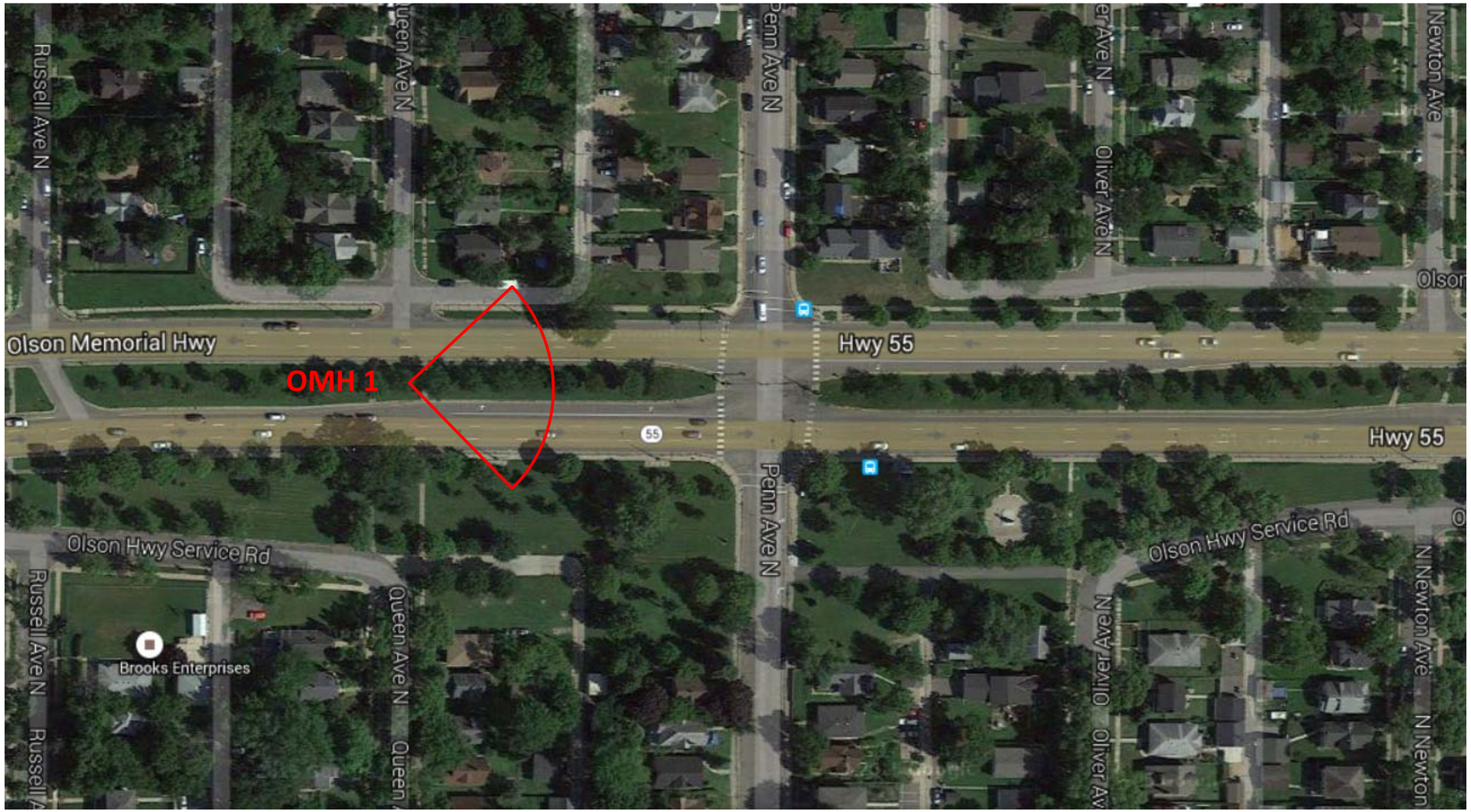
DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	23 EXISTING	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL PEDESTRIAN OVERPASS AT BASS LAKE ROAD DUAL VERTICAL CIRCULATION OPTION	E	Rev 0 01/25/2016	23 PROPOSED	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

