Kimley»Horn

MEMORANDUM

To: Jennifer Monson
City of St. Louis Park

From: Jacob Rojer, P.E.

Date: May 24, 2021

Re: Beltline Residential Development – Traffic Impact Analysis
St. Louis Park, MN

Introduction

Opus Development Company is proposing to redevelop an approximately 3.75-acre site on the northwest corner of the intersection of Beltline Boulevard & 35th Street in St. Louis Park, Minnesota. The proposed redevelopment is a mix of residential and commercial uses consistent with the City of St. Louis Park's 2040 Future Land Use plan. The redevelopment is proposed to include an approximately 250-unit apartment building with 7,450 square feet of retail on the ground floor. The conceptual site plan is provided in **Attachment 1**.

A traffic impact analysis has been completed to determine if the proposed redevelopment will significantly impact the adjacent transportation system and to recommend any mitigation measures (if needed). The study objectives are as follows:

- Forecast the amount of traffic that is expected to be generated by the proposed development. Distribute and assign the new generated traffic to the existing transportation system.
- Identify potential capacity constraints at the study intersections for the Opening Year (2023) No-Build Conditions. The no-build traffic volumes are the anticipated future traffic volumes with area growth taken into consideration and without the inclusion of the project traffic.
- Identify potential capacity constraints at the study intersections and the site driveway locations for Opening Year (2023) Build Conditions with and without access to Park Glen Road.
- Identify potential improvements and mitigation options if capacity constraints are anticipated.

The following memorandum provides a summary of the traffic analysis.

Background Information

Study Area

The proposed development is located on the northwest corner of the intersection of Beltline Boulevard & 35th Street in St. Louis Park, Minnesota. Based on discussions with the City of St. Louis Park staff, the study area includes the following study intersections:

- Beltline Boulevard & Park Glen Road
- Beltline Boulevard & 35th Street
- 36th Street & Raleigh Avenue
- 35th Street & Site Access

The project location and study intersections are shown in **Exhibit 1**.

Roadway Characteristics

The existing conditions were not considered in the analysis due to the planned roadways improvements and speed limit adjustments that will take place in 2021 by the City of St. Louis Park. The following provides a detailed description of the roadways that are included in the study area:

Beltline Boulevard is currently a four-lane undivided roadway that runs in the north/south direction along the east side of the proposed redevelopment. Beltline Boulevard is a Municipal State Aid Street (MSAS) and is proposed to be a Major Collector roadway per the City of St. Louis Park's Comprehensive Plan with reconstruction planned for 2021. This reconstruction provides the following changes in the study area:

- Convert Beltline Boulevard from a 4-lane section to a 3-lane section to provide a single lane in each direction with a two-way left turn lane.
- On-street bike lanes and trails will be provided on both sides of Beltline Boulevard.
- A pedestrian refuge island will be provided for pedestrians to cross at 35th Street.

Per the City's recommended speed limit map, Beltline Boulevard is anticipated to have a posted speed limit of 25 miles per hour (mph). The annual average daily traffic (AADT) in 2018 was 10,500 vehicles per day (vpd) according to the Beltline Boulevard Multimodal Feasibility Study completed by SRF in 2019 in **Attachment 2**.

35th Street/Raleigh Avenue is a two-lane undivided roadway that serves as an access road for the proposed site and the surrounding developments. 35th Street runs east-west, and it transitions into a north-south roadway which is designated as Raleigh Avenue. 35th Street/Raleigh Avenue is designated as a City Street in the City of St. Louis Park's Comprehensive Plan. Per the City's recommended speed limit map, 35th Street/Raleigh Avenue is anticipated to have a speed limit of 20 mph. The AADT in 2017 was 2,200 vpd according to the MnDOT Traffic Mapping Application.

36th Street is a four-lane divided roadway south of the proposed redevelopment that runs in an east-west direction. 36th Street is a MSAS that is designated as a Major Collector in the City of St. Louis Park's Comprehensive Plan. 36th Street will be reconstructed by the City of St. Louis Park in 2021 with Beltline Boulevard. This reconstruction provides the following changes in the study area.

- Convert from a 4-lane divided roadway section with left turn lanes to a 3-lane divided roadway section, which will provide a single lane in the eastbound direction and two lanes in the westbound direction with dedicated left turn lanes.
- 36th Street will be a bike route and provide a trail on the south side and a sidewalk on the north side.
- The access at Raleigh Avenue will change from full access to ¾ access.
- A pedestrian refuge island will be provided at Raleigh Avenue.

Per the City's recommended speed limit map, 36th Street is anticipated to have a speed limit of 30 mph. The AADT in 2018 was 14,900 vpd according to the 36th Street Multimodal Feasibility Study completed by SRF in 2019 in **Attachment 3**.

Park Glen Road is a two-lane undivided roadway that serves as an access road for commercial and residential developments on the east and west sides of Beltline Boulevard. Park Glen Road is designated as a City Street in the City of St. Louis Park's Comprehensive Plan. Per the City's recommended speed limit map, Park Glen Road is anticipated to have a speed limit of 20 mph. AADT volumes on Park Glen Road are not available.

Exhibit 2 provides the geometry and intersection control for the study intersections under Opening Year (2023) No-Build Conditions.

Pedestrian, Bicycle, and Transit

Pedestrian

With the reconstruction of Beltline Boulevard, pedestrian facilities will be provided on both sides on the roadway. This reconstruction will also include a pedestrian refuge island at 35th Street at the crosswalk. Less than one-quarter mile north of the site, the trails along Beltline Boulevard will connect to the Cedar Lake Trail. Sidewalk connections from the site will be provided to the trail along Beltline Boulevard.

35th Street does not currently provide pedestrian facilities and Raleigh Avenue does have a sidewalk for 600 feet along the west side of the roadway. According to the St. Louis Park Comprehensive Plan, 35th Street and Raleigh Avenue do not have pedestrian improvements planned.

Bicycle

The reconstruction of Beltline Boulevard will allow bicycles to use the trails on both sides of the road as well as the on-street bicycle facilities. As previously mentioned, the facilities along Beltline Boulevard will connect to the Cedar Lake Trail north of the site. This provides access to the regional bicycle/trail network. 36th Street will be a bicycle route and will provide a trail on the south side of the roadway.

Transit

Transit service is available near the project area. There are two bus routes within the study area and the Beltline Boulevard Station for the Southwest Light Rail (SWLRT) is currently under construction and is anticipated to open in 2024.

Route 17F is a local bus route from St. Louis Park to Downtown Minneapolis with major stops along Minnetonka Boulevard, Lake Street, and Hennepin Avenue. The 17F is a spur route off of Route 17 and is currently not running due to the COVID-19 pandemic. It is assumed that the route will resume service in the future. Route 17F stops at the intersection of 35th Street & Beltline Boulevard immediately adjacent to the site.

Route 615 is a local bus route from the Ridgedale Center in Minnetonka to the Park Nicollet Clinic in St. Louis Park with major stops at the Knollwood Mall and downtown Hopkins. Route 615 stops along 36th Street with the nearest stop approximately one-quarter mile south of the site at the intersection of Beltline Boulevard & 36th Street.

SWLRT Beltline Station will be located on the east side of Beltline Boulevard adjacent to the Cedar Lake Trail. This station will be less than a one-quarter mile from the proposed development. Based on the proximity to this station, it is anticipated that the SWLRT will be the most likely alternate mode of transportation for site trips.

