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Metro Transit

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**Date:** May 5, 2016

**Subject:** METRO Orange Line BRT A&E Design Services  
Traffic Impact Study

**Introduction**

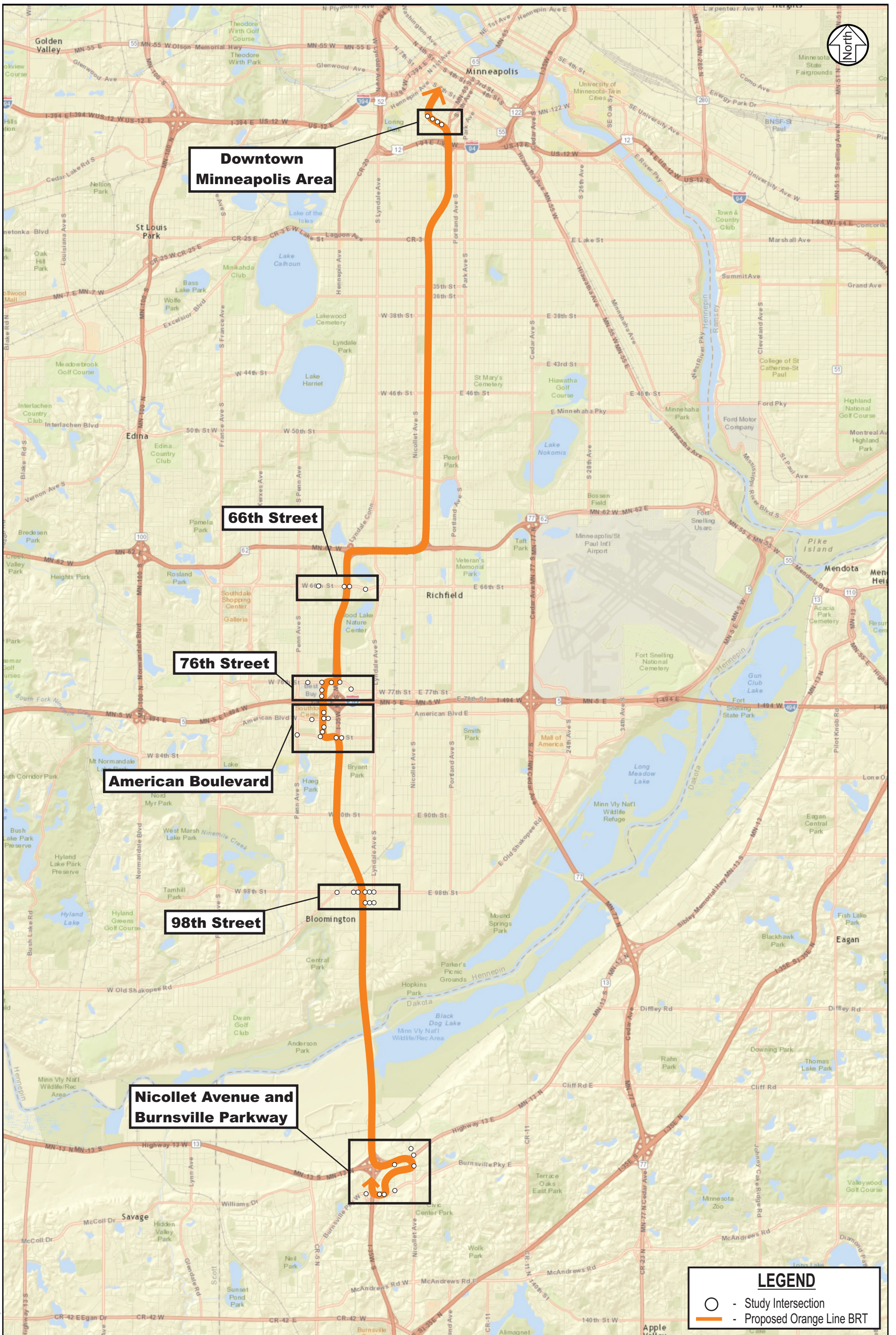
A traffic impact study was completed for the METRO Orange Line BRT A&E Design Services to assess the potential impacts to general purpose traffic at arterial intersections as a result of implementing the Orange Line Bus Rapid Transit (BRT). The results of this study are for inclusion in the Documented Categorical Exclusion (DCE). The Orange Line BRT project follows the I-35W corridor from Burnsville to downtown Minneapolis (see Figure 1). Results from this study were used to: 1) identify and describe potential traffic and parking impacts; 2) determine whether existing intersections have adequate capacity to accommodate increased bus service and associated Park-and-Ride traffic; and 3) describe connectivity to other transportation facilities and modes.

The existing 46th Street Station does not impact arterial intersections and the future Lake Street Station impacts are being documented under a separate project, so these stations were excluded from this analysis. The Orange Line BRT stations analyzed and the jurisdictional review agencies in addition to Metro Transit are shown in Table 1.

**Table 1. Jurisdictional Review Agencies by Station**

Station	Jurisdictional Review Agencies
Downtown Minneapolis Area	City of Minneapolis and MnDOT
66th Street	City of Richfield, Hennepin County, and MnDOT
76th Street	City of Richfield, City of Bloomington, Hennepin County, and MnDOT
American Boulevard	City of Richfield, City of Bloomington, Hennepin County, and MnDOT
98th Street	City of Bloomington, Hennepin County, and MnDOT
Nicollet Avenue and Burnsville Pkwy	City of Burnsville, Dakota County, and MnDOT





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## Data Collection

Existing traffic volumes, geometry, and traffic controls within the study area are shown in Figures A-1 through A-6 attached in Attachment A.

Weekday a.m. and p.m. peak period turning movement counts were collected during February 2016 at the study intersections. Counts were not performed on days when there was anticipated snow or there was snow on the roadways. These turning movements were compared to existing Minnesota Department of Transportation (MnDOT) annual average daily traffic (AADTs) to ensure the counts collected were representative of a typical day.

Field observations were also completed to identify roadway characteristics within the study area (e.g. roadway geometry, posted speed limits, and traffic control). The roadway characteristics were used to assist with the development of the traffic operations models.

## Traffic Forecasts

To support the traffic operations analysis, daily and peak hour (a.m. and p.m. peak) traffic forecasts were developed for all study intersections under the following scenarios:

- Year 2040 No Build
- Year 2040 Build
- Year 2019 (Opening Year) No Build
- Year 2019 (Opening Year) Build.

The following summarizes the daily and peak hour traffic forecast methodology.

### Year 2040 Daily Forecasts

Daily traffic forecasts were estimated based on published existing AADTs, previous traffic forecasting studies, Thrive MSP 2040 socioeconomic assumptions, and engineering judgment. No detailed travel demand modeling was completed for this study. Below is a list of sources referenced and the corresponding station area:

- Orange Line Downtown Connection Study (2015) – Downtown Minneapolis Area
- 66th street Corridor Study (2013) – 66th Street Station
- I-494/TH 62 Congestion Relief Study and Travel Demand Model (2015) – 76th Street, American Boulevard, and 98th Street Stations
- Dakota County Travel Demand Model/Comprehensive Plan (2009) – Nicollet Avenue and Burnsville Parkway.

Adjustments were made to account for differences in analysis forecast horizons, and updated 2040 socioeconomic assumptions as of March 2016. Traffic forecasts from the Hennepin County TSP, Richfield and Bloomington Comprehensive Plans were reviewed, but not used since these forecasts

were either less refined, or inconsistent with current year 2040 socioeconomic forecasts. The year 2040 daily traffic forecasts estimated from these sources were reviewed for reasonableness by comparing traffic growth rates to TAZ level socioeconomic growth in each station area and roadway segment travelshed.

### **Year 2040 and Year 2019 Peak Hour Turning Movement Forecasts**

Peak hour turning movement forecasts were developed based on daily traffic forecasts and existing year 2016 turning movement counts. The turning movement forecasts were derived using the NCHRP 255 iterative process, which consists of the following steps:

- Daily forecasts were converted to directional approach volumes based on existing peak hour percentages and directional distribution.
- Intersection inflows and outflows were balanced and existing turning movements were adjusted to match the approach forecasts.
- A statistical review process was implemented as a reasonableness check on the forecast turning movements. This included an analysis of peak hour percentages, directional distribution by movement, previously published forecasts, and magnitude of growth. Existing peak hour percentages were maintained.
- Intersection turning movements were balanced with adjacent intersections for use in the operations analysis. Additional quality control checks were applied to review intersections with large volume imbalances.

Year 2040 Park-and-Ride trips were generated, distributed and added to the year 2040 No Build turning movement forecasts to develop year 2040 Build turning movement forecasts. The following is a summary of the Park-and-Ride assumptions:

- Capacity reduction at the existing Knox Avenue Park-and-Ride.
- No Park-and-Ride will be constructed at American Boulevard.
- No Park-and-Ride capacity increase at South Bloomington Transit Center.
- With the implementation of the Orange Line BRT there will be an increase in demand of 300 spaces at the existing Nicollet Park-and-Ride.

Year 2019 No Build turning movements were estimated utilizing linear interpolation between year 2040 peak hour forecasts and existing year 2016 turning movements. Year 2019 Park-and-Ride trip generation was added to the year 2019 No Build traffic volumes to develop year 2019 Build turning movement forecasts.

The year 2019 peak hour turning movement forecasts are shown in Figures A-13 through A-18 in Attachment A. The year 2040 peak hour turning movement forecasts are shown in Figures A-7 through A-12 also in Attachment A.



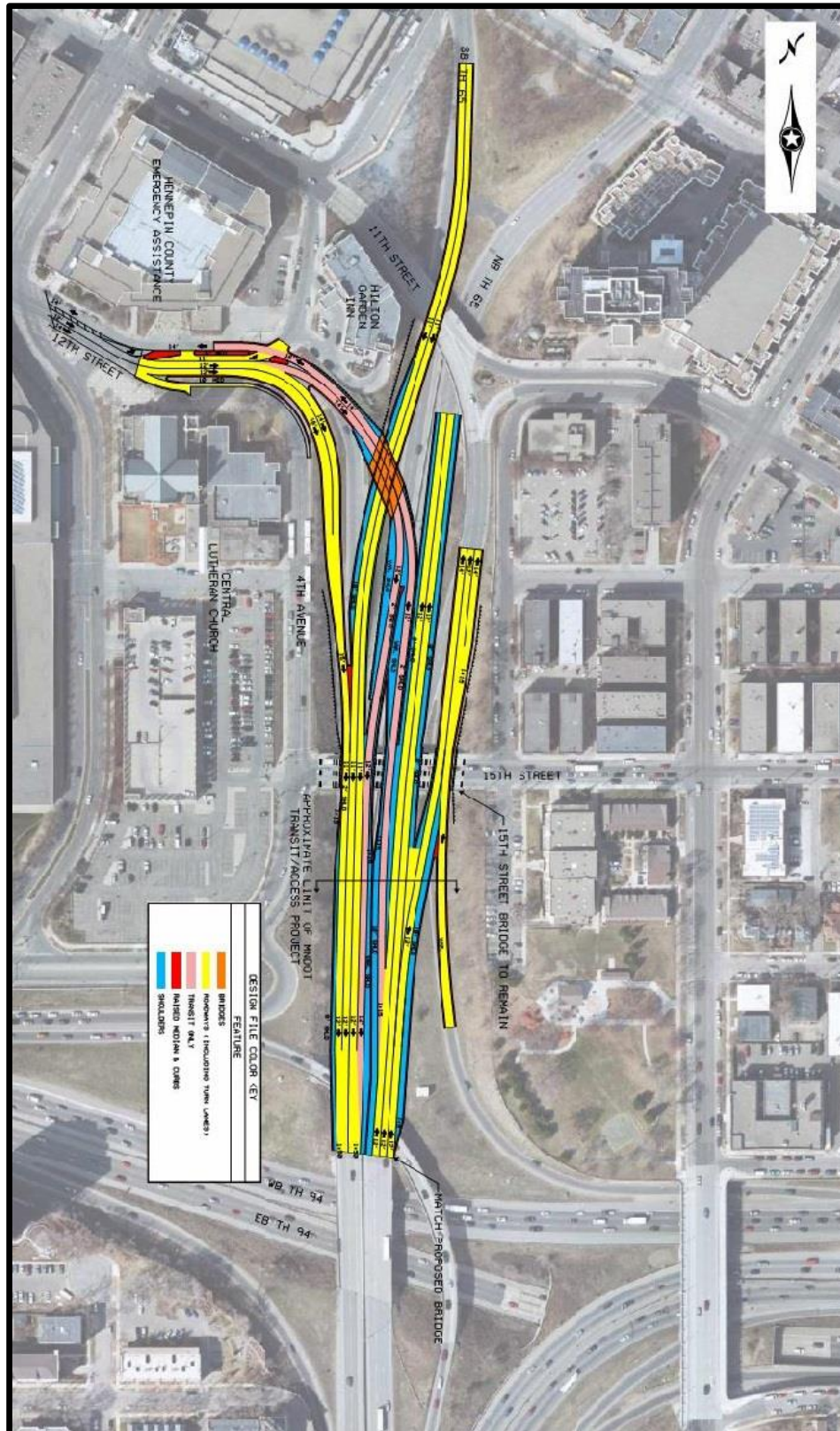
## **Geometric Alternatives**

Various geometric improvements were evaluated to provide a connection between I-35W and 12th Street in Downtown Minneapolis. Ultimately, an alternative for this connection was selected, which is described below. Alternatives were also evaluated to provide a continuous Knox Avenue connection from Knox Avenue south of I-494 to Knox Avenue north of I-494. To provide this connection, a tunnel is proposed to be constructed under I-494. Two alternatives for this connection were carried forward and analyzed for traffic operations, which are described below.

### **Downtown Minneapolis Area Stations - 12th Street Transit Ramp**

The Orange Line BRT will connect to 12th Street in downtown Minneapolis via a new transit-only ramp connecting 12th Street with I-35W (see Figure 2). This future connection will provide a dedicated bus-only connection allowing buses to access I-35W to/from the inside lane on I-35W. As part of this connection, a westbound bus-only contraflow lane will be provided on 12th Street connecting the new transit-only ramp to 2nd Avenue. The contraflow lane will require the removal of 15 on-street parking spaces.

Figure 2. 12th Street Transit Ramp Connection

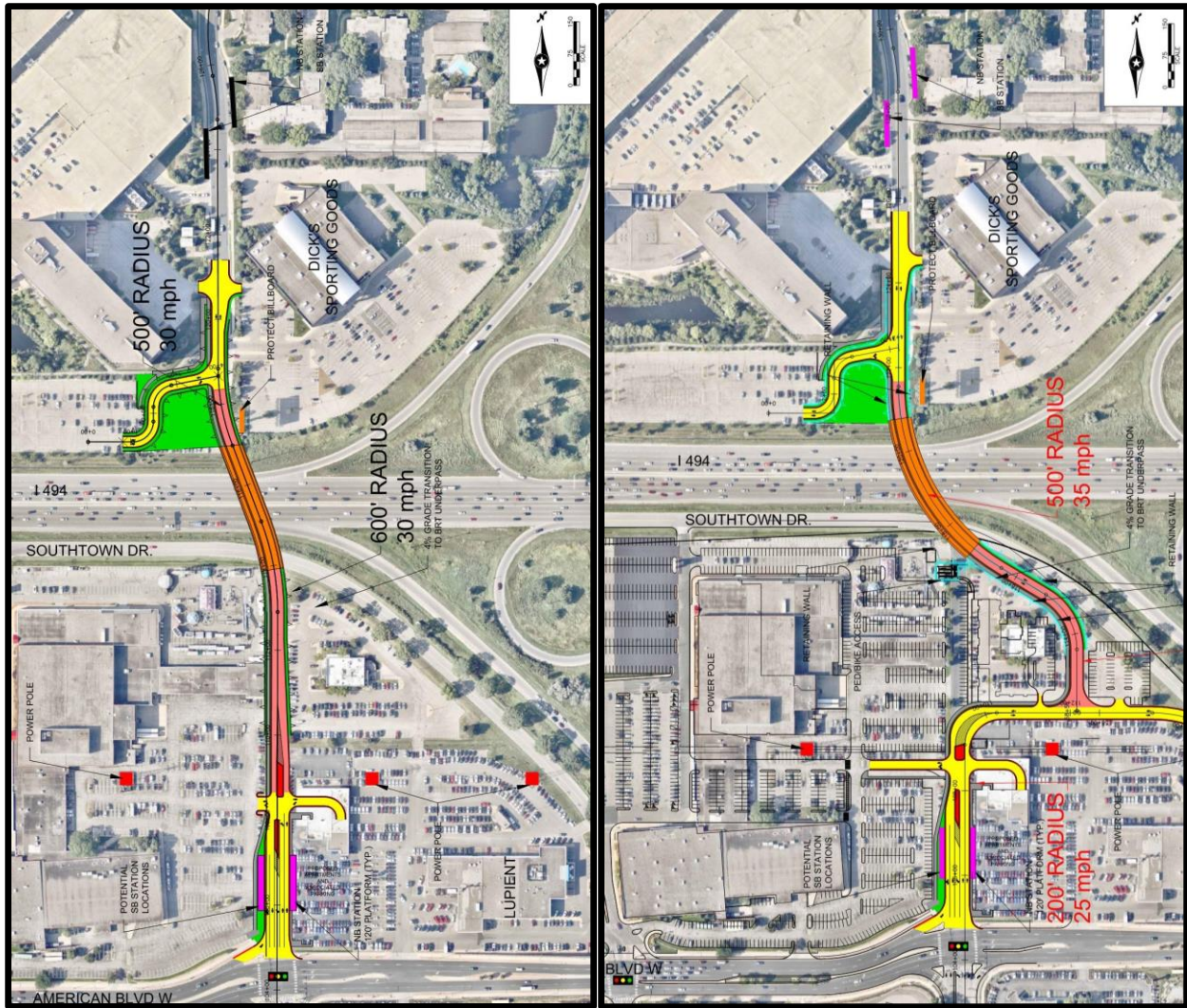




### Knox Avenue Connection Alternatives

Two alignment alternatives were compared for the Knox Avenue connection from the 76th Street station to the American Boulevard station (see Figure 3). These connections include a transit-only tunnel under I-494 that will accommodate the future I-494/I-35W reconstruction. The first alternative is the Curved Alignment where Knox Avenue is realigned to the east and a curve is proposed to bring Knox Avenue back to the tunnel. The second Alternative is the Direct Alignment where Knox Avenue is proposed to follow its current alignment to the tunnel under I-494.

Figure 3. Knox Avenue Connection Alternatives



Direct Alignment

Curved Alignment

## Traffic Analysis Methodology

The traffic operations analysis was conducted using PTV Vissim (version 8.00-05). Vissim is a multimodal traffic analysis software program capable of analyzing the interaction between transit uses, general purpose traffic, and pedestrians and bikes. Potential impacts to the transportation system from implementing the Orange Line BRT were determined by comparing Build and No Build analysis results. Specific measures of effectiveness (MOEs) used include: 1) overall average delay per vehicle by intersection; 2) overall intersection levels of service (LOS); and 3) average and maximum queues by approach.

### Traffic Analysis Assumptions

The traffic analysis was completed for the a.m. and p.m. peak hours using the assumptions outlined in Table 2.

**Table 2. Modeling Assumptions**

Model Component	Scenario	Assumptions
Roadway Geometry	Existing/No Build	Existing roadway geometry.
	Build	Same as existing except transit-only ramp at 12th Street and realignment of Knox Avenue for transit-only tunnel under I-494.
Signal Timing	Existing	Existing signal timing.
	No Build	Optimized signal timing.
	Build	Optimized signal timing and TSP at key signalized intersections.
Transit	Existing/No Build	Existing bus routes, headways, and station locations.
	Build	Existing bus routes and headways except Route 535 replaced by Orange Line. Existing station locations and addition of BRT stations.
Orange Line	Build	10-minute headways in a.m. and p.m. peak hours.

### Transit Signal Priority

Transit Signal Priority (TSP) was included in the analysis to determine the potential benefit for transit vehicles and the potential impacts it could have to general-purpose traffic. The transit advantage was determined by comparing the change in average delay by movement per BRT bus at locations where TSP is recommended.

A slack-time analysis was performed to determine the locations where there is slack-time that TSP could take advantage of. In addition to the slack-time analysis, the volume to capacity ratio (v/c) for the intersections and the specific BRT movement through the intersection (i.e. left-turn, through, or right-turn) were used to develop a list of recommended intersections to implement TSP.



The following is a list of intersections and the movement that is recommended to implement TSP:

- 66th Street/I-35W Southbound Ramp – Southbound through
- 66th Street/I-35W Northbound Ramp – Northbound through
- 76th Street/I-35W Northbound Ramp – Eastbound left-turn
- American Boulevard/Knox Avenue – Northbound/Southbound through
- 82nd Street/Knox Avenue – Southbound left-turn
- 82nd Street/I-35W Northbound Ramp – Northbound left-turn
- 98th Street/I-35W Southbound Ramp – Southbound left-turn
- 98th Street/I-35W Northbound Ramp – Northbound through/left-turn
- Burnsville Parkway/I-35W NB Ramp – Southbound through.

TSP is not recommended to be implemented at the Downtown Minneapolis signals since the BRT will operate in a dedicated bus lane, so there would be a minimal transit advantage. TSP is also not recommended to be installed for any right-turn movements. Besides the downtown Minneapolis signal, TSP is recommended for all BRT left-turns and through movements with the exception of the westbound left-turn at 76th Street/Knox Avenue and the eastbound through at 98th Street/I-35W. It is not recommended to implement TSP for the westbound left-turn at 76th Street/Knox Avenue since there is a permissive westbound left-turn phase that is over 75 seconds in the a.m. and p.m. peak hours. It is not recommended to implement TSP for the eastbound through at 98th Street/I-35W Northbound Ramp since both the northbound and southbound BRT will be a northbound movement at this intersection, and implementing TSP on the northbound approach has a greater travel time savings advantage for the BRT.

The reduction for each signal phase for TSP was calculated as the minimum of either the slack time or 1/3 the existing split. This can be modified in the future if it is determined the impact to general purpose traffic is greater than expected.

## Traffic Analysis Results

The results of the traffic analysis are summarized below. The results are separated based on the location and jurisdiction of the Orange Line BRT stations. The five include:

- Downtown Minneapolis Area Stations
- 66th Street Stations
- 76th Street and American Boulevard Stations
- 98th Avenue Stations
- Nicollet Avenue and Burnsville Parkway Stations.

### Downtown Minneapolis Area Stations

The results of the operations analysis for the Downtown Minneapolis Area Stations are shown in Tables 3 and 4.

**Table 3. AM Downtown Minneapolis Area Stations Intersection Results**

Intersection	Existing		2019 No Build		2019 12th Street Transit Ramp		2040 No Build		2040 12th Street Transit Ramp	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
South 12th Street and Marquette Avenue South	19	B	19	B	20	C	19	B	20	C
South 12th Street and 2nd Avenue South	15	B	15	B	15	B	16	B	15	B
South 12th Street and 3rd Avenue South	16	B	16	B	18	B	17	B	19	B
South 12th Street and 4th Avenue South	1	A	1	A	1	A	1	A	1	A

**Table 4. PM Downtown Minneapolis Area Station Intersection Results**

Intersection	Existing		2019 No Build		2019 12th Street Transit Ramp		2040 No Build		2040 12th Street Transit Ramp	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
South 12th Street and Marquette Avenue South	23	C	23	C	23	C	24	C	23	C
South 12th Street and 2nd Avenue South	20	C	21	C	22	C	22	C	24	C
South 12th Street and 3rd Avenue South	19	B	19	B	19	B	19	B	20	C
South 12th Street and 4th Avenue South	1	A	1	A	1	A	1	A	1	A

The results of the operations analysis indicate that all study intersections in Downtown Minneapolis are currently operating acceptably, with a LOS C or better in the a.m. and p.m. peak hours. All the study intersections are expected to continue to operate acceptably in year 2019 and year 2040, both with and without the implementation of the Orange Line BRT. The increase in delay in the build scenarios is negligible (<5 seconds) and the LOS is still C or better at all intersections, which is considered acceptable. No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.



## 66<sup>th</sup> Street Stations

The results of the operations analysis for the 66th Street Stations are shown in Tables 5 and 6.

**Table 5. AM 66<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
<b>West 66th Street and Logan Avenue South</b>	6	A	6	A	6	A	6	A	6	A	6	A	6	A
<b>West 66th Street and I-35W SB Ramps</b>	16	B	16	B	17	B	15	B	28	C	22	C	22	C
<b>West 66th Street and I-35W NB Ramps</b>	12	B	11	B	11	B	12	B	13	B	14	B	15	B
<b>West 66th Street and Lake Shore Drive South</b>	16	B	16	B	16	B	16	B	17	B	17	B	17	B

**Table 6. PM 66<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
<b>West 66th Street and Logan Avenue South</b>	4	A	4	A	4	A	4	A	5	A	5	A	5	A
<b>West 66th Street and I-35W SB Ramps</b>	14	B	14	B	14	B	14	B	17	B	17	B	17	B
<b>West 66th Street and I-35W NB Ramps</b>	11	B	11	B	11	B	12	B	13	B	14	B	14	B
<b>West 66th Street and Lake Shore Drive South</b>	14	B	14	B	14	B	15	B	15	B	15	B	15	B

The results of the operations analysis indicate that all study intersections along 66th Street are currently operating acceptably, with LOS B or better in the a.m. and p.m. peak hours. All the study intersections are expected to continue to operate acceptably in year 2019 and year 2040, both with and without the implementation of the Orange Line BRT. The increase in delay in the build scenarios is negligible (<5 seconds) and the LOS is still C or better, which is considered acceptable. The results also indicate that TSP can be implemented at the two 66th Street/I-35W Ramp intersections without significantly impacting general purpose traffic. No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.

Even though the 66th Street/I-35W Southbound Ramp intersection is expected to operate acceptably, it is recommended to restripe the southbound approach from a left-turn lane and shared through/right-turn lane to a shared left-turn/through lane and right-turn lane. This will allow the southbound right to make a right-turn on red (RTOR) without possibly being restricted from a through vehicle. This will also provide better alignment with the receiving lane for through vehicles. The change is expected reduce the delay for both general purpose traffic and the BRT.

### 76<sup>th</sup> Street and American Boulevard Stations

The results for these two areas are reported as one since the transit-only tunnel under I-494 will provide a continuous connection for the Orange Line BRT from 76th Street to American Boulevard along Knox Avenue. The results of the operations analysis for the 76th Street Stations are shown in Tables 7 and 8, and the results for the American Boulevard Stations are shown in Tables 9 and 10. The results shown in Tables 7 through 10 are for the Direct Alignment for Knox Avenue.

**Table 7. AM 76<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
West 76th Street and Newton Avenue South	16	B	16	B	16	B	16	B	17	B	17	B	17	B
West 76th Street and Knox Avenue South	5	A	5	A	5	A	5	A	6	A	5	A	5	A
West 76th Street and I-35W SB Ramps	24	C	24	C	24	C	24	C	25	C	25	C	25	C
West 76th Street and I-35W NB Ramps	6	A	6	A	6	A	6	A	7	A	7	A	7	A
West 77th Street and Meridian Crossings	7	A	7	A	7	A	7	A	6	A	6	A	7	A
Knox Avenue South and Best Buy Parking Ramp	3	A	3	A	4	A	4	A	3	A	4	A	4	A
Knox Avenue South and Dicks Sporting Goods / Park & Ride	2	A	3	A	5	A	5	A	2	A	4	A	4	A

**Table 8. PM 76<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
West 76th Street and Newton Avenue South	21	C	22	C	21	C	21	C	24	C	24	C	24	C
West 76th Street and Knox Avenue South	14	B	15	B	15	B	15	B	23	C	23	C	21	C
West 76th Street and I-35W SB Ramps	12	B	12	B	12	B	12	B	18	B	18	B	17	B
West 76th Street and I-35W NB Ramps	16	B	17	B	17	B	17	B	19	B	20	C	19	B
West 77th Street and Meridian Crossings	16	B	16	B	16	B	16	B	20	C	20	C	21	C
Knox Avenue South and Best Buy Parking Ramp	26	D	28	D	30	D	30	D	76	F	77	F	74	F
Knox Avenue South and Dicks Sporting Goods / Park & Ride	5	A	5	A	8	A	8	A	6	A	8	A	8	A



**Table 9. AM American Boulevard Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Knox Avenue South and Southeast Parking Lot	2	A	2	A	4	A	4	A	1	A	3	A	3	A
American Boulevard and Morgan Circle	4	A	4	A	4	A	4	A	4	A	4	A	4	A
American Boulevard and Knox Avenue	10	B	11	B	12	B	12	B	11	B	11	B	12	B
American Boulevard and Lupient Chevrolet	1	A	1	A	1	A	1	A	1	A	1	A	1	A
Knox Avenue and West 81st Street	1	A	1	A	1	A	1	A	2	A	2	A	2	A
Knox Avenue and Southpoint Office	2	A	2	A	2	A	2	A	3	A	3	A	3	A
West 82nd Street and Penn Avenue South	11	B	11	B	11	B	11	B	16	B	16	B	16	B
West 82nd Street and Knox Avenue South	7	A	7	A	7	A	7	A	7	A	7	A	7	A
West 82nd Street and I-35W SB Ramps	7	A	7	A	7	A	7	A	8	A	8	A	8	A
West 82nd Street and I-35W NB Ramps	17	B	18	B	18	B	18	B	20	C	20	C	20	C

**Table 10. PM American Boulevard Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Knox Avenue South and Southeast Parking Lot	2	A	1	A	2	A	2	A	1	A	2	A	2	A
American Boulevard and Morgan Circle	14	B	15	B	16	B	15	B	26	C	26	C	24	C
American Boulevard and Knox Avenue	19	B	21	C	21	C	21	C	24	C	24	C	25	C
American Boulevard and Lupient Chevrolet	1	A	1	A	1	A	1	A	2	A	2	A	2	A
Knox Avenue and West 81st Street	6	A	6	A	6	A	6	A	18	C	17	C	16	C
Knox Avenue and Southpoint Office	6	A	8	A	8	A	9	A	45	E	48	E	55	F
West 82nd Street and Penn Avenue South	8	A	9	A	9	A	9	A	14	B	14	B	14	B
West 82nd Street and Knox Avenue South	21	C	22	C	22	C	24	C	21	C	21	C	24	C
West 82nd Street and I-35W SB Ramps	7	A	7	A	7	A	7	A	10	B	10	B	11	B
West 82nd Street and I-35W NB Ramps	10	A	10	B	10	B	10	B	17	B	17	B	18	B

The results of the operations analysis indicate that all study intersections along 76th Street, Knox Avenue, American Boulevard, and 82nd Street are currently operating acceptably, with LOS D or better in the a.m. and p.m. peak hours. All study intersections are expected to continue to operate acceptably in year 2019, both with and without the implementation of the Orange Line BRT. By year 2040, the Knox Avenue/Best Buy Parking Ramp and Knox Avenue/Southpoint Office intersections are expected to be failing without the implementation of the Orange Line BRT due to the background growth in the a.m. and p.m. hours, respectively. The implementation of the Orange Line BRT is not expected to greatly impact the Knox Avenue/Best Buy Parking Ramp intersection.

With the implementation of the Orange Line BRT with TSP, the Knox Avenue/Southpoint Office intersection is expected to worsen from LOS E to LOS F. This intersection is a side-street stop controlled intersection with a high demand on the westbound approach, which is the stopped approach, and the LOS only decreases to LOS F with TSP. If in the future this intersection operates poorly and it is determined that it is caused from TSP, the TSP parameters can be modified to reduce the priority given to the BRT.

Other than the Knox Avenue/Southpoint Office intersection, the results indicate that TSP can be implemented at 76th Street/I-35W Northbound Ramp, American Boulevard/Knox Avenue, 82nd Avenue/Knox Avenue, and 82nd Avenue/I-35W Northbound Ramp intersections in these two areas without significantly impacting general purpose traffic.

No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.

### Knox Avenue Alignment Alternative Evaluation

A comparison between the operations for the Curved Alignment and Direct Alignment was completed to determine if one is expected to provide more efficient operations or a transit advantage. The two intersections along Knox Avenue to the north of I-494 and the two intersections along Knox Avenue to the south of I-494 were included in the comparison since these are the intersections that the alignment alternatives would have the greatest impact on. The results of the comparison are shown in Tables 11 and 12.

**Table 11. Knox Avenue Connection – AM Alternative Comparison**

Intersection	2040 Curved Alignment Build		2040 Direct Alignment Build		2040 Curved Alignment Build - TSP		2040 Direct Alignment Build - TSP		2040 Direct Alignment Build - TSP	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Knox Avenue and Best Buy Parking Ramp	4	A	4	A	4	A	4	A	4	A
Knox Avenue and Dicks Sporting Goods / PnR	3	A	4	A	3	A	4	A	4	A
Knox Avenue and Southeast Parking Lot	3	A	3	A	3	A	3	A	3	A
American Boulevard West and Knox Avenue	11	B	11	B	12	B	12	B	11	B

**Table 12. Knox Avenue Connection – PM Alternative Comparison**

Intersection	2040 Curved Alignment Build		2040 Direct Alignment Build		2040 Curved Alignment Build - TSP		2040 Direct Alignment Build - TSP		2040 Direct Alignment Build S Station -TSP	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Knox Avenue and Best Buy Parking Ramp	80	F	77	F	78	F	74	F	77	F
Knox Avenue and Dicks Sporting Goods / PnR	8	A	8	A	8	A	8	A	8	A
Knox Avenue and Southeast Parking Lot	2	A	2	A	2	A	2	A	2	A
American Boulevard West and Knox Avenue	24	C	24	C	24	C	25	C	25	C



The results of the comparison indicate that both alternatives are expected to operate comparably. The difference in delay at the four selected intersections is negligible (<2 seconds) and the LOSs are the same between the two alternatives. However, the route along Knox Avenue in the Direct Alignment is shorter than the Curved Alignment; therefore, the travel time for the Direct Alignment would be shorter. There would be a 5 to 30 second reduction in travel time with the Direct Alignment compared to the Curved Alignment.

### Southbound BRT Station Location at American Boulevard

There are two possible locations for the southbound BRT station at the Knox Avenue/American Boulevard intersection, near-side (north of American Boulevard) and far-side (south of American Boulevard). All of the results shown above were determined with a near-side stop. The comparison was made assuming the Direct Alignment and TSP would be implemented at the Knox Avenue/American Boulevard intersection. The results of the comparison are shown in Tables 13 and 14.

**Table 13. Near-Side vs. Far-Side Comparison – AM Alternative Comparison**

Intersection	2040 Near-Side Stop		2040 Far-Side Stop	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Knox Avenue South and Best Buy Parking Ramp	4	A	4	A
Knox Avenue South and Dicks Sporting Goods / Park & Ride	4	A	4	A
Knox Avenue South and Southeast Parking Lot	3	A	3	A
American Boulevard West and Knox Avenue South	12	B	11	B

**Table 14. Near-Side vs. Far-Side Comparison – PM Alternative Comparison**

Intersection	2040 Near-Side Stop		2040 Far-Side Stop	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Knox Avenue South and Best Buy Parking Ramp	<b>74</b>	<b>F</b>	<b>77</b>	<b>F</b>
Knox Avenue South and Dicks Sporting Goods / Park & Ride	8	A	8	A
Knox Avenue South and Southeast Parking Lot	2	A	2	A
American Boulevard West and Knox Avenue South	25	C	25	C

The results of the comparison indicate that two alternatives operate comparably and the difference in delay at the four comparison intersections is less than five seconds per vehicle. Safety and design considerations should be the deciding factors in station location and not operations since they provide similar operations.

## 98<sup>th</sup> Street Stations

The results of the operations analysis for the 98th Street Stations are shown in Tables 15 and 16.

**Table 15. AM 98<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
West 98th Street and Old Shakopee Road	6	A	6	A	5	A	6	A	6	A	6	A	6	A
West 98th Street and Dupont Avenue South	15	B	15	B	15	B	16	B	16	B	17	B	23	C
West 98th Street and I-35W SB Ramps	2	A	2	A	2	A	3	A	3	A	3	A	7	A
West 98th Street and I-35W NB Ramps	14	B	15	B	15	B	19	B	17	B	17	B	21	C
West 98th Street and Aldrich Avenue South	1	A	1	A	1	A	1	A	1	A	1	A	1	A
West 98th Street and Lyndale Avenue South	28	C	28	C	28	C	28	C	29	C	29	C	29	C
West 99th Street and Bloomington Freeway	1	A	1	A	1	A	1	A	1	A	1	A	1	A
West 99th Street and Aldrich Avenue South	3	A	3	A	3	A	4	A	3	A	4	A	4	A
West 99th Street and Lyndale Avenue South	1	A	1	A	1	A	1	A	1	A	1	A	1	A

**Table 16. PM 98<sup>th</sup> Street Station Intersection Results**

Intersection	Existing		2019 No-Build		2019 Build		2019 Build with TSP		2040 No-Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
West 98th Street and Old Shakopee Road	12	B	12	B	12	B	13	B	21	C	24	C	28	C
West 98th Street and Dupont Avenue South	17	B	19	B	19	B	22	C	37	D	40	D	43	D
West 98th Street and I-35W SB Ramps	4	A	4	A	5	A	5	A	7	A	7	A	7	A
West 98th Street and I-35W NB Ramps	16	B	16	B	17	B	19	B	20	C	21	C	23	C
West 98th Street and Aldrich Avenue South	2	A	2	A	2	A	2	A	2	A	3	A	4	A
West 98th Street and Lyndale Avenue South	33	C	33	C	33	C	33	C	35	C	34	C	35	D
West 99th Street and Bloomington Freeway	1	A	1	A	1	A	1	A	1	A	1	A	1	A
West 99th Street and Aldrich Avenue South	5	A	5	A	5	A	5	A	5	A	5	A	5	A
West 99th Street and Lyndale Avenue South	2	A	2	A	2	A	2	A	2	A	2	A	2	A

The results of the operations analysis indicate that all study intersections along 98th and 99th Street are currently operating acceptably, with LOS C or better in the a.m. and p.m. peak hours. All the study intersections are expected to continue to operate acceptably in year 2019 and year 2040, both with and without the implementation of the Orange Line BRT. The increase in delay in the build scenarios is negligible (<5 seconds) and the LOS is still D or better, which is considered acceptable. No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.

The results also indicate that TSP can be implemented at the 98th Avenue/I-35W Southbound Ramp and 98th Avenue/I-35W Northbound Ramp intersections in these two areas without significantly impacting general purpose traffic.

### Nicollet Avenue and Burnsville Parkway Stations

The results of the operations analysis for the Nicollet Avenue and Burnsville Stations are shown in Tables 17 and 18.

**Table 17. AM Nicollet Avenue and Burnsville Parkway Stations Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Nicollet Avenue and River Ridge Lane	13	B	14	B	14	B	14	B	14	B	14	B	14	B
Nicollet Avenue and Hwy 13	40	D	48	D	47	D	47	D	65	E	65	E	65	E
Nicollet Avenue and Travelers Trail	8	A	11	B	11	B	11	B	63	E	68	E	67	E
Travelers Trail and Pleasant Avenue	1	A	1	A	1	A	1	A	2	A	1	A	1	A
Burnsville Parkway and I-35W SB Ramps	11	B	11	B	11	B	11	B	14	B	15	B	15	B
Burnsville Parkway and I-35W NB Ramps	8	A	7	A	7	A	9	A	9	A	9	A	11	B
Burnsville Parkway and Gateway Boulevard	6	A	10	A	14	B	11	B	36	E	32	D	29	D
Burnsville Parkway and Pleasant Avenue	3	A	3	A	3	A	3	A	4	A	4	A	4	A

**Table 18. PM Nicollet Avenue and Burnsville Parkway Stations Intersection Results**

Intersection	Existing		2019 No Build		2019 Build		2019 Build with TSP		2040 No Build		2040 Build		2040 Build with TSP	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Nicollet Avenue and River Ridge Lane	24	C	25	C	25	C	25	C	45	D	50	D	50	D
Nicollet Avenue and Hwy 13	42	D	47	D	47	D	47	D	70	E	72	E	71	E
Nicollet Avenue and Travelers Trail	11	B	10	B	11	B	11	B	11	B	11	B	11	B
Travelers Trail and Pleasant Avenue	3	A	3	A	3	A	3	A	3	A	3	A	3	A
Burnsville Parkway and I-35W SB Ramps	23	C	23	C	23	C	23	C	31	C	31	C	31	C
Burnsville Parkway and I-35W NB Ramps	8	A	8	A	9	A	10	B	10	B	11	B	12	B
Burnsville Parkway and Gateway Boulevard	7	A	10	B	9	A	8	A	29	D	29	D	28	D
Burnsville Parkway and Pleasant Avenue	8	A	9	A	8	A	9	A	9	A	9	A	9	A

The results of the operations analysis indicate that all study intersections along Nicollet Avenue and Burnsville Parkway are currently operating acceptably, with LOS D or better in the a.m. and p.m. peak hours. All study intersections are expected to continue to operate acceptably in year 2019, both with and without the implementation of the Orange Line BRT. By year 2040, Nicollet Avenue/Highway



13, Nicollet Avenue/Travelers Trail, and Burnsville Parkway/Gateway Boulevard intersections expected to be near failing in the a.m. peak hour without the implementation of the Orange Line BRT due to background growth. These three intersections are expected to operate at LOS E in the a.m. peak hour, and the Nicollet Avenue/Highway 13 intersection is also expected to operate at LOS E in the p.m. peak hour. The analysis indicates that cycle failure is expected to occur on multiple approaches at the Nicollet Avenue/Highway 13 intersection regardless of if the Orange Line BRT is implemented or not. The implementation of the Orange Line BRT is not expected to have a significant impact to these near failing intersections, with the change in delay less than five seconds per vehicle. No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.

To reduce the impact of congestion at the Nicollet Avenue/Highway 13 intersection on the Orange Line BRT, it is recommended to implement a bus-only shoulder on the eastbound approach. This will reduce the delay for the Orange Line BRT at this intersection. Furthermore, the end of the proposed southbound Orange Line BRT route is at the Nicollet Avenue station. As such, to reduce the travel time for passengers on the southbound Orange Line BRT wishing to alight at the Burnsville Avenue station, the northbound Orange Line BRT should not depart the Nicollet Avenue station until the next BRT bus arrives. This will allow passengers to transfer buses and arrive to the Burnsville Station quicker.

The results also indicate that TSP can be implemented at the Burnsville Parkway/I-35W Northbound Ramp intersection without significantly impacting general purpose traffic.

### **Transit Signal Priority Evaluation**

The results shown previously in this memorandum indicate that TSP can be implemented at the nine identified intersections without having a significant negative impact to general purpose traffic. To further understand the benefits of TSP for the Orange Line BRT, a comparison of delay for the BRT with and without TSP was completed. The comparison evaluated the delay for the specific movements that would benefit from the implementation of TSP. The results of the comparison are shown in Table 19.

**Table 19. TSP Evaluation**

Intersection	Movement	2019 AM Build	2019 AM Build- TSP	2019 AM TSP Delay Reduction	2040 AM Build	2040 AM Build- TSP	2040 AM TSP Delay Reduction
		Delay (sec/BRT)	Delay (sec/BRT)	(sec/BRT)	Delay (sec/BRT)	Delay (sec/BRT)	(sec/BRT)
West 66th Street and I-35W SB Ramps	SBT	51 (58)	28 (22)	23 (36)	56 (51)	43 (24)	13 (27)
West 66th Street and I-35W NB Ramps	NBT	53 (71)	29 (31)	24 (40)	59 (67)	30 (36)	29 (31)
West 76th Street and I-35W NB Ramps	EBL	20 (14)	12 (12)	8 (2)	25 (30)	15 (14)	10 (16)
American Boulevard West and Knox Avenue South	NBT	66 (26)	24 (10)	42 (16)	67 (29)	25 (14)	42 (15)
American Boulevard West and Knox Avenue South	SBT	61 (39)	17 (16)	44 (23)	45 (36)	16 (16)	29 (20)
West 82nd Street and Knox Avenue South	SBL	47 (59)	7 (24)	40 (35)	38 (61)	6 (26)	32 (35)
West 82nd Street and I-35W NB Ramps	NBL	37 (28)	13 (11)	24 (17)	38 (27)	17 (12)	21 (15)
West 98th Street and Dupont Avenue South	SBL	60 (50)	24 (23)	36 (27)	60 (48)	31 (25)	29 (23)
West 98th Street and I-35W NB Ramps	NBT	111 (79)	26 (51)	85 (28)	108 (77)	27 (53)	81 (24)
West 98th Street and I-35W NB Ramps	NBL	40 (40)	24 (33)	16 (7)	29 (43)	22 (31)	7 (12)
Burnsville Parkway and I-35W NB Ramps	SBT	76 (91)	24 (23)	52 (68)	75 (88)	23 (26)	52 (62)

The results of the TSP comparison indicate that the implementation of TSP at these nine intersections would provide a significant travel time savings for the BRT. TSP would be particularly beneficial for BRT buses that are behind schedule to help them get back on schedule. The intersections where the BRT is on the minor approach would recognize the greatest benefit from TSP since there is more slack time available for these buses to take advantage of compared to buses on the major approach.

These results assume that every Orange Line BRT bus would get TSP. The decision may be made to only give TSP to buses that are a certain time behind schedule using automatic vehicle location (AVL), so reduction in delay for all BRT buses would be less than what is shown.

## Conclusions

A traffic impact study was completed to assess the potential impacts on general purpose traffic and parking at key arterial intersections with the implementation of the Orange Line BRT. Key arterial intersections were identified around the BRT station locations and grouped together based on the jurisdictional review agencies and connectivity of the intersections. The existing 46th Street Station and the proposed Lake Street Station were excluded from this analysis since the 46th Street Station does not impact arterial intersections and the Lake Street Station impacts are being documented under a separate project.

The results of the traffic impact study indicate that the Orange Line BRT can be implemented without having a significant negative impact to general purpose traffic. The following conclusions are provided:

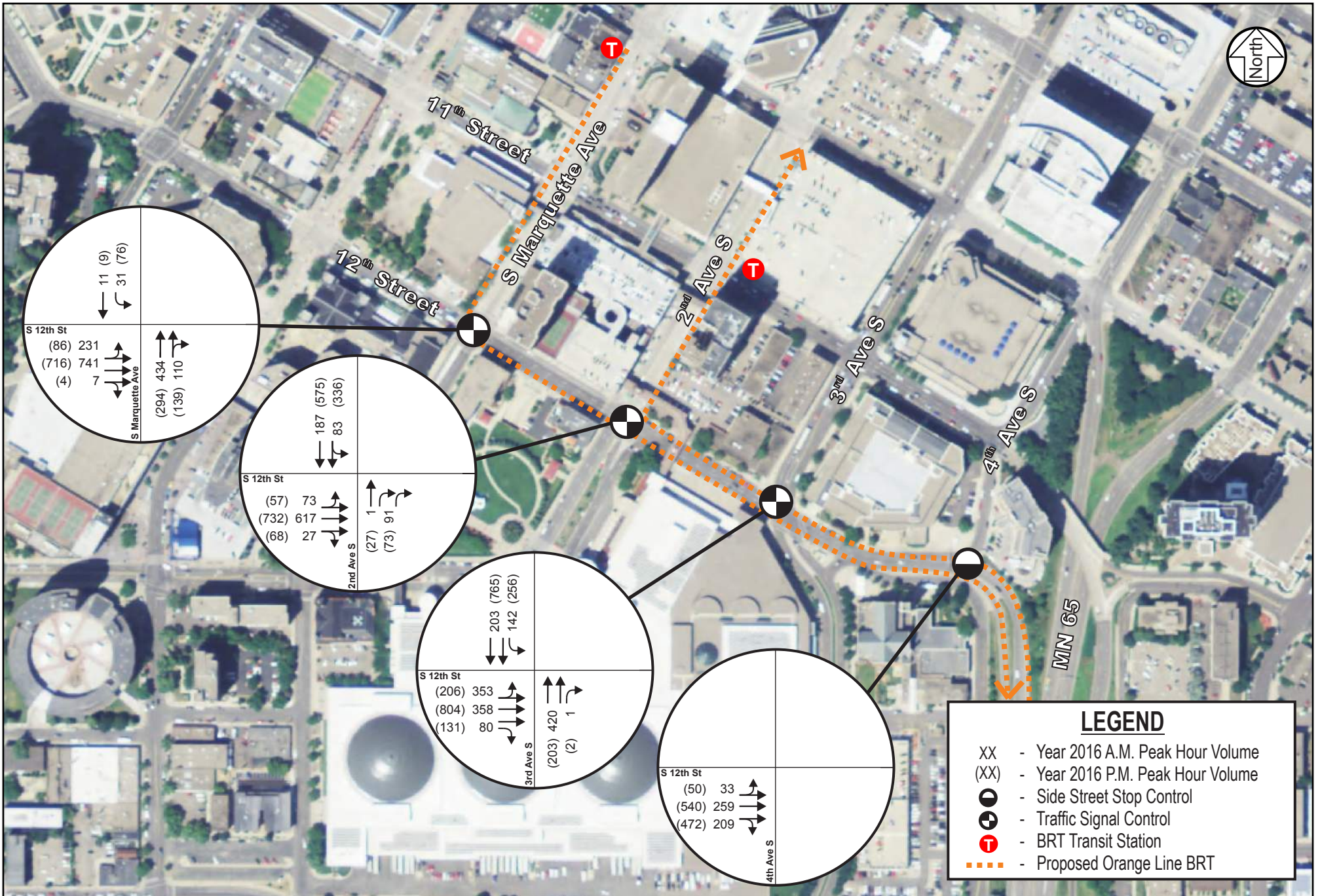
- The implementation of the Orange Line BRT is not expected to have any major impacts to general purpose traffic at the analysis intersections. No major degradations in intersection approach queues are expected with the implementation of the Orange Line BRT.
  - All study intersections currently operate at an acceptable overall LOS D or better in the a.m. and p.m. peak hours with existing geometrics and traffic control.
  - The existing intersections have adequate capacity to accommodate year 2019 and year 2040 forecast volumes, along with the increased bus service with the implementation of the Orange Line BRT.
    - Increasing development in the American Boulevard and Knox Avenue areas may lead to unacceptable future operations based on overall average delay per vehicle at two unsignalized intersections. These impacts are caused by increased vehicular traffic due to general traffic background growth on Knox Avenue and not as a result of the implementation of the Orange Line BRT.
    - A recommended improvement is at the 66<sup>th</sup> Street/I-35W Southbound Ramp intersection. The southbound approach should be restriped to a shared left-turn/through lane and separate right-turn lane to better balance lane utilization, provide better ramp alignment with the far-side station, and to minimize BRT delay. This mitigation does not cause additional impacts to general purpose traffic and is included as part of the Orange Line BRT project.
- The 12th Street Transit Ramp connection will provide a direct connection to the arterial network for BRT along with existing transit routes from future freeway bus lanes thereby reducing delay for buses caused by weaving conditions.
- With the addition of a westbound bus-only lane along 12th Street between I-35W and 2nd Avenue, the removal of 15 parking spaces on the north side of 12th Street is necessary. This improvement will decrease the number of eastbound lanes from three to two, but will cause minimum increases in average delay per vehicle (less than two seconds of delay per vehicle) along 12th Street.
- The Direct Alignment alternative for the Knox Avenue areas provides a better transit advantage compared to the Curved Alignment connection for the Knox Avenue connection under I-494 by decreasing the Orange Line BRT's travel time between the 76th Street and American Boulevard Stations.
- Analysis of the Orange Line BRT southbound station location at the Knox Avenue/American Boulevard intersection showed there is expected to be minimal operational differences between the near-side and far-side station locations at American Boulevard. Additional safety and design considerations are needed for a recommendation,



which will be vetted through the design development process. Impacts to general purpose traffic are minimal regardless of the station location.

- A bus-only shoulder is recommended for eastbound Highway 13 between I-35W and Nicollet Avenue to bypass queuing that is expected from the Highway 13 and Nicollet Avenue intersection.
- TSP is expected to provide a significant benefit for the BRT, particularly at the intersections where the BRT is on the minor approach. With the implementation of TSP, BRT travel times can be decreased by 5 to 7 minutes along the entire corridor. Allowing the BRT to use TSP is expected to cause a minimal increase in total intersection delay, but will still preserve acceptable levels of service.
  - 66th Street/I-35W Southbound Ramp – Southbound through
  - 66th Street/I-35W Northbound Ramp – Northbound through
  - 76th Street/I-35W Northbound Ramp – Eastbound left-turn
  - American Boulevard/Knox Avenue – Northbound/Southbound through
  - 82nd Street/Knox Avenue – Southbound left-turn
  - 82nd Street/I-35W Northbound Ramp – Northbound left-turn
  - 98th Street/I-35W Southbound Ramp – Southbound left-turn
  - 98th Street/I-35W Northbound Ramp – Northbound through/left-turn
  - Burnsville Parkway/I-35W NB Ramp – Southbound through.

**Attachment A:  
Traffic Volumes**



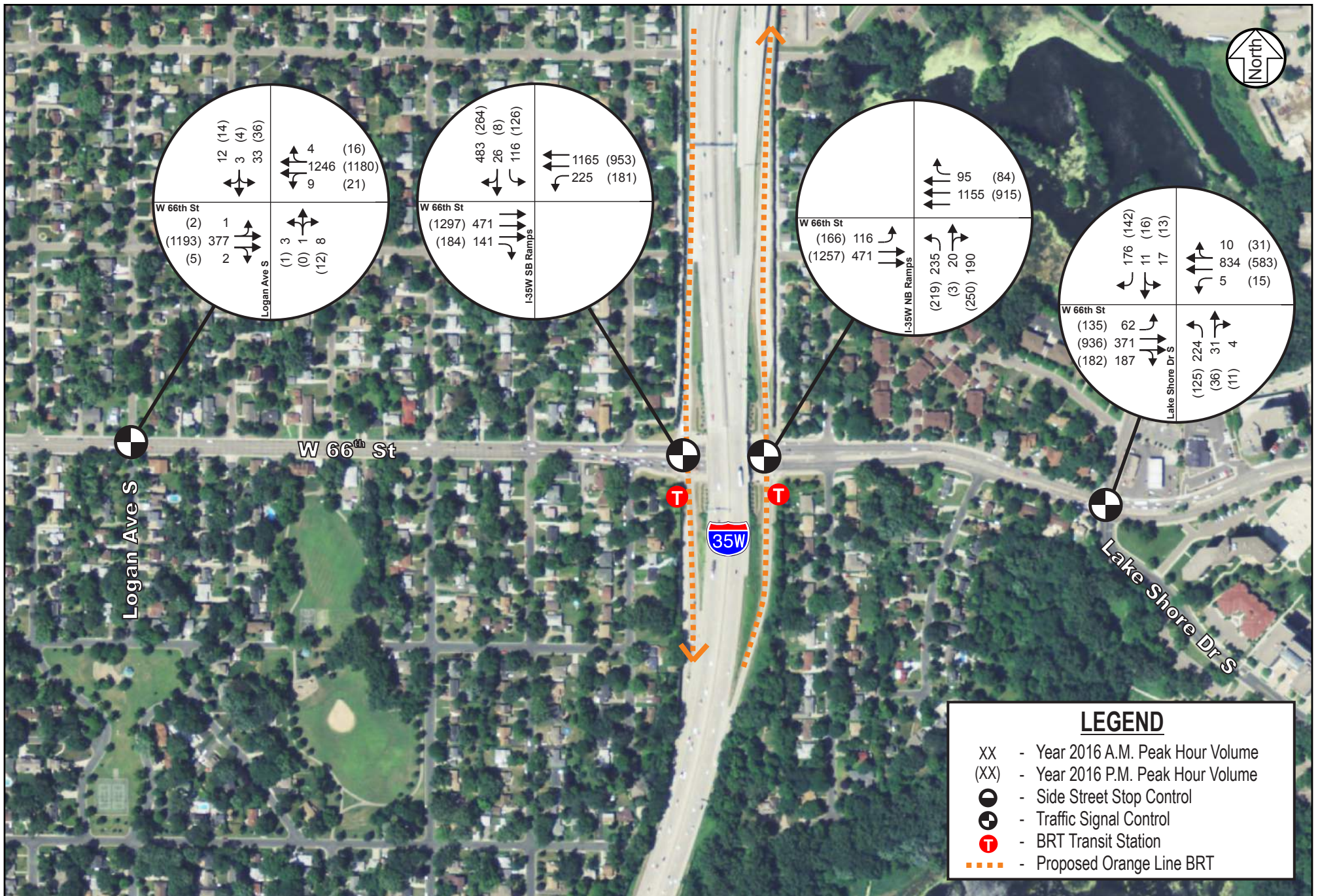
### Downtown Minneapolis Area Stations Existing Volumes

METRO Orange Line BRT Study

Project Name: Orange Line BRT A&E Design Services

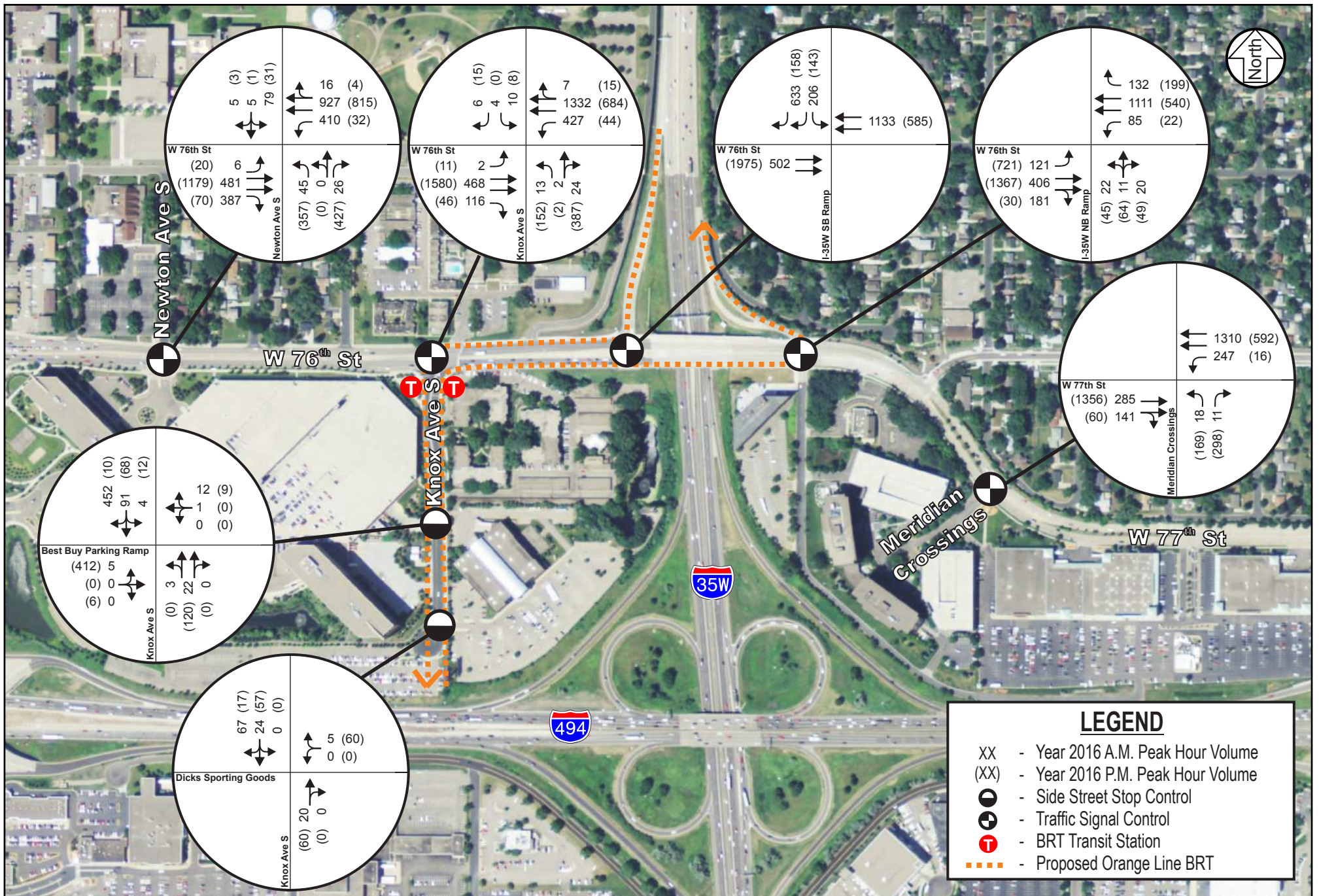
Metropolitan Council





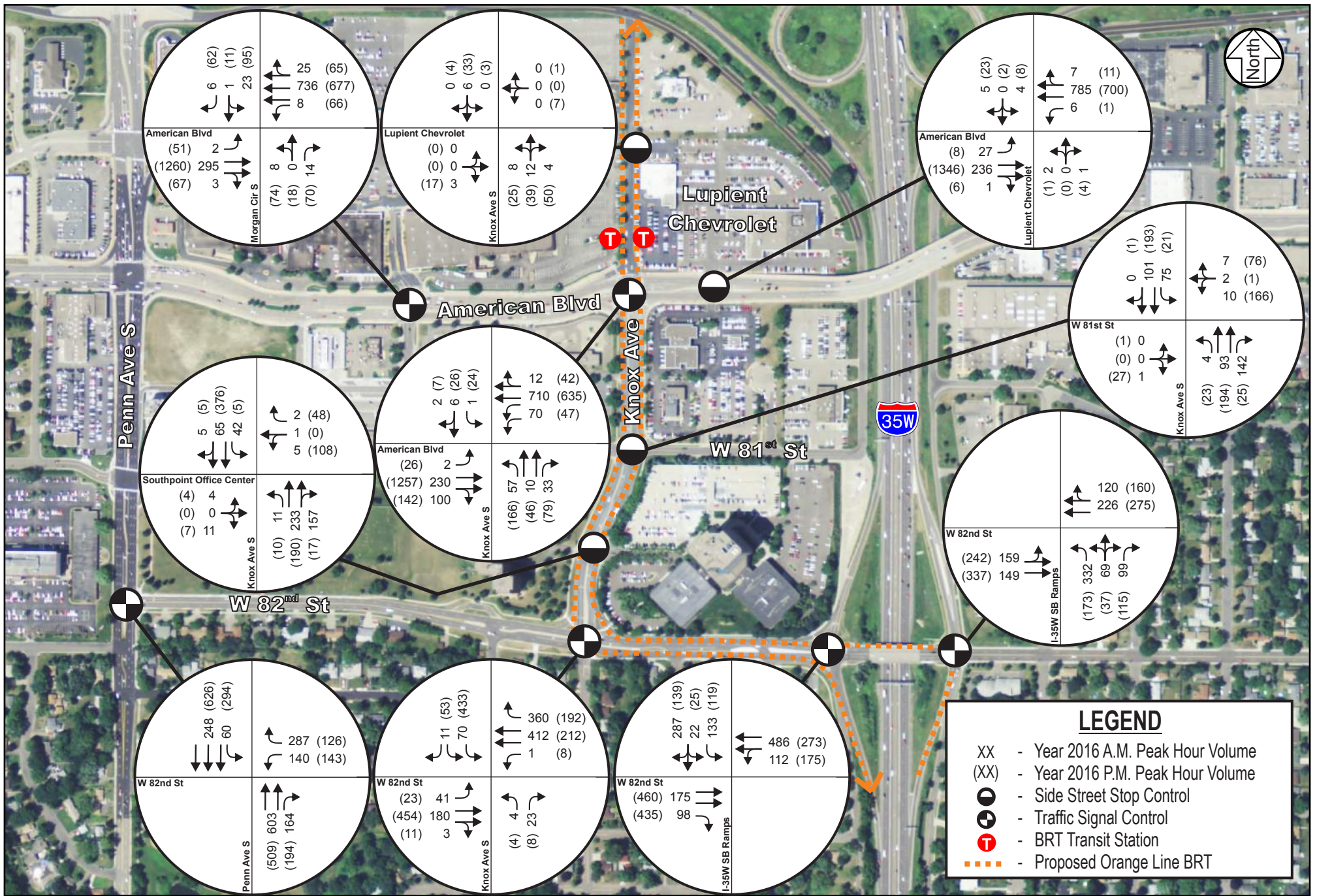
### 66th Street Area Stations Existing Volumes





### 76th Street Area Stations Existing Volumes



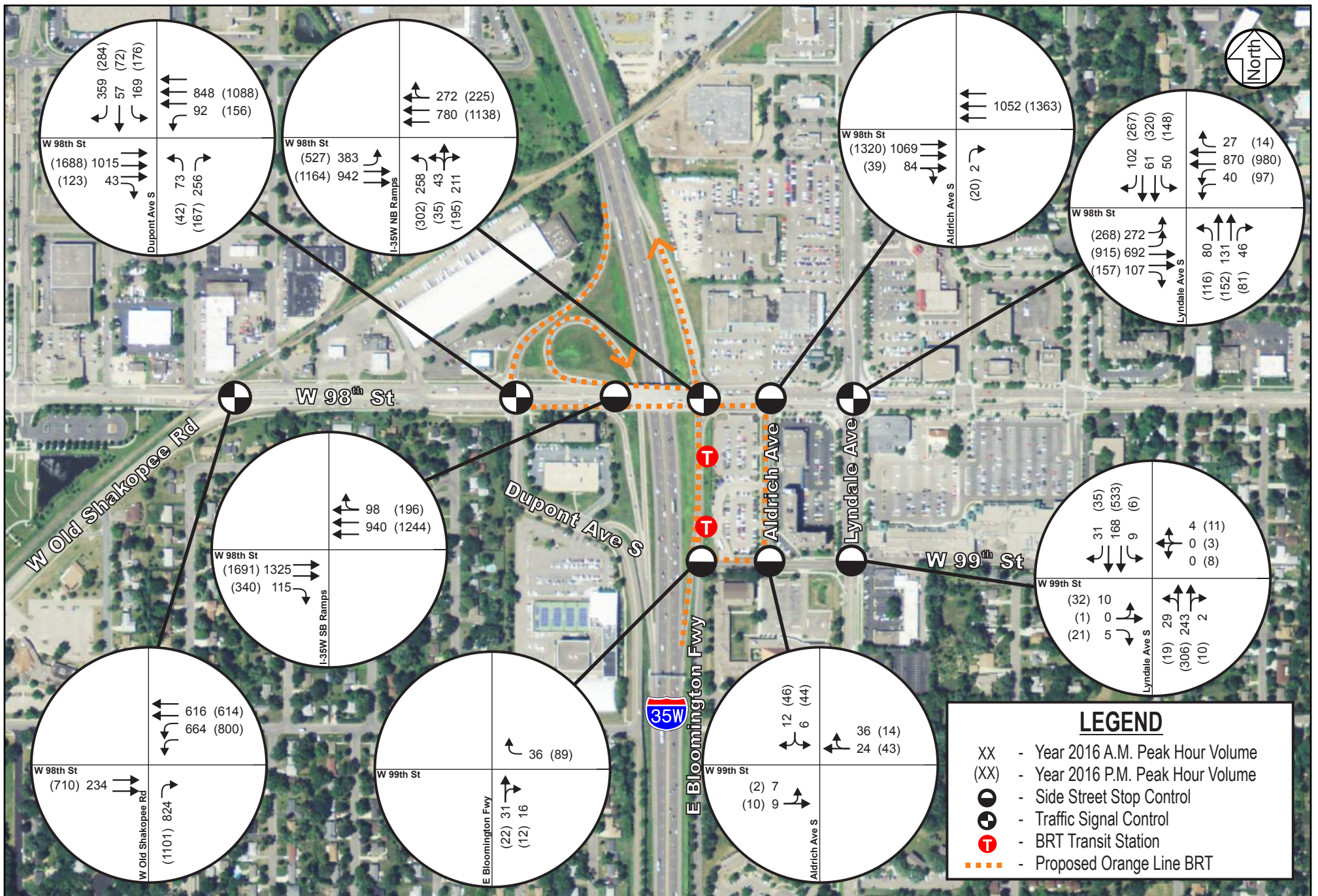


### American Boulevard Area Stations Existing Volumes

METRO Orange Line BRT Study

Project Name: Orange Line BRT A&E Design Services  
Metropolitan Council

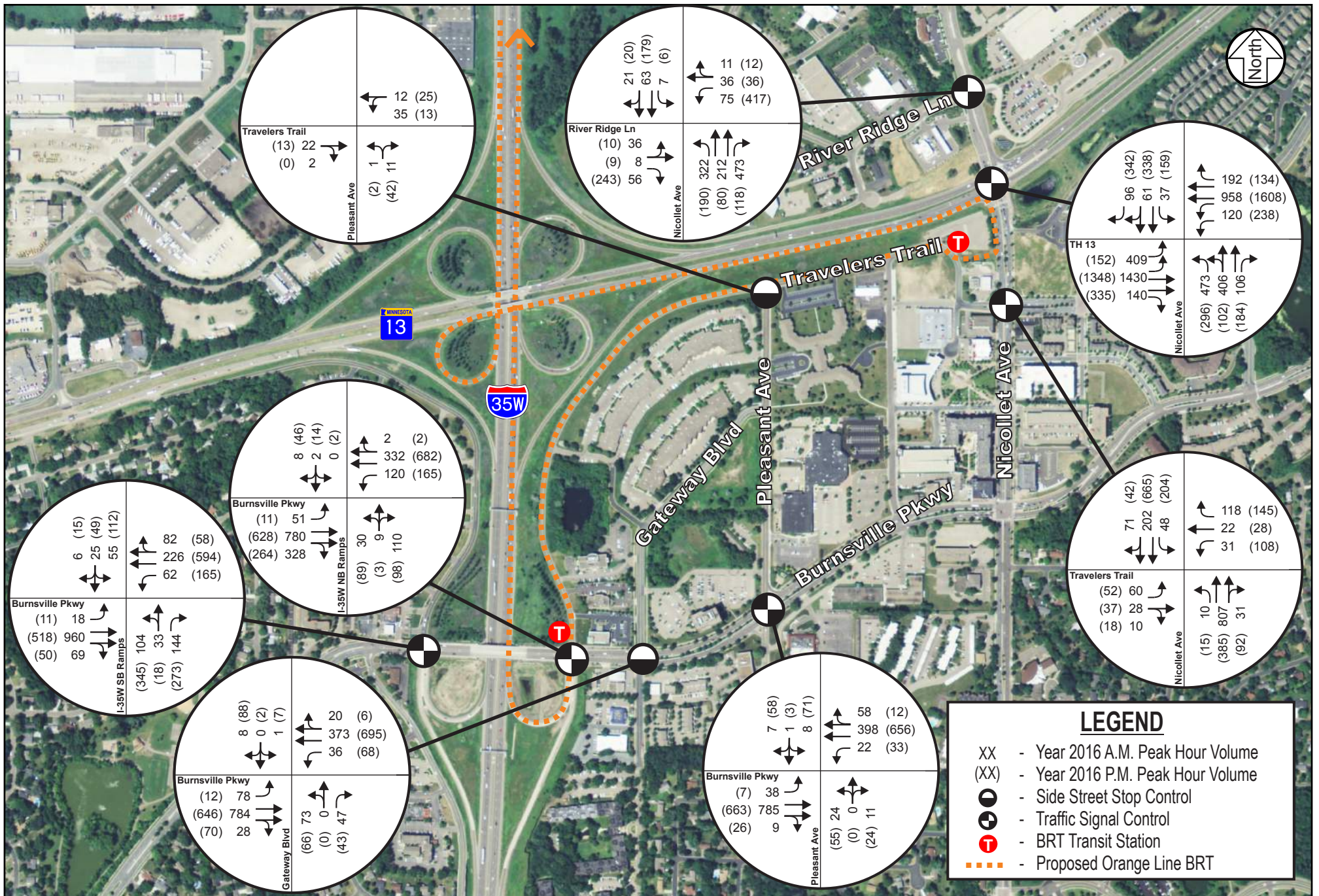




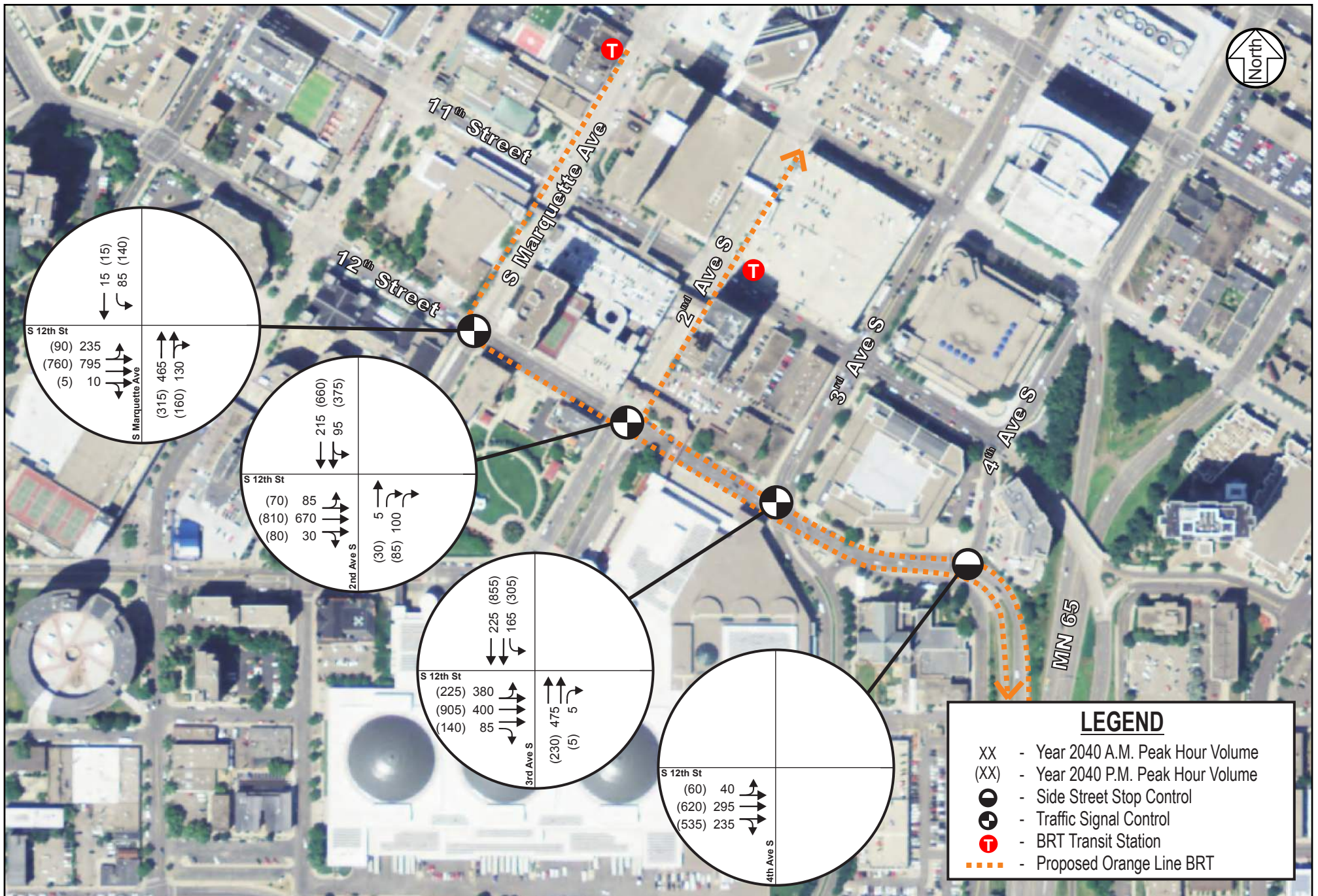
### 98th Street Area Stations Existing Volumes