Olson Memorial Highway Median: Sketchup View

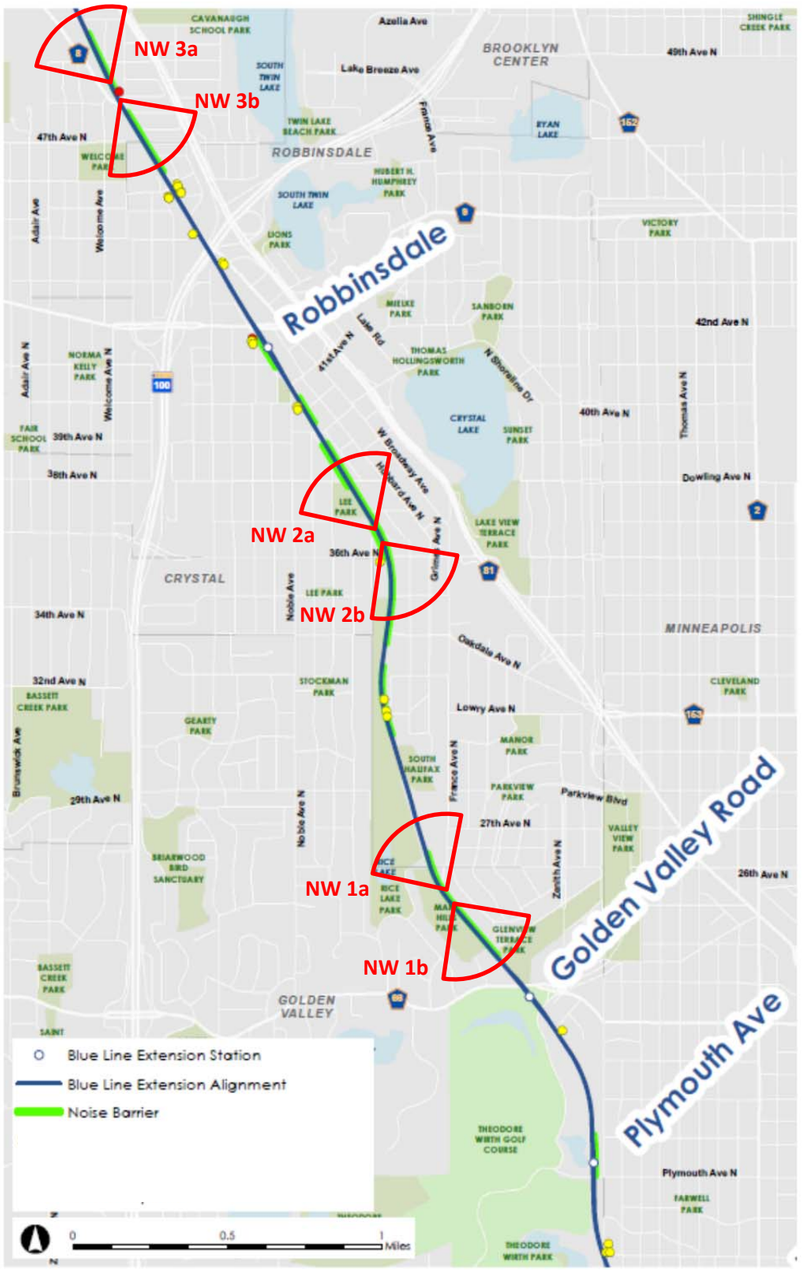


Olson Memorial Highway (OMH) Median View Location Map

OMH 1a: Existing view of Olson Memorial Highway median; View to the east toward Penn Avenue

OMH 1b: Sketchup view of Olson Memorial Highway median with project

Proposed Noise Wall Location Photographs



NW 1a: View to the northwest - noise wall would be on the east side of the corridor (right in the photo)