Volume Development

Traffic volumes were obtained at the three study intersections to perform the capacity analysis. Turning movement counts were collected at the intersection of Beltline Boulevard & 35th Street and 36th Street & Raleigh Avenue on Thursday, April 1st, 2021. The count at 36th Street & Raleigh Avenue was conducted on a typical weekday from 7:00 to 9:00AM and 4:00 to 6:00PM. The count at Beltline Boulevard & 35th Street was conducted on a typical weekday for a 24-hour period. The 24-hour count was conducted to

provide a comparison to pre-COVID-19 traffic volumes. At the time of the data collection, the COVID-19 pandemic impacted traffic patterns resulting in atypical traffic conditions in the study area. The traffic counts were evaluated against historical count data in order to estimate typical conditions. The turning movement count data is included in **Attachment 4**.

A traffic count had recently been completed at the intersection of Beltline Boulevard & Park Glen Road for a nearby development in September 2019, so new data was not collected at this intersection.

In addition to the recent traffic data at the study intersections mentioned above, counts are available at the study intersections from Fall 2018 as part of the Beltline Boulevard Multimodal Feasibility Study and the 36th Street Multimodal Feasibility Study completed by SRF (Attachments 2 & 3).

A summary of the sources of traffic data available at each study intersection is provided below:

- **Beltline Boulevard & Park Glen Road:** 13-hour turning movement count from September 2019 and peak hour turning movement count from Fall 2018
- **Beltline Boulevard & 35th Street:** 24-hour turning movement count from April 2021 and peak hour turning movement count from Fall 2018
- **36th Street & Raleigh Avenue:** peak hour turning movement count from April 2021 and peak hour turning movement count from Fall 2018

Due to the different sources of traffic data available at the study intersections and the varying times they were completed, comparisons were made between the volume data sets. As previously mentioned, a 24-hour turning movement count was performed at Beltline Boulevard & 35th Street to compare the daily traffic volumes. A summary of the traffic volume comparison is shown below.

- **Beltline Boulevard & 35th Street**
  - AM Peak Hour: 2021 count is 57% less than 2018 count
  - PM Peak Hour: 2021 count is 46% less than 2018 count
- **36th Street & Raleigh Avenue**
  - AM Peak Hour: 2021 count is 47% less than 2018 count
  - PM Peak Hour: 2021 count is 27% less than 2018 count
- **Beltline Boulevard**
  - Daily: 2021 count is 38% less than 2018 count
- **35th Street**
  - Daily: 2021 count is 22% less than 2018 count

Due to the significant reduction in current traffic volumes compared to recent count data, the traffic volumes from Fall 2018 were conservatively utilized for the capacity analysis of this traffic study, assuming that traffic volumes will eventually return to pre-COVID-19 levels. Even though more recent pre-COVID-19 traffic data was available at the Beltline Boulevard & Park Glen Road intersection than the Fall 2018 data, the Fall 2018 count data was still used in the analysis to have a consistent data set for the whole network. The traffic counts from Fall 2018 are provided in the Beltline Boulevard Multimodal Feasibility Study and 36th Street Multimodal Feasibility Study (Attachments 2 & 3).

Background Growth

The turning movement counts from Fall 2018 were grown to develop Opening Year (2023) No-Build traffic volumes. Based on a review of the historical AADT data in the study area, projected AADT data from the City of St. Louis Park's Comprehensive Plan, and a review of other traffic studies in the area, an annual background growth rate of 1% was used to develop future traffic volumes.

The yearly growth rate was applied to the 2018 volumes at the study intersections to grow the traffic volumes by five years to develop the Opening Year (2023) No-Build traffic volumes. **Exhibit 3** provides a summary of the weekday AM and PM peak hour turning movement counts for Opening Year (2023) No-Build Conditions. Traffic volumes were not balanced in between study intersections due to the presence of one or more site driveways located in between the intersections.

Proposed Development Traffic

The proposed site is located in the northwest quadrant of the Beltline Boulevard & 35th Street intersection. The redevelopment is proposed to be an approximately 250-unit apartment building with 7,450 square feet of retail on the ground floor. A pick-up/drop-off loop will be provided on 35th Street for the apartment building. All other site traffic will use the access on the west side of the existing building off of 35th Street. This driveway also provides access to the adjacent existing building. As discussed in the following section, an additional scenario was also analyzed where the alley on the northwest corner of the site would connect to Park Glen Road. The conceptual site plan is provided in **Attachment 1**.

In order to calculate trips generated by the proposed site, data was referenced from the Institute of Transportation Engineers (ITE) manual titled Trip Generation, Tenth Edition. Standard ITE trip generation rates were used to develop the gross new trips generated by the site.

The trip generation was based on the following uses:

- Multifamily Housing (Mid-Rise) (ITE code 221)
- Fast Casual Restaurant (ITE code 930)
- Quality Restaurant (ITE code 931)

The Fast Casual Restaurant and Quality Restaurant land uses were conservatively assumed based on the proposed sizes of retail spaces from the site plan. Site generated trips are expected to exhibit multiple routing patterns when traveling to and from the subject site, as described below:

- **Internal Capture -** The proposed commercial use is intended to complement the residential use; thus, it is likely that some patrons that visit the commercial use will originate from the residential land use on site and will not travel on external roadways to access the commercial land use. To reflect these "internally captured" trips, an internal capture reduction was applied for the proposed residential and commercial uses.
- **Pass-by** – Pass-by traffic reflects the travel patterns of motorists who are already traveling on the adjacent study roadways and stop at the site en route to another primary destination. According to the ITE Trip Generation Handbook, Third Edition, roughly 44 percent of vehicles at a Quality Restaurant (ITE code 931) and Fast Casual Restaurant (ITE code 930) during the evening peak hour are pass-by trips. Pass-by trips were not assumed for the residential uses.
- **Primary Trips** – Vehicles that travel to the subject development and then return directly to their place of origin are called "primary trips." Primary trips reflect new traffic volumes generated by the proposed development that would approach and depart on the same route. Trips to/from the site that are not pass-by or internal capture trips are expected to be primary trips.

Based on the proximity to the Beltline Boulevard LRT station, a mode split of 10 percent transit was assumed for the total trip generation. A reduction to account for trips that access the existing site was not applied to the proposed site trip generation, so the trip generation for the proposed site will produce conservative analysis results. However, most existing site trips do not access the site from any of the study intersections because the existing site has a dedicated access on Beltline Boulevard. Because the access would not be maintained with the project, the site trips from the proposed redevelopment would be required to access the site from one of the study intersections. **Table 1** summarizes the trip generation for the proposed site.

Table 1: Proposed Development Trip Generation

ITE Code	Land Use Description	Units	Size	AM Peak Hour			PM Peak Hour		
				Trips Enter	Trips Exit	Total Trips	Trips Enter	Trips Exit	Total Trips
221	Multifamily Housing (Mid-Rise)	DU	250	23	67	90	67	43	110
930	Fast Casual Restaurant	SF	2,700	4	2	6	21	17	38
931	Quality Restaurant	SF	4,750	2	1	3	25	12	37
Total Site Trips				29	70	99	113	72	185
Internal Capture Trips				-1	-1	-2	-12	-12	-24
Mode Split Reduction				-3	-7	-10	-10	-6	-16
Pass-by Trips				0	0	0	-16	-10	-26
Rounded Pass-By Trips				**0**	**0**	**0**	**15**	**10**	**25**
Rounded Primary External Auto Trips				**25**	**60**	**85**	**75**	**45**	**120**

The estimated distribution of site-generated traffic on the surrounding roadway network as it approaches and departs the site is a function of several variables, such as the nature of surrounding land uses, prevailing traffic volumes/patterns, characteristics of the street system, and the ease with which motorists can travel over various sections of that system. The anticipated directional distributions estimated for the proposed development are assumed to be as follows:

- 50% to/from the north via Beltline Boulevard
- 40% to/from the southwest via 36th Street
- 10% to/from the southeast via Monterey Drive

The site traffic assignment, representing traffic volumes associated with the proposed development at the study intersections, is a function of the estimated trip generation and the directional distribution. **Exhibit 4** and **Exhibit 5** show the primary trip distribution and the corresponding primary trip assignment, respectively. The proposed development pass-by trips were similarly distributed throughout the study area. **Exhibit 6** and **Exhibit 7** show the pass-by trip distribution and the corresponding pass-by trip assignment, respectively. The combined total trip assignment is shown in **Exhibit 8**. It should be noted that no trips were assigned to the pick-up/drop-off loop on 35th Street as it would be a small portion of the site trips.