METRO Orange Line BRT Study  
 Project Name: Orange Line BRT A&E Design Services  
 Metropolitan Council







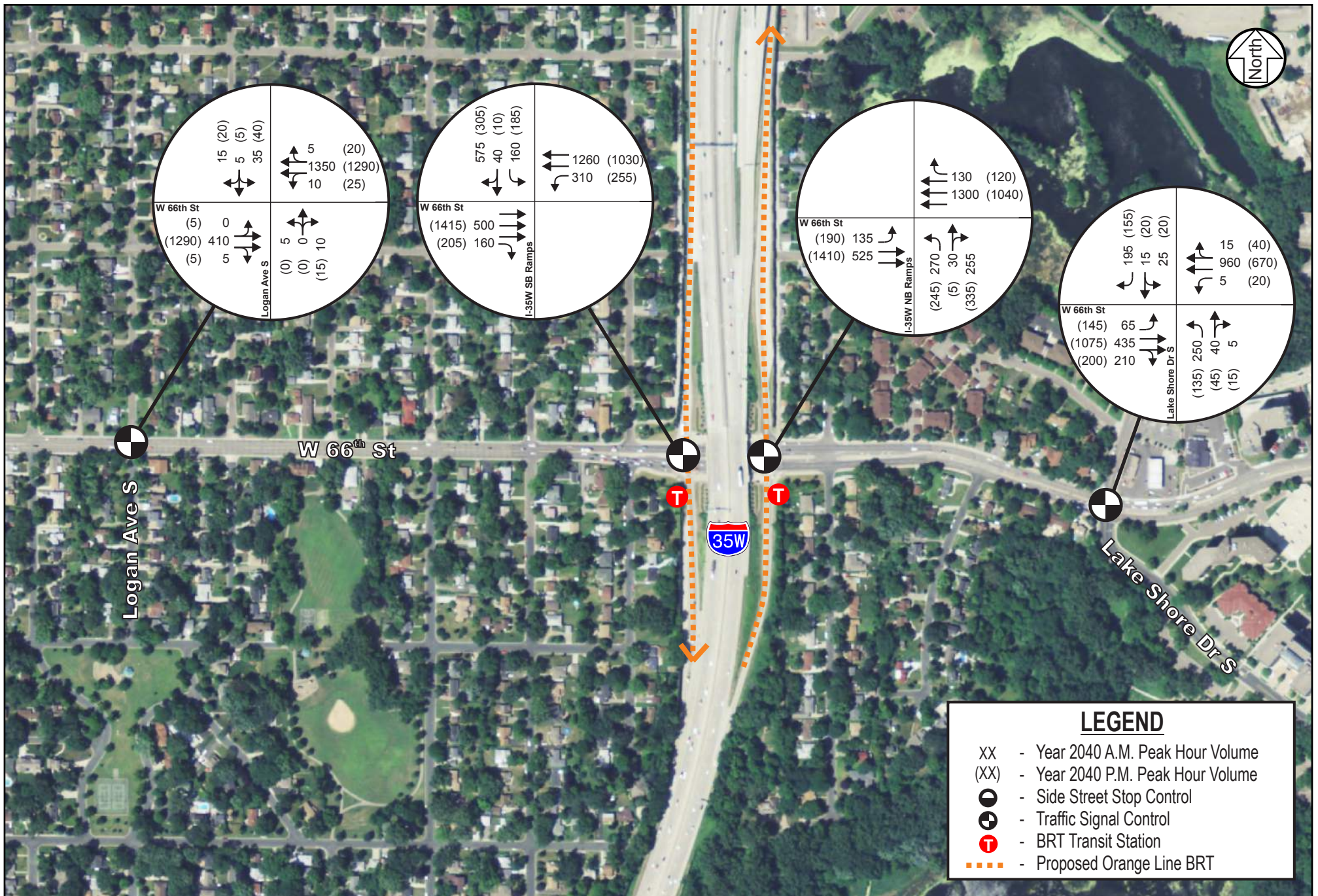


### Downtown Minneapolis Area Stations Year 2040 Conditions

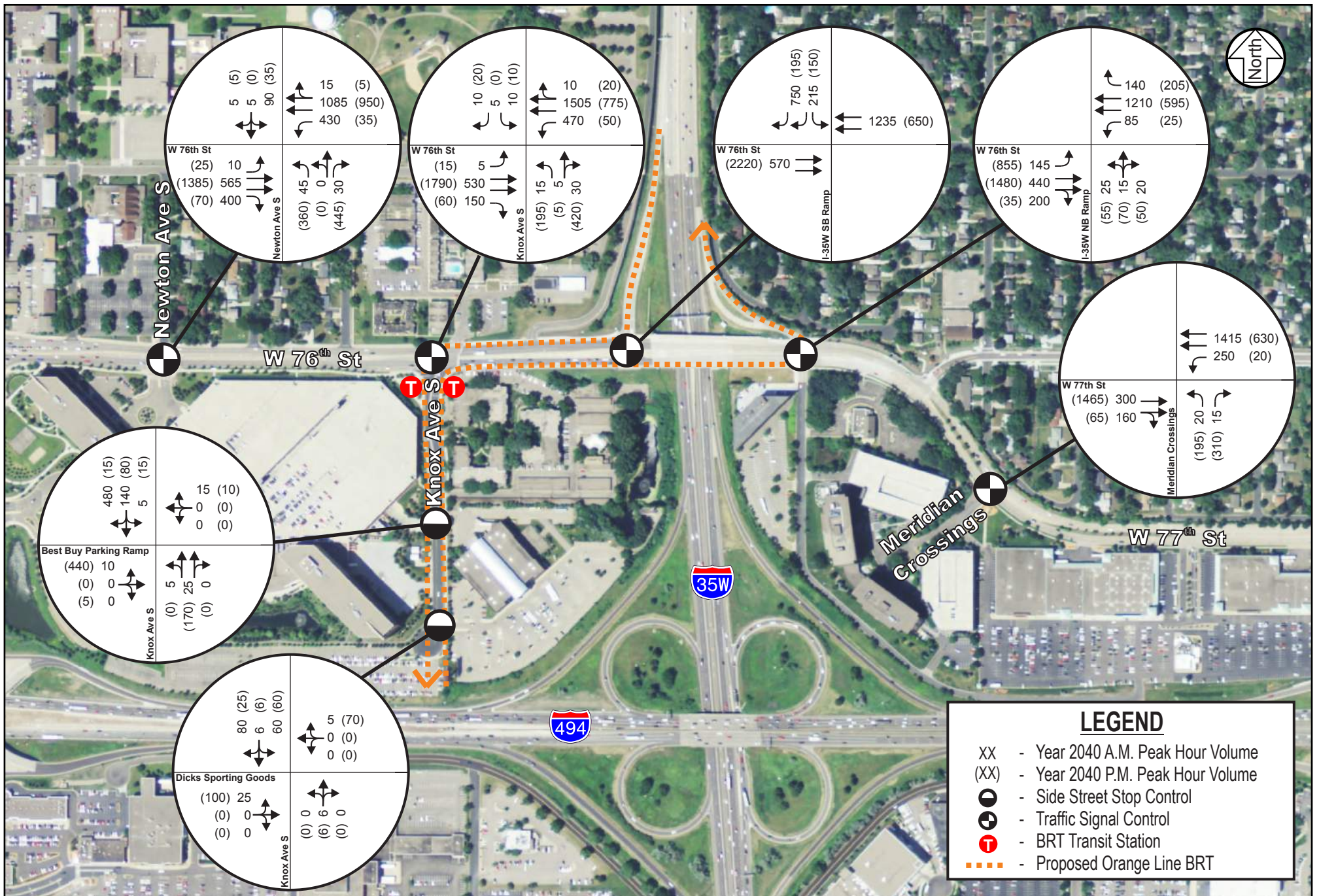
METRO Orange Line BRT Study

Project Name: Orange Line BRT A&E Design Services  
Metropolitan Council

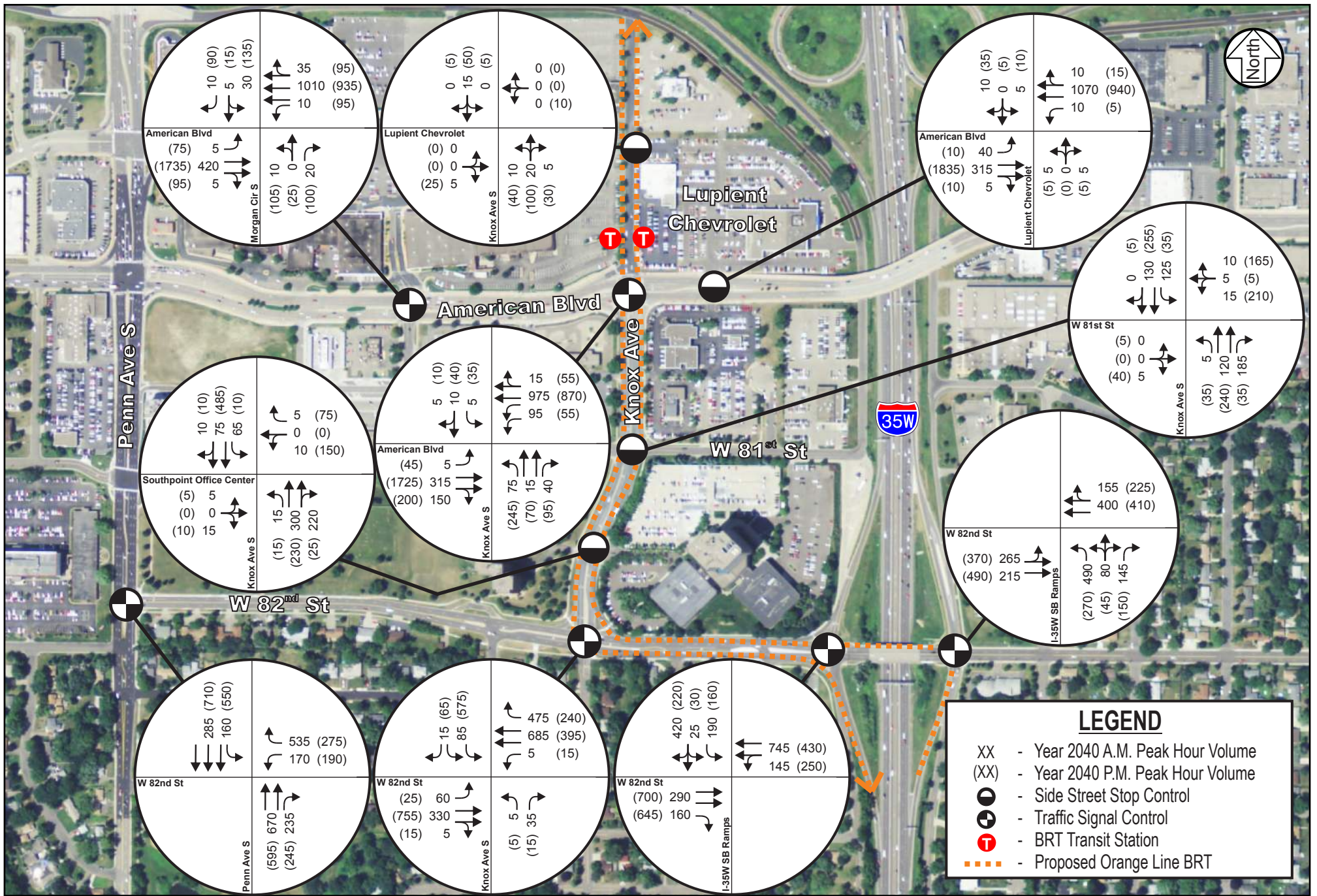










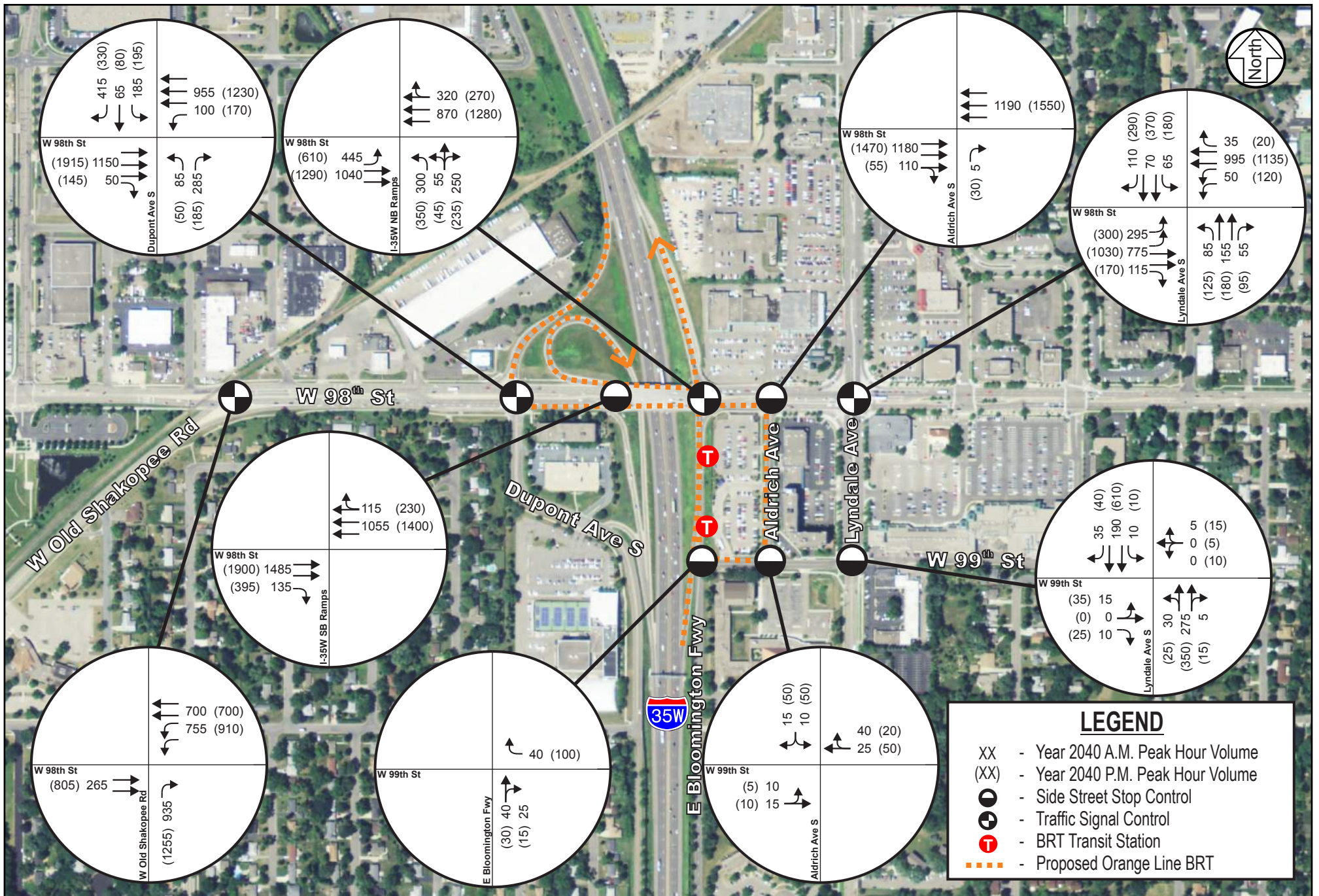


### American Boulevard Area Stations Year 2040 Conditions

METRO Orange Line BRT Study

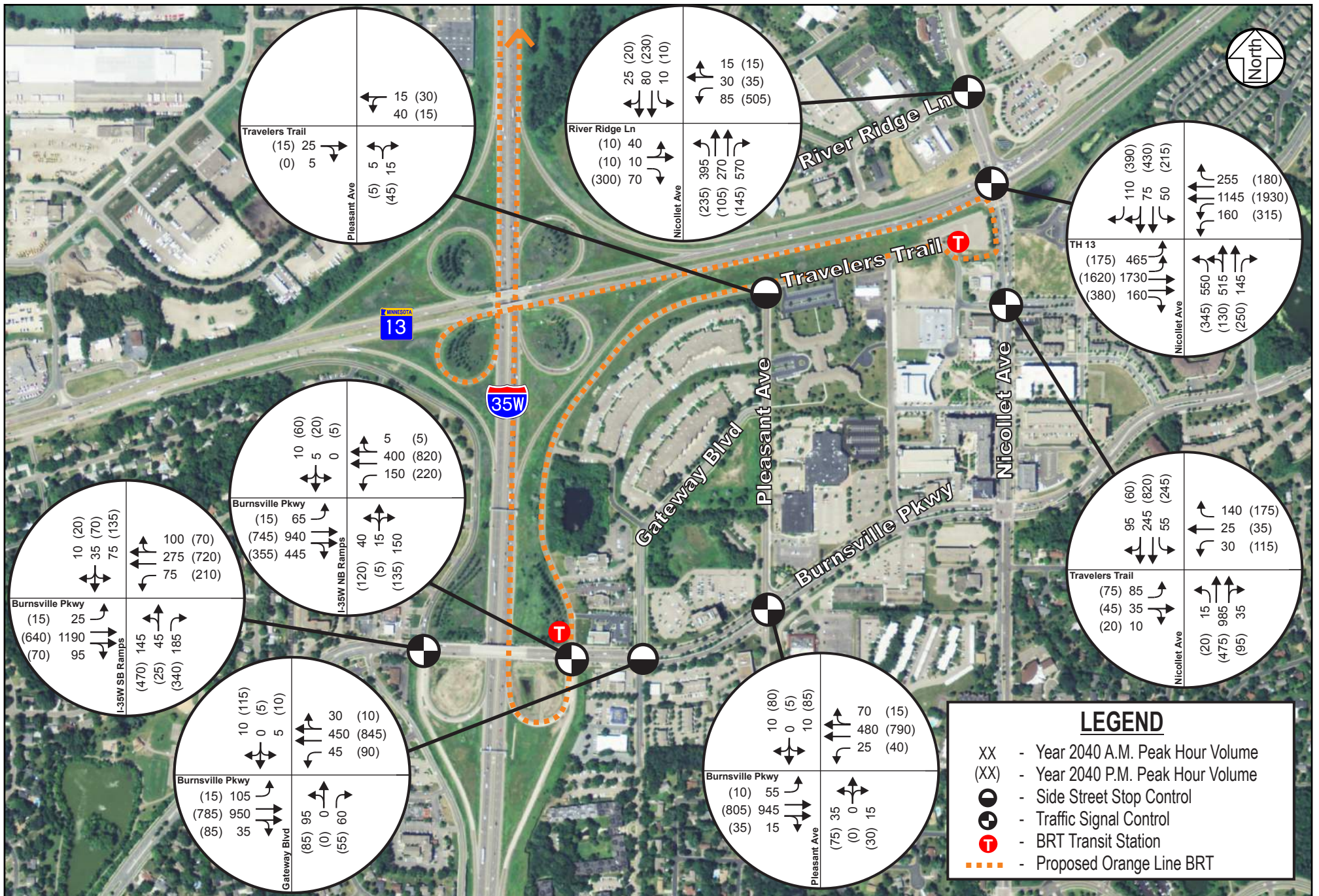
Project Name: Orange Line BRT A&E Design Services  
Metropolitan Council



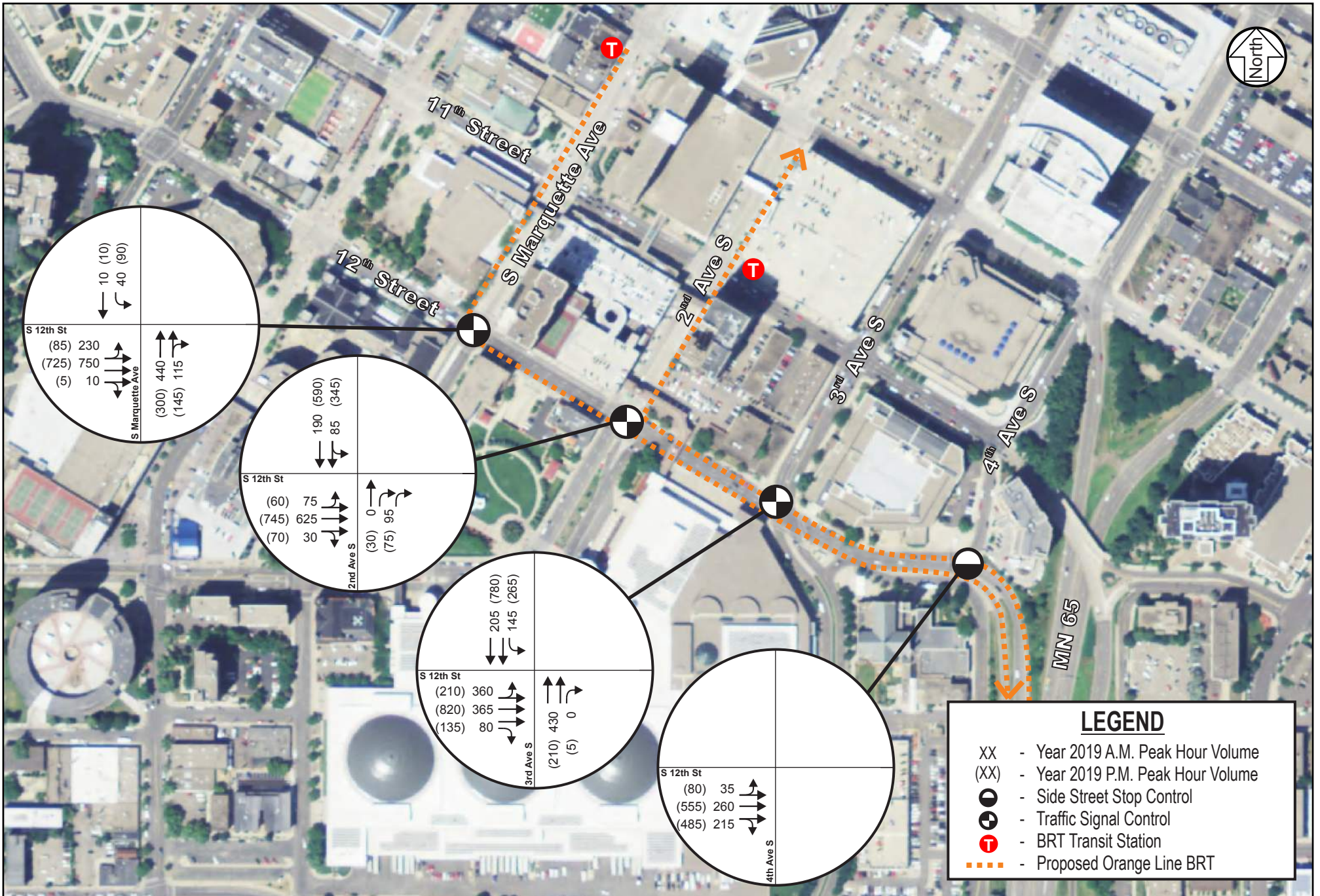


### 98th Street Area Stations Year 2040 Conditions

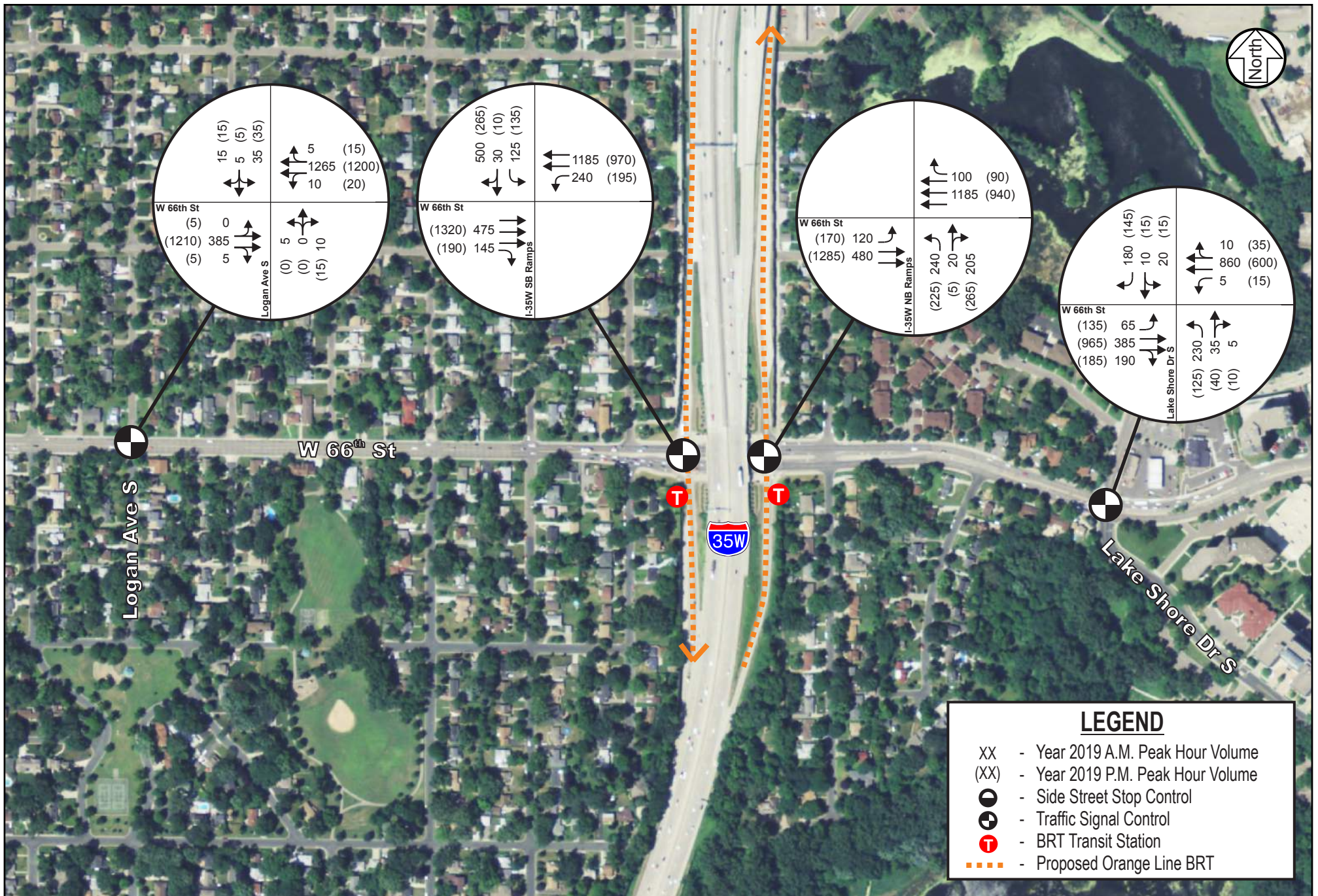




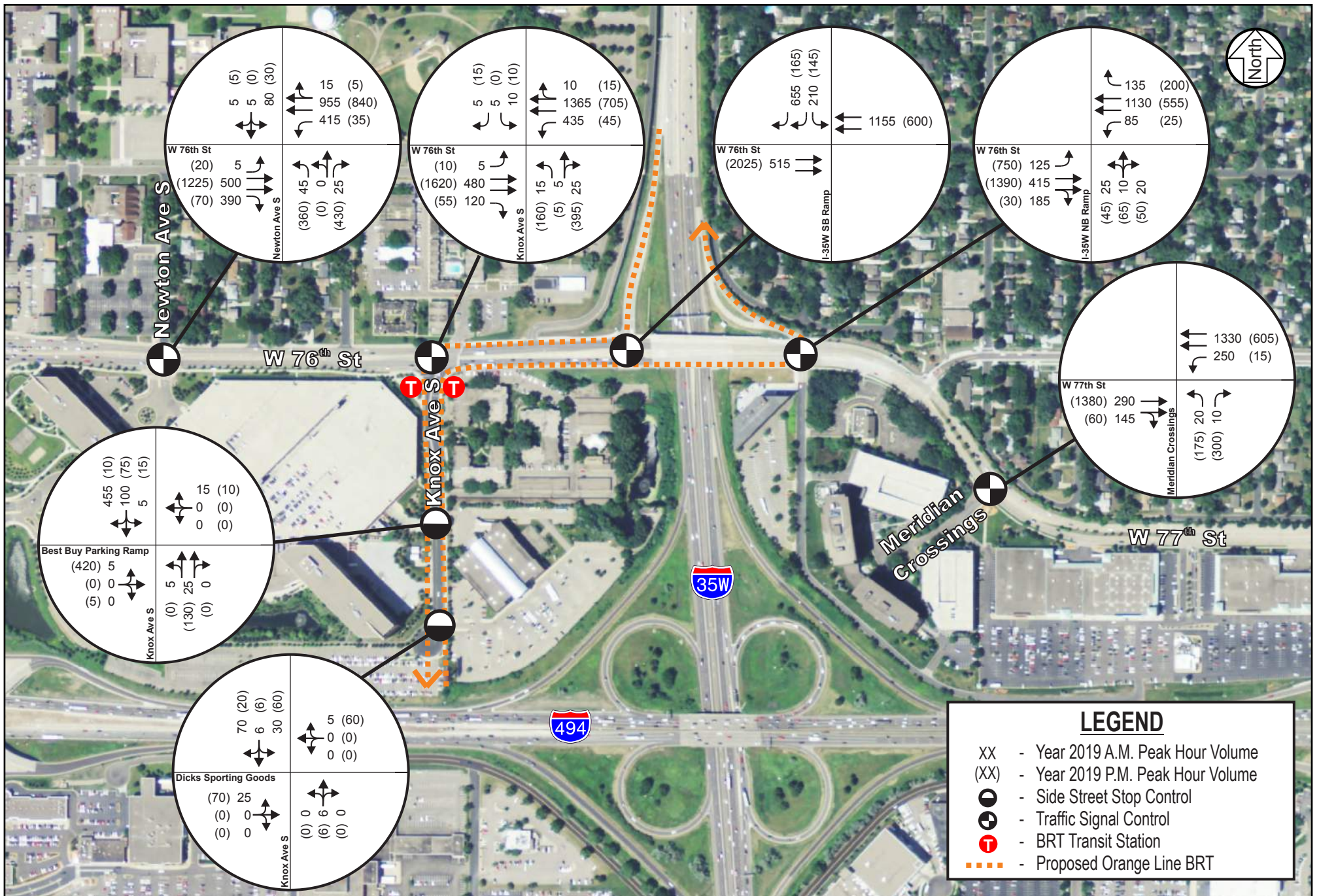




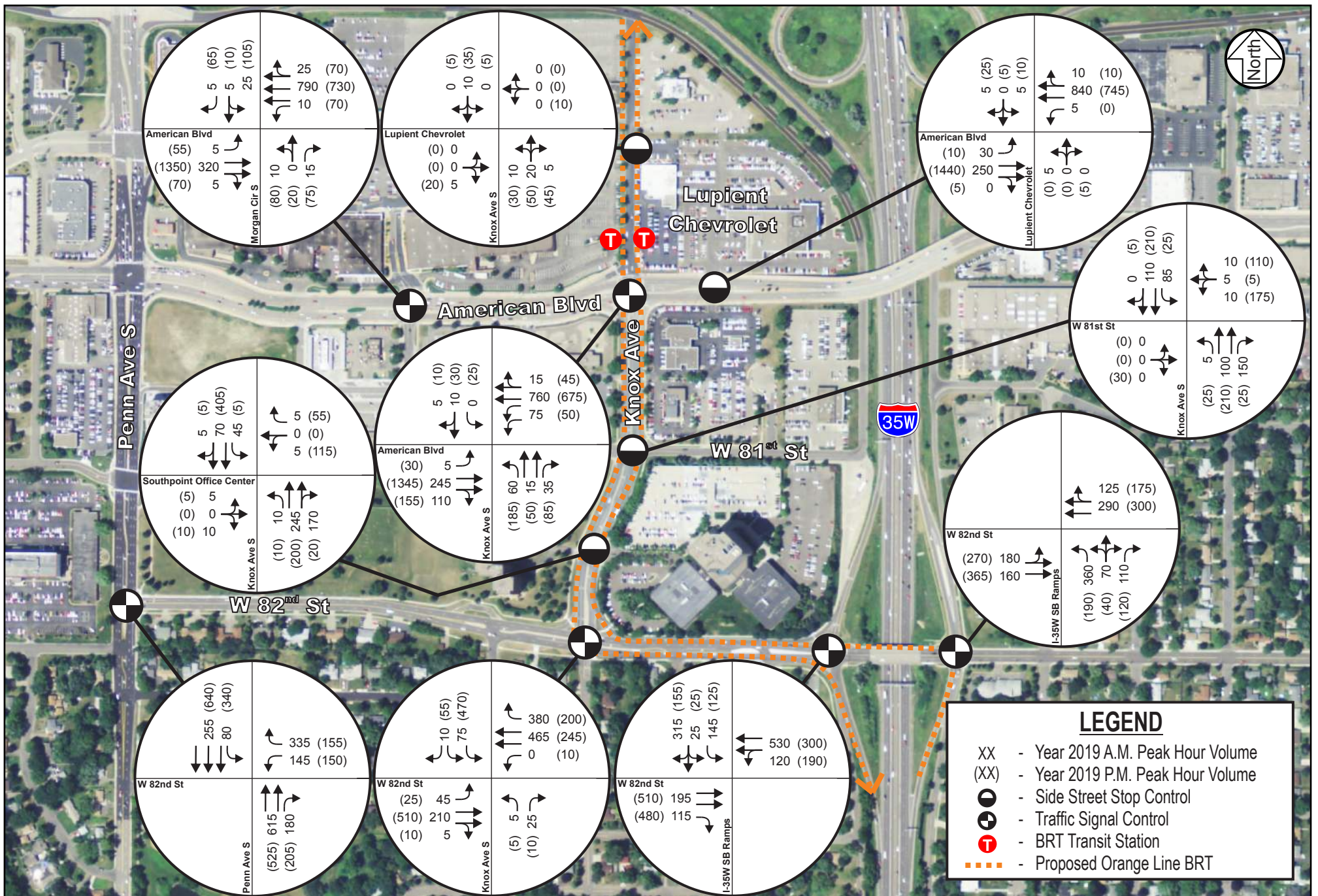










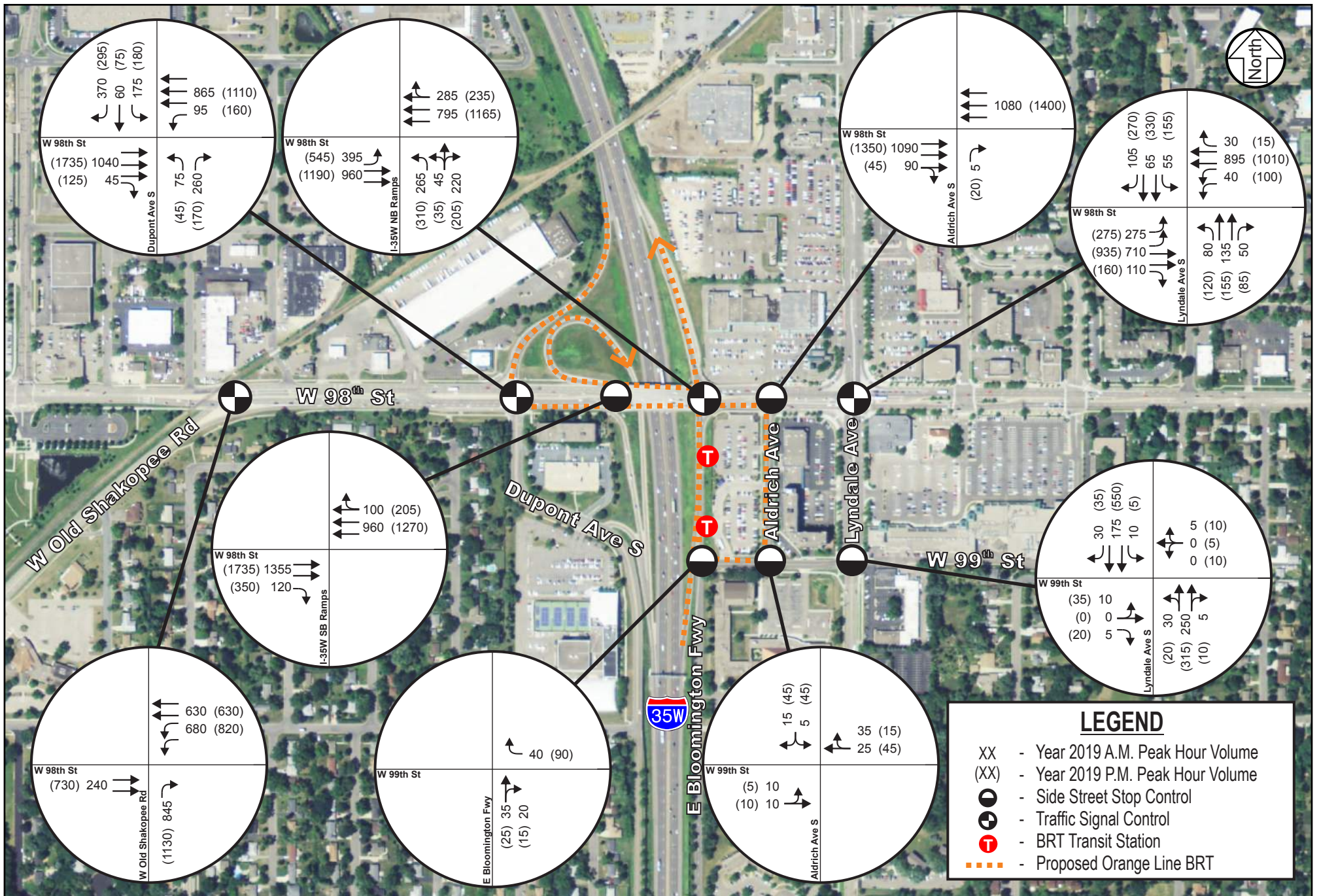


### American Boulevard Area Stations Opening Day (Year 2019) Conditions

METRO Orange Line BRT Study  
 Project Name: Orange Line BRT A&E Design Services  
 Metropolitan Council

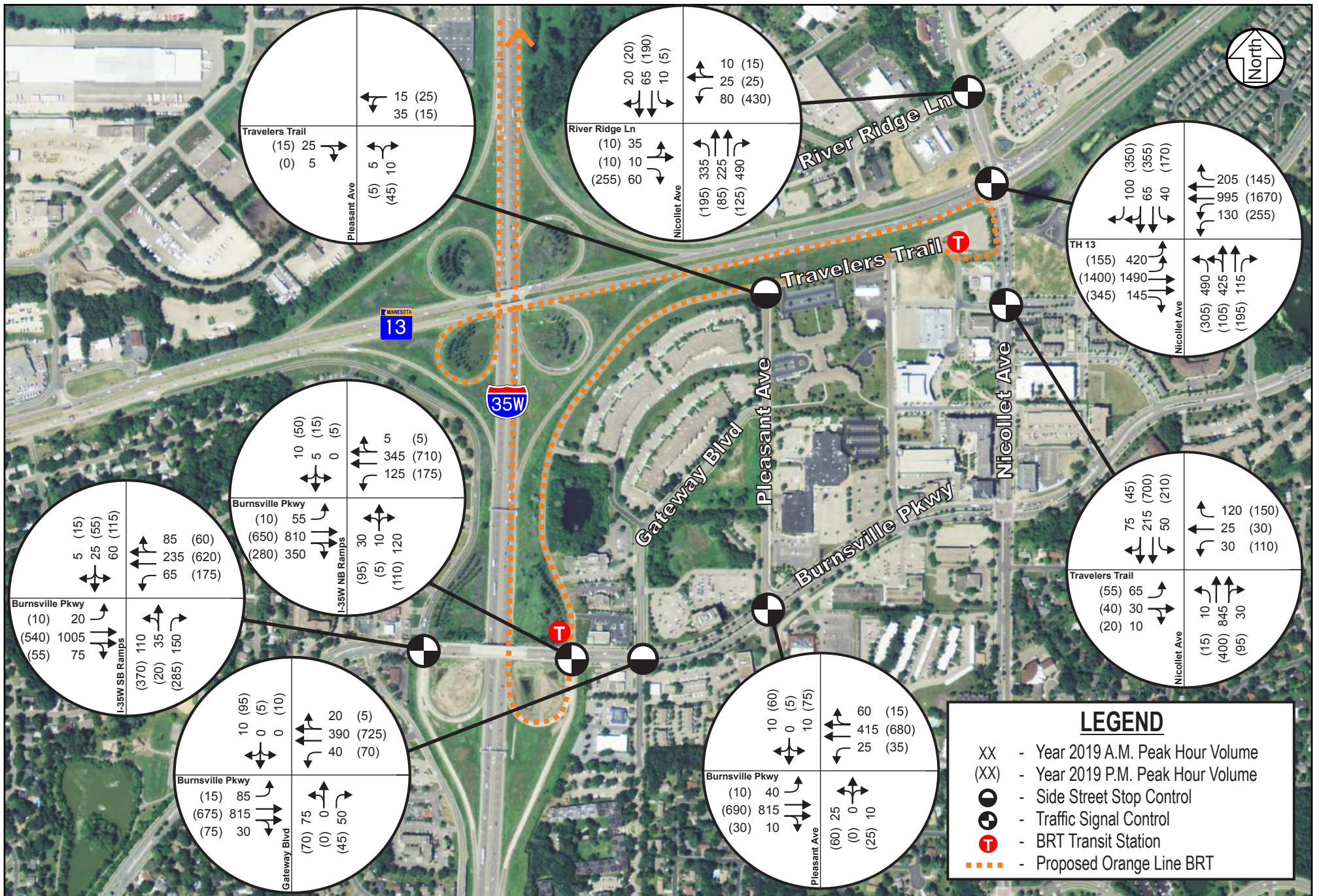
Figure A-16





### 98th Street Area Stations Opening Day (Year 2019) Conditions





**Attachment B:**  
**Measures of Effectiveness (MOEs)**



## 2016 Existing MOEs

**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	435	33	181	19.2	B	18.4	B	19.2	B	434	435	1
	Right	109	42	208	15.4	B					110	109	-1
Southbound	Left	8	0	0	20.8	C	20.8	C			8	8	0
	Thru	0	-	-	-	A					0	0	0
Eastbound	Left	232	53	236	20.4	C	19.6	B			231	232	1
	Thru	738	53	236	19.4	B					741	738	-3
	Right	7	60	259	14.2	B			7	7	0		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	1	1	45	52.3	D	47.7	D	14.7	B	1	1	0
	Right	91	20	110	47.7	D					91	91	0
Southbound	Left	86	33	139	36.3	D	29.6	C			83	86	3
	Thru	185	33	139	26.5	C					187	185	-2
Eastbound	Left	69	10	87	5.5	A	4.3	A			73	69	-4
	Thru	586	10	87	4.3	A					617	586	-31
	Right	25	19	120	3.0	A			27	25	-2		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	418	25	146	18.1	B	18.0	B	15.9	B	420	418	-2
	Right	1	0	0	0.6	A					1	1	0
Southbound	Left	141	23	137	31.1	C	23.2	C			142	141	-1
	Thru	203	13	81	17.8	B					203	203	0
Eastbound	Left	346	32	181	13.1	B	11.4	B			353	346	-7
	Thru	342	32	182	11.4	B					358	342	-16
	Right	74	1	68	3.3	A			80	74	-6		

**South 12th Street and 4th Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	32	0	0	0.5	A	0.7	A	0.7	A	33	32	-1
	Thru	249	0	0	0.6	A					259	249	-10
	HOV/Bus	7	0	0	0.1	A					7	7	0
	Right	195	0	0	1.0	A					209	195	-14

**West 66th Street and Logan Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	26	39.5	D	17.3	B	5.8	A	3	4	1
	Thru	0	-	-	-	A					1	0	-1
	Right	8	1	33	6.2	A					8	8	0
Southbound	Left	31	9	65	43.1	D	36.6	D			33	31	-2
	Thru	4	8	65	43.9	D					3	4	1
	Right	13	15	86	18.7	B					12	13	1
Eastbound	Left	0	-	-	-	A	3.8	A	1	0	-1		
	Thru	376	5	67	3.8	A			377	376	-1		
	Right	1	9	86	4.2	A			2	1	-1		
Westbound	Left	9	18	253	8.4	A	5.1	A	9	9	0		
	Thru	1,198	18	249	5.0	A			1,246	1,198	-48		
	Right	4	24	277	7.8	A			4	4	0		

**West 66th Street and I-35W SB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	105	22	126	46.2	D	40.2	D	15.5	B	116	105	-11
	Thru	24	197	563	55.1	E					26	24	-2
	Right	436	209	581	38.0	D					483	436	-47
Eastbound	Thru	347	22	145	18.0	B	14.2	B			355	347	-8
	Right	143	5	88	5.0	A					141	143	2
Westbound	Left	226	10	152	10.9	B	5.8	A			225	226	1
	Thru	1,147	22	251	4.8	A			1,165	1,147	-18		

**West 66th Street and I-35W NB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	229	56	233	43.2	D	29.5	C	11.5	B	235	229	-6
	Thru	17	12	157	46.0	D					20	17	-3
	Right	193	19	179	11.8	B					190	193	3
Eastbound	Left	112	12	118	26.0	C	8.2	A			116	112	-4
	Thru	450	8	101	3.8	A					471	450	-21
Westbound	Thru	914	12	175	5.7	A	5.4	A			930	914	-16
	Right	99	1	62	3.1	A			95	99	4		



West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	228	60	268	44.5	D	43.1	D	16.2	B
	Thru	27	5	45	35.4	D				
	Right	4	8	59	11.7	B				
Southbound	Left	18	5	60	33.4	C	12.2	B		
	Thru	11	5	62	33.8	C				
	Right	175	9	94	8.7	A				
Eastbound	Left	62	10	97	29.7	C	6.6	A		
	Thru	363	7	102	3.7	A				
	Right	180	18	152	4.3	A				
Westbound	Left	6	1	19	51.4	D	15.8	B		
	Thru	824	43	261	15.6	B				
	Right	11	54	285	13.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
224	228	4
31	27	-4
4	4	0
17	18	1
11	11	0
176	175	-1
62	62	0
371	363	-8
187	180	-7
5	6	1
834	824	-10
10	11	1

West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	13	58	63.9	E	42.9	D	16.1	B
	Thru	0	-	-	-	A				
	Right	26	1	47	5.7	A				
Southbound	Left	79	32	133	65.5	E	64.3	E		
	Thru	4	32	133	64.9	E				
	Right	4	40	146	41.0	D				
Eastbound	Left	8	0	12	14.0	B	12.1	B		
	Thru	471	27	190	16.8	B				
	Right	389	15	153	6.3	A				
Westbound	Left	405	85	374	36.7	D	14.1	B		
	Thru	902	11	146	4.1	A				
	Right	13	17	171	5.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	46	1
0	0	0
26	26	0
79	79	0
5	4	-1
5	4	-1
6	8	2
481	471	-10
387	389	2
410	405	-5
927	902	-25
14	13	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	8	46	82.2	F	35.0	D	4.5	A
	Thru	0	-	-	-	A				
	Right	14	10	58	8.1	A				
Southbound	Left	8	3	25	62.5	E	61.4	E		
	Thru	4	3	28	115.3	F				
	Right	5	4	40	16.5	B				
Eastbound	Left	2	0	1	5.7	A	3.6	A		
	Thru	462	3	72	3.2	A				
	Right	108	2	75	4.9	A				
Westbound	Left	421	11	172	9.9	A	3.9	A		
	Thru	1,321	5	158	2.0	A				
	Right	7	6	172	2.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
13	8	-5
2	0	-2
24	14	-10
10	8	-2
4	4	0
6	5	-1
2	2	0
468	462	-6
116	108	-8
427	421	-6
1,332	1,321	-11
7	7	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	209	51	235	43.5	D	47.8	D	23.5	C
	Right	637	103	358	49.2	D				
Eastbound	Thru	484	13	108	8.2	A	8.2	A		
Westbound	Thru	1,118	44	333	11.7	B	11.7	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
206	209	3
633	637	4
502	484	-18
1,133	1,118	-15

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	13	75	62.3	E	46.5	D	5.5	A
	Thru	10	12	75	58.1	E				
	Right	19	18	89	22.1	C				
Eastbound	Left	119	5	78	13.8	B	5.4	A		
	Thru	392	8	157	3.2	A				
	Right	182	11	189	4.7	A				
Westbound	Left	83	1	42	7.6	A	3.9	A		
	Thru	1,098	9	175	3.8	A				
	Right	131	1	57	3.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
22	22	0
11	10	-1
20	19	-1
121	119	-2
406	392	-14
181	182	1
85	83	-2
1,111	1,098	-13
132	131	-1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	4	40	40.5	D	27.6	C	6.6	A
	Right	11	0	36	6.6	A				
Eastbound	Thru	273	6	104	5.6	A	5.4	A		
	Right	138	7	124	5.1	A				
Westbound	Left	258	43	201	29.8	C	6.5	A		
	Thru	1,293	3	125	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
18	18	0
11	11	0
285	273	-12
141	138	-3
247	258	11
1,310	1,293	-17

Knox Avenue South and Best Buy Parking Ramp

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	0	10	9.7	A	5.2	A	3.2	A
	Thru	18	3	50	4.2	A				
Southbound	Thru	88	0	0	3.1	A	3.0	A		
	Right	443	0	0	3.0	A				
Eastbound	Left	4	0	34	13.3	B	13.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
3	4	1
22	18	-4
91	88	-3
452	443	-9
5	4	-1
0	0	0

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	18	4	95	9.4	A	9.4	A	2.3	A
Southbound	Left	24	0	1	0.7	A	0.7	A		
	Right	64	0	0	0.7	A				
Westbound	Right	4	0	32	6.0	A	6.0	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	18	-2
24	24	0
67	64	-3
5	4	-1

**American Boulevard West and Morgan Circle South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	2	24	68.4	E	29.8	C	3.6	A
	Thru	0	-	-	-	A				
	Right	14	1	39	7.7	A				
Southbound	Left	23	8	48	68.7	E	55.8	E		
	Thru	0	-	-	-	A				
	Right	6	0	31	6.5	A				
Eastbound	Left	3	1	14	93.6	F	2.3	A		
	Thru	293	2	56	1.4	A				
	Right	4	4	82	2.9	A				
Westbound	Left	7	0	3	1.2	A	1.3	A		
	Thru	726	2	67	1.3	A				
	Right	24	0	0	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
8	8	0
0	0	0
14	14	0
23	23	0
1	0	-1
6	6	0
2	3	1
295	293	-2
3	4	1
8	7	-1
736	726	-10
25	24	-1

**American Boulevard West and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	52	20	99	65.7	E	46.8	D	10.0	B
	Thru	9	4	40	81.4	F				
	Right	28	0	1	0.8	A				
Southbound	Left	0	-	-	-	A	96.4	F		
	Thru	4	3	41	120.3	F				
	Right	1	3	102	0.7	A				
Eastbound	Left	2	1	10	91.2	F	4.0	A		
	Thru	227	3	61	4.0	A				
	Right	101	0	0	2.4	A				
Westbound	Left	71	19	67	66.2	E	7.8	A		
	Thru	706	4	95	2.0	A				
	Right	11	4	101	2.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
57	52	-5
10	9	-1
33	28	-5
1	0	-1
6	4	-2
2	1	-1
2	2	0
230	227	-3
100	101	1
70	71	1
710	706	-4
12	11	-1

**American Boulevard West and Lupient Chevrolet Access Drive**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0.5	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	4	1	24	37.2	E	24.5	C		
	Thru	0	-	-	-	A				
	Right	4	1	24	11.7	B				
Eastbound	Left	26	1	28	5.6	A	0.7	A		
	Thru	228	0	0	0.1	A				
	Right	0	-	-	-	A				
Westbound	Left	7	0	1	1.7	A	0.3	A		
	Thru	782	0	0	0.2	A				
	Right	9	0	0	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
2	0	-2
0	0	0
1	0	-1
4	4	0
0	0	0
5	4	-1
27	26	-1
236	228	-8
1	0	-1
6	7	1
785	782	-3
7	9	2

**Knox Avenue South and Lupient Chevrolet Access Drive**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	15	0	0	2.5	A	2.1	A	1.6	A
	Right	6	0	0	1.1	A				
Southbound	Left	0	-	-	-	A	0.0	A		
	Thru	6	0	0	0.0	A				
Westbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
12	15	3
4	6	2
0	0	0
6	6	0
0	0	0
0	0	0

**Knox Avenue South and West 81st Street**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	0	0	0.7	A	0.7	A	1.2	A
	Thru	83	0	0	0.0	A				
	Right	147	0	0	1.1	A				
Southbound	Left	73	1	40	2.9	A	1.3	A		
	Thru	102	0	0	0.2	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!		
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Westbound	Left	9	0	29	10.3	B	6.5	A		
	Thru	2	0	30	10.0	B				
	Right	7	0	0	0.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
4	4	0
93	83	-10
142	147	5
75	73	-2
101	102	1
0	0	0
0	0	0
0	0	0
1	0	-1
10	9	-1
2	2	0
7	7	0



**Knox Avenue South and Southpoint Office Center**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	0	3	5.0	A	1.4	A	1.8	A
	Thru	229	3	66	0.9	A				
	Right	153	3	64	1.9	A				
Southbound	Left	41	0	28	3.8	A	1.5	A		
	Thru	64	0	0	0.1	A				
	Right	6	0	0	0.6	A				
Eastbound	Left	4	0	28	16.2	C	9.9	A		
	Thru	0	-	-	-	A				
	Right	9	0	28	7.1	A				
Westbound	Left	4	0	29	12.5	B	10.6	B		
	Thru	0	-	-	-	A				
	Right	2	0	10	6.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
11	11	0
233	229	-4
157	153	-4
42	41	-1
65	64	-1
5	6	1
4	4	0
0	0	0
11	9	-2
5	4	-1
1	0	-1
2	2	0

**West 82nd Street and Penn Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	603	9	108	5.5	A	5.0	A	10.6	B
	Right	162	3	80	3.2	A				
Southbound	Left	62	2	47	10.9	B	6.1	A		
	Thru	244	3	54	4.9	A				
Westbound	Left	132	47	198	54.1	D	24.0	C		
	Right	287	58	215	10.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
603	603	0
164	162	-2
60	62	2
248	244	-4
140	132	-8
287	287	0

**West 82nd Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	16	46.6	D	12.7	B	6.6	A
	Right	21	1	55	6.3	A				
Southbound	Left	65	12	65	38.8	D	33.2	C		
	Right	11	0	0	0.5	A				
Eastbound	Left	41	9	63	43.9	D	10.1	B		
	Thru	180	1	44	2.5	A				
	Right	2	5	94	1.8	A				
Westbound	Left	0	-	-	-	A	2.7	A		
	Thru	406	5	78	4.1	A				
	Right	355	0	0	1.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
4	4	0
23	21	-2
70	65	-5
11	11	0
41	41	0
180	180	0
3	2	-1
1	0	-1
412	406	-6
360	355	-5

**West 82nd Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	131	22	102	38.5	D	14.8	B	6.9	A
	Thru	21	22	102	38.4	D				
	Right	291	0	9	2.4	A				
Eastbound	Thru	174	2	52	4.0	A	3.3	A		
	Right	93	0	29	1.9	A				
Westbound	Left	114	4	92	3.6	A	2.6	A		
	Thru	472	4	91	2.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
133	131	-2
22	21	-1
287	291	4
175	174	-1
98	93	-5
112	114	2
486	472	-14

**West 82nd Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	321	50	209	34.0	C	30.1	C	17.4	B
	Thru	70	50	209	34.3	C				
	Right	102	59	222	14.8	B				
Eastbound	Left	156	6	97	8.3	A	6.7	A		
	Thru	148	6	97	4.9	A				
Westbound	Thru	263	14	120	10.4	B	9.5	A		
	Right	118	21	146	7.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
332	321	-11
69	70	1
99	102	3
159	156	-3
149	148	-1
266	263	-3
120	118	-2

**West 98th Street and West Old Shakopee Road**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	823	0	0	1.3	A	1.3	A	5.5	A
Eastbound	Thru	231	12	84	15.2	B	15.2	B		
Westbound	Left	653	19	159	11.1	B	6.4	A		
	Thru	602	0	2	1.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
824	823	-1
234	231	-3
664	653	-11
616	602	-14

**West 98th Street and Dupont Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	70	25	126	45.2	D	20.1	C	15.0	B
	Right	257	42	154	13.2	B				
Southbound	Left	169	41	182	42.9	D	18.5	B		
	Thru	56	17	91	38.6	D				
Eastbound	Right	354	4	112	3.7	A	17.6	B		
	Thru	1,013	56	290	18.1	B				
Westbound	Right	41	4	57	4.2	A	8.1	A		
	Left	92	29	147	50.7	D				
Thru	843	5	117	3.5	A					

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
73	70	-3
256	257	1
169	169	0
57	56	-1
359	354	-5
1,015	1,013	-2
43	41	-2
92	92	0
848	843	-5

West 98th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,314	0	35	2.5	A	2.4	A	1.6	A
	Right	123	0	0	0.9	A				
Westbound	Thru	935	0	0	0.5	A	0.5	A		
	Right	96	0	0	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,325	1,314	-11
115	123	8
940	935	-5
98	96	-2

West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	256	58	236	47.5	D	32.3	C	14.3	B
	Right	204	5	95	13.2	B				
Eastbound	Left	374	97	369	37.2	D	12.1	B		
	Thru	938	5	108	2.1	A				
Westbound	Thru	774	24	177	9.0	A	9.0	A		
	Right	267	26	198	8.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
258	256	-2
211	204	-7
383	374	-9
942	938	-4
780	774	-6
272	267	-5

West 98th Street and Aldrich Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	0.8	A
Eastbound	Thru	1,066	1	82	1.0	A	1.0	A		
	Right	77	1	79	1.5	A				
Westbound	Thru	1,041	0	3	0.5	A	0.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
2	0	-2
1,069	1,066	-3
84	77	-7
1,052	1,041	-11

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	18	103	43.7	D	40.1	D	27.8	C
	Thru	126	24	89	49.0	D				
	Right	46	3	66	9.7	A				
Southbound	Left	50	15	87	53.4	D	123.0	F		
	Thru	57	85	185	403.9	F				
	Right	103	0	0	1.3	A				
Eastbound	Left	267	40	152	40.0	D	14.2	B		
	Thru	686	14	122	6.3	A				
	Right	110	0	0	0.9	A				
Westbound	Left	40	13	63	62.6	E	18.7	B		
	Thru	863	48	265	17.3	B				
	Right	32	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	76	-4
131	126	-5
46	46	0
50	50	0
61	57	-4
102	103	1
272	267	-5
692	686	-6
107	110	3
40	40	0
870	863	-7
27	32	5

West 99th Street and East Bloomington Freeway

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	31	0	0	0.1	A	0.3	A	0.4	A
	Right	15	0	0	0.6	A				
Westbound	Right	29	0	8	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
31	31	0
16	15	-1
36	29	-7

West 99th Street and Aldrich Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.0	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!		
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Eastbound	Left	13	0	2	0.7	A	1.0	A		
	Thru	10	0	0	1.4	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	3.7	A		
	Thru	25	0	0	1.8	A				
	Right	38	0	0	4.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
6	0	-6
0	0	0
12	0	-12
7	13	6
9	10	1
0	0	0
0	0	0
24	25	1
36	38	2

West 99th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	10	1.5	A	0.3	A	0.7	A
	Thru	238	0	1	0.1	A				
	Right	3	0	1	0.7	A				
Southbound	Left	9	0	8	1.9	A	0.5	A		
	Thru	167	0	0	0.3	A				
	Right	31	0	0	1.5	A				
Eastbound	Left	5	1	48	19.4	C	16.0	C		
	Thru	0	-	-	-	A				
	Right	3	0	33	10.4	B				
Westbound	Left	0	-	-	-	A	6.7	A		
	Thru	0	-	-	-	A				
	Right	4	0	30	6.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
29	31	2
243	238	-5
2	3	1
9	9	0
168	167	-1
31	31	0
10	5	-5
0	0	0
5	3	-2
0	0	0
0	0	0
4	4	0



Nicollet Avenue and River Ridge Lane

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	314	18	236	10.9	B	9.2	A	13.0	B
	Thru	209	6	83	8.4	A				
	Right	451	21	298	8.4	A				
Southbound	Left	8	1	15	20.8	C	14.4	B		
	Thru	60	4	47	17.0	B				
	Right	23	2	107	5.6	A				
Eastbound	Left	35	10	68	43.4	D	22.5	C		
	Thru	8	10	68	47.2	D				
	Right	56	2	66	5.8	A				
Westbound	Left	70	17	80	40.7	D	38.1	D		
	Thru	24	18	81	41.2	D				
	Right	12	30	104	17.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
322	314	-8
212	209	-3
473	451	-22
7	8	1
63	60	-3
21	23	2
36	35	-1
8	8	0
56	56	0
70	70	0
26	24	-2
11	12	1

Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	465	154	533	55.7	E	52.4	D	39.9	D
	Thru	396	155	533	55.2	E				
	Right	104	10	135	27.3	C				
Southbound	Left	33	12	71	66.3	E	45.0	D		
	Thru	64	23	89	69.5	E				
	Right	94	40	113	20.9	C				
Eastbound	Left	402	95	288	65.5	E	35.9	D		
	Thru	1,423	168	769	30.5	C				
	Right	141	0	39	5.8	A				
Westbound	Left	123	35	107	72.9	E	35.7	D		
	Thru	958	116	436	36.4	D				
	Right	186	4	79	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
473	465	-8
406	396	-10
106	104	-2
37	33	-4
61	64	3
96	94	-2
409	402	-7
1,430	1,423	-7
140	141	1
120	123	3
958	958	0
192	186	-6

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	0	14	5.9	A	6.0	A	8.1	A
	Thru	799	12	157	6.1	A				
	Right	32	5	117	3.5	A				
Southbound	Left	49	0	27	6.2	A	3.9	A		
	Thru	202	6	99	3.1	A				
	Right	76	8	118	4.6	A				
Eastbound	Left	57	9	74	33.3	C	29.9	C		
	Thru	27	4	51	30.6	C				
	Right	10	7	67	8.5	A				
Westbound	Left	34	6	53	32.9	C	14.5	B		
	Thru	22	3	38	28.5	C				
	Right	115	0	5	6.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	10	0
807	799	-8
31	32	1
48	49	1
202	202	0
71	76	5
60	57	-3
28	27	-1
10	10	0
31	34	3
22	22	0
118	115	-3

Travelers Trail and Pleasant Avenue

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	6.0	A	1.2	A
	Right	12	0	25	6.0	A				
Eastbound	Thru	20	0	0	0.0	A	0.1	A		
	Right	2	0	0	0.7	A				
Westbound	Left	37	0	4	0.7	A	0.6	A		
	Thru	13	0	0	0.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1	0	-1
11	12	1
22	20	-2
2	2	0
35	37	2
12	13	1

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	38	174	50.6	D	29.6	C	11.2	B
	Thru	30	38	175	48.1	D				
	Right	139	38	116	10.6	B				
Southbound	Left	50	41	132	39.4	D	37.6	D		
	Thru	22	40	130	39.7	D				
	Right	6	48	151	15.6	B				
Eastbound	Left	16	0	15	5.6	A	6.5	A		
	Thru	903	93	289	6.4	A				
	Right	70	97	326	7.1	A				
Westbound	Left	60	1	34	10.8	B	4.7	A		
	Thru	219	2	57	3.4	A				
	Right	74	7	110	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
104	99	-5
33	30	-3
144	139	-5
55	50	-5
25	22	-3
6	6	0
18	16	-2
960	903	-57
69	70	1
62	60	-2
226	219	-7
82	74	-8

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	38	118	154.5	F	48.4	D	7.9	A
	Thru	10	38	118	167.3	F				
	Right	109	4	68	7.4	A				
Southbound	Left	0	-	-	-	A	6.7	A		
	Thru	0	-	-	-	A				
	Right	8	1	61	6.7	A				
Eastbound	Left	48	0	17	3.2	A	3.5	A		
	Thru	737	53	210	3.3	A				
	Right	298	60	248	3.9	A				
Westbound	Left	111	25	93	14.0	B	4.9	A		
	Thru	316	1	50	1.8	A				
	Right	2	4	95	2.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
9	10	1
110	109	-1
0	0	0
2	0	-2
8	8	0
51	48	-3
780	737	-43
328	298	-30
120	111	-9
332	316	-16
2	2	0

2016\_AM\_Existing  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Gateway Boulevard

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	66	81	192	76.7	F	66.1	F	6.1	A	73	66	-7
	Thru	0	-	-	-	A					0	0	0
	Right	46	79	190	50.9	F					47	46	-1
Southbound	Left	0	-	-	-	A	7.8	A			1	0	-1
	Thru	0	-	-	-	A					0	0	0
	Right	8	2	26	7.8	A					8	8	0
Eastbound	Left	73	2	32	2.7	A	0.6	A			78	73	-5
	Thru	743	1	39	0.4	A					784	743	-41
	Right	28	2	41	1.8	A					28	28	0
Westbound	Left	34	0	23	4.9	A	0.8	A			36	34	-2
	Thru	359	22	63	0.4	A			373	359	-14		
	Right	18	25	70	1.2	A			20	18	-2		

Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	22	6	51	46.6	D	35.1	D	2.9	A	24	22	-2
	Thru	0	-	-	-	A					0	0	0
	Right	11	11	74	12.2	B					11	11	0
Southbound	Left	6	2	28	45.0	D	34.1	C			8	6	-2
	Thru	1	2	28	61.3	E					1	1	0
	Right	4	4	55	10.9	B					7	4	-3
Eastbound	Left	36	0	9	2.7	A	1.5	A			38	36	-2
	Thru	744	2	65	1.4	A					785	744	-41
	Right	10	0	1	4.2	A					9	10	1
Westbound	Left	22	0	13	6.4	A	2.2	A			22	22	0
	Thru	389	8	78	2.0	A			398	389	-9		
	Right	58	0	7	1.5	A			58	58	0		



South 12th Street and Marquette Avenue South (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	294	23	151	16.9	B	15.4	B	22.7	C
	Right	140	29	179	12.4	B				
Southbound	Left	80	12	92	41.3	D	38.8	D		
	Thru	8	12	91	13.7	B				
Eastbound	Left	86	50	199	26.8	C	24.9	C		
	Thru	704	50	199	24.7	C				
	Right	4	58	223	24.1	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
294	294	0
139	140	1
76	80	4
9	8	-1
86	86	0
716	704	-12
4	4	0