NW 1b: View to the southeast - noise wall would be on the east side in the background (left of the corridor in the photo)

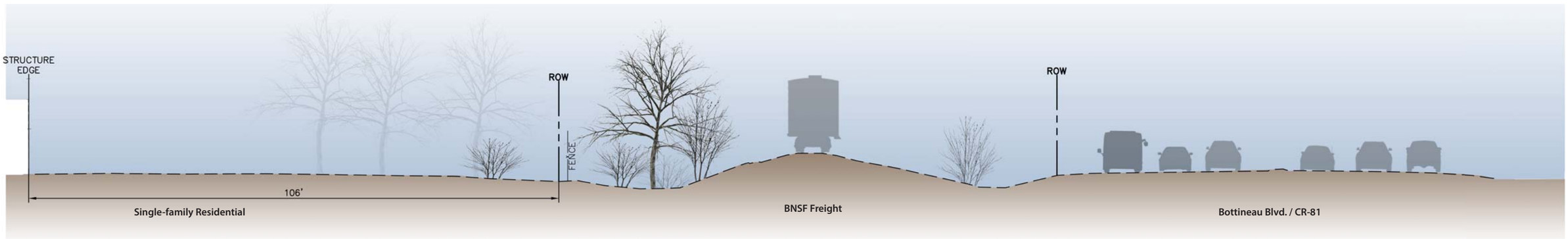
NW 2a: View to the northwest - noise walls would be on the east and west sides of the corridor

NW 3a: View to the northwest - noise wall would be on the east side of the corridor (right in the photo)

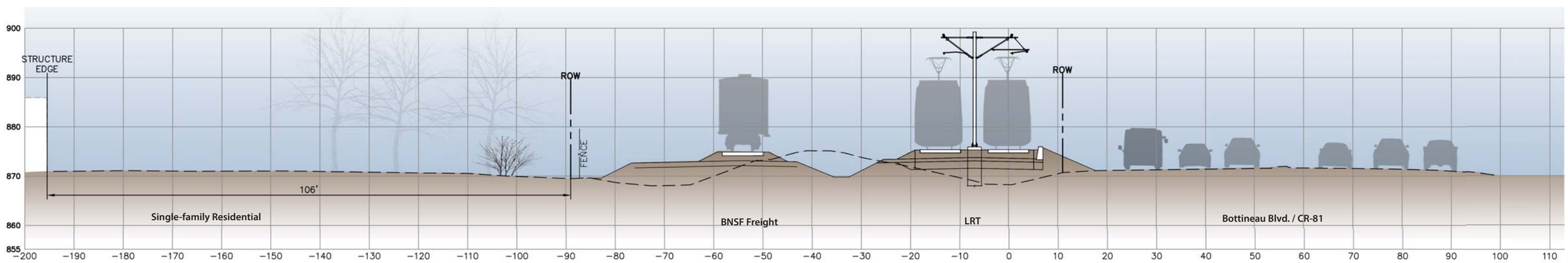
NW 2b: View to the southeast - noise wall would be on the east side of the corridor (left in the photo)

NW 3b: View to the southeast - noise wall would be on the east side of the corridor (left of the rails in the photo)