Opening Year (2023) Build Scenarios

Two different Opening Year (2023) Build scenarios were evaluated in this study. In Opening Year (2023) Build – Scenario 1, all site traffic was assumed to access the development via the driveway in the southwest corner of the site off of 35th Street. The traffic volumes for Opening Year (2023) Build Conditions – Scenario 1 were developed by adding the combined total trip assignment (Exhibit 8) to the Opening Year (2023) No-Build traffic volumes (Exhibit 3). The weekday AM and PM peak hour traffic volumes for Opening Year (2023) Build – Scenario 1 are summarized in **Exhibit 9**.

For Opening Year (2023) Build – Scenario 2, a second access was assumed at the northwest corner of the site at Park Glen Road. In Scenario 2, a portion of the total site trips was redistributed to the Park Glen Road site access. Additionally, it was assumed that some of the existing background traffic from the existing adjacent site would redistribute to utilize this driveway to access Beltline Boulevard. The amount

of traffic diverted from the existing adjacent site was determined based on comparing the size of the adjacent building to the total building area for the parcels near the 35th Street & Beltline Boulevard intersection and reassigning a relative proportion of the 35th Street traffic to Park Glen Road.

The weekday AM and PM peak hour traffic volumes for Opening Year (2023) Build – Scenario 2 are summarized in **Exhibit 10**.

Intersection Capacity Analysis

A capacity analysis was performed to quantify the delay and level of service at the study intersections during the weekday AM and PM peak hours. Peak hour factors and heavy vehicle percentages were applied based on the most recent traffic data available at each intersection. The peak hour factors were applied at the intersection-level, and heavy vehicle percentages were applied by movement, with a 2% minimum assumed.

The capacity of an intersection quantifies its ability to accommodate traffic volumes and is expressed in terms of level of service (LOS), measured in average delay per vehicle. LOS grades range from A to F, with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions). The capacity analysis was performed using Synchro/ SimTraffic.

The LOS boundaries for signalized and unsignalized intersections, as documented in the *Highway Capacity Manual 6th Edition,* are provided in **Table 2**. The overall intersection is not shown for side street stop-controlled intersections because the minimal delay for the major street through movements skews the weighted overall intersection delay, which may mask poor operations at the individual movement level.

For the purposes of this study, LOS A through LOS D are considered acceptable LOS for both signalized and unsignalized intersections.

Table 2: Level of Service Boundaries

Level of Service	*Average Control Delay (seconds/vehicle)*		*Description*
	Unsignalized Intersection	*Signalized Intersection*	
A	0-10	0-10	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B	>10-15	>10-20	Minor control delay at signalized intersections; traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream.
C	>15-25	>20-35	Moderate control delay; movement within traffic stream more restricted than at LOS B; formation of queues contributes to lower average travel speeds.
D	>25-35	>35-55	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E	>35-50	>55-80	High control delay; average travel speed no more than 33 percent of free flow speed.
F	>50	>80	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

Analysis Scenarios

Three initial scenarios were included in the analysis of the study area:

- Opening Year (2023) No-Build
- Opening Year (2023) Build – Scenario 1
- Opening Year (2023) Build – Scenario 2

As previously mentioned, the existing conditions were not analyzed as there will be geometric changes to both Beltline Boulevard and 36th Street in 2021.

The Opening Year (2023) No-Build scenario was analyzed in order to develop the baseline operating conditions for the study area without the addition of the development. The Opening Year (2023) Build scenarios assumed the addition of the site traffic for the site.

Opening Year (2023) No-Build Conditions Analysis

The Opening Year (2023) No-Build Conditions analysis was completed to develop an understanding of the baseline operating conditions for the study area without the addition of the development traffic. It should be noted that a dedicated right-turn lane was included in the SimTraffic models at the eastbound approach of Beltline Boulevard & 35th Street and at the westbound approach of Beltline Boulevard & Park Glen Road. Although these turn lanes are not currently striped at the intersections, the current roadway width provides enough space for right-turning vehicles to bypass vehicles waiting to turn left movement. This is consistent with what was analyzed in the Beltline Boulevard Multimodal Feasibility Study completed by SRF.

Table 3 and **Table 4** provide a summary of the average delay (seconds per vehicle) and LOS under Opening Year (2023) No-Build Conditions for each movement at the study intersections during the AM peak hour and PM peak hour, respectively. The movements that are anticipated to operate at LOS E are shown in yellow and the movements that are anticipated to operate at LOS F are shown in red. The full SimTraffic reports are included in **Attachment 5**.

Table 3: Opening Year (2023) No-Build Conditions AM Peak Hour

Intersection	*Control*	*Approach*	*Operations by Movement*					
			Left		*Through*		*Right*	
			Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	19.2	C	18.1	C	4.9	A
		WB	19.4	C	28.8	D	5.9	A
		NB	4.5	A	1.4	A	0.8	A
		SB	4.1	A	0.6	A	0.5	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	11.1	B	-	-	4.0	A
		NB	5.0	A	0.8	A	-	-
		SB	-	-	1.3	A	1.0	A
36th Street & Raleigh Avenue	Side Street Stop	EB	5.5	A	0.6	A	0.0	A
		WB	2.9	A	0.8	A	0.0	A
		NB	-	-	-	-	3.5	A
		SB	-	-	-	-	6.4	A

Table 4: Opening Year (2023) No-Build Conditions PM Peak Hour

Intersection	Control	Approach	Operations by Movement					
			Left		Through		Right	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	100+	F	96.3	F	89.4	F
		WB	100+	F	100+	F	13.4	B
		NB	6.9	A	2.2	A	1.6	A
		SB	7.4	A	0.9	A	0.7	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	71.5	F	-	-	8.3	A
		NB	8.0	A	1.3	A	-	-
		SB	-	-	2.1	A	1.3	A
36th Street & Raleigh Avenue	Side Street Stop	EB	7.0	A	1.5	A	0.0	A
		WB	7.8	A	1.0	A	0.1	A
		NB	-	-	-	-	8.4	A
		SB	-	-	-	-	5.6	A

Under Opening Year (2023) No-Build Conditions, all intersection movements are anticipated to operate at an acceptable LOS except for the following:

- **Beltline Boulevard & Park Glen Road** – the eastbound approach and the westbound left-turn and through movements are expected to operate at LOS F during the PM peak hour. The projected delay on these legs is not unusual for a minor-street stop-controlled intersection with a heavily traveled arterial such as Beltline Boulevard.
- **Beltline Boulevard & 35th Street** – the eastbound left movement is expected to operate at LOS F during the PM peak hour. The projected delay on these legs is not unusual for a minor-street stop-controlled intersection with a heavily traveled arterial such as Beltline Boulevard.

The 95th percentile queues were reviewed at the study intersections. The 95th percentile queues for the movements that exceed their storage capacity or have undesirable levels of delay are listed below.