South 12th Street and 2nd Avenue South (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	35	17	92	70.7	E	57.4	E	20.4	C
	Right	72	16	93	50.9	D				
Southbound	Left	329	86	335	29.5	C	23.3	C		
	Thru	579	87	335	19.7	B				
Eastbound	Left	56	51	213	13.2	B	12.6	B		
	Thru	721	51	214	12.8	B				
	Right	65	70	247	9.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
27	35	8
73	72	-1
336	329	-7
575	579	4
57	56	-1
732	721	-11
68	65	-3

South 12th Street and 3rd Avenue South (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	203	16	90	23.3	C	23.1	C	18.6	B
	Right	2	0	4	2.8	A				
Southbound	Left	260	45	260	31.4	C	25.4	C		
	Thru	764	64	321	23.3	C				
Eastbound	Left	222	41	181	11.9	B	11.8	B		
	Thru	811	41	181	12.7	B				
	Right	130	3	82	5.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
203	203	0
2	2	0
256	260	4
765	764	-1
206	222	16
804	811	7
131	130	-1

South 12th Street and 4th Avenue South (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Left	51	0	1	0.6	A	1.2	A	1.2	A
	Thru	471	0	1	0.9	A				
	HOV/Bus	81	0	1	0.7	A				
	Right	471	0	0	1.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
50	51	1
462	471	9
78	81	3
472	471	-1

West 66th Street and Logan Avenue South (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	8.5	A	4.0	A
	Thru	0	-	-	-	A				
	Right	12	1	30	8.5	A				
Southbound	Left	34	15	84	61.9	E	51.1	D		
	Thru	4	15	84	59.1	E				
	Right	15	24	106	24.3	C				
Eastbound	Left	0	-	-	-	A	2.5	A		
	Thru	1,187	6	133	2.4	A				
	Right	4	9	153	3.2	A				
Westbound	Left	23	10	188	15.2	B	3.3	A		
	Thru	1,175	10	188	3.1	A				
	Right	14	15	217	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1	0	-1
0	0	0
12	12	0
36	34	-2
4	4	0
14	15	1
2	0	-2
1,193	1,187	-6
5	4	-1
21	23	2
1,180	1,175	-5
16	14	-2

West 66th Street and I-35W SB Ramps (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	124	41	172	58.0	E	34.3	C	14.0	B
	Thru	10	38	260	67.9	E				
	Right	260	45	258	21.8	C				
Eastbound	Thru	1,121	48	364	12.0	B	11.3	B		
	Right	188	4	100	6.8	A				
Westbound	Left	182	36	190	37.7	D	10.0	A		
	Thru	944	17	198	4.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
126	124	-2
8	10	2
264	260	-4
1,131	1,121	-10
184	188	4
181	182	1
953	944	-9

West 66th Street and I-35W NB Ramps (Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	212	71	269	56.5	E	36.4	D	10.8	B
	Thru	6	26	205	57.7	E				
	Right	252	34	204	19.0	B				
Eastbound	Left	162	14	137	20.5	C	4.0	A		
	Thru	1,245	8	155	1.9	A				
Westbound	Thru	723	18	148	8.1	A	7.6	A		
	Right	86	1	59	2.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
219	212	-7
3	6	3
250	252	2
166	162	-4
1,257	1,245	-12
734	723	-11
84	86	2

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	122	42	184	58.7	E	54.7	D	14.2	B
	Thru	37	11	80	52.5	D				
	Right	11	16	93	18.7	B				
Southbound	Left	12	7	62	46.9	D	14.3	B		
	Thru	16	7	61	46.8	D				
	Right	141	6	89	7.9	A				
Eastbound	Left	136	35	180	43.1	D	8.1	A		
	Thru	937	13	155	3.6	A				
	Right	171	25	207	5.0	A				
Westbound	Left	16	6	42	72.5	E	15.2	B		
	Thru	580	28	196	13.6	B				
	Right	30	38	221	15.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	122	-3
36	37	1
11	11	0
13	12	-1
16	16	0
142	141	-1
135	136	1
936	937	1
182	171	-11
15	16	1
583	580	-3
31	30	-1

West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	354	88	354	53.1	D	40.0	D	21.2	C
	Thru	0	-	-	-	A				
	Right	414	83	331	28.7	C				
Southbound	Left	29	12	73	69.2	E	64.1	E		
	Thru	0	-	-	-	A				
	Right	4	17	86	27.6	C				
Eastbound	Left	22	1	27	12.1	B	12.5	B		
	Thru	1,177	49	353	13.0	B				
	Right	69	1	77	4.2	A				
Westbound	Left	30	2	38	20.6	C	15.4	B		
	Thru	805	42	281	15.2	B				
	Right	4	51	307	18.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
357	354	-3
0	0	0
427	414	-13
31	29	-2
1	0	-1
3	4	1
20	22	2
1,179	1,177	-2
70	69	-1
32	30	-2
815	805	-10
4	4	0

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	143	83	281	49.0	D	36.2	D	14.0	B
	Thru	3	81	264	41.2	D				
	Right	376	97	297	31.2	C				
Southbound	Left	8	2	26	51.9	D	23.7	C		
	Thru	0	-	-	-	A				
	Right	13	0	35	6.4	A				
Eastbound	Left	11	0	5	8.5	A	8.9	A		
	Thru	1,558	39	428	8.9	A				
	Right	43	1	68	8.7	A				
Westbound	Left	43	3	58	22.6	C	9.3	A		
	Thru	679	19	177	8.5	A				
	Right	15	21	188	7.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
152	143	-9
2	3	1
387	376	-11
8	8	0
0	0	0
15	13	-2
11	11	0
1,580	1,558	-22
46	43	-3
44	43	-1
684	679	-5
15	15	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	133	46	183	60.2	E	56.5	E	11.7	B
	Right	161	34	119	53.4	D				
Eastbound	Thru	1,939	40	323	7.5	A	7.5	A		
Westbound	Thru	579	5	82	3.3	A	3.3	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
143	133	-10
158	161	3
1,975	1,939	-36
585	579	-6

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	49	197	61.7	E	54.5	D	16.3	B
	Thru	65	49	197	60.3	E				
	Right	48	58	210	39.6	D				
Eastbound	Left	704	158	565	33.5	C	14.0	B		
	Thru	1,329	14	205	3.8	A				
	Right	29	20	236	6.3	A				
Westbound	Left	21	1	28	23.8	C	14.5	B		
	Thru	535	26	176	15.2	B				
	Right	196	10	120	11.6	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	46	1
64	65	1
49	48	-1
721	704	-17
1,367	1,329	-38
30	29	-1
22	21	-1
540	535	-5
199	196	-3

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	167	98	391	71.6	E	48.4	D	15.7	B
	Right	296	77	342	35.3	D				
Eastbound	Thru	1,306	38	351	8.9	A	8.9	A		
	Right	60	42	372	8.7	A				
Westbound	Left	18	6	42	71.1	E	6.3	A		
	Thru	589	7	114	4.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
169	167	-2
298	296	-2
1,356	1,306	-50
60	60	0
16	18	2
592	589	-3

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.9	A	26.0	D
	Thru	117	3	44	0.9	A				
Southbound	Thru	75	0	0	2.3	A	2.2	A		
	Right	12	0	0	1.6	A				
Eastbound	Left	408	114	326	38.6	E	38.1	E		
	Right	6	120	332	6.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
120	117	-3
68	75	7
10	12	2
412	408	-4
6	6	0



**Knox Avenue South and Dicks Sporting Goods / Park & Ride (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	59	5	106	9.1	A	9.1	A	5.0	A
Southbound	Left	62	0	2	0.9	A	0.8	A		
	Right	18	0	0	0.8	A				
Westbound	Right	58	2	50	6.7	A	6.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
60	59	-1
57	62	5
17	18	1
60	58	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	24	124	57.8	E	40.8	D	14.1	B
	Thru	16	10	94	54.0	D				
	Right	70	15	108	20.5	C				
Southbound	Left	92	36	184	57.0	E	39.2	D		
	Thru	10	36	184	55.0	E				
	Right	60	2	58	9.2	A				
Eastbound	Left	52	17	89	59.8	E	10.7	B		
	Thru	1,261	36	328	8.7	A				
	Right	68	43	355	9.3	A				
Westbound	Left	65	3	50	9.8	A	9.7	A		
	Thru	666	18	151	10.4	B				
	Right	67	0	16	2.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
74	71	-3
18	16	-2
70	70	0
95	92	-3
11	10	-1
62	60	-2
51	52	1
1,260	1,261	1
67	68	1
66	65	-1
677	666	-11
65	67	2

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	161	59	232	61.3	E	42.9	D	18.9	B
	Thru	41	11	75	48.7	D				
	Right	76	0	5	0.8	A				
Southbound	Left	17	5	39	53.6	D	43.2	D		
	Thru	17	6	80	47.5	D				
	Right	6	1	58	1.2	A				
Eastbound	Left	26	9	61	63.3	E	17.2	B		
	Thru	1,260	84	515	16.9	B				
	Right	138	0	0	11.7	B				
Westbound	Left	46	14	62	63.8	E	11.4	B		
	Thru	630	17	150	7.9	A				
	Right	44	19	158	6.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
166	161	-5
46	41	-5
79	76	-3
24	17	-7
26	17	-9
7	6	-1
26	26	0
1,257	1,260	3
142	138	-4
47	46	-1
635	630	-5
42	44	2

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	27.9	D	0.9	A
	Thru	0	-	-	-	A				
	Right	4	0	28	27.9	D				
Southbound	Left	8	5	47	69.2	F	35.3	E		
	Thru	2	6	49	44.6	E				
	Right	22	5	47	22.0	C				
Eastbound	Left	9	0	14	4.8	A	0.3	A		
	Thru	1,337	0	0	0.3	A				
	Right	4	0	0	0.7	A				
Westbound	Left	0	-	-	-	A	0.3	A		
	Thru	697	0	0	0.2	A				
	Right	12	0	0	0.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1	0	-1
0	0	0
4	4	0
8	8	0
2	2	0
23	22	-1
8	9	1
1,346	1,337	-9
6	4	-2
1	0	-1
700	697	-3
11	12	1

**Knox Avenue South and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	46	0	0	1.6	A	1.5	A	1.5	A
	Right	65	0	0	1.4	A				
Southbound	Left	4	0	2	1.1	A	0.2	A		
	Thru	31	0	0	0.1	A				
Westbound	Left	8	0	3	7.1	A	7.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
39	46	7
50	65	15
3	4	1
33	31	-2
7	8	1
1	0	-1

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	19	0	10	1.3	A	0.3	A	5.7	A
	Thru	182	0	0	0.1	A				
	Right	27	0	0	0.8	A				
Southbound	Left	21	0	12	1.8	A	0.3	A		
	Thru	180	0	0	0.1	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	7.2	A		
	Thru	0	-	-	-	A				
	Right	25	1	33	7.2	A				
Westbound	Left	165	21	136	20.7	C	14.3	B		
	Thru	0	-	-	-	A				
	Right	96	3	62	3.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
23	19	-4
194	182	-12
25	27	2
21	21	0
193	180	-13
1	0	-1
1	0	-1
0	0	0
27	25	-2
166	165	-1
1	0	-1
96	96	0

Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	12	0	11	7.3	A	1.3	A	6.0	A	10	12	2
	Thru	178	3	79	0.9	A					190	178	-12
	Right	17	4	79	1.9	A					17	17	0
Southbound	Left	6	0	10	7.2	A	0.3	A			5	6	1
	Thru	357	0	0	0.2	A					376	357	-19
	Right	5	0	0	0.6	A					5	5	0
Eastbound	Left	4	0	25	16.0	C	10.8	B			4	4	0
	Thru	0	-	-	-	A					0	0	0
	Right	6	0	25	7.2	A					7	6	-1
Westbound	Left	107	20	112	32.8	D	25.6	D			108	107	-1
	Thru	0	-	-	-	A					0	0	0
	Right	46	3	89	8.9	A			48	46	-2		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	511	10	96	7.2	A	6.3	A	7.9	A	509	511	2
	Right	194	2	68	3.9	A					194	194	0
Southbound	Left	298	18	158	14.2	B	7.3	A			294	298	4
	Thru	621	5	67	4.0	A					626	621	-5
Westbound	Left	131	16	130	22.1	C	14.3	B			143	131	-12
	Right	130	23	146	6.5	A					126	130	4

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	19	73.0	E	30.0	C	21.3	C	4	4	0
	Right	8	0	46	8.4	A					8	8	0
Southbound	Left	406	86	246	53.0	D	47.3	D			433	406	-27
	Right	50	0	0	1.5	A					53	50	-3
Eastbound	Left	21	7	48	68.6	E	10.1	B			23	21	-2
	Thru	458	13	142	7.4	A					454	458	4
	Right	11	22	186	7.6	A					11	11	0
Westbound	Left	8	3	27	79.3	E	5.1	A			8	8	0
	Thru	209	5	63	6.2	A					212	209	-3
	Right	186	0	0	0.7	A					192	186	-6

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	120	15	79	28.0	C	15.2	B	6.8	A	119	120	1
	Thru	25	15	79	28.0	C					25	25	0
	Right	140	0	0	1.9	A					139	140	1
Eastbound	Thru	449	9	109	5.8	A	5.8	A			460	449	-11
	Right	428	9	216	5.8	A					435	428	-7
Westbound	Left	175	3	70	5.8	A	3.5	A			175	175	0
	Thru	261	3	70	1.9	A			273	261	-12		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	163	25	115	28.5	C	23.2	C	9.7	A	173	163	-10
	Thru	36	25	115	31.4	C					37	36	-1
	Right	120	33	127	13.5	B					115	120	5
Eastbound	Left	239	12	132	10.9	B	6.4	A			242	239	-3
	Thru	331	11	132	3.1	A					337	331	-6
Westbound	Thru	272	7	98	4.3	A	4.2	A			275	272	-3
	Right	158	9	118	4.1	A			160	158	-2		

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Right	1,096	0	0	1.8	A	1.8	A	12.2	B	1,101	1,096	-5
Eastbound	Thru	708	89	327	37.3	D	37.3	D			710	708	-2
Westbound	Left	792	21	262	11.8	B	7.5	A			800	792	-8
	Thru	609	0	1	2.0	A					614	609	-5

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	37	20	118	49.9	D	29.4	C	17.2	B	42	37	-5
	Right	169	36	147	24.9	C					167	169	2
Southbound	Left	175	52	224	48.5	D	24.3	C			176	175	-1
	Thru	67	17	91	43.8	D					72	67	-5
Eastbound	Right	284	5	109	4.8	A	19.6	B			284	284	0
	Thru	1,691	96	547	20.7	C					1,688	1,691	3
Westbound	Right	120	2	56	4.6	A	8.7	A			123	120	-3
	Left	150	51	217	54.6	D					156	150	-6
	Thru	1,099	4	124	2.4	A					1,088	1,099	11



**West 98th Street and I-35W SB Ramps (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,680	7	281	7.1	A	6.2	A	3.9	A
	Right	344	0	0	1.9	A				
Westbound	Thru	1,256	0	12	0.7	A	0.8	A		
	Right	193	0	12	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,691	1,680	-11
340	344	4
1,244	1,256	12
196	193	-3

**West 98th Street and I-35W NB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	303	74	258	52.3	D	39.5	D	16.2	B
	Right	189	9	131	19.0	B				
Eastbound	Left	504	127	391	31.1	C	12.1	B		
	Thru	1,167	13	190	3.8	A				
Westbound	Thru	1,141	47	256	12.8	B	12.9	B		
	Right	221	54	277	13.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
302	303	1
195	189	-6
527	504	-23
1,164	1,167	3
1,138	1,141	3
225	221	-4

**West 98th Street and Aldrich Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	32	0	8	20.7	C	20.7	C	1.5	A
Eastbound	Thru	1,318	3	143	1.5	A	1.5	A		
		Right	37	3	142	1.4	A			
Westbound	Thru	1,361	1	68	1.2	A	1.2	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	32	12
1,320	1,318	-2
39	37	-2
1,363	1,361	-2

**West 98th Street and Lyndale Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	110	32	160	49.0	D	41.8	D	33.2	C
	Thru	149	31	123	53.7	D				
	Right	80	5	76	9.7	A				
Southbound	Left	146	43	176	54.1	D	62.7	E		
	Thru	316	136	446	113.2	F				
	Right	267	0	0	7.7	A				
Eastbound	Left	263	39	154	41.0	D	17.3	B		
	Thru	930	45	277	13.3	B				
	Right	158	0	0	1.1	A				
Westbound	Left	99	28	92	68.6	E	30.5	C		
	Thru	983	88	386	27.2	C				
	Right	17	0	0	0.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
116	110	-6
152	149	-3
81	80	-1
148	146	-2
320	316	-4
267	267	0
268	263	-5
915	930	15
157	158	1
97	99	2
980	983	3
14	17	3

**West 99th Street and East Bloomington Freeway (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	22	0	0	0.1	A	0.3	A	0.5	A
	Right	11	0	0	0.6	A				
Westbound	Right	91	0	13	0.6	A	0.6	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
22	22	0
12	11	-1
89	91	2

**West 99th Street and Aldrich Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	4.9	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	42	2	49	7.5	A	7.0	A		
	Thru	0	-	-	-	A				
	Right	41	2	49	6.6	A				
Eastbound	Left	11	0	1	0.6	A	1.3	A		
	Thru	11	0	0	1.9	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	3.2	A		
	Thru	44	0	0	1.6	A				
	Right	15	0	0	7.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
44	42	-2
0	0	0
46	41	-5
2	11	9
10	11	1
0	0	0
0	0	0
43	44	1
14	15	1

**West 99th Street and Lyndale Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	19	0	14	2.5	A	0.3	A	1.6	A
	Thru	305	0	1	0.1	A				
	Right	9	0	1	0.8	A				
Southbound	Left	6	0	4	2.6	A	0.7	A		
	Thru	529	0	0	0.7	A				
	Right	37	0	0	1.5	A				
Eastbound	Left	31	3	57	17.9	C	15.1	C		
	Thru	1	0	26	8.7	A				
	Right	22	1	45	11.3	B				
Westbound	Left	7	1	41	14.3	B	13.0	B		
	Thru	4	1	40	21.6	C				
	Right	10	1	39	8.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
19	19	0
306	305	-1
10	9	-1
6	6	0
533	529	-4
35	37	2
32	31	-1
1	1	0
21	22	1
8	7	-1
3	4	1
11	10	-1

Nicollet Avenue and River Ridge Lane

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	178	14	153	14.9	B	11.2	B	24.2	C
	Thru	76	4	49	12.9	B				
	Right	114	3	91	4.3	A				
Southbound	Left	7	1	22	29.5	C	22.8	C		
	Thru	176	17	107	23.6	C				
	Right	21	8	168	14.2	B				
Eastbound	Left	10	5	47	42.9	D	11.7	B		
	Thru	9	5	46	44.3	D				
	Right	242	15	122	9.2	A				
Westbound	Left	408	64	233	43.4	D	43.1	D		
	Thru	24	64	233	43.3	D				
	Right	12	82	257	32.2	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	178	-12
80	76	-4
118	114	-4
6	7	1
179	176	-3
20	21	1
10	10	0
9	9	0
243	242	-1
412	408	-4
26	24	-2
12	12	0

Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	282	107	289	87.0	F	65.0	E	42.0	D
	Thru	99	106	288	83.0	F				
	Right	182	40	256	21.2	C				
Southbound	Left	152	54	226	58.1	E	51.9	D		
	Thru	333	90	304	60.2	E				
	Right	327	110	328	40.5	D				
Eastbound	Left	144	40	129	75.8	E	31.5	C		
	Thru	1,359	167	747	32.6	C				
	Right	335	5	122	8.3	A				
Westbound	Left	249	67	186	90.3	F	41.0	D		
	Thru	1,620	258	956	35.8	D				
	Right	130	0	30	11.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
296	282	-14
102	99	-3
184	182	-2
159	152	-7
338	333	-5
342	327	-15
152	144	-8
1,348	1,359	11
335	335	0
238	249	11
1,608	1,620	12
134	130	-4

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	0	18	7.0	A	8.9	A	11.3	B
	Thru	385	14	129	9.7	A				
	Right	91	4	89	5.9	A				
Southbound	Left	205	6	137	7.8	A	8.2	A		
	Thru	668	21	241	8.2	A				
	Right	47	26	261	9.2	A				
Eastbound	Left	49	8	72	33.1	C	29.2	C		
	Thru	35	6	63	32.4	C				
	Right	17	10	80	11.5	B				
Westbound	Left	113	19	116	32.5	C	19.0	B		
	Thru	28	4	48	28.3	C				
	Right	139	0	5	6.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	15	0
385	385	0
92	91	-1
204	205	1
665	668	3
42	47	5
52	49	-3
37	35	-2
18	17	-1
108	113	5
28	28	0
145	139	-6

Travelers Trail and Pleasant Avenue

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	1	32	5.9	A	5.8	A	2.7	A
	Right	40	1	37	5.8	A				
Eastbound	Thru	12	0	0	0.0	A	0.0	A		
	Right	0	-	-	-	A				
Westbound	Left	15	0	0	0.6	A	0.3	A		
	Thru	25	0	0	0.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
2	1	-1
42	40	-2
13	12	-1
0	0	0
13	15	2
25	25	0

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	343	88	486	32.1	C	24.0	C	22.5	C
	Thru	19	89	487	31.5	C				
	Right	270	10	116	13.3	B				
Southbound	Left	111	48	207	46.8	D	46.2	D		
	Thru	47	48	207	48.6	D				
	Right	16	61	228	34.8	C				
Eastbound	Left	12	1	17	18.9	B	24.4	C		
	Thru	512	47	224	24.7	C				
	Right	53	70	266	23.1	C				
Westbound	Left	157	11	105	16.8	B	14.6	B		
	Thru	587	28	184	14.3	B				
	Right	56	50	236	12.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
345	343	-2
18	19	1
273	270	-3
112	111	-1
49	47	-2
15	16	1
11	12	1
518	512	-6
50	53	3
165	157	-8
594	587	-7
58	56	-2

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	88	25	120	48.5	D	27.2	C	8.4	A
	Thru	3	25	123	52.0	D				
	Right	97	4	64	7.1	A				
Southbound	Left	3	11	89	77.5	E	34.5	C		
	Thru	13	10	87	71.2	E				
	Right	45	21	123	21.0	C				
Eastbound	Left	10	0	7	5.1	A	4.4	A		
	Thru	626	11	170	4.2	A				
	Right	254	17	208	4.7	A				
Westbound	Left	160	12	111	17.9	B	6.5	A		
	Thru	669	7	111	3.8	A				
	Right	2	14	149	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
89	88	-1
3	3	0
98	97	-1
2	3	1
14	13	-1
46	45	-1
11	10	-1
628	626	-2
264	254	-10
165	160	-5
682	669	-13
2	2	0



**Burnsville Parkway and Gateway Boulevard (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	63	180	102.8	F	91.9	F	7.4	A
	Thru	0	-	-	-	A				
	Right	44	60	176	76.8	F				
Southbound	Left	8	9	80	43.9	E	18.2	C		
	Thru	2	10	89	41.5	E				
	Right	84	8	78	15.2	C				
Eastbound	Left	9	0	12	4.4	A	0.5	A		
	Thru	645	1	33	0.4	A				
	Right	70	1	31	1.4	A				
Westbound	Left	67	1	44	6.3	A	1.0	A		
	Thru	689	3	73	0.5	A				
	Right	7	3	73	1.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
66	61	-5
0	0	0
43	44	1
7	8	1
2	2	0
88	84	-4
12	9	-3
646	645	-1
70	70	0
68	67	-1
695	689	-6
6	7	1

**Burnsville Parkway and Pleasant Avenue (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	18	106	49.3	D	41.5	D	8.1	A
	Thru	0	-	-	-	A				
	Right	23	27	128	23.1	C				
Southbound	Left	72	31	152	50.5	D	42.3	D		
	Thru	4	31	152	58.6	E				
	Right	56	46	179	30.7	C				
Eastbound	Left	6	0	4	6.8	A	1.9	A		
	Thru	661	3	65	1.8	A				
	Right	27	0	4	1.1	A				
Westbound	Left	33	0	23	7.3	A	4.1	A		
	Thru	655	7	117	4.0	A				
	Right	13	0	1	2.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	54	-1
0	0	0
24	23	-1
71	72	1
3	4	1
58	56	-2
7	6	-1
663	661	-2
26	27	1
33	33	0
656	655	-1
12	13	1

## 2019 No-Build MOEs



2019\_AM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



South 12th Street and Marquette Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	444	35	187	19.7	B	19.1	B	19.0	B	440	444	4
	Right	114	44	214	16.5	B					115	114	-1
Southbound	Left	38	1	23	6.2	A	8.7	A			40	38	-2
	Thru	12	1	23	16.7	B					10	12	2
Eastbound	Left	230	53	248	20.7	C	19.5	B			230	230	0
	Thru	747	53	248	19.3	B					750	747	-3
	Right	10	61	272	13.8	B			10	10	0		

South 12th Street and 2nd Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	1	1	46	52.3	D	47.0	D	15.3	B	1	1	0
	Right	95	21	109	46.9	D					95	95	0
Southbound	Left	87	34	139	36.9	D	29.7	C			85	87	2
	Thru	188	34	139	26.3	C					190	188	-2
Eastbound	Left	69	11	83	6.1	A	5.0	A			75	69	-6
	Thru	582	11	83	5.0	A					625	582	-43
	Right	26	21	117	3.6	A			30	26	-4		

South 12th Street and 3rd Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	431	26	149	18.3	B	18.3	B	16.3	B	430	431	1
	Right	0	-	-	-	A					0	0	0
Southbound	Left	144	25	142	32.6	C	23.9	C			145	144	-1
	Thru	205	13	83	17.8	B					205	205	0
Eastbound	Left	347	33	176	13.2	B	11.6	B			360	347	-13
	Thru	343	33	177	11.8	B					365	343	-22
	Right	72	1	73	3.6	A			80	72	-8		

South 12th Street and 4th Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Eastbound	Left	34	0	0	0.5	A	0.7	A	0.7	A	35	34	-1
	Thru	248	0	0	0.6	A					260	248	-12
	HOV/Bus	7	0	0	0.1	A					7	7	0
	Right	199	0	0	0.9	A					215	199	-16

West 76th Street and Newton Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	45	13	58	66.5	E	45.4	D	16.0	B	45	45	0
	Thru	0	-	-	-	A					0	0	0
	Right	24	1	44	5.9	A					25	24	-1
Southbound	Left	79	32	134	65.2	E	64.0	E			80	79	-1
	Thru	4	32	134	64.7	E					5	4	-1
	Right	4	40	147	38.7	D					5	4	-1
Eastbound	Left	5	0	11	15.3	B	12.2	B	5	5	0		
	Thru	488	28	182	16.4	B			500	488	-12		
	Right	393	17	169	7.0	A			390	393	3		
Westbound	Left	413	85	380	36.3	D	13.8	B	415	413	-2		
	Thru	928	12	151	4.0	A			955	928	-27		
	Right	14	17	178	6.5	A			15	14	-1		

West 76th Street and Knox Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	12	9	51	78.5	E	39.8	D	4.8	A	15	12	-3
	Thru	4	7	47	66.6	E					5	4	-1
	Right	18	12	63	8.0	A					25	18	-7
Southbound	Left	8	3	25	64.9	E	65.7	E			10	8	-2
	Thru	5	3	29	106.0	F					5	5	0
	Right	4	5	39	17.0	B					5	4	-1
Eastbound	Left	6	0	3	9.4	A	3.6	A	5	6	1		
	Thru	469	3	68	3.1	A			480	469	-11		
	Right	112	2	79	5.1	A			120	112	-8		
Westbound	Left	427	12	182	10.1	B	4.0	A	435	427	-8		
	Thru	1,354	6	155	2.1	A			1,365	1,354	-11		
	Right	10	6	165	2.1	A			10	10	0		

West 76th Street and I-35W SB Ramps (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Southbound	Left	213	52	231	43.5	D	47.2	D	23.5	C	210	213	3
	Right	657	105	377	48.5	D					655	657	2
Eastbound	Thru	495	14	110	8.4	A	8.4	A			515	495	-20
Westbound	Thru	1,139	46	346	12.0	B	12.0	B			1,155	1,139	-16

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West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	14	80	59.9	E	48.2	D	5.8	A
	Thru	10	14	82	68.0	E				
	Right	19	19	92	22.4	C				
Eastbound	Left	122	5	84	14.7	B	5.8	A	5.8	A
	Thru	402	8	153	3.6	A				
	Right	185	12	185	4.7	A				
Westbound	Left	82	1	44	7.9	A	4.1	A	4.1	A
	Thru	1,114	10	178	3.9	A				
	Right	134	1	59	3.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
10	10	0
20	19	-1
125	122	-3
415	402	-13
185	185	0
85	82	-3
1,130	1,114	-16
135	134	-1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	41	40.4	D	30.8	C	6.7	A
	Right	8	0	35	6.9	A				
Eastbound	Thru	278	6	94	5.4	A	5.5	A	6.7	A
	Right	143	7	115	5.7	A				
Westbound	Left	262	43	226	30.2	C	6.6	A	6.6	A
	Thru	1,311	4	130	1.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
10	8	-2
290	278	-12
145	143	-2
250	262	12
1,330	1,311	-19

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	15	9.5	A	4.1	A	3.2	A
	Thru	28	3	49	2.9	A				
Southbound	Thru	96	0	0	3.3	A	3.0	A	3.2	A
	Right	443	0	0	2.9	A				
Eastbound	Left	4	0	34	15.9	C	15.9	C	15.9	C
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	28	3
100	96	-4
455	443	-12
5	4	-1
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	4	95	9.3	A	9.3	A	2.8	A
Southbound	Left	30	0	1	0.8	A	0.8	A		
	Right	67	0	0	0.8	A				
Westbound	Right	4	0	32	6.1	A	6.1	A	2.8	A

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	29	-1
30	30	0
70	67	-3
5	4	-1

American Boulevard West and Morgan Circle South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	3	27	68.4	E	28.6	C	3.9	A
	Thru	0	-	-	-	A				
	Right	15	1	40	7.4	A				
Southbound	Left	25	9	51	67.8	E	57.5	E	3.9	A
	Thru	0	-	-	-	A				
	Right	5	0	30	6.3	A				
Eastbound	Left	5	2	26	69.4	E	2.5	A	2.5	A
	Thru	316	2	56	1.5	A				
	Right	7	3	75	2.5	A				
Westbound	Left	9	0	4	1.7	A	1.7	A	1.7	A
	Thru	776	3	75	1.7	A				
	Right	24	0	1	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	8	-2
0	0	0
15	15	0
25	25	0
0	0	0
5	5	0
5	5	0
320	316	-4
5	7	2
10	9	-1
790	776	-14
25	24	-1

American Boulevard West and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	21	101	66.2	E	47.6	D	10.5	B
	Thru	13	7	47	80.4	F				
	Right	31	0	1	0.8	A				
Southbound	Left	0	-	-	-	A	53.6	D	10.5	B
	Thru	7	4	61	83.2	F				
	Right	4	2	55	1.9	A				
Eastbound	Left	5	1	18	54.1	D	4.2	A	4.2	A
	Thru	240	3	62	4.0	A				
	Right	109	0	0	2.3	A				
Westbound	Left	75	20	71	67.1	E	8.2	A	8.2	A
	Thru	755	5	110	2.4	A				
	Right	14	6	113	2.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
60	55	-5
15	13	-2
35	31	-4
0	0	0
10	7	-3
5	4	-1
5	5	0
245	240	-5
110	109	-1
75	75	0
760	755	-5
15	14	-1

American Boulevard West and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	28	49.1	E	49.1	E	0.8	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	5	1	24	57.8	F	37.5	E	0.8	A
	Thru	0	-	-	-	A				
	Right	4	1	25	12.2	B				
Eastbound	Left	30	1	25	5.5	A	0.7	A	0.7	A
	Thru	240	0	0	0.1	A				
	Right	0	-	-	-	A				
Westbound	Left	4	0	2	1.2	A	0.3	A	0.3	A
	Thru	836	0	0	0.3	A				
	Right	10	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
0	0	0
5	5	0
0	0	0
5	4	-1
30	30	0
250	240	-10
0	0	0
5	4	-1
840	836	-4
10	10	0



2019\_AM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	24	0	0	2.7	A	2.5	A	1.9	A	20	24	4
	Right	5	0	0	1.8	A					5	5	0
Southbound	Left	0	-	-	-	A	0.0	A			0	0	0
	Thru	10	0	0	0.0	A					10	10	0
Westbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!			0	0	0
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and West 81st Street

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	0	4	1.7	A	0.8	A	1.3	A	5	4	-1
	Thru	88	0	0	0.0	A					100	88	-12
	Right	154	0	0	1.2	A					150	154	4
Southbound	Left	83	0	35	2.8	A	1.3	A			85	83	-2
	Thru	110	0	0	0.2	A					110	110	0
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	9	1	31	10.5	B	6.5	A	10	9	-1		
	Thru	4	0	31	12.6	B			5	4	-1		
	Right	10	0	0	0.5	A			10	10	0		

Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	11	0	3	4.8	A	1.4	A	1.8	A	10	11	1
	Thru	239	3	67	1.0	A					245	239	-6
	Right	166	3	66	1.9	A					170	166	-4
Southbound	Left	45	1	32	4.1	A	1.6	A			45	45	0
	Thru	69	0	0	0.1	A					70	69	-1
	Right	6	0	0	0.6	A					5	6	1
Eastbound	Left	4	0	28	17.6	C	10.3	B	5	4	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	9	0	28	7.1	A			10	9	-1		
Westbound	Left	4	0	25	14.2	B	11.0	B	5	4	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	18	7.8	A			5	4	-1		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	615	10	112	6.1	A	5.5	A	11.4	B	615	615	0
	Right	178	4	83	3.5	A					180	178	-2
Southbound	Left	83	3	60	12.8	B	7.1	A			80	83	3
	Thru	251	3	55	5.3	A					255	251	-4
Westbound	Left	137	52	211	54.3	D	24.2	C			145	137	-8
	Right	334	64	229	11.9	B					335	334	-1

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	17	42.3	D	11.3	B	6.9	A	5	4	-1
	Right	25	1	54	6.3	A					25	25	0
Southbound	Left	72	14	76	40.1	D	34.9	C			75	72	-3
	Right	11	0	0	0.6	A					10	11	1
Eastbound	Left	44	11	71	44.4	D	9.7	A			45	44	-1
	Thru	211	2	51	2.6	A					210	211	1
	Right	5	5	96	2.4	A			5	5	0		
Westbound	Left	0	-	-	-	A	3.1	A	0	0	0		
	Thru	461	7	85	4.5	A			465	461	-4		
Right	371	0	1	1.3	A	380	371	-9					

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	143	24	106	38.4	D	14.9	B	7.0	A	145	143	-2
	Thru	23	24	106	41.1	D					25	23	-2
	Right	317	0	11	2.4	A					315	317	2
Eastbound	Thru	196	3	55	4.1	A	3.3	A			195	196	1
	Right	112	0	29	1.9	A					115	112	-3
Westbound	Left	121	4	98	3.8	A	2.8	A			120	121	1
	Thru	518	4	98	2.6	A			530	518	-12		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	349	53	218	33.5	C	29.4	C	17.6	B	360	349	-11
	Thru	70	53	218	34.4	C					70	70	0
	Right	113	62	231	13.6	B					110	113	3
Eastbound	Left	179	8	104	9.0	A	7.2	A			180	179	-1
	Thru	158	8	104	5.2	A					160	158	-2
Westbound	Thru	287	17	137	11.6	B	10.8	B			290	287	-3
	Right	124	25	163	9.1	A			125	124	-1		

2019\_AM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.7	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.6	A				
Southbound	Left	33	10	72	43.1	D	35.7	D	5.7	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	18.8	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.7	A
	Thru	384	5	67	3.8	A				
	Right	4	8	87	3.5	A				
Westbound	Left	11	17	220	9.7	A	4.9	A	5.7	A
	Thru	1,247	17	215	4.8	A				
	Right	5	23	245	4.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
385	384	-1
5	4	-1
10	11	1
1,265	1,247	-18
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	123	25	141	42.7	D	37.1	D	15.9	B
	Thru	29	119	511	49.8	D				
	Right	495	133	523	35.0	D				
Eastbound	Thru	462	19	136	18.5	B	15.2	B	15.9	B
	Right	147	5	93	4.9	A				
Westbound	Left	241	12	166	11.8	B	6.4	A	15.9	B
	Thru	1,166	24	258	5.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	123	-2
30	29	-1
500	495	-5
475	462	-13
145	147	2
240	241	1
1,185	1,166	-19

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	236	57	237	42.8	D	27.5	C	10.8	B
	Thru	16	7	100	41.4	D				
	Right	208	12	119	9.1	A				
Eastbound	Left	115	14	126	28.0	C	9.1	A	10.8	B
	Thru	470	9	110	4.5	A				
Westbound	Thru	1,166	11	194	5.8	A	5.6	A	10.8	B
	Right	104	1	61	3.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
240	236	-4
20	16	-4
205	208	3
120	115	-5
480	470	-10
1,185	1,166	-19
100	104	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	234	61	270	44.1	D	42.5	D	16.3	B
	Thru	32	6	50	35.2	D				
	Right	6	9	63	16.3	B				
Southbound	Left	20	5	56	36.7	D	12.6	B	16.3	B
	Thru	10	5	54	33.2	C				
	Right	179	9	97	8.7	A				
Eastbound	Left	67	12	97	33.2	C	7.0	A	16.3	B
	Thru	380	8	103	3.9	A				
	Right	187	18	155	4.0	A				
Westbound	Left	6	2	20	58.8	E	15.7	B	16.3	B
	Thru	848	44	268	15.4	B				
	Right	11	55	294	14.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
230	234	4
35	32	-3
5	6	1
20	20	0
10	10	0
180	179	-1
65	67	2
385	380	-5
190	187	-3
5	6	1
860	848	-12
10	11	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	843	0	0	1.3	A	1.3	A	5.5	A
Eastbound	Thru	238	12	83	15.1	B	15.1	B		
Westbound	Left	677	19	159	11.2	B	6.5	A		
	Thru	624	0	1	1.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
845	843	-2
240	238	-2
680	677	-3
630	624	-6

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	72	24	124	43.7	D	20.7	C	15.1	B
	Right	263	41	152	14.4	B				
Southbound	Left	175	42	194	41.3	D	18.0	B	15.1	B
	Thru	60	13	84	39.4	D				
	Right	370	4	110	3.6	A				
Eastbound	Thru	1,039	59	297	18.7	B	18.1	B	15.1	B
	Right	44	1	47	4.1	A				
Westbound	Left	97	27	143	49.1	D	8.0	A	15.1	B
	Thru	868	6	114	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	72	-3
260	263	3
175	175	0
60	60	0
370	370	0
1,040	1,039	-1
45	44	-1
95	97	2
865	868	3

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,348	1	66	2.9	A	2.8	A	1.8	A
	Right	128	0	0	0.8	A				
Westbound	Thru	964	0	1	0.4	A	0.4	A	1.8	A
	Right	97	0	1	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,355	1,348	-7
120	128	8
960	964	4
100	97	-3



West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	270	63	245	46.7	D	32.7	C	14.7	B
	Right	216	8	125	15.1	B				
Eastbound	Left	385	104	374	37.5	D	12.5	B		
	Thru	961	6	110	2.5	A				
Westbound	Thru	793	26	194	9.6	A	9.4	A		
	Right	283	29	215	8.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
265	270	5
220	216	-4
395	385	-10
960	961	1
795	793	-2
285	283	-2

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	0.8	A
Eastbound	Thru	1,092	1	79	1.1	A	1.1	A		
	Right	84	1	77	1.4	A				
Westbound	Thru	1,074	0	1	0.5	A	0.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	0	-5
1,090	1,092	2
90	84	-6
1,080	1,074	-6

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	78	18	107	40.8	D	38.8	D	27.8	C
	Thru	129	24	94	48.8	D				
	Right	49	3	67	9.2	A				
Southbound	Left	55	17	86	55.0	E	118.5	F		
	Thru	60	83	178	386.6	F				
	Right	107	0	0	0.7	A				
Eastbound	Left	270	40	153	39.7	D	14.4	B		
	Thru	705	16	125	6.8	A				
	Right	115	0	0	0.9	A				
Westbound	Left	40	13	66	59.7	E	19.2	B		
	Thru	889	51	284	18.0	B				
	Right	34	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	78	-2
135	129	-6
50	49	-1
55	55	0
65	60	-5
105	107	2
275	270	-5
710	705	-5
110	115	5
40	40	0
895	889	-6
30	34	4

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	35	0	0	0.1	A	0.3	A	0.5	A
	Right	19	0	0	0.6	A				
Westbound	Right	43	0	10	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	35	0
20	19	-1
40	43	3

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.0	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	4	0	27	7.2	A	6.5	A		
	Thru	0	-	-	-	A				
	Right	13	0	27	6.2	A				
Eastbound	Left	16	0	3	0.8	A	1.0	A		
	Thru	9	0	0	1.3	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	2.9	A		
	Thru	26	0	0	1.8	A				
	Right	35	0	0	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
5	4	-1
0	0	0
15	13	-2
10	16	6
10	9	-1
0	0	0
0	0	0
25	26	1
35	35	0

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	14	1.7	A	0.3	A	0.8	A
	Thru	247	0	1	0.1	A				
	Right	4	0	1	0.7	A				
Southbound	Left	8	0	5	1.7	A	0.5	A		
	Thru	174	0	0	0.3	A				
	Right	28	0	0	1.2	A				
Eastbound	Left	9	1	42	15.1	C	13.4	B		
	Thru	0	-	-	-	A				
	Right	6	0	37	10.9	B				
Westbound	Left	0	-	-	-	A	7.3	A		
	Thru	0	-	-	-	A				
	Right	4	0	30	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
250	247	-3
5	4	-1
10	8	-2
175	174	-1
30	28	-2
10	9	-1
0	0	0
5	6	1
0	0	0
0	0	0
5	4	-1

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	325	21	274	11.3	B	9.6	A	13.5	B
	Thru	221	6	83	8.8	A				
	Right	467	22	323	8.8	A				
Southbound	Left	11	1	23	17.0	B	14.2	B		
	Thru	61	5	51	16.6	B				
	Right	23	3	111	6.8	A				
Eastbound	Left	36	11	68	46.7	D	23.6	C		
	Thru	9	11	68	45.9	D				
	Right	58	2	67	5.9	A				
Westbound	Left	78	18	84	39.9	D	39.3	D		
	Thru	23	18	84	45.2	D				
	Right	11	31	109	22.9	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
335	325	-10
225	221	-4
490	467	-23
10	11	1
65	61	-4
20	23	3
35	36	1
10	9	-1
60	58	-2
80	78	-2
25	23	-2
10	11	1

Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	484	233	624	74.2	E	69.9	E	47.5	D
	Thru	412	233	624	72.8	E				
	Right	113	16	183	40.4	D				
Southbound	Left	35	19	85	86.8	F	58.8	E		
	Thru	69	31	96	87.1	F				
	Right	100	50	120	29.5	C				
Eastbound	Left	414	109	340	75.3	E	39.6	D		
	Thru	1,482	222	960	32.7	C				
	Right	146	0	31	7.9	A				
Westbound	Left	132	47	131	93.8	F	41.0	D		
	Thru	991	141	555	40.3	D				
	Right	199	6	93	9.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	484	-6
425	412	-13
115	113	-2
40	35	-5
65	69	4
100	100	0
420	414	-6
1,490	1,482	-8
145	146	1
130	132	2
995	991	-4
205	199	-6

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	0	12	5.7	A	9.5	A	10.5	B
	Thru	839	21	203	9.7	A				
	Right	30	11	162	5.0	A				
Southbound	Left	51	1	46	8.8	A	5.3	A		
	Thru	216	7	118	4.4	A				
	Right	81	9	137	5.4	A				
Eastbound	Left	62	11	77	35.3	D	30.1	C		
	Thru	30	4	48	26.4	C				
	Right	9	7	66	7.0	A				
Westbound	Left	33	5	55	30.7	C	14.6	B		
	Thru	26	3	41	28.3	C				
	Right	118	0	4	7.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	10	0
845	839	-6
30	30	0
50	51	1
215	216	1
75	81	6
65	62	-3
30	30	0
10	9	-1
30	33	3
25	26	1
120	118	-2

Travelers Trail and Pleasant Avenue

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	5.8	A	0.9	A
	Right	8	0	24	5.8	A				
Eastbound	Thru	23	0	0	0.0	A	0.2	A		
	Right	6	0	0	0.7	A				
Westbound	Left	37	0	1	0.8	A	0.6	A		
	Thru	16	0	0	0.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
10	8	-2
25	23	-2
5	6	1
35	37	2
15	16	1

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	112	41	183	48.9	D	29.1	C	11.3	B
	Thru	32	41	182	46.8	D				
	Right	150	8	82	10.4	B				
Southbound	Left	58	18	103	38.9	D	37.2	D		
	Thru	23	18	103	36.4	D				
	Right	5	27	125	21.2	C				
Eastbound	Left	20	0	18	5.1	A	6.7	A		
	Thru	996	23	206	6.7	A				
	Right	80	30	247	7.7	A				
Westbound	Left	63	1	37	10.9	B	4.9	A		
	Thru	235	3	69	3.7	A				
	Right	81	8	122	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
110	112	2
35	32	-3
150	150	0
60	58	-2
25	23	-2
5	5	0
20	20	0
1,005	996	-9
75	80	5
65	63	-2
235	235	0
85	81	-4

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	29	32	115	130.8	F	39.8	D	7.1	A
	Thru	12	32	114	132.3	F				
	Right	117	5	70	7.8	A				
Southbound	Left	0	-	-	-	A	24.4	C		
	Thru	4	2	30	52.7	D				
	Right	8	4	66	10.3	B				
Eastbound	Left	54	0	22	3.5	A	3.3	A		
	Thru	805	7	140	3.0	A				
	Right	344	12	177	3.8	A				
Westbound	Left	122	5	69	15.7	B	5.5	A		
	Thru	342	2	56	1.9	A				
	Right	5	4	104	2.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	29	-1
10	12	2
120	117	-3
0	0	0
5	4	-1
10	8	-2
55	54	-1
810	805	-5
350	344	-6
125	122	-3
345	342	-3
5	5	0

Burnsville Parkway and Gateway Boulevard

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	70	90	210	121.8	F	108.9	F	9.5	A
	Thru	0	-	-	-	A				
	Right	52	85	203	91.4	F				
Southbound	Left	0	-	-	-	A	8.2	A		
	Thru	0	-	-	-	A				
	Right	8	0	24	8.2	A				
Eastbound	Left	85	0	29	2.4	A	0.6	A		
	Thru	804	1	42	0.4	A				
	Right	32	2	44	1.6	A				
Westbound	Left	38	1	30	5.5	A	0.8	A		
	Thru	390	1	37	0.3	A				
	Right	20	1	43	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	70	-5
0	0	0
50	52	2
0	0	0
0	0	0
10	8	-2
85	85	0
815	804	-11
30	32	2
40	38	-2
390	390	0
20	20	0



2019\_AM\_No Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Pleasant Avenue (Signal)										Target Volume (vph)	Simulated Volume (vph)	Difference (vph)	
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	23	6	53	47.4	D	37.2	D	3.1	A	25	23	-2
	Thru	0	-	-	-	A					0	0	0
	Right	10	11	75	13.7	B					10	10	0
Southbound	Left	8	2	33	46.2	D	26.1	C			10	8	-2
	Thru	0	-	-	-	A					0	0	0
	Right	9	5	58	8.3	A					10	9	-1
Eastbound	Left	39	0	8	3.1	A	1.8	A			40	39	-1
	Thru	807	3	81	1.7	A					815	807	-8
	Right	10	0	1	3.3	A					10	10	0
Westbound	Left	24	0	15	7.4	A	2.5	A	25	24	-1		
	Thru	417	2	65	2.4	A			415	417	2		
	Right	60	0	7	1.5	A			60	60	0		

2019\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



South 12th Street and Marquette Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	301	24	159	17.7	B	16.0	B	22.9	C	300	301	1
	Right	145	31	187	12.6	B					145	145	0
Southbound	Left	93	14	106	39.0	D	37.0	D			90	93	3
	Thru	9	13	105	16.6	B					10	9	-1
Eastbound	Left	85	50	200	26.6	C	24.9	C			85	85	0
	Thru	715	50	200	24.8	C					725	715	-10
	Right	4	59	224	13.7	B			5	4	-1		

South 12th Street and 2nd Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	38	18	95	67.9	E	56.7	E	20.7	C	30	38	8
	Right	76	17	97	51.1	D					75	76	1
Southbound	Left	338	92	355	29.9	C	23.6	C			345	338	-7
	Thru	595	92	356	20.0	B					590	595	5
Eastbound	Left	58	51	217	11.6	B	12.8	B			60	58	-2
	Thru	732	52	219	13.1	B					745	732	-13
	Right	67	71	252	10.8	B			70	67	-3		

South 12th Street and 3rd Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	209	17	94	23.3	C	23.0	C	18.7	B	210	209	-1
	Right	4	0	8	3.2	A					5	4	-1
Southbound	Left	270	47	261	31.6	C	25.8	C			265	270	5
	Thru	780	66	322	23.8	C					780	780	0
Eastbound	Left	226	41	186	11.9	B	11.7	B			210	226	16
	Thru	828	41	185	12.6	B					820	828	8
	Right	133	3	80	5.4	A			135	133	-2		

South 12th Street and 4th Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Eastbound	Left	51	0	4	0.6	A	1.2	A	1.2	A	50	51	1
	Thru	486	0	4	0.9	A					477	486	9
	HOV/Bus	81	0	4	0.7	A					78	81	3
	Right	484	0	0	1.7	A					485	484	-1

West 76th Street and Newton Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	357	92	354	53.6	D	41.1	D	21.6	C	360	357	-3
	Thru	0	-	-	-	A					0	0	0
	Right	417	90	348	30.4	C					430	417	-13
Southbound	Left	29	12	72	68.1	E	62.8	E			30	29	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	16	85	24.4	C					5	4	-1
Eastbound	Left	21	1	22	13.0	B	13.1	B	20	21	1		
	Thru	1,216	54	385	13.6	B			1,225	1,216	-9		
	Right	68	1	75	4.4	A			70	68	-2		
Westbound	Left	33	2	38	20.1	C	15.2	B	35	33	-2		
	Thru	820	42	288	15.0	B			840	820	-20		
	Right	4	51	314	20.5	C			5	4	-1		

West 76th Street and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	143	85	287	50.2	D	38.0	D	14.5	B	160	143	-17
	Thru	4	85	286	56.1	E					5	4	-1
	Right	363	98	303	33.0	C					395	363	-32
Southbound	Left	10	2	33	44.8	D	21.9	C			10	10	0
	Thru	0	-	-	-	A					0	0	0
	Right	15	0	32	6.7	A					15	15	0
Eastbound	Left	10	0	12	12.5	B	9.3	A	10	10	0		
	Thru	1,600	43	453	9.3	A			1,620	1,600	-20		
	Right	47	1	75	8.2	A			55	47	-8		
Westbound	Left	45	4	55	27.6	C	9.7	A	45	45	0		
	Thru	694	20	178	8.5	A			705	694	-11		
	Right	14	21	189	8.0	A			15	14	-1		

West 76th Street and I-35W SB Ramps (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Southbound	Left	135	45	188	58.1	E	55.5	E	12.2	B	145	135	-10
	Right	167	35	119	53.4	D					165	167	2
Eastbound	Thru	1,969	47	356	8.1	A	8.1	A			2,025	1,969	-56
Westbound	Thru	589	5	84	3.5	A	3.5	A			600	589	-11



2019\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	51	199	62.7	E	55.4	E	17.0	B
	Thru	65	51	199	60.6	E				
	Right	48	60	211	41.3	D				
Eastbound	Left	725	169	581	34.6	C	14.6	B	17.0	B
	Thru	1,342	15	218	4.0	A				
	Right	29	22	250	6.7	A				
Westbound	Left	24	2	34	27.7	C	15.4	B	17.0	B
	Thru	545	28	179	16.2	B				
	Right	198	10	113	11.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
65	65	0
50	48	-2
750	725	-25
1,390	1,342	-48
30	29	-1
25	24	-1
555	545	-10
200	198	-2

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	172	102	408	72.6	E	51.2	D	16.4	B
	Right	300	89	374	39.0	D				
Eastbound	Thru	1,320	40	376	9.0	A	9.0	A	16.4	B
	Right	60	44	397	8.0	A				
Westbound	Left	16	7	48	79.8	E	6.5	A	16.4	B
	Thru	597	8	114	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
175	172	-3
300	300	0
1,380	1,320	-60
60	60	0
15	16	1
605	597	-8

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	1.1	A	27.6	D
	Thru	106	3	48	1.1	A				
Southbound	Thru	79	0	0	2.2	A	2.0	A	27.6	D
	Right	13	0	0	1.2	A				
Eastbound	Left	409	120	328	40.4	E	40.1	E	27.6	D
	Right	4	122	332	5.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
130	106	-24
75	79	4
10	13	3
420	409	-11
5	4	-1

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	47	5	104	9.1	A	9.1	A	4.7	A
Southbound	Left	63	0	6	0.9	A	0.9	A		
	Right	21	0	1	0.8	A				
Westbound	Right	58	2	50	6.7	A	6.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
60	47	-13
60	63	3
20	21	1
60	58	-2

American Boulevard West and Morgan Circle South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	26	134	56.7	E	41.0	D	15.3	B
	Thru	16	12	106	53.5	D				
	Right	76	18	120	22.8	C				
Southbound	Left	101	40	192	57.5	E	40.2	D	15.3	B
	Thru	10	40	194	53.9	D				
	Right	64	2	55	10.9	B				
Eastbound	Left	57	19	92	62.4	E	11.9	B	15.3	B
	Thru	1,353	44	376	9.8	A				
	Right	70	53	404	10.1	B				
Westbound	Left	70	4	61	11.0	B	11.2	B	15.3	B
	Thru	713	22	167	12.0	B				
	Right	71	0	23	3.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	76	-4
20	16	-4
75	76	1
105	101	-4
10	10	0
65	64	-1
55	57	2
1,350	1,353	3
70	70	0
70	70	0
730	713	-17
70	71	1

American Boulevard West and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	182	64	244	59.2	E	42.2	D	20.5	C
	Thru	46	13	77	48.5	D				
	Right	82	0	2	0.8	A				
Southbound	Left	17	4	36	56.5	E	43.2	D	20.5	C
	Thru	20	7	82	48.7	D				
	Right	8	2	61	0.9	A				
Eastbound	Left	31	11	64	70.7	E	19.2	B	20.5	C
	Thru	1,346	107	599	18.7	B				
	Right	152	0	0	12.9	B				
Westbound	Left	49	15	69	66.4	E	12.8	B	20.5	C
	Thru	666	22	176	9.1	A				
	Right	47	24	184	8.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
185	182	-3
50	46	-4
85	82	-3
25	17	-8
30	20	-10
10	8	-2
30	31	1
1,345	1,346	1
155	152	-3
50	49	-1
675	666	-9
45	47	2

American Boulevard West and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	22.1	C	1.1	A
	Thru	0	-	-	-	A				
	Right	4	0	28	22.1	C				
Southbound	Left	9	8	57	77.7	F	44.5	E	1.1	A
	Thru	4	8	58	73.3	F				
	Right	23	8	59	26.5	D				
Eastbound	Left	12	0	20	5.0	A	0.3	A	1.1	A
	Thru	1,426	0	0	0.3	A				
	Right	4	0	0	0.8	A				
Westbound	Left	0	-	-	-	A	0.3	A	1.1	A
	Thru	739	0	0	0.3	A				
	Right	12	0	0	0.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
5	4	-1
10	9	-1
5	4	-1
25	23	-2
10	12	2
1,440	1,426	-14
5	4	-1
0	0	0
745	739	-6
10	12	2

2019\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



Knox Avenue South and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	63	0	0	1.4	A	1.4	A	1.4	A
	Right	59	0	0	1.4	A				
Southbound	Left	5	0	2	1.3	A	0.3	A		
	Thru	35	0	1	0.2	A				
Westbound	Left	8	0	3	7.1	A	7.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
50	63	13
45	59	14
5	5	0
35	35	0
10	8	-2
0	0	0

Knox Avenue South and West 81st Street

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	0	11	1.7	A	0.3	A	6.4	A
	Thru	200	0	0	0.1	A				
	Right	29	0	0	0.7	A				
Southbound	Left	24	0	17	2.1	A	0.3	A		
	Thru	195	0	0	0.1	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	7.1	A		
	Thru	0	-	-	-	A				
	Right	29	1	37	7.1	A				
Westbound	Left	173	27	156	23.7	C	16.5	C		
	Thru	0	-	-	-	A				
	Right	108	5	82	4.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	22	-3
210	200	-10
25	29	4
25	24	-1
210	195	-15
0	0	0
0	0	0
0	0	0
30	29	-1
175	173	-2
0	0	0
110	108	-2

Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	0	15	7.4	A	1.2	A	7.5	A
	Thru	191	3	78	0.8	A				
	Right	20	3	78	1.6	A				
Southbound	Left	5	0	8	9.0	A	0.4	A		
	Thru	386	0	0	0.3	A				
	Right	4	0	0	0.7	A				
Eastbound	Left	4	0	28	18.5	C	10.7	B		
	Thru	0	-	-	-	A				
	Right	9	0	28	7.3	A				
Westbound	Left	112	30	149	41.8	E	32.5	D		
	Thru	0	-	-	-	A				
	Right	54	8	117	13.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	11	1
200	191	-9
20	20	0
5	5	0
405	386	-19
5	4	-1
5	4	-1
0	0	0
10	9	-1
115	112	-3
0	0	0
55	54	-1

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	526	11	96	8.0	A	7.0	A	8.5	A
	Right	205	3	67	4.4	A				
Southbound	Left	347	23	174	15.3	B	8.1	A		
	Thru	640	5	72	4.2	A				
Westbound	Left	136	17	134	22.2	C	13.9	B		
	Right	157	24	150	6.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
525	526	1
205	205	0
340	347	7
640	640	0
150	136	-14
155	157	2

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	22	80.1	F	36.5	D	21.6	C
	Right	8	0	47	9.2	A				
Southbound	Left	444	94	262	53.5	D	47.9	D		
	Right	53	0	0	1.3	A				
Eastbound	Left	23	8	53	65.5	E	10.4	B		
	Thru	520	15	166	8.1	A				
	Right	11	25	210	7.4	A				
Westbound	Left	10	4	34	75.9	E	5.8	A		
	Thru	239	6	76	7.0	A				
	Right	199	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
10	8	-2
470	444	-26
55	53	-2
25	23	-2
510	520	10
10	11	1
10	10	0
245	239	-6
200	199	-1

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	123	16	89	28.1	C	15.0	B	7.2	A
	Thru	28	16	89	29.9	C				
	Right	155	0	2	1.9	A				
Eastbound	Thru	503	10	127	6.4	A	6.4	A		
	Right	472	12	255	6.4	A				
Westbound	Left	187	5	79	6.9	A	3.9	A		
	Thru	293	5	79	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	123	-2
25	28	3
155	155	0
510	503	-7
480	472	-8
190	187	-3
300	293	-7

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	181	27	115	28.3	C	23.1	C	10.4	B
	Thru	37	27	115	30.2	C				
	Right	124	35	127	13.5	B				
Eastbound	Left	265	18	168	14.1	B	7.9	A		
	Thru	362	18	168	3.3	A				
Westbound	Thru	299	7	95	4.5	A	4.4	A		
	Right	172	10	118	4.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	181	-9
40	37	-3
120	124	4
270	265	-5
365	362	-3
300	299	-1
175	172	-3



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	8.1	A	4.0	A
	Thru	0	-	-	-	A				
	Right	13	1	31	8.1	A				
Southbound	Left	33	15	84	62.1	E	50.3	D		
	Thru	4	15	84	61.3	E				
	Right	17	24	106	25.0	C				
Eastbound	Left	4	7	140	20.4	C	2.6	A		
	Thru	1,205	7	140	2.5	A				
	Right	4	9	161	3.4	A				
Westbound	Left	21	11	187	15.4	B	3.4	A		
	Thru	1,193	11	186	3.2	A				
	Right	14	15	215	4.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
35	33	-2
5	4	-1
15	17	2
5	4	-1
1,210	1,205	-5
5	4	-1
20	21	1
1,200	1,193	-7
15	14	-1

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	134	44	173	57.1	E	29.5	C	13.6	B
	Thru	5	19	159	48.7	D				
	Right	266	26	165	15.2	B				
Eastbound	Thru	1,306	46	361	12.5	B	11.8	B		
	Right	193	4	110	7.0	A				
Westbound	Left	195	42	202	39.5	D	10.4	B		
	Thru	959	17	201	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	134	-1
10	5	-5
270	266	-4
1,320	1,306	-14
190	193	3
195	195	0
970	959	-11

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	218	74	274	56.9	E	33.8	C	10.6	B
	Thru	0	-	-	-	A				
	Right	266	24	150	14.8	B				
Eastbound	Left	166	16	150	22.4	C	4.3	A		
	Thru	1,274	9	171	1.9	A				
Westbound	Thru	931	17	148	9.0	A	8.4	A		
	Right	91	1	59	2.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
225	218	-7
7	0	-7
265	266	1
170	166	-4
1,285	1,274	-11
940	931	-9
90	91	1

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	119	41	177	57.7	E	54.1	D	14.1	B
	Thru	40	12	85	50.4	D				
	Right	9	17	99	22.7	C				
Southbound	Left	15	9	75	57.5	E	16.2	B		
	Thru	14	9	75	52.3	D				
	Right	144	6	88	8.4	A				
Eastbound	Left	134	35	186	43.7	D	8.1	A		
	Thru	967	14	168	3.8	A				
	Right	175	25	219	4.9	A				
Westbound	Left	16	6	41	71.9	E	15.1	B		
	Thru	597	29	194	13.5	B				
	Right	33	39	219	15.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	119	-6
40	40	0
10	9	-1
15	15	0
145	144	-1
135	134	-1
965	967	2
185	175	-10
15	16	1
600	597	-3
35	33	-2

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,126	0	15	2.1	A	2.1	A	12.2	B
Eastbound	Thru	732	89	329	36.3	D	36.3	D		
Westbound	Left	815	23	269	12.4	B	7.9	A		
	Thru	629	0	2	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,130	1,126	-4
730	732	2
820	815	-5
630	629	-1

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	22	127	49.0	D	31.9	C	18.9	B
	Right	169	40	155	27.6	C				
Southbound	Left	173	50	220	47.5	D	23.5	C		
	Thru	71	16	94	42.4	D				
	Right	296	5	104	5.0	A				
Eastbound	Thru	1,737	122	585	24.2	C	23.0	C		
	Right	122	2	54	5.3	A				
Westbound	Left	153	53	223	55.2	E	8.9	A		
	Thru	1,123	5	134	2.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	42	-3
170	169	-1
180	173	-7
75	71	-4
295	296	1
1,730	1,737	7
125	122	-3
160	153	-7
1,115	1,123	8

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,712	10	295	7.9	A	6.9	A	4.3	A
	Right	355	0	4	1.9	A				
Westbound	Thru	1,283	0	12	0.7	A	0.7	A		
	Right	197	0	12	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,730	1,712	-18
350	355	5
1,275	1,283	8
205	197	-8

West 98th Street and I-35W NB Ramps (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	305	72	262	51.6	D	38.5	D	16.4	B	310	305	-5
	Right	200	10	141	18.5	B					205	200	-5
Eastbound	Left	520	139	390	32.0	C	12.7	B			545	520	-25
	Thru	1,183	14	196	4.3	A					1,190	1,183	-7
Westbound	Thru	1,169	46	255	12.5	B	12.8	B			1,165	1,169	4
	Right	231	54	276	14.1	B					235	231	-4

West 98th Street and Aldrich Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Right	25	0	7	19.8	C	19.8	C	1.5	A	20	25	5
Eastbound	Thru	1,349	4	148	1.5	A	1.5	A			1,350	1,349	-1
	Right	31	4	150	1.9	A					40	31	-9
Westbound	Thru	1,399	1	81	1.2	A	1.2	A	1,400	1,399	-1		

West 98th Street and Lyndale Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	116	34	159	48.5	D	41.1	D	32.8	C	120	116	-4
	Thru	152	31	111	52.9	D					155	152	-3
	Right	86	5	76	10.1	B					85	86	1
Southbound	Left	153	46	208	53.2	D	61.3	E			155	153	-2
	Thru	318	135	458	111.6	F					330	318	-12
Eastbound	Right	269	0	0	6.4	A	17.0	B			270	269	-1
	Left	269	39	148	39.1	D			275	269	-6		
	Thru	943	46	283	13.4	B			935	943	8		
Westbound	Right	161	0	0	1.1	A	30.9	C	160	161	1		
	Left	100	29	92	69.9	E			100	100	0		
	Thru	1,012	92	412	27.5	C			1,010	1,012	2		
Right	18	0	0	0.8	A	15	18	3					

West 99th Street and East Bloomington Freeway (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	23	0	0	0.2	A	0.3	A	0.5	A	25	23	-2
	Right	14	0	0	0.6	A					15	14	-1
Westbound	Right	87	0	11	0.6	A	0.6	A			90	87	-3

West 99th Street and Aldrich Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	4.6	A	0	0	0
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	44	2	46	7.7	A	7.2	A			45	44	-1
	Thru	0	-	-	-	A					0	0	0
Eastbound	Right	35	2	46	6.6	A	1.0	A			45	35	-10
	Left	7	0	1	0.6	A			5	7	2		
	Thru	11	0	0	1.2	A			10	11	1		
Westbound	Right	0	-	-	-	A	2.3	A	0	0	0		
	Left	0	-	-	-	A			0	0	0		
	Thru	45	0	0	1.0	A			45	45	0		
Right	17	0	0	5.5	A	15	17	2					

West 99th Street and Lyndale Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	20	0	21	3.6	A	0.4	A	1.7	A	20	20	0
	Thru	315	0	3	0.1	A					315	315	0
	Right	9	0	3	0.7	A					10	9	-1
Southbound	Left	5	0	2	2.1	A	0.7	A			5	5	0
	Thru	539	0	0	0.7	A					550	539	-11
Eastbound	Right	36	0	0	1.2	A	15.6	C			35	36	1
	Left	35	3	57	18.6	C			35	35	0		
	Thru	0	-	-	-	A			0	0	0		
Westbound	Right	21	1	44	10.7	B	14.0	B	20	21	1		
	Left	9	1	43	15.1	C			10	9	-1		
	Thru	5	1	43	19.0	C			5	5	0		
Right	10	1	42	10.7	B	10	10	0					

Nicollet Avenue and River Ridge Lane (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	186	17	172	16.7	B	12.3	B	25.2	C	200	186	-14
	Thru	79	4	53	13.6	B					85	79	-6
	Right	119	3	89	4.4	A					125	119	-6
Southbound	Left	4	1	12	27.9	C	23.5	C			5	4	-1
	Thru	187	19	121	24.5	C					190	187	-3
Eastbound	Right	20	8	181	13.5	B	13.6	B			20	20	0
	Left	10	5	40	53.0	D			10	10	0		
	Thru	10	5	41	43.4	D			10	10	0		
Westbound	Right	254	18	128	10.8	B	43.5	D	255	254	-1		
	Left	427	66	225	43.9	D			430	427	-3		
	Thru	24	66	225	43.8	D			25	24	-1		
Right	15	84	248	31.7	C	15	15	0					



**Nicollet Avenue and Hwy 13**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	296	100	317	77.4	E	58.9	E	46.6	D	305	296	-9
	Thru	102	100	317	79.2	E					105	102	-3
	Right	191	39	247	19.4	B					195	191	-4
Southbound	Left	167	78	318	73.4	E	65.4	E			170	167	-3
	Thru	357	123	405	74.0	E					355	357	2
	Right	341	144	430	52.6	D					350	341	-9
Eastbound	Left	148	48	140	92.5	F	35.5	D			155	148	-7
	Thru	1,393	209	899	35.5	D					1,400	1,393	-7
	Right	339	4	107	10.7	B					345	339	-6
Westbound	Left	262	91	234	110.6	F	45.3	D			255	262	7
	Thru	1,656	310	1,116	37.7	D					1,670	1,656	-14
	Right	140	0	33	13.2	B					145	140	-5

**Nicollet Avenue and Travelers Trail**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	0	17	7.8	A	8.6	A	10.4	B	15	14	-1
	Thru	398	13	128	9.2	A					400	398	-2
	Right	94	4	88	6.0	A					95	94	-1
Southbound	Left	211	6	135	7.6	A	6.8	A			210	211	1
	Thru	694	17	213	6.5	A					695	694	-1
	Right	51	22	232	7.2	A					45	51	6
Eastbound	Left	52	8	68	30.2	C	27.4	C			55	52	-3
	Thru	38	7	70	31.6	C					40	38	-2
	Right	21	12	87	12.9	B					20	21	1
Westbound	Left	114	20	116	33.0	C	19.1	B			110	114	4
	Thru	30	4	44	28.3	C					30	30	0
	Right	144	0	6	6.2	A					150	144	-6

**Travelers Trail and Pleasant Avenue**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	40	7.3	A	6.0	A	3.1	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	17	0	1	0.6	A	0.3	A			15	17	2
	Thru	19	0	0	0.1	A					25	19	-6

**Burnsville Parkway and I-35W SB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	370	97	536	31.9	C	24.6	C	23.3	C	370	370	0
	Thru	20	97	538	30.7	C					20	20	0
	Right	282	14	156	14.6	B					285	282	-3
Southbound	Left	113	50	212	47.0	D	46.1	D			115	113	-2
	Thru	54	50	212	47.6	D					55	54	-1
	Right	16	64	233	34.6	C					15	16	1
Eastbound	Left	12	1	22	21.3	C	25.9	C			10	12	2
	Thru	534	53	239	26.1	C					540	534	-6
	Right	57	77	281	25.2	C					55	57	2
Westbound	Left	167	12	114	17.4	B	15.4	B			175	167	-8
	Thru	616	31	203	15.0	B					620	616	-4
	Right	58	55	256	12.7	B					60	58	-2

**Burnsville Parkway and I-35W NB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	95	27	137	48.4	D	27.7	C	8.3	A	95	95	0
	Thru	5	27	136	59.7	E					5	5	0
	Right	103	4	64	7.0	A					105	103	-2
Southbound	Left	5	9	82	61.3	E	27.9	C			5	5	0
	Thru	8	8	80	71.2	E					15	8	-7
	Right	48	18	116	17.3	B					50	48	-2
Eastbound	Left	8	0	3	5.8	A	4.2	A			10	8	-2
	Thru	648	8	145	3.9	A					650	648	-2
	Right	271	15	182	4.7	A					280	271	-9
Westbound	Left	174	11	112	18.7	B	6.7	A			175	174	-1
	Thru	697	7	114	3.7	A					710	697	-13
	Right	4	14	160	2.8	A					5	4	-1