Light Vegetation - Existing Condition



Freight Corridor - Existing Condition

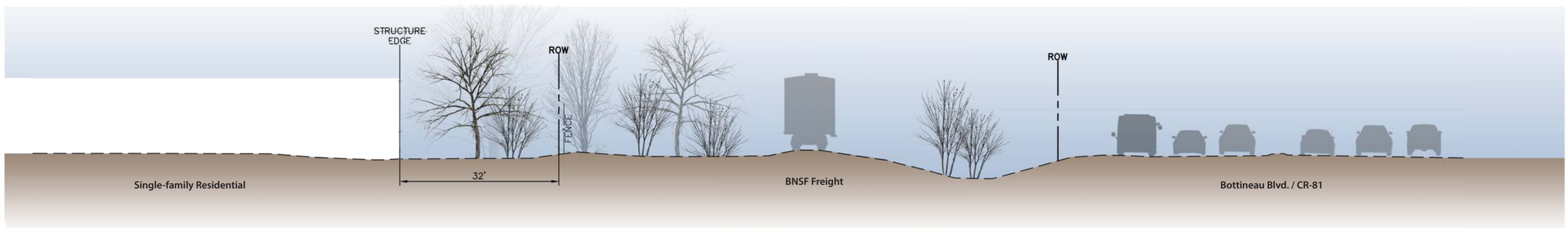


Freight & Light Rail Corridor

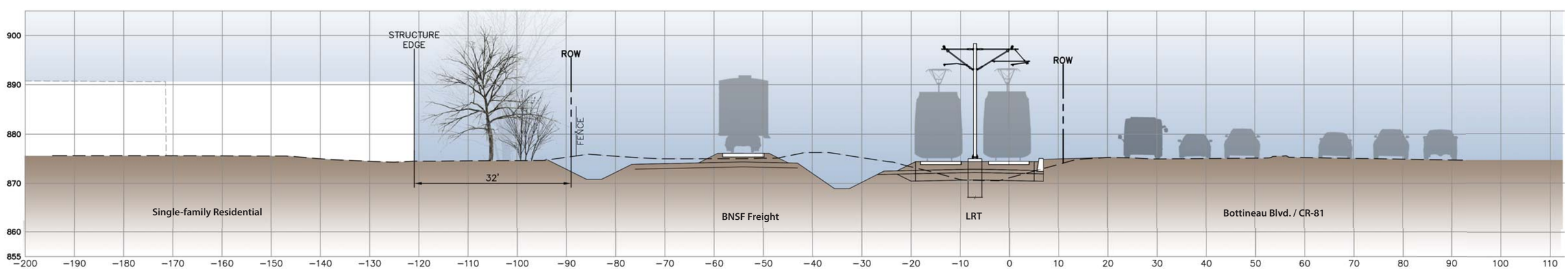
DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL BNSF RAILWAY CORRIDOR - TYPICAL SECTIONS VEGETATION REVIEW - LIGHT CONDITION	SHEET 1 OF 3	Rev 0 02/10/2016	0 10' 20'	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