- **Beltline Boulevard & Park Glen Road –** In the PM peak hour, the eastbound approach would have approximately a 10-vehicle queue which would extend beyond the closest existing driveway on Park Glen Road. In the PM peak hour, the westbound approach would have approximately an 8-vehicle queue which would extend beyond the residential driveway on Park Glen Road.
- **Beltline Boulevard & 35th Street –** In the PM peak hour, the eastbound approach would have approximately a 7-vehicle queue.

The capacity analysis results for Opening Year (2023) No-Build Conditions are consistent with the findings in the Beltline Boulevard Multimodal Feasibility Study (Attachment 2). The study states that side street delays on Park Glen Road at Beltline Boulevard will approach two minutes after the reconstruction of Beltline Boulevard. The study also noted that side street delays on 35th Street at Beltline Boulevard would operate at LOS F. These delays are only anticipated to occur in the PM peak hour and are not uncommon for this type of facility during peak periods.

Opening Year (2023) Build Conditions – Scenario 1 Analysis

The Opening Year (2023) Build Conditions – Scenario 1 analysis was completed to provide an understanding of how the proposed development could potentially impact the operating conditions of the transportation network within the study area based on the addition of the site traffic. This analysis was first completed without any mitigation.

Table 5 and **Table 6** provide a summary of the average delay (seconds per vehicle) and LOS under Opening Year (2023) Build Conditions – Scenario 1 for each movement at the study intersections during the AM peak hour and PM peak hour, respectively. Consistent with the Opening Year (2023) No-Build Conditions analysis, the movements that are anticipated to operate at LOS E are shown in yellow and the movements that are anticipated to operate at LOS F are shown in red. The full SimTraffic reports are included in **Attachment 5**.

Table 5: Opening Year (2023) Build Conditions – Scenario 1 AM Peak Hour

Intersection	Control	Approach	Operations by Movement					
			Left		Through		Right	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	14.3	B	24.6	C	11.2	B
		WB	22.3	C	22.6	C	5.6	A
		NB	4.6	A	1.3	A	1.1	A
		SB	4.1	A	0.6	A	0.5	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	14.8	B	-	-	4.8	A
		NB	3.9	A	0.9	A	-	-
		SB	-	-	1.3	A	1.0	A
36th Street & Raleigh Avenue	Side Street Stop	EB	5.9	A	0.7	A	0.0	A
		WB	3.2	A	0.8	A	0.1	A
		NB	-	-	-	-	3.9	A
		SB	-	-	-	-	6.2	A
35th Street & Site Access	Side Street Stop	EB	1.5	A	0.2	A	-	-
		WB	-	-	0.5	A	0.2	A
		SB	4.5	A	-	-	3.2	A

Table 6: Opening Year (2023) Build Conditions – Scenario 1 PM Peak Hour Delay Results

Intersection	Control	Approach	Operations by Movement					
			Left		Through		Right	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	100+	F	100+	F	100+	F
		WB	100+	F	100+	F	13.2	B
		NB	6.3	A	2.0	A	1.5	A
		SB	6.5	A	1.1	A	0.8	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	100+	F	-	-	8.8	A
		NB	9.8	A	1.3	A	-	-
		SB	-	-	2.5	A	2.0	A
36th Street & Raleigh Avenue	Side Street Stop	EB	8.3	A	1.7	A	0.0	A
		WB	8.0	A	1.1	A	0.0	A
		NB	-	-	-	-	7.6	A
		SB	-	-	-	-	6.8	A
35th Street & Site Access	Side Street Stop	EB	3.4	A	3.2	A	-	-
		WB	-	-	6.7	A	3.6	A
		SB	24.0	C	-	-	17.7	C

Under Opening Year (2023) Build Conditions – Scenario 1, all intersection movements are anticipated to operate at an acceptable LOS except for the following:

- **Beltline Boulevard & Park Glen Road** – consistent with the Opening Year (2023) No-Build Conditions, the eastbound approach and westbound left-turn and through movements are expected to continue operating at LOS F during the PM peak hour due to the traffic volumes and lack of gaps in the traffic flow along Beltline Boulevard.
- **Beltline Boulevard & 35th Street** – the eastbound left-turn movement is expected to experience LOS F during the PM peak hour due to the lack of gaps in the traffic flow along Beltline Boulevard. This movement is anticipated to operate at LOS F under Opening Year (2023) No-Build Conditions but is expected to experience an increase in delay due to additional site traffic.

The 95th percentile queues were reviewed at the study intersections. The 95th percentile queues for the movements that exceed their storage capacity or have undesirable levels of delay are listed below.

- **Beltline Boulevard & Park Glen Road** – In the PM peak hour, the eastbound approach would have approximately a 12-vehicle queue which would extend beyond the closest existing driveway on Park Glen Road. In the PM peak hour, the westbound approach queue is expected to be consistent with the Opening Year (2023) No-Build Conditions.
- **Beltline Boulevard & 35th Street –** In the PM peak hour, the eastbound approach would have approximately an 11-vehicle queue. This 95th percentile queue length is anticipated to just reach the Site Access off of 35th Street.

Opening Year (2023) Build Conditions – Scenario 2 Analysis

The Opening Year (2023) Build Conditions – Scenario 2 analysis was completed to provide an understanding of how the proposed development could impact the operating conditions of the transportation network within the study area based on the addition of the site traffic and an additional site access at Park Glen Road.

Table 7 and **Table 8** provide a summary of the average delay (seconds per vehicle) and LOS under Opening Year (2023) Build Conditions – Scenario 2 for each movement at the study intersections during the AM peak hour and PM peak hour, respectively. Consistent with the Opening Year (2023) No-Build Conditions, the movements that are anticipated to operate at LOS E are shown in yellow and the movements that are anticipated to operate at LOS F are shown in red. The full SimTraffic reports are included in **Attachment 5**.

Table 7: Opening Year (2023) Build Conditions – Scenario 2 AM Peak Hour

Intersection	Control	Approach	Operations by Movement					
			Left		Through		Right	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	21.3	C	29.9	D	5.3	A
		WB	18.5	C	26.3	D	6.4	A
		NB	4.9	A	1.4	A	0.9	A
		SB	4.0	A	0.7	A	0.6	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	13.8	B	-	-	4.4	A
		NB	4.5	A	0.8	A	-	-
		SB	-	-	1.3	A	0.9	A
36th Street & Raleigh Avenue	Side Street Stop	EB	5.4	A	0.7	A	0.0	A
		WB	1.2	A	0.3	A	0.0	A
		NB	-	-	-	-	2.5	A
		SB	-	-	-	-	5.6	A
35th Street & Site Access	Side Street Stop	EB	1.6	A	0.1	A	-	-
		WB	-	-	0.5	A	0.2	A
		SB	4.3	A	-	-	2.9	A
Park Glen Road & Site Access	Side Street Stop	EB	-	-	0.0	A	0.0	A
		WB	1.2	A	0.3	A	-	-
		NB	0.0	A	-	-	2.5	A

Table 8: Opening Year (2023) Build Conditions – Scenario 2 PM Peak Hour

Intersection	Control	Approach	Operations by Movement					
			Left		Through		Right	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Side Street Stop	EB	100+	F	100+	F	85.2	F
		WB	85.9	F	100+	F	14.6	B
		NB	8.6	A	2.0	A	1.4	A
		SB	6.7	A	1.0	A	0.7	A
Beltline Boulevard & 35th Street	Side Street Stop	EB	48.0	E	-	-	7.9	A
		NB	8.0	A	1.2	A	-	-
		SB	-	-	2.1	A	1.5	A
36th Street & Raleigh Avenue	Side Street Stop	EB	8.0	A	1.7	A	0.0	A
		WB	8.3	A	1.1	A	0.0	A
		NB	-	-	-	-	8.4	A
		SB	-	-	-	-	6.9	A
35th Street & Site Access	Side Street Stop	EB	0.2	A	0.4	A	-	-
		WB	-	-	6.1	A	3.5	A
		SB	0.3	A	-	-	0.1	A
Park Glen Road & Site Access	Side Street Stop	EB	-	-	99.7	F	0.0	A
		WB	1.4	A	0.4	A	-	-
		NB	0.0	A	-	-	100+	F