**Burnsville Parkway and Gateway Boulevard**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	64	96	209	137.7	F	127.1	F	9.9	A	70	64	-6
	Thru	0	-	-	-	A					0	0	0
	Right	46	91	204	112.5	F					45	46	1
Southbound	Left	11	12	91	40.8	E	21.1	C			10	11	1
	Thru	5	11	91	46.3	E					5	5	0
	Right	94	10	89	17.4	C					95	94	-1
Eastbound	Left	13	0	18	4.8	A	0.6	A			15	13	-2
	Thru	670	1	35	0.4	A					675	670	-5
	Right	74	1	33	1.5	A					75	74	-1
Westbound	Left	68	2	49	6.6	A	1.1	A			70	68	-2
	Thru	721	3	73	0.6	A					725	721	-4
	Right	6	3	73	0.9	A					5	6	1

2019\_PM\_No Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Burnsville Parkway and Pleasant Avenue										(Signal)			
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	58	19	108	49.1	D	41.9	D	8.5	A	60	58	-2
	Thru	0	-	-	-	A					0	0	0
	Right	24	29	129	24.5	C					25	24	-1
Southbound	Left	77	36	165	54.1	D	45.2	D			75	77	2
	Thru	4	36	165	43.5	D					5	4	-1
	Right	58	52	191	33.6	C					60	58	-2
Eastbound	Left	9	0	4	5.6	A	2.0	A			10	9	-1
	Thru	686	4	71	2.0	A					690	686	-4
	Right	31	0	3	1.2	A					30	31	1
Westbound	Left	35	0	23	7.0	A	4.2	A	35	35	0		
	Thru	679	7	124	4.1	A			680	679	-1		
	Right	14	0	0	1.8	A			15	14	-1		



## 2019 Build MOEs

West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.6	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.6	A				
Southbound	Left	33	10	72	43.1	D	35.6	D	5.6	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	18.4	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.6	A
	Thru	384	5	67	3.8	A				
	Right	4	8	87	3.5	A				
Westbound	Left	11	17	220	9.9	A	4.8	A	5.6	A
	Thru	1,251	17	215	4.8	A				
	Right	5	23	249	3.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
385	384	-1
5	4	-1
10	11	1
1,265	1,251	-14
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	123	25	142	44.9	D	41.0	D	17.3	B
	Thru	34	141	555	53.2	D				
	Right	496	157	571	39.3	D				
Eastbound	Thru	463	21	140	19.5	B	16.0	B	17.3	B
	Right	147	5	94	5.1	A				
Westbound	Left	242	13	171	12.5	B	6.8	A	17.3	B
	Thru	1,169	26	263	5.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	123	-2
30	34	4
500	496	-4
475	463	-12
145	147	2
240	242	2
1,185	1,169	-16

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	236	57	239	42.9	D	29.5	C	11.3	B
	Thru	22	16	160	47.2	D				
	Right	209	21	177	12.6	B				
Eastbound	Left	116	14	127	27.9	C	8.9	A	11.3	B
	Thru	471	9	106	4.3	A				
Westbound	Thru	1,168	11	196	6.0	A	5.8	A	11.3	B
	Right	104	1	61	3.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
240	236	-4
20	22	2
205	209	4
120	116	-4
480	471	-9
1,185	1,168	-17
100	104	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	234	61	269	44.1	D	42.5	D	16.3	B
	Thru	32	6	50	35.2	D				
	Right	6	9	63	16.3	B				
Southbound	Left	20	5	56	36.7	D	12.6	B	16.3	B
	Thru	10	5	54	33.2	C				
	Right	179	9	97	8.7	A				
Eastbound	Left	67	12	98	33.1	C	6.9	A	16.3	B
	Thru	380	8	105	3.6	A				
	Right	187	18	156	4.2	A				
Westbound	Left	6	2	20	58.8	E	15.8	B	16.3	B
	Thru	848	44	268	15.5	B				
	Right	11	55	294	15.1	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
230	234	4
35	32	-3
5	6	1
20	20	0
10	10	0
180	179	-1
65	67	2
385	380	-5
190	187	-3
5	6	1
860	848	-12
10	11	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	843	0	0	1.3	A	1.3	A	5.4	A
Eastbound	Thru	238	12	83	15.1	B	15.1	B		
Westbound	Left	677	18	152	10.9	B	6.3	A		
	Thru	623	0	1	1.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
845	843	-2
240	238	-2
680	677	-3
630	623	-7

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	73	23	123	42.8	D	20.4	C	15.3	B
	Right	263	41	151	14.1	B				
Southbound	Left	182	45	214	41.6	D	18.4	B	15.3	B
	Thru	60	12	84	38.9	D				
	Right	369	4	108	3.6	A				
Eastbound	Thru	1,039	60	301	19.1	B	18.5	B	15.3	B
	Right	44	1	48	4.1	A				
Westbound	Left	97	27	143	48.6	D	7.9	A	15.3	B
	Thru	868	6	112	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	73	-2
260	263	3
175	182	7
60	60	0
370	369	-1
1,040	1,039	-1
45	44	-1
95	97	2
865	868	3

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,353	1	70	3.0	A	2.8	A	1.8	A
	Right	128	0	0	0.8	A				
Westbound	Thru	964	0	0	0.5	A	0.5	A	1.8	A
	Right	103	0	0	0.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,355	1,353	-2
120	128	8
960	964	4
100	103	3



West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	275	70	265	47.7	D	34.2	C	15.2	B
	Right	216	8	135	17.0	B				
Eastbound	Left	385	103	376	37.3	D	12.6	B		
	Thru	966	7	130	2.8	A				
Westbound	Thru	793	28	207	10.1	B	9.9	A		
	Right	283	31	228	9.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
265	275	10
220	216	-4
395	385	-10
960	966	6
795	793	-2
285	283	-2

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	0.8	A
Eastbound	Thru	1,091	1	78	1.1	A	1.1	A		
	Right	91	1	77	1.3	A				
Westbound	Thru	1,074	0	2	0.5	A	0.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	0	-5
1,090	1,091	1
90	91	1
1,080	1,074	-6

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	78	18	106	40.5	D	38.7	D	27.7	C
	Thru	129	24	94	48.8	D				
	Right	49	3	67	9.3	A				
Southbound	Left	55	17	86	55.0	D	118.4	F		
	Thru	60	82	178	386.6	F				
Eastbound	Right	107	0	0	0.7	A	14.0	B		
	Left	270	39	152	39.2	D				
	Thru	705	15	118	6.5	A				
Westbound	Right	115	0	0	0.9	A	19.2	B		
	Left	40	13	65	59.3	E				
	Thru	890	52	284	18.1	B				
	Right	34	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	78	-2
135	129	-6
50	49	-1
55	55	0
65	60	-5
105	107	2
275	270	-5
710	705	-5
110	115	5
40	40	0
895	890	-5
30	34	4

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	35	0	0	0.1	A	0.3	A	0.4	A
	Right	19	0	0	0.6	A				
Westbound	Right	49	0	13	0.6	A	0.6	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	35	0
20	19	-1
40	49	9

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.4	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	4	1	51	7.0	A	8.0	A		
	Thru	0	-	-	-	A				
Eastbound	Right	19	1	51	8.2	A	1.0	A		
	Left	16	0	4	0.8	A				
	Thru	9	0	0	1.3	A				
Westbound	Right	0	-	-	-	A	2.7	A		
	Left	0	-	-	-	A				
	Thru	26	0	0	1.6	A				
	Right	35	0	0	3.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
5	4	-1
0	0	0
15	19	4
10	16	6
10	9	-1
0	0	0
0	0	0
25	26	1
35	35	0

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	16	1.6	A	0.3	A	0.8	A
	Thru	247	0	1	0.1	A				
	Right	4	0	1	0.7	A				
Southbound	Left	9	0	5	1.7	A	0.5	A		
	Thru	174	0	0	0.3	A				
Eastbound	Right	29	0	0	1.2	A	12.9	B		
	Left	9	1	41	14.3	B				
	Thru	0	-	-	-	A				
Westbound	Right	6	0	37	10.8	B	7.3	A		
	Left	0	-	-	-	A				
	Thru	0	-	-	-	A				
	Right	4	0	30	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
250	247	-3
5	4	-1
10	9	-1
175	174	-1
30	29	-1
10	9	-1
0	0	0
5	6	1
0	0	0
0	0	0
5	4	-1

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	327	20	287	11.5	B	9.9	A	13.7	B
	Thru	221	7	91	9.6	A				
	Right	468	23	316	8.9	A				
Southbound	Left	12	1	16	11.8	B	13.9	B		
	Thru	61	5	55	17.2	B				
Eastbound	Right	23	3	114	6.4	A	22.8	C		
	Left	35	11	71	44.9	D				
	Thru	9	11	71	45.3	D				
Westbound	Right	58	2	67	5.9	A	40.1	D		
	Left	78	18	87	42.9	D				
	Thru	22	19	87	40.7	D				
	Right	10	32	111	17.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
335	327	-8
225	221	-4
490	468	-22
10	12	2
65	61	-4
20	23	3
35	35	0
10	9	-1
60	58	-2
80	78	-2
25	22	-3
10	10	0

Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	484	234	621	72.6	E	69.8	E	47.4	D
	Thru	413	234	621	74.0	E				
	Right	112	12	138	42.0	D				
Southbound	Left	37	17	82	83.3	F	58.8	E		
	Thru	69	31	96	88.5	F				
	Right	98	50	120	28.6	C				
Eastbound	Left	416	108	326	75.2	E	39.3	D		
	Thru	1,485	225	986	32.7	C				
	Right	164	0	31	8.3	A				
Westbound	Left	133	49	135	95.7	F	41.2	D		
	Thru	991	141	556	40.3	D				
	Right	199	6	91	9.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
491	484	-7
425	413	-12
115	112	-3
40	37	-3
65	69	4
100	98	-2
420	416	-4
1,490	1,485	-5
158	164	6
130	133	3
995	991	-4
205	199	-6

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	1	30	5.5	A	9.3	A	10.7	B
	Thru	844	22	200	9.7	A				
	Right	30	11	159	4.9	A				
Southbound	Left	50	1	46	8.8	A	5.8	A		
	Thru	210	8	118	5.1	A				
	Right	99	11	137	6.0	A				
Eastbound	Left	61	11	76	34.8	C	29.9	C		
	Thru	29	5	52	29.2	C				
	Right	14	8	70	10.0	B				
Westbound	Left	34	5	55	33.1	C	16.2	B		
	Thru	32	5	55	30.8	C				
	Right	115	0	6	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
56	56	0
845	844	-1
30	30	0
50	50	0
215	210	-5
95	99	4
66	61	-5
30	29	-1
15	14	-1
30	34	4
31	32	1
120	115	-5

Travelers Trail and Pleasant Avenue

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	5.9	A	0.9	A
	Right	8	0	24	5.9	A				
Eastbound	Thru	23	0	0	0.0	A	0.2	A		
	Right	6	0	0	0.7	A				
Westbound	Left	36	0	5	0.8	A	0.5	A		
	Thru	20	0	0	0.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
10	8	-2
25	23	-2
5	6	1
35	36	1
15	20	5

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	112	41	182	48.7	D	29.2	C	11.4	B
	Thru	32	41	181	47.2	D				
	Right	149	9	84	10.7	B				
Southbound	Left	58	18	105	39.6	D	37.6	D		
	Thru	23	18	106	36.4	D				
	Right	5	28	129	19.6	B				
Eastbound	Left	20	0	13	4.6	A	7.1	A		
	Thru	1,024	25	228	7.1	A				
	Right	80	33	265	7.6	A				
Westbound	Left	65	1	38	10.7	B	4.7	A		
	Thru	234	3	58	3.5	A				
	Right	81	8	110	3.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
110	112	2
35	32	-3
150	149	-1
60	58	-2
25	23	-2
5	5	0
20	20	0
1,031	1,024	-7
75	80	5
67	65	-2
236	234	-2
85	81	-4

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	30	23	98	97.0	F	25.7	C	7.1	A
	Thru	10	23	100	91.8	F				
	Right	158	7	85	8.0	A				
Southbound	Left	0	-	-	-	A	44.5	D		
	Thru	10	8	100	66.4	E				
	Right	8	11	99	17.2	B				
Eastbound	Left	53	0	21	3.5	A	3.8	A		
	Thru	832	9	167	3.6	A				
	Right	345	15	202	4.3	A				
Westbound	Left	121	6	73	17.5	B	6.5	A		
	Thru	343	2	63	2.6	A				
	Right	4	6	109	1.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	30	0
10	10	0
160	158	-2
0	0	0
5	10	5
10	8	-2
55	53	-2
836	832	-4
350	345	-5
125	121	-4
348	343	-5
5	4	-1

Burnsville Parkway and Gateway Boulevard

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	70	139	269	178.6	F	165.7	F	13.6	B
	Thru	0	-	-	-	A				
	Right	52	134	262	148.4	F				
Southbound	Left	0	-	-	-	A	7.7	A		
	Thru	0	-	-	-	A				
	Right	8	0	24	7.7	A				
Eastbound	Left	86	0	33	2.8	A	0.7	A		
	Thru	871	2	48	0.4	A				
	Right	34	2	50	2.1	A				
Westbound	Left	39	1	28	6.2	A	0.8	A		
	Thru	392	1	35	0.3	A				
	Right	19	1	41	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	70	-5
0	0	0
50	52	2
0	0	0
0	0	0
10	8	-2
85	86	1
881	871	-10
30	34	4
40	39	-1
393	392	-1
20	19	-1

2019\_AM\_Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	23	6	52	47.4	D	37.2	D	3.2	A
	Thru	0	-	-	-	A				
	Right	10	11	74	13.8	B				
Southbound	Left	8	2	33	44.7	D	25.4	C		
	Thru	0	-	-	-	A				
	Right	9	5	58	8.3	A				
Eastbound	Left	40	0	12	3.5	A	1.9	A		
	Thru	872	3	98	1.9	A				
	Right	10	0	1	2.4	A				
Westbound	Left	25	0	15	8.5	A	2.7	A		
	Thru	418	2	65	2.5	A				
	Right	61	0	6	1.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	23	-2
0	0	0
10	10	0
10	8	-2
0	0	0
10	9	-1
40	40	0
881	872	-9
10	10	0
25	25	0
418	418	0
60	61	1

SB Orange Line Travel Time- 98th Street (sec)

Avg	St Dev
242	15

SB Orange Line Travel Time- Burnsville (sec)

Avg	St Dev
908	10



2019\_AM\_Downtown Build 12th Street Transit Ramp Option  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	444	35	187	19.7	B	19.0	B	19.5	B	440	444	4
	Right	114	44	214	16.4	B					115	114	-1
Southbound	Left	13	3	55	46.9	D	36.2	D			13	13	0
	Thru	8	3	54	18.9	B					10	8	-2
Eastbound	Left	230	50	233	19.8	B	19.3	B			230	230	0
	Thru	747	50	233	19.3	B					750	747	-3
	Right	10	58	257	13.4	B			10	10	0		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	1	1	46	52.8	D	46.7	D	14.9	B	1	1	0
	Right	95	20	112	46.6	D					95	95	0
Southbound	Left	87	34	139	38.1	D	30.1	C			85	87	2
	Thru	185	34	139	26.3	C					190	185	-5
Eastbound	Left	71	14	136	6.2	A	6.2	A			75	71	-4
	Thru	584	14	136	6.3	A					625	584	-41
	Right	27	22	161	4.6	A			30	27	-3		
Westbound - Bus Only	Right	96	0	16	1.7	A	1.7	A	95	96	1		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	431	26	149	18.3	B	18.3	B	18.1	B	430	431	1
	Right	0	-	-	-	A					0	0	0
Southbound	Left	144	25	142	31.8	C	23.6	C			145	144	-1
	Thru	205	13	83	17.8	B					205	205	0
Eastbound	Left	349	52	278	20.1	C	15.3	B			360	349	-11
	Thru	346	52	280	12.9	B					365	346	-19
	Right	72	2	73	3.7	A			80	72	-8		
Westbound - Bus Only	Thru	96	17	151	19.2	B	19.2	B	95	96	1		

**South 12th Street and 4th Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	35	0	17	1.4	A	0.5	A	0.5	A	35	35	0
	Thru	242	0	0	0.3	A					248	242	-6
	HOV/Bus	12	0	0	0.3	A					12	12	0
	Right	203	0	0	0.6	A					215	203	-12
Westbound - Bus Only	-	95	0	0	0.8	A	0.8	A	95	95	0		

**I-35W Entrances and Exits (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Bus Lane	94	0	0	2.7	A	8.6	A	7.2	A	95	94	-1
	Thru	1,059	88	540	1.2	A					1,040	1,059	19
	Right	1,941	89	538	12.9	B					1,980	1,941	-39
Southbound	Left	240	9	81	8.5	A	2.3	A			248	240	-8
	Thru	649	0	0	0.0	A					650	649	-1
	Bus Lane	13	0	0	0.4	A					12	13	1

**I-35W SB Bridge (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Thru	901	0	1	0.0	A	0.0	A	0.0	A	910	901	-9

2019\_AM\_Build Knox Curved Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	13	55	64.5	E	44.1	D	16.4	B
	Thru	0	-	-	-	A				
	Right	25	1	47	5.6	A				
Southbound	Left	82	33	136	64.2	E	63.3	E		
	Thru	4	33	136	64.3	E				
	Right	4	41	149	44.9	D				
Eastbound	Left	4	0	10	15.6	B	12.0	B		
	Thru	487	27	178	16.2	B				
	Right	392	16	156	6.7	A				
Westbound	Left	413	89	387	38.5	D	14.7	B		
	Thru	928	12	145	4.2	A				
	Right	14	17	171	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
0	0	0
25	25	0
80	82	2
5	4	-1
5	4	-1
5	4	-1
500	487	-13
390	392	2
415	413	-2
955	928	-27
15	14	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	7	54	75.8	E	41.6	D	4.8	A
	Thru	3	7	54	77.1	E				
	Right	18	11	69	16.7	B				
Southbound	Left	11	3	30	65.2	E	70.5	E		
	Thru	5	5	36	127.6	F				
	Right	4	6	44	13.5	B				
Eastbound	Left	5	0	1	12.1	B	3.5	A		
	Thru	474	3	74	3.1	A				
	Right	112	2	79	4.6	A				
Westbound	Left	428	11	175	9.3	A	3.9	A		
	Thru	1,353	7	169	2.2	A				
	Right	10	8	181	2.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	10	-5
5	3	-2
25	18	-7
10	11	1
5	5	0
5	4	-1
5	5	0
480	474	-6
120	112	-8
435	428	-7
1,365	1,353	-12
10	10	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	214	52	227	43.6	D	46.8	D	23.4	C
	Right	657	104	364	47.8	D				
Eastbound	Thru	501	14	114	8.4	A	A			
Westbound	Thru	1,140	47	339	12.1	B	B			

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
210	214	4
655	657	2
515	501	-14
1,155	1,140	-15

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	14	82	60.6	E	48.3	D	5.8	A
	Thru	10	14	81	65.0	E				
	Right	20	19	94	24.5	C				
Eastbound	Left	123	5	75	14.2	B	5.7	A		
	Thru	403	8	159	3.5	A				
	Right	188	12	189	5.0	A				
Westbound	Left	82	1	34	6.9	A	4.0	A		
	Thru	1,114	10	172	3.9	A				
	Right	134	1	57	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
10	10	0
20	20	0
125	123	-2
415	403	-12
185	188	3
85	82	-3
1,130	1,114	-16
135	134	-1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	41	40.4	D	30.8	C	6.7	A
	Right	8	0	35	6.7	A				
Eastbound	Thru	279	5	97	5.2	A	5.3	A		
	Right	141	7	118	5.4	A				
Westbound	Left	261	43	218	29.7	C	6.6	A		
	Thru	1,314	4	128	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
10	8	-2
290	279	-11
145	141	-4
250	261	11
1,330	1,314	-16

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	16	11.0	B	2.1	A	4.2	A
	Thru	27	0	0	0.1	A				
Southbound	Thru	97	6	224	5.2	A	4.3	A		
	Right	447	6	223	4.1	A				
Eastbound	Left	4	0	34	16.8	C	16.8	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	27	2
100	97	-3
455	447	-8
5	4	-1
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	0	0	0.1	A	0.1	A	0.5	A
	Right	0	-	-	-	A				
Southbound	Left	30	0	2	0.7	A	0.4	A		
	Thru	68	0	0	0.2	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	29	4
0	0	0
30	30	0
70	68	-2
0	0	0
5	4	-1

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	3.2	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.6	A		
	Right	61	0	0	0.7	A				
Eastbound	Left	23	1	73	11.3	B	11.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
6	6	0
70	61	-9
25	23	-2
0	0	0

Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Southbound	Left	0	-	-	-	A	10.5	B	1.8	A	0	0	0
	Right	6	1	81	10.5	B					6	6	0
Eastbound	Left	6	0	0	0.0	A	0.0	A			6	6	0
	Thru	15	0	0	0.0	A					14	15	1
Westbound	Thru	8	0	0	0.0	A	0.0	A			9	8	-1
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	11	0	0	0.6	A	3.9	A	3.3	A	10	11	1
	Thru	21	0	0	6.3	A					20	21	1
	Right	5	0	0	0.9	A					5	5	0
Southbound	Thru	14	0	0	0.5	A	0.5	A			10	14	4
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	2	0	59	11.8	B	11.8	B			5	2	-3
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	11	4	30	65.9	E	34.1	C	3.7	A	10	11	1
	Thru	0	-	-	-	A					0	0	0
	Right	13	0	37	7.2	A					15	13	-2
Southbound	Left	24	8	51	59.9	E	52.3	D			25	24	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	25	6.9	A					5	4	-1
Eastbound	Left	6	2	20	68.0	E	2.6	A	5	6	1		
	Thru	320	2	52	1.4	A			320	320	0		
	Right	5	3	76	1.2	A			5	5	0		
Westbound	Left	11	0	7	1.6	A	1.6	A	10	11	1		
	Thru	783	3	73	1.7	A			790	783	-7		
	Right	23	0	1	0.9	A			25	23	-2		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	60	22	98	65.7	E	47.1	D	10.8	B	60	60	0
	Thru	16	7	50	72.8	E					15	16	1
	Right	33	0	0	0.7	A					35	33	-2
Southbound	Left	0	-	-	-	A	38.1	D			0	0	0
	Thru	10	3	47	56.6	E					10	10	0
	Right	5	4	102	1.0	A					5	5	0
Eastbound	Left	5	2	19	76.8	E	4.6	A	5	5	0		
	Thru	241	3	64	4.6	A			245	241	-4		
	Right	111	1	40	1.4	A			110	111	1		
Westbound	Left	79	20	73	62.9	E	8.3	A	75	79	4		
	Thru	757	5	108	2.6	A			760	757	-3		
	Right	14	7	123	3.2	A			15	14	-1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	1	28	41.2	E	41.2	E	0.7	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	4	1	25	44.9	E	31.0	D			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	26	17.1	C					5	4	-1
Eastbound	Left	29	1	24	5.2	A	0.6	A	30	29	-1		
	Thru	243	0	0	0.1	A			250	243	-7		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	4	0	1	1.3	A	0.3	A	5	4	-1		
	Thru	842	0	0	0.3	A			840	842	2		
	Right	9	0	0	0.9	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	5	0	0	0.7	A	0.7	A	1.3	A	5	5	0
	Thru	97	0	0	0.0	A					100	97	-3
	Right	142	0	0	1.1	A					150	142	-8
Southbound	Left	80	1	46	3.3	A	1.5	A			85	80	-5
	Thru	119	0	0	0.2	A					110	119	9
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	9	1	33	10.3	B	6.8	A	10	9	-1		
	Thru	5	1	34	13.2	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		



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Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	3	4.6	A	1.4	A	1.7	A
	Thru	237	3	62	0.9	A				
	Right	163	2	60	1.8	A				
Southbound	Left	47	0	31	3.7	A	1.4	A		
	Thru	74	0	0	0.1	A				
	Right	6	0	0	0.6	A				
Eastbound	Left	4	0	28	15.3	C	9.6	A		
	Thru	0	-	-	-	A				
	Right	9	0	29	7.1	A				
Westbound	Left	4	0	23	13.1	B	11.1	B		
	Thru	0	-	-	-	A				
	Right	4	0	18	9.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	9	-1
245	237	-8
170	163	-7
45	47	2
70	74	4
5	6	1
5	4	-1
0	0	0
10	9	-1
5	4	-1
0	0	0
5	4	-1

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	614	9	116	5.9	A	5.4	A	11.5	B
	Right	178	4	87	3.6	A				
Southbound	Left	78	3	57	12.7	B	6.5	A		
	Thru	256	3	53	4.7	A				
Westbound	Left	146	55	212	55.6	E	25.0	C		
	Right	329	66	228	11.4	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
615	614	-1
180	178	-2
80	78	-2
255	256	1
145	146	1
335	329	-6

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	17	41.0	D	12.2	B	7.0	A
	Right	25	1	56	6.4	A				
Southbound	Left	76	15	81	40.1	D	35.1	D		
	Right	11	0	0	0.6	A				
Eastbound	Left	41	10	70	44.9	D	9.4	A		
	Thru	208	2	54	2.6	A				
	Right	6	4	96	2.1	A				
Westbound	Left	0	-	-	-	A	3.1	A		
	Thru	466	7	85	4.5	A				
	Right	369	0	0	1.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
25	25	0
75	76	1
10	11	1
45	41	-4
210	208	-2
5	6	1
0	0	0
465	466	1
380	369	-11

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	146	24	109	38.3	D	14.9	B	7.2	A
	Thru	23	24	109	35.2	D				
	Right	312	0	6	2.4	A				
Eastbound	Thru	192	3	60	4.5	A	3.7	A		
	Right	119	1	55	2.4	A				
Westbound	Left	117	5	99	4.3	A	3.2	A		
	Thru	522	5	99	2.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	146	1
25	23	-2
315	312	-3
195	192	-3
115	119	4
120	117	-3
530	522	-8

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	352	55	274	34.4	C	30.5	C	18.0	B
	Thru	69	55	274	34.4	C				
	Right	114	64	285	16.0	B				
Eastbound	Left	181	8	109	8.8	A	6.9	A		
	Thru	156	8	109	4.7	A				
Westbound	Thru	289	17	126	11.9	B	10.8	B		
	Right	124	25	154	8.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	352	-8
70	69	-1
110	114	4
180	181	1
160	156	-4
290	289	-1
125	124	-1

NB Orange Line Travel Time (sec)

Avg	St Dev
387	19

SB Orange Line Travel Time (sec)

Avg	St Dev
360	22

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West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	13	58	63.7	E	43.5	D	16.0	B
	Thru	0	-	-	-	A				
	Right	25	1	47	5.4	A				
Southbound	Left	82	33	138	64.5	E	63.7	E		
	Thru	4	33	138	64.8	E				
	Right	4	41	151	47.5	D				
Eastbound	Left	5	0	10	15.3	B	12.0	B		
	Thru	497	27	185	16.4	B				
	Right	394	15	151	6.5	A				
Westbound	Left	414	83	388	36.3	D	14.0	B		
	Thru	934	11	137	4.2	A				
	Right	14	17	162	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
0	0	0
25	25	0
80	82	2
5	4	-1
5	4	-1
5	5	0
500	497	-3
390	394	4
415	414	-1
955	934	-21
15	14	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	13	7	64	62.7	E	42.2	D	5.0	A
	Thru	4	7	62	65.4	E				
	Right	16	11	78	19.7	B				
Southbound	Left	11	3	30	64.5	E	71.9	E		
	Thru	5	4	37	127.3	F				
	Right	4	6	45	22.9	C				
Eastbound	Left	6	0	4	10.3	B	3.5	A		
	Thru	477	4	68	3.2	A				
	Right	117	2	77	4.5	A				
Westbound	Left	422	11	173	9.5	A	4.0	A		
	Thru	1,358	7	174	2.3	A				
	Right	10	8	184	3.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	13	-2
5	4	-1
25	16	-9
10	11	1
5	5	0
5	4	-1
5	6	1
480	477	-3
120	117	-3
435	422	-13
1,365	1,358	-7
10	10	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	214	53	225	43.4	D	46.7	D	23.6	C
	Right	652	103	379	47.7	D				
Eastbound	Thru	502	15	127	8.9	A	8.9	A		
Westbound	Thru	1,144	50	352	12.6	B	12.6	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
210	214	4
655	652	-3
515	502	-13
1,155	1,144	-11

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	16	83	67.0	E	54.3	D	6.0	A
	Thru	10	16	82	71.4	E				
	Right	20	22	95	30.0	C				
Eastbound	Left	118	5	76	14.4	B	5.6	A		
	Thru	409	8	156	3.4	A				
	Right	188	12	188	5.0	A				
Westbound	Left	82	1	45	7.6	A	4.2	A		
	Thru	1,120	10	173	4.1	A				
	Right	134	1	58	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
10	10	0
20	20	0
125	118	-7
415	409	-6
185	188	3
85	82	-3
1,130	1,120	-10
135	134	-1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	41	40.4	D	30.7	C	6.7	A
	Right	8	0	35	6.4	A				
Eastbound	Thru	286	6	96	5.7	A	5.8	A		
	Right	141	8	117	5.9	A				
Westbound	Left	262	42	221	29.4	C	6.6	A		
	Thru	1,319	4	124	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
10	8	-2
290	286	-4
145	141	-4
250	262	12
1,330	1,319	-11

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	16	7.8	A	2.0	A	4.3	A
	Thru	29	0	0	0.2	A				
Southbound	Thru	95	7	224	5.1	A	4.4	A		
	Right	447	6	222	4.2	A				
Eastbound	Left	4	0	34	15.5	C	15.5	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	9	4
25	29	4
100	95	-5
455	447	-8
5	4	-1
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	33	0	0	0.1	A	0.1	A	0.6	A
	Right	0	-	-	-	A				
Southbound	Left	60	0	3	0.7	A	0.5	A		
	Thru	35	0	0	0.3	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	33	8
0	0	0
60	60	0
40	35	-5
0	0	0
5	4	-1

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	4.5	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.5	A		
	Right	29	0	0	0.6	A				
Eastbound	Left	27	2	73	10.6	B	10.6	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
13	6	-7
12	6	-6
28	29	1
25	27	2
0	0	0

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Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.3	A	3.2	A	13	6	-7
	Right	7	0	0	0.4	A					20	7	-13
Southbound	Thru	6	0	0	0.7	A	0.7	A			12	6	-6
	Left	0	-	-	-	A					0	0	0
Westbound	Left	12	0	36	7.6	A	7.6	A			12	12	0
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	13	0	2	0.8	A	4.1	A	3.5	A	10	13	3
	Thru	13	0	0	8.5	A					20	13	-7
	Right	5	0	0	1.5	A					5	5	0
Southbound	Thru	6	0	0	0.9	A	0.7	A			12	6	-6
	Right	12	0	0	0.6	A					12	12	0
Eastbound	Right	6	0	52	8.5	A	8.5	A			5	6	1
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	11	4	30	65.9	E	34.1	C	4.0	A	10	11	1
	Thru	0	-	-	-	A					0	0	0
	Right	13	0	37	7.2	A					15	13	-2
Southbound	Left	24	8	51	60.2	E	52.6	D			25	24	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	25	6.9	A					5	4	-1
Eastbound	Left	6	2	20	67.3	E	2.6	A	5	6	1		
	Thru	320	2	52	1.4	A			320	320	0		
	Right	5	3	75	1.2	A			5	5	0		
Westbound	Left	11	0	8	2.5	A	2.0	A	10	11	1		
	Thru	784	3	99	2.0	A			790	784	-6		
	Right	23	0	0	1.0	A			25	23	-2		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	62	24	113	65.7	E	42.5	D	11.7	B	60	62	2
	Thru	10	2	38	31.8	C					15	10	-5
	Right	32	0	0	0.7	A					35	32	-3
Southbound	Left	0	-	-	-	A	21.7	C			0	0	0
	Thru	9	1	35	30.7	C					13	9	-4
	Right	4	4	106	1.4	A					5	4	-1
Eastbound	Left	5	2	19	80.7	F	5.7	A	5	5	0		
	Thru	241	5	71	6.2	A			245	241	-4		
	Right	112	1	40	1.4	A			110	112	2		
Westbound	Left	79	22	80	72.3	E	10.3	B	75	79	4		
	Thru	756	9	141	4.0	A			760	756	-4		
	Right	14	11	155	3.2	A			15	14	-1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	1	28	38.6	E	38.6	E	0.8	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	4	1	25	50.3	F	33.4	D			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	26	16.5	C					5	4	-1
Eastbound	Left	29	1	27	5.8	A	0.7	A	30	29	-1		
	Thru	242	0	0	0.1	A			250	242	-8		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	4	0	1	1.4	A	0.4	A	5	4	-1		
	Thru	841	0	0	0.4	A			840	841	1		
	Right	9	0	0	1.0	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	5	0	2	1.0	A	0.7	A	1.3	A	5	5	0
	Thru	95	0	0	0.0	A					100	95	-5
	Right	143	0	0	1.1	A					150	143	-7
Southbound	Left	79	1	43	3.0	A	1.3	A			85	79	-6
	Thru	119	0	0	0.2	A					110	119	9
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	9	1	34	11.4	B	7.0	A	10	9	-1		
	Thru	5	0	34	11.8	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		



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Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	2	4.9	A	1.4	A	1.8	A
	Thru	235	3	63	1.0	A				
	Right	165	2	61	1.9	A				
Southbound	Left	47	1	30	3.5	A	1.4	A		
	Thru	74	0	0	0.1	A				
	Right	6	0	0	0.6	A				
Eastbound	Left	4	0	28	18.3	C	10.5	B		
	Thru	0	-	-	-	A				
	Right	9	0	29	7.1	A				
Westbound	Left	4	0	23	14.0	B	11.7	B		
	Thru	0	-	-	-	A				
	Right	4	0	18	9.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	9	-1
245	235	-10
170	165	-5
45	47	2
70	74	4
5	6	1
5	4	-1
0	0	0
10	9	-1
5	4	-1
0	0	0
5	4	-1

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	617	9	118	6.0	A	5.4	A	11.2	B
	Right	178	4	89	3.6	A				
Southbound	Left	79	3	52	12.7	B	6.5	A		
	Thru	261	3	55	4.6	A				
Westbound	Left	146	53	217	53.0	D	24.4	C		
	Right	328	64	234	11.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
615	617	2
180	178	-2
80	79	-1
255	261	6
145	146	1
335	328	-7

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	16	43.8	D	13.7	B	7.0	A
	Right	25	1	56	7.7	A				
Southbound	Left	76	13	78	37.7	D	33.0	C		
	Right	11	0	0	0.6	A				
Eastbound	Left	41	10	65	45.3	D	9.4	A		
	Thru	209	2	48	2.5	A				
	Right	6	4	91	1.4	A				
Westbound	Left	0	-	-	-	A	3.4	A		
	Thru	463	7	89	5.0	A				
	Right	367	0	0	1.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
25	25	0
75	76	1
10	11	1
45	41	-4
210	209	-1
5	6	1
0	0	0
465	463	-2
380	367	-13

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	150	24	102	38.3	D	14.1	B	6.8	A
	Thru	14	24	103	38.6	D				
	Right	311	0	4	1.4	A				
Eastbound	Thru	193	3	53	4.5	A	3.5	A		
	Right	118	0	41	2.0	A				
Westbound	Left	117	5	95	4.3	A	3.0	A		
	Thru	518	5	96	2.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	150	5
25	14	-11
315	311	-4
195	193	-2
115	118	3
120	117	-3
530	518	-12

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	345	55	273	33.6	C	29.1	C	17.5	B
	Thru	69	55	273	32.9	C				
	Right	114	63	285	13.0	B				
Eastbound	Left	181	9	109	9.7	A	7.8	A		
	Thru	160	9	109	5.6	A				
Westbound	Thru	292	17	131	11.9	B	10.9	B		
	Right	126	25	156	8.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	345	-15
70	69	-1
110	114	4
180	181	1
160	160	0
290	292	2
125	126	1

NB Orange Line Travel Time (sec)

Avg	St Dev
323	15

SB Orange Line Travel Time (sec)

Avg	St Dev
277	10

West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	8.0	A	4.0	A
	Thru	0	-	-	-	A				
	Right	13	1	31	8.0	A				
Southbound	Left	33	15	84	62.1	E	50.3	D	4.0	A
	Thru	4	15	84	61.3	E				
	Right	17	24	106	24.9	C				
Eastbound	Left	4	7	138	16.5	B	2.6	A	4.0	A
	Thru	1,206	7	137	2.5	A				
	Right	4	9	158	3.4	A				
Westbound	Left	21	10	177	17.4	B	3.4	A	4.0	A
	Thru	1,195	10	179	3.1	A				
	Right	15	14	206	3.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
35	33	-2
5	4	-1
15	17	2
5	4	-1
1,210	1,206	-4
5	4	-1
20	21	1
1,200	1,195	-5
15	15	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	132	45	181	57.8	E	32.5	C	14.0	B
	Thru	10	28	210	51.5	D				
	Right	260	36	215	19.0	B				
Eastbound	Thru	1,306	46	352	12.4	B	11.7	B	14.0	B
	Right	193	4	112	7.0	A				
Westbound	Left	194	42	206	39.7	D	10.6	B	14.0	B
	Thru	958	17	197	4.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	132	-3
10	10	0
265	260	-5
1,320	1,306	-14
190	193	3
195	194	-1
970	958	-12

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	218	74	275	57.3	E	38.7	D	11.4	B
	Thru	6	34	260	71.1	E				
	Right	266	44	268	22.7	C				
Eastbound	Left	166	16	152	22.0	C	4.2	A	11.4	B
	Thru	1,273	9	153	1.9	A				
Westbound	Thru	929	17	143	9.0	A	8.4	A	11.4	B
	Right	91	1	60	2.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
225	218	-7
7	6	-1
265	266	1
170	166	-4
1,285	1,273	-12
940	929	-11
90	91	1

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	119	41	177	57.7	E	54.1	D	14.0	B
	Thru	40	12	85	50.4	D				
	Right	9	17	99	23.5	C				
Southbound	Left	15	9	75	57.5	E	16.2	B	14.0	B
	Thru	14	9	75	52.3	D				
	Right	144	6	88	8.4	A				
Eastbound	Left	135	35	186	43.5	D	8.0	A	14.0	B
	Thru	965	13	162	3.6	A				
	Right	175	24	212	4.7	A				
Westbound	Left	16	6	41	71.8	E	15.1	B	14.0	B
	Thru	597	29	194	13.6	B				
	Right	33	39	219	14.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	119	-6
40	40	0
10	9	-1
15	15	0
15	14	-1
145	144	-1
135	135	0
965	965	0
185	175	-10
15	16	1
600	597	-3
35	33	-2

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,125	0	16	2.2	A	2.2	A	12.3	B
Eastbound	Thru	732	89	329	36.3	D	36.3	D		
Westbound	Left	812	22	257	12.4	B	7.9	A		
Westbound	Thru	627	0	1	2.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,130	1,125	-5
730	732	2
820	812	-8
630	627	-3

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	21	126	47.9	D	31.1	C	19.4	B
	Right	169	38	154	26.9	C				
Southbound	Left	179	52	232	46.9	D	23.6	C	19.4	B
	Thru	71	16	95	42.1	D				
	Right	296	5	105	5.0	A				
Eastbound	Thru	1,739	132	614	25.4	C	24.1	C	19.4	B
	Right	122	2	54	5.8	A				
Westbound	Left	154	51	219	53.5	D	8.8	A	19.4	B
	Thru	1,122	5	122	2.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	42	-3
170	169	-1
180	179	-1
75	71	-4
295	296	1
1,735	1,739	4
125	122	-3
160	154	-6
1,110	1,122	12

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,721	11	300	8.2	A	7.1	A	4.5	A
	Right	354	0	0	1.9	A				
Westbound	Thru	1,282	0	14	0.7	A	0.7	A	4.5	A
	Right	203	0	14	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,735	1,721	-14
350	354	4
1,270	1,282	12
205	203	-2

West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	311	76	280	51.0	D	39.1	D	17.1	B
	Right	198	16	178	20.5	C				
Eastbound	Left	521	138	391	32.2	C	13.1	B		
	Thru	1,190	16	210	4.7	A				
Westbound	Thru	1,170	52	266	13.6	B	14.0	B		
	Right	231	61	287	15.9	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
310	311	1
205	198	-7
545	521	-24
1,190	1,190	0
1,165	1,170	5
235	231	-4

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	25	0	5	18.6	C	18.6	C	1.7	A
Eastbound	Thru	1,345	3	151	1.6	A	1.6	A		
	Right	42	3	150	1.6	A				
Westbound	Thru	1,400	2	115	1.6	A	1.6	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	25	5
1,350	1,345	-5
45	42	-3
1,400	1,400	0

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	117	34	160	49.4	D	41.2	D	32.7	C
	Thru	151	31	113	52.8	D				
	Right	86	5	72	9.6	A				
Southbound	Left	153	48	217	54.2	D	60.7	E		
	Thru	319	133	446	109.7	F				
	Right	269	0	0	6.3	A				
Eastbound	Left	268	39	154	39.7	D	16.8	B		
	Thru	940	44	274	12.9	B				
	Right	160	0	0	1.1	A				
Westbound	Left	100	30	96	70.5	E	30.9	C		
	Thru	1,013	92	414	27.5	C				
	Right	18	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
120	117	-3
155	151	-4
85	86	1
155	153	-2
330	319	-11
270	269	-1
275	268	-7
935	940	5
160	160	0
100	100	0
1,010	1,013	3
15	18	3

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	23	0	0	0.2	A	0.3	A	0.5	A
	Right	14	0	0	0.6	A				
Westbound	Right	92	0	13	0.5	A	0.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	23	-2
15	14	-1
90	92	2

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	5.0	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	44	3	66	7.9	A	8.0	A		
	Thru	0	-	-	-	A				
	Right	40	3	66	8.1	A				
Eastbound	Left	8	0	2	0.7	A	1.0	A		
	Thru	11	0	0	1.2	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	2.2	A		
	Thru	46	0	0	1.0	A				
	Right	17	0	0	5.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
45	44	-1
0	0	0
45	40	-5
5	8	3
10	11	1
0	0	0
0	0	0
45	46	1
15	17	2

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	0	17	3.3	A	0.3	A	1.7	A
	Thru	315	0	1	0.1	A				
	Right	9	0	1	0.7	A				
Southbound	Left	6	0	4	2.2	A	0.8	A		
	Thru	540	0	0	0.7	A				
	Right	37	0	0	1.4	A				
Eastbound	Left	34	3	54	17.6	C	15.0	B		
	Thru	0	-	-	-	A				
	Right	21	1	43	10.7	B				
Westbound	Left	9	1	42	16.6	C	14.1	B		
	Thru	5	1	42	18.1	C				
	Right	10	1	41	9.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
315	315	0
10	9	-1
5	6	1
550	540	-10
35	37	2
35	34	-1
0	0	0
20	21	1
10	9	-1
5	5	0
10	10	0

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	185	15	160	15.9	B	12.3	B	25.1	C
	Thru	80	5	56	15.9	B				
	Right	120	3	92	4.6	A				
Southbound	Left	4	0	10	18.7	B	22.4	C		
	Thru	186	18	121	23.6	C				
	Right	21	8	181	12.7	B				
Eastbound	Left	9	5	39	47.3	D	13.0	B		
	Thru	11	5	39	46.7	D				
	Right	254	18	125	10.3	B				
Westbound	Left	430	67	229	44.2	D	43.7	D		
	Thru	24	66	228	42.9	D				
	Right	15	85	253	31.3	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	185	-10
85	80	-5
125	120	-5
5	4	-1
190	186	-4
20	21	1
10	9	-1
10	11	1
255	254	-1
430	430	0
25	24	-1
15	15	0



Nicollet Avenue and Hwy 13

											(Signal)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	305	102	320	76.8	E	59.2	E	46.8	D	317	305	-12
	Thru	103	102	320	80.5	F					105	103	-2
	Right	194	38	253	20.4	C					201	194	-7
Southbound	Left	167	78	328	74.1	E	65.3	E			170	167	-3
	Thru	356	123	404	73.8	E					355	356	1
	Right	342	144	428	52.2	D					350	342	-8
Eastbound	Left	149	48	141	93.1	F	35.8	D			155	149	-6
	Thru	1,396	213	909	35.9	D					1,400	1,396	-4
	Right	346	5	110	10.8	B					346	346	0
Westbound	Left	264	93	235	111.4	F	45.5	D			256	264	8
	Thru	1,656	308	1,110	37.8	D					1,670	1,656	-14
	Right	141	0	37	13.2	B			145	141	-4		

Nicollet Avenue and Travelers Trail

											(Signal)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	24	1	24	8.2	A	8.7	A	10.9	B	24	24	0
	Thru	397	13	128	9.5	A					400	397	-3
	Right	94	4	88	5.9	A					95	94	-1
Southbound	Left	212	6	137	7.6	A	7.3	A			210	212	2
	Thru	697	20	234	7.1	A					700	697	-3
	Right	51	24	253	8.6	A					47	51	4
Eastbound	Left	68	10	73	30.6	C	23.4	C			73	68	-5
	Thru	46	10	95	28.2	C					46	46	0
	Right	63	15	112	12.1	B					63	63	0
Westbound	Left	114	19	113	32.5	C	18.8	B			110	114	4
	Thru	30	4	45	28.1	C					31	30	-1
	Right	144	0	6	6.0	A			150	144	-6		

Travelers Trail and Pleasant Avenue

											(Unsignalized)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	41	7.7	A	6.0	A	3.0	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	16	0	0	0.6	A	0.3	A			15	16	1
	Thru	24	0	0	0.0	A					25	24	-1

Burnsville Parkway and I-35W SB Ramps

											(Signal)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	369	98	539	32.2	C	24.8	C	23.4	C	370	369	-1
	Thru	20	98	541	29.8	C					20	20	0
	Right	282	14	153	14.8	B					285	282	-3
Southbound	Left	113	50	211	47.4	D	46.4	D			115	113	-2
	Thru	54	50	211	48.1	D					55	54	-1
	Right	16	64	232	34.3	C					15	16	1
Eastbound	Left	11	1	19	20.4	C	26.8	C			10	11	1
	Thru	539	55	243	27.1	C					542	539	-3
	Right	57	80	285	24.9	C					55	57	2
Westbound	Left	198	17	130	19.3	B	15.2	B			210	198	-12
	Thru	640	31	218	14.3	B					643	640	-3
	Right	59	54	269	11.6	B			60	59	-1		

Burnsville Parkway and I-35W NB Ramps

											(Signal)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	97	27	136	48.5	D	26.8	C	9.0	A	95	97	2
	Thru	4	27	136	50.1	D					5	4	-1
	Right	110	4	63	6.9	A					113	110	-3
Southbound	Left	5	16	109	63.5	E	36.1	D			5	5	0
	Thru	14	17	110	78.3	E					15	14	-1
	Right	48	27	138	21.0	C					50	48	-2
Eastbound	Left	8	0	6	6.1	A	4.6	A			10	8	-2
	Thru	653	10	150	4.6	A					652	653	1
	Right	272	17	187	4.7	A					280	272	-8
Westbound	Left	172	14	122	21.2	C	7.5	A			175	172	-3
	Thru	754	9	129	4.4	A					768	754	-14
	Right	6	17	171	3.6	A			5	6	1		

Burnsville Parkway and Gateway Boulevard

											(Unsignalized)		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	65	79	196	119.8	F	108.0	F	9.1	A	70	65	-5
	Thru	0	-	-	-	A					0	0	0
	Right	47	76	193	91.7	F					45	47	2
Southbound	Left	11	18	104	51.7	F	29.3	D			10	11	1
	Thru	5	17	100	69.2	F					5	5	0
	Right	93	16	102	24.5	C					95	93	-2
Eastbound	Left	12	0	18	5.5	A	0.6	A			15	12	-3
	Thru	680	1	43	0.4	A					680	680	0
	Right	74	1	40	1.9	A					75	74	-1
Westbound	Left	71	2	44	6.8	A	1.1	A			70	71	1
	Thru	775	3	71	0.6	A					783	775	-8
	Right	6	3	70	1.2	A			5	6	1		

2019\_PM\_Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	58	19	108	49.1	D	41.9	D	8.4	A	60	58	-2
	Thru	0	-	-	-	A					0	0	0
	Right	24	29	129	24.7	C					25	24	-1
Southbound	Left	77	36	165	54.1	D	45.3	D			75	77	2
	Thru	4	36	165	43.5	D					5	4	-1
	Right	58	52	191	33.7	C					60	58	-2
Eastbound	Left	9	0	4	4.9	A	2.1	A			10	9	-1
	Thru	696	4	82	2.1	A					695	696	1
	Right	32	0	7	1.4	A					30	32	2
Westbound	Left	35	0	19	6.3	A	4.2	A	35	35	0		
	Thru	736	8	130	4.2	A			738	736	-2		
	Right	16	0	1	2.6	A			15	16	1		

SB Orange Line Travel Time- 98th Street (sec)

<u>Avg</u>	<u>St Dev</u>
231	10

SB Orange Line Travel Time- Burnsville (sec)

<u>Avg</u>	<u>St Dev</u>
925	15

2019\_PM\_Downtown Build 12th Street Transit Ramp Option  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	301	25	162	17.8	B	16.3	B	23.2	C	300	301	1
	Right	145	32	189	13.2	B					145	145	0
Southbound	Left	87	13	98	41.6	D	39.3	D			76	87	11
	Thru	8	13	96	13.7	B					10	8	-2
Eastbound	Left	85	51	208	25.6	C	25.1	C			85	85	0
	Thru	730	51	208	25.0	C					725	730	5
	Right	4	60	232	26.2	C			5	4	-1		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	35	17	91	70.8	E	56.4	E	21.5	C	27	35	8
	Right	75	16	94	49.7	D					75	75	0
Southbound	Left	338	91	354	29.8	C	23.5	C			345	338	-7
	Thru	594	91	356	19.8	B					590	594	4
Eastbound	Left	58	56	208	15.1	B	15.3	B			60	58	-2
	Thru	736	57	209	15.6	B					745	736	-9
	Right	67	72	237	12.5	B			70	67	-3		
Westbound - Bus Only	Right	16	0	31	3.9	A	3.9	A	16	16	0		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	210	17	95	23.5	C	23.1	C	19.0	B	210	210	0
	Right	4	0	11	3.1	A					5	4	-1
Southbound	Left	269	46	260	30.8	C	25.6	C			265	269	4
	Thru	780	66	321	23.8	C					780	780	0
Eastbound	Left	226	48	253	14.4	B	12.7	B			210	226	16
	Thru	834	48	252	12.9	B					820	834	14
	Right	135	5	89	8.2	A			135	135	0		
Westbound - Bus Only	Thru	16	1	50	12.8	B	12.8	B	16	16	0		

**South 12th Street and 4th Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	51	0	3	0.6	A	0.7	A	0.7	A	50	51	1
	Thru	483	0	4	0.4	A					473	483	10
	HOV/Bus	88	0	4	0.6	A					82	88	6
	Right	484	0	0	1.1	A					485	484	-1
Westbound - Bus Only	-	16	0	0	0.6	A	0.6	A	16	16	0		

**I-35W Entrances and Exits (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Bus Lane	16	0	0	1.7	A	0.9	A	2.0	A	16	16	0
	Thru	1,754	0	24	0.8	A					1,740	1,754	14
	Right	1,043	0	24	1.2	A					1,070	1,043	-27
Southbound	Left	479	34	138	15.7	C	3.1	A			473	479	6
	Thru	2,092	0	0	0.3	A					2,100	2,092	-8
	Bus Lane	88	0	0	0.7	A					82	88	6

**I-35W SB Bridge (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Thru	2,660	2	66	0.3	A	0.3	A	0.3	A	2,655	2,660	5



**2019\_PM\_Build Knox Curved Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	87	353	53.4	D	40.4	D	21.2	C
	Thru	0	-	-	-	A				
	Right	417	86	339	29.3	C				
Southbound	Left	29	12	72	68.2	E	62.9	E		
	Thru	0	-	-	-	A				
	Right	4	16	84	24.7	C				
Eastbound	Left	21	1	22	11.7	B	13.0	B		
	Thru	1,215	53	389	13.5	B				
	Right	68	1	76	4.5	A				
Westbound	Left	33	2	41	19.6	B	14.8	B		
	Thru	827	40	284	14.6	B				
	Right	4	49	310	16.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
430	417	-13
30	29	-1
0	0	0
5	4	-1
20	21	1
1,220	1,215	-5
70	68	-2
35	33	-2
840	827	-13
5	4	-1

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	150	91	314	49.4	D	38.2	D	14.5	B
	Thru	4	91	313	45.0	D				
	Right	382	104	331	33.7	C				
Southbound	Left	10	2	33	47.3	D	23.1	C		
	Thru	0	-	-	-	A				
	Right	15	0	32	6.9	A				
Eastbound	Left	10	0	11	11.3	B	8.9	A		
	Thru	1,597	43	484	8.9	A				
	Right	47	1	56	7.2	A				
Westbound	Left	45	4	73	26.4	C	9.7	A		
	Thru	694	20	179	8.7	A				
	Right	15	22	190	7.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	150	-10
5	4	-1
395	382	-13
10	10	0
0	0	0
15	15	0
10	10	0
1,620	1,597	-23
50	47	-3
45	45	0
700	694	-6
15	15	0

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	136	45	189	57.6	E	55.8	E	12.0	B
	Right	167	36	124	54.4	D				
Eastbound	Thru	1,987	44	350	7.9	A	7.9	A		
Westbound	Thru	585	5	85	3.5	A	3.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	136	-9
165	167	2
2,020	1,987	-33
600	585	-15

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	52	200	62.6	E	55.5	E	16.9	B
	Thru	65	52	200	60.8	E				
	Right	49	61	213	41.7	D				
Eastbound	Left	729	172	584	34.6	C	14.4	B		
	Thru	1,353	14	197	3.8	A				
	Right	29	20	228	5.4	A				
Westbound	Left	24	1	29	25.6	C	15.4	B		
	Thru	545	29	179	16.3	B				
	Right	197	10	118	11.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
65	65	0
50	49	-1
745	729	-16
1,390	1,353	-37
30	29	-1
25	24	-1
550	545	-5
200	197	-3

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	172	104	408	73.7	E	51.9	D	16.4	B
	Right	299	90	385	39.4	D				
Eastbound	Thru	1,334	38	348	8.7	A	8.7	A		
	Right	59	42	369	8.9	A				
Westbound	Left	16	7	48	79.0	E	6.5	A		
	Thru	597	8	113	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
175	172	-3
300	299	-1
1,375	1,334	-41
60	59	-1
15	16	1
600	597	-3

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.1	A	28.3	D
	Thru	132	0	0	0.1	A				
Southbound	Thru	80	2	74	4.3	A	4.2	A		
	Right	13	2	73	3.6	A				
Eastbound	Left	409	130	344	43.1	E	42.7	E		
	Right	4	131	347	4.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
130	132	2
70	80	10
10	13	3
415	409	-6
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	74	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	60	0	8	0.8	A	0.7	A		
	Thru	25	0	1	0.3	A				
Westbound	Left	0	-	-	-	A	7.0	A		
	Right	58	2	55	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
70	74	4
0	0	0
60	60	0
25	25	0
0	0	0
60	58	-2

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	7.3	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.4	A		
	Right	19	0	0	0.5	A				
Eastbound	Left	68	4	85	10.5	B	10.5	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
19	19	0
70	68	-2
0	0	0

2019\_PM\_Build Knox Curved Alignment TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	0	-	-	-	A	10.7	B	0.7	A
	Right	6	1	81	10.7	B				
Eastbound	Left	6	0	5	0.5	A	0.2	A		
	Thru	42	0	1	0.1	A				
Westbound	Thru	49	0	0	0.1	A	0.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
7	6	-1
50	42	-8
50	49	-1
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	4	0.7	A	1.9	A	2.3	A
	Thru	47	0	0	3.3	A				
	Right	43	0	0	1.2	A				
Southbound	Thru	51	0	0	0.6	A	0.6	A		
	Right	7	0	0	0.9	A				
Eastbound	Right	18	1	51	7.7	A	7.7	A		
Westbound	Right	0	-	-	-	A	9.1	A		
	Left	8	0	37	9.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
50	47	-3
45	43	-2
50	51	1
5	7	2
20	18	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	25	135	55.4	E	39.2	D	15.2	B
	Thru	16	11	110	48.2	D				
	Right	75	16	122	20.8	C				
Southbound	Left	105	40	190	58.1	E	40.8	D		
	Thru	9	39	191	58.4	E				
	Right	64	3	72	9.9	A				
Eastbound	Left	57	18	98	60.3	E	11.8	B		
	Thru	1,349	45	394	9.8	A				
	Right	74	54	421	10.8	B				
Westbound	Left	72	3	54	10.3	B	11.1	B		
	Thru	728	22	172	11.9	B				
	Right	64	1	35	3.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	76	-4
20	16	-4
75	75	0
105	105	0
10	9	-1
65	64	-1
55	57	2
1,350	1,349	-1
70	74	4
70	72	2
725	728	3
70	64	-6

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	188	69	265	62.9	E	44.8	D	21.5	C
	Thru	48	11	62	49.0	D				
	Right	82	0	0	0.7	A				
Southbound	Left	28	8	55	52.8	D	43.5	D		
	Thru	33	9	47	52.3	D				
	Right	13	4	103	1.1	A				
Eastbound	Left	31	12	65	77.2	E	19.2	B		
	Thru	1,345	106	622	18.6	B				
	Right	152	71	522	12.9	B				
Westbound	Left	53	16	67	66.4	E	14.5	B		
	Thru	669	25	181	10.8	B				
	Right	42	30	195	7.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
180	188	8
50	48	-2
80	82	2
25	28	3
30	33	3
10	13	3
30	31	1
1,345	1,345	0
155	152	-3
50	53	3
680	669	-11
45	42	-3

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	20.8	C	1.0	A
	Thru	0	-	-	-	A				
	Right	4	0	28	20.8	C				
Southbound	Left	8	8	55	81.5	F	42.4	E		
	Thru	5	9	56	45.6	E				
	Right	23	8	55	28.1	D				
Eastbound	Left	10	0	18	5.3	A	0.3	A		
	Thru	1,437	0	0	0.3	A				
	Right	4	0	0	0.7	A				
Westbound	Left	0	-	-	-	A	0.3	A		
	Thru	742	0	0	0.3	A				
	Right	10	0	0	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
5	4	-1
10	8	-2
5	5	0
25	23	-2
10	10	0
1,440	1,437	-3
5	4	-1
0	0	0
745	742	-3
10	10	0

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	0	13	1.7	A	0.3	A	5.8	A
	Thru	200	0	0	0.1	A				
	Right	25	0	0	0.7	A				
Southbound	Left	18	0	13	1.9	A	0.3	A		
	Thru	221	0	0	0.1	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	7.3	A		
	Thru	0	-	-	-	A				
	Right	29	1	35	7.3	A				
Westbound	Left	165	24	145	23.6	C	15.3	C		
	Thru	0	-	-	-	A				
	Right	116	3	69	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	26	1
205	200	-5
25	25	0
25	18	-7
205	221	16
0	0	0
0	0	0
0	0	0
30	29	-1
175	165	-10
0	0	0
110	116	6

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 Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	10	0	11	7.4	A	1.0	A	8.2	A	10	10	0
	Thru	193	2	41	0.6	A					200	193	-7
	Right	20	2	47	1.9	A					20	20	0
Southbound	Left	5	0	12	13.4	B	1.0	A			5	5	0
	Thru	404	0	0	0.9	A					395	404	9
	Right	5	0	0	0.7	A					5	5	0
Eastbound	Left	4	1	28	20.6	C	12.2	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	8.5	A					10	9	-1
Westbound	Left	114	33	147	44.9	E	35.2	E	115	114	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	53	12	125	14.2	B			55	53	-2		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	524	12	104	8.1	A	7.0	A	8.8	A	525	524	-1
	Right	204	3	73	4.3	A					205	204	-1
Southbound	Left	348	25	189	15.6	B	8.1	A			345	348	3
	Thru	638	5	74	4.1	A					640	638	-2
Westbound	Left	148	20	155	24.4	C	15.6	B			150	148	-2
	Right	152	28	171	7.1	A					155	152	-3

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	3	2	20	77.2	E	26.3	C	23.8	C	5	3	-2
	Right	9	1	48	9.4	A					10	9	-1
Southbound	Left	457	103	292	57.8	E	52.0	D			460	457	-3
	Right	53	0	0	2.3	A					55	53	-2
Eastbound	Left	26	10	55	68.5	E	11.7	B			25	26	1
	Thru	515	17	169	8.9	A					510	515	5
	Right	13	28	213	9.9	A					10	13	3
Westbound	Left	10	4	32	84.2	F	6.7	A			10	10	0
	Thru	244	7	77	8.4	A					245	244	-1
	Right	198	0	0	0.8	A			200	198	-2		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	126	16	87	29.1	C	15.0	B	7.1	A	125	126	1
	Thru	19	16	88	26.9	C					25	19	-6
	Right	153	0	2	1.9	A					155	153	-2
Eastbound	Thru	500	10	127	6.2	A	6.3	A			505	500	-5
	Right	485	13	269	6.5	A					475	485	10
Westbound	Left	191	5	84	6.8	A	3.8	A			190	191	1
	Thru	297	5	84	1.9	A			305	297	-8		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	186	26	118	27.5	C	22.9	C	10.5	B	190	186	-4
	Thru	39	27	118	30.2	C					40	39	-1
	Right	118	34	130	13.3	B					120	118	-2
Eastbound	Left	270	18	167	14.0	B	8.1	A			265	270	5
	Thru	359	18	166	3.7	A					365	359	-6
Westbound	Thru	301	8	104	4.7	A	4.6	A			300	301	1
	Right	172	11	127	4.5	A			175	172	-3		

NB Orange Line Travel Time (sec)

Avg 316 St Dev 11

SB Orange Line Travel Time (sec)

Avg 340 St Dev 5



2019\_PM\_Build Knox Direct Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	357	88	352	53.0	D	40.5	D	21.4	C
	Thru	0	-	-	-	A				
	Right	417	88	337	29.8	C				
Southbound	Left	29	12	72	68.9	E	63.5	E		
	Thru	0	-	-	-	A				
	Right	4	16	84	24.7	C				
Eastbound	Left	21	1	23	13.1	B	13.1	B		
	Thru	1,217	54	397	13.6	B				
	Right	68	1	77	4.7	A				
Westbound	Left	34	2	38	20.1	C	15.2	B		
	Thru	826	41	282	15.0	B				
	Right	4	50	308	11.5	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	357	-3
0	0	0
430	417	-13
30	29	-1
0	0	0
5	4	-1
20	21	1
1,220	1,217	-3
70	68	-2
35	34	-1
840	826	-14
5	4	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	152	96	330	48.6	D	39.1	D	14.7	B
	Thru	4	95	328	56.4	E				
	Right	383	109	346	35.2	D				
Southbound	Left	10	2	33	47.0	D	22.9	C		
	Thru	0	-	-	-	A				
	Right	15	0	32	6.8	A				
Eastbound	Left	10	0	9	10.8	B	9.1	A		
	Thru	1,601	45	480	9.1	A				
	Right	47	1	56	7.3	A				
Westbound	Left	45	4	72	25.0	C	9.6	A		
	Thru	695	20	180	8.6	A				
	Right	14	21	191	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	152	-8
5	4	-1
395	383	-12
10	10	0
0	0	0
15	15	0
10	10	0
1,620	1,601	-19
50	47	-3
45	45	0
700	695	-5
15	14	-1

West 76th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	136	46	190	58.2	E	56.1	E	12.4	B
	Right	167	36	124	54.3	D				
Eastbound	Thru	1,991	48	395	8.4	A	8.4	A		
Westbound	Thru	588	5	86	3.5	A	3.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	136	-9
165	167	2
2,020	1,991	-29
600	588	-12

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	51	199	62.7	E	55.4	E	16.9	B
	Thru	65	51	199	60.6	E				
	Right	49	61	211	41.5	D				
Eastbound	Left	731	168	581	34.1	C	14.4	B		
	Thru	1,354	14	207	4.0	A				
	Right	29	20	237	6.0	A				
Westbound	Left	23	2	31	28.2	C	15.7	B		
	Thru	545	29	177	16.5	B				
	Right	198	10	115	12.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
65	65	0
50	49	-1
745	731	-14
1,390	1,354	-36
30	29	-1
25	23	-2
550	545	-5
200	198	-2

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	172	102	409	72.3	E	50.9	D	16.2	B
	Right	300	87	372	38.7	D				
Eastbound	Thru	1,335	38	347	8.7	A	8.7	A		
	Right	59	42	368	8.7	A				
Westbound	Left	16	7	48	79.0	E	6.5	A		
	Thru	597	8	113	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
175	172	-3
300	300	0
1,375	1,335	-40
60	59	-1
15	16	1
600	597	-3

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.2	A	30.0	D
	Thru	132	0	0	0.2	A				
Southbound	Thru	79	2	74	4.4	A	4.2	A		
	Right	13	2	74	3.3	A				
Eastbound	Left	409	139	348	45.6	E	45.2	E		
	Right	4	140	351	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
130	132	2
70	79	9
10	13	3
415	409	-6
5	4	-1

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	74	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	68	0	6	0.7	A	0.7	A		
	Thru	16	0	0	0.4	A				
Westbound	Left	0	-	-	-	A	7.0	A		
	Right	58	2	55	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
70	74	4
0	0	0
60	68	8
15	16	1
0	0	0
60	58	-2

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	8.0	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.3	A		
	Right	10	0	0	0.4	A				
Eastbound	Left	68	4	84	10.4	B	10.4	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
10	10	0
70	68	-2
0	0	0

**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	6	0	0	0.3	A	0.6	A	4.1	A
	Right	40	0	0	0.6	A				
Southbound	Thru	6	0	0	0.7	A	0.7	A		
	Left	0	-	-	-	A				
Westbound	Left	45	1	46	8.2	A	8.2	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
7	6	-1
40	40	0
6	6	0
0	0	0
45	45	0
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	10	0.8	A	1.7	A	2.2	A
	Thru	46	0	0	2.7	A				
	Right	42	0	0	1.3	A				
Southbound	Thru	45	0	0	0.3	A	0.3	A		
	Right	6	0	0	0.6	A				
Eastbound	Right	18	1	51	7.8	A	7.8	A		
Westbound	Right	0	-	-	-	A	9.2	A		
	Left	8	0	37	9.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
50	46	-4
45	42	-3
45	45	0
5	6	1
20	18	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	25	135	55.4	E	39.4	D	15.5	B
	Thru	16	11	110	48.2	D				
	Right	75	17	122	21.4	C				
Southbound	Left	104	39	184	57.9	E	40.7	D		
	Thru	9	39	184	59.2	E				
	Right	64	3	68	10.1	B				
Eastbound	Left	57	18	100	59.8	E	12.0	B		
	Thru	1,346	49	406	10.0	B				
	Right	74	58	433	11.1	B				
Westbound	Left	72	4	62	11.5	B	11.8	B		
	Thru	728	23	179	12.6	B				
	Right	64	1	32	3.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	76	-4
20	16	-4
75	75	0
105	104	-1
10	9	-1
65	64	-1
55	57	2
1,350	1,346	-4
70	74	4
70	72	2
725	728	3
70	64	-6

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	187	67	254	60.5	E	42.6	D	21.4	C
	Thru	47	10	60	44.3	D				
	Right	82	0	0	0.8	A				
Southbound	Left	27	7	52	54.4	D	40.6	D		
	Thru	32	7	67	45.0	D				
	Right	13	4	102	1.0	A				
Eastbound	Left	30	10	61	67.6	E	20.0	B		
	Thru	1,344	113	604	19.6	B				
	Right	152	76	503	13.9	B				
Westbound	Left	53	15	64	63.4	E	13.7	B		
	Thru	671	24	185	10.2	B				
	Right	42	28	200	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
180	187	7
50	47	-3
80	82	2
25	27	2
30	32	2
10	13	3
30	30	0
1,345	1,344	-1
155	152	-3
50	53	3
680	671	-9
45	42	-3

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	25.6	D	1.0	A
	Thru	0	-	-	-	A				
	Right	4	0	28	25.6	D				
Southbound	Left	8	7	55	70.1	F	37.2	E		
	Thru	5	7	55	49.2	E				
	Right	24	7	56	23.7	C				
Eastbound	Left	11	0	17	5.8	A	0.3	A		
	Thru	1,437	0	0	0.3	A				
	Right	4	0	0	0.7	A				
Westbound	Left	0	-	-	-	A	0.4	A		
	Thru	741	0	0	0.4	A				
	Right	10	0	0	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
5	4	-1
10	8	-2
5	5	0
25	24	-1
10	11	1
1,440	1,437	-3
5	4	-1
0	0	0
745	741	-4
10	10	0

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	0	13	1.7	A	0.3	A	6.1	A
	Thru	200	0	0	0.1	A				
	Right	24	0	0	0.7	A				
Southbound	Left	18	0	14	2.0	A	0.3	A		
	Thru	218	0	0	0.1	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	7.5	A		
	Thru	0	-	-	-	A				
	Right	29	1	36	7.5	A				
Westbound	Left	166	25	151	24.3	C	16.1	C		
	Thru	0	-	-	-	A				
	Right	116	5	77	4.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	26	1
205	200	-5
25	24	-1
25	18	-7
205	218	13
0	0	0
0	0	0
0	0	0
30	29	-1
175	166	-9
0	0	0
110	116	6

2019\_PM\_Build Knox Direct Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	10	0	11	6.8	A	1.0	A	7.6	A	10	10	0
	Thru	193	2	38	0.6	A					200	193	-7
	Right	20	2	44	1.4	A					20	20	0
Southbound	Left	5	0	11	10.1	B	0.5	A			5	5	0
	Thru	403	0	0	0.4	A					395	403	8
	Right	5	0	0	0.7	A					5	5	0
Eastbound	Left	4	1	28	25.1	D	13.1	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	7.7	A					10	9	-1
Westbound	Left	114	31	138	43.0	E	33.5	D	115	114	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	54	9	119	13.5	B			55	54	-1		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	524	12	100	8.4	A	7.2	A	8.9	A	525	524	-1
	Right	204	3	71	4.3	A					205	204	-1
Southbound	Left	347	26	195	15.9	B	8.3	A			345	347	2
	Thru	638	6	76	4.1	A					640	638	-2
Westbound	Left	147	19	143	22.9	C	14.8	B			150	147	-3
	Right	152	26	159	7.0	A					155	152	-3