Moderate Vegetation - Existing Condition



Freight Corridor - Existing Condition

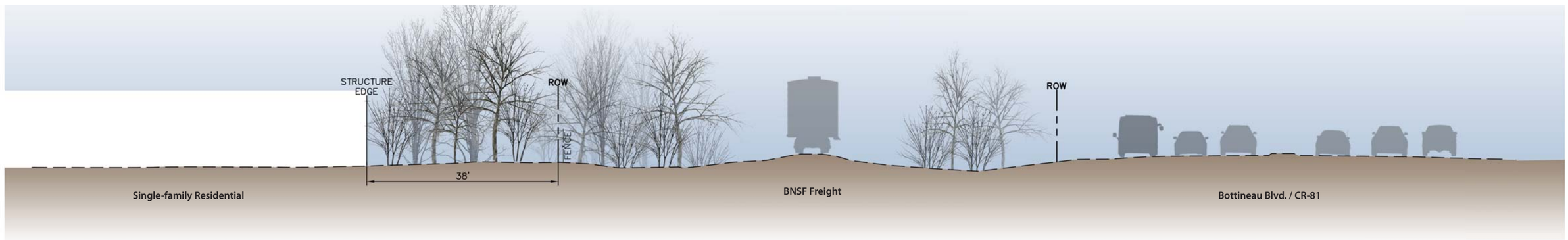


Freight & Light Rail Corridor

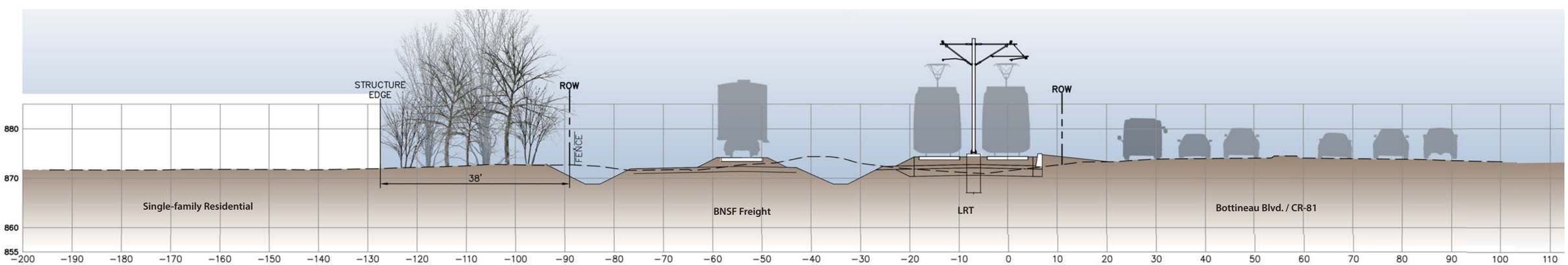
DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL BNSF RAILWAY CORRIDOR - TYPICAL SECTIONS VEGETATION REVIEW -MODERATE CONDITION	SHEET 2 OF 3	Rev 0 02/10/2016	0 10' 20'	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

Dense Vegetation - Existing Condition



Freight Corridor - Existing Condition



Freight & Light Rail Corridor

DRAFT-WORK IN PROCESS

METRO BLUE LINE EXTENSION Bottineau LRT	BLUE LINE LRT EXTENSION CITY OF CRYSTAL BNSF RAILWAY CORRIDOR - TYPICAL SECTIONS VEGETATION REVIEW - DENSE CONDITION	SHEET 3 OF 3	Rev 0 02/10/2016	0 10' 20'	METROPOLITAN COUNCIL · Kimley»Horn · SRF Consulting Group, Inc. · miller dunwiddie ARCHITECTURE

Appendix F
Supporting Technical Reports

F.4 Economic Impacts of Bottineau LRT

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Internal Memorandum

DATE: December 21, 2015

TO: Caroline Miller, MetroTransit
Kathryn O'Brien, MetroTransit

FROM: Todd Graham, Regional Policy and Research (602-1322)

SUBJECT: Economic impacts of Bottineau LRT

This memo describes a Bottineau LRT economic impact analysis, prepared to inform the project's EIS. A baseline and an alternative build scenario are specified in Metropolitan Council's REMI-PI economic model. This model returns the following impacts representing our expectations for Bottineau LRT.

During the construction phase, 2018-20:

- Minnesota employment (jobs) will expand **+3,762 more *jobXyears*** for the 2018-20 period.
- Personal income for the 3-year period will be **+$349 million higher** than in the base case. (All figures expressed in constant 2015 $)
- Workers employed will come from both the metro region and Greater Minnesota: $223 million (58%) of the personal income gained will situate in the metro region, $125 million (32%) in Greater Minnesota, and $38 million (10%) will be earned by workers from out-of-state.
- Gross domestic product for the state (GSP), representing the size of the Minnesota economy, will be **+$593 million higher** than in the base case.
- Of that **$593 million** of additional economic activity, 93% will be situated at businesses in the metro region; 7% in Greater Minnesota.

Over the long-term:

- The economic impact of Bottineau LRT will be small initially, but will grow as accessibility gains and mode shifts bring benefits to the metro industries.
- Minnesota employment (jobs) will be **+279 jobs higher** in 2030 than in the base case.
- Annual personal income will be **+$30 million higher** in 2030 than in the base case.
- Gross domestic product for the state (GSP) will be **+$118 million higher** in 2030 than in the base case.
- The cumulative additional GSP grows from **$593 million** for 2018-2020 to **$1.197 Billion** for 2018-2030 to **$3.012 Billion** for 2018-2040. It takes 15 years of accessibility gains and mode shift benefits for the project to "pay for itself" through economic returns.