Under Opening Year (2023) Build Conditions – Scenario 2, all intersection movements are anticipated to operate at an acceptable LOS except for the following:

- **Beltline Boulevard & Park Glen Road** – similar to the Opening Year (2023) No-Build Conditions, the eastbound approach and westbound left-turn and through movements are expected to continue operating at LOS F during the PM peak hour due to the traffic volumes and lack of gaps in the traffic flow along Beltline Boulevard.
- **Beltline Boulevard & 35th Street** – the eastbound left-turn movement is expected to experience unacceptable operations during the PM peak hour due to the lack of gaps in the traffic flow along Beltline Boulevard. This movements is anticipated to operate at LOS F under Opening Year (2023) No-Build Conditions but is expected to experience a decrease in delay under Opening Year (2023) Build Conditions – Scenario 2 due to the redistribution of some area traffic to Park Glen Road.
- **Park Glen Road & Site Access** – the northbound right-turn movement is expected to operate at LOS F during the PM peak hour due to the eastbound queue on Park Glen Road extending from Beltline Boulevard and blocking the Site Access intersection.

The 95th percentile queues were reviewed at the study intersections. The 95th percentile queues for the movements that exceed their storage capacity or have undesirable levels of delay are listed below.

- **Beltline Boulevard & Park Glen Road** – In the PM peak hour, the eastbound approach would have approximately a 17-vehicle queue. This queue is anticipated to block the northbound approach of the Site Access driveway, leading to northbound delays at the intersection. In the PM peak hour, the westbound approach queue is expected to be consistent with the Opening Year (2023) No-Build Conditions.
- **Beltline Boulevard & 35th Street** – In the PM peak hour, the eastbound approach would have approximately a 4-vehicle queue. The queue is shorter than the Opening Year (2023) No-Build Conditions because of the additional access at Park Glen Road.

Opening Year (2023) Build Conditions – Mitigated Analysis & Recommendations

In order to address the poor levels of service in the study area that are experienced under the Opening Year (2023) No-Build Conditions, several mitigations were considered at the study intersections and evaluated under the Opening Year (2023) Build Conditions – Mitigated analysis scenarios. The mitigation measures included the following:

- Addition of a striped/dedicated right-turn lane at the eastbound approach of Beltline Boulevard & 35th Street. This mitigation would not result in a significant change in the traffic modeling results because the current width of the intersection approach is already wide enough to allow for right-turning vehicles to bypass vehicles waiting to turn left. However, providing striping will more clearly define and separate the storage spaces for left- and right-turning vehicles and could be concurrently implemented with the planned Beltline Boulevard reconstruction with minor impact to 35th Street.
- Installation of a traffic signal at the intersection of Beltline Boulevard & Park Glen Road. Poor operations are anticipated at the intersection in the Opening Year (2023) Conditions with or without the development, and this mitigation is consistent with what was determined in the Beltline Boulevard Multimodal Feasibility Study completed by SRF. A timeframe for when the intersection will require signalization was not determined in the study, but it is anticipated that it will need to occur when traffic volumes reach the level of Opening Year (2023) No-Build Conditions. With the addition of a traffic signal at the intersection, single lane approaches were assumed along Park Glen Road.

Table 9 and **Table 10** provide a summary of the average delay (seconds per vehicle) and LOS under Opening Year (2023) Build Conditions – Mitigated Scenario 1 for each movement at Beltline Boulevard & Park Glen Road during the AM peak hour and PM peak hour, respectively. The results are only shown for the study intersections that would be expected to see an impact with the suggested mitigations: Beltline

Boulevard & Park Glen Road and Beltline Boulevard & 35th Street. The other study intersections were not reported as they would operate similarly to the unmitigated scenarios. The installation of a signal at Beltline Boulevard & Park Glen Road would improve operations to an acceptable level. The full SimTraffic reports are included in **Attachment 5**.

Table 9: Opening Year (2023) Build Conditions – Mitigated Scenario 1 AM Peak Hour

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Signal	EB	9.4	A	12.3	B	4.6	A	5.3	A
		WB	10.4	B	11.6	B	5.5	A		
		NB	11.5	B	5.0	A	3.7	A		
		SB	8.9	A	4.2	A	1.7	A		

Table 10: Opening Year (2023) Build Conditions – Mitigated Scenario 1 PM Peak Hour

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Signal	EB	22.5	C	22.2	C	13.8	B	9.0	A
		WB	25.2	C	18.6	B	14.5	B		
		NB	17.5	B	7.5	A	5.9	A		
		SB	17.0	B	6.3	A	2.7	A		

Table 11 and **Table 12** provide a summary of the average delay (seconds per vehicle) and LOS under Opening Year (2023) Build Conditions – Mitigated Scenario 2 for each movement at Beltline Boulevard & Park Glen Road and Park Glen Road & Site Access during the AM peak hour and PM peak hour respectively. The other study intersections were not reported as they would operate similarly to the unmitigated scenarios. The installation of signal at Beltline Boulevard & Park Glen Road would improve operations to an acceptable level for Scenario 2 and would also improve operations at the Site Access on Park Glen Road. The full SimTraffic reports are included in **Attachment 5**.

Table 11: Opening Year (2023) Build Conditions – Mitigated Scenario 2 AM Peak Hour

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Signal	EB	11.9	B	14.2	B	3.8	A	6.0	A
		WB	11.0	B	9.8	A	6.1	A		
		NB	11.6	B	5.6	A	3.8	A		
		SB	10.1	B	4.8	A	2.0	A		
Park Glen Road & Site Access	Side Street Stop	EB	-	-	0.0	A	0.0	A	-	-
		WB	1.3	A	0.4	A	-	-		
		NB	0.0	A	-	-	2.5	A		

Table 12: Opening Year (2023) Build Conditions – Mitigated Scenario 2 PM Peak Hour

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Beltline Boulevard & Park Glen Road	Signal	EB	23.1	C	22.7	C	15.7	B	9.3	A
		WB	21.5	C	27.1	C	12.9	B		
		NB	19.4	B	7.7	A	5.3	A		
		SB	19.2	B	6.4	A	2.9	A		
Park Glen Road & Site Access	Side Street Stop	EB	-	-	0.5	A	0.0	A	-	-
		WB	1.6	A	0.4	A	-	-		
		NB	0.0	A	-	-	2.9	A		

Based on the results of the analysis, it is recommended to install a signal at Beltline Boulevard & Park Glen Road when traffic volumes reach the Opening Year (2023) No-Build volumes as there will be significant delays at the intersection with or without the proposed development.

In the Build conditions, the eastbound left-turn movement at Beltline Boulevard & 35th Street is expected to have an undesirable level of service in the PM peak hour for both Scenario 1 and Scenario 2. If feasible, a connection to Park Glen Road (Scenario 2) once Beltline Boulevard & Park Glen Road is signalized, would improve operations at Beltline Boulevard & 35th Street. However, the eastbound left-turn movement is still anticipated to operate at LOS E. While this LOS is not desirable, it is not uncommon for side street approaches on roadways like Beltline Boulevard during the peak periods.