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	3	2	20	72.1	E	25.5	C	22.3	C	5	3	-2
	Right	9	1	48	9.9	A					10	9	-1
Southbound	Left	458	101	271	54.5	D	48.9	D			460	458	-2
	Right	54	0	0	2.0	A					55	54	-1
Eastbound	Left	27	9	55	62.0	E	10.6	B			25	27	2
	Thru	514	15	171	8.0	A					510	514	4
	Right	13	25	216	8.2	A					10	13	3
Westbound	Left	10	4	32	75.2	E	6.2	A			10	10	0
	Thru	242	7	77	7.7	A					245	242	-3
	Right	198	0	0	0.8	A			200	198	-2		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	126	16	85	28.0	C	14.1	B	7.2	A	125	126	1
	Thru	19	16	86	27.9	C					25	19	-6
	Right	154	0	0	1.0	A					155	154	-1
Eastbound	Thru	499	11	120	6.6	A	6.6	A			505	499	-6
	Right	485	13	240	6.6	A					475	485	10
Westbound	Left	192	5	82	7.2	A	4.0	A			190	192	2
	Thru	297	5	82	2.0	A			305	297	-8		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	187	28	129	27.5	C	22.0	C	10.2	B	190	187	-3
	Thru	40	28	128	26.4	C					40	40	0
	Right	118	36	141	11.8	B					120	118	-2
Eastbound	Left	269	19	160	14.4	B	7.9	A			265	269	4
	Thru	360	19	159	3.1	A					365	360	-5
Westbound	Thru	301	7	101	4.4	A	4.4	A			300	301	1
	Right	171	10	121	4.5	A			175	171	-4		

NB Orange Line Travel Time (sec)

Avg 324 St Dev 13

SB Orange Line Travel Time (sec)

Avg 390 St Dev 8



## 2019 Build TSP MOEs

West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.7	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.7	A				
Southbound	Left	33	10	72	43.1	D	35.8	D	5.7	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	19.2	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.7	A
	Thru	384	5	67	3.8	A				
	Right	4	8	87	3.5	A				
Westbound	Left	11	17	218	9.4	A	4.9	A	5.7	A
	Thru	1,246	17	218	4.8	A				
	Right	5	24	243	6.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
385	384	-1
5	4	-1
10	11	1
1,265	1,246	-19
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	124	24	142	41.2	D	35.5	D	15.4	B
	Thru	35	112	511	45.9	D				
	Right	494	125	523	33.4	C				
Eastbound	Thru	461	18	134	17.3	B	14.3	B	15.4	B
	Right	147	5	92	4.8	A				
Westbound	Left	241	13	163	12.6	B	6.5	A	15.4	B
	Thru	1,165	24	253	5.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	124	-1
30	35	5
500	494	-6
475	461	-14
145	147	2
240	241	1
1,185	1,165	-20

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	235	54	237	41.0	D	27.4	C	12.4	B
	Thru	22	11	135	39.1	D				
	Right	208	17	153	10.7	B				
Eastbound	Left	115	14	124	29.2	C	11.1	B	12.4	B
	Thru	468	13	141	6.7	A				
Westbound	Thru	1,167	18	271	7.8	A	7.5	A	12.4	B
	Right	104	1	62	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
240	235	-5
20	22	2
205	208	3
120	115	-5
480	468	-12
1,185	1,167	-18
100	104	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	234	61	269	44.1	D	42.5	D	16.3	B
	Thru	32	6	50	35.2	D				
	Right	6	9	63	16.3	B				
Southbound	Left	20	5	56	36.7	D	12.6	B	16.3	B
	Thru	10	5	54	33.2	C				
	Right	179	9	97	8.7	A				
Eastbound	Left	66	13	101	35.8	D	7.3	A	16.3	B
	Thru	380	8	100	3.9	A				
	Right	187	18	152	4.3	A				
Westbound	Left	6	2	20	58.9	E	15.5	B	16.3	B
	Thru	848	44	267	15.2	B				
	Right	11	55	293	14.5	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
230	234	4
35	32	-3
5	6	1
20	20	0
10	10	0
180	179	-1
65	66	1
385	380	-5
190	187	-3
5	6	1
860	848	-12
10	11	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	843	0	0	1.3	A	1.3	A	5.5	A
Eastbound	Thru	238	12	83	15.1	B	15.1	B		
Westbound	Left	676	19	153	11.2	B	6.4	A		
	Thru	624	0	2	1.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
845	843	-2
240	238	-2
680	676	-4
630	624	-6

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	70	26	132	44.7	D	21.8	C	15.9	B
	Right	263	44	161	15.7	B				
Southbound	Left	180	45	220	42.8	D	18.8	B	15.9	B
	Thru	59	13	86	40.7	D				
	Right	370	4	107	3.6	A				
Eastbound	Thru	1,039	61	304	19.8	B	19.1	B	15.9	B
	Right	44	1	47	3.9	A				
Westbound	Left	98	25	136	46.2	D	8.4	A	15.9	B
	Thru	866	8	114	4.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	70	-5
260	263	3
175	180	5
60	59	-1
370	370	0
1,040	1,039	-1
45	44	-1
95	98	3
865	866	1

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,352	4	156	5.7	A	5.2	A	3.2	A
	Right	128	0	0	0.9	A				
Westbound	Thru	963	0	0	0.5	A	0.5	A	3.2	A
	Right	103	0	0	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,355	1,352	-3
120	128	8
960	963	3
100	103	3

West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	272	65	275	47.1	D	33.5	C	18.5	B
	Right	217	9	137	16.4	B				
Eastbound	Left	384	144	385	48.5	D	18.0	B		
	Thru	966	17	235	5.8	A				
Westbound	Thru	793	34	237	12.5	B	12.2	B		
	Right	281	39	258	11.6	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
265	272	7
220	217	-3
395	384	-11
960	966	6
795	793	-2
285	281	-4

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	1.0	A
Eastbound	Thru	1,092	2	119	1.3	A	1.3	A		
	Right	90	2	117	1.6	A				
Westbound	Thru	1,074	0	17	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	0	-5
1,090	1,092	2
90	90	0
1,080	1,074	-6

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	78	18	107	41.1	D	38.8	D	27.8	C
	Thru	129	24	94	48.6	D				
	Right	49	3	67	9.2	A				
Southbound	Left	55	17	86	54.8	D	117.5	F		
	Thru	60	82	173	383.4	F				
Eastbound	Right	107	0	0	0.6	A	14.7	B		
	Left	269	40	158	40.4	D				
	Thru	706	16	144	7.1	A				
Westbound	Right	115	0	0	1.0	A	19.1	B		
	Left	40	13	66	59.2	E				
	Thru	889	51	282	18.0	B				
	Right	34	0	0	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	78	-2
135	129	-6
50	49	-1
55	55	0
65	60	-5
105	107	2
275	269	-6
710	706	-4
110	115	5
40	40	0
895	889	-6
30	34	4

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	35	0	0	0.1	A	0.3	A	0.5	A
	Right	19	0	0	0.6	A				
Westbound	Right	49	0	14	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	35	0
20	19	-1
40	49	9

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.5	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	4	1	47	7.1	A	8.0	A		
	Thru	0	-	-	-	A				
Eastbound	Right	20	1	47	8.2	A	1.0	A		
	Left	16	0	3	0.8	A				
	Thru	9	0	0	1.3	A				
Westbound	Right	0	-	-	-	A	2.8	A		
	Left	0	-	-	-	A				
	Thru	25	0	0	1.6	A				
	Right	36	0	0	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
5	4	-1
0	0	0
15	20	5
10	16	6
10	9	-1
0	0	0
0	0	0
25	25	0
35	36	1

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	17	1.7	A	0.3	A	0.8	A
	Thru	247	0	2	0.1	A				
	Right	4	0	2	0.7	A				
Southbound	Left	9	0	9	2.0	A	0.5	A		
	Thru	175	0	0	0.3	A				
Eastbound	Right	30	0	0	1.1	A	14.1	B		
	Left	9	1	42	16.6	C				
	Thru	0	-	-	-	A				
Westbound	Right	6	0	37	10.3	B	7.3	A		
	Left	0	-	-	-	A				
	Thru	0	-	-	-	A				
	Right	4	0	30	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
250	247	-3
5	4	-1
10	9	-1
175	175	0
30	30	0
10	9	-1
0	0	0
5	6	1
0	0	0
0	0	0
5	4	-1

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	327	19	276	11.0	B	9.6	A	13.5	B
	Thru	221	7	89	9.3	A				
	Right	468	22	313	8.6	A				
Southbound	Left	12	1	19	12.9	B	14.0	B		
	Thru	61	5	56	16.8	B				
Eastbound	Right	23	2	115	7.1	A	22.6	C		
	Left	35	11	73	44.8	D				
	Thru	9	11	73	43.6	D				
Westbound	Right	58	2	70	6.0	A	40.2	D		
	Left	78	18	85	42.5	D				
	Thru	23	18	85	41.9	D				
	Right	10	31	110	18.8	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
335	327	-8
225	221	-4
490	468	-22
10	12	2
65	61	-4
20	23	3
35	35	0
10	9	-1
60	58	-2
80	78	-2
25	23	-2
10	10	0



**Nicollet Avenue and Hwy 13**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	485	234	629	73.0	E	70.0	E	47.4	D	491	485	-6
	Thru	413	234	629	74.0	E					425	413	-12
	Right	113	14	154	42.3	D					115	113	-2
Southbound	Left	37	18	84	85.2	F	58.4	E			40	37	-3
	Thru	69	31	95	87.4	F					65	69	4
	Right	100	49	119	28.5	C					100	100	0
Eastbound	Left	415	108	324	75.1	E	39.2	D			420	415	-5
	Thru	1,485	224	984	32.6	C					1,490	1,485	-5
	Right	164	0	37	8.3	A					158	164	6
Westbound	Left	133	49	134	95.7	F	41.1	D			130	133	3
	Thru	991	141	555	40.2	D					995	991	-4
	Right	199	6	89	9.1	A			205	199	-6		

**Nicollet Avenue and Travelers Trail**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	56	1	30	5.3	A	9.2	A	10.6	B	56	56	0
	Thru	843	21	205	9.6	A					845	843	-2
	Right	30	10	163	4.9	A					30	30	0
Southbound	Left	50	1	44	8.6	A	5.8	A			50	50	0
	Thru	210	8	119	5.0	A					215	210	-5
	Right	99	11	138	5.9	A					95	99	4
Eastbound	Left	61	11	76	34.5	C	29.7	C			66	61	-5
	Thru	29	5	52	29.2	C					30	29	-1
	Right	14	8	70	10.0	A					15	14	-1
Westbound	Left	34	5	55	33.1	C	16.2	B			30	34	4
	Thru	32	5	55	30.8	C					31	32	1
	Right	115	0	6	7.2	A			120	115	-5		

**Travelers Trail and Pleasant Avenue**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	0	-	-	-	A	5.9	A	0.9	A	0	0	0
	Right	8	0	24	5.9	A					10	8	-2
Eastbound	Thru	23	0	0	0.0	A	0.2	A			25	23	-2
	Right	6	0	0	0.7	A					5	6	1
Westbound	Left	36	0	5	0.8	A	0.6	A			35	36	1
	Thru	20	0	0	0.2	A					15	20	5

**Burnsville Parkway and I-35W SB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	112	41	182	48.5	D	29.2	C	11.4	B	110	112	2
	Thru	32	41	180	47.1	D					35	32	-3
	Right	149	9	84	10.8	B					150	149	-1
Southbound	Left	58	18	105	39.7	D	37.7	D			60	58	-2
	Thru	23	18	106	36.5	D					25	23	-2
	Right	5	28	129	19.8	B					5	5	0
Eastbound	Left	20	0	13	4.4	A	7.1	A			20	20	0
	Thru	1,024	25	228	7.1	A					1,031	1,024	-7
	Right	80	33	266	7.6	A					75	80	5
Westbound	Left	65	1	42	10.6	B	4.6	A			67	65	-2
	Thru	235	3	61	3.4	A					236	235	-1
	Right	81	8	113	3.4	A			85	81	-4		

**Burnsville Parkway and I-35W NB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	30	19	89	82.9	F	22.7	C	8.5	A	30	30	0
	Thru	10	19	90	75.4	E					10	10	0
	Right	158	7	85	8.0	A					160	158	-2
Southbound	Left	0	-	-	-	A	22.2	C			0	0	0
	Thru	10	4	100	32.7	C					5	10	5
	Right	8	4	75	9.0	A					10	8	-2
Eastbound	Left	53	1	26	4.7	A	6.2	A			55	53	-2
	Thru	832	20	270	6.2	A					836	832	-4
	Right	345	28	306	6.4	A					350	345	-5
Westbound	Left	121	6	82	18.4	B	8.0	A			125	121	-4
	Thru	344	5	85	4.4	A					348	344	-4
	Right	4	10	131	2.6	A			5	4	-1		

**Burnsville Parkway and Gateway Boulevard**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	71	109	238	141.9	F	129.8	F	10.9	B	75	71	-4
	Thru	0	-	-	-	A					0	0	0
	Right	52	102	228	113.2	F					50	52	2
Southbound	Left	0	-	-	-	A	7.7	A			0	0	0
	Thru	0	-	-	-	A					0	0	0
	Right	8	0	24	7.7	A					10	8	-2
Eastbound	Left	86	0	34	2.9	A	0.8	A			85	86	1
	Thru	872	2	52	0.5	A					881	872	-9
	Right	34	2	52	2.3	A					30	34	4
Westbound	Left	39	1	29	6.4	A	0.8	A			40	39	-1
	Thru	392	1	35	0.3	A					393	392	-1
	Right	19	1	40	1.0	A			20	19	-1		

2019\_AM\_Build 66th, 98th, Burns TSP  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	23	6	52	46.7	D	36.8	D	3.3	A
	Thru	0	-	-	-	A				
	Right	10	11	74	13.9	B				
Southbound	Left	8	2	33	44.7	D	25.4	C		
	Thru	0	-	-	-	A				
	Right	9	5	58	8.3	A				
Eastbound	Left	40	0	11	3.5	A	2.1	A		
	Thru	873	4	106	2.0	A				
	Right	10	0	1	2.1	A				
Westbound	Left	25	0	15	8.5	A	2.6	A		
	Thru	418	2	64	2.4	A				
	Right	61	0	6	1.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	23	-2
0	0	0
10	10	0
10	8	-2
0	0	0
10	9	-1
40	40	0
881	873	-8
10	10	0
25	25	0
418	418	0
60	61	1

SB Orange Line Travel Time- 98th Street (sec)

Avg	St Dev
189	6

SB Orange Line Travel Time- Burnsville (sec)

Avg	St Dev
856	6

**2019\_AM\_Build Knox Curved Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (AM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	13	55	65.0	E	44.2	D	16.0	B
	Thru	0	-	-	-	A				
	Right	25	1	47	5.8	A				
Southbound	Left	82	33	134	63.8	E	62.9	E		
	Thru	4	33	134	64.3	E				
	Right	4	41	148	44.4	D				
Eastbound	Left	4	0	10	15.4	B	11.7	B		
	Thru	488	26	177	15.8	B				
	Right	393	16	155	6.7	A				
Westbound	Left	412	85	374	37.3	D	14.2	B		
	Thru	929	11	146	4.1	A				
	Right	14	17	173	5.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	46	1
0	0	0
25	25	0
80	82	2
5	4	-1
5	4	-1
5	4	-1
500	488	-12
390	393	3
415	412	-3
955	929	-26
15	14	-1

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	7	52	76.0	E	39.8	D	4.8	A
	Thru	3	7	52	75.2	E				
	Right	19	10	68	15.1	B				
Southbound	Left	11	3	30	65.3	E	70.4	E		
	Thru	5	5	36	127.5	F				
	Right	4	6	44	13.0	B				
Eastbound	Left	5	0	2	12.4	B	3.5	A		
	Thru	473	3	72	3.1	A				
	Right	112	2	84	4.9	A				
Westbound	Left	427	11	168	9.3	A	3.9	A		
	Thru	1,354	6	167	2.2	A				
	Right	10	7	181	3.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	10	-5
5	3	-2
25	19	-6
10	11	1
5	5	0
5	4	-1
5	5	0
480	473	-7
120	112	-8
435	427	-8
1,365	1,354	-11
10	10	0

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	215	53	226	43.8	D	47.5	D	24.3	C
	Right	658	106	368	48.7	D				
Eastbound	Thru	502	14	118	8.5	A	8.5	A		
Westbound	Thru	1,138	55	374	13.6	B	13.6	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
210	215	5
655	658	3
515	502	-13
1,155	1,138	-17

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	24	17	82	68.6	E	55.1	E	6.7	A
	Thru	11	16	82	68.4	E				
	Right	19	22	94	30.4	C				
Eastbound	Left	124	5	78	13.6	B	5.7	A		
	Thru	401	9	149	3.7	A				
	Right	187	13	181	4.8	A				
Westbound	Left	82	1	46	8.0	A	5.3	A		
	Thru	1,111	15	229	5.3	A				
	Right	134	1	68	4.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	24	-1
10	11	1
20	19	-1
125	124	-1
415	401	-14
185	187	2
85	82	-3
1,130	1,111	-19
135	134	-1

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	41	40.4	D	30.7	C	7.1	A
	Right	8	0	35	6.5	A				
Eastbound	Thru	279	8	114	7.2	A	7.3	A		
	Right	142	10	135	7.3	A				
Westbound	Left	261	43	218	29.7	C	6.6	A		
	Thru	1,314	4	128	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
10	8	-2
290	279	-11
145	142	-3
250	261	11
1,330	1,314	-16

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	19	12.2	B	2.4	A	4.4	A
	Thru	28	0	0	0.3	A				
Southbound	Thru	97	7	237	5.2	A	4.5	A		
	Right	446	7	234	4.3	A				
Eastbound	Left	4	0	34	16.2	C	16.2	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	28	3
100	97	-3
455	446	-9
5	4	-1
0	0	0

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	0	0	0.1	A	0.1	A	0.5	A
	Right	0	-	-	-	A				
Southbound	Left	30	0	3	0.6	A	0.4	A		
	Thru	68	0	1	0.2	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	29	4
0	0	0
30	30	0
70	68	-2
0	0	0
5	4	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	3.2	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.7	A		
	Right	62	0	0	0.7	A				
Eastbound	Left	23	1	72	11.3	B	11.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
6	6	0
70	62	-8
25	23	-2
0	0	0



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Arterial MOEs (AM Peak Hour)



Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Southbound	Left	0	-	-	-	A	10.6	B	1.8	A	0	0	0
	Right	6	1	81	10.6	B					6	6	0
Eastbound	Left	6	0	0	0.0	A	0.0	A			6	6	0
	Thru	15	0	0	0.0	A					14	15	1
Westbound	Thru	8	0	0	0.0	A	0.0	A			9	8	-1
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	9	0	0	0.6	A	4.0	A	3.3	A	10	9	-1
	Thru	21	0	0	6.1	A					20	21	1
	Right	5	0	0	0.9	A					5	5	0
Southbound	Thru	14	0	0	0.5	A	0.5	A			10	14	4
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	2	0	59	11.8	B	11.8	B			5	2	-3
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	11	4	30	65.9	E	34.1	C	4.1	A	10	11	1
	Thru	0	-	-	-	A					0	0	0
	Right	13	0	37	7.1	A					15	13	-2
Southbound	Left	24	8	51	59.7	E	52.1	D			25	24	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	25	6.9	A					5	4	-1
Eastbound	Left	6	2	20	68.0	E	2.6	A	5	6	1		
	Thru	320	2	52	1.4	A			320	320	0		
	Right	5	3	77	1.0	A			5	5	0		
Westbound	Left	11	0	7	2.2	A	2.2	A	10	11	1		
	Thru	786	4	105	2.3	A			790	786	-4		
	Right	23	0	0	1.2	A			25	23	-2		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	60	19	92	56.0	E	37.0	D	12.5	B	60	60	0
	Thru	16	3	33	38.4	D					15	16	1
	Right	32	0	0	0.7	A					35	32	-3
Southbound	Left	0	-	-	-	A	25.2	C			0	0	0
	Thru	10	3	36	37.4	D					10	10	0
	Right	5	4	102	1.0	A					5	5	0
Eastbound	Left	5	2	21	73.1	E	7.2	A	5	5	0		
	Thru	242	7	84	8.5	A			245	242	-3		
	Right	111	1	42	1.4	A			110	111	1		
Westbound	Left	79	22	79	69.8	E	11.4	B	75	79	4		
	Thru	756	13	158	5.4	A			760	756	-4		
	Right	14	16	173	4.8	A			15	14	-1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	1	28	43.6	E	43.6	E	0.8	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	4	1	25	45.1	E	31.2	D			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	26	17.4	C					5	4	-1
Eastbound	Left	29	1	26	5.5	A	0.7	A	30	29	-1		
	Thru	245	0	0	0.1	A			250	245	-5		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	4	0	0	1.4	A	0.3	A	5	4	-1		
	Thru	842	0	1	0.3	A			840	842	2		
	Right	9	0	1	0.9	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	5	0	2	0.8	A	0.7	A	1.4	A	5	5	0
	Thru	98	0	0	0.0	A					100	98	-2
	Right	141	0	0	1.1	A					150	141	-9
Southbound	Left	81	1	50	3.7	A	1.6	A			85	81	-4
	Thru	118	0	0	0.2	A					110	118	8
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	9	1	33	10.7	B	6.8	A	10	9	-1		
	Thru	5	0	34	12.4	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		

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 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	10	0	4	4.9	A	1.4	A	1.8	A	10	10	0
	Thru	236	3	60	1.0	A					245	236	-9
	Right	163	2	58	1.9	A					170	163	-7
Southbound	Left	48	1	30	3.8	A	1.5	A			45	48	3
	Thru	76	0	0	0.1	A					70	76	6
	Right	7	0	0	0.6	A					5	7	2
Eastbound	Left	4	1	28	20.8	C	11.3	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	7.1	A					10	9	-1
Westbound	Left	4	0	23	13.5	B	11.3	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	18	9.0	A			5	4	-1		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	614	12	127	7.4	A	6.7	A	11.8	B	615	614	-1
	Right	178	5	99	4.3	A					180	178	-2
Southbound	Left	77	4	59	15.3	B	8.1	A			80	77	-3
	Thru	256	4	59	6.0	A					255	256	1
Westbound	Left	148	51	212	51.9	D	23.0	C			145	148	3
	Right	330	63	228	10.0	A					335	330	-5

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	5	1	18	68.8	E	16.8	B	9.8	A	5	5	0
	Right	25	1	56	6.4	A					25	25	0
Southbound	Left	75	21	85	59.8	E	52.2	D			75	75	0
	Right	11	0	0	0.5	A					10	11	1
Eastbound	Left	41	17	79	73.1	E	14.1	B			45	41	-4
	Thru	209	2	57	2.8	A					210	209	-1
	Right	6	5	100	2.6	A					5	6	1
Westbound	Left	0	-	-	-	A	3.9	A			0	0	0
	Thru	463	9	108	5.9	A					465	463	-2
	Right	369	0	0	1.4	A					380	369	-11

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	145	23	104	37.7	D	14.7	B	7.9	A	145	145	0
	Thru	23	23	103	36.1	D					25	23	-2
	Right	312	0	6	2.4	A					315	312	-3
Eastbound	Thru	191	5	90	7.2	A	5.3	A			195	191	-4
	Right	117	0	37	2.1	A					115	117	2
Westbound	Left	117	7	143	4.9	A	4.2	A			120	117	-3
	Thru	522	7	143	4.0	A					530	522	-8

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	350	47	220	30.2	C	27.1	C	15.1	B	360	350	-10
	Thru	69	47	220	31.9	C					70	69	-1
	Right	114	56	232	14.8	B					110	114	4
Eastbound	Left	181	10	113	12.2	B	8.7	A			180	181	1
	Thru	156	10	113	4.7	A					160	156	-4
Westbound	Thru	287	7	100	4.9	A	4.8	A			290	287	-3
	Right	124	11	126	4.6	A					125	124	-1

NB Orange Line Travel Time (sec)

Avg 299 St Dev 6

SB Orange Line Travel Time (sec)

Avg 307 St Dev 12

2019\_AM\_Build Knox Direct Alignment TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	47	13	58	63.7	E	43.5	D	16.0	B	45	47	2
	Thru	0	-	-	-	A					0	0	0
	Right	25	1	47	5.4	A					25	25	0
Southbound	Left	82	33	138	64.5	E	63.7	E	16.0	B	80	82	2
	Thru	4	33	138	64.8	E					5	4	-1
	Right	4	41	151	47.5	D					5	4	-1
Eastbound	Left	5	0	10	15.3	B	12.0	B	16.0	B	5	5	0
	Thru	497	27	185	16.4	B					500	497	-3
	Right	394	15	151	6.5	A					390	394	4
Westbound	Left	414	83	388	36.3	D	14.0	B	16.0	B	415	414	-1
	Thru	934	11	137	4.2	A					955	934	-21
	Right	14	17	162	4.5	A					15	14	-1

West 76th Street and Knox Avenue South

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	13	7	64	62.7	E	42.2	D	5.0	A	15	13	-2
	Thru	4	7	62	65.4	E					5	4	-1
	Right	16	11	78	19.7	B					25	16	-9
Southbound	Left	11	3	30	64.5	E	71.9	E	5.0	A	10	11	1
	Thru	5	4	37	127.3	F					5	5	0
	Right	4	6	45	22.9	C					5	4	-1
Eastbound	Left	6	0	4	10.3	B	3.5	A	5.0	A	5	6	1
	Thru	477	4	68	3.2	A					480	477	-3
	Right	117	2	77	4.5	A					120	117	-3
Westbound	Left	422	11	173	9.5	A	4.0	A	5.0	A	435	422	-13
	Thru	1,358	7	174	2.3	A					1,365	1,358	-7
	Right	10	8	184	3.2	A					10	10	0

West 76th Street and I-35W SB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Southbound	Left	214	53	225	43.4	D	46.7	D	23.6	C	210	214	4
	Right	652	103	379	47.7	D					655	652	-3
Eastbound	Thru	502	15	127	8.9	A	8.9	A	23.6	C	515	502	-13
Westbound	Thru	1,144	50	352	12.6	B	12.6	B	23.6	C	1,155	1,144	-11

West 76th Street and I-35W NB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	25	16	83	67.0	E	54.3	D	6.0	A	25	25	0
	Thru	10	16	82	71.4	E					10	10	0
	Right	20	22	95	30.0	C					20	20	0
Eastbound	Left	118	5	76	14.4	B	5.6	A	6.0	A	125	118	-7
	Thru	409	8	156	3.4	A					415	409	-6
	Right	188	12	188	5.0	A					185	188	3
Westbound	Left	82	1	45	7.6	A	4.2	A	6.0	A	85	82	-3
	Thru	1,120	10	173	4.1	A					1,130	1,120	-10
	Right	134	1	58	3.6	A					135	134	-1

West 77th Street and Meridian Crossings

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	20	4	41	40.4	D	30.7	C	6.7	A	20	20	0
	Right	8	0	35	6.4	A					10	8	-2
Eastbound	Thru	286	6	96	5.7	A	5.8	A	6.7	A	290	286	-4
	Right	141	8	117	5.9	A					145	141	-4
Westbound	Left	262	42	221	29.4	C	6.6	A	6.7	A	250	262	12
	Thru	1,319	4	124	2.0	A					1,330	1,319	-11

Knox Avenue South and Best Buy Parking Ramp

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	9	0	16	7.8	A	2.0	A	4.3	A	5	9	4
	Thru	29	0	0	0.2	A					25	29	4
Southbound	Thru	95	7	224	5.1	A	4.4	A	4.3	A	100	95	-5
	Right	447	6	222	4.2	A					455	447	-8
Eastbound	Left	4	0	34	15.5	C	15.5	C	4.3	A	5	4	-1
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	33	0	0	0.1	A	0.1	A	0.6	A	25	33	8
	Right	0	-	-	-	A					0	0	0
Southbound	Left	60	0	3	0.7	A	0.5	A	0.6	A	60	60	0
	Thru	35	0	0	0.3	A					40	35	-5
Westbound	Left	0	-	-	-	A	6.1	A	0.6	A	0	0	0
	Right	4	0	37	6.1	A					5	4	-1

Knox Avenue South and South Parking Ride

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	0	-	-	-	A	0.7	A	4.5	A	0	0	0
	Thru	6	0	0	0.7	A					13	6	-7
Southbound	Thru	6	0	0	0.1	A	0.5	A	4.5	A	12	6	-6
	Right	29	0	0	0.6	A					28	29	1
Eastbound	Left	27	2	73	10.6	B	10.6	B	4.5	A	25	27	2
	Right	0	-	-	-	A					0	0	0



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Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.3	A	3.2	A	13	6	-7
	Right	7	0	0	0.4	A					20	7	-13
Southbound	Thru	6	0	0	0.7	A	0.7	A			12	6	-6
	Left	0	-	-	-	A					0	0	0
Westbound	Left	12	0	36	7.6	A	7.6	A			12	12	0
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	13	0	2	0.8	A	4.1	A	3.5	A	10	13	3
	Thru	13	0	0	8.5	A					20	13	-7
	Right	5	0	0	1.5	A					5	5	0
Southbound	Thru	6	0	0	0.9	A	0.7	A			12	6	-6
	Right	12	0	0	0.6	A					12	12	0
Eastbound	Right	6	0	52	8.5	A	8.5	A			5	6	1
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	11	4	30	65.9	E	34.1	C	4.0	A	10	11	1
	Thru	0	-	-	-	A					0	0	0
	Right	13	0	37	7.2	A					15	13	-2
Southbound	Left	24	8	51	60.2	E	52.6	D			25	24	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	25	6.9	A					5	4	-1
Eastbound	Left	6	2	20	67.3	E	2.6	A	5	6	1		
	Thru	320	2	52	1.4	A			320	320	0		
	Right	5	3	75	1.2	A			5	5	0		
Westbound	Left	11	0	8	2.5	A	2.0	A	10	11	1		
	Thru	784	3	99	2.0	A			790	784	-6		
	Right	23	0	0	1.0	A			25	23	-2		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	62	24	113	65.7	E	42.5	D	11.7	B	60	62	2
	Thru	10	2	38	31.8	C					15	10	-5
	Right	32	0	0	0.7	A					35	32	-3
Southbound	Left	0	-	-	-	A	21.7	C			0	0	0
	Thru	9	1	35	30.7	C					13	9	-4
	Right	4	4	106	1.4	A					5	4	-1
Eastbound	Left	5	2	19	80.7	F	5.7	A	5	5	0		
	Thru	241	5	71	6.2	A			245	241	-4		
	Right	112	1	40	1.4	A			110	112	2		
Westbound	Left	79	22	80	72.3	E	10.3	B	75	79	4		
	Thru	756	9	141	4.0	A			760	756	-4		
	Right	14	11	155	3.2	A			15	14	-1		

American Boulevard West and Lupient Chevrolet Access Drive (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	1	28	38.6	E	38.6	E	0.8	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	4	1	25	50.3	F	33.4	D			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	26	16.5	C					5	4	-1
Eastbound	Left	29	1	27	5.8	A	0.7	A	30	29	-1		
	Thru	242	0	0	0.1	A			250	242	-8		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	4	0	1	1.4	A	0.4	A	5	4	-1		
	Thru	841	0	0	0.4	A			840	841	1		
	Right	9	0	0	1.0	A			10	9	-1		

Knox Avenue South and West 81st Street (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	5	0	2	1.0	A	0.7	A	1.3	A	5	5	0
	Thru	95	0	0	0.0	A					100	95	-5
	Right	143	0	0	1.1	A					150	143	-7
Southbound	Left	79	1	43	3.0	A	1.3	A			85	79	-6
	Thru	119	0	0	0.2	A					110	119	9
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	9	1	34	11.4	B	7.0	A	10	9	-1		
	Thru	5	0	34	11.8	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		

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Knox Avenue South and Southpoint Office Center

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	2	4.9	A	1.4	A	1.8	A
	Thru	235	3	63	1.0	A				
	Right	165	2	61	1.9	A				
Southbound	Left	47	1	30	3.5	A	1.4	A		
	Thru	74	0	0	0.1	A				
	Right	6	0	0	0.6	A				
Eastbound	Left	4	0	28	18.3	C	10.5	B		
	Thru	0	-	-	-	A				
	Right	9	0	29	7.1	A				
Westbound	Left	4	0	23	14.0	B	11.7	B		
	Thru	0	-	-	-	A				
	Right	4	0	18	9.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	9	-1
245	235	-10
170	165	-5
45	47	2
70	74	4
5	6	1
5	4	-1
0	0	0
10	9	-1
5	4	-1
0	0	0
5	4	-1

West 82nd Street and Penn Avenue South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	617	9	118	6.0	A	5.4	A	11.2	B
	Right	178	4	89	3.6	A				
Southbound	Left	79	3	52	12.7	B	6.5	A		
	Thru	261	3	55	4.6	A				
Westbound	Left	146	53	217	53.0	D	24.4	C		
	Right	328	64	234	11.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
615	617	2
180	178	-2
80	79	-1
255	261	6
145	146	1
335	328	-7

West 82nd Street and Knox Avenue South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	16	43.8	D	13.7	B	7.0	A
	Right	25	1	56	7.7	A				
Southbound	Left	76	13	78	37.7	D	33.0	C		
	Right	11	0	0	0.6	A				
Eastbound	Left	41	10	65	45.3	D	9.4	A		
	Thru	209	2	48	2.5	A				
	Right	6	4	91	1.4	A				
Westbound	Left	0	-	-	-	A	3.4	A		
	Thru	463	7	89	5.0	A				
	Right	367	0	0	1.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
25	25	0
75	76	1
10	11	1
45	41	-4
210	209	-1
5	6	1
0	0	0
465	463	-2
380	367	-13

West 82nd Street and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	150	24	102	38.3	D	14.1	B	6.8	A
	Thru	14	24	103	38.6	D				
	Right	311	0	4	1.4	A				
Eastbound	Thru	193	3	53	4.5	A	3.5	A		
	Right	118	0	41	2.0	A				
Westbound	Left	117	5	95	4.3	A	3.0	A		
	Thru	518	5	96	2.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	150	5
25	14	-11
315	311	-4
195	193	-2
115	118	3
120	117	-3
530	518	-12

West 82nd Street and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	345	55	273	33.6	C	29.1	C	17.5	B
	Thru	69	55	273	32.9	C				
	Right	114	63	285	13.0	B				
Eastbound	Left	181	9	109	9.7	A	7.8	A		
	Thru	160	9	109	5.6	A				
Westbound	Thru	292	17	131	11.9	B	10.9	B		
	Right	126	25	156	8.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	345	-15
70	69	-1
110	114	4
180	181	1
160	160	0
290	292	2
125	126	1

NB Orange Line Travel Time (sec)

Avg	St Dev
323	15

SB Orange Line Travel Time (sec)

Avg	St Dev
277	10

West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	7.9	A	4.0	A
	Thru	0	-	-	-	A				
	Right	13	1	31	7.9	A				
Southbound	Left	33	15	84	62.1	E	50.3	D	4.0	A
	Thru	4	15	84	61.3	E				
	Right	17	24	106	24.8	C				
Eastbound	Left	4	7	138	18.5	B	2.6	A	4.0	A
	Thru	1,207	7	138	2.5	A				
	Right	4	9	159	3.4	A				
Westbound	Left	21	10	195	17.3	B	3.4	A	4.0	A
	Thru	1,187	10	195	3.2	A				
	Right	14	14	222	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
35	33	-2
5	4	-1
15	17	2
5	4	-1
1,210	1,207	-3
5	4	-1
20	21	1
1,200	1,187	-13
15	14	-1

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	132	46	185	59.8	E	30.6	C	13.6	B
	Thru	10	19	179	29.2	C				
	Right	260	28	192	15.8	B				
Eastbound	Thru	1,304	45	347	12.6	B	11.9	B	13.6	B
	Right	194	4	109	7.1	A				
Westbound	Left	194	40	202	38.6	D	9.9	A	13.6	B
	Thru	959	16	200	4.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	132	-3
10	10	0
265	260	-5
1,320	1,304	-16
190	194	4
195	194	-1
970	959	-11

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	218	74	286	57.6	E	35.1	D	11.6	B
	Thru	6	18	159	30.5	C				
	Right	267	31	177	16.9	B				
Eastbound	Left	167	18	151	24.6	C	5.8	A	11.6	B
	Thru	1,274	17	240	3.4	A				
Westbound	Thru	930	17	163	8.9	A	8.4	A	11.6	B
	Right	91	1	60	2.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
225	218	-7
7	6	-1
265	267	2
170	167	-3
1,285	1,274	-11
940	930	-10
90	91	1

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	119	41	177	57.7	E	54.1	D	14.5	B
	Thru	40	12	85	50.4	D				
	Right	9	17	99	23.4	C				
Southbound	Left	15	9	75	57.5	E	16.2	B	14.5	B
	Thru	14	9	75	52.3	D				
	Right	144	6	88	8.4	A				
Eastbound	Left	136	37	184	45.7	D	8.7	A	14.5	B
	Thru	965	16	184	4.0	A				
	Right	175	27	236	5.6	A				
Westbound	Left	16	6	41	71.8	E	15.1	B	14.5	B
	Thru	597	29	194	13.6	B				
	Right	33	39	219	15.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	119	-6
40	40	0
10	9	-1
15	15	0
15	14	-1
145	144	-1
135	136	1
965	965	0
185	175	-10
15	16	1
600	597	-3
35	33	-2

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,125	2	28	2.5	A	2.5	A	12.9	B
Eastbound	Thru	732	89	330	36.4	D	36.4	D		
Westbound	Left	813	24	266	13.8	B	9.0	A		
	Thru	628	0	4	2.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,130	1,125	-5
730	732	2
820	813	-7
630	628	-2

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	41	23	130	47.6	D	32.8	C	22.1	C
	Right	170	40	158	29.3	C				
Southbound	Left	176	50	230	45.7	D	23.0	C	22.1	C
	Thru	71	16	94	40.8	D				
	Right	297	6	117	5.3	A				
Eastbound	Thru	1,739	160	660	29.8	C	28.3	C	22.1	C
	Right	122	2	58	6.9	A				
Westbound	Left	152	58	237	59.3	E	11.0	B	22.1	C
	Thru	1,121	10	184	4.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	41	-4
170	170	0
180	176	-4
75	71	-4
295	297	2
1,735	1,739	4
125	122	-3
160	152	-8
1,110	1,121	11

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,719	13	338	9.2	A	8.0	A	5.0	A
	Right	355	0	0	2.1	A				
Westbound	Thru	1,277	0	15	0.9	A	0.9	A	5.0	A
	Right	203	0	15	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,735	1,719	-16
350	355	5
1,270	1,277	7
205	203	-2



West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	308	73	279	49.9	D	38.1	D	19.2	B
	Right	199	12	164	19.9	B				
Eastbound	Left	521	148	392	34.5	C	15.2	B		
	Thru	1,192	25	279	6.7	A				
Westbound	Thru	1,169	63	268	17.0	B	17.4	B		
	Right	231	73	289	19.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
310	308	-2
205	199	-6
545	521	-24
1,190	1,192	2
1,165	1,169	4
235	231	-4

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	25	0	2	17.1	C	17.1	C	2.3	A
Eastbound	Thru	1,347	5	176	1.9	A	1.9	A		
	Right	42	5	174	1.7	A				
Westbound	Thru	1,400	4	133	2.3	A	2.3	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	25	5
1,350	1,347	-3
45	42	-3
1,400	1,400	0

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	117	34	164	49.0	D	41.2	D	32.8	C
	Thru	150	31	113	53.2	D				
	Right	86	5	74	9.8	A				
Southbound	Left	154	47	215	54.3	D	61.2	E		
	Thru	318	135	461	110.6	F				
	Right	269	0	0	6.8	A				
Eastbound	Left	269	39	158	39.9	D	17.0	B		
	Thru	942	45	288	13.2	B				
	Right	161	0	0	1.2	A				
Westbound	Left	100	30	95	70.3	E	30.8	C		
	Thru	1,013	91	411	27.4	C				
	Right	18	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
120	117	-3
155	150	-5
85	86	1
155	154	-1
330	318	-12
270	269	-1
275	269	-6
935	942	7
160	161	1
100	100	0
1,010	1,013	3
15	18	3

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	23	0	0	0.1	A	0.3	A	0.5	A
	Right	14	0	0	0.6	A				
Westbound	Right	92	0	16	0.6	A	0.6	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	23	-2
15	14	-1
90	92	2

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	5.1	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	44	3	65	8.1	A	8.0	A		
	Thru	0	-	-	-	A				
	Right	40	3	65	8.0	A				
Eastbound	Left	8	0	1	0.6	A	1.0	A		
	Thru	11	0	0	1.3	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	2.4	A		
	Thru	45	0	0	1.2	A				
	Right	17	0	0	5.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
45	44	-1
0	0	0
45	40	-5
5	8	3
10	11	1
0	0	0
0	0	0
45	45	0
15	17	2

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	0	17	3.4	A	0.3	A	1.7	A
	Thru	315	0	2	0.1	A				
	Right	9	0	2	0.7	A				
Southbound	Left	5	0	2	2.0	A	0.7	A		
	Thru	539	0	0	0.7	A				
	Right	35	0	0	1.3	A				
Eastbound	Left	34	4	59	18.3	C	15.2	C		
	Thru	0	-	-	-	A				
	Right	21	1	42	10.3	B				
Westbound	Left	9	1	42	16.7	C	14.4	B		
	Thru	5	1	42	19.2	C				
	Right	10	1	41	10.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
315	315	0
10	9	-1
5	5	0
550	539	-11
35	35	0
35	34	-1
0	0	0
20	21	1
10	9	-1
5	5	0
10	10	0

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	185	16	157	16.2	B	12.5	B	25.0	C
	Thru	80	5	55	16.0	B				
	Right	121	3	91	4.6	A				
Southbound	Left	4	0	10	19.5	B	22.4	C		
	Thru	186	18	122	23.6	C				
	Right	21	8	182	12.6	B				
Eastbound	Left	9	5	40	46.2	D	13.1	B		
	Thru	11	5	40	45.2	D				
	Right	254	18	128	10.5	B				
Westbound	Left	430	66	223	43.8	D	43.3	D		
	Thru	24	66	223	42.3	D				
	Right	15	84	247	31.2	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	185	-10
85	80	-5
125	121	-4
5	4	-1
190	186	-4
20	21	1
10	9	-1
10	11	1
255	254	-1
430	430	0
25	24	-1
15	15	0

**Nicollet Avenue and Hwy 13**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	306	102	317	76.8	E	59.2	E	46.9	D	317	306	-11
	Thru	103	102	316	80.1	F					105	103	-2
	Right	194	38	253	20.4	C					201	194	-7
Southbound	Left	167	77	321	73.7	E	65.6	E			170	167	-3
	Thru	356	123	399	74.1	E					355	356	1
	Right	342	144	423	52.9	D					350	342	-8
Eastbound	Left	149	48	141	93.3	F	35.8	D			155	149	-6
	Thru	1,396	213	912	35.9	D					1,400	1,396	-4
	Right	346	5	110	10.8	B					346	346	0
Westbound	Left	264	92	236	111.2	F	45.6	D			256	264	8
	Thru	1,656	310	1,111	37.9	D					1,670	1,656	-14
	Right	141	0	37	13.3	B					145	141	-4

**Nicollet Avenue and Travelers Trail**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	24	1	24	8.3	A	8.8	A	10.9	B	24	24	0
	Thru	397	13	130	9.5	A					400	397	-3
	Right	94	4	90	6.0	A					95	94	-1
Southbound	Left	211	6	139	7.6	A	7.3	A			210	211	1
	Thru	696	20	238	7.2	A					700	696	-4
	Right	50	25	257	8.4	A					47	50	3
Eastbound	Left	68	10	73	30.6	C	23.3	C			73	68	-5
	Thru	46	10	95	28.0	C					46	46	0
	Right	63	15	112	12.1	B					63	63	0
Westbound	Left	114	19	113	32.6	C	18.8	B			110	114	4
	Thru	30	4	45	28.1	C					31	30	-1
	Right	144	0	6	6.0	A					150	144	-6

**Travelers Trail and Pleasant Avenue**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	41	7.7	A	6.0	A	3.0	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	16	0	0	0.6	A	0.3	A			15	16	1
	Thru	24	0	0	0.0	A					25	24	-1

**Burnsville Parkway and I-35W SB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	370	97	537	32.1	C	24.7	C	23.4	C	370	370	0
	Thru	20	97	539	31.2	C					20	20	0
	Right	282	14	154	14.6	B					285	282	-3
Southbound	Left	113	51	212	47.4	D	46.5	D			115	113	-2
	Thru	54	50	212	48.3	D					55	54	-1
	Right	16	64	233	34.2	C					15	16	1
Eastbound	Left	11	1	19	19.4	B	26.9	C			10	11	1
	Thru	540	55	242	27.2	C					542	540	-2
	Right	57	80	284	24.6	C					55	57	2
Westbound	Left	199	17	132	19.2	B	15.4	B			210	199	-11
	Thru	640	31	218	14.5	B					643	640	-3
	Right	58	54	269	12.4	B					60	58	-2

**Burnsville Parkway and I-35W NB Ramps**

											<b>(Signal)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	96	26	137	46.1	D	25.6	C	10.4	B	95	96	1
	Thru	4	26	138	48.3	D					5	4	-1
	Right	110	4	64	6.9	A					113	110	-3
Southbound	Left	5	10	104	55.9	E	25.2	C			5	5	0
	Thru	14	10	104	43.9	D					15	14	-1
	Right	48	17	113	16.5	B					50	48	-2
Eastbound	Left	8	0	12	9.8	A	7.5	A			10	8	-2
	Thru	652	20	236	7.6	A					652	652	0
	Right	271	29	274	7.2	A					280	271	-9
Westbound	Left	172	14	123	20.8	C	8.8	A			175	172	-3
	Thru	755	14	180	6.1	A					768	755	-13
	Right	6	23	221	3.7	A					5	6	1

**Burnsville Parkway and Gateway Boulevard**

											<b>(Unsignalized)</b>		
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	66	70	181	109.2	F	98.0	F	8.4	A	70	66	-4
	Thru	0	-	-	-	A					0	0	0
	Right	47	68	179	82.3	F					45	47	2
Southbound	Left	10	15	98	47.7	E	27.1	D			10	10	0
	Thru	5	16	100	62.0	F					5	5	0
	Right	94	15	99	23.0	C					95	94	-1
Eastbound	Left	12	0	17	5.9	A	0.6	A			15	12	-3
	Thru	680	1	41	0.4	A					680	680	0
	Right	74	1	37	1.7	A					75	74	-1
Westbound	Left	71	2	43	6.6	A	1.1	A			70	71	1
	Thru	775	3	71	0.6	A					783	775	-8
	Right	6	3	71	1.4	A					5	6	1

2019\_PM\_Build 66th, 98th, Burns TSP  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	58	19	108	49.1	D	41.9	D	8.5	A	60	58	-2
	Thru	0	-	-	-	A					0	0	0
	Right	24	29	129	24.6	C					25	24	-1
Southbound	Left	77	36	165	54.1	D	45.3	D			75	77	2
	Thru	4	36	165	43.5	D					5	4	-1
	Right	58	52	191	33.7	C					60	58	-2
Eastbound	Left	9	0	5	5.4	A	2.4	A			10	9	-1
	Thru	695	5	96	2.4	A					695	695	0
	Right	32	0	8	1.8	A					30	32	2
Westbound	Left	35	0	19	6.3	A	4.2	A	35	35	0		
	Thru	736	8	128	4.2	A			738	736	-2		
	Right	16	0	1	2.6	A			15	16	1		

SB Orange Line Travel Time- 98th Street (sec)

<u>Avg</u>	<u>St Dev</u>
197	11

SB Orange Line Travel Time- Burnsville (sec)

<u>Avg</u>	<u>St Dev</u>
857	9



**2019\_PM\_Build Knox Curved Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	87	353	53.4	D	40.4	D	21.2	C
	Thru	0	-	-	-	A				
	Right	417	86	339	29.3	C				
Southbound	Left	29	12	72	68.2	E	62.9	E		
	Thru	0	-	-	-	A				
	Right	4	16	84	24.7	C				
Eastbound	Left	21	1	22	11.7	B	13.0	B		
	Thru	1,215	53	389	13.5	B				
	Right	68	1	76	4.5	A				
Westbound	Left	33	2	41	19.6	B	14.8	B		
	Thru	827	40	284	14.6	B				
	Right	4	49	310	16.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
430	417	-13
30	29	-1
0	0	0
5	4	-1
20	21	1
1,220	1,215	-5
70	68	-2
35	33	-2
840	827	-13
5	4	-1

**West 76th Street and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	150	91	314	49.4	D	38.2	D	14.5	B
	Thru	4	91	313	45.0	D				
	Right	382	104	331	33.7	C				
Southbound	Left	10	2	33	47.3	D	23.1	C		
	Thru	0	-	-	-	A				
	Right	15	0	32	6.9	A				
Eastbound	Left	10	0	11	11.3	B	8.9	A		
	Thru	1,597	43	484	8.9	A				
	Right	47	1	56	7.2	A				
Westbound	Left	45	4	73	26.4	C	9.7	A		
	Thru	694	20	179	8.7	A				
	Right	15	22	190	7.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	150	-10
5	4	-1
395	382	-13
10	10	0
0	0	0
15	15	0
10	10	0
1,620	1,597	-23
50	47	-3
45	45	0
700	694	-6
15	15	0

**West 76th Street and I-35W SB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	136	45	189	57.6	E	55.8	E	12.0	B
	Right	167	36	124	54.4	D				
Eastbound	Thru	1,987	44	350	7.9	A	7.9	A		
Westbound	Thru	585	5	85	3.5	A	3.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	136	-9
165	167	2
2,020	1,987	-33
600	585	-15

**West 76th Street and I-35W NB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	52	200	62.6	E	55.5	E	16.9	B
	Thru	65	52	200	60.8	E				
	Right	49	61	213	41.7	D				
Eastbound	Left	729	172	584	34.6	C	14.4	B		
	Thru	1,353	14	197	3.8	A				
	Right	29	20	228	5.4	A				
Westbound	Left	24	1	29	25.6	C	15.4	B		
	Thru	545	29	179	16.3	B				
	Right	197	10	118	11.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
65	65	0
50	49	-1
745	729	-16
1,390	1,353	-37
30	29	-1
25	24	-1
550	545	-5
200	197	-3

**West 77th Street and Meridian Crossings (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	172	104	408	73.7	E	51.9	D	16.4	B
	Right	299	90	385	39.4	D				
Eastbound	Thru	1,334	38	348	8.7	A	8.7	A		
	Right	59	42	369	8.9	A				
Westbound	Left	16	7	48	79.0	E	6.5	A		
	Thru	597	8	113	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
175	172	-3
300	299	-1
1,375	1,334	-41
60	59	-1
15	16	1
600	597	-3

**Knox Avenue South and Best Buy Parking Ramp (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.1	A	28.3	D
	Thru	132	0	0	0.1	A				
Southbound	Thru	80	2	74	4.3	A	4.2	A		
	Right	13	2	73	3.6	A				
Eastbound	Left	409	130	344	43.1	E	42.7	E		
	Right	4	131	347	4.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
130	132	2
70	80	10
10	13	3
415	409	-6
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	74	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	60	0	8	0.8	A	0.7	A		
	Thru	25	0	1	0.3	A				
Westbound	Left	0	-	-	-	A	7.0	A		
	Right	58	2	55	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
70	74	4
0	0	0
60	60	0
25	25	0
0	0	0
60	58	-2

**Knox Avenue South and South Parking Ride (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	7.3	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.4	A		
	Right	19	0	0	0.5	A				
Eastbound	Left	68	4	85	10.5	B	10.5	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
19	19	0
70	68	-2
0	0	0

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**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	0	-	-	-	A	10.7	B	0.7	A
	Right	6	1	81	10.7	B				
Eastbound	Left	6	0	5	0.5	A	0.2	A		
	Thru	42	0	1	0.1	A				
Westbound	Thru	49	0	0	0.1	A	0.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
7	6	-1
50	42	-8
50	49	-1
0	0	0

**Knox Avenue South and Southeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	31	0	4	0.7	A	1.9	A	2.3	A
	Thru	47	0	0	3.3	A				
	Right	43	0	0	1.2	A				
Southbound	Thru	51	0	0	0.6	A	0.6	A		
	Right	7	0	0	0.9	A				
Eastbound	Right	18	1	51	7.7	A	7.7	A		
Westbound	Right	0	-	-	-	A	9.1	A		
	Left	8	0	37	9.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
50	47	-3
45	43	-2
50	51	1
5	7	2
20	18	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	25	135	55.4	E	39.2	D	15.2	B
	Thru	16	11	110	48.2	D				
	Right	75	16	122	20.8	C				
Southbound	Left	105	40	190	58.1	E	40.8	D		
	Thru	9	39	191	58.4	E				
	Right	64	3	72	9.9	A				
Eastbound	Left	57	18	98	60.3	E	11.8	B		
	Thru	1,349	45	394	9.8	A				
	Right	74	54	421	10.8	B				
Westbound	Left	72	3	54	10.3	B	11.1	B		
	Thru	728	22	172	11.9	B				
	Right	64	1	35	3.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
80	76	-4
20	16	-4
75	75	0
105	105	0
10	9	-1
65	64	-1
55	57	2
1,350	1,349	-1
70	74	4
70	72	2
725	728	3
70	64	-6

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	188	69	265	62.9	E	44.8	D	21.5	C
	Thru	48	11	62	49.0	D				
	Right	82	0	0	0.7	A				
Southbound	Left	28	8	55	52.8	D	43.5	D		
	Thru	33	9	47	52.3	D				
	Right	13	4	103	1.1	A				
Eastbound	Left	31	12	65	77.2	E	19.2	B		
	Thru	1,345	106	622	18.6	B				
	Right	152	71	522	12.9	B				
Westbound	Left	53	16	67	66.4	E	14.5	B		
	Thru	669	25	181	10.8	B				
	Right	42	30	195	7.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
180	188	8
50	48	-2
80	82	2
25	28	3
30	33	3
10	13	3
30	31	1
1,345	1,345	0
155	152	-3
50	53	3
680	669	-11
45	42	-3

**American Boulevard West and Lupient Chevrolet Access Drive (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	20.8	C	1.0	A
	Thru	0	-	-	-	A				
	Right	4	0	28	20.8	C				
Southbound	Left	8	8	55	81.5	F	42.4	E		
	Thru	5	9	56	45.6	E				
	Right	23	8	55	28.1	D				
Eastbound	Left	10	0	18	5.3	A	0.3	A		
	Thru	1,437	0	0	0.3	A				
	Right	4	0	0	0.7	A				
Westbound	Left	0	-	-	-	A	0.3	A		
	Thru	742	0	0	0.3	A				
	Right	10	0	0	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
5	4	-1
10	8	-2
5	5	0
25	23	-2
10	10	0
1,440	1,437	-3
5	4	-1
0	0	0
745	742	-3
10	10	0

**Knox Avenue South and West 81st Street (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	0	13	1.7	A	0.3	A	5.8	A
	Thru	200	0	0	0.1	A				
	Right	25	0	0	0.7	A				
Southbound	Left	18	0	13	1.9	A	0.3	A		
	Thru	221	0	0	0.1	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	7.3	A		
	Thru	0	-	-	-	A				
	Right	29	1	35	7.3	A				
Westbound	Left	165	24	145	23.6	C	15.3	C		
	Thru	0	-	-	-	A				
	Right	116	3	69	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	26	1
205	200	-5
25	25	0
25	18	-7
205	221	16
0	0	0
0	0	0
0	0	0
30	29	-1
175	165	-10
0	0	0
110	116	6

**Knox Avenue South and Southpoint Office Center**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	0	11	7.4	A	1.0	A	8.2	A
	Thru	193	2	41	0.6	A				
	Right	20	2	47	1.9	A				
Southbound	Left	5	0	12	13.4	B	1.0	A		
	Thru	404	0	0	0.9	A				
	Right	5	0	0	0.7	A				
Eastbound	Left	4	1	28	20.6	C	12.2	B		
	Thru	0	-	-	-	A				
	Right	9	1	29	8.5	A				
Westbound	Left	114	33	147	44.9	E	35.2	E		
	Thru	0	-	-	-	A				
	Right	53	12	125	14.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	10	0
200	193	-7
20	20	0
5	5	0
395	404	9
5	5	0
5	4	-1
0	0	0
10	9	-1
115	114	-1
0	0	0
55	53	-2

**West 82nd Street and Penn Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	524	12	104	8.1	A	7.0	A	8.8	A
	Right	204	3	73	4.3	A				
Southbound	Left	348	25	189	15.6	B	8.1	A		
	Thru	638	5	74	4.1	A				
Westbound	Left	148	20	155	24.4	C	15.6	B		
	Right	152	28	171	7.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
525	524	-1
205	204	-1
345	348	3
640	638	-2
150	148	-2
155	152	-3

**West 82nd Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	2	20	77.2	E	26.3	C	23.8	C
	Right	9	1	48	9.4	A				
Southbound	Left	457	103	292	57.8	E	52.0	D		
	Right	53	0	0	2.3	A				
Eastbound	Left	26	10	55	68.5	E	11.7	B		
	Thru	515	17	169	8.9	A				
	Right	13	28	213	9.9	A				
Westbound	Left	10	4	32	84.2	F	6.7	A		
	Thru	244	7	77	8.4	A				
	Right	198	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	3	-2
10	9	-1
460	457	-3
55	53	-2
25	26	1
510	515	5
10	13	3
10	10	0
245	244	-1
200	198	-2

**West 82nd Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	126	16	87	29.1	C	15.0	B	7.1	A
	Thru	19	16	88	26.9	C				
	Right	153	0	2	1.9	A				
Eastbound	Thru	500	10	127	6.2	A	6.3	A		
	Right	485	13	269	6.5	A				
Westbound	Left	191	5	84	6.8	A	3.8	A		
	Thru	297	5	84	1.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	126	1
25	19	-6
155	153	-2
505	500	-5
475	485	10
190	191	1
305	297	-8

**West 82nd Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	186	26	118	27.5	C	22.9	C	10.5	B
	Thru	39	27	118	30.2	C				
	Right	118	34	130	13.3	B				
Eastbound	Left	270	18	167	14.0	B	8.1	A		
	Thru	359	18	166	3.7	A				
Westbound	Thru	301	8	104	4.7	A	4.6	A		
	Right	172	11	127	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	186	-4
40	39	-1
120	118	-2
265	270	5
365	359	-6
300	301	1
175	172	-3

**NB Orange Line Travel Time (sec)**

Avg	St Dev
316	11

**SB Orange Line Travel Time (sec)**

Avg	St Dev
340	5



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West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	357	87	354	52.9	D	40.2	D	21.3	C
	Thru	0	-	-	-	A				
	Right	417	86	337	29.3	C				
Southbound	Left	29	12	72	68.5	E	63.2	E		
	Thru	0	-	-	-	A				
	Right	4	16	84	24.8	C				
Eastbound	Left	21	1	23	12.9	B	13.2	B		
	Thru	1,218	54	390	13.7	B				
	Right	68	1	77	4.6	A				
Westbound	Left	33	2	40	21.1	C	15.1	B		
	Thru	827	41	281	14.9	B				
	Right	4	49	306	13.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	357	-3
0	0	0
430	417	-13
30	29	-1
0	0	0
5	4	-1
20	21	1
1,220	1,218	-2
70	68	-2
35	33	-2
840	827	-13
5	4	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	151	95	325	49.5	D	39.2	D	14.7	B
	Thru	4	95	324	48.7	D				
	Right	382	108	342	35.1	D				
Southbound	Left	10	3	33	47.7	D	23.0	C		
	Thru	0	-	-	-	A				
	Right	15	0	33	6.5	A				
Eastbound	Left	10	0	10	9.8	A	8.9	A		
	Thru	1,600	44	479	8.9	A				
	Right	47	1	54	7.1	A				
Westbound	Left	45	4	73	25.6	C	9.6	A		
	Thru	695	20	179	8.6	A				
	Right	15	21	190	7.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	151	-9
5	4	-1
395	382	-13
10	10	0
0	0	0
15	15	0
10	10	0
1,620	1,600	-20
50	47	-3
45	45	0
700	695	-5
15	15	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	136	45	189	57.4	E	55.7	E	12.4	B
	Right	167	36	124	54.2	D				
Eastbound	Thru	1,990	48	380	8.5	A	8.5	A		
Westbound	Thru	588	5	85	3.5	A	3.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	136	-9
165	167	2
2,020	1,990	-30
600	588	-12

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	52	201	64.1	E	56.0	E	16.9	B
	Thru	65	52	202	60.8	E				
	Right	49	61	214	42.1	D				
Eastbound	Left	730	167	581	34.0	C	14.4	B		
	Thru	1,354	14	205	4.0	A				
	Right	29	20	235	6.0	A				
Westbound	Left	24	1	30	25.2	C	15.6	B		
	Thru	546	29	177	16.5	B				
	Right	198	10	120	12.1	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	46	1
65	65	0
50	49	-1
745	730	-15
1,390	1,354	-36
30	29	-1
25	24	-1
550	546	-4
200	198	-2

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	172	103	409	72.6	E	51.0	D	16.3	B
	Right	300	89	367	38.7	D				
Eastbound	Thru	1,334	40	364	8.9	A	8.9	A		
	Right	59	44	386	8.8	A				
Westbound	Left	16	7	48	79.0	E	6.5	A		
	Thru	597	8	113	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
175	172	-3
300	300	0
1,375	1,334	-41
60	59	-1
15	16	1
600	597	-3

Knox Avenue South and Best Buy Parking Ramp

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.1	A	30.0	D
	Thru	132	0	0	0.1	A				
Southbound	Thru	79	2	73	4.3	A	4.1	A		
	Right	13	2	74	3.4	A				
Eastbound	Left	410	138	347	45.7	E	45.3	E		
	Right	4	140	350	5.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
130	132	2
70	79	9
10	13	3
415	410	-5
5	4	-1

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	74	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	69	0	7	0.7	A	0.7	A		
	Thru	16	0	0	0.4	A				
Westbound	Left	0	-	-	-	A	7.0	A		
	Right	58	2	55	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
70	74	4
0	0	0
60	69	9
15	16	1
0	0	0
60	58	-2

Knox Avenue South and South Parking Ride

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	8.1	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.3	A		
	Right	10	0	0	0.4	A				
Eastbound	Left	68	4	85	10.5	B	10.5	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
10	10	0
70	68	-2
0	0	0

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Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.6	A	4.0	A	7	6	-1
	Right	41	0	0	0.6	A					40	41	1
Southbound	Thru	6	0	0	0.7	A	0.7	A			6	6	0
	Left	0	-	-	-	A					0	0	0
Westbound	Left	45	1	46	8.1	A	8.1	A			45	45	0
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	32	0	4	0.8	A	1.6	A	2.1	A	30	32	2
	Thru	47	0	0	2.7	A					50	47	-3
	Right	43	0	0	1.1	A					45	43	-2
Southbound	Thru	45	0	0	0.3	A	0.3	A			45	45	0
	Right	6	0	0	0.6	A					5	6	1
Eastbound	Right	18	1	51	7.7	A	7.7	A			20	18	-2
Westbound	Right	0	-	-	-	A	9.1	A	0	0	0		
	Left	8	0	37	9.1	A			10	8	-2		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	76	25	135	55.4	E	39.0	D	14.7	B	80	76	-4
	Thru	16	11	110	48.2	D					20	16	-4
	Right	75	16	123	20.5	C					75	75	0
Southbound	Left	104	39	184	58.0	E	40.7	D			105	104	-1
	Thru	9	39	184	59.2	E					10	9	-1
	Right	64	3	68	10.1	B					65	64	-1
Eastbound	Left	57	18	99	59.8	E	11.8	B	55	57	2		
	Thru	1,346	48	404	9.8	A			1,350	1,346	-4		
	Right	74	57	430	10.9	B			70	74	4		
Westbound	Left	72	3	54	10.1	B	9.6	A	70	72	2		
	Thru	728	19	167	10.1	B			725	728	3		
	Right	65	0	16	2.6	A			70	65	-5		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	190	69	270	62.6	E	45.2	D	20.8	C	180	190	10
	Thru	49	12	63	51.9	D					50	49	-1
	Right	82	0	0	0.8	A					80	82	2
Southbound	Left	27	8	53	60.5	E	43.9	D			25	27	2
	Thru	32	8	47	47.4	D					30	32	2
	Right	13	4	103	1.0	A					10	13	3
Eastbound	Left	31	12	67	78.0	E	17.8	B	30	31	1		
	Thru	1,344	95	600	17.1	B			1,345	1,344	-1		
	Right	151	60	501	11.7	B			155	151	-4		
Westbound	Left	53	16	64	66.8	E	14.4	B	50	53	3		
	Thru	669	25	195	10.6	B			680	669	-11		
	Right	42	29	209	8.2	A			45	42	-3		

American Boulevard West and Lupient Chevrolet Access Drive (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	0	-	-	-	A	22.8	C	1.2	A	0	0	0
	Thru	0	-	-	-	A					0	0	0
	Right	4	0	28	22.8	C					5	4	-1
Southbound	Left	8	10	62	89.2	F	51.4	F			10	8	-2
	Thru	4	12	66	71.2	F					5	4	-1
	Right	23	10	63	34.8	D					25	23	-2
Eastbound	Left	11	0	16	5.6	A	0.3	A	10	11	1		
	Thru	1,435	0	0	0.3	A			1,440	1,435	-5		
	Right	4	0	0	0.7	A			5	4	-1		
Westbound	Left	0	-	-	-	A	0.4	A	0	0	0		
	Thru	741	0	0	0.4	A			745	741	-4		
	Right	10	0	0	1.0	A			10	10	0		

Knox Avenue South and West 81st Street (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	26	0	9	1.5	A	0.3	A	6.1	A	25	26	1
	Thru	199	0	0	0.1	A					205	199	-6
	Right	25	0	0	0.7	A					25	25	0
Southbound	Left	18	0	11	1.7	A	0.2	A			25	18	-7
	Thru	218	0	0	0.1	A					205	218	13
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	7.4	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	29	1	35	7.4	A			30	29	-1		
Westbound	Left	166	25	148	24.3	C	15.9	C	175	166	-9		
	Thru	0	-	-	-	A			0	0	0		
	Right	116	4	74	4.0	A			110	116	6		

2019\_PM\_Build Knox Direct Alignment TSP  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	0	15	8.6	A	1.0	A	8.9	A
	Thru	194	2	41	0.6	A				
	Right	20	2	47	1.6	A				
Southbound	Left	5	0	11	11.4	B	1.4	A		
	Thru	403	0	1	1.3	A				
	Right	5	0	1	0.7	A				
Eastbound	Left	4	1	28	22.7	C	12.6	B		
	Thru	0	-	-	-	A				
	Right	9	1	29	8.1	A				
Westbound	Left	114	35	147	47.1	E	37.7	E		
	Thru	0	-	-	-	A				
	Right	53	14	123	17.6	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	10	0
200	194	-6
20	20	0
5	5	0
395	403	8
5	5	0
5	4	-1
0	0	0
10	9	-1
115	114	-1
0	0	0
55	53	-2

West 82nd Street and Penn Avenue South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	524	12	100	8.3	A	7.1	A	8.9	A
	Right	204	3	70	4.2	A				
Southbound	Left	347	26	193	15.9	B	8.2	A		
	Thru	638	6	75	4.0	A				
Westbound	Left	147	20	156	23.8	C	15.3	B		
	Right	151	27	172	7.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
525	524	-1
205	204	-1
345	347	2
640	638	-2
150	147	-3
155	151	-4

West 82nd Street and Knox Avenue South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	2	20	74.1	E	26.3	C	24.4	C
	Right	9	1	48	10.4	B				
Southbound	Left	456	108	299	59.8	E	53.9	D		
	Right	53	0	0	3.2	A				
Eastbound	Left	26	10	56	69.6	E	11.8	B		
	Thru	514	17	180	9.0	A				
	Right	13	28	224	9.3	A				
Westbound	Left	10	4	32	76.9	E	6.6	A		
	Thru	243	7	78	8.5	A				
	Right	198	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	3	-2
10	9	-1
460	456	-4
55	53	-2
25	26	1
510	514	4
10	13	3
10	10	0
245	243	-2
200	198	-2

West 82nd Street and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	126	16	87	28.2	C	14.2	B	7.2	A
	Thru	19	16	88	27.8	C				
	Right	154	0	0	1.0	A				
Eastbound	Thru	499	11	125	6.6	A	6.7	A		
	Right	482	12	238	6.7	A				
Westbound	Left	192	5	84	6.8	A	3.9	A		
	Thru	297	5	84	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	126	1
25	19	-6
155	154	-1
505	499	-6
475	482	7
190	192	2
305	297	-8

West 82nd Street and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	187	26	126	26.3	C	21.1	C	10.2	B
	Thru	40	26	125	25.7	C				
	Right	118	34	138	11.4	B				
Eastbound	Left	268	20	173	14.6	B	8.4	A		
	Thru	359	20	173	3.8	A				
Westbound	Thru	301	8	103	4.7	A	4.6	A		
	Right	171	11	126	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	187	-3
40	40	0
120	118	-2
265	268	3
365	359	-6
300	301	1
175	171	-4

NB Orange Line Travel Time (sec)

Avg                      St Dev  
 307                              9

SB Orange Line Travel Time (sec)

Avg                      St Dev  
 331                              8



## 2040 No-Build MOEs

2040\_AM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



South 12th Street and Marquette Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	468	38	196	19.6	B	19.2	B	19.1	B	465	468	3
	Right	128	47	224	17.4	B					130	128	-2
Southbound	Left	62	1	28	5.6	A	6.3	A			85	62	-23
	Thru	5	1	28	15.6	B					15	5	-10
Eastbound	Left	236	57	254	21.1	C	19.9	B			235	236	1
	Thru	789	56	254	19.6	B					795	789	-6
	Right	10	65	278	17.1	B			10	10	0		

South 12th Street and 2nd Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	5	1	27	46.2	D	46.4	D	16.2	B	5	5	0
	Right	100	21	112	46.4	D					100	100	0
Southbound	Left	98	39	149	37.5	D	30.5	C			95	98	3
	Thru	211	39	150	27.2	C					215	211	-4
Eastbound	Left	79	12	96	6.0	A	5.7	A			85	79	-6
	Thru	618	12	96	5.8	A					670	618	-52
	Right	27	23	128	3.5	A			30	27	-3		

South 12th Street and 3rd Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	477	29	160	18.4	B	18.2	B	16.8	B	476	477	1
	Right	5	0	3	1.6	A					5	5	0
Southbound	Left	163	29	157	33.7	C	25.0	C			165	163	-2
	Thru	228	15	96	18.8	B					225	228	3
Eastbound	Left	367	36	199	14.0	B	12.0	B			380	367	-13
	Thru	371	36	199	11.8	B					400	371	-29
	Right	75	1	72	3.3	A			85	75	-10		

South 12th Street and 4th Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Eastbound	Left	38	0	2	0.5	A	0.7	A	0.7	A	40	38	-2
	Thru	280	0	2	0.6	A					295	280	-15
	HOV/Bus	7	0	2	0.1	A					7	7	0
	Right	215	0	0	1.0	A					235	215	-20

West 76th Street and Newton Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	45	13	58	65.5	E	40.8	D	16.8	B	45	45	0
	Thru	0	-	-	-	A					0	0	0
	Right	32	1	45	6.1	A					30	32	2
Southbound	Left	89	36	147	64.1	E	62.8	E			90	89	-1
	Thru	5	36	146	54.4	D					5	5	0
	Right	5	44	160	48.1	D					5	5	0
Eastbound	Left	11	1	18	18.5	B	13.8	B	10	11	1		
	Thru	550	35	214	18.2	B			565	550	-15		
	Right	401	19	172	7.6	A			400	401	1		
Westbound	Left	430	94	381	39.0	D	14.4	B	430	430	0		
	Thru	1,053	14	174	4.5	A			1,085	1,053	-32		
	Right	14	20	200	5.8	A			15	14	-1		