Economic impact analysis. Metropolitan Council uses a REMI-PI model for economic impact analyses. For the Bottineau LRT project, I have prepared a scenario to represent the Bottineau LRT project as a major infrastructure investment, which may generate spillover economic activity. In the short-term, 2018-20, the construction phase provides an economic stimulus to the regional economy.

In the long-term, beyond 2020, the Bottineau LRT marginally improves transit accessibility for commuting workers who use the expanded transit system, and also marginally mitigates car ownership and associated costs.

METROPOLITAN COUNCIL

In this scenario, I assume:

- The new LRT improves labor accessibility, specifically for transit-dependent residents who are newly connected to worksite locations because of Bottineau LRT service. Overall regional labor accessibility improves +0.03% in the first year of service, rising to +0.04% in the second year, and beyond.
- Additionally, there will be a small fraction of new frequent riders who are motivated to reduce their car ownership. After five years, the new LRT will reduce regional car ownership by -1,200 and car-ownership costs by $10 million per year.
- Household expense for transit will increase. Given the transportation forecast of 12,100 net new daily trips, the corresponding transit costs are higher by $6.1 million per year.
- The Bottineau LRT has no effect on roadways drive times and congestion, and no benefit to freight movement. While Bottineau LRT will mitigate 200,000 regional vehicle miles traveled (VMT) per day, a separate transportation model analysis find that drive times do not improve as a result.

For comparison with the build scenario, the *base case* is the economic growth path found in Metropolitan Council's long-range forecast to 2040.

Data inputs. Data inputs needed to construct the build scenario are drawn from the project's environmental impact statement:

- $1.293 Billion of transitway capital investment during 2018-20, including.
    - $860 million for construction.
    - $433 million for administration, design, engineering, and other professional services.
- $748 million in local and state taxes collected *in Minnesota* to fund the construction phase.
    - In economic modeling, taxes are a debit against disposable personal income, and can slow economic growth. Still, in the case of Bottineau LRT, an equal-sized investment comes from a national revenue pool – this is external investment.
    - For expediency, the build scenario assumes that the timing of local and state tax revenues coincides with the spending of same.
- Following the conclusion of the construction phase, Bottineau LRT will have permanent employment of 145 jobs for operations and maintenance.
    - For this modeling, I specify a fixed public sector budget scenario in which the operation and maintenance of Bottineau LRT is a fiscal substitute for other public spending and employment that would have occurred in a *no-build* scenario.
    - Infrastructure maintenance for Bottineau LRT is assumed to be 1% of the initial cost and is credited as annual expenditure to maintain the nonresidential capital stock. (The infrastructure maintenance estimate does not include operations.)

Not considered in the scenario. The modeling accounts for the local, metro and state taxes raised and directed to the Bottineau LRT project. Other factors and costs expected during the construction phase have *not* been introduced to the model.

- $136 million budgeted for LRT-vehicles is *not* considered as a stimulus factor. The LRT-vehicles are manufactured out of state; thus their manufacture induces no additional economic activity here.
- $67 million for purchase of right of way does not by itself generate economic activity, and so is also *not* considered as a stimulus factor.

- While the FEIS acknowledges disruptions to business (noise, disrupted access to local streets), those costs have not been quantified, and have not been introduced to the model.

Short-term economic impact results. Short-term impacts, now to 2020, are substantially positive during the construction phase – and this is mainly a windfall gain from the external (federal government) investment in the region.

Table 1. Net effects of construction (short-term) activity

External investment (US FTA investment)	$748,000,000
2018-20 Economic Impact	
• Output	$1,135,000,000
• Gross State Product	$593,000,000
• Personal Income	$349,000,000
• Employment (jobs x years)	3,762
Impact compared to external investment	
• Output	1.517 x external invest.
• Gross State Product	0.792 x external invest.
• Personal Income	0.467 x external invest.
• Employment (jobs x years)	5.03 per $1 million

Source: Metropolitan Council analysis.