Summary and Conclusion

The Beltline residential redevelopment, located west of Beltline Boulevard on the north side of 35th Street, is proposed to be an approximately 250-unit apartment building with 7,450 square feet of retail on the ground floor. The site is anticipated to generate a total of 85 AM peak hour trips (25 entering and 60 exiting) and 145 PM peak hour trips (90 entering and 55 exiting), including pass-by trips.

A capacity analysis was completed for four scenarios: Opening Year (2023) No-Build Conditions, Opening Year (2023) Build Conditions – Scenario 1, Opening Year (2023) Build Conditions – Scenario 2, and Opening Year (2023) Mitigated Build Conditions.

Under Opening Year (2023) No-Build Conditions, all intersection movements are anticipated to operate at an acceptable LOS except for the eastbound approach and westbound left-turn and through movements at Beltline Boulevard & Park Glen Road and the eastbound left -turn movement at Beltline Boulevard & 35th Street in the PM peak hour. These operational deficiencies are consistent with the Beltline Boulevard Multimodal Feasibility Study completed by SRF in 2019.

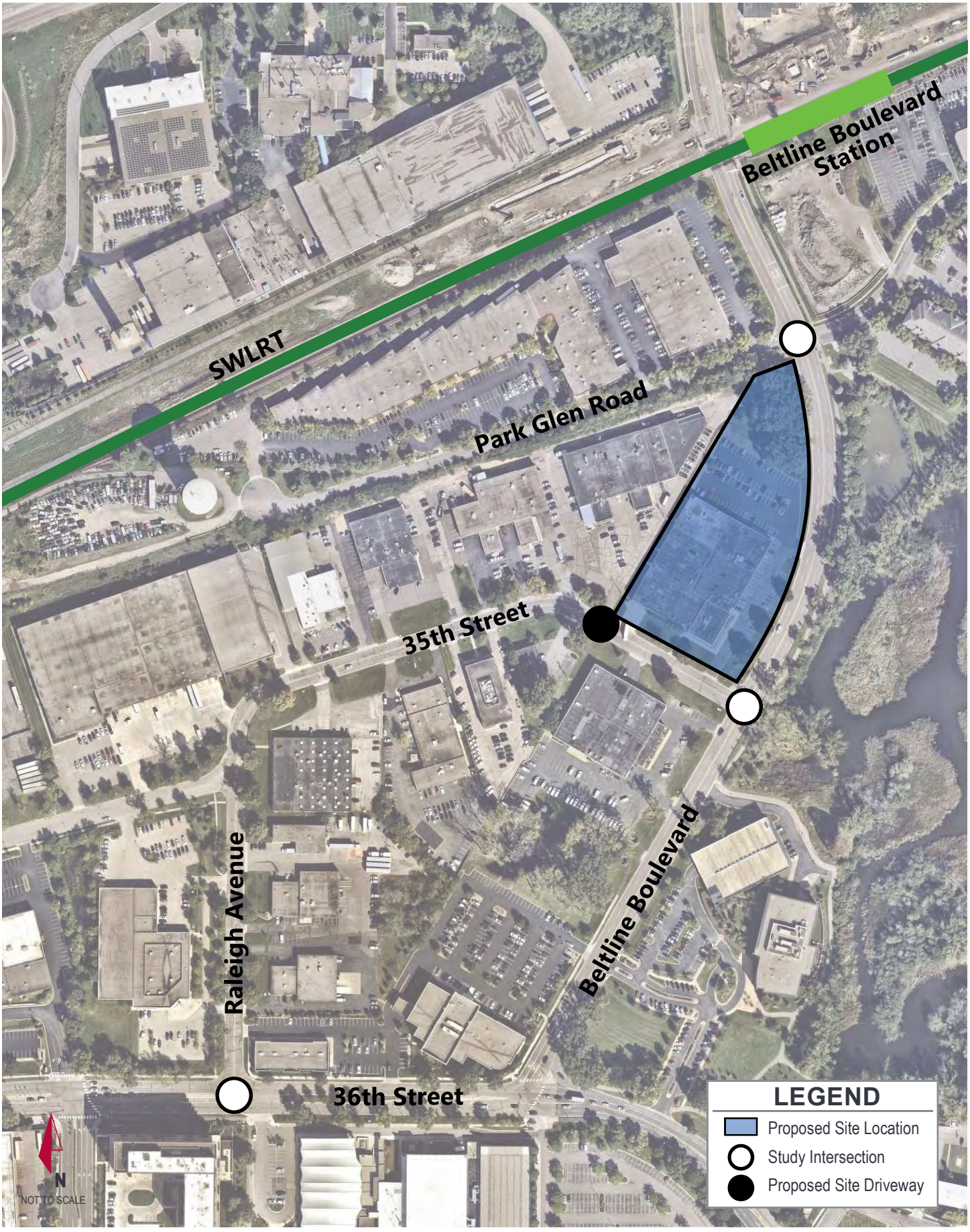
With the proposed development traffic in Scenario 1, the same operational deficiencies as the Opening Year (2023) No-Build Conditions are anticipated to occur, however, operations at Beltline Boulevard & 35th Street are anticipated to experience increased delay in the PM peak hour.

With the proposed development traffic in Scenario 2, the same operational deficiencies as the Opening Year (2023) No-Build Conditions are anticipated to occur. It is anticipated that, with the connection to Park Glen Road from the site, operations at Beltline Boulevard & 35th Street will remain consistent with Opening Year (2023) No-Build Conditions. Site access operations at Park Glen Road would operate poorly if operations at Beltline Boulevard & Park Glen Road are not addressed.

The Opening Year (2023) Mitigated Build Conditions for both Scenarios 1 and 2 were analyzed with a signal at Beltline Boulevard & Park Glen Road to remain consistent with what was determined in the Beltline Boulevard Multimodal Feasibility Study completed by SRF in 2019. Based on the results of the analysis, it is recommended to install a signal at Park Glen Road & Beltline Boulevard when traffic volumes reach the Opening Year (2023) No-Build Conditions volumes as there will be excessive delays at the intersection with or without the proposed development. The installation of a signal at Beltline Boulevard & Park Glen Road would improve operations to an acceptable level for both Scenarios 1 and 2.

The following improvements are recommended to facilitate improved operations and access to the residential development.

- Beltline Boulevard & Park Glen Road
  - Install a traffic signal when the Opening Year (2023) No-Build traffic volumes are reached.
- Beltline Boulevard & 35th Street
  - Restripe eastbound approach at intersection to create separate left-turn and right-turn lanes. The width of the roadway at the intersection already allows for right-turning vehicles to bypass vehicles waiting to turn left but providing striping would clearly separate the storage spaces for left- and right-turning vehicles. This improvement could be concurrently implemented with the planned Beltline Boulevard reconstruction with minor impacts to 35th Street.
- If feasible, consider constructing a new access to Park Glen Road (Scenario 2)
  - This connection should only be considered after Beltline Boulevard & Park Glen Road is signalized.
  - Provide a single inbound lane and single outbound lane on the south leg of the intersection (site access).
  - Install a stop sign for outbound traffic at the site access.