West 76th Street and Knox Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	12	9	53	71.2	E	33.3	C	5.5	A	15	12	-3
	Thru	3	9	55	62.6	E					5	3	-2
	Right	22	12	67	8.7	A					30	22	-8
Southbound	Left	10	4	34	68.9	E	63.5	E			10	10	0
	Thru	4	4	33	146.3	F					5	4	-1
	Right	10	6	45	24.9	C					10	10	0
Eastbound	Left	7	0	3	11.7	B	4.4	A	5	7	2		
	Thru	520	5	86	4.0	A			530	520	-10		
	Right	144	3	93	5.7	A			150	144	-6		
Westbound	Left	460	20	215	12.6	B	4.7	A	470	460	-10		
	Thru	1,487	6	172	2.2	A			1,505	1,487	-18		
	Right	11	7	183	2.0	A			10	11	1		

West 76th Street and I-35W SB Ramps (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Southbound	Left	223	51	231	42.8	D	50.3	D	25.2	C	215	223	8
	Right	747	135	473	52.6	D					750	747	-3
Eastbound	Thru	552	17	128	9.1	A	9.1	A			570	552	-18
Westbound	Thru	1,218	53	393	12.5	B	12.5	B			1,235	1,218	-17

2040\_AM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	16	88	61.6	E	47.7	D	6.8	A
	Thru	14	16	87	60.3	E				
	Right	20	21	101	21.5	C				
Eastbound	Left	144	9	107	17.8	B	6.6	A	6.8	A
	Thru	430	9	162	3.6	A				
	Right	203	13	194	5.1	A				
Westbound	Left	85	1	44	8.3	A	5.2	A	6.8	A
	Thru	1,194	15	216	5.1	A				
	Right	141	1	64	3.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
15	14	-1
20	20	0
145	144	-1
440	430	-10
200	203	3
85	85	0
1,210	1,194	-16
140	141	1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.5	C	6.4	A
	Right	13	0	41	6.3	A				
Eastbound	Thru	291	6	102	5.1	A	5.2	A	6.4	A
	Right	156	7	122	5.4	A				
Westbound	Left	257	42	202	29.3	C	6.3	A	6.4	A
	Thru	1,401	4	144	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	291	-9
160	156	-4
250	257	7
1,415	1,401	-14

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	14	8.9	A	4.0	A	3.3	A
	Thru	28	3	50	2.9	A				
Southbound	Thru	135	0	0	3.2	A	3.1	A	3.3	A
	Right	471	0	0	3.0	A				
Eastbound	Left	8	1	37	16.7	C	16.7	C	3.3	A
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	28	3
140	135	-5
480	471	-9
10	8	-2
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	4	97	9.2	A	9.2	A	2.3	A
Southbound	Left	59	0	2	0.8	A	0.8	A		
	Right	77	0	0	0.8	A				
Westbound	Right	4	0	32	6.1	A	6.1	A	2.3	A

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	29	-1
60	59	-1
80	77	-3
5	4	-1

American Boulevard West and Morgan Circle South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	3	28	66.8	E	24.3	C	4.1	A
	Thru	0	-	-	-	A				
	Right	21	1	40	8.2	A				
Southbound	Left	30	13	69	67.8	E	56.1	E	4.1	A
	Thru	6	13	69	72.1	E				
	Right	9	0	40	6.4	A				
Eastbound	Left	4	2	23	73.3	E	2.4	A	4.1	A
	Thru	419	3	63	1.7	A				
	Right	5	5	91	3.5	A				
Westbound	Left	10	0	5	3.0	A	2.0	A	4.1	A
	Thru	992	4	90	2.0	A				
	Right	34	0	0	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	8	-2
0	0	0
20	21	1
30	30	0
5	6	1
10	9	-1
5	4	-1
420	419	-1
5	5	0
10	10	0
1,010	992	-18
35	34	-1

American Boulevard West and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	69	26	117	66.5	E	47.2	D	10.6	B
	Thru	13	5	42	73.1	E				
	Right	36	0	1	0.8	A				
Southbound	Left	4	1	15	60.0	E	52.9	D	10.6	B
	Thru	7	3	61	78.6	E				
	Right	4	2	53	0.8	A				
Eastbound	Left	5	2	22	67.8	E	4.6	A	10.6	B
	Thru	312	4	76	4.6	A				
	Right	151	0	3	2.5	A				
Westbound	Left	95	24	85	65.8	E	8.5	A	10.6	B
	Thru	969	9	145	3.0	A				
	Right	12	9	150	3.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	69	-6
15	13	-2
40	36	-4
5	4	-1
10	7	-3
5	4	-1
5	5	0
315	312	-3
150	151	1
95	95	0
975	969	-6
15	12	-3

American Boulevard West and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	2	32	68.7	F	39.0	E	1.1	A
	Thru	0	-	-	-	A				
	Right	4	0	32	9.2	A				
Southbound	Left	4	2	27	74.7	F	39.7	E	1.1	A
	Thru	0	-	-	-	A				
	Right	8	2	28	22.1	C				
Eastbound	Left	39	2	39	9.0	A	1.1	A	1.1	A
	Thru	307	0	0	0.1	A				
	Right	5	0	0	0.7	A				
Westbound	Left	11	0	7	1.9	A	0.4	A	1.1	A
	Thru	1,064	0	0	0.4	A				
	Right	11	0	0	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
5	4	-1
0	0	0
10	8	-2
40	39	-1
315	307	-8
5	5	0
10	11	1
1,070	1,064	-6
10	11	1



2040\_AM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	24	0	0	2.3	A	2.0	A	1.4	A	20	24	4
	Right	7	0	0	0.9	A					5	7	2
Southbound	Left	0	-	-	-	A	0.1	A			0	0	0
	Thru	14	0	0	0.1	A					15	14	-1
Westbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!			0	0	0
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and West 81st Street

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	0	1	0.8	A	0.9	A	2.1	A	5	4	-1
	Thru	108	0	0	0.0	A					120	108	-12
	Right	187	0	0	1.4	A					185	187	2
Southbound	Left	121	2	69	5.4	A	2.8	A			125	121	-4
	Thru	131	0	0	0.3	A					130	131	1
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	5.9	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	25	5.9	A			5	4	-1		
Westbound	Left	13	1	34	11.9	B	8.7	A	15	13	-2		
	Thru	6	1	33	14.1	B			5	6	1		
	Right	9	0	0	0.5	A			10	9	-1		

Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	16	0	7	4.7	A	1.8	A	2.5	A	15	16	1
	Thru	291	4	99	1.2	A					300	291	-9
	Right	217	4	95	2.4	A					220	217	-3
Southbound	Left	66	2	43	6.1	A	2.8	A			65	66	1
	Thru	72	0	0	0.1	A					75	72	-3
	Right	11	0	0	0.7	A					10	11	1
Eastbound	Left	5	1	29	24.4	C	12.3	B	5	5	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	12	1	30	7.3	A			15	12	-3		
Westbound	Left	9	1	31	17.4	C	14.5	B	10	9	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	19	7.7	A			5	4	-1		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	671	22	169	11.5	B	10.4	B	16.0	B	670	671	1
	Right	231	13	141	7.1	A					235	231	-4
Southbound	Left	162	17	125	21.9	C	13.3	B			160	162	2
	Thru	279	6	67	8.3	A					285	279	-6
Westbound	Left	165	76	321	46.2	D	25.1	C			170	165	-5
	Right	528	87	337	18.5	B					535	528	-7

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	17	46.8	D	10.7	B	6.6	A	5	4	-1
	Right	34	1	60	6.5	A					35	34	-1
Southbound	Left	77	13	71	38.1	D	32.0	C			85	77	-8
	Right	15	0	0	0.8	A					15	15	0
Eastbound	Left	58	14	87	45.7	D	9.5	A			60	58	-2
	Thru	328	3	80	3.2	A					330	328	-2
	Right	4	7	123	2.8	A			5	4	-1		
Westbound	Left	4	1	18	41.5	D	3.4	A	5	4	-1		
	Thru	675	9	101	4.2	A			685	675	-10		
	Right	466	0	5	1.9	A			475	466	-9		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	187	29	125	37.4	D	14.4	B	7.9	A	190	187	-3
	Thru	24	29	126	37.6	D					25	24	-1
	Right	420	0	17	2.8	A					420	420	0
Eastbound	Thru	284	8	96	6.8	A	5.4	A			290	284	-6
	Right	154	1	53	2.9	A					160	154	-6
Westbound	Left	149	11	164	5.6	A	4.5	A			145	149	4
	Thru	729	11	164	4.3	A			745	729	-16		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	480	67	287	31.3	C	27.7	C	19.9	B	490	480	-10
	Thru	83	67	287	32.1	C					80	83	3
	Right	148	76	299	13.7	B					145	148	3
Eastbound	Left	258	21	175	15.2	B	11.5	B			265	258	-7
	Thru	212	21	176	6.9	A					215	212	-3
Westbound	Thru	397	34	193	18.0	B	17.0	B			400	397	-3
	Right	153	46	223	14.7	B			155	153	-2		

2040\_AM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.7	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.7	A				
Southbound	Left	33	10	72	43.1	D	35.8	D	5.7	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	19.1	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.7	A
	Thru	409	5	75	3.8	A				
	Right	4	8	95	2.4	A				
Westbound	Left	10	20	254	8.5	A	4.9	A	5.7	A
	Thru	1,329	19	249	4.9	A				
	Right	5	26	277	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
410	409	-1
5	4	-1
10	10	0
1,350	1,329	-21
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	160	38	190	72.2	E	74.8	E	28.1	C
	Thru	38	413	835	85.1	F				
	Right	565	419	847	74.8	E				
Eastbound	Thru	484	28	170	24.2	C	19.7	B	28.1	C
	Right	160	6	96	5.9	A				
Westbound	Left	314	25	236	14.8	B	8.7	A	28.1	C
	Thru	1,239	37	282	7.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	160	0
40	38	-2
575	565	-10
500	484	-16
160	160	0
310	314	4
1,260	1,239	-21

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	263	64	263	42.2	D	27.8	C	12.7	B
	Thru	26	14	148	40.8	D				
	Right	258	22	167	11.9	B				
Eastbound	Left	131	20	143	32.9	C	10.1	B	12.7	B
	Thru	513	10	104	4.3	A				
Westbound	Thru	1,286	16	220	8.4	A	8.0	A	12.7	B
	Right	133	1	66	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
270	263	-7
30	26	-4
255	258	3
135	131	-4
525	513	-12
1,300	1,286	-14
130	133	3

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	254	65	294	43.5	D	42.0	D	16.8	B
	Thru	39	7	67	35.5	D				
	Right	5	10	81	18.3	B				
Southbound	Left	25	7	74	32.8	C	13.9	B	16.8	B
	Thru	16	7	74	34.1	C				
	Right	192	11	113	9.7	A				
Eastbound	Left	66	10	86	29.1	C	6.4	A	16.8	B
	Thru	433	9	114	3.9	A				
	Right	206	20	161	4.3	A				
Westbound	Left	6	2	25	51.1	D	17.4	B	16.8	B
	Thru	947	57	312	17.2	B				
	Right	16	69	340	15.1	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
250	254	4
40	39	-1
5	5	0
25	25	0
15	16	1
195	192	-3
65	66	1
435	433	-2
210	206	-4
5	6	1
960	947	-13
15	16	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	933	0	2	1.5	A	1.5	A	5.8	A
Eastbound	Thru	263	13	86	14.9	B	14.9	B		
Westbound	Left	748	22	165	12.1	B	7.0	A		
	Thru	694	0	0	1.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
935	933	-2
265	263	-2
755	748	-7
700	694	-6

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	82	33	160	42.7	D	24.3	C	16.4	B
	Right	287	51	187	19.0	B				
Southbound	Left	185	44	197	42.1	D	18.2	B	16.4	B
	Thru	64	13	86	38.4	D				
	Right	412	6	129	4.3	A				
Eastbound	Thru	1,146	74	349	21.6	C	20.8	C	16.4	B
	Right	50	1	50	4.7	A				
Westbound	Left	96	26	143	46.2	D	7.6	A	16.4	B
	Thru	957	7	133	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	82	-3
285	287	2
185	185	0
65	64	-1
415	412	-3
1,150	1,146	-4
50	50	0
100	96	-4
955	957	2

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,471	5	169	5.7	A	5.3	A	3.3	A
	Right	143	0	0	0.9	A				
Westbound	Thru	1,056	0	1	0.5	A	0.5	A	3.3	A
	Right	114	0	1	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,485	1,471	-14
135	143	8
1,055	1,056	1
115	114	-1

2040\_AM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	304	72	276	46.6	D	33.7	C	16.5	B
	Right	245	11	154	17.7	B				
Eastbound	Left	431	137	385	40.4	D	14.6	B		
	Thru	1,038	11	165	3.9	A				
Westbound	Thru	865	34	217	10.5	B	10.8	B		
	Right	319	39	238	11.5	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
300	304	4
250	245	-5
445	431	-14
1,040	1,038	-2
870	865	-5
320	319	-1

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	1.1	A
Eastbound	Thru	1,177	2	119	1.4	A	1.4	A		
	Right	105	2	119	1.8	A				
Westbound	Thru	1,182	0	23	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	0	-5
1,180	1,177	-3
110	105	-5
1,190	1,182	-8

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	84	19	108	40.3	D	38.5	D	28.9	C
	Thru	149	26	101	48.3	D				
	Right	56	3	67	9.5	A				
Southbound	Left	64	20	106	54.1	D	126.7	F		
	Thru	65	92	188	413.4	F				
	Right	111	0	0	0.7	A				
Eastbound	Left	286	41	154	39.1	D	14.3	B		
	Thru	770	18	152	7.2	A				
	Right	119	0	0	1.0	A				
Westbound	Left	48	14	73	58.4	E	20.5	C		
	Thru	990	62	319	19.4	B				
	Right	40	0	0	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	84	-1
155	149	-6
55	56	1
65	64	-1
70	65	-5
110	111	1
295	286	-9
775	770	-5
115	119	4
50	48	-2
995	990	-5
35	40	5

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	40	0	0	0.2	A	0.4	A	0.5	A
	Right	22	0	0	0.7	A				
Westbound	Right	44	0	17	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
25	22	-3
40	44	4

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.4	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	11	1	29	7.4	A	6.7	A		
	Thru	0	-	-	-	A				
	Right	14	1	29	6.2	A				
Eastbound	Left	14	0	4	1.0	A	0.9	A		
	Thru	15	0	0	0.9	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	3.2	A		
	Thru	25	0	0	1.9	A				
	Right	40	0	0	4.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
10	11	1
0	0	0
15	14	-1
10	14	4
15	15	0
0	0	0
0	0	0
25	25	0
40	40	0

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	30	0	17	2.3	A	0.3	A	1.0	A
	Thru	272	0	1	0.1	A				
	Right	4	0	1	0.7	A				
Southbound	Left	10	0	4	1.8	A	0.6	A		
	Thru	188	0	0	0.4	A				
	Right	34	0	0	1.5	A				
Eastbound	Left	14	1	40	13.5	B	11.4	B		
	Thru	0	-	-	-	A				
	Right	11	0	36	8.7	A				
Westbound	Left	0	-	-	-	A	8.1	A		
	Thru	0	-	-	-	A				
	Right	4	0	30	8.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	30	0
275	272	-3
5	4	-1
10	10	0
190	188	-2
35	34	-1
15	14	-1
0	0	0
10	11	1
0	0	0
0	0	0
5	4	-1

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	379	27	313	12.2	B	10.4	B	14.3	B
	Thru	261	8	103	9.8	A				
	Right	531	30	347	9.6	A				
Southbound	Left	10	1	21	20.5	C	16.1	B		
	Thru	74	7	69	18.2	B				
	Right	27	4	130	8.8	A				
Eastbound	Left	43	13	86	45.6	D	22.7	C		
	Thru	9	12	84	38.4	D				
	Right	67	3	70	5.9	A				
Westbound	Left	86	21	94	43.5	D	40.2	D		
	Thru	27	21	94	42.3	D				
	Right	16	35	118	19.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
395	379	-16
270	261	-9
570	531	-39
10	10	0
80	74	-6
25	27	2
40	43	3
10	9	-1
70	67	-3
85	86	1
30	27	-3
15	16	1



2040\_AM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	518	419	705	98.7	F	94.8	F	64.9	E
	Thru	480	419	705	97.3	F				
	Right	136	60	427	71.5	E				
Southbound	Left	46	24	97	87.8	F	63.4	E		
	Thru	76	33	108	85.3	F				
	Right	109	53	132	37.8	D				
Eastbound	Left	456	137	399	98.2	F	62.3	E		
	Thru	1,708	996	2,135	55.9	E				
	Right	162	0	27	28.9	C				
Westbound	Left	169	67	169	108.8	F	47.3	D		
	Thru	1,140	202	770	45.2	D				
	Right	246	10	117	14.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
550	518	-32
515	480	-35
145	136	-9
50	46	-4
75	76	1
110	109	-1
465	456	-9
1,730	1,708	-22
160	162	2
160	169	9
1,145	1,140	-5
255	246	-9

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	16	0	19	61.9	E	96.1	F	63.0	E
	Thru	945	374	694	97.2	F				
	Right	34	341	646	79.7	E				
Southbound	Left	56	3	59	20.1	C	7.1	A		
	Thru	247	8	119	4.7	A				
	Right	102	11	138	5.9	A				
Eastbound	Left	79	14	89	50.6	D	41.4	D		
	Thru	34	5	56	28.9	C				
	Right	9	9	74	8.0	A				
Westbound	Left	34	5	51	30.3	C	23.5	C		
	Thru	24	3	37	27.8	C				
	Right	137	2	37	21.1	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	16	1
985	945	-40
35	34	-1
55	56	1
245	247	2
95	102	7
85	79	-6
35	34	-1
10	9	-1
30	34	4
25	24	-1
140	137	-3

Travelers Trail and Pleasant Avenue

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	0	28	7.1	A	6.1	A	1.5	A
	Right	14	0	28	5.9	A				
Eastbound	Thru	23	0	0	0.0	A	0.2	A		
	Right	6	0	0	0.7	A				
Westbound	Left	43	0	4	0.8	A	0.7	A		
	Thru	15	0	0	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
15	14	-1
25	23	-2
5	6	1
40	43	3
15	15	0

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	148	56	281	46.8	D	31.0	C	14.3	B
	Thru	42	56	281	47.3	D				
	Right	182	13	115	14.4	B				
Southbound	Left	74	24	134	37.4	D	35.5	D		
	Thru	34	24	133	36.6	D				
	Right	11	34	154	19.3	B				
Eastbound	Left	24	0	18	7.5	A	10.3	B		
	Thru	1,184	45	325	10.3	B				
	Right	100	56	367	11.4	B				
Westbound	Left	72	2	49	15.0	B	6.1	A		
	Thru	264	4	72	4.6	A				
	Right	91	12	124	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	148	3
45	42	-3
185	182	-3
75	74	-1
35	34	-1
10	11	1
25	24	-1
1,190	1,184	-6
95	100	5
75	72	-3
275	264	-11
100	91	-9

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	42	138	135.0	F	42.9	D	8.5	A
	Thru	16	42	138	131.4	F				
	Right	147	7	87	8.2	A				
Southbound	Left	0	-	-	-	A	24.4	C		
	Thru	4	1	30	53.0	D				
	Right	8	4	66	10.0	B				
Eastbound	Left	62	0	23	3.3	A	3.9	A		
	Thru	933	10	171	3.6	A				
	Right	440	17	209	4.8	A				
Westbound	Left	141	10	95	21.8	C	7.3	A		
	Thru	380	2	56	2.0	A				
	Right	5	5	102	1.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
15	16	1
150	147	-3
0	0	0
5	4	-1
10	8	-2
65	62	-3
940	933	-7
445	440	-5
150	141	-9
400	380	-20
5	5	0

Burnsville Parkway and Gateway Boulevard

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	522	706	517.0	F	511.3	F	36.4	E
	Thru	0	-	-	-	A				
	Right	49	519	698	503.2	F				
Southbound	Left	4	1	30	47.9	E	23.4	C		
	Thru	0	-	-	-	A				
	Right	9	1	29	12.5	B				
Eastbound	Left	103	1	37	3.4	A	0.8	A		
	Thru	935	2	55	0.5	A				
	Right	38	2	56	1.6	A				
Westbound	Left	44	1	32	7.3	A	0.9	A		
	Thru	448	1	33	0.3	A				
	Right	30	1	37	1.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
95	71	-24
0	0	0
60	49	-11
5	4	-1
0	0	0
10	9	-1
105	103	-2
950	935	-15
35	38	3
45	44	-1
450	448	-2
30	30	0

2040\_AM\_No Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	36	9	67	45.9	D	37.5	D	3.7	A	35	36	1
	Thru	0	-	-	-	A					0	0	0
	Right	14	16	88	15.9	B					15	14	-1
Southbound	Left	8	2	33	44.4	D	24.8	C			10	8	-2
	Thru	0	-	-	-	A					0	0	0
	Right	9	4	58	7.4	A					10	9	-1
Eastbound	Left	53	0	11	3.5	A	2.0	A			55	53	-2
	Thru	917	3	84	1.9	A					945	917	-28
	Right	14	0	4	3.3	A					15	14	-1
Westbound	Left	25	0	15	8.5	A	3.0	A	25	25	0		
	Thru	480	3	72	2.9	A			480	480	0		
	Right	72	0	9	1.9	A			70	72	2		

2040\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	319	29	170	19.1	B	17.7	B	23.7	C	315	319	4
	Right	158	37	198	14.9	B					160	158	-2
Southbound	Left	143	24	149	35.4	D	33.6	C			140	143	3
	Thru	16	23	148	17.3	B					15	16	1
Eastbound	Left	91	53	213	26.4	C	25.2	C			90	91	1
	Thru	745	53	213	25.1	C					760	745	-15
	Right	4	62	237	19.9	B			5	4	-1		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	38	18	96	69.6	E	54.9	D	22.1	C	30	38	8
	Right	85	17	95	48.3	D					85	85	0
Southbound	Left	367	109	409	33.0	C	25.6	C			375	367	-8
	Thru	668	109	409	21.5	C					660	668	8
Eastbound	Left	69	54	221	13.8	B	14.0	B			70	69	-1
	Thru	788	55	222	14.2	B					810	788	-22
	Right	76	74	256	11.9	B			80	76	-4		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	229	19	96	24.6	C	24.3	C	19.4	B	230	229	-1
	Right	4	0	7	4.3	A					5	4	-1
Southbound	Left	307	59	318	34.4	C	27.1	C			305	307	2
	Thru	856	80	371	24.5	C					855	856	1
Eastbound	Left	238	42	192	11.6	B	11.6	B			225	238	13
	Thru	905	42	192	12.5	B					905	905	0
	Right	139	4	85	5.8	A			140	139	-1		

**South 12th Street and 4th Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	61	0	6	0.7	A	1.3	A	1.3	A	60	61	1
	Thru	546	0	6	1.0	A					542	546	4
	HOV/Bus	81	0	7	0.8	A					78	81	3
	Right	530	0	0	1.8	A					535	530	-5

**West 76th Street and Newton Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	355	113	436	54.6	D	49.2	D	24.2	C	360	355	-5
	Thru	0	-	-	-	A					0	0	0
	Right	431	140	437	44.8	D					445	431	-14
Southbound	Left	33	13	79	67.6	E	63.9	E			35	33	-2
	Thru	0	-	-	-	A					0	0	0
	Right	4	19	92	33.4	C					5	4	-1
Eastbound	Left	27	1	30	15.2	B	15.0	B	25	27	2		
	Thru	1,384	70	456	15.4	B			1,385	1,384	-1		
	Right	69	2	82	5.8	A			70	69	-1		
Westbound	Left	33	2	43	21.5	C	16.6	B	35	33	-2		
	Thru	934	53	336	16.5	B			950	934	-16		
	Right	5	63	360	12.9	B			5	5	0		

**West 76th Street and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	181	178	423	56.1	E	64.1	E	23.2	C	195	181	-14
	Thru	5	172	418	87.1	F					5	5	0
	Right	393	192	439	67.5	E					420	393	-27
Southbound	Left	10	2	27	42.1	D	19.0	B			10	10	0
	Thru	0	-	-	-	A					0	0	0
	Right	19	1	36	6.8	A					20	19	-1
Eastbound	Left	17	0	14	15.8	B	16.0	B	15	17	2		
	Thru	1,765	97	643	16.1	B			1,790	1,765	-25		
	Right	57	1	75	11.5	B			60	57	-3		
Westbound	Left	48	5	60	29.0	C	10.8	B	50	48	-2		
	Thru	765	24	197	9.7	A			775	765	-10		
	Right	19	26	208	8.6	A			20	19	-1		

**West 76th Street and I-35W SB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	142	51	198	64.7	E	57.8	E	17.6	B	150	142	-8
	Right	196	38	136	52.8	D					195	196	1
Eastbound	Thru	2,158	128	590	15.4	B	15.4	B			2,220	2,158	-62
Westbound	Thru	637	6	88	3.7	A	3.7	A			650	637	-13



2040\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	56	217	61.8	E	55.7	E	19.2	B
	Thru	69	56	217	59.6	E				
	Right	49	66	229	43.1	D				
Eastbound	Left	821	238	637	38.7	D	16.7	B	19.2	B
	Thru	1,434	15	203	4.4	A				
	Right	35	22	238	5.8	A				
Westbound	Left	23	2	35	30.3	C	18.5	B	19.2	B
	Thru	587	37	198	19.2	B				
	Right	203	14	135	15.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	69	-1
50	49	-1
855	821	-34
1,480	1,434	-46
35	35	0
25	23	-2
595	587	-8
205	203	-2

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	191	158	443	87.4	F	68.9	E	20.3	C
	Right	309	159	437	57.5	E				
Eastbound	Thru	1,409	50	464	9.7	A	9.7	A	20.3	C
	Right	63	54	482	9.0	A				
Westbound	Left	21	8	52	68.7	E	6.9	A	20.3	C
	Thru	626	8	113	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	191	-4
310	309	-1
1,465	1,409	-56
65	63	-2
20	21	1
630	626	-4

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	2.4	A	75.6	F
	Thru	170	4	49	2.4	A				
Southbound	Thru	88	0	0	2.0	A	2.2	A	75.6	F
	Right	16	0	0	3.1	A				
Eastbound	Left	416	319	473	123.9	F	123.4	F	75.6	F
	Right	4	322	477	70.7	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	170	0
80	88	8
15	16	1
440	416	-24
5	4	-1

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	100	5	118	9.0	A	9.0	A	5.6	A
Southbound	Left	66	0	3	0.9	A	0.9	A		
	Right	27	0	0	0.8	A				
Westbound	Right	69	2	55	6.9	A	6.9	A	5.6	A

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	100	0
60	66	6
25	27	2
70	69	-1

American Boulevard West and Morgan Circle South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	101	33	185	53.2	D	44.3	D	25.5	C
	Thru	23	23	168	56.8	E				
	Right	100	31	185	32.5	C				
Southbound	Left	130	53	227	56.6	E	40.0	D	25.5	C
	Thru	13	52	227	50.7	D				
	Right	89	3	67	14.1	B				
Eastbound	Left	76	27	199	64.9	E	26.7	C	25.5	C
	Thru	1,738	185	697	25.1	C				
	Right	93	203	726	24.4	C				
Westbound	Left	94	7	82	14.7	B	16.6	B	25.5	C
	Thru	914	40	248	17.7	B				
	Right	92	1	39	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
105	101	-4
25	23	-2
100	100	0
135	130	-5
15	13	-2
90	89	-1
75	76	1
1,735	1,738	3
95	93	-2
95	94	-1
935	914	-21
95	92	-3

American Boulevard West and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	236	88	313	61.1	E	45.0	D	24.2	C
	Thru	65	17	103	48.5	D				
	Right	91	0	3	0.9	A				
Southbound	Left	24	7	50	52.9	D	43.5	D	24.2	C
	Thru	28	8	89	45.5	D				
	Right	7	3	77	3.4	A				
Eastbound	Left	46	18	87	81.8	F	23.6	C	24.2	C
	Thru	1,717	213	813	22.7	C				
	Right	194	0	1	17.9	B				
Westbound	Left	56	16	70	59.9	E	15.9	B	24.2	C
	Thru	863	43	243	13.3	B				
	Right	56	46	251	11.5	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	236	-9
70	65	-5
95	91	-4
35	24	-11
40	28	-12
10	7	-3
45	46	1
1,725	1,717	-8
200	194	-6
55	56	1
870	863	-7
55	56	1

American Boulevard West and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	30	76.8	F	58.6	F	2.2	A
	Thru	0	-	-	-	A				
	Right	4	1	31	35.9	E				
Southbound	Left	11	22	84	141.1	F	84.8	F	2.2	A
	Thru	4	23	86	99.5	F				
	Right	34	24	88	64.9	F				
Eastbound	Left	11	0	19	7.6	A	0.4	A	2.2	A
	Thru	1,811	0	0	0.4	A				
	Right	8	0	0	0.7	A				
Westbound	Left	5	1	12	29.1	D	0.9	A	2.2	A
	Thru	939	0	2	0.8	A				
	Right	16	0	2	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
0	0	0
5	4	-1
10	11	1
5	4	-1
35	34	-1
10	11	1
1,835	1,811	-24
10	8	-2
5	5	0
940	939	-1
15	16	1

2040\_PM\_No Build 12th Street and Knox  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



Knox Avenue South and Lupient Chevrolet Access Drive

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	127	0	0	1.1	A	1.2	A	1.1	A
	Right	39	0	0	1.4	A				
Southbound	Left	4	0	2	1.2	A	0.2	A		
	Thru	51	0	1	0.2	A				
Westbound	Left	8	0	3	7.1	A	7.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
140	127	-13
30	39	9
5	4	-1
50	51	1
10	8	-2
0	0	0

Knox Avenue South and West 81st Street

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	30	0	15	2.0	A	0.4	A	18.2	C
	Thru	223	0	0	0.1	A				
	Right	38	0	0	0.8	A				
Southbound	Left	33	0	20	2.4	A	0.4	A		
	Thru	238	0	0	0.1	A				
	Right	5	0	0	0.8	A				
Eastbound	Left	5	0	23	16.5	C	8.8	A		
	Thru	0	-	-	-	A				
	Right	39	1	38	7.8	A				
Westbound	Left	209	118	361	57.0	F	46.0	E		
	Thru	5	115	361	56.7	F				
	Right	163	72	288	31.7	D				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	30	-5
240	223	-17
35	38	3
35	33	-2
255	238	-17
5	5	0
5	5	0
0	0	0
40	39	-1
210	209	-1
5	5	0
165	163	-2

Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	0	17	8.8	A	1.4	A	45.3	E
	Thru	221	3	80	0.9	A				
	Right	25	3	81	1.5	A				
Southbound	Left	10	1	22	19.4	C	1.0	A		
	Thru	468	0	0	0.6	A				
	Right	10	0	0	0.8	A				
Eastbound	Left	4	1	28	32.2	D	16.5	C		
	Thru	0	-	-	-	A				
	Right	9	1	28	9.5	A				
Westbound	Left	125	298	412	244.3	F	222.5	F		
	Thru	0	-	-	-	A				
	Right	64	273	399	179.9	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	15	0
230	221	-9
25	25	0
10	10	0
485	468	-17
10	10	0
5	4	-1
0	0	0
10	9	-1
150	125	-25
0	0	0
75	64	-11

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	596	20	121	11.7	B	10.0	B	14.4	B
	Right	245	7	93	6.0	A				
Southbound	Left	548	121	425	34.1	C	17.6	B		
	Thru	709	7	79	4.8	A				
Westbound	Left	179	25	183	20.7	C	13.8	B		
	Right	276	33	199	9.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
595	596	1
245	245	0
550	548	-2
710	709	-1
190	179	-11
275	276	1

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	2	22	73.6	E	22.8	C	20.6	C
	Right	16	1	53	10.1	B				
Southbound	Left	529	114	291	54.9	D	49.5	D		
	Right	61	0	0	2.2	A				
Eastbound	Left	24	8	56	58.8	E	10.3	B		
	Thru	754	24	236	8.8	A				
	Right	15	36	279	10.5	B				
Westbound	Left	15	6	38	70.7	E	6.9	A		
	Thru	394	11	110	8.1	A				
Right	238	0	0	0.9	A					

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
15	16	1
575	529	-46
65	61	-4
25	24	-1
755	754	-1
15	15	0
15	15	0
395	394	-1
240	238	-2

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	158	19	102	28.1	C	14.2	B	10.1	B
	Thru	31	19	103	28.9	C				
	Right	222	0	2	2.1	A				
Eastbound	Thru	671	26	202	11.5	B	10.5	B		
	Right	628	30	339	9.5	A				
Westbound	Left	248	16	137	13.6	B	6.7	A		
	Thru	423	16	137	2.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	158	-2
30	31	1
220	222	2
700	671	-29
645	628	-17
250	248	-2
430	423	-7

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	260	38	151	30.4	C	25.4	C	16.7	B
	Thru	42	38	151	30.8	C				
	Right	155	47	164	15.5	B				
Eastbound	Left	361	106	339	42.6	D	20.8	C		
	Thru	466	105	338	3.9	A				
Westbound	Thru	411	10	122	4.8	A	4.9	A		
	Right	220	14	147	5.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
270	260	-10
45	42	-3
150	155	5
370	361	-9
490	466	-24
410	411	1
225	220	-5

2040\_PM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	9.1	A	4.9	A
	Thru	0	-	-	-	A				
	Right	13	1	31	9.1	A				
Southbound	Left	37	17	94	61.0	E	48.3	D		
	Thru	5	17	92	56.4	E				
	Right	22	27	115	25.0	C				
Eastbound	Left	4	10	171	37.6	D	3.3	A		
	Thru	1,284	10	171	3.1	A				
	Right	6	13	193	3.9	A				
Westbound	Left	26	16	234	22.8	C	4.4	A		
	Thru	1,276	16	234	4.0	A				
	Right	19	22	263	5.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
40	37	-3
5	5	0
20	22	2
5	4	-1
1,290	1,284	-6
5	6	1
25	26	1
1,290	1,276	-14
20	19	-1

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	179	63	236	57.9	E	32.6	C	16.5	B
	Thru	4	23	177	50.1	D				
	Right	300	34	196	17.3	B				
Eastbound	Thru	1,401	62	436	15.2	B	14.3	B		
	Right	208	4	96	8.3	A				
Westbound	Left	255	75	266	44.3	D	13.2	B		
	Thru	1,014	22	240	5.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
185	179	-6
10	4	-6
305	300	-5
1,415	1,401	-14
205	208	3
255	255	0
1,030	1,014	-16

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	236	78	298	55.1	E	35.5	D	12.7	B
	Thru	3	33	208	44.8	D				
	Right	334	48	216	21.6	C				
Eastbound	Left	185	26	183	28.7	C	5.1	A		
	Thru	1,397	10	189	2.0	A				
Westbound	Thru	1,026	24	177	12.9	B	11.9	B		
	Right	124	2	68	3.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	236	-9
10	3	-7
335	334	-1
190	185	-5
1,410	1,397	-13
1,040	1,026	-14
120	124	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	130	44	179	56.9	E	52.3	D	14.7	B
	Thru	45	14	85	50.3	D				
	Right	15	19	100	17.9	B				
Southbound	Left	21	11	78	50.8	D	17.2	B		
	Thru	17	11	78	53.6	D				
	Right	153	7	88	8.6	A				
Eastbound	Left	145	37	191	42.3	D	8.6	A		
	Thru	1,071	19	187	4.6	A				
	Right	188	32	238	5.6	A				
Westbound	Left	20	7	50	64.1	E	15.8	B		
	Thru	669	34	221	14.5	B				
	Right	39	44	245	14.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	130	-5
45	45	0
15	15	0
20	21	1
20	17	-3
155	153	-2
145	145	0
1,075	1,071	-4
200	188	-12
20	20	0
670	669	-1
40	39	-1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,240	113	384	25.5	C	25.5	C	20.6	C
Eastbound	Thru	807	91	344	34.2	C	34.2	C		
Westbound	Left	898	30	283	15.3	B	10.0	A		
	Thru	696	0	7	3.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,255	1,240	-15
805	807	2
910	898	-12
700	696	-4

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	33	170	44.8	D	40.5	D	36.6	D
	Right	184	52	198	39.4	D				
Southbound	Left	187	49	245	44.1	D	22.6	C		
	Thru	76	18	106	41.8	D				
	Right	330	8	134	6.1	A				
Eastbound	Thru	1,881	477	1,143	62.0	E	59.1	E		
	Right	137	4	75	19.3	B				
Westbound	Left	165	58	244	55.9	E	9.5	A		
	Thru	1,242	8	152	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
50	46	-4
185	184	-1
195	187	-8
80	76	-4
330	330	0
1,915	1,881	-34
145	137	-8
170	165	-5
1,230	1,242	12

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,836	25	365	12.4	B	10.7	B	6.6	A
	Right	400	0	1	2.8	A				
Westbound	Thru	1,414	0	28	0.9	A	0.9	A		
	Right	221	0	28	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,900	1,836	-64
395	400	5
1,400	1,414	14
230	221	-9



2040\_PM\_No Build 66th, 98th, Burns  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 98th Street and I-35W NB Ramps (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	343	86	309	52.1	D	40.9	D	20.2	C	350	343	-7
	Right	228	27	231	24.0	C					235	228	-7
Eastbound	Left	571	178	392	36.6	D	17.1	B			610	571	-39
	Thru	1,255	32	281	8.2	A					1,290	1,255	-35
Westbound	Thru	1,286	67	260	15.8	B	16.2	B			1,280	1,286	6
	Right	265	77	281	18.4	B					270	265	-5

West 98th Street and Aldrich Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Right	35	0	12	20.3	C	20.3	C	2.3	A	30	35	5
Eastbound	Thru	1,437	7	204	2.1	A	2.1	A			1,470	1,437	-33
	Right	44	7	204	2.2	A					55	44	-11
Westbound	Thru	1,550	5	174	2.1	A	2.1	A	1,550	1,550	0		

West 98th Street and Lyndale Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	123	36	170	50.2	D	40.8	D	34.9	C	125	123	-2
	Thru	170	33	126	51.4	D					180	170	-10
	Right	98	6	80	10.6	B					95	98	3
Southbound	Left	182	55	248	55.5	E	60.8	E			180	182	2
	Thru	355	149	496	105.5	F					370	355	-15
	Right	285	0	0	8.3	A					290	285	-5
Eastbound	Left	289	43	165	40.5	D	17.8	B	300	289	-11		
	Thru	1,018	55	315	14.0	B			1,030	1,018	-12		
	Right	168	0	0	1.2	A			170	168	-2		
Westbound	Left	119	37	107	79.2	E	36.3	D	120	119	-1		
	Thru	1,140	127	514	32.4	C			1,135	1,140	5		
	Right	21	0	0	1.2	A			20	21	1		

West 99th Street and East Bloomington Freeway (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	31	0	0	0.2	A	0.3	A	0.5	A	30	31	1
	Right	14	0	0	0.6	A					15	14	-1
Westbound	Right	95	0	17	0.6	A	0.6	A			100	95	-5

West 99th Street and Aldrich Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	4.6	A	0	0	0
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	49	2	48	7.5	A	7.2	A			50	49	-1
	Thru	0	-	-	-	A					0	0	0
	Right	38	2	48	6.8	A					50	38	-12
Eastbound	Left	9	0	3	0.8	A	1.0	A	5	9	4		
	Thru	12	0	0	1.2	A			10	12	2		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	0	-	-	-	A	2.3	A	0	0	0		
	Thru	49	0	0	1.3	A			50	49	-1		
	Right	20	0	0	4.7	A			20	20	0		

West 99th Street and Lyndale Avenue South (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	25	0	20	3.0	A	0.3	A	1.8	A	25	25	0
	Thru	351	0	1	0.1	A					350	351	1
	Right	15	0	1	0.7	A					15	15	0
Southbound	Left	10	0	6	2.5	A	0.8	A			10	10	0
	Thru	591	0	0	0.7	A					610	591	-19
	Right	40	0	0	1.3	A					40	40	0
Eastbound	Left	35	4	60	19.5	C	16.0	C	35	35	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	27	1	43	11.5	B			25	27	2		
Westbound	Left	10	2	46	18.3	C	15.1	C	10	10	0		
	Thru	4	2	45	26.1	D			5	4	-1		
	Right	15	2	44	9.9	A			15	15	0		

Nicollet Avenue and River Ridge Lane (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	220	31	231	24.9	C	18.3	B	44.7	D	235	220	-15
	Thru	95	8	61	21.2	C					105	95	-10
	Right	135	5	109	5.6	A					145	135	-10
Southbound	Left	11	2	29	30.5	C	39.1	D			10	11	1
	Thru	223	30	143	40.8	D					230	223	-7
	Right	22	13	204	25.8	C					20	22	2
Eastbound	Left	9	5	45	51.3	D	34.1	C	10	9	-1		
	Thru	12	5	44	48.1	D			10	12	2		
	Right	299	67	258	33.1	C			300	299	-1		
Westbound	Left	497	141	432	76.2	E	75.8	E	500	497	-3		
	Thru	23	139	428	74.7	E			25	23	-2		
	Right	16	166	467	66.1	E			15	16	1		

Nicollet Avenue and Hwy 13

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	339	126	382	80.6	F	63.1	E	70.0	E	345	339	-6
	Thru	128	125	380	78.4	E					130	128	-2
	Right	242	81	384	30.5	C					250	242	-8
Southbound	Left	211	157	490	95.0	F	84.3	F			215	211	-4
	Thru	422	220	509	90.0	F					430	422	-8
	Right	375	244	535	71.8	E					390	375	-15
Eastbound	Left	169	61	162	114.6	F	56.2	E			175	169	-6
	Thru	1,604	629	1,582	56.6	E					1,620	1,604	-16
	Right	369	9	176	28.2	C					380	369	-11
Westbound	Left	298	218	391	149.2	F	78.9	E			315	298	-17
	Thru	1,768	1,998	2,785	70.4	E					1,930	1,768	-162
	Right	162	1	49	42.4	D			180	162	-18		

Nicollet Avenue and Travelers Trail

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	19	0	22	8.9	A	9.6	A	11.0	B	20	19	-1
	Thru	473	16	149	10.3	B					475	473	-2
	Right	97	6	111	6.2	A					95	97	2
Southbound	Left	238	7	165	8.3	A	7.6	A			245	238	-7
	Thru	788	22	254	7.2	A					820	788	-32
	Right	61	28	273	9.3	A					60	61	1
Eastbound	Left	70	11	81	31.2	C	28.1	C			75	70	-5
	Thru	45	8	71	30.7	C					45	45	0
	Right	19	13	87	10.1	B					20	19	-1
Westbound	Left	119	20	114	32.6	C	18.1	B			115	119	4
	Thru	33	4	48	26.8	C					35	33	-2
	Right	172	0	14	6.3	A			175	172	-3		

Travelers Trail and Pleasant Avenue

(Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	4	1	40	7.7	A	6.0	A	3.1	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	15	0	1	0.6	A	0.3	A			15	15	0
	Thru	21	0	0	0.0	A					30	21	-9

Burnsville Parkway and I-35W SB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	466	218	665	44.6	D	37.7	D	30.6	C	470	466	-4
	Thru	28	216	664	43.0	D					25	28	3
	Right	334	34	390	27.6	C					340	334	-6
Southbound	Left	134	66	254	50.8	D	49.1	D			135	134	-1
	Thru	69	66	255	48.8	D					70	69	-1
	Right	21	81	273	39.2	D					20	21	1
Eastbound	Left	14	1	28	25.9	C	32.6	C			15	14	-1
	Thru	636	82	311	32.8	C					640	636	-4
	Right	73	110	354	32.1	C					70	73	3
Westbound	Left	197	24	155	25.9	C	18.8	B			210	197	-13
	Thru	704	42	241	17.2	B					720	704	-16
	Right	68	68	294	14.9	B			70	68	-2		

Burnsville Parkway and I-35W NB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	120	34	153	48.2	D	27.2	C	10.1	B	120	120	0
	Thru	5	33	155	45.7	D					5	5	0
	Right	132	5	72	7.4	A					135	132	-3
Southbound	Left	6	13	109	72.7	E	33.7	C			5	6	1
	Thru	14	13	110	72.0	E					20	14	-6
	Right	59	24	146	20.6	C					60	59	-1
Eastbound	Left	12	0	6	6.4	A	5.6	A			15	12	-3
	Thru	742	15	198	5.2	A					745	742	-3
	Right	348	23	235	6.4	A					355	348	-7
Westbound	Left	212	24	154	25.8	C	8.9	A			220	212	-8
	Thru	792	9	131	4.4	A					820	792	-28
	Right	6	18	178	3.4	A			5	6	1		

Burnsville Parkway and Gateway Boulevard

(Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	61	462	638	514.3	F	497.7	F	28.5	D	85	61	-24
	Thru	0	-	-	-	A					0	0	0
	Right	44	453	625	474.7	F					55	44	-11
Southbound	Left	10	25	134	59.3	F	33.3	D			10	10	0
	Thru	4	24	135	67.4	F					5	4	-1
	Right	112	23	133	29.8	D					115	112	-3
Eastbound	Left	13	0	18	6.1	A	0.7	A			15	13	-2
	Thru	780	1	57	0.5	A					785	780	-5
	Right	85	1	55	2.0	A					85	85	0
Westbound	Left	91	3	59	9.4	A	1.5	A			90	91	1
	Thru	838	3	79	0.6	A					845	838	-7
	Right	10	3	80	2.1	A			10	10	0		

2040\_PM\_No Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	74	26	130	51.6	D	45.7	D	9.1	A	75	74	-1
	Thru	0	-	-	-	A					0	0	0
	Right	27	38	151	29.5	C					30	27	-3
Southbound	Left	83	43	187	55.1	E	45.1	D			85	83	-2
	Thru	5	42	183	51.4	D					5	5	0
	Right	78	61	214	34.0	C					80	78	-2
Eastbound	Left	9	0	4	6.0	A	2.1	A			10	9	-1
	Thru	787	5	87	2.1	A					805	787	-18
	Right	36	0	7	1.3	A					35	36	1
Westbound	Left	39	1	24	8.6	A	4.6	A	40	39	-1		
	Thru	788	9	141	4.4	A			790	788	-2		
	Right	16	0	0	2.7	A			15	16	1		



## 2040 Build MOEs

West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.6	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.7	A				
Southbound	Left	33	10	72	43.1	D	35.8	D	5.6	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	19.0	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.6	A
	Thru	409	5	75	3.8	A				
	Right	4	8	95	2.4	A				
Westbound	Left	10	19	267	7.7	A	4.9	A	5.6	A
	Thru	1,334	19	261	4.8	A				
	Right	5	26	299	4.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
410	409	-1
5	4	-1
10	10	0
1,350	1,334	-16
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	160	31	164	51.1	D	52.6	D	22.1	C
	Thru	45	255	724	60.5	E				
	Right	568	271	743	52.4	D				
Eastbound	Thru	485	26	164	23.1	C	18.8	B	22.1	C
	Right	160	6	97	5.8	A				
Westbound	Left	315	25	233	14.8	B	8.3	A	22.1	C
	Thru	1,241	34	279	6.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	160	0
40	45	5
575	568	-7
500	485	-15
160	160	0
310	315	5
1,260	1,241	-19

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	264	64	267	42.8	D	30.8	C	13.5	B
	Thru	32	28	224	46.3	D				
	Right	258	36	240	16.5	B				
Eastbound	Left	130	20	141	33.1	C	11.2	B	13.5	B
	Thru	516	13	123	5.7	A				
Westbound	Thru	1,286	16	224	8.2	A	7.8	A	13.5	B
	Right	133	1	65	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
270	264	-6
30	32	2
255	258	3
135	130	-5
525	516	-9
1,300	1,286	-14
130	133	3

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	254	65	294	43.5	D	42.0	D	16.8	B
	Thru	39	7	67	35.5	D				
	Right	5	10	81	18.2	B				
Southbound	Left	25	7	74	32.8	C	13.9	B	16.8	B
	Thru	16	7	74	34.1	C				
	Right	192	11	114	9.8	A				
Eastbound	Left	67	10	88	27.8	C	6.4	A	16.8	B
	Thru	433	10	120	3.9	A				
	Right	207	21	171	4.6	A				
Westbound	Left	6	2	25	51.0	D	17.4	B	16.8	B
	Thru	946	57	312	17.2	B				
	Right	16	69	340	15.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
250	254	4
40	39	-1
5	5	0
25	25	0
15	16	1
195	192	-3
65	67	2
435	433	-2
210	207	-3
5	6	1
960	946	-14
15	16	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	933	0	2	1.5	A	1.5	A	5.9	A
Eastbound	Thru	263	13	86	14.9	B	14.9	B		
Westbound	Left	747	22	168	12.1	B	7.2	A		
	Thru	694	0	0	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
935	933	-2
265	263	-2
755	747	-8
700	694	-6

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	82	32	159	42.8	D	24.1	C	16.6	B
	Right	287	51	186	18.7	B				
Southbound	Left	190	47	213	42.3	D	18.5	B	16.6	B
	Thru	64	13	86	38.0	D				
	Right	412	6	124	4.5	A				
Eastbound	Thru	1,146	74	351	21.8	C	21.1	C	16.6	B
	Right	50	1	50	4.7	A				
Westbound	Left	97	26	144	46.2	D	7.6	A	16.6	B
	Thru	957	7	127	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	82	-3
285	287	2
185	190	5
65	64	-1
415	412	-3
1,150	1,146	-4
50	50	0
100	97	-3
955	957	2

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,477	5	174	5.7	A	5.2	A	3.2	A
	Right	142	0	0	1.0	A				
Westbound	Thru	1,055	0	5	0.5	A	0.5	A	3.2	A
	Right	119	0	5	0.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,485	1,477	-8
135	142	7
1,055	1,055	0
115	119	4

West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	310	78	291	46.1	D	34.3	C	16.7	B
	Right	246	15	183	19.4	B				
Eastbound	Left	431	136	384	40.2	D	14.7	B		
	Thru	1,044	12	173	4.1	A				
Westbound	Thru	865	34	218	10.8	B	11.0	B		
	Right	317	39	239	11.6	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
300	310	10
250	246	-4
445	431	-14
1,040	1,044	4
870	865	-5
320	317	-3

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	1.0	A
Eastbound	Thru	1,178	2	122	1.3	A	1.3	A		
	Right	111	2	123	1.6	A				
Westbound	Thru	1,182	0	23	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	0	-5
1,180	1,178	-2
110	111	1
1,190	1,182	-8

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	84	19	108	40.3	D	38.4	D	28.8	C
	Thru	149	26	101	48.3	D				
	Right	56	3	65	9.5	A				
Southbound	Left	64	20	106	54.1	D	126.5	F		
	Thru	64	93	191	417.2	F				
	Right	111	0	0	0.7	A				
Eastbound	Left	286	40	157	38.6	D	14.2	B		
	Thru	770	18	146	7.1	A				
	Right	118	0	0	1.0	A				
Westbound	Left	48	14	73	58.6	E	20.5	C		
	Thru	990	62	319	19.5	B				
	Right	40	0	0	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	84	-1
155	149	-6
55	56	1
65	64	-1
70	64	-6
110	111	1
295	286	-9
775	770	-5
115	118	3
50	48	-2
995	990	-5
35	40	5

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	40	0	0	0.2	A	0.4	A	0.5	A
	Right	22	0	0	0.7	A				
Westbound	Right	49	0	21	0.7	A	0.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
25	22	-3
40	49	9

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.8	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	11	1	50	7.2	A	7.9	A		
	Thru	0	-	-	-	A				
	Right	20	1	50	8.3	A				
Eastbound	Left	14	0	4	1.0	A	1.0	A		
	Thru	15	0	0	0.9	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	3.2	A		
	Thru	25	0	0	1.7	A				
	Right	40	0	0	4.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
10	11	1
0	0	0
15	20	5
10	14	4
15	15	0
0	0	0
0	0	0
25	25	0
40	40	0

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	30	0	18	2.3	A	0.3	A	1.0	A
	Thru	272	0	1	0.1	A				
	Right	4	0	1	0.6	A				
Southbound	Left	9	0	6	2.2	A	0.6	A		
	Thru	187	0	0	0.4	A				
	Right	34	0	0	1.5	A				
Eastbound	Left	14	1	42	14.5	B	12.0	B		
	Thru	0	-	-	-	A				
	Right	11	0	36	8.7	A				
Westbound	Left	0	-	-	-	A	8.1	A		
	Thru	0	-	-	-	A				
	Right	4	0	30	8.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	30	0
275	272	-3
5	4	-1
10	9	-1
190	187	-3
35	34	-1
15	14	-1
0	0	0
10	11	1
0	0	0
0	0	0
5	4	-1

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	379	24	310	11.7	B	9.7	A	13.7	B
	Thru	260	8	93	8.8	A				
	Right	531	25	327	8.8	A				
Southbound	Left	11	1	21	21.9	C	15.6	B		
	Thru	75	6	67	17.6	B				
	Right	27	4	128	7.4	A				
Eastbound	Left	42	12	82	45.5	D	23.2	C		
	Thru	9	12	81	46.6	D				
	Right	67	3	70	6.1	A				
Westbound	Left	84	21	91	42.7	D	40.1	D		
	Thru	27	21	91	43.8	D				
	Right	16	35	115	20.2	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
395	379	-16
270	260	-10
570	531	-39
10	11	1
80	75	-5
25	27	2
40	42	2
10	9	-1
70	67	-3
85	84	-1
30	27	-3
15	16	1



Nicollet Avenue and Hwy 13

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	520	427	709	99.8	F	96.2	F	64.9	E
	Thru	480	427	709	99.0	F				
	Right	136	45	320	73.0	E				
Southbound	Left	45	24	104	86.0	F	63.2	E	64.9	E
	Thru	77	34	107	85.8	F				
	Right	109	54	131	37.8	D				
Eastbound	Left	452	130	358	97.2	F	61.5	E	64.9	E
	Thru	1,702	1,069	2,187	55.6	E				
	Right	181	0	30	28.0	C				
Westbound	Left	169	70	167	110.4	F	47.4	D	64.9	E
	Thru	1,140	202	773	45.2	D				
	Right	246	10	121	14.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
551	520	-31
515	480	-35
145	136	-9
50	45	-5
75	77	2
110	109	-1
465	452	-13
1,730	1,702	-28
173	181	8
160	169	9
1,145	1,140	-5
255	246	-9

Nicollet Avenue and Travelers Trail

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	57	1	38	75.0	E	103.9	F	68.1	E
	Thru	946	432	743	106.4	F				
	Right	33	404	707	83.3	F				
Southbound	Left	57	3	60	19.9	B	7.7	A	68.1	E
	Thru	241	9	123	5.5	A				
	Right	120	13	142	6.5	A				
Eastbound	Left	83	15	92	53.0	D	42.3	D	68.1	E
	Thru	35	6	60	30.0	C				
	Right	14	10	78	9.9	A				
Westbound	Left	34	5	50	31.0	C	25.8	C	68.1	E
	Thru	31	4	46	29.2	C				
	Right	136	2	42	23.7	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
61	57	-4
985	946	-39
35	33	-2
55	57	2
245	241	-4
115	120	5
86	83	-3
35	35	0
15	14	-1
30	34	4
31	31	0
140	136	-4

Travelers Trail and Pleasant Avenue

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	0	28	7.0	A	6.2	A	1.4	A
	Right	14	0	28	5.9	A				
Eastbound	Thru	23	0	0	0.0	A	0.2	A	1.4	A
	Right	6	0	0	0.7	A				
Westbound	Left	40	0	4	0.7	A	0.5	A	1.4	A
	Thru	20	0	0	0.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
15	14	-1
25	23	-2
5	6	1
40	40	0
15	20	5

Burnsville Parkway and I-35W SB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	138	52	257	46.6	D	31.3	C	15.1	B
	Thru	39	51	257	46.0	D				
	Right	171	51	165	15.5	B				
Southbound	Left	71	66	181	41.2	D	38.0	D	15.1	B
	Thru	31	64	178	36.7	D				
	Right	11	77	200	21.3	C				
Eastbound	Left	22	0	14	6.9	A	11.2	B	15.1	B
	Thru	1,131	137	427	11.2	B				
	Right	94	146	464	12.7	B				
Westbound	Left	70	3	46	15.7	B	6.7	A	15.1	B
	Thru	254	4	66	5.1	A				
	Right	85	11	118	4.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	138	-7
45	39	-6
185	171	-14
75	71	-4
35	31	-4
10	11	1
25	22	-3
1,216	1,131	-85
95	94	-1
77	70	-7
276	254	-22
100	85	-15

Burnsville Parkway and I-35W NB Ramps

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	36	96	205	117.8	F	32.6	C	9.3	A
	Thru	13	98	208	112.7	F				
	Right	178	10	90	9.5	A				
Southbound	Left	0	-	-	-	A	42.7	D	9.3	A
	Thru	10	8	100	65.4	E				
	Right	8	11	98	14.3	B				
Eastbound	Left	55	67	95	3.5	A	5.2	A	9.3	A
	Thru	899	12	202	5.1	A				
	Right	410	20	236	5.6	A				
Westbound	Left	135	10	101	22.7	C	8.6	A	9.3	A
	Thru	365	20	83	3.5	A				
	Right	5	32	132	2.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	36	-4
15	13	-2
190	178	-12
0	0	0
5	10	5
10	8	-2
65	55	-10
966	899	-67
445	410	-35
150	135	-15
403	365	-38
5	5	0

Burnsville Parkway and Gateway Boulevard

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	68	468	638	458.1	F	455.8	F	31.9	D
	Thru	0	-	-	-	A				
	Right	48	477	642	452.5	F				
Southbound	Left	3	3	32	46.6	E	21.8	C	31.9	D
	Thru	0	-	-	-	A				
	Right	9	4	33	13.5	B				
Eastbound	Left	98	1	37	3.7	A	0.9	A	31.9	D
	Thru	944	2	55	0.5	A				
	Right	37	2	55	2.2	A				
Westbound	Left	43	1	34	8.2	A	1.0	A	31.9	D
	Thru	432	23	69	0.3	A				
	Right	28	25	73	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
95	68	-27
0	0	0
60	48	-12
5	3	-2
0	0	0
10	9	-1
105	98	-7
1,016	944	-72
35	37	2
45	43	-2
453	432	-21
30	28	-2

2040\_AM\_Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	34	11	71	45.0	D	36.5	D	3.6	A	35	34	-1
	Thru	0	-	-	-	A					0	0	0
	Right	14	18	92	16.0	B					15	14	-1
Southbound	Left	8	3	34	43.7	D	24.5	C			10	8	-2
	Thru	0	-	-	-	A					0	0	0
	Right	9	5	59	7.4	A					10	9	-1
Eastbound	Left	51	0	10	3.5	A	1.9	A			55	51	-4
	Thru	928	3	91	1.9	A					1,011	928	-83
	Right	14	0	2	1.6	A					15	14	-1
Westbound	Left	24	0	14	8.4	A	3.0	A	25	24	-1		
	Thru	468	20	95	2.9	A			483	468	-15		
	Right	71	0	10	1.8	A			70	71	1		

SB Orange Line Travel Time- 98th Street (sec)

Avg                      St Dev  
 234                              8

SB Orange Line Travel Time- Burnsville (sec)

Avg                      St Dev  
 930                              19

2040\_AM\_Downtown Build 12th Street Transit Ramp Option  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	468	38	195	19.6	B	19.1	B	19.6	B	465	468	3
	Right	128	47	223	17.4	B					130	128	-2
Southbound	Left	13	4	56	47.6	D	33.0	C			13	13	0
	Thru	13	3	53	18.4	B					15	13	-2
Eastbound	Left	236	53	254	20.2	C	19.5	B			235	236	1
	Thru	789	53	253	19.4	B					795	789	-6
	Right	10	62	278	16.8	B			10	10	0		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	1	1	45	52.8	D	45.8	D	15.4	B	1	1	0
	Right	100	21	112	45.8	D					100	100	0
Southbound	Left	98	39	149	37.7	D	30.6	C			95	98	3
	Thru	211	39	150	27.3	C					215	211	-4
Eastbound	Left	80	15	134	6.6	A	6.6	A			85	80	-5
	Thru	630	16	136	6.7	A					670	630	-40
	Right	26	25	160	4.9	A			30	26	-4		
Westbound - Bus Only	Right	96	0	20	1.8	A	1.8	A	95	96	1		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	477	29	160	18.4	B	18.3	B	18.6	B	476	477	1
	Right	5	1	89	2.7	A					5	5	0
Southbound	Left	164	29	157	33.3	C	24.8	C			165	164	-1
	Thru	228	15	96	18.8	B					225	228	3
Eastbound	Left	369	58	297	20.6	C	15.8	B			380	369	-11
	Thru	380	58	298	13.7	B					400	380	-20
	Right	77	1	73	3.7	A			85	77	-8		
Westbound - Bus Only	Thru	96	17	151	19.2	B	19.2	B	95	96	1		

**South 12th Street and 4th Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	39	0	15	1.4	A	0.5	A	0.6	A	40	39	-1
	Thru	276	0	0	0.3	A					283	276	-7
	HOV/Bus	12	0	0	0.4	A					12	12	0
	Right	222	0	0	0.6	A					235	222	-13
Westbound - Bus Only	-	95	0	0	0.8	A	0.8	A	95	95	0		

**I-35W Entrances and Exits (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Bus Lane	94	0	0	2.7	A	8.6	A	7.2	A	95	94	-1
	Thru	1,059	88	540	1.2	A					1,040	1,059	19
	Right	1,941	89	538	12.9	B					1,980	1,941	-39
Southbound	Left	272	11	92	9.5	A	2.8	A			283	272	-11
	Thru	649	0	0	0.0	A					650	649	-1
	Bus Lane	13	0	0	0.4	A					12	13	1

**I-35W SB Bridge (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Thru	934	0	4	0.0	A	0.0	A	0.0	A	945	934	-11



**2040\_AM\_Build Knox Curved Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	13	56	66.5	E	41.5	D	16.5	B
	Thru	0	-	-	-	A				
	Right	31	1	47	6.0	A				
Southbound	Left	90	36	147	64.9	E	64.0	E		
	Thru	5	36	148	67.2	E				
	Right	5	44	161	45.6	D				
Eastbound	Left	11	1	19	17.6	B	13.2	B		
	Thru	553	33	213	17.3	B				
	Right	402	19	172	7.5	A				
Westbound	Left	429	94	379	38.5	D	14.2	B		
	Thru	1,053	13	170	4.4	A				
	Right	14	19	196	5.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	44	-1
0	0	0
30	31	1
90	90	0
5	5	0
5	5	0
10	11	1
565	553	-12
400	402	2
430	429	-1
1,085	1,053	-32
15	14	-1

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	7	53	73.2	E	35.9	D	5.2	A
	Thru	4	6	52	58.4	E				
	Right	23	10	69	14.2	B				
Southbound	Left	9	4	35	72.4	E	59.3	E		
	Thru	4	4	33	142.4	F				
	Right	10	6	46	14.3	B				
Eastbound	Left	7	0	4	12.2	B	3.7	A		
	Thru	519	4	78	3.4	A				
	Right	143	2	79	4.7	A				
Westbound	Left	461	18	208	11.7	B	4.5	A		
	Thru	1,485	8	183	2.3	A				
	Right	10	8	195	2.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	11	-4
5	4	-1
30	23	-7
10	9	-1
5	4	-1
10	10	0
5	7	2
530	519	-11
150	143	-7
470	461	-9
1,505	1,485	-20
10	10	0

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	222	52	235	42.8	D	48.4	D	24.4	C
	Right	747	126	450	50.1	D				
Eastbound	Thru	551	17	131	9.1	A	A			
Westbound	Thru	1,216	53	384	12.3	B	12.3	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
215	222	7
750	747	-3
570	551	-19
1,235	1,216	-19

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	16	88	61.6	E	48.1	D	6.7	A
	Thru	14	16	87	60.3	E				
	Right	19	21	101	21.4	C				
Eastbound	Left	144	8	98	16.9	B	6.4	A		
	Thru	431	9	159	3.6	A				
	Right	202	13	191	5.1	A				
Westbound	Left	85	1	44	8.7	A	5.2	A		
	Thru	1,194	15	217	5.1	A				
	Right	140	1	57	3.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
15	14	-1
20	19	-1
145	144	-1
440	431	-9
200	202	2
85	85	0
1,210	1,194	-16
140	140	0

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.5	C	6.5	A
	Right	13	1	41	6.5	A				
Eastbound	Thru	291	6	108	5.2	A	5.3	A		
	Right	157	7	130	5.6	A				
Westbound	Left	257	42	210	30.1	C	6.4	A		
	Thru	1,400	4	141	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	291	-9
160	157	-3
250	257	7
1,415	1,400	-15

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	18	10.5	B	2.1	A	4.3	A
	Thru	27	0	0	0.3	A				
Southbound	Thru	136	6	220	4.8	A	4.3	A		
	Right	468	6	219	4.1	A				
Eastbound	Left	8	1	37	14.0	B	14.0	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	27	2
140	136	-4
480	468	-12
10	8	-2
0	0	0

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	0	0	0.1	A	0.1	A	0.5	A
	Right	0	-	-	-	A				
Southbound	Left	58	0	3	0.7	A	0.4	A		
	Thru	78	0	0	0.3	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	29	4
0	0	0
60	58	-2
80	78	-2
0	0	0
5	4	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	2.9	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.7	A		
	Right	72	0	0	0.7	A				
Eastbound	Left	23	1	73	11.3	B	11.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
6	6	0
80	72	-8
25	23	-2
0	0	0

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**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	0	-	-	-	A	10.4	B	1.7	A
	Right	6	1	81	10.4	B				
Eastbound	Left	6	0	0	-0.1	A	0.0	A		
	Thru	16	0	0	0.0	A				
Westbound	Thru	8	0	0	0.0	A	0.0	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
6	6	0
14	16	2
9	8	-1
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	0	0	0.6	A	3.6	A	3.1	A
	Thru	22	0	0	5.8	A				
	Right	6	0	0	0.8	A				
Southbound	Thru	14	0	0	0.5	A	0.5	A		
	Right	0	-	-	-	A				
Eastbound	Right	2	0	59	11.8	B	11.8	B		
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!		
	Left	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	10	0
20	22	2
5	6	1
15	14	-1
0	0	0
5	2	-3
0	0	0
0	0	0

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	4	31	74.6	E	28.7	C	4.1	A
	Thru	0	-	-	-	A				
	Right	20	1	42	8.1	A				
Southbound	Left	31	12	70	63.1	E	51.1	D		
	Thru	5	12	68	65.7	E				
	Right	10	0	36	6.7	A				
Eastbound	Left	6	2	20	73.9	E	2.8	A		
	Thru	417	2	62	1.7	A				
	Right	5	4	90	2.1	A				
Westbound	Left	11	0	5	1.6	A	1.9	A		
	Thru	1,002	4	85	2.0	A				
	Right	31	0	1	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
10	9	-1
0	0	0
20	20	0
30	31	1
5	5	0
10	10	0
5	6	1
420	417	-3
5	5	0
10	11	1
1,010	1,002	-8
35	31	-4

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	74	28	120	67.1	E	46.5	D	11.0	B
	Thru	15	7	51	63.7	E				
	Right	39	0	0	0.8	A				
Southbound	Left	4	1	15	68.4	E	47.0	D		
	Thru	10	3	45	56.8	E				
	Right	4	4	102	1.3	A				
Eastbound	Left	5	2	21	62.3	E	4.9	A		
	Thru	310	5	83	5.6	A				
	Right	151	1	42	1.4	A				
Westbound	Left	97	25	85	66.8	E	8.9	A		
	Thru	970	9	157	3.2	A				
	Right	16	11	172	2.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	74	-1
15	15	0
40	39	-1
5	4	-1
10	10	0
5	4	-1
5	5	0
315	310	-5
150	151	1
95	97	2
975	970	-5
15	16	1

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	2	32	91.6	F	59.0	F	1.3	A
	Thru	0	-	-	-	A				
	Right	4	1	32	26.3	D				
Southbound	Left	4	3	35	90.9	F	42.6	E		
	Thru	0	-	-	-	A				
	Right	9	2	32	21.1	C				
Eastbound	Left	37	1	37	9.0	A	1.1	A		
	Thru	308	0	0	0.1	A				
	Right	5	0	0	0.7	A				
Westbound	Left	8	0	3	1.8	A	0.4	A		
	Thru	1,071	0	0	0.4	A				
	Right	9	0	0	0.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
5	4	-1
0	0	0
10	9	-1
40	37	-3
315	308	-7
5	5	0
10	8	-2
1,070	1,071	1
10	9	-1

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	1	0.7	A	0.8	A	1.8	A
	Thru	116	0	0	0.0	A				
	Right	178	0	0	1.2	A				
Southbound	Left	121	2	64	4.2	A	2.1	A		
	Thru	137	0	0	0.3	A				
	Right	0	-	-	-	A				
Eastbound	Left	0	-	-	-	A	6.7	A		
	Thru	0	-	-	-	A				
	Right	4	0	25	6.7	A				
Westbound	Left	13	1	37	14.6	B	9.2	A		
	Thru	5	1	36	12.6	B				
	Right	10	0	0	0.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
120	116	-4
185	178	-7
125	121	-4
130	137	7
0	0	0
0	0	0
0	0	0
5	4	-1
15	13	-2
5	5	0
10	10	0

2040\_AM\_Build Knox Curved Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	0	4	4.3	A	1.7	A	2.4	A
	Thru	290	4	108	1.1	A				
	Right	211	4	108	2.4	A				
Southbound	Left	66	1	41	5.6	A	2.5	A		
	Thru	77	0	0	0.1	A				
	Right	10	0	0	0.6	A				
Eastbound	Left	4	1	32	17.6	C	9.4	A		
	Thru	0	-	-	-	A				
	Right	16	1	33	7.4	A				
Westbound	Left	8	1	30	17.7	C	14.2	B		
	Thru	0	-	-	-	A				
	Right	5	0	20	8.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	15	0
300	290	-10
220	211	-9
65	66	1
75	77	2
10	10	0
5	4	-1
0	0	0
15	16	1
10	8	-2
0	0	0
5	5	0

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	671	22	168	11.5	B	10.3	B	16.6	B
	Right	231	12	139	6.7	A				
Southbound	Left	157	16	119	21.9	C	13.1	B		
	Thru	285	6	67	8.2	A				
Westbound	Left	173	83	351	46.7	D	26.8	C		
	Right	530	95	369	20.4	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
670	671	1
235	231	-4
160	157	-3
285	285	0
170	173	3
535	530	-5