In response to the direct stimulus of the construction phase:

- ***Metro region.*** Cumulative employment located in the metro region during 2018-20 will be +3,275 more *jobXyears* in the build scenario than the base case. The construction and professional services industries will account for the largest share of this new employment.
- The REMI-PI model estimates that Bottineau LRT project itself accounts for 4,850 construction industry *jobXyears*. The construction resources needed to accomplish Bottineau LRT are diverted during this period to an extent that some other projects and some industries lose employment temporarily.
- Cumulative personal income for the metro region during 2018-20 will be +$223 million larger (constant 2015 $) in the build scenario than the base case.
- Cumulative gross domestic product for the metro (GMP) will be larger by +$556 million (constant 2015 $) for the three-year period 2018-20.

- ***Greater Minnesota.*** Cumulative employment located in the rest of Minnesota during 2018-20 will be +487 more *jobXyears* in the build scenario than the base case. This is all indirect and induced economic growth.
- Cumulative personal income for the rest of Minnesota during 2018-20 will be +$125 million larger (constant 2015 $) in the build scenario than the base case; most of this personal income gain are paycheck earnings from worksites in the metro region, brought back by commuters to home locations in Greater Minnesota.
- Cumulative gross domestic product for the rest of Minnesota will be larger by +$37 million (constant 2015 $) for the three-year period 2018-20; this amount only accounts production situated in Greater Minnesota.

- ***Minnesota, statewide.*** Cumulative employment for the state during 2018-20 will be +3,762 more *jobXyears* in the build scenario than the base case.
- Cumulative personal income for the state during 2018-20 will be +$349 million larger (constant 2015 $) in the build scenario than the base case.
- Workers employed will come from both the metro region and Greater Minnesota: $223 million (58%) of the personal income gained will situate in the metro region, $125 million (32%) in Greater Minnesota, and $38 million (10%) will be earned by workers from out-of-state.
- Cumulative gross domestic product for the state (GSP) will be larger by +$593 million (constant 2015 $) for the three-year period 2018-20. Of that $593 million of additional economic activity, 94% will be situated at businesses in the metro region; 6% in Greater Minnesota.

Long-term economic impact results. Following the conclusion of the construction phase, *after* 2020, the indirect and induced impacts of the construction itself will quickly taper off.

Residents will enjoy improved accessibility to workplaces and other destinations. Overall labor accessibility (the metro region average number of workers within commute distance of workplaces) improves slightly. Some transit-dependent workers are enabled to reach workplaces they could not have reached prior. At higher levels of labor accessibility improvement, the region's industries are more successful in finding and hiring workers who best fit industries' talent needs.

Long-term economic impact derives from these marginal accessibility gains and also car ownership mitigation. These adjustments to the economy should mature 5-7 years after the start of Bottineau LRT operation.

Table 2. Long-term net impacts of Bottineau LRT

	2018-20	2021-30	2031-40
	3 years	10 years	10 years
• Gross State Product	$593,000,000	$603,000,000	$1,815,000,000
o Construction	$636,000,000	-$115,000,000	$33,000,000
o Professional and technical services	$52,000,000	$155,000,000	$210,000,000
o All other private sector	-$95,000,000	$477,000,000	$1,422,000,000
o Transit and ground passenger transportation	0	$75,000,000	$80,000,000
o All other government	0	$11,000,000	$70,000,000
• Personal Income	$349,000,000	$114,000,000	$561,000,000
• Employment (jobs x years)	3,762	751	5,260

Source: Metropolitan Council analysis.

- ***Minnesota employment.*** In the 10th year of Bottineau LRT operation (2030), state total employment will be +279 jobs higher than the base case.
    - Throughout the forecast period, the transit industry itself is the largest employment gainer, with 145 directly created jobs in the metro region. Initially, during 2021-27, transit's gain is balanced by slight losses in other industries.