Kimley»Horn

EXHIBIT 1

PROJECT SITE LOCATION AND STUDY AREA

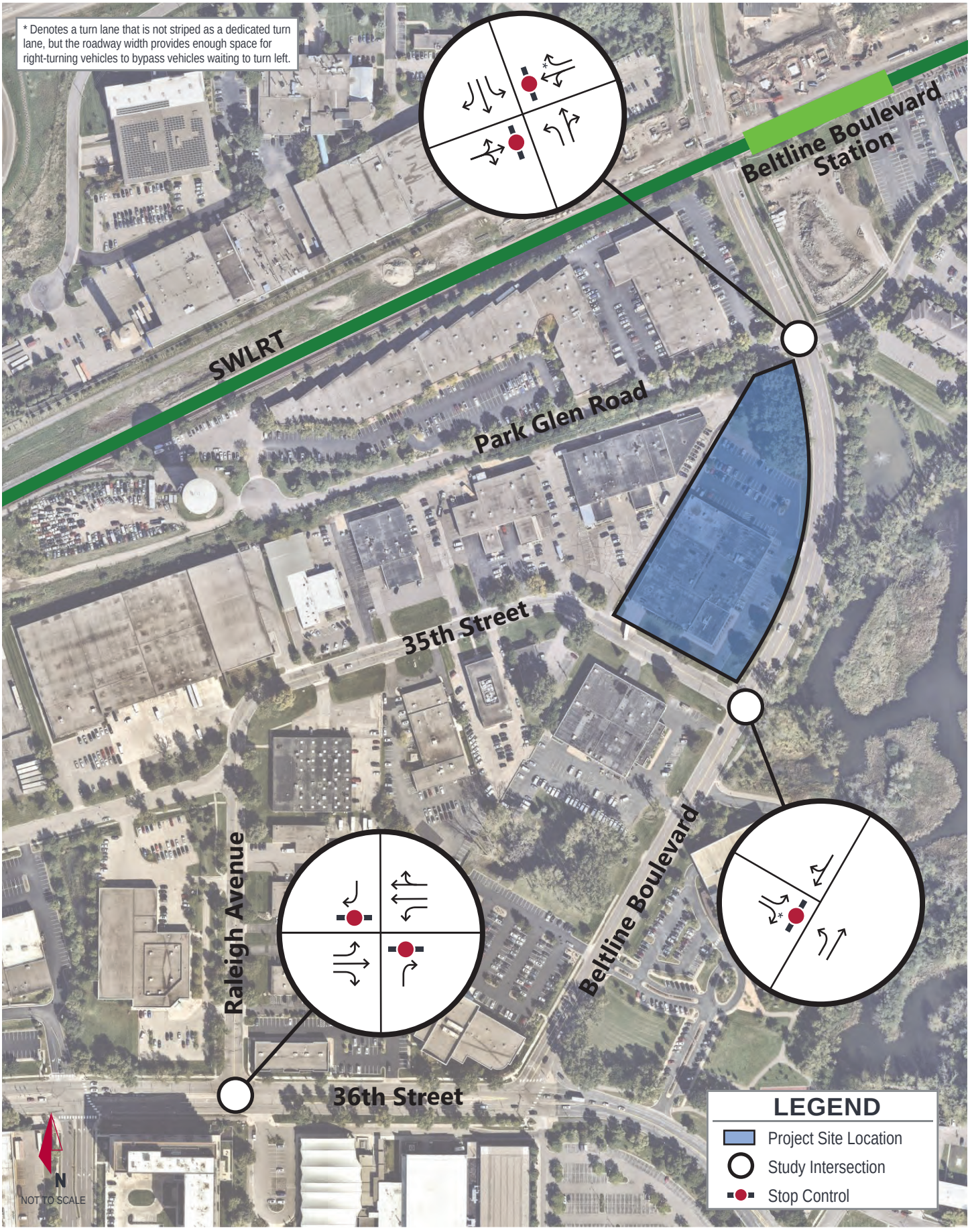


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EXHIBIT 2

OPENING YEAR (2023) NO-BUILD GEOMETRY AND INTERSECTION CONTROL

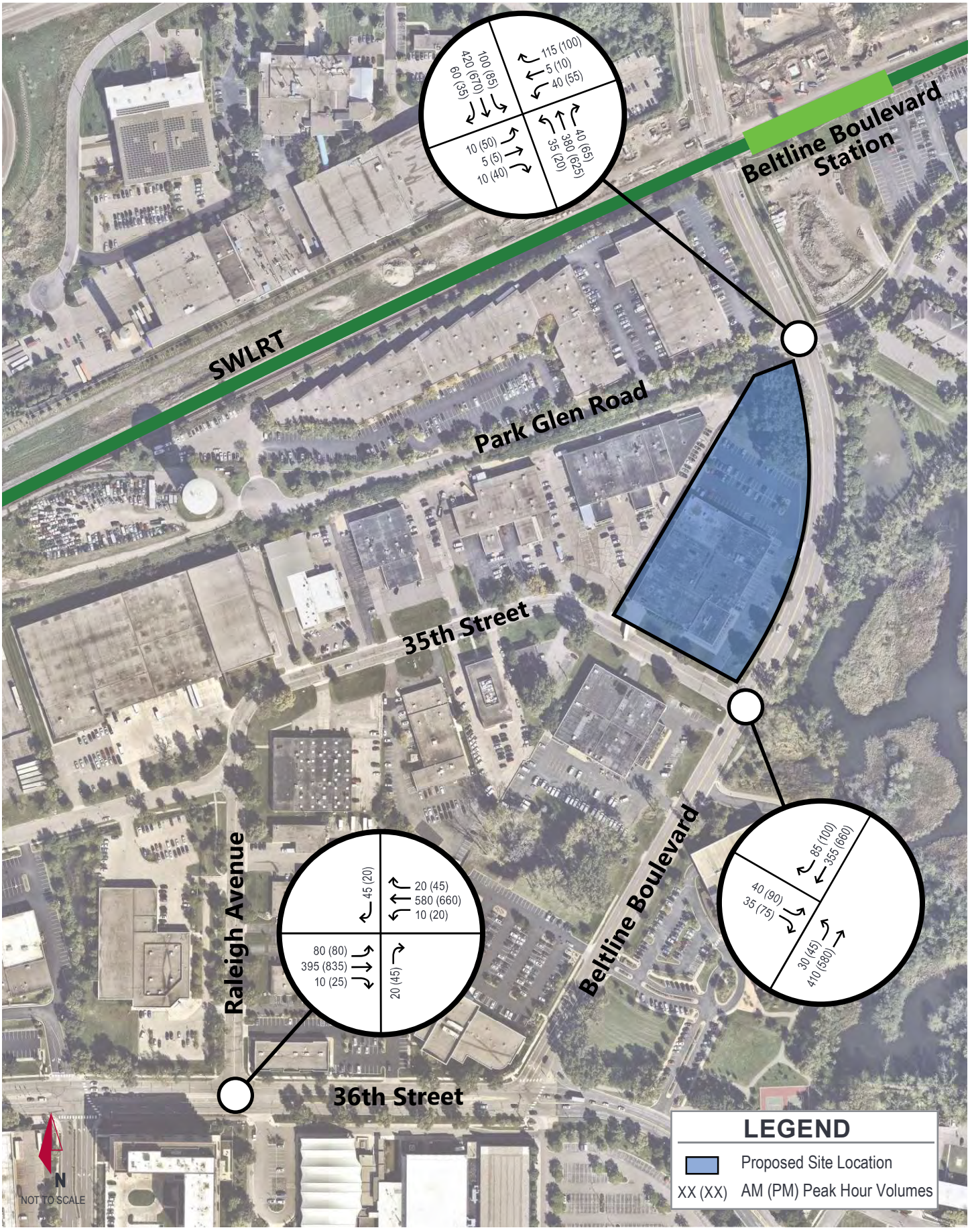

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EXHIBIT 3