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	18	44.9	D	11.8	B	7.1	A
	Right	32	1	59	6.7	A				
Southbound	Left	83	17	83	41.3	D	35.1	D		
	Right	15	0	0	0.8	A				
Eastbound	Left	57	14	81	45.7	D	9.6	A		
	Thru	324	3	82	3.4	A				
	Right	6	7	126	3.4	A				
Westbound	Left	6	1	20	47.2	D	3.7	A		
	Thru	683	9	115	4.5	A				
	Right	459	0	9	1.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
35	32	-3
85	83	-2
15	15	0
60	57	-3
330	324	-6
5	6	1
5	6	1
685	683	-2
475	459	-16

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	192	29	131	38.2	D	14.8	B	7.9	A
	Thru	19	28	125	39.3	D				
	Right	418	0	12	2.9	A				
Eastbound	Thru	276	7	89	6.5	A	5.1	A		
	Right	164	1	59	2.6	A				
Westbound	Left	144	10	151	5.7	A	4.4	A		
	Thru	735	10	152	4.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	192	2
25	19	-6
420	418	-2
290	276	-14
160	164	4
145	144	-1
745	735	-10

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	481	75	421	32.6	C	29.4	C	20.6	C
	Thru	77	75	421	32.9	C				
	Right	149	84	432	17.2	B				
Eastbound	Left	263	22	176	15.7	B	11.9	B		
	Thru	210	22	175	7.1	A				
Westbound	Thru	398	33	186	17.7	B	16.8	B		
	Right	154	46	215	14.5	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	481	-9
80	77	-3
145	149	4
265	263	-2
215	210	-5
400	398	-2
155	154	-1

NB Orange Line Travel Time (sec)

Avg 378 St Dev 21

SB Orange Line Travel Time (sec)

Avg 375 St Dev 26



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Arterial MOEs (AM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	13	58	64.4	E	41.1	D	17.0	B
	Thru	0	-	-	-	A				
	Right	31	1	45	5.8	A				
Southbound	Left	89	36	147	64.7	E	63.4	E		
	Thru	5	36	148	57.4	E				
	Right	5	44	161	46.1	D				
Eastbound	Left	11	1	19	18.4	B	13.9	B		
	Thru	557	36	220	18.5	B				
	Right	403	19	165	7.4	A				
Westbound	Left	429	101	408	40.9	D	14.8	B		
	Thru	1,063	13	162	4.4	A				
	Right	14	19	186	5.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
0	0	0
30	31	1
90	89	-1
5	5	0
5	5	0
10	11	1
565	557	-8
400	403	3
430	429	-1
1,085	1,063	-22
15	14	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	8	53	74.4	E	42.0	D	5.4	A
	Thru	4	7	52	73.0	E				
	Right	20	12	68	13.1	B				
Southbound	Left	9	4	35	71.5	E	60.8	E		
	Thru	4	4	33	146.5	F				
	Right	10	6	45	16.9	B				
Eastbound	Left	7	0	2	13.2	B	3.9	A		
	Thru	522	4	77	3.6	A				
	Right	145	2	81	4.8	A				
Westbound	Left	454	17	194	11.3	B	4.6	A		
	Thru	1,491	9	194	2.5	A				
	Right	10	9	206	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	14	-1
5	4	-1
30	20	-10
10	9	-1
5	4	-1
10	10	0
5	7	2
530	522	-8
150	145	-5
470	454	-16
1,505	1,491	-14
10	10	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	224	53	240	43.3	D	48.5	D	24.6	C
	Right	743	123	432	50.1	D				
Eastbound	Thru	552	18	137	9.7	A	A			
Westbound	Thru	1,221	54	384	12.5	B	B			

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
215	224	9
750	743	-7
570	552	-18
1,235	1,221	-14

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	16	88	61.6	E	47.8	D	6.7	A
	Thru	14	16	87	60.3	E				
	Right	20	21	101	21.7	C				
Eastbound	Left	137	8	97	17.1	B	6.7	A		
	Thru	436	10	173	4.0	A				
	Right	203	14	205	5.4	A				
Westbound	Left	84	1	45	8.8	A	5.0	A		
	Thru	1,197	14	207	5.0	A				
	Right	141	1	62	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
15	14	-1
20	20	0
145	137	-8
440	436	-4
200	203	3
85	84	-1
1,210	1,197	-13
140	141	1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.4	C	6.4	A
	Right	13	0	41	6.3	A				
Eastbound	Thru	298	6	99	5.1	A	5.1	A		
	Right	157	7	120	5.2	A				
Westbound	Left	257	41	203	29.6	C	6.4	A		
	Thru	1,404	4	138	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	298	-2
160	157	-3
250	257	7
1,415	1,404	-11

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	18	8.3	A	2.1	A	4.3	A
	Thru	28	0	0	0.1	A				
Southbound	Thru	133	6	230	4.7	A	4.3	A		
	Right	467	6	229	4.2	A				
Eastbound	Left	8	1	37	17.3	C	17.3	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	9	4
25	28	3
140	133	-7
480	467	-13
10	8	-2
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	33	0	0	0.1	A	0.1	A	0.6	A
	Right	0	-	-	-	A				
Southbound	Left	88	0	7	0.7	A	0.6	A		
	Thru	45	0	0	0.3	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
37	33	-4
0	0	0
60	88	28
37	45	8
0	0	0
5	4	-1

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	4.2	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.6	A		
	Right	39	0	0	0.6	A				
Eastbound	Left	27	2	73	10.9	B	10.9	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
13	6	-7
12	6	-6
25	39	14
25	27	2
0	0	0

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Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.4	A	3.3	A	13	6	-7
	Right	8	0	0	0.5	A					20	8	-12
Southbound	Thru	6	0	0	0.7	A	0.7	A			12	6	-6
	Left	0	-	-	-	A					0	0	0
Westbound	Left	13	0	37	7.7	A	7.7	A			15	13	-2
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	13	0	1	0.8	A	4.2	A	3.4	A	10	13	3
	Thru	14	0	0	8.5	A					20	14	-6
	Right	5	0	0	1.0	A					5	5	0
Southbound	Thru	19	0	0	0.4	A	0.4	A			15	19	4
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	6	0	52	8.6	A	8.6	A			5	6	1
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	9	4	31	74.6	E	28.6	C	4.1	A	10	9	-1
	Thru	0	-	-	-	A					0	0	0
	Right	20	1	42	7.9	A					20	20	0
Southbound	Left	31	12	70	63.6	E	51.7	D			30	31	1
	Thru	5	12	68	66.6	E					5	5	0
	Right	10	0	37	7.3	A					10	10	0
Eastbound	Left	6	2	24	76.5	E	2.8	A	5	6	1		
	Thru	421	3	65	1.8	A			420	421	1		
	Right	5	5	92	2.1	A			5	5	0		
Westbound	Left	12	0	7	2.3	A	1.8	A	10	12	2		
	Thru	1,010	4	86	1.9	A			1,010	1,010	0		
	Right	31	0	0	1.1	A			35	31	-4		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	77	29	124	66.1	E	44.9	D	11.1	B	75	77	2
	Thru	8	5	41	62.1	E					15	8	-7
	Right	40	0	0	0.7	A					40	40	0
Southbound	Left	8	3	28	60.3	E	36.0	D			5	8	3
	Thru	8	3	45	55.3	E					13	8	-5
	Right	10	4	103	1.1	A					5	10	5
Eastbound	Left	5	2	24	66.3	E	5.1	A	5	5	0		
	Thru	311	6	82	5.9	A			315	311	-4		
	Right	154	1	49	1.6	A			150	154	4		
Westbound	Left	98	24	88	66.4	E	9.2	A	95	98	3		
	Thru	971	10	156	3.5	A			975	971	-4		
	Right	16	12	170	3.3	A			15	16	1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	2	31	89.1	F	57.2	F	1.4	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	31	25.3	D					5	4	-1
Southbound	Left	4	3	34	97.8	F	45.6	E			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	2	32	22.4	C					10	9	-1
Eastbound	Left	37	1	34	9.3	A	1.1	A	40	37	-3		
	Thru	315	0	0	0.1	A			315	315	0		
	Right	5	0	0	0.6	A			5	5	0		
Westbound	Left	8	0	6	2.6	A	0.5	A	10	8	-2		
	Thru	1,070	0	0	0.5	A			1,070	1,070	0		
	Right	9	0	0	0.8	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	7	0	2	1.0	A	0.7	A	1.8	A	5	7	2
	Thru	115	0	0	0.0	A					120	115	-5
	Right	179	0	0	1.2	A					185	179	-6
Southbound	Left	119	2	65	4.6	A	2.3	A			125	119	-6
	Thru	138	0	0	0.3	A					130	138	8
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	6.2	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	25	6.2	A			5	4	-1		
Westbound	Left	13	1	35	13.7	B	8.9	A	15	13	-2		
	Thru	5	1	34	13.0	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		

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Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	5	4.8	A	1.7	A	2.5	A
	Thru	288	4	102	1.2	A				
	Right	212	4	102	2.2	A				
Southbound	Left	68	2	47	6.3	A	2.8	A		
	Thru	78	0	0	0.1	A				
	Right	10	0	0	0.6	A				
Eastbound	Left	4	1	33	22.8	C	10.4	B		
	Thru	0	-	-	-	A				
	Right	16	1	33	7.3	A				
Westbound	Left	8	1	30	20.8	C	15.9	C		
	Thru	0	-	-	-	A				
	Right	5	0	20	8.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	14	-1
300	288	-12
220	212	-8
65	68	3
75	78	3
10	10	0
5	4	-1
0	0	0
15	16	1
10	8	-2
0	0	0
5	5	0

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	675	22	173	11.6	B	10.4	B	16.4	B
	Right	231	13	145	7.0	A				
Southbound	Left	159	16	119	22.1	C	13.1	B		
	Thru	289	6	70	8.2	A				
Westbound	Left	172	82	354	45.1	D	26.2	C		
	Right	529	94	373	20.1	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
670	675	5
235	231	-4
160	159	-1
285	289	4
170	172	2
535	529	-6

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	18	46.1	D	12.8	B	7.3	A
	Right	32	1	59	7.7	A				
Southbound	Left	85	17	82	42.0	D	35.8	D		
	Right	15	0	0	0.8	A				
Eastbound	Left	56	15	85	49.3	D	10.0	B		
	Thru	323	3	77	3.4	A				
	Right	6	7	120	3.3	A				
Westbound	Left	6	1	18	44.8	D	3.7	A		
	Thru	684	9	110	4.6	A				
	Right	457	0	10	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
35	32	-3
85	85	0
15	15	0
60	56	-4
330	323	-7
5	6	1
5	6	1
685	684	-1
475	457	-18

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	196	30	128	37.2	D	13.6	B	7.7	A
	Thru	13	30	130	37.3	D				
	Right	416	0	12	1.7	A				
Eastbound	Thru	280	7	93	6.7	A	5.2	A		
	Right	163	1	60	2.6	A				
Westbound	Left	144	11	154	6.2	A	4.7	A		
	Thru	733	11	155	4.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	196	6
25	13	-12
420	416	-4
290	280	-10
160	163	3
145	144	-1
745	733	-12

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	475	78	434	31.2	C	27.5	C	19.7	B
	Thru	77	78	434	30.3	C				
	Right	151	86	447	14.5	B				
Eastbound	Left	262	22	176	15.1	B	11.3	B		
	Thru	214	22	176	6.7	A				
Westbound	Thru	402	34	187	17.7	B	16.9	B		
	Right	155	46	215	14.9	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	475	-15
80	77	-3
145	151	6
265	262	-3
215	214	-1
400	402	2
155	155	0

NB Orange Line Travel Time (sec)

Avg 383 St Dev 29

SB Orange Line Travel Time (sec)

Avg 336 St Dev 19



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	9.1	A	4.9	A
	Thru	0	-	-	-	A				
	Right	13	1	31	9.1	A				
Southbound	Left	37	17	94	61.0	E	48.3	D		
	Thru	5	17	92	56.4	E				
	Right	22	27	115	25.1	C				
Eastbound	Left	4	10	171	36.9	D	3.3	A		
	Thru	1,284	10	171	3.1	A				
	Right	6	13	194	3.9	A				
Westbound	Left	26	16	231	22.3	C	4.4	A		
	Thru	1,280	16	231	4.0	A				
	Right	19	21	260	5.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
40	37	-3
5	5	0
20	22	2
5	4	-1
1,290	1,284	-6
5	6	1
25	26	1
1,290	1,280	-10
20	19	-1

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	179	63	242	58.1	E	34.5	C	16.9	B
	Thru	10	33	213	51.5	D				
	Right	301	43	227	19.9	B				
Eastbound	Thru	1,402	62	440	15.3	B	14.4	B		
	Right	208	4	96	8.4	A				
Westbound	Left	255	75	267	44.6	D	13.3	B		
	Thru	1,013	22	243	5.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
185	179	-6
10	10	0
305	301	-4
1,415	1,402	-13
205	208	3
255	255	0
1,030	1,013	-17

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	237	79	294	56.5	E	42.1	D	14.0	B
	Thru	8	64	313	61.7	E				
	Right	335	80	333	31.4	C				
Eastbound	Left	186	26	187	28.9	C	5.1	A		
	Thru	1,398	10	192	2.0	A				
Westbound	Thru	1,026	24	177	13.1	B	12.0	B		
	Right	124	2	68	3.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	237	-8
10	8	-2
335	335	0
190	186	-4
1,410	1,398	-12
1,040	1,026	-14
120	124	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	130	43	179	56.9	E	52.3	D	14.6	B
	Thru	45	14	85	50.3	D				
	Right	15	19	100	17.8	B				
Southbound	Left	21	11	78	50.8	D	17.3	B		
	Thru	17	11	78	54.4	D				
	Right	153	7	88	8.5	A				
Eastbound	Left	145	37	194	42.7	D	8.5	A		
	Thru	1,071	18	185	4.3	A				
	Right	189	31	236	5.5	A				
Westbound	Left	20	7	50	64.1	E	15.8	B		
	Thru	669	34	221	14.5	B				
	Right	39	44	245	14.4	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	130	-5
45	45	0
15	15	0
20	21	1
20	17	-3
155	153	-2
145	145	0
1,075	1,071	-4
200	189	-11
20	20	0
670	669	-1
40	39	-1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,240	169	515	36.1	D	36.1	D	24.2	C
Eastbound	Thru	805	91	346	34.9	C	34.9	C		
Westbound	Left	899	30	280	14.8	B	9.6	A		
	Thru	697	0	2	2.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,255	1,240	-15
805	805	0
910	899	-11
700	697	-3

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	33	173	43.9	D	41.2	D	39.5	D
	Right	183	52	201	40.5	D				
Southbound	Left	193	53	260	45.4	D	23.1	C		
	Thru	78	17	106	40.1	D				
	Right	329	8	138	6.0	A				
Eastbound	Thru	1,872	548	1,188	68.8	E	65.7	E		
	Right	137	4	72	23.5	C				
Westbound	Left	166	52	244	50.7	D	8.9	A		
	Thru	1,242	7	142	3.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
50	47	-3
185	183	-2
195	193	-2
80	78	-2
330	329	-1
1,915	1,872	-43
145	137	-8
170	166	-4
1,230	1,242	12

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,835	28	370	12.9	B	11.1	B	6.8	A
	Right	398	0	2	2.9	A				
Westbound	Thru	1,415	0	30	1.0	A	1.0	A		
	Right	225	0	30	1.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,900	1,835	-65
395	398	3
1,400	1,415	15
230	225	-5

West 98th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	349	88	311	50.9	D	40.5	D	21.1	C
	Right	227	25	233	24.6	C				
Eastbound	Left	569	179	396	37.0	D	17.7	B		
	Thru	1,258	37	307	9.0	A				
Westbound	Thru	1,287	74	263	17.4	B	17.8	B		
	Right	264	85	284	20.1	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
350	349	-1
235	227	-8
610	569	-41
1,290	1,258	-32
1,280	1,287	7
270	264	-6

West 98th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	33	0	8	18.6	C	18.6	C	2.6	A
Eastbound	Thru	1,434	7	213	2.3	A	2.3	A		
	Right	49	7	216	2.5	A				
Westbound	Thru	1,551	6	196	2.5	A	2.5	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	33	3
1,470	1,434	-36
55	49	-6
1,550	1,551	1

West 98th Street and Lyndale Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	36	165	50.6	D	41.2	D	34.3	C
	Thru	172	33	127	52.1	D				
	Right	98	6	82	10.1	B				
Southbound	Left	180	56	243	56.0	E	59.5	E		
	Thru	356	144	483	102.6	F				
	Right	285	0	0	7.8	A				
Eastbound	Left	291	41	167	39.1	D	17.0	B		
	Thru	1,016	52	304	13.3	B				
	Right	167	0	0	1.3	A				
Westbound	Left	119	37	108	77.9	E	35.8	D		
	Thru	1,140	124	501	32.0	C				
	Right	21	0	0	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	124	-1
180	172	-8
95	98	3
180	180	0
370	356	-14
290	285	-5
300	291	-9
1,030	1,016	-14
170	167	-3
120	119	-1
1,135	1,140	5
20	21	1

West 99th Street and East Bloomington Freeway

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	31	0	0	0.2	A	0.3	A	0.5	A
	Right	14	0	0	0.6	A				
Westbound	Right	101	0	19	0.6	A	0.6	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
15	14	-1
100	101	1

West 99th Street and Aldrich Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	5.1	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	49	3	70	8.2	A	8.1	A		
	Thru	0	-	-	-	A				
	Right	44	3	70	8.0	A				
Eastbound	Left	9	0	2	1.0	A	1.1	A		
	Thru	12	0	0	1.2	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	2.3	A		
	Thru	50	0	0	1.3	A				
	Right	20	0	0	5.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
50	49	-1
0	0	0
50	44	-6
5	9	4
10	12	2
0	0	0
0	0	0
50	50	0
20	20	0

West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	0	20	3.2	A	0.4	A	1.9	A
	Thru	351	0	0	0.2	A				
	Right	15	0	0	0.7	A				
Southbound	Left	10	0	8	2.5	A	0.8	A		
	Thru	591	0	0	0.7	A				
	Right	40	0	0	1.3	A				
Eastbound	Left	35	4	59	21.0	C	16.7	C		
	Thru	0	-	-	-	A				
	Right	27	1	44	11.2	B				
Westbound	Left	10	2	46	19.2	C	15.3	C		
	Thru	4	2	45	25.1	D				
	Right	15	2	44	10.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
350	351	1
15	15	0
10	10	0
610	591	-19
40	40	0
35	35	0
0	0	0
25	27	2
10	10	0
5	4	-1
15	15	0

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	219	32	226	25.3	C	18.6	B	49.6	D
	Thru	95	8	67	21.8	C				
	Right	137	5	108	5.6	A				
Southbound	Left	11	2	27	34.4	C	46.1	D		
	Thru	224	34	158	48.3	D				
	Right	22	15	219	28.6	C				
Eastbound	Left	9	6	44	56.4	E	48.2	D		
	Thru	11	6	44	57.9	E				
	Right	299	98	300	47.6	D				
Westbound	Left	493	142	450	79.0	E	78.4	E		
	Thru	24	142	449	72.1	E				
	Right	16	163	475	67.6	E				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
235	219	-16
105	95	-10
145	137	-8
10	11	1
230	224	-6
20	22	2
10	9	-1
10	11	1
300	299	-1
500	493	-7
25	24	-1
15	16	1

Nicollet Avenue and Hwy 13

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	349	128	394	81.0	F	63.4	E	71.8	E	357	349	-8
	Thru	128	128	392	78.0	E					130	128	-2
	Right	248	88	391	31.3	C					256	248	-8
Southbound	Left	210	167	497	98.5	F	88.1	F			215	210	-5
	Thru	420	241	520	94.3	F					430	420	-10
	Right	372	265	545	75.3	E					390	372	-18
Eastbound	Left	168	66	177	123.5	F	59.2	E			175	168	-7
	Thru	1,601	682	1,634	59.3	E					1,620	1,601	-19
	Right	375	9	169	29.9	C					381	375	-6
Westbound	Left	300	261	462	148.0	F	79.3	E			316	300	-16
	Thru	1,767	2,002	2,775	71.1	E					1,930	1,767	-163
	Right	162	1	48	41.9	D			180	162	-18		

Nicollet Avenue and Travelers Trail

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	29	1	28	9.4	A	9.7	A	11.4	B	29	29	0
	Thru	471	16	144	10.3	B					475	471	-4
	Right	97	6	104	6.6	A					95	97	2
Southbound	Left	239	8	166	8.7	A	8.0	A			245	239	-6
	Thru	787	23	258	7.7	A					820	787	-33
	Right	64	29	276	9.2	A					62	64	2
Eastbound	Left	90	14	90	30.3	C	24.2	C			93	90	-3
	Thru	51	11	94	28.3	C					51	51	0
	Right	63	16	110	12.1	B					63	63	0
Westbound	Left	119	21	113	33.1	C	18.0	B			115	119	4
	Thru	34	4	47	25.3	C					36	34	-2
	Right	172	0	13	6.1	A			175	172	-3		

Travelers Trail and Pleasant Avenue

(Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	4	1	41	7.4	A	6.0	A	2.9	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	15	0	0	0.6	A	0.2	A			15	15	0
	Thru	28	0	0	0.0	A					30	28	-2

Burnsville Parkway and I-35W SB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	466	231	668	46.6	D	39.8	D	31.4	C	470	466	-4
	Thru	28	227	667	46.9	D					25	28	3
	Right	334	36	425	29.6	C					340	334	-6
Southbound	Left	134	68	260	52.3	D	50.7	D			135	134	-1
	Thru	69	69	260	50.4	D					70	69	-1
	Right	21	83	280	41.2	D					20	21	1
Eastbound	Left	14	1	28	25.6	C	32.8	C			15	14	-1
	Thru	636	82	303	33.0	C					642	636	-6
	Right	73	110	346	32.0	C					70	73	3
Westbound	Left	225	32	172	29.0	C	19.5	B			245	225	-20
	Thru	732	42	241	17.0	B					743	732	-11
	Right	68	69	293	14.4	B			70	68	-2		

Burnsville Parkway and I-35W NB Ramps

(Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	121	33	147	47.1	D	26.2	C	10.6	B	120	121	1
	Thru	4	33	147	37.6	D					5	4	-1
	Right	135	5	74	7.2	A					138	135	-3
Southbound	Left	6	19	122	77.1	E	38.8	D			5	6	1
	Thru	21	20	124	74.7	E					20	21	1
	Right	59	32	158	22.1	C					60	59	-1
Eastbound	Left	11	0	6	6.9	A	5.9	A			15	11	-4
	Thru	744	15	199	5.6	A					747	744	-3
	Right	348	24	236	6.5	A					355	348	-7
Westbound	Left	212	24	159	26.7	C	9.3	A			220	212	-8
	Thru	848	12	150	5.1	A					878	848	-30
	Right	6	22	201	2.9	A			5	6	1		

Burnsville Parkway and Gateway Boulevard

(Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	61	483	655	532.8	F	520.1	F	28.5	D	85	61	-24
	Thru	0	-	-	-	A					0	0	0
	Right	42	474	644	501.6	F					55	42	-13
Southbound	Left	10	27	140	68.4	F	36.6	E			10	10	0
	Thru	4	27	142	66.8	F					5	4	-1
	Right	111	26	140	32.7	D					115	111	-4
Eastbound	Left	13	0	20	6.6	A	0.7	A			15	13	-2
	Thru	785	1	49	0.4	A					790	785	-5
	Right	86	1	48	1.9	A					85	86	1
Westbound	Left	92	4	64	9.3	A	1.5	A			90	92	2
	Thru	895	3	82	0.7	A					903	895	-8
	Right	10	3	80	1.5	A			10	10	0		



2040\_PM\_Build 66th, 98th, Burns  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Burnsville Parkway and Pleasant Avenue

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	74	26	130	51.5	D	45.6	D	9.0	A	75	74	-1
	Thru	0	-	-	-	A					0	0	0
	Right	27	38	151	29.4	C					30	27	-3
Southbound	Left	83	43	187	55.3	E	45.2	D			85	83	-2
	Thru	5	42	183	51.5	D					5	5	0
	Right	78	61	214	34.1	C					80	78	-2
Eastbound	Left	8	0	5	7.4	A	2.1	A			10	8	-2
	Thru	794	5	86	2.1	A					810	794	-16
	Right	36	0	3	1.6	A					35	36	1
Westbound	Left	39	1	26	8.2	A	4.7	A	40	39	-1		
	Thru	844	10	150	4.5	A			848	844	-4		
	Right	16	0	1	2.6	A			15	16	1		

SB Orange Line Travel Time- 98th Street (sec)

Avg                      St Dev  
 239                              28

SB Orange Line Travel Time- Burnsville (sec)

Avg                      St Dev  
 932                              18

2040\_PM\_Downtown Build 12th Street Transit Ramp Option  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



**South 12th Street and Marquette Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	318	26	163	17.8	B	16.6	B	23.3	C	315	318	3
	Right	158	34	191	14.2	B					160	158	-2
Southbound	Left	87	14	97	42.1	D	38.5	D			76	87	11
	Thru	13	13	96	14.4	B					15	13	-2
Eastbound	Left	91	54	217	25.7	C	25.3	C			90	91	1
	Thru	764	54	217	25.2	C					760	764	4
	Right	4	63	241	19.5	B			5	4	-1		

**South 12th Street and 2nd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	36	18	94	71.1	E	55.7	E	23.7	C	27	36	9
	Right	84	17	94	49.0	D					85	84	-1
Southbound	Left	366	111	417	33.6	C	26.0	C			375	366	-9
	Thru	667	111	418	21.8	C					660	667	7
Eastbound	Left	70	66	222	18.9	B	17.6	B			70	70	0
	Thru	798	68	223	17.7	B					810	798	-12
	Right	77	83	250	15.1	B			80	77	-3		
Westbound - Bus Only	Right	16	0	29	3.9	A	3.9	A	16	16	0		

**South 12th Street and 3rd Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	229	19	95	24.6	C	24.3	C	20.1	C	230	229	-1
	Right	4	0	16	7.0	A					5	4	-1
Southbound	Left	308	60	318	33.7	C	26.9	C			305	308	3
	Thru	857	80	369	24.4	C					855	857	2
Eastbound	Left	241	54	288	14.9	B	13.4	B			225	241	16
	Thru	913	54	287	13.7	B					905	913	8
	Right	139	6	90	9.2	A			140	139	-1		
Westbound - Bus Only	Thru	16	1	50	12.8	B	12.8	B	16	16	0		

**South 12th Street and 4th Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Eastbound	Left	61	0	5	0.7	A	0.8	A	0.8	A	60	61	1
	Thru	546	0	2	0.4	A					538	546	8
	HOV/Bus	87	0	1	0.6	A					82	87	5
	Right	532	0	4	1.1	A					535	532	-3
Westbound - Bus Only	-	16	0	0	0.6	A	0.6	A	16	16	0		

**I-35W Entrances and Exits (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Bus Lane	16	0	0	1.7	A	0.9	A	2.7	A	16	16	0
	Thru	1,754	0	24	0.8	A					1,740	1,754	14
	Right	1,043	0	24	1.2	A					1,070	1,043	-27
Southbound	Left	540	54	170	21.6	C	4.5	A			538	540	2
	Thru	2,092	0	0	0.3	A					2,100	2,092	-8
	Bus Lane	88	0	0	0.7	A					82	88	6

**I-35W SB Bridge (Unsignalized)**

Direction	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Thru	2,722	2	64	0.3	A	0.3	A	0.3	A	2,720	2,722	2

**2040\_PM\_Build Knox Curved Alignment**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	355	113	404	56.1	E	48.2	D	23.8	C
	Thru	0	-	-	-	A				
	Right	432	131	410	41.6	D				
Southbound	Left	33	13	79	67.5	E	63.8	E		
	Thru	0	-	-	-	A				
	Right	4	19	92	33.3	C				
Eastbound	Left	27	1	30	15.1	B	14.7	B		
	Thru	1,381	70	467	15.1	B				
	Right	68	2	82	5.9	A				
Westbound	Left	33	2	37	20.4	C	16.5	B		
	Thru	936	52	328	16.4	B				
	Right	5	60	353	13.8	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	355	-5
0	0	0
445	432	-13
35	33	-2
0	0	0
5	4	-1
25	27	2
1,385	1,381	-4
70	68	-2
35	33	-2
950	936	-14
5	5	0

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	183	188	432	56.5	E	64.7	E	22.4	C
	Thru	5	203	450	91.9	F				
	Right	393	204	450	68.1	E				
Southbound	Left	10	2	27	39.1	D	18.0	B		
	Thru	0	-	-	-	A				
	Right	19	1	36	6.9	A				
Eastbound	Left	17	0	13	13.6	B	14.5	B		
	Thru	1,761	89	650	14.7	B				
	Right	57	1	62	9.5	A				
Westbound	Left	48	5	76	28.4	C	10.5	B		
	Thru	765	24	199	9.5	A				
	Right	19	26	209	7.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	183	-12
5	5	0
420	393	-27
10	10	0
0	0	0
20	19	-1
15	17	2
1,790	1,761	-29
60	57	-3
50	48	-2
775	765	-10
20	19	-1

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	143	48	189	62.5	E	57.1	E	18.2	B
	Right	197	41	140	53.3	D				
Eastbound	Thru	2,156	135	633	16.3	B	16.3	B		
Westbound	Thru	637	6	90	3.8	A	3.8	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
150	143	-7
195	197	2
2,220	2,156	-64
650	637	-13

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	57	217	61.8	E	55.9	E	19.7	B
	Thru	69	57	217	59.8	E				
	Right	49	66	229	43.6	D				
Eastbound	Left	816	255	642	40.3	D	17.3	B		
	Thru	1,437	15	210	4.6	A				
	Right	35	22	243	5.8	A				
Westbound	Left	23	2	35	30.0	C	18.4	B		
	Thru	586	36	200	19.0	B				
	Right	202	14	131	15.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	69	-1
50	49	-1
855	816	-39
1,480	1,437	-43
35	35	0
25	23	-2
595	586	-9
205	202	-3

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	190	174	446	92.6	F	74.3	E	21.3	C
	Right	307	179	440	62.9	E				
Eastbound	Thru	1,411	50	462	9.8	A	9.7	A		
	Right	64	53	480	9.1	A				
Westbound	Left	21	8	52	68.7	E	6.9	A		
	Thru	626	8	116	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	190	-5
310	307	-3
1,465	1,411	-54
65	64	-1
20	21	1
630	626	-4

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	1.3	A	79.8	F
	Thru	175	0	1	1.3	A				
Southbound	Thru	88	2	79	4.7	A	4.5	A		
	Right	18	2	78	3.4	A				
Eastbound	Left	414	340	483	132.2	F	131.7	F		
	Right	4	342	487	83.4	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	175	5
80	88	8
15	18	3
440	414	-26
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	106	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	66	0	9	0.9	A	0.7	A		
	Thru	27	0	1	0.4	A				
Westbound	Left	0	-	-	-	A	7.2	A		
	Right	69	3	59	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	106	6
0	0	0
60	66	6
25	27	2
0	0	0
70	69	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	7.8	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.5	A		
	Right	21	0	0	0.6	A				
Eastbound	Left	100	6	91	10.3	B	10.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
25	21	-4
100	100	0
0	0	0



2040\_PM\_Build Knox Curved Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	0	-	-	-	A	11.0	B	0.5	A
	Right	6	1	83	11.0	B				
Eastbound	Left	6	0	2	0.2	A	0.1	A		
	Thru	91	0	0	0.1	A				
Westbound	Thru	58	0	0	0.1	A	0.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
7	6	-1
100	91	-9
60	58	-2
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	0	6	0.8	A	1.9	A	2.3	A
	Thru	96	0	1	2.5	A				
	Right	29	0	1	1.3	A				
Southbound	Thru	56	0	0	0.6	A	0.7	A		
	Right	10	0	0	1.0	A				
Eastbound	Right	23	1	53	7.9	A	7.9	A		
Westbound	Right	0	-	-	-	A	10.2	B		
	Left	8	0	37	10.2	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
100	96	-4
30	29	-1
50	56	6
10	10	0
25	23	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	33	186	55.3	E	43.3	D	24.7	C
	Thru	21	20	156	48.4	D				
	Right	104	27	166	30.9	C				
Southbound	Left	132	51	224	56.1	E	39.6	D		
	Thru	15	52	223	54.1	D				
	Right	86	3	76	11.8	B				
Eastbound	Left	76	21	124	62.7	E	25.7	C		
	Thru	1,732	178	708	24.2	C				
	Right	97	194	736	23.0	C				
Westbound	Left	97	8	89	15.8	B	16.3	B		
	Thru	930	40	254	17.3	B				
	Right	86	1	42	6.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
105	99	-6
25	21	-4
100	104	4
135	132	-3
15	15	0
90	86	-4
75	76	1
1,735	1,732	-3
95	97	2
95	97	2
935	930	-5
95	86	-9

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	237	85	304	59.5	E	42.8	D	24.2	C
	Thru	65	12	73	40.7	D				
	Right	91	0	0	0.9	A				
Southbound	Left	34	9	62	53.0	D	40.6	D		
	Thru	41	8	54	41.8	D				
	Right	12	4	103	1.2	A				
Eastbound	Left	46	17	91	78.3	E	23.8	C		
	Thru	1,718	214	818	22.9	C				
	Right	191	165	717	18.4	B				
Westbound	Left	55	16	66	63.2	E	16.1	B		
	Thru	867	43	245	13.4	B				
	Right	54	49	259	10.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	237	-8
70	65	-5
95	91	-4
35	34	-1
40	41	1
10	12	2
45	46	1
1,725	1,718	-7
200	191	-9
55	55	0
870	867	-3
55	54	-1

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	2	31	71.2	F	53.5	F	2.0	A
	Thru	0	-	-	-	A				
	Right	4	1	31	35.8	E				
Southbound	Left	9	21	86	116.1	F	74.8	F		
	Thru	5	24	88	114.4	F				
	Right	34	21	86	58.0	F				
Eastbound	Left	10	0	19	7.7	A	0.4	A		
	Thru	1,821	0	0	0.4	A				
	Right	9	0	0	0.8	A				
Westbound	Left	4	0	10	22.6	C	0.9	A		
	Thru	940	0	3	0.8	A				
	Right	14	0	3	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
10	9	-1
5	5	0
35	34	-1
10	10	0
1,835	1,821	-14
10	9	-1
5	4	-1
940	940	0
15	14	-1

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	36	0	23	2.1	A	0.4	A	17.1	C
	Thru	220	0	0	0.1	A				
	Right	31	0	0	0.8	A				
Southbound	Left	26	0	23	2.4	A	0.4	A		
	Thru	256	0	0	0.1	A				
	Right	5	0	0	0.7	A				
Eastbound	Left	5	0	17	19.5	C	8.8	A		
	Thru	0	-	-	-	A				
	Right	41	1	41	7.5	A				
Westbound	Left	201	114	351	56.2	F	43.9	E		
	Thru	5	101	340	56.4	F				
	Right	167	68	276	28.6	D				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	36	1
240	220	-20
35	31	-4
35	26	-9
255	256	1
5	5	0
5	5	0
0	0	0
40	41	1
210	201	-9
5	5	0
165	167	2

2040\_PM\_Build Knox Curved Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	0	16	9.2	A	1.2	A	47.9	E	15	14	-1
	Thru	219	2	43	0.7	A					230	219	-11
	Right	28	2	45	1.7	A					25	28	3
Southbound	Left	10	1	17	19.2	C	1.3	A			10	10	0
	Thru	478	0	0	0.9	A					485	478	-7
	Right	10	0	0	0.7	A					10	10	0
Eastbound	Left	4	1	28	27.3	D	14.3	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	8.6	A					10	9	-1
Westbound	Left	124	315	411	265.1	F	239.5	F	150	124	-26		
	Thru	0	-	-	-	A			0	0	0		
	Right	63	289	397	189.1	F			75	63	-12		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	596	19	122	11.4	B	9.8	A	13.6	B	595	596	1
	Right	245	7	94	5.9	A					245	245	0
Southbound	Left	546	102	398	30.5	C	16.0	B			550	546	-4
	Thru	712	7	86	4.9	A					710	712	2
Westbound	Left	186	25	174	21.5	C	14.1	B			190	186	-4
	Right	265	33	190	8.9	A					275	265	-10

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	17	87.7	F	25.3	C	20.9	C	5	4	-1
	Right	16	1	52	9.7	A					15	16	1
Southbound	Left	534	120	300	56.4	E	51.0	D			575	534	-41
	Right	59	0	0	2.7	A					65	59	-6
Eastbound	Left	26	8	57	59.5	E	9.9	A			25	26	1
	Thru	750	22	222	8.2	A					755	750	-5
	Right	17	33	266	8.0	A			15	17	2		
Westbound	Left	15	5	38	67.9	E	6.7	A	15	15	0		
	Thru	395	11	108	7.8	A			395	395	0		
	Right	234	0	0	0.9	A			240	234	-6		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	161	19	98	29.8	C	14.5	B	10.3	B	160	161	1
	Thru	21	19	98	28.2	C					30	21	-9
	Right	222	0	2	2.1	A					220	222	2
Eastbound	Thru	672	29	214	12.5	B	11.0	B			700	672	-28
	Right	630	29	320	9.4	A					645	630	-15
Westbound	Left	252	15	142	13.2	B	6.6	A			250	252	2
	Thru	421	15	142	2.6	A			430	421	-9		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	265	38	156	29.7	C	25.7	C	17.3	B	270	265	-5
	Thru	43	38	157	31.1	C					45	43	-2
	Right	150	46	168	17.1	B					150	150	0
Eastbound	Left	364	118	335	45.1	D	21.9	C			370	364	-6
	Thru	471	118	335	4.0	A					490	471	-19
Westbound	Thru	407	10	134	5.0	A	5.1	A			410	407	-3
	Right	225	14	155	5.4	A			225	225	0		

NB Orange Line Travel Time (sec)

Avg 405 St Dev 31

SB Orange Line Travel Time (sec)

Avg 396 St Dev 10

2040\_PM\_Build Knox Direct Alignment  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	109	413	56.1	E	48.3	D	24.1	C
	Thru	0	-	-	-	A				
	Right	432	131	417	41.9	D				
Southbound	Left	33	14	81	68.2	E	64.6	E		
	Thru	0	-	-	-	A				
	Right	4	19	94	35.0	C				
Eastbound	Left	28	1	29	13.4	B	15.0	B		
	Thru	1,381	72	479	15.5	B				
	Right	69	2	79	6.0	A				
Westbound	Left	33	2	38	22.4	C	16.9	B		
	Thru	935	53	333	16.7	B				
	Right	5	61	359	13.4	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
445	432	-13
35	33	-2
0	0	0
5	4	-1
25	28	3
1,385	1,381	-4
70	69	-1
35	33	-2
950	935	-15
5	5	0

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	181	176	415	55.6	E	62.9	E	22.5	C
	Thru	5	193	430	96.7	F				
	Right	394	192	433	65.8	E				
Southbound	Left	10	2	27	39.7	D	18.2	B		
	Thru	0	-	-	-	A				
	Right	19	1	36	6.9	A				
Eastbound	Left	17	0	13	14.5	B	15.2	B		
	Thru	1,763	94	663	15.4	B				
	Right	57	1	60	10.4	B				
Westbound	Left	49	6	75	29.4	C	10.6	B		
	Thru	765	24	201	9.5	A				
	Right	18	26	212	8.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	181	-14
5	5	0
420	394	-26
10	10	0
0	0	0
20	19	-1
15	17	2
1,790	1,763	-27
60	57	-3
50	49	-1
775	765	-10
20	18	-2

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	142	48	188	62.5	E	57.3	E	18.0	B
	Right	197	41	140	53.5	D				
Eastbound	Thru	2,161	133	621	16.0	B	16.0	B		
Westbound	Thru	637	6	86	3.8	A	3.8	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
150	142	-8
195	197	2
2,220	2,161	-59
650	637	-13

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	56	217	61.8	E	55.9	E	19.5	B
	Thru	69	56	217	59.8	E				
	Right	48	66	229	43.3	D				
Eastbound	Left	820	247	638	39.4	D	17.1	B		
	Thru	1,434	15	203	4.6	A				
	Right	34	22	235	5.9	A				
Westbound	Left	23	2	35	29.8	C	18.6	B		
	Thru	586	37	201	19.3	B				
	Right	203	14	132	15.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	69	-1
50	48	-2
855	820	-35
1,480	1,434	-46
35	34	-1
25	23	-2
595	586	-9
205	203	-2

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	191	154	441	86.7	F	68.8	E	20.2	C
	Right	308	165	448	57.7	E				
Eastbound	Thru	1,410	49	445	9.6	A	9.6	A		
	Right	64	53	465	9.1	A				
Westbound	Left	21	8	52	68.7	E	6.9	A		
	Thru	626	8	116	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	191	-4
310	308	-2
1,465	1,410	-55
65	64	-1
20	21	1
630	626	-4

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	1.2	A	76.8	F
	Thru	175	0	0	1.2	A				
Southbound	Thru	88	2	77	4.5	A	4.2	A		
	Right	18	2	77	2.8	A				
Eastbound	Left	414	330	475	127.4	F	126.9	F		
	Right	4	332	478	73.2	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	175	5
80	88	8
15	18	3
440	414	-26
5	4	-1

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	106	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	65	0	11	0.9	A	0.7	A		
	Thru	27	0	3	0.4	A				
Westbound	Left	0	-	-	-	A	7.2	A		
	Right	69	3	59	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	106	6
0	0	0
60	65	5
25	27	2
0	0	0
70	69	-1

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	7.9	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.5	A		
	Right	21	0	0	0.6	A				
Eastbound	Left	100	6	92	10.3	B	10.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
25	21	-4
100	100	0
0	0	0



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Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	6	0	0	0.3	A	0.8	A	3.7	A
	Right	90	0	0	0.8	A				
Southbound	Thru	6	0	0	0.7	A	0.7	A		
	Left	0	-	-	-	A				
Westbound	Left	58	2	56	9.0	A	9.0	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
7	6	-1
100	90	-10
6	6	0
0	0	0
60	58	-2
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	0	7	0.9	A	1.4	A	1.9	A
	Thru	97	0	0	1.6	A				
	Right	29	0	0	1.2	A				
Southbound	Thru	53	0	0	0.3	A	0.3	A		
	Right	10	0	0	0.6	A				
Eastbound	Right	23	1	53	7.9	A	7.9	A		
Westbound	Right	0	-	-	-	A	9.2	A		
	Left	8	0	37	9.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
100	97	-3
30	29	-1
50	53	3
10	10	0
25	23	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	33	183	54.9	D	43.6	D	25.8	C
	Thru	21	20	163	48.3	D				
	Right	103	28	175	31.8	C				
Southbound	Left	132	51	222	56.2	E	40.0	D		
	Thru	16	51	221	56.3	E				
	Right	86	3	77	11.9	B				
Eastbound	Left	76	22	136	65.6	E	27.2	C		
	Thru	1,733	199	721	25.7	C				
	Right	97	216	749	23.7	C				
Westbound	Left	96	7	89	15.3	B	16.8	B		
	Thru	932	42	256	17.9	B				
	Right	87	1	43	6.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
105	99	-6
25	21	-4
100	103	3
135	132	-3
15	16	1
90	86	-4
75	76	1
1,735	1,733	-2
95	97	2
95	96	1
935	932	-3
95	87	-8

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	239	85	310	59.8	E	43.1	D	24.3	C
	Thru	65	13	70	40.6	D				
	Right	91	0	0	1.0	A				
Southbound	Left	34	9	61	51.6	D	41.8	D		
	Thru	40	9	62	45.6	D				
	Right	12	4	102	1.3	A				
Eastbound	Left	47	17	93	77.7	E	23.8	C		
	Thru	1,720	215	822	22.9	C				
	Right	192	166	722	18.5	B				
Westbound	Left	55	16	66	61.8	E	16.3	B		
	Thru	867	45	260	13.7	B				
	Right	54	50	274	10.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	239	-6
70	65	-5
95	91	-4
35	34	-1
40	40	0
10	12	2
45	47	2
1,725	1,720	-5
200	192	-8
55	55	0
870	867	-3
55	54	-1

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	30	69.7	F	51.3	F	2.3	A
	Thru	0	-	-	-	A				
	Right	4	1	31	32.8	D				
Southbound	Left	9	25	95	136.5	F	87.5	F		
	Thru	5	28	97	120.3	F				
	Right	35	26	94	70.2	F				
Eastbound	Left	10	0	20	10.0	A	0.4	A		
	Thru	1,821	0	0	0.4	A				
	Right	9	0	0	0.7	A				
Westbound	Left	4	0	10	20.9	C	1.1	A		
	Thru	941	0	3	1.0	A				
	Right	14	0	3	1.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
10	9	-1
5	5	0
35	35	0
10	10	0
1,835	1,821	-14
10	9	-1
5	4	-1
940	941	1
15	14	-1

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	36	0	18	2.1	A	0.4	A	16.7	C
	Thru	220	0	0	0.1	A				
	Right	31	0	0	0.8	A				
Southbound	Left	26	0	21	2.5	A	0.4	A		
	Thru	257	0	0	0.2	A				
	Right	5	0	0	0.8	A				
Eastbound	Left	5	0	17	21.9	C	9.1	A		
	Thru	0	-	-	-	A				
	Right	41	1	42	7.6	A				
Westbound	Left	203	113	354	54.9	F	42.7	E		
	Thru	5	101	344	52.1	F				
	Right	168	67	281	27.5	D				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	36	1
240	220	-20
35	31	-4
35	26	-9
255	257	2
5	5	0
5	5	0
0	0	0
40	41	1
210	203	-7
5	5	0
165	168	3

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Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	0	18	9.3	A	1.2	A	47.9	E	15	14	-1
	Thru	220	2	46	0.7	A					230	220	-10
	Right	28	2	48	1.8	A					25	28	3
Southbound	Left	10	1	19	15.7	C	1.1	A			10	10	0
	Thru	479	0	0	0.8	A					485	479	-6
	Right	10	0	0	0.7	A					10	10	0
Eastbound	Left	4	1	28	30.2	D	15.6	C			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	9.1	A					10	9	-1
Westbound	Left	123	320	415	267.9	F	240.3	F			150	123	-27
	Thru	0	-	-	-	A			0	0	0		
	Right	64	294	402	187.2	F			75	64	-11		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	596	19	121	11.4	B	9.8	A	13.8	B	595	596	1
	Right	245	6	93	6.0	A					245	245	0
Southbound	Left	546	110	422	31.5	C	16.4	B			550	546	-4
	Thru	711	7	85	4.8	A					710	711	1
Westbound	Left	187	25	175	21.5	C	14.1	B			190	187	-3
	Right	266	34	191	8.9	A					275	266	-9

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	17	87.9	F	26.4	C	21.1	C	5	4	-1
	Right	16	1	52	11.0	B					15	16	1
Southbound	Left	536	121	298	56.8	E	51.3	D			575	536	-39
	Right	60	0	0	2.6	A					65	60	-5
Eastbound	Left	26	8	58	58.9	E	10.0	A			25	26	1
	Thru	750	23	231	8.4	A					755	750	-5
	Right	17	33	275	7.5	A					15	17	2
Westbound	Left	15	5	40	65.7	E	6.7	A			15	15	0
	Thru	395	11	103	8.0	A					395	395	0
Right	234	0	0	0.9	A	240	234	-6					

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	161	20	97	28.5	C	13.4	B	10.3	B	160	161	1
	Thru	21	20	97	27.1	C					30	21	-9
	Right	222	0	2	1.2	A					220	222	2
Eastbound	Thru	672	30	208	13.1	B	11.2	B			700	672	-28
	Right	629	28	323	9.1	A					645	629	-16
Westbound	Left	251	16	133	14.0	B	6.9	A			250	251	1
	Thru	421	16	133	2.6	A			430	421	-9		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	265	36	154	27.9	C	23.4	C	16.8	B	270	265	-5
	Thru	42	37	154	26.7	C					45	42	-3
	Right	150	45	167	14.4	B					150	150	0
Eastbound	Left	363	122	344	45.5	D	22.1	C			370	363	-7
	Thru	470	122	343	3.9	A					490	470	-20
Westbound	Thru	407	10	130	5.0	A	5.1	A			410	407	-3
	Right	225	14	150	5.3	A			225	225	0		

NB Orange Line Travel Time (sec)

Avg 381 St Dev 37

SB Orange Line Travel Time (sec)

Avg 395 St Dev 9

2040 Build TSP MOEs



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	27	36.8	D	16.6	B	5.6	A
	Thru	0	-	-	-	A				
	Right	9	2	34	7.7	A				
Southbound	Left	33	10	72	43.1	D	35.8	D	5.6	A
	Thru	4	10	72	46.7	D				
	Right	17	17	93	19.0	B				
Eastbound	Left	0	-	-	-	A	3.8	A	5.6	A
	Thru	409	5	75	3.8	A				
	Right	4	8	95	2.4	A				
Westbound	Left	10	19	252	7.6	A	4.9	A	5.6	A
	Thru	1,330	19	248	4.8	A				
	Right	5	25	275	4.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
10	9	-1
35	33	-2
5	4	-1
15	17	2
0	0	0
410	409	-1
5	4	-1
10	10	0
1,350	1,330	-20
5	5	0

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	161	29	148	50.4	D	51.3	D	22.3	C
	Thru	45	242	747	57.5	E				
	Right	568	259	769	51.1	D				
Eastbound	Thru	485	26	162	23.3	C	19.0	B	22.3	C
	Right	160	6	96	5.7	A				
Westbound	Left	314	30	236	16.6	B	9.1	A	22.3	C
	Thru	1,237	38	276	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
160	161	1
40	45	5
575	568	-7
500	485	-15
160	160	0
310	314	4
1,260	1,237	-23

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	263	63	277	41.7	D	28.8	C	14.6	B
	Thru	32	22	204	40.0	D				
	Right	258	30	223	14.4	B				
Eastbound	Left	131	21	146	34.6	C	12.1	B	14.6	B
	Thru	515	13	138	6.4	A				
Westbound	Thru	1,286	26	322	10.8	B	10.2	B	14.6	B
	Right	133	2	72	4.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
270	263	-7
30	32	2
255	258	3
135	131	-4
525	515	-10
1,300	1,286	-14
130	133	3

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	254	66	294	43.5	D	42.1	D	16.8	B
	Thru	39	7	67	35.5	D				
	Right	5	10	81	18.1	B				
Southbound	Left	25	7	74	32.8	C	13.9	B	16.8	B
	Thru	16	7	74	34.1	C				
	Right	192	11	114	9.8	A				
Eastbound	Left	66	10	93	30.1	C	6.7	A	16.8	B
	Thru	430	9	114	4.1	A				
	Right	206	21	164	4.4	A				
Westbound	Left	6	2	25	51.0	D	17.1	B	16.8	B
	Thru	946	56	306	17.0	B				
	Right	16	68	333	15.6	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
250	254	4
40	39	-1
5	5	0
25	25	0
15	16	1
195	192	-3
65	66	1
435	430	-5
210	206	-4
5	6	1
960	946	-14
15	16	1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	933	0	2	1.5	A	1.5	A	6.1	A
Eastbound	Thru	263	13	86	14.9	B	14.9	B		
Westbound	Left	748	22	171	12.4	B	7.4	A		
	Thru	693	0	2	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
935	933	-2
265	263	-2
755	748	-7
700	693	-7

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	81	53	210	41.5	D	34.9	C	22.7	C
	Right	285	72	237	33.1	C				
Southbound	Left	189	43	202	40.7	D	17.9	B	22.7	C
	Thru	64	13	91	37.7	D				
	Right	412	6	123	4.4	A				
Eastbound	Thru	1,146	113	401	35.0	C	33.7	C	22.7	C
	Right	50	1	49	5.1	A				
Westbound	Left	98	24	138	43.1	D	9.0	A	22.7	C
	Thru	956	12	153	5.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	81	-4
285	285	0
185	189	4
65	64	-1
415	412	-3
1,150	1,146	-4
50	50	0
100	98	-2
955	956	1

West 98th Street and I-35W SB Ramps

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,475	20	313	13.1	B	12.1	B	7.2	A
	Right	142	0	0	1.5	A				
Westbound	Thru	1,054	0	1	0.5	A	0.5	A	7.2	A
	Right	118	0	1	0.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,485	1,475	-10
135	142	7
1,055	1,054	-1
115	118	3

West 98th Street and I-35W NB Ramps (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	308	76	306	45.8	D	35.0	D	21.1	C	300	308	8
	Right	244	16	199	21.4	C					250	244	-6
Eastbound	Left	428	203	394	54.5	D	21.9	C			445	428	-17
	Thru	1,044	30	313	8.6	A					1,040	1,044	4
Westbound	Thru	864	43	252	13.4	B	13.6	B			870	864	-6
	Right	316	50	272	14.0	B					320	316	-4

West 98th Street and Aldrich Avenue South (Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Right	0	-	-	-	A	#VALUE!	#VALUE!	1.4	A	5	0	-5
Eastbound	Thru	1,176	4	176	1.9	A	1.9	A			1,180	1,176	-4
	Right	110	4	175	2.1	A					110	110	0
Westbound	Thru	1,182	0	38	0.9	A	0.9	A	1,190	1,182	-8		

West 98th Street and Lyndale Avenue South (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	84	18	110	39.9	D	38.2	D	28.7	C	85	84	-1
	Thru	149	26	99	48.1	D					155	149	-6
	Right	56	3	65	9.5	A					55	56	1
Southbound	Left	64	20	106	54.6	D	125.8	F			65	64	-1
	Thru	63	93	191	418.7	F					70	63	-7
	Right	111	0	0	0.7	A					110	111	1
Eastbound	Left	287	41	168	39.4	D	14.1	B	295	287	-8		
	Thru	768	17	182	6.7	A			775	768	-7		
	Right	119	0	0	1.1	A			115	119	4		
Westbound	Left	48	14	71	61.5	E	20.7	C	50	48	-2		
	Thru	990	62	321	19.5	B			995	990	-5		
	Right	40	0	0	1.0	A			35	40	5		

West 99th Street and East Bloomington Freeway (Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Thru	40	0	0	0.2	A	0.4	A	0.5	A	40	40	0
	Right	22	0	0	0.7	A					25	22	-3
Westbound	Right	48	0	21	0.7	A	0.7	A			40	48	8

West 99th Street and Aldrich Avenue South (Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	3.9	A	0	0	0
	Thru	0	-	-	-	A					0	0	0
	Right	0	-	-	-	A					0	0	0
Southbound	Left	11	1	50	7.2	A	8.0	A			10	11	1
	Thru	0	-	-	-	A					0	0	0
	Right	20	1	50	8.4	A					15	20	5
Eastbound	Left	14	0	6	1.0	A	1.0	A	10	14	4		
	Thru	15	0	1	1.0	A			15	15	0		
	Right	0	-	-	-	A			0	0	0		
Westbound	Left	0	-	-	-	A	3.3	A	0	0	0		
	Thru	26	0	0	2.4	A			25	26	1		
	Right	40	0	0	3.8	A			40	40	0		

West 99th Street and Lyndale Avenue South (Unsignalized)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	30	0	13	2.2	A	0.3	A	1.0	A	30	30	0
	Thru	272	0	0	0.1	A					275	272	-3
	Right	4	0	0	0.6	A					5	4	-1
Southbound	Left	10	0	8	2.1	A	0.6	A			10	10	0
	Thru	187	0	0	0.3	A					190	187	-3
	Right	34	0	2	1.5	A					35	34	-1
Eastbound	Left	14	1	40	14.7	B	12.0	B	15	14	-1		
	Thru	0	-	-	-	A			0	0	0		
	Right	11	0	37	8.6	A			10	11	1		
Westbound	Left	0	-	-	-	A	8.1	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	30	8.1	A			5	4	-1		

Nicollet Avenue and River Ridge Lane (Signal)											Target Volume	Simulated Volume	Difference
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	(vph)	(vph)	(vph)
Northbound	Left	378	26	309	12.4	B	10.3	B	14.3	B	395	378	-17
	Thru	262	9	112	9.5	A					270	262	-8
	Right	532	28	339	9.1	A					570	532	-38
Southbound	Left	12	1	19	19.2	B	16.4	B			10	12	2
	Thru	75	7	72	18.9	B					80	75	-5
	Right	26	4	133	7.8	A					25	26	1
Eastbound	Left	42	13	78	45.8	D	23.3	C	40	42	2		
	Thru	9	13	78	46.4	D			10	9	-1		
	Right	67	3	71	6.1	A			70	67	-3		
Westbound	Left	85	21	91	44.1	D	40.8	D	85	85	0		
	Thru	26	21	91	42.0	D			30	26	-4		
	Right	16	35	115	21.1	C			15	16	1		

**Nicollet Avenue and Hwy 13**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	521	421	709	99.6	F	95.5	F	64.5	E
	Thru	480	420	709	97.8	F				
	Right	137	27	241	72.1	E				
Southbound	Left	46	23	104	84.4	F	62.0	E		
	Thru	77	33	106	84.3	F				
	Right	109	53	130	36.8	D				
Eastbound	Left	455	137	397	96.8	F	61.1	E		
	Thru	1,706	1,034	2,148	55.1	E				
	Right	181	0	29	27.7	C				
Westbound	Left	169	69	168	109.0	F	47.2	D		
	Thru	1,140	202	772	45.2	D				
	Right	246	10	118	14.1	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
551	521	-30
515	480	-35
145	137	-8
50	46	-4
75	77	2
110	109	-1
465	455	-10
1,730	1,706	-24
173	181	8
160	169	9
1,145	1,140	-5
255	246	-9

**Nicollet Avenue and Travelers Trail**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	57	1	43	74.2	E	101.9	F	66.8	E
	Thru	946	425	739	104.1	F				
	Right	34	407	711	85.3	F				
Southbound	Left	56	3	56	18.4	B	7.7	A		
	Thru	242	10	122	5.6	A				
	Right	120	13	142	6.7	A				
Eastbound	Left	83	14	94	52.7	D	42.1	D		
	Thru	35	6	60	30.0	C				
	Right	14	10	77	9.7	A				
Westbound	Left	34	5	50	31.1	C	24.5	C		
	Thru	31	4	46	28.9	C				
	Right	135	2	41	21.8	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
61	57	-4
985	946	-39
35	34	-1
55	56	1
245	242	-3
115	120	5
86	83	-3
35	35	0
15	14	-1
30	34	4
31	31	0
140	135	-5

**Travelers Trail and Pleasant Avenue**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	0	28	7.3	A	6.2	A	1.4	A
	Right	14	0	28	5.9	A				
Eastbound	Thru	23	0	0	0.0	A	0.2	A		
	Right	6	0	0	0.7	A				
Westbound	Left	40	0	4	0.7	A	0.5	A		
	Thru	20	0	0	0.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
15	14	-1
25	23	-2
5	6	1
40	40	0
15	20	5

**Burnsville Parkway and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	139	51	251	46.5	D	31.4	C	15.1	B
	Thru	39	51	249	46.3	D				
	Right	172	51	162	15.8	B				
Southbound	Left	71	66	182	39.4	D	36.6	D		
	Thru	31	64	178	35.7	D				
	Right	11	78	201	20.3	C				
Eastbound	Left	22	0	15	7.1	A	11.3	B		
	Thru	1,131	139	437	11.3	B				
	Right	94	148	473	12.7	B				
Westbound	Left	70	3	47	15.9	B	7.0	A		
	Thru	254	4	70	5.6	A				
	Right	85	11	122	3.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
145	139	-6
45	39	-6
185	172	-13
75	71	-4
35	31	-4
10	11	1
25	22	-3
1,216	1,131	-85
95	94	-1
77	70	-7
276	254	-22
100	85	-15

**Burnsville Parkway and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	37	89	189	93.0	F	27.1	C	10.9	B
	Thru	13	90	192	90.9	F				
	Right	178	9	86	8.8	A				
Southbound	Left	0	-	-	-	A	21.5	C		
	Thru	10	4	100	31.8	C				
	Right	8	4	72	8.5	A				
Eastbound	Left	55	68	102	5.5	A	8.3	A		
	Thru	900	31	345	8.3	A				
	Right	411	41	376	8.6	A				
Westbound	Left	135	11	102	23.5	C	10.2	B		
	Thru	368	23	111	5.4	A				
	Right	5	37	158	5.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	37	-3
15	13	-2
190	178	-12
0	0	0
5	10	5
10	8	-2
65	55	-10
966	900	-66
445	411	-34
150	135	-15
403	368	-35
5	5	0



2040\_AM\_Build 66th, 98th, Burns TSP  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



**Burnsville Parkway and Gateway Boulevard (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	70	416	582	406.7	F	400.7	F	28.8	D
	Thru	0	-	-	-	A				
	Right	49	414	576	392.1	F				
Southbound	Left	3	2	32	38.3	E	17.1	C		
	Thru	0	-	-	-	A				
	Right	9	4	33	10.1	B				
Eastbound	Left	98	1	39	3.8	A	0.9	A		
	Thru	943	2	55	0.5	A				
	Right	37	2	55	2.2	A				
Westbound	Left	43	1	33	8.3	A	1.1	A		
	Thru	432	23	69	0.3	A				
	Right	28	25	73	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
95	70	-25
0	0	0
60	49	-11
5	3	-2
0	0	0
10	9	-1
105	98	-7
1,016	943	-73
35	37	2
45	43	-2
453	432	-21
30	28	-2

**Burnsville Parkway and Pleasant Avenue (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	34	11	71	45.0	D	36.5	D	3.6	A
	Thru	0	-	-	-	A				
	Right	14	18	92	15.7	B				
Southbound	Left	8	3	34	43.7	D	24.5	C		
	Thru	0	-	-	-	A				
	Right	9	5	59	7.5	A				
Eastbound	Left	50	0	13	3.8	A	2.0	A		
	Thru	929	3	98	1.9	A				
	Right	14	0	4	2.1	A				
Westbound	Left	24	0	14	9.2	A	3.0	A		
	Thru	468	20	93	2.8	A				
	Right	71	0	9	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	34	-1
0	0	0
15	14	-1
10	8	-2
0	0	0
10	9	-1
55	50	-5
1,011	929	-82
15	14	-1
25	24	-1
483	468	-15
70	71	1

**SB Orange Line Travel Time- 98th Street (sec)**

Avg	St Dev
202	9

**SB Orange Line Travel Time- Burnsville (sec)**

Avg	St Dev
875	17

**2040\_AM\_Build Knox Curved Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (AM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	13	55	66.7	E	41.6	D	16.5	B
	Thru	0	-	-	-	A				
	Right	31	1	47	5.9	A				
Southbound	Left	90	36	147	64.9	E	64.0	E		
	Thru	5	36	148	67.2	E				
	Right	5	44	161	46.0	D				
Eastbound	Left	11	0	17	15.1	B	13.3	B		
	Thru	552	34	215	17.5	B				
	Right	402	19	172	7.5	A				
Westbound	Left	429	94	393	38.4	D	14.2	B		
	Thru	1,054	13	165	4.5	A				
	Right	14	19	192	5.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	44	-1
0	0	0
30	31	1
90	90	0
5	5	0
5	5	0
10	11	1
565	552	-13
400	402	2
430	429	-1
1,085	1,054	-31
15	14	-1

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	6	53	69.9	E	34.2	C	5.3	A
	Thru	4	6	53	48.5	D				
	Right	22	10	69	13.8	B				
Southbound	Left	9	4	35	72.4	E	56.5	E		
	Thru	4	3	32	128.2	F				
	Right	10	5	44	13.4	B				
Eastbound	Left	7	0	5	14.0	B	3.9	A		
	Thru	519	5	80	3.6	A				
	Right	143	2	81	4.8	A				
Westbound	Left	460	19	204	11.8	B	4.6	A		
	Thru	1,487	8	187	2.4	A				
	Right	10	9	198	3.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	11	-4
5	4	-1
30	22	-8
10	9	-1
5	4	-1
10	10	0
5	7	2
530	519	-11
150	143	-7
470	460	-10
1,505	1,487	-18
10	10	0

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	222	52	236	43.0	D	48.8	D	24.9	C
	Right	748	129	461	50.6	D				
Eastbound	Thru	551	18	138	9.3	A	9.3	A		
Westbound	Thru	1,218	55	383	13.0	B	13.0	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
215	222	7
750	748	-2
570	551	-19
1,235	1,218	-17

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	19	92	73.1	E	59.3	E	6.9	A
	Thru	13	19	92	70.8	E				
	Right	18	25	106	31.9	C				
Eastbound	Left	143	8	100	16.8	B	6.4	A		
	Thru	430	9	165	3.6	A				
	Right	203	13	197	5.2	A				
Westbound	Left	84	1	45	8.5	A	5.1	A		
	Thru	1,194	15	222	5.1	A				
	Right	141	1	58	3.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	25	0
15	13	-2
20	18	-2
145	143	-2
440	430	-10
200	203	3
85	84	-1
1,210	1,194	-16
140	141	1

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.5	C	6.6	A
	Right	13	1	41	6.6	A				
Eastbound	Thru	291	6	107	5.4	A	5.6	A		
	Right	156	8	130	5.9	A				
Westbound	Left	257	42	210	30.1	C	6.4	A		
	Thru	1,400	4	141	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	291	-9
160	156	-4
250	257	7
1,415	1,400	-15

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	6	0	17	10.9	B	2.1	A	4.3	A
	Thru	28	0	0	0.2	A				
Southbound	Thru	136	6	212	4.7	A	4.3	A		
	Right	469	6	211	4.1	A				
Eastbound	Left	8	1	37	15.0	B	15.0	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	6	1
25	28	3
140	136	-4
480	469	-11
10	8	-2
0	0	0

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	29	0	0	0.1	A	0.1	A	0.5	A
	Right	0	-	-	-	A				
Southbound	Left	59	0	3	0.7	A	0.4	A		
	Thru	78	0	0	0.2	A				
Westbound	Left	0	-	-	-	A	6.1	A		
	Right	4	0	37	6.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	29	4
0	0	0
60	59	-1
80	78	-2
0	0	0
5	4	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	3.0	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.7	A		
	Right	72	0	0	0.7	A				
Eastbound	Left	23	1	73	11.6	B	11.6	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	6	0
6	6	0
80	72	-8
25	23	-2
0	0	0

2040\_AM\_Build Knox Curved Alignment TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Southbound	Left	0	-	-	-	A	10.4	B	1.7	A	0	0	0
	Right	6	1	81	10.4	B					6	6	0
Eastbound	Left	6	0	0	-0.1	A	0.0	A			6	6	0
	Thru	16	0	0	0.0	A					14	16	2
Westbound	Thru	8	0	0	0.0	A	0.0	A			9	8	-1
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	10	0	0	0.6	A	3.7	A	3.2	A	10	10	0
	Thru	22	0	0	5.9	A					20	22	2
	Right	6	0	0	0.7	A					5	6	1
Southbound	Thru	14	0	0	0.5	A	0.5	A			15	14	-1
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	2	0	59	11.8	B	11.8	B			5	2	-3
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	9	4	31	74.6	E	28.7	C	4.1	A	10	9	-1
	Thru	0	-	-	-	A					0	0	0
	Right	20	1	42	8.1	A					20	20	0
Southbound	Left	31	12	70	63.1	E	51.1	D			30	31	1
	Thru	5	12	68	65.7	E					5	5	0
	Right	10	0	36	6.7	A					10	10	0
Eastbound	Left	6	2	20	73.9	E	2.8	A	5	6	1		
	Thru	417	2	62	1.8	A			420	417	-3		
	Right	5	4	90	2.1	A			5	5	0		
Westbound	Left	11	0	5	1.6	A	1.8	A	10	11	1		
	Thru	1,000	4	90	1.9	A			1,010	1,000	-10		
	Right	31	0	1	1.1	A			35	31	-4		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	73	28	121	65.1	E	42.5	D	11.9	B	75	73	-2
	Thru	15	4	48	41.1	D					15	15	0
	Right	39	0	0	0.8	A					40	39	-1
Southbound	Left	4	1	15	65.8	E	34.8	C			5	4	-1
	Thru	8	2	42	36.1	D					10	8	-2
	Right	4	4	102	1.1	A					5	4	-1
Eastbound	Left	5	2	21	68.4	E	5.8	A	5	5	0		
	Thru	309	7	90	6.9	A			315	309	-6		
	Right	151	1	42	1.4	A			150	151	1		
Westbound	Left	97	26	88	70.8	E	10.5	B	95	97	2		
	Thru	970	14	179	4.6	A			975	970	-5		
	Right	16	17	193	2.8	A			15	16	1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	2	32	92.7	F	58.2	F	1.3	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	32	23.6	C					5	4	-1
Southbound	Left	4	3	33	92.3	F	45.8	E			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	2	31	25.2	D					10	9	-1
Eastbound	Left	37	1	35	9.3	A	1.1	A	40	37	-3		
	Thru	308	0	0	0.1	A			315	308	-7		
	Right	5	0	0	0.7	A			5	5	0		
Westbound	Left	8	0	4	2.0	A	0.5	A	10	8	-2		
	Thru	1,071	0	0	0.4	A			1,070	1,071	1		
	Right	9	0	0	0.8	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	6	0	0	0.6	A	0.7	A	1.8	A	5	6	1
	Thru	116	0	0	0.0	A					120	116	-4
	Right	178	0	0	1.2	A					185	178	-7
Southbound	Left	120	2	71	4.2	A	2.1	A			125	120	-5
	Thru	135	0	0	0.3	A					130	135	5
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	6.8	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	25	6.8	A			5	4	-1		
Westbound	Left	13	1	38	14.5	B	9.2	A	15	13	-2		
	Thru	5	1	37	12.9	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		



2040\_AM\_Build Knox Curved Alignment TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	3	4.7	A	1.8	A	2.5	A
	Thru	290	4	100	1.2	A				
	Right	212	4	101	2.4	A				
Southbound	Left	66	2	42	6.1	A	2.7	A		
	Thru	76	0	0	0.1	A				
	Right	10	0	0	0.6	A				
Eastbound	Left	4	1	33	24.1	C	10.9	B		
	Thru	0	-	-	-	A				
	Right	16	1	33	7.5	A				
Westbound	Left	8	1	30	17.2	C	14.3	B		
	Thru	0	-	-	-	A				
	Right	5	0	20	9.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	14	-1
300	290	-10
220	212	-8
65	66	1
75	76	1
10	10	0
5	4	-1
0	0	0
15	16	1
10	8	-2
0	0	0
5	5	0

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	671	22	168	11.5	B	10.3	B	16.5	B
	Right	229	12	140	6.9	A				
Southbound	Left	158	16	120	22.0	C	13.0	B		
	Thru	287	6	66	8.0	A				
Westbound	Left	171	83	344	47.1	D	26.7	C		
	Right	530	94	361	20.1	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
670	671	1
235	229	-6
160	158	-2
285	287	2
170	171	1
535	530	-5

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	19	49.8	D	12.5	B	7.4	A
	Right	32	1	59	6.6	A				
Southbound	Left	85	15	75	38.5	D	33.2	C		
	Right	14	0	0	0.8	A				
Eastbound	Left	57	15	87	49.4	D	10.4	B		
	Thru	323	4	85	3.6	A				
	Right	6	8	132	3.0	A				
Westbound	Left	6	2	21	49.4	D	4.0	A		
	Thru	685	10	118	5.1	A				
	Right	458	0	13	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
35	32	-3
85	85	0
15	14	-1
60	57	-3
330	323	-7
5	6	1
5	6	1
685	685	0
475	458	-17