    - Beyond that, as industries absorb the benefit of the improved labor accessibility, the long-term employment gains are broad-based, spread among all industry sectors.
- ***Annual personal income.*** Closely related to employment, annual personal income in 2030 will be +$30 million higher (constant 2015 $) than the base case.
- ***Gross domestic product for the state (GSP).*** The most complete measure of the economy's expansion due to Bottineau LRT is gross domestic product. Gross domestic product is a summarization of "final goods and services" production, removing duplication of intermediate inputs and supplies. Gross domestic product in 2030 will be +$118 million higher (constant 2015 $) than the base case.
    - Summarizing all of the economic gains, the cumulative additional GSP grows from $593 million for 2018-2020 to $1.197 Billion for 2018-2030 to $3.012 Billion for 2018-2040.
    - In the first years of operation, all of the economic impacts from accessibility improvements and car ownership mitigation will be situated in the metro region. Gradually, the metro's economic growth spills over. For the entire period 2018-2040, 96% of the additional economic activity is situated at businesses in the metro region; 4% in Greater Minnesota.

An Excel spreadsheet accompanying this memo provides a time-series of results for each year, 2018 to 2044.

Assumptions details. Projections of the economic return from labor accessibility gain are based on average economic returns observed historically and in other regions – data available to the REMI-PI model. The eventual Twin Cities results for the forecast period could be higher or lower than the historically-based, average, generic case.

Beyond the construction phase economic stimulus, Bottineau LRT's economic impact depends on what it does for the greater transportation system, providing residents expanded transit. These outcomes are introduced to the REMI-PI model as factors affecting economic performance.

From a separate transportation modeling analysis, SRF Consulting forecasts that Bottineau LRT will prompt 12,100 net new trips by transit. Most of that new transit use will be for work commutes (5,800 net new home-based work trips). For economic modeling purposes, these trips only constitute a labor accessibility gain if they connect workers to workplaces that the workers could not reach prior, but for the new LRT service.

Additionally, SRF Consulting forecasts that Bottineau LRT will prompt a reduction of 200,000 daily vehicle miles traveled, due to travel mode shift; equivalent to -0.2% of daily VMT in the region. However, there will be no improvement in average roadway speeds, and no measureable improvement to overall accessibility *on roadways*.

For economic modeling, the build scenario assumes a +0.03% regionwide labor accessibility improvement in the first full year of service, with the improvement growing to +0.04% in the second year, and beyond. I arrive at this estimated improvement by considering the transit accessibility improvement for the workforce most certain to benefit:

- From analysis of Census data, an estimated 0.08% of the metro workforce is both transit-dependent (no vehicles) *and* living in the immediate area of Bottineau LRT stations.
- Within these station areas, SRF Consulting finds that transit accessibility will improve by 47%.
- The multiplicative product of these two variables is 0.04%.

The assumption of accessibility gains is an exogenous input to the REMI-PI model, not a prediction of the model. (REMI-PI is not a transportation model designed to project accessibility and transportation network outcomes.) This and all of the exogenous inputs and have leverage on the economic model results. The economic impact of Bottineau LRT is most sensitive to the extent of regional labor accessibility improvement. Attentive to this, the specific assumption – a +0.03% to 0.04% improvement in regionwide labor accessibility improvement – is deliberately conservative.

The regional economy may benefit in another way as well: There will be new frequent transit riders who are motivated to reduce their car ownership. For this analysis, after five years the new LRT will reduce total regional car ownership by -0.05% (or -1,200 vehicles) and associated car-ownership costs by $10 million per year. This mitigated spending by households outweighs the increased spending on transit fares (12,100 net new trips / 2 trips per day X $85 monthly pass X 12 months = $6.1 million per year), and the balance allows other uses or savings. Long-term economic benefits result.