OPENING YEAR (2023) NO-BUILD TRAFFIC VOLUMES

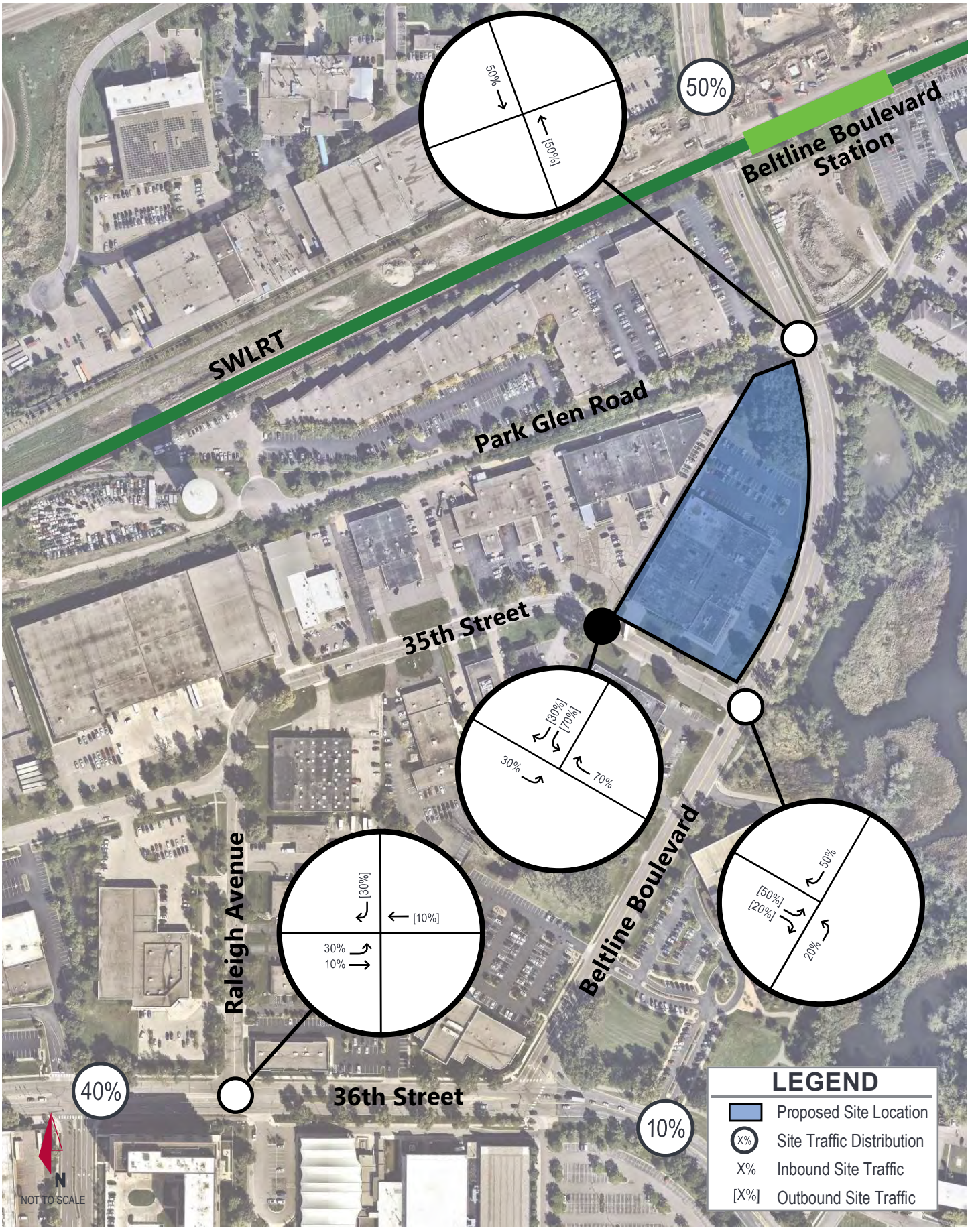

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EXHIBIT 4

PRIMARY SITE TRIP DISTRIBUTION

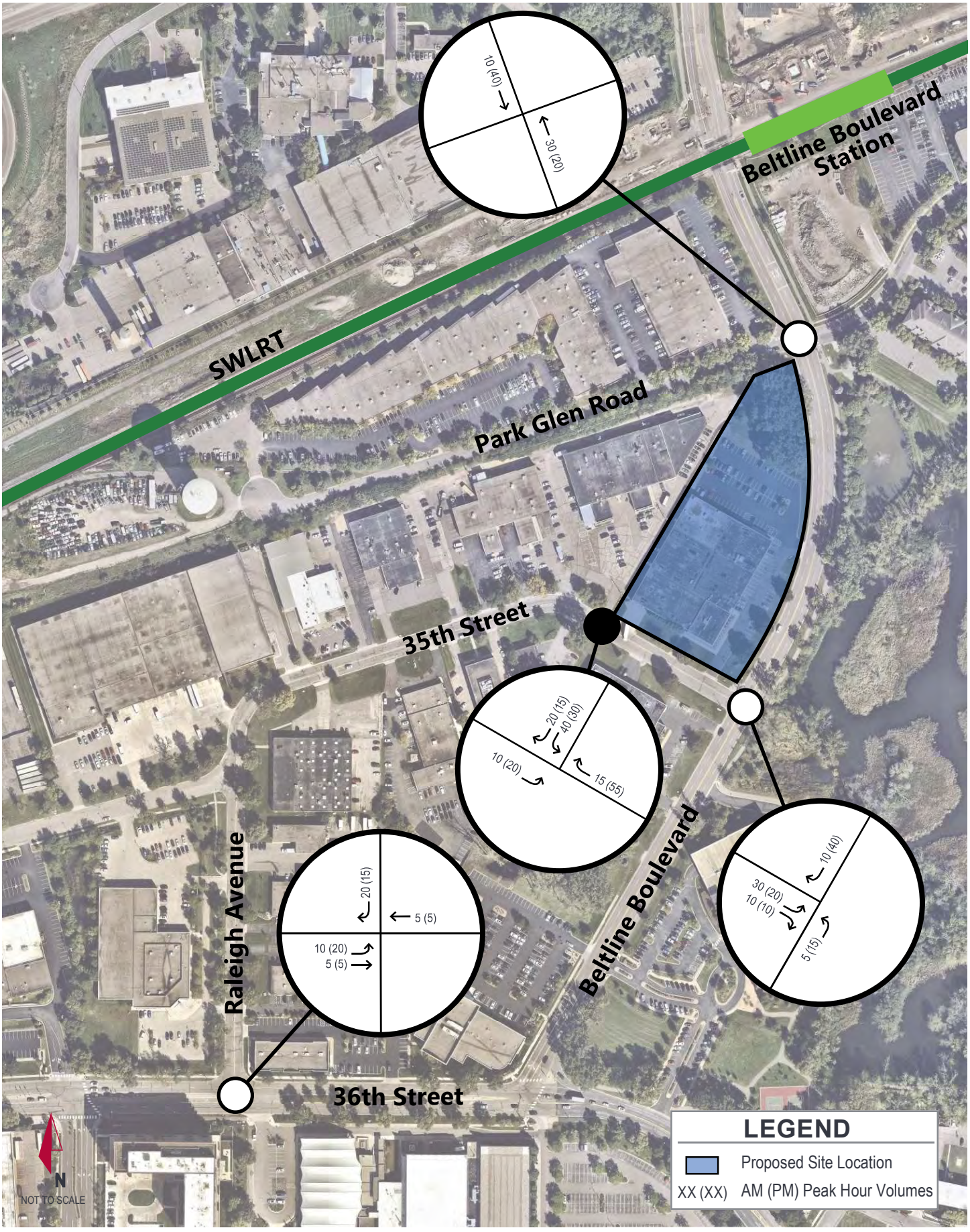

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EXHIBIT 5

PRIMARY SITE TRIP ASSIGNMENT