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	192	28	128	37.9	D	14.7	B	7.8	A
	Thru	19	28	124	39.2	D				
	Right	418	0	13	2.9	A				
Eastbound	Thru	277	7	89	6.7	A	5.2	A		
	Right	163	1	58	2.6	A				
Westbound	Left	145	9	147	5.5	A	4.1	A		
	Thru	735	9	147	3.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	192	2
25	19	-6
420	418	-2
290	277	-13
160	163	3
145	145	0
745	735	-10

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	481	73	422	32.1	C	29.0	C	20.6	C
	Thru	77	73	422	33.6	C				
	Right	150	82	433	16.9	B				
Eastbound	Left	262	23	179	15.8	B	12.1	B		
	Thru	209	22	179	7.5	A				
Westbound	Thru	398	34	186	17.7	B	16.9	B		
	Right	154	46	214	15.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	481	-9
80	77	-3
145	150	5
265	262	-3
215	209	-6
400	398	-2
155	154	-1

NB Orange Line Travel Time (sec)

Avg	St Dev
351	8

SB Orange Line Travel Time (sec)

Avg	St Dev
305	9

2040\_AM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



West 76th Street and Newton Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	13	58	64.4	E	41.1	D	17.3	B
	Thru	0	-	-	-	A				
	Right	31	1	45	5.8	A				
Southbound	Left	89	36	147	64.7	E	63.4	E		
	Thru	5	36	148	57.4	E				
	Right	5	44	161	46.1	D				
Eastbound	Left	11	1	18	16.9	B	14.0	B		
	Thru	557	36	219	18.7	B				
	Right	403	19	166	7.5	A				
Westbound	Left	429	103	395	41.6	D	15.1	B		
	Thru	1,063	13	171	4.5	A				
	Right	14	19	196	5.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
0	0	0
30	31	1
90	89	-1
5	5	0
5	5	0
10	11	1
565	557	-8
400	403	3
430	429	-1
1,085	1,063	-22
15	14	-1

West 76th Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	13	8	56	76.3	E	43.4	D	5.3	A
	Thru	4	8	56	71.3	E				
	Right	20	12	72	16.4	B				
Southbound	Left	10	4	35	73.4	E	59.8	E		
	Thru	4	3	32	135.2	F				
	Right	10	5	44	16.1	B				
Eastbound	Left	7	0	1	12.9	B	3.7	A		
	Thru	522	4	71	3.3	A				
	Right	146	2	80	4.6	A				
Westbound	Left	453	17	196	11.2	B	4.5	A		
	Thru	1,493	8	187	2.5	A				
	Right	10	9	198	2.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	13	-2
5	4	-1
30	20	-10
10	10	0
5	4	-1
10	10	0
5	7	2
530	522	-8
150	146	-4
470	453	-17
1,505	1,493	-12
10	10	0

West 76th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	224	53	239	43.0	D	48.3	D	25.0	C
	Right	743	122	429	49.9	D				
Eastbound	Thru	553	19	138	10.1	B	10.1	B		
Westbound	Thru	1,220	59	405	13.4	B	13.4	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
215	224	9
750	743	-7
570	553	-17
1,235	1,220	-15

West 76th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	20	92	72.5	E	59.7	E	6.8	A
	Thru	13	20	92	73.8	E				
	Right	19	26	105	32.6	C				
Eastbound	Left	137	7	97	16.0	B	6.3	A		
	Thru	436	9	164	3.7	A				
	Right	203	13	197	5.3	A				
Westbound	Left	85	1	44	8.4	A	5.0	A		
	Thru	1,197	14	199	4.9	A				
	Right	141	1	58	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	26	1
15	13	-2
20	19	-1
145	137	-8
440	436	-4
200	203	3
85	85	0
1,210	1,197	-13
140	141	1

West 77th Street and Meridian Crossings

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.4	C	6.5	A
	Right	13	0	41	6.3	A				
Eastbound	Thru	297	6	106	5.5	A	5.6	A		
	Right	157	8	128	5.7	A				
Westbound	Left	257	41	203	29.6	C	6.4	A		
	Thru	1,404	4	138	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	297	-3
160	157	-3
250	257	7
1,415	1,404	-11

Knox Avenue South and Best Buy Parking Ramp

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	19	8.5	A	2.1	A	4.3	A
	Thru	29	0	0	0.1	A				
Southbound	Thru	133	6	221	4.8	A	4.3	A		
	Right	467	6	219	4.2	A				
Eastbound	Left	8	1	37	16.3	C	16.3	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	9	4
25	29	4
140	133	-7
480	467	-13
10	8	-2
0	0	0

Knox Avenue South and Dicks Sporting Goods / Park & Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	33	0	0	0.1	A	0.1	A	0.6	A
	Right	0	-	-	-	A				
Southbound	Left	88	0	4	0.7	A	0.6	A		
	Thru	45	0	0	0.3	A				
Westbound	Left	0	-	-	-	A	6.3	A		
	Right	4	0	37	6.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
37	33	-4
0	0	0
60	88	28
37	45	8
0	0	0
5	4	-1

Knox Avenue South and South Parking Ride

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	4.1	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.6	A		
	Right	39	0	0	0.7	A				
Eastbound	Left	27	2	72	10.8	B	10.8	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
13	6	-7
12	6	-6
25	39	14
25	27	2
0	0	0

2040\_AM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.4	A	3.3	A	13	6	-7
	Right	8	0	0	0.5	A					20	8	-12
Southbound	Thru	6	0	0	0.7	A	0.7	A			12	6	-6
	Left	0	-	-	-	A					0	0	0
Westbound	Left	13	0	37	7.6	A	7.6	A			15	13	-2
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	13	0	1	0.7	A	4.2	A	3.3	A	10	13	3
	Thru	14	0	0	8.6	A					20	14	-6
	Right	5	0	0	0.9	A					5	5	0
Southbound	Thru	19	0	0	0.2	A	0.2	A			15	19	4
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	6	0	52	8.5	A	8.5	A			5	6	1
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	9	4	31	74.6	E	28.6	C	4.4	A	10	9	-1
	Thru	0	-	-	-	A					0	0	0
	Right	20	1	42	7.9	A					20	20	0
Southbound	Left	31	12	70	63.6	E	51.6	D			30	31	1
	Thru	5	12	68	66.6	E					5	5	0
	Right	10	0	37	7.2	A					10	10	0
Eastbound	Left	6	2	24	76.5	E	2.9	A	5	6	1		
	Thru	421	3	65	1.8	A			420	421	1		
	Right	5	5	92	2.1	A			5	5	0		
Westbound	Left	12	0	8	2.8	A	2.4	A	10	12	2		
	Thru	1,009	5	122	2.4	A			1,010	1,009	-1		
	Right	31	0	0	1.2	A			35	31	-4		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	77	31	136	67.6	E	43.9	D	11.3	B	75	77	2
	Thru	8	2	42	32.3	C					15	8	-7
	Right	40	0	0	0.7	A					40	40	0
Southbound	Left	9	3	28	67.2	E	32.5	C			5	9	4
	Thru	8	2	46	33.1	C					13	8	-5
	Right	10	0	0	0.8	A					5	10	5
Eastbound	Left	5	2	24	61.6	E	5.0	A	5	5	0		
	Thru	311	6	90	5.8	A			315	311	-4		
	Right	154	1	49	1.6	A			150	154	4		
Westbound	Left	97	27	95	73.6	E	9.8	A	95	97	2		
	Thru	971	10	159	3.5	A			975	971	-4		
	Right	16	12	173	3.1	A			15	16	1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	2	30	87.1	F	53.7	F	1.4	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	31	20.4	C					5	4	-1
Southbound	Left	4	4	36	104.7	F	49.8	E			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	3	32	25.4	D					10	9	-1
Eastbound	Left	37	2	41	9.9	A	1.2	A	40	37	-3		
	Thru	313	0	0	0.1	A			315	313	-2		
	Right	5	0	0	0.6	A			5	5	0		
Westbound	Left	8	0	5	2.4	A	0.5	A	10	8	-2		
	Thru	1,070	0	0	0.5	A			1,070	1,070	0		
	Right	9	0	0	0.8	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	7	0	2	1.2	A	0.8	A	2.3	A	5	7	2
	Thru	115	0	0	0.0	A					120	115	-5
	Right	178	0	0	1.2	A					185	178	-7
Southbound	Left	124	2	73	6.2	A	3.3	A			125	124	-1
	Thru	132	0	0	0.5	A					130	132	2
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	5.8	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	25	5.8	A			5	4	-1		
Westbound	Left	13	1	36	14.5	B	9.0	A	15	13	-2		
	Thru	5	1	34	12.0	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		



2040\_AM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	5	4.8	A	1.8	A	2.5	A
	Thru	288	4	101	1.2	A				
	Right	211	4	101	2.3	A				
Southbound	Left	68	2	45	6.0	A	2.8	A		
	Thru	72	0	0	0.0	A				
	Right	10	0	0	0.6	A				
Eastbound	Left	4	1	33	21.2	C	10.2	B		
	Thru	0	-	-	-	A				
	Right	16	1	33	7.5	A				
Westbound	Left	8	1	30	19.1	C	15.1	C		
	Thru	0	-	-	-	A				
	Right	5	0	20	8.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	14	-1
300	288	-12
220	211	-9
65	68	3
75	72	-3
10	10	0
5	4	-1
0	0	0
15	16	1
10	8	-2
0	0	0
5	5	0

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	675	23	173	11.7	B	10.5	B	16.4	B
	Right	231	13	145	7.1	A				
Southbound	Left	159	17	120	22.4	C	13.1	B		
	Thru	290	6	71	8.1	A				
Westbound	Left	172	82	363	44.8	D	26.2	C		
	Right	529	93	382	20.2	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
670	675	5
235	231	-4
160	159	-1
285	290	5
170	172	2
535	529	-6

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	18	47.3	D	13.0	B	7.0	A
	Right	32	1	58	7.6	A				
Southbound	Left	78	14	72	40.3	D	34.3	C		
	Right	14	0	0	0.8	A				
Eastbound	Left	56	15	85	47.8	D	9.7	A		
	Thru	324	3	76	3.3	A				
	Right	6	7	120	2.9	A				
Westbound	Left	6	1	19	42.3	D	3.7	A		
	Thru	685	9	112	4.6	A				
	Right	456	0	11	1.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
35	32	-3
85	78	-7
15	14	-1
60	56	-4
330	324	-6
5	6	1
5	6	1
685	685	0
475	456	-19

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	196	31	138	36.5	D	13.7	B	7.7	A
	Thru	19	31	136	40.5	D				
	Right	416	0	12	1.8	A				
Eastbound	Thru	280	7	95	6.9	A	5.3	A		
	Right	157	1	54	2.4	A				
Westbound	Left	144	10	150	5.9	A	4.4	A		
	Thru	734	10	150	4.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	196	6
25	19	-6
420	416	-4
290	280	-10
160	157	-3
145	144	-1
745	734	-11

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	475	77	446	30.7	C	27.3	C	19.9	B
	Thru	77	77	446	30.3	C				
	Right	151	86	458	14.9	B				
Eastbound	Left	263	24	183	16.3	B	12.3	B		
	Thru	214	24	183	7.3	A				
Westbound	Thru	402	34	191	17.8	B	17.2	B		
	Right	155	47	220	15.4	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	475	-15
80	77	-3
145	151	6
265	263	-2
215	214	-1
400	402	2
155	155	0

NB Orange Line Travel Time (sec)

Avg	St Dev
340	10

SB Orange Line Travel Time (sec)

Avg	St Dev
321	17

**2040\_AM\_Build Knox Direct Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (AM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	13	58	64.4	E	41.1	D	17.2	B
	Thru	0	-	-	-	A				
	Right	31	1	45	5.8	A				
Southbound	Left	89	36	147	64.7	E	63.4	E		
	Thru	5	36	148	57.4	E				
	Right	5	44	161	46.1	D				
Eastbound	Left	11	1	18	16.8	B	14.0	B		
	Thru	558	36	220	18.6	B				
	Right	403	19	165	7.5	A				
Westbound	Left	429	102	399	41.4	D	15.0	B		
	Thru	1,062	13	169	4.5	A				
	Right	14	19	193	5.4	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
45	47	2
0	0	0
30	31	1
90	89	-1
5	5	0
5	5	0
10	11	1
565	558	-7
400	403	3
430	429	-1
1,085	1,062	-23
15	14	-1

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	13	8	58	76.5	E	44.2	D	5.3	A
	Thru	4	8	57	75.7	E				
	Right	20	13	74	17.0	B				
Southbound	Left	10	4	35	73.4	E	60.7	E		
	Thru	4	4	32	138.4	F				
	Right	10	6	44	16.8	B				
Eastbound	Left	7	0	2	13.0	B	3.7	A		
	Thru	522	4	71	3.3	A				
	Right	146	2	81	4.6	A				
Westbound	Left	454	17	199	11.2	B	4.5	A		
	Thru	1,494	8	185	2.4	A				
	Right	10	9	195	2.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	13	-2
5	4	-1
30	20	-10
10	10	0
5	4	-1
10	10	0
5	7	2
530	522	-8
150	146	-4
470	454	-16
1,505	1,494	-11
10	10	0

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	224	53	239	43.0	D	48.4	D	25.0	C
	Right	743	122	428	50.0	D				
Eastbound	Thru	553	19	136	10.1	B	10.1	B		
Westbound	Thru	1,221	59	404	13.2	B	13.2	B		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
215	224	9
750	743	-7
570	553	-17
1,235	1,221	-14

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	19	92	69.6	E	57.0	E	6.8	A
	Thru	13	19	92	70.7	E				
	Right	19	25	105	30.6	C				
Eastbound	Left	138	7	96	16.0	B	6.3	A		
	Thru	436	9	162	3.7	A				
	Right	203	13	194	5.2	A				
Westbound	Left	85	1	43	8.3	A	5.1	A		
	Thru	1,197	14	203	5.0	A				
	Right	141	1	57	3.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
25	26	1
15	13	-2
20	19	-1
145	138	-7
440	436	-4
200	203	3
85	85	0
1,210	1,197	-13
140	141	1

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	20	4	42	41.2	D	27.4	C	6.5	A
	Right	13	0	41	6.3	A				
Eastbound	Thru	297	6	107	5.5	A	5.6	A		
	Right	157	8	129	5.7	A				
Westbound	Left	257	41	203	29.6	C	6.4	A		
	Thru	1,404	4	138	2.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
20	20	0
15	13	-2
300	297	-3
160	157	-3
250	257	7
1,415	1,404	-11

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	9	0	18	8.6	A	2.1	A	4.3	A
	Thru	29	0	0	0.1	A				
Southbound	Thru	133	6	223	4.8	A	4.3	A		
	Right	467	6	221	4.2	A				
Eastbound	Left	8	1	37	15.1	C	15.1	C		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	9	4
25	29	4
140	133	-7
480	467	-13
10	8	-2
0	0	0

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	33	0	0	0.1	A	0.1	A	0.6	A
	Right	0	-	-	-	A				
Southbound	Left	88	0	5	0.7	A	0.5	A		
	Thru	45	0	0	0.3	A				
Westbound	Left	0	-	-	-	A	6.3	A		
	Right	4	0	37	6.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
37	33	-4
0	0	0
60	88	28
37	45	8
0	0	0
5	4	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	4.1	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.6	A		
	Right	39	0	0	0.7	A				
Eastbound	Left	27	2	72	10.8	B	10.8	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
13	6	-7
12	6	-6
25	39	14
25	27	2
0	0	0

2040\_AM\_Build Knox Direct Alignment TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (AM Peak Hour)



Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.4	A	3.3	A	13	6	-7
	Right	8	0	0	0.5	A					20	8	-12
Southbound	Thru	6	0	0	0.7	A	0.7	A			12	6	-6
	Left	0	-	-	-	A					0	0	0
Westbound	Left	13	0	37	7.6	A	7.6	A			15	13	-2
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	13	0	1	0.8	A	4.2	A	3.4	A	10	13	3
	Thru	14	0	0	8.6	A					20	14	-6
	Right	5	0	0	0.9	A					5	5	0
Southbound	Thru	19	0	0	0.4	A	0.4	A			15	19	4
	Right	0	-	-	-	A					0	0	0
Eastbound	Right	6	0	52	8.6	A	8.6	A			5	6	1
Westbound	Right	0	-	-	-	A	#DIV/0!	#DIV/0!	0	0	0		
	Left	0	-	-	-	A			0	0	0		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	9	4	31	74.6	E	28.6	C	4.3	A	10	9	-1
	Thru	0	-	-	-	A					0	0	0
	Right	20	1	42	7.9	A					20	20	0
Southbound	Left	31	12	70	63.6	E	51.7	D			30	31	1
	Thru	5	12	68	66.6	E					5	5	0
	Right	10	0	37	7.3	A					10	10	0
Eastbound	Left	6	2	24	76.5	E	2.9	A	5	6	1		
	Thru	421	3	66	1.8	A			420	421	1		
	Right	5	5	93	2.1	A			5	5	0		
Westbound	Left	12	0	10	2.8	A	2.2	A	10	12	2		
	Thru	1,008	5	120	2.2	A			1,010	1,008	-2		
	Right	31	0	1	1.2	A			35	31	-4		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	77	29	132	63.3	E	41.2	D	12.0	B	75	77	2
	Thru	8	2	42	31.6	C					15	8	-7
	Right	40	0	0	0.7	A					40	40	0
Southbound	Left	8	3	26	59.1	E	28.7	C			5	8	3
	Thru	8	1	42	32.7	C					13	8	-5
	Right	10	4	103	1.1	A					5	10	5
Eastbound	Left	5	2	24	60.7	E	5.8	A	5	5	0		
	Thru	311	7	95	7.1	A			315	311	-4		
	Right	154	1	48	1.6	A			150	154	4		
Westbound	Left	97	27	92	73.2	E	10.8	B	95	97	2		
	Thru	971	15	190	4.7	A			975	971	-4		
	Right	16	17	205	4.3	A			15	16	1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	2	31	87.0	F	55.6	F	1.4	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	31	24.2	C					5	4	-1
Southbound	Left	3	3	34	96.1	F	43.8	E			5	3	-2
	Thru	0	-	-	-	A					0	0	0
	Right	9	3	32	26.4	D					10	9	-1
Eastbound	Left	37	2	40	9.8	A	1.2	A	40	37	-3		
	Thru	314	0	0	0.1	A			315	314	-1		
	Right	5	0	0	0.6	A			5	5	0		
Westbound	Left	8	0	5	2.7	A	0.6	A	10	8	-2		
	Thru	1,070	0	0	0.6	A			1,070	1,070	0		
	Right	9	0	0	0.8	A			10	9	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	7	0	2	1.0	A	0.8	A	1.8	A	5	7	2
	Thru	114	0	0	0.1	A					120	114	-6
	Right	178	0	0	1.2	A					185	178	-7
Southbound	Left	118	2	66	4.6	A	2.3	A			125	118	-7
	Thru	139	0	0	0.2	A					130	139	9
	Right	0	-	-	-	A					0	0	0
Eastbound	Left	0	-	-	-	A	6.0	A	0	0	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	4	0	25	6.0	A			5	4	-1		
Westbound	Left	13	1	37	13.6	B	8.7	A	15	13	-2		
	Thru	5	1	36	12.2	B			5	5	0		
	Right	10	0	0	0.5	A			10	10	0		



2040\_AM\_Build Knox Direct Alignment TSP  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (AM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	5	4.7	A	1.7	A	2.5	A
	Thru	288	4	93	1.2	A				
	Right	212	4	92	2.2	A				
Southbound	Left	69	2	43	5.9	A	2.7	A		
	Thru	78	0	0	0.1	A				
	Right	10	0	0	0.6	A				
Eastbound	Left	4	1	33	22.9	C	10.5	B		
	Thru	0	-	-	-	A				
	Right	16	1	33	7.4	A				
Westbound	Left	8	1	30	20.3	C	16.1	C		
	Thru	0	-	-	-	A				
	Right	5	0	20	9.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
15	14	-1
300	288	-12
220	212	-8
65	69	4
75	78	3
10	10	0
5	4	-1
0	0	0
15	16	1
10	8	-2
0	0	0
5	5	0

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	674	22	172	11.6	B	10.4	B	16.2	B
	Right	231	13	144	6.9	A				
Southbound	Left	159	17	123	22.5	C	13.2	B		
	Thru	290	6	68	8.1	A				
Westbound	Left	171	80	359	44.5	D	25.7	C		
	Right	529	91	378	19.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
670	674	4
235	231	-4
160	159	-1
285	290	5
170	171	1
535	529	-6

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	18	47.4	D	13.0	B	7.3	A
	Right	32	1	59	7.6	A				
Southbound	Left	85	14	72	37.1	D	32.0	C		
	Right	14	0	0	0.8	A				
Eastbound	Left	56	15	85	48.2	D	9.9	A		
	Thru	323	3	75	3.4	A				
	Right	6	8	119	2.7	A				
Westbound	Left	6	1	19	47.1	D	4.2	A		
	Thru	684	11	133	5.4	A				
	Right	456	0	4	1.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	5	0
35	32	-3
85	85	0
15	14	-1
60	56	-4
330	323	-7
5	6	1
5	6	1
685	684	-1
475	456	-19

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	196	30	128	37.2	D	13.6	B	7.6	A
	Thru	13	30	127	37.3	D				
	Right	416	0	13	1.7	A				
Eastbound	Thru	279	8	95	7.0	A	5.4	A		
	Right	163	1	56	2.5	A				
Westbound	Left	144	10	159	5.9	A	4.5	A		
	Thru	734	10	160	4.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
190	196	6
25	13	-12
420	416	-4
290	279	-11
160	163	3
145	144	-1
745	734	-11

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	475	76	451	30.3	C	26.9	C	19.9	B
	Thru	77	76	450	29.4	C				
	Right	150	85	463	14.9	B				
Eastbound	Left	261	24	183	16.4	B	12.3	B		
	Thru	213	24	182	7.4	A				
Westbound	Thru	403	35	191	18.2	B	17.5	B		
	Right	154	47	219	15.6	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
490	475	-15
80	77	-3
145	150	5
265	261	-4
215	213	-2
400	403	3
155	154	-1

NB Orange Line Travel Time (sec)

Avg	St Dev
340	16

SB Orange Line Travel Time (sec)

Avg	St Dev
272	8

2040\_PM\_Build 66th, 98th, Burns TSP  
Orange Line BRT A&E Design Services  
Arterial MOEs (PM Peak Hour)



West 66th Street and Logan Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	9.1	A	4.8	A
	Thru	0	-	-	-	A				
	Right	13	1	31	9.1	A				
Southbound	Left	37	17	94	61.0	E	48.7	D		
	Thru	5	17	92	56.4	E				
	Right	22	27	115	26.2	C				
Eastbound	Left	4	9	167	23.2	C	3.1	A		
	Thru	1,284	9	167	3.0	A				
	Right	6	12	188	3.8	A				
Westbound	Left	26	15	227	20.2	C	4.3	A		
	Thru	1,271	15	227	3.9	A				
	Right	19	20	255	5.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
15	13	-2
40	37	-3
5	5	0
20	22	2
5	4	-1
1,290	1,284	-6
5	6	1
25	26	1
1,290	1,271	-19
20	19	-1

West 66th Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	181	65	252	59.2	E	34.3	C	17.0	B
	Thru	11	28	204	37.1	D				
	Right	300	39	223	19.1	B				
Eastbound	Thru	1,402	63	429	15.8	B	14.8	B		
	Right	209	4	100	8.5	A				
Westbound	Left	255	76	266	44.9	D	12.9	B		
	Thru	1,013	20	242	4.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
185	181	-4
10	11	1
305	300	-5
1,415	1,402	-13
205	209	4
255	255	0
1,030	1,013	-17

West 66th Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	236	79	305	55.5	E	38.5	D	14.3	B
	Thru	9	46	243	40.6	D				
	Right	334	63	262	26.4	C				
Eastbound	Left	186	29	185	31.4	C	6.6	A		
	Thru	1,396	19	268	3.3	A				
Westbound	Thru	1,027	26	209	13.9	B	12.7	B		
	Right	124	2	67	3.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	236	-9
10	9	-1
335	334	-1
190	186	-4
1,410	1,396	-14
1,040	1,027	-13
120	124	4

West 66th Street and Lake Shore Drive South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	130	44	179	57.0	E	52.3	D	15.0	B
	Thru	45	14	85	50.3	D				
	Right	15	19	100	17.8	B				
Southbound	Left	21	11	78	50.8	D	17.3	B		
	Thru	17	11	78	54.4	D				
	Right	153	7	88	8.6	A				
Eastbound	Left	145	40	195	44.9	D	9.2	A		
	Thru	1,072	21	229	4.8	A				
	Right	189	34	279	6.6	A				
Westbound	Left	20	7	50	64.2	E	15.8	B		
	Thru	669	34	220	14.5	B				
	Right	39	44	245	14.4	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
135	130	-5
45	45	0
15	15	0
20	21	1
20	17	-3
155	153	-2
145	145	0
1,075	1,072	-3
200	189	-11
20	20	0
670	669	-1
40	39	-1

West 98th Street and West Old Shakopee Road

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	1,220	224	531	44.6	D	44.6	D	27.9	C
Eastbound	Thru	808	91	344	35.1	D	35.1	D		
Westbound	Left	898	37	329	17.8	B	11.5	B		
	Thru	698	0	3	3.5	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,255	1,220	-35
805	808	3
910	898	-12
700	698	-2

West 98th Street and Dupont Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	34	169	44.8	D	42.0	D	42.9	D
	Right	183	53	198	41.3	D				
Southbound	Left	192	51	252	44.6	D	23.3	C		
	Thru	77	18	107	42.6	D				
	Right	331	9	143	6.5	A				
Eastbound	Thru	1,862	590	1,178	74.3	E	70.9	E		
	Right	137	5	85	24.6	C				
Westbound	Left	164	67	272	63.2	E	11.6	B		
	Thru	1,241	13	204	4.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
50	47	-3
185	183	-2
195	192	-3
80	77	-3
330	331	1
1,915	1,862	-53
145	137	-8
170	164	-6
1,230	1,241	11

**West 98th Street and I-35W SB Ramps (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Eastbound	Thru	1,823	29	377	13.4	B	11.5	B	7.1	A
	Right	396	0	2	2.8	A				
Westbound	Thru	1,412	0	37	1.1	A	1.1	A	7.1	A
	Right	225	0	37	0.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
1,900	1,823	-77
395	396	1
1,400	1,412	12
230	225	-5

**West 98th Street and I-35W NB Ramps (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	349	84	319	49.4	D	39.6	D	22.8	C
	Right	228	26	236	24.7	C				
Eastbound	Left	564	182	395	37.3	D	18.7	B	22.8	C
	Thru	1,250	42	330	10.2	B				
Westbound	Thru	1,286	88	267	20.8	C	21.4	C	22.8	C
	Right	265	100	288	24.3	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
350	349	-1
235	228	-7
610	564	-46
1,290	1,250	-40
1,280	1,286	6
270	265	-5

**West 98th Street and Aldrich Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Right	34	0	12	20.6	C	20.6	C	3.5	A
Eastbound	Thru	1,426	8	218	2.3	A	2.3	A		
	Right	50	8	217	2.3	A				
Westbound	Thru	1,549	14	228	4.2	A	4.2	A	3.5	A

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	34	4
1,470	1,426	-44
55	50	-5
1,550	1,549	-1

**West 98th Street and Lyndale Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	37	171	50.9	D	41.3	D	35.3	D
	Thru	172	33	128	51.9	D				
	Right	97	6	75	10.0	B				
Southbound	Left	180	57	249	56.6	E	60.6	E	35.3	D
	Thru	355	148	504	103.9	F				
	Right	285	0	1	9.2	A				
Eastbound	Left	288	42	167	40.1	D	17.4	B	35.3	D
	Thru	1,009	53	311	13.6	B				
	Right	167	0	0	1.3	A				
Westbound	Left	119	37	107	79.2	E	37.7	D	35.3	D
	Thru	1,140	132	525	34.0	C				
	Right	21	0	0	1.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
125	124	-1
180	172	-8
95	97	2
180	180	0
370	355	-15
290	285	-5
300	288	-12
1,030	1,009	-21
170	167	-3
120	119	-1
1,135	1,140	5
20	21	1

**West 99th Street and East Bloomington Freeway (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	31	0	0	0.2	A	0.3	A	0.5	A
	Right	14	0	0	0.6	A				
Westbound	Right	101	0	17	0.6	A	0.6	A	0.5	A

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
30	31	1
15	14	-1
100	101	1

**West 99th Street and Aldrich Avenue South (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	#DIV/0!	#DIV/0!	5.1	A
	Thru	0	-	-	-	A				
	Right	0	-	-	-	A				
Southbound	Left	49	3	65	8.0	A	7.9	A	5.1	A
	Thru	0	-	-	-	A				
	Right	45	3	65	7.7	A				
Eastbound	Left	9	0	2	0.9	A	1.1	A	5.1	A
	Thru	12	0	0	1.2	A				
	Right	0	-	-	-	A				
Westbound	Left	0	-	-	-	A	2.5	A	5.1	A
	Thru	51	0	0	1.4	A				
	Right	20	0	0	5.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
0	0	0
0	0	0
50	49	-1
0	0	0
50	45	-5
5	9	4
10	12	2
0	0	0
0	0	0
50	51	1
20	20	0



West 99th Street and Lyndale Avenue South

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	25	0	19	3.3	A	0.4	A	1.9	A	25	25	0
	Thru	351	0	0	0.1	A					350	351	1
	Right	15	0	0	0.7	A					15	15	0
Southbound	Left	10	0	7	2.1	A	0.8	A			10	10	0
	Thru	590	0	0	0.7	A					610	590	-20
	Right	41	0	0	1.2	A					40	41	1
Eastbound	Left	35	4	59	20.9	C	16.4	C			35	35	0
	Thru	0	-	-	-	A					0	0	0
	Right	27	1	41	10.7	B					25	27	2
Westbound	Left	10	2	46	18.5	C	15.0	B			10	10	0
	Thru	4	2	45	26.6	D					5	4	-1
	Right	15	2	44	9.5	A			15	15	0		

Nicollet Avenue and River Ridge Lane

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	220	31	228	25.0	C	18.2	B	49.8	D	235	220	-15
	Thru	95	8	65	20.9	C					105	95	-10
	Right	137	4	102	5.4	A					145	137	-8
Southbound	Left	11	2	30	35.7	D	44.4	D			10	11	1
	Thru	222	33	156	46.6	D					230	222	-8
	Right	22	16	217	26.4	C					20	22	2
Eastbound	Left	9	6	45	56.6	E	47.3	D			10	9	-1
	Thru	11	6	44	56.5	E					10	11	1
	Right	299	96	297	46.6	D					300	299	-1
Westbound	Left	495	149	464	81.1	F	80.7	F			500	495	-5
	Thru	23	147	459	80.2	F					25	23	-2
	Right	16	170	489	69.0	E			15	16	1		

Nicollet Avenue and Hwy 13

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	349	128	391	81.1	F	63.3	E	71.4	E	357	349	-8
	Thru	128	128	390	77.6	E					130	128	-2
	Right	248	88	406	30.9	C					256	248	-8
Southbound	Left	210	164	493	97.4	F	86.7	F			215	210	-5
	Thru	419	235	516	93.3	F					430	419	-11
	Right	373	259	540	73.2	E					390	373	-17
Eastbound	Left	169	66	174	122.7	F	58.9	E			175	169	-6
	Thru	1,601	678	1,635	58.9	E					1,620	1,601	-19
	Right	375	10	171	30.0	C					381	375	-6
Westbound	Left	300	262	462	148.1	F	79.2	E			316	300	-16
	Thru	1,767	2,003	2,773	71.0	E					1,930	1,767	-163
	Right	162	1	46	41.2	D			180	162	-18		

Nicollet Avenue and Travelers Trail

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	29	1	28	9.4	A	9.7	A	11.4	B	29	29	0
	Thru	470	17	143	10.4	B					475	470	-5
	Right	97	6	104	6.6	A					95	97	2
Southbound	Left	238	7	164	8.5	A	8.0	A			245	238	-7
	Thru	787	23	255	7.8	A					820	787	-33
	Right	64	29	274	8.8	A					62	64	2
Eastbound	Left	90	14	90	30.3	C	24.2	C			93	90	-3
	Thru	51	11	94	28.3	C					51	51	0
	Right	63	16	110	12.0	B					63	63	0
Westbound	Left	119	21	112	33.1	C	18.0	B			115	119	4
	Thru	34	4	47	25.3	C					36	34	-2
	Right	172	0	12	6.1	A			175	172	-3		

Travelers Trail and Pleasant Avenue

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	1	41	7.4	A	6.0	A	2.9	A	5	4	-1
	Right	45	1	41	5.9	A					45	45	0
Eastbound	Thru	13	0	0	0.0	A	0.0	A			15	13	-2
	Right	0	-	-	-	A					0	0	0
Westbound	Left	16	0	0	0.6	A	0.3	A			15	16	1
	Thru	27	0	0	0.1	A					30	27	-3

**Burnsville Parkway and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	464	226	663	46.1	D	39.1	D	31.3	C
	Thru	28	223	663	45.5	D				
	Right	333	31	349	29.0	C				
Southbound	Left	134	65	252	50.0	D	48.3	D		
	Thru	68	65	252	48.1	D				
	Right	22	80	271	39.1	D				
Eastbound	Left	14	1	28	26.2	C	33.2	C		
	Thru	636	82	303	33.4	C				
	Right	73	111	346	32.1	C				
Westbound	Left	224	32	186	28.9	C	19.9	B		
	Thru	732	44	249	17.7	B				
	Right	67	71	300	14.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
470	464	-6
25	28	3
340	333	-7
135	134	-1
70	68	-2
20	22	2
15	14	-1
642	636	-6
70	73	3
245	224	-21
743	732	-11
70	67	-3

**Burnsville Parkway and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	120	32	142	45.4	D	25.4	C	12.4	B
	Thru	4	32	142	35.9	D				
	Right	134	5	75	7.3	A				
Southbound	Left	6	15	121	66.7	E	30.6	C		
	Thru	20	15	122	52.5	D				
	Right	59	24	148	19.5	B				
Eastbound	Left	12	0	9	8.4	A	9.5	A		
	Thru	743	31	316	9.4	A				
	Right	347	42	352	9.9	A				
Westbound	Left	210	27	168	28.3	C	10.7	B		
	Thru	849	17	207	6.4	A				
	Right	6	27	250	5.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
120	120	0
5	4	-1
138	134	-4
5	6	1
20	20	0
60	59	-1
15	12	-3
747	743	-4
355	347	-8
220	210	-10
878	849	-29
5	6	1

**Burnsville Parkway and Gateway Boulevard**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	457	628	497.5	F	489.3	F	27.7	D
	Thru	0	-	-	-	A				
	Right	45	458	627	478.3	F				
Southbound	Left	10	28	139	65.6	F	37.2	E		
	Thru	5	29	141	67.4	F				
	Right	110	27	139	33.2	D				
Eastbound	Left	14	0	19	6.9	A	0.7	A		
	Thru	785	1	52	0.5	A				
	Right	86	1	51	2.3	A				
Westbound	Left	92	3	59	8.4	A	1.5	A		
	Thru	895	3	88	0.7	A				
	Right	10	3	87	1.6	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
85	61	-24
0	0	0
55	45	-10
10	10	0
5	5	0
115	110	-5
15	14	-1
790	785	-5
85	86	1
90	92	2
903	895	-8
10	10	0

**Burnsville Parkway and Pleasant Avenue**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	74	26	130	51.5	D	45.6	D	9.1	A
	Thru	0	-	-	-	A				
	Right	27	38	151	29.6	C				
Southbound	Left	83	43	187	55.3	E	45.3	D		
	Thru	5	42	183	51.5	D				
	Right	78	61	214	34.2	C				
Eastbound	Left	8	0	6	6.8	A	2.3	A		
	Thru	792	5	98	2.3	A				
	Right	36	0	5	1.3	A				
Westbound	Left	39	1	27	8.9	A	4.7	A		
	Thru	845	10	150	4.5	A				
	Right	16	0	1	2.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
75	74	-1
0	0	0
30	27	-3
85	83	-2
5	5	0
80	78	-2
10	8	-2
810	792	-18
35	36	1
40	39	-1
848	845	-3
15	16	1

**SB Orange Line Travel Time- 98th Street (sec)**

Avg	St Dev
205	11

**SB Orange Line Travel Time- Burnsville (sec)**

Avg	St Dev
871	13

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**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	104	407	54.2	D	46.6	D	23.2	C
	Thru	0	-	-	-	A				
	Right	432	125	411	40.3	D				
Southbound	Left	33	13	79	67.6	E	63.8	E		
	Thru	0	-	-	-	A				
	Right	4	19	92	33.0	C				
Eastbound	Left	27	1	30	15.1	B	14.4	B		
	Thru	1,379	69	462	14.8	B				
	Right	68	2	82	5.8	A				
Westbound	Left	34	2	39	20.4	C	15.9	B		
	Thru	936	50	323	15.8	B				
	Right	5	58	351	13.8	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
445	432	-13
35	33	-2
0	0	0
5	4	-1
25	27	2
1,385	1,379	-6
70	68	-2
35	34	-1
950	936	-14
5	5	0

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	183	173	417	54.3	D	60.6	E	21.1	C
	Thru	4	172	416	86.4	F				
	Right	396	188	434	63.3	E				
Southbound	Left	10	2	27	39.4	D	18.2	B		
	Thru	0	-	-	-	A				
	Right	19	1	36	7.0	A				
Eastbound	Left	17	0	14	14.1	B	13.3	B		
	Thru	1,762	83	629	13.4	B				
	Right	57	1	62	9.6	A				
Westbound	Left	48	5	75	27.8	C	10.8	B		
	Thru	764	25	204	9.8	A				
	Right	18	27	214	8.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	183	-12
5	4	-1
420	396	-24
10	10	0
0	0	0
20	19	-1
15	17	2
1,790	1,762	-28
60	57	-3
50	48	-2
775	764	-11
20	18	-2

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	141	46	184	58.9	E	55.8	E	16.1	B
	Right	197	41	141	53.6	D				
Eastbound	Thru	2,162	105	539	13.6	B	13.6	B		
Westbound	Thru	636	6	88	3.7	A	3.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
150	141	-9
195	197	2
2,220	2,162	-58
650	636	-14

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	58	227	62.2	E	57.6	E	19.3	B
	Thru	69	58	226	63.2	E				
	Right	48	67	239	44.1	D				
Eastbound	Left	820	232	641	38.3	D	16.5	B		
	Thru	1,439	15	218	4.3	A				
	Right	35	22	249	5.5	A				
Westbound	Left	23	2	36	32.9	C	19.2	B		
	Thru	586	38	216	19.8	B				
	Right	202	14	131	15.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	69	-1
50	48	-2
855	820	-35
1,480	1,439	-41
35	35	0
25	23	-2
595	586	-9
205	202	-3

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	191	170	446	91.0	F	72.0	E	20.6	C
	Right	307	172	439	60.2	E				
Eastbound	Thru	1,413	46	423	9.2	A	9.2	A		
	Right	64	50	444	9.0	A				
Westbound	Left	21	8	52	68.7	E	6.8	A		
	Thru	626	8	116	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	191	-4
310	307	-3
1,465	1,413	-52
65	64	-1
20	21	1
630	626	-4

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.8	A	77.6	F
	Thru	175	0	0	0.8	A				
Southbound	Thru	88	2	81	4.8	A	4.6	A		
	Right	19	2	81	3.6	A				
Eastbound	Left	417	339	484	128.5	F	128.1	F		
	Right	4	341	487	84.1	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	175	5
80	88	8
15	19	4
440	417	-23
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	106	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	66	0	10	0.9	A	0.7	A		
	Thru	27	0	1	0.4	A				
Westbound	Left	0	-	-	-	A	7.2	A		
	Right	69	3	59	7.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	106	6
0	0	0
60	66	6
25	27	2
0	0	0
70	69	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.4	A	8.0	A
	Thru	6	0	0	0.4	A				
Southbound	Thru	6	0	0	0.0	A	0.5	A		
	Right	21	0	0	0.6	A				
Eastbound	Left	100	6	91	10.3	B	10.4	B		
	Right	2	6	97	17.2	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
25	21	-4
100	100	0
0	2	2



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**Knox Avenue South and Northeast Parking Lot (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	0	-	-	-	A	10.9	B	0.6	A
	Right	8	1	83	10.9	B				
Eastbound	Left	6	0	3	0.4	A	0.1	A		
	Thru	90	0	0	0.1	A				
Westbound	Thru	58	0	0	0.1	A	0.1	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
6	8	2
7	6	-1
100	90	-10
60	58	-2
0	0	0

**Knox Avenue South and Southeast Parking Lot (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	0	5	0.8	A	1.7	A	2.3	A
	Thru	96	0	1	2.3	A				
	Right	30	0	1	1.2	A				
Southbound	Thru	56	0	0	0.6	A	0.6	A		
	Right	10	0	0	1.0	A				
Eastbound	Right	23	1	53	7.9	A	7.9	A		
Westbound	Right	0	-	-	-	A	10.0	B		
	Left	8	0	37	10.0	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
100	96	-4
30	30	0
50	56	6
10	10	0
25	23	-2
0	0	0
10	8	-2

**American Boulevard West and Morgan Circle South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	33	182	54.9	D	43.5	D	24.6	C
	Thru	21	20	160	49.3	D				
	Right	103	28	170	31.3	C				
Southbound	Left	132	51	224	56.2	E	39.7	D		
	Thru	16	51	223	53.8	D				
	Right	86	3	76	11.6	B				
Eastbound	Left	75	22	159	62.3	E	25.9	C		
	Thru	1,733	181	710	24.5	C				
	Right	97	197	738	22.9	C				
Westbound	Left	96	8	87	15.6	B	15.4	B		
	Thru	927	38	242	16.2	B				
	Right	86	2	54	6.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
105	99	-6
25	21	-4
100	103	3
135	132	-3
15	16	1
90	86	-4
75	75	0
1,735	1,733	-2
95	97	2
95	96	1
935	927	-8
95	86	-9

**American Boulevard West and Knox Avenue South (Signal)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	239	89	329	62.8	E	45.6	D	24.3	C
	Thru	65	13	78	44.1	D				
	Right	90	0	0	0.9	A				
Southbound	Left	34	10	64	54.9	D	44.4	D		
	Thru	42	9	55	48.2	D				
	Right	12	4	103	1.2	A				
Eastbound	Left	46	20	92	85.5	F	23.1	C		
	Thru	1,718	203	816	22.0	C				
	Right	192	156	715	18.0	B				
Westbound	Left	56	17	69	66.6	E	16.5	B		
	Thru	867	44	253	13.6	B				
	Right	54	50	267	10.9	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	239	-6
70	65	-5
95	90	-5
35	34	-1
40	42	2
10	12	2
45	46	1
1,725	1,718	-7
200	192	-8
55	56	1
870	867	-3
55	54	-1

**American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	1	31	71.4	F	54.7	F	2.1	A
	Thru	0	-	-	-	A				
	Right	4	1	31	38.0	E				
Southbound	Left	9	23	91	131.0	F	82.7	F		
	Thru	5	26	93	119.5	F				
	Right	34	24	91	64.6	F				
Eastbound	Left	10	0	19	8.3	A	0.4	A		
	Thru	1,821	0	0	0.4	A				
	Right	9	0	0	0.8	A				
Westbound	Left	4	0	8	17.3	C	0.9	A		
	Thru	940	0	1	0.9	A				
	Right	14	0	1	1.1	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
10	9	-1
5	5	0
35	34	-1
10	10	0
1,835	1,821	-14
10	9	-1
5	4	-1
940	940	0
15	14	-1

**Knox Avenue South and West 81st Street (Unsignalized)**

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	35	0	16	1.8	A	0.4	A	17.4	C
	Thru	219	0	0	0.1	A				
	Right	31	0	0	0.8	A				
Southbound	Left	26	0	22	2.7	A	0.4	A		
	Thru	257	0	0	0.1	A				
	Right	5	0	0	0.8	A				
Eastbound	Left	5	0	17	17.5	C	8.8	A		
	Thru	0	-	-	-	A				
	Right	41	1	40	7.8	A				
Westbound	Left	201	118	354	56.9	F	44.5	E		
	Thru	5	105	342	58.1	F				
	Right	169	71	279	29.2	D				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	35	0
240	219	-21
35	31	-4
35	26	-9
255	257	2
5	5	0
5	5	0
0	0	0
40	41	1
210	201	-9
5	5	0
165	169	4

**2040\_PM\_Build Knox Curved Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**Knox Avenue South and Southpoint Office Center**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	0	20	11.9	B	1.3	A	52.2	F	15	14	-1
	Thru	219	2	43	0.6	A					230	219	-11
	Right	28	2	45	1.9	A					25	28	3
Southbound	Left	9	1	17	20.4	C	2.4	A			10	9	-1
	Thru	479	0	1	2.0	A					485	479	-6
	Right	10	0	1	1.6	A					10	10	0
Eastbound	Left	4	1	28	28.8	D	16.7	C			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	11.3	B					10	9	-1
Westbound	Left	118	345	436	295.7	F	267.8	F			150	118	-32
	Thru	0	-	-	-	A			0	0	0		
	Right	61	322	425	213.8	F			75	61	-14		

**West 82nd Street and Penn Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	596	19	122	11.1	B	9.6	A	13.7	B	595	596	1
	Right	245	6	93	5.8	A					245	245	0
Southbound	Left	544	100	398	29.8	C	15.6	B			550	544	-6
	Thru	711	7	86	4.8	A					710	711	1
Westbound	Left	188	30	193	24.7	C	16.0	B			190	188	-2
	Right	265	38	209	9.8	A					275	265	-10

**West 82nd Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	17	83.7	F	24.7	C	22.8	C	5	4	-1
	Right	16	1	52	9.9	A					15	16	1
Southbound	Left	529	125	330	59.5	E	53.9	D			575	529	-46
	Right	59	0	0	4.2	A					65	59	-6
Eastbound	Left	26	9	57	63.6	E	12.4	B			25	26	1
	Thru	749	30	253	10.7	B					755	749	-6
	Right	17	42	296	10.4	B			15	17	2		
Westbound	Left	15	5	40	64.4	E	7.3	A	15	15	0		
	Thru	395	12	114	8.9	A			395	395	0		
	Right	235	0	0	0.9	A			240	235	-5		

**West 82nd Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	161	18	90	29.7	C	14.4	B	10.8	B	160	161	1
	Thru	21	18	90	26.8	C					30	21	-9
	Right	222	0	0	2.1	A					220	222	2
Eastbound	Thru	670	33	224	14.2	B	11.7	B			700	670	-30
	Right	626	27	325	9.1	A					645	626	-19
Westbound	Left	253	16	132	13.9	B	6.8	A			250	253	3
	Thru	420	16	132	2.5	A			430	420	-10		

**West 82nd Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	265	36	163	28.6	C	24.9	C	18.1	B	270	265	-5
	Thru	43	37	167	30.8	C					45	43	-2
	Right	150	45	175	16.6	B					150	150	0
Eastbound	Left	362	132	361	49.4	D	24.1	C			370	362	-8
	Thru	468	132	360	4.5	A					490	468	-22
Westbound	Thru	407	11	137	5.2	A	5.3	A			410	407	-3
	Right	225	15	159	5.5	A			225	225	0		

**NB Orange Line Travel Time (sec)**

Avg                      St Dev  
348                              23

**SB Orange Line Travel Time (sec)**

Avg                      St Dev  
337                              12

**2040\_PM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	118	422	56.8	E	49.2	D	24.0	C
	Thru	0	-	-	-	A				
	Right	432	136	424	43.0	D				
Southbound	Left	33	14	81	68.1	E	64.6	E	24.0	C
	Thru	0	-	-	-	A				
	Right	4	19	94	35.0	D				
Eastbound	Left	28	1	29	14.1	B	14.8	B	24.0	C
	Thru	1,381	70	462	15.2	B				
	Right	69	1	79	5.9	A				
Westbound	Left	33	2	39	22.5	C	16.2	B	24.0	C
	Thru	937	50	329	16.0	B				
	Right	5	59	353	10.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
445	432	-13
35	33	-2
0	0	0
5	4	-1
25	28	3
1,385	1,381	-4
70	69	-1
35	33	-2
950	937	-13
5	5	0

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	182	172	404	55.2	E	60.9	E	21.7	C
	Thru	5	187	416	92.2	F				
	Right	394	186	421	63.2	E				
Southbound	Left	10	2	27	40.3	D	18.6	B	21.7	C
	Thru	0	-	-	-	A				
	Right	19	1	36	7.2	A				
Eastbound	Left	17	0	14	14.6	B	14.2	B	21.7	C
	Thru	1,761	89	643	14.4	B				
	Right	57	1	61	10.1	B				
Westbound	Left	48	5	77	28.4	C	10.9	B	21.7	C
	Thru	765	25	209	9.9	A				
	Right	18	27	221	7.9	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	182	-13
5	5	0
420	394	-26
10	10	0
0	0	0
20	19	-1
15	17	2
1,790	1,761	-29
60	57	-3
50	48	-2
775	765	-10
20	18	-2

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	143	49	190	61.6	E	57.3	E	17.4	B
	Right	197	41	142	54.2	D				
Eastbound	Thru	2,161	125	597	15.1	B	15.1	B	17.4	B
Westbound	Thru	636	6	92	3.8	A	3.8	A	17.4	B

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
150	143	-7
195	197	2
2,220	2,161	-59
650	636	-14

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	58	222	62.8	E	57.3	E	19.5	B
	Thru	68	58	222	62.1	E				
	Right	49	68	235	44.3	D				
Eastbound	Left	821	236	634	38.7	D	16.7	B	19.5	B
	Thru	1,437	15	217	4.4	A				
	Right	35	22	250	5.4	A				
Westbound	Left	23	2	35	31.5	C	19.3	B	19.5	B
	Thru	585	39	221	19.9	B				
	Right	202	14	135	15.9	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	68	-2
50	49	-1
855	821	-34
1,480	1,437	-43
35	35	0
25	23	-2
595	585	-10
205	202	-3

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	190	171	447	91.9	F	72.7	E	21.0	C
	Right	307	173	446	60.9	E				
Eastbound	Thru	1,411	50	455	9.8	A	9.8	A	21.0	C
	Right	64	54	476	9.6	A				
Westbound	Left	21	8	52	68.7	E	6.8	A	21.0	C
	Thru	626	8	116	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	190	-5
310	307	-3
1,465	1,411	-54
65	64	-1
20	21	1
630	626	-4

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	1.1	A	77.3	F
	Thru	175	0	0	1.1	A				
Southbound	Thru	88	2	76	4.5	A	4.2	A	77.3	F
	Right	18	2	76	2.9	A				
Eastbound	Left	415	330	473	128.2	F	127.6	F	77.3	F
	Right	4	332	476	73.2	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	175	5
80	88	8
15	18	3
440	415	-25
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	106	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	65	0	9	0.8	A	0.7	A	2.2	A
	Thru	27	0	2	0.4	A				
Westbound	Left	0	-	-	-	A	7.3	A	2.2	A
	Right	69	3	59	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	106	6
0	0	0
60	65	5
25	27	2
0	0	0
70	69	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	7.9	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.5	A	7.9	A
	Right	21	0	0	0.6	A				
Eastbound	Left	100	6	93	10.4	B	10.4	B	7.9	A
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
25	21	-4
100	100	0
0	0	0



2040\_PM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Knox Avenue South and Northeast Parking Lot

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	6	0	0	0.3	A	0.8	A	3.7	A
	Right	91	0	0	0.8	A				
Southbound	Thru	6	0	0	0.7	A	0.7	A		
	Left	0	-	-	-	A				
Westbound	Left	58	2	56	8.9	A	8.9	A		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
7	6	-1
100	91	-9
6	6	0
0	0	0
60	58	-2
0	0	0

Knox Avenue South and Southeast Parking Lot

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	0	8	0.9	A	1.3	A	1.9	A
	Thru	96	0	0	1.6	A				
	Right	30	0	0	0.9	A				
Southbound	Thru	53	0	0	0.2	A	0.3	A		
	Right	10	0	0	0.6	A				
Eastbound	Right	23	1	53	7.7	A	7.7	A		
Westbound	Right	0	-	-	-	A	9.7	A		
	Left	8	0	37	9.7	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
40	40	0
100	96	-4
30	30	0
50	53	3
10	10	0
25	23	-2
0	0	0
10	8	-2

American Boulevard West and Morgan Circle South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	100	34	180	55.3	E	43.4	D	23.9	C
	Thru	22	20	155	47.1	D				
	Right	104	27	166	31.1	C				
Southbound	Left	133	51	221	56.1	E	39.9	D		
	Thru	16	51	221	55.3	E				
	Right	86	3	76	11.9	B				
Eastbound	Left	76	24	167	64.0	E	25.5	C		
	Thru	1,733	186	715	24.1	C				
	Right	97	201	742	22.1	C				
Westbound	Left	97	6	83	13.4	B	13.7	B		
	Thru	932	34	239	14.5	B				
	Right	88	1	28	5.0	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
105	100	-5
25	22	-3
100	104	4
135	133	-2
15	16	1
90	86	-4
75	76	1
1,735	1,733	-2
95	97	2
95	97	2
935	932	-3
95	88	-7

American Boulevard West and Knox Avenue South

(Signal)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	242	91	329	63.1	E	46.2	D	24.6	C
	Thru	67	14	74	46.5	D				
	Right	91	0	0	0.9	A				
Southbound	Left	34	10	64	56.1	E	42.3	D		
	Thru	40	8	51	43.1	D				
	Right	12	0	0	0.8	A				
Eastbound	Left	47	20	86	83.5	F	23.3	C		
	Thru	1,720	196	818	22.3	C				
	Right	192	149	717	17.9	B				
Westbound	Left	56	17	70	67.1	E	16.7	B		
	Thru	868	44	263	13.7	B				
	Right	54	50	276	12.1	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
245	242	-3
70	67	-3
95	91	-4
35	34	-1
40	40	0
10	12	2
45	47	2
1,725	1,720	-5
200	192	-8
55	56	1
870	868	-2
55	54	-1

American Boulevard West and Lupient Chevrolet Access Drive

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	4	2	31	71.3	F	53.2	F	2.3	A
	Thru	0	-	-	-	A				
	Right	4	1	31	35.2	E				
Southbound	Left	9	26	95	146.3	F	86.8	F		
	Thru	6	24	92	105.8	F				
	Right	35	25	96	68.3	F				
Eastbound	Left	10	0	20	8.4	A	0.4	A		
	Thru	1,821	0	0	0.4	A				
	Right	9	0	0	0.8	A				
Westbound	Left	4	0	10	21.1	C	1.1	A		
	Thru	941	0	3	1.0	A				
	Right	14	0	3	1.2	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
5	4	-1
0	0	0
5	4	-1
10	9	-1
5	6	1
35	35	0
10	10	0
1,835	1,821	-14
10	9	-1
5	4	-1
940	941	1
15	14	-1

Knox Avenue South and West 81st Street

(Unsignalized)										
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	36	0	19	2.3	A	0.5	A	15.8	C
	Thru	224	0	0	0.1	A				
	Right	32	0	0	0.8	A				
Southbound	Left	32	0	24	6.1	A	0.8	A		
	Thru	250	0	0	0.1	A				
	Right	5	0	0	0.7	A				
Eastbound	Left	5	0	17	19.0	C	8.9	A		
	Thru	0	-	-	-	A				
	Right	41	1	41	7.7	A				
Westbound	Left	201	104	336	52.6	F	40.0	E		
	Thru	5	92	323	48.9	E				
	Right	169	59	261	24.7	C				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
35	36	1
240	224	-16
35	32	-3
35	32	-3
255	250	-5
5	5	0
5	5	0
0	0	0
40	41	1
210	201	-9
5	5	0
165	169	4

2040\_PM\_Build Knox Direct Alignment TSP (SB Far-Side Stop at American Blvd/Knox Ave)  
 Orange Line BRT A&E Design Services  
 Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	0	17	8.2	A	1.2	A	43.9	E	15	14	-1
	Thru	220	2	45	0.6	A					230	220	-10
	Right	28	2	47	1.9	A					25	28	3
Southbound	Left	9	1	20	16.4	C	1.0	A			10	9	-1
	Thru	473	0	0	0.7	A					485	473	-12
	Right	10	0	0	0.7	A					10	10	0
Eastbound	Left	4	1	28	24.7	C	14.6	B			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	29	10.1	B					10	9	-1
Westbound	Left	131	290	405	233.3	F	209.0	F	150	131	-19		
	Thru	0	-	-	-	A			0	0	0		
	Right	67	266	395	161.4	F			75	67	-8		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	596	19	120	11.3	B	9.7	A	13.7	B	595	596	1
	Right	245	6	92	5.8	A					245	245	0
Southbound	Left	547	107	420	30.9	C	16.2	B			550	547	-3
	Thru	711	7	87	4.8	A					710	711	1
Westbound	Left	187	25	172	21.3	C	14.1	B			190	187	-3
	Right	266	34	188	9.0	A					275	266	-9

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	17	88.1	F	26.2	C	21.0	C	5	4	-1
	Right	16	1	52	10.7	B					15	16	1
Southbound	Left	536	119	289	56.1	E	50.7	D			575	536	-39
	Right	60	0	0	2.4	A					65	60	-5
Eastbound	Left	26	9	59	59.7	E	10.0	B			25	26	1
	Thru	749	23	228	8.3	A					755	749	-6
	Right	17	34	272	7.3	A			15	17	2		
Westbound	Left	15	5	39	65.1	E	6.7	A	15	15	0		
	Thru	393	11	109	8.0	A			395	393	-2		
	Right	234	0	0	0.9	A			240	234	-6		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	160	20	103	28.3	C	13.5	B	10.0	B	160	160	0
	Thru	27	20	103	26.7	C					30	27	-3
	Right	222	0	2	1.2	A					220	222	2
Eastbound	Thru	675	28	207	12.1	B	10.6	B			700	675	-25
	Right	628	27	320	9.0	A					645	628	-17
Westbound	Left	252	16	135	13.6	B	6.8	A			250	252	2
	Thru	421	16	136	2.7	A			430	421	-9		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	264	36	165	27.4	C	23.1	C	17.0	B	270	264	-6
	Thru	42	36	168	27.0	C					45	42	-3
	Right	150	44	176	14.5	B					150	150	0
Eastbound	Left	364	122	348	46.6	D	22.6	C			370	364	-6
	Thru	472	122	348	4.0	A					490	472	-18
Westbound	Thru	407	11	134	5.3	A	5.3	A			410	407	-3
	Right	225	15	159	5.3	A			225	225	0		

NB Orange Line Travel Time (sec)

Avg 348 St Dev 31

SB Orange Line Travel Time (sec)

Avg 334 St Dev 8

**2040\_PM\_Build Knox Direct Alignment TSP**  
**Orange Line BRT A&E Design Services**  
**Arterial MOEs (PM Peak Hour)**



**West 76th Street and Newton Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	356	107	413	55.4	E	47.6	D	23.7	C
	Thru	0	-	-	-	A				
	Right	432	129	415	41.2	D				
Southbound	Left	33	14	81	68.1	E	64.6	E		
	Thru	0	-	-	-	A				
	Right	4	19	94	35.1	D				
Eastbound	Left	28	1	29	14.4	B	14.8	B		
	Thru	1,381	71	470	15.3	B				
	Right	69	1	79	5.9	A				
Westbound	Left	33	2	39	21.9	C	16.4	B		
	Thru	938	51	332	16.2	B				
	Right	5	60	356	11.3	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
360	356	-4
0	0	0
445	432	-13
35	33	-2
0	0	0
5	4	-1
25	28	3
1,385	1,381	-4
70	69	-1
35	33	-2
950	938	-12
5	5	0

**West 76th Street and Knox Avenue South**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	184	158	407	51.3	D	55.7	E	20.5	C
	Thru	5	168	419	70.1	E				
	Right	397	174	425	57.6	E				
Southbound	Left	10	2	27	39.3	D	18.1	B		
	Thru	0	-	-	-	A				
	Right	19	1	36	6.9	A				
Eastbound	Left	17	0	14	14.2	B	13.7	B		
	Thru	1,760	85	629	13.8	B				
	Right	57	1	62	9.6	A				
Westbound	Left	48	6	77	29.2	C	10.7	B		
	Thru	765	24	203	9.6	A				
	Right	18	26	215	8.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	184	-11
5	5	0
420	397	-23
10	10	0
0	0	0
20	19	-1
15	17	2
1,790	1,760	-30
60	57	-3
50	48	-2
775	765	-10
20	18	-2

**West 76th Street and I-35W SB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	142	49	186	61.4	E	56.7	E	17.4	B
	Right	198	41	140	53.4	D				
Eastbound	Thru	2,163	129	638	15.2	B	15.2	B		
Westbound	Thru	635	6	88	3.7	A	3.7	A		

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
150	142	-8
195	198	3
2,220	2,163	-57
650	635	-15

**West 76th Street and I-35W NB Ramps**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	58	224	62.9	E	57.3	E	19.3	B
	Thru	68	58	224	61.5	E				
	Right	47	68	236	44.7	D				
Eastbound	Left	823	232	631	37.9	D	16.5	B		
	Thru	1,439	15	211	4.5	A				
	Right	35	22	244	5.4	A				
Westbound	Left	23	2	35	28.7	C	19.2	B		
	Thru	585	38	214	20.0	B				
	Right	203	14	133	15.7	B				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
55	56	1
70	68	-2
50	47	-3
855	823	-32
1,480	1,439	-41
35	35	0
25	23	-2
595	585	-10
205	203	-2

**West 77th Street and Meridian Crossings**

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	191	165	443	89.4	F	70.4	E	20.5	C
	Right	308	170	438	58.6	E				
Eastbound	Thru	1,411	49	449	9.7	A	9.7	A		
	Right	64	54	471	9.1	A				
Westbound	Left	21	8	52	68.7	E	6.9	A		
	Thru	626	8	115	4.8	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
195	191	-4
310	308	-2
1,465	1,411	-54
65	64	-1
20	21	1
630	626	-4

**Knox Avenue South and Best Buy Parking Ramp**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.5	A	74.1	F
	Thru	175	0	0	0.5	A				
Southbound	Thru	88	2	77	4.6	A	4.4	A		
	Right	17	2	78	3.4	A				
Eastbound	Left	418	328	473	122.4	F	122.0	F		
	Right	4	330	476	73.1	F				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
170	175	5
80	88	8
15	17	2
440	418	-22
5	4	-1

**Knox Avenue South and Dicks Sporting Goods / Park & Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	106	0	0	0.1	A	0.1	A	2.2	A
	Right	0	-	-	-	A				
Southbound	Left	65	0	8	0.8	A	0.7	A		
	Thru	27	0	1	0.4	A				
Westbound	Left	0	-	-	-	A	7.3	A		
	Right	69	3	59	7.3	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
100	106	6
0	0	0
60	65	5
25	27	2
0	0	0
70	69	-1

**Knox Avenue South and South Parking Ride**

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	0	-	-	-	A	0.7	A	7.9	A
	Thru	6	0	0	0.7	A				
Southbound	Thru	6	0	0	0.1	A	0.5	A		
	Right	21	0	0	0.6	A				
Eastbound	Left	100	6	91	10.3	B	10.3	B		
	Right	0	-	-	-	A				

Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
0	0	0
7	6	-1
6	6	0
25	21	-4
100	100	0
0	0	0



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Knox Avenue South and Northeast Parking Lot (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Thru	6	0	0	0.3	A	0.8	A	3.8	A	7	6	-1
	Right	91	0	0	0.8	A					100	91	-9
Southbound	Thru	6	0	0	0.7	A	0.7	A			6	6	0
	Left	0	-	-	-	A					0	0	0
Westbound	Left	58	2	56	9.1	A	9.1	A			60	58	-2
	Right	0	-	-	-	A					0	0	0

Knox Avenue South and Southeast Parking Lot (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	41	0	8	0.9	A	1.3	A	1.9	A	40	41	1
	Thru	97	0	0	1.6	A					100	97	-3
	Right	30	0	0	1.0	A					30	30	0
Southbound	Thru	53	0	0	0.3	A	0.3	A			50	53	3
	Right	10	0	0	0.6	A					10	10	0
Eastbound	Right	23	1	53	7.8	A	7.8	A			25	23	-2
Westbound	Right	0	-	-	-	A	9.4	A	0	0	0		
	Left	8	0	37	9.4	A			10	8	-2		

American Boulevard West and Morgan Circle South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	100	33	181	54.9	D	43.7	D	23.9	C	105	100	-5
	Thru	22	20	161	47.2	D					25	22	-3
	Right	103	28	172	32.0	C					100	103	3
Southbound	Left	132	51	222	56.0	E	39.8	D			135	132	-3
	Thru	15	51	222	55.7	E					15	15	0
	Right	86	3	76	12.1	B					90	86	-4
Eastbound	Left	75	24	171	64.4	E	25.6	C	75	75	0		
	Thru	1,734	184	719	24.1	C			1,735	1,734	-1		
	Right	97	200	746	22.5	C			95	97	2		
Westbound	Left	97	6	83	13.2	B	13.8	B	95	97	2		
	Thru	929	34	240	14.6	B			935	929	-6		
	Right	86	1	51	5.5	A			95	86	-9		

American Boulevard West and Knox Avenue South (Signal)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	239	89	320	63.4	E	46.5	D	24.7	C	245	239	-6
	Thru	66	14	72	48.6	D					70	66	-4
	Right	91	0	0	0.9	A					95	91	-4
Southbound	Left	34	10	63	55.7	E	43.6	D			35	34	-1
	Thru	40	9	52	46.2	D					40	40	0
	Right	12	4	102	1.1	A					10	12	2
Eastbound	Left	47	20	92	85.6	F	23.3	C	45	47	2		
	Thru	1,717	201	824	22.3	C			1,725	1,717	-8		
	Right	191	152	723	17.4	B			200	191	-9		
Westbound	Left	56	17	69	67.6	E	16.9	B	55	56	1		
	Thru	869	45	265	13.9	B			870	869	-1		
	Right	54	51	280	12.3	B			55	54	-1		

American Boulevard West and Lupient Chevrolet Access Drive (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	4	2	31	82.5	F	60.2	F	2.2	A	5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	4	1	31	38.0	E					5	4	-1
Southbound	Left	8	25	96	153.6	F	85.5	F			10	8	-2
	Thru	5	25	94	106.2	F					5	5	0
	Right	34	25	97	66.4	F					35	34	-1
Eastbound	Left	10	0	21	7.7	A	0.4	A	10	10	0		
	Thru	1,820	0	0	0.4	A			1,835	1,820	-15		
	Right	9	0	0	0.7	A			10	9	-1		
Westbound	Left	4	1	11	26.8	D	1.1	A	5	4	-1		
	Thru	941	0	1	1.0	A			940	941	1		
	Right	14	0	1	1.2	A			15	14	-1		

Knox Avenue South and West 81st Street (Unsignalized)											Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS			
Northbound	Left	35	0	17	2.2	A	0.4	A	15.6	C	35	35	0
	Thru	217	0	0	0.1	A					240	217	-23
	Right	31	0	0	0.8	A					35	31	-4
Southbound	Left	26	0	18	1.9	A	0.3	A			35	26	-9
	Thru	256	0	0	0.1	A					255	256	1
	Right	5	0	0	0.7	A					5	5	0
Eastbound	Left	5	0	17	20.2	C	9.1	A	5	5	0		
	Thru	0	-	-	-	A			0	0	0		
	Right	40	1	41	7.7	A			40	40	0		
Westbound	Left	203	104	344	51.2	F	39.5	E	210	203	-7		
	Thru	5	90	325	52.2	F			5	5	0		
	Right	169	60	269	25.0	C			165	169	4		

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 Arterial MOEs (PM Peak Hour)



Knox Avenue South and Southpoint Office Center

(Unsignalized)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	14	1	20	11.8	B	1.3	A	54.5	F	15	14	-1
	Thru	220	2	42	0.6	A					230	220	-10
	Right	28	2	44	1.6	A					25	28	3
Southbound	Left	10	1	21	24.4	C	3.5	A			10	10	0
	Thru	478	0	5	3.1	A					485	478	-7
	Right	10	0	4	1.6	A					10	10	0
Eastbound	Left	4	1	29	33.1	D	20.3	C			5	4	-1
	Thru	0	-	-	-	A					0	0	0
	Right	9	1	31	14.6	B					10	9	-1
Westbound	Left	117	343	436	306.9	F	279.1	F	150	117	-33		
	Thru	0	-	-	-	A			0	0	0		
	Right	60	324	427	224.9	F			75	60	-15		

West 82nd Street and Penn Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	596	19	120	11.0	B	9.5	A	13.7	B	595	596	1
	Right	245	6	92	5.8	A					245	245	0
Southbound	Left	547	104	419	30.2	C	15.7	B			550	547	-3
	Thru	711	7	88	4.6	A					710	711	1
Westbound	Left	188	29	186	23.9	C	15.6	B			190	188	-2
	Right	266	37	202	9.8	A					275	266	-9

West 82nd Street and Knox Avenue South

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	4	2	17	87.3	F	26.0	C	23.6	C	5	4	-1
	Right	16	1	52	10.7	B					15	16	1
Southbound	Left	527	132	340	62.0	E	56.3	E			575	527	-48
	Right	58	0	0	3.6	A					65	58	-7
Eastbound	Left	27	9	59	64.7	E	12.8	B			25	27	2
	Thru	751	30	249	11.0	B					755	751	-4
	Right	17	42	292	10.3	B			15	17	2		
Westbound	Left	15	5	42	66.3	E	7.2	A	15	15	0		
	Thru	394	12	117	8.7	A			395	394	-1		
	Right	234	0	0	0.9	A			240	234	-6		

West 82nd Street and I-35W SB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Southbound	Left	161	20	100	29.0	C	13.6	B	10.5	B	160	161	1
	Thru	21	20	99	26.2	C					30	21	-9
	Right	222	0	2	1.2	A					220	222	2
Eastbound	Thru	668	29	207	13.2	B	11.3	B			700	668	-32
	Right	626	29	321	9.2	A					645	626	-19
Westbound	Left	253	17	144	14.3	B	7.1	A			250	253	3
	Thru	421	17	144	2.7	A			430	421	-9		

West 82nd Street and I-35W NB Ramps

(Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	265	36	165	27.6	C	23.3	C	17.7	B	270	265	-5
	Thru	42	36	168	27.1	C					45	42	-3
	Right	149	45	178	14.5	B					150	149	-1
Eastbound	Left	362	134	368	49.5	D	24.2	C			370	362	-8
	Thru	466	134	368	4.5	A					490	466	-24
Westbound	Thru	407	11	136	5.3	A	5.3	A			410	407	-3
	Right	225	15	157	5.5	A			225	225	0		

NB Orange Line Travel Time (sec)

Avg 344 St Dev 23

SB Orange Line Travel Time (sec)

Avg 334 St Dev 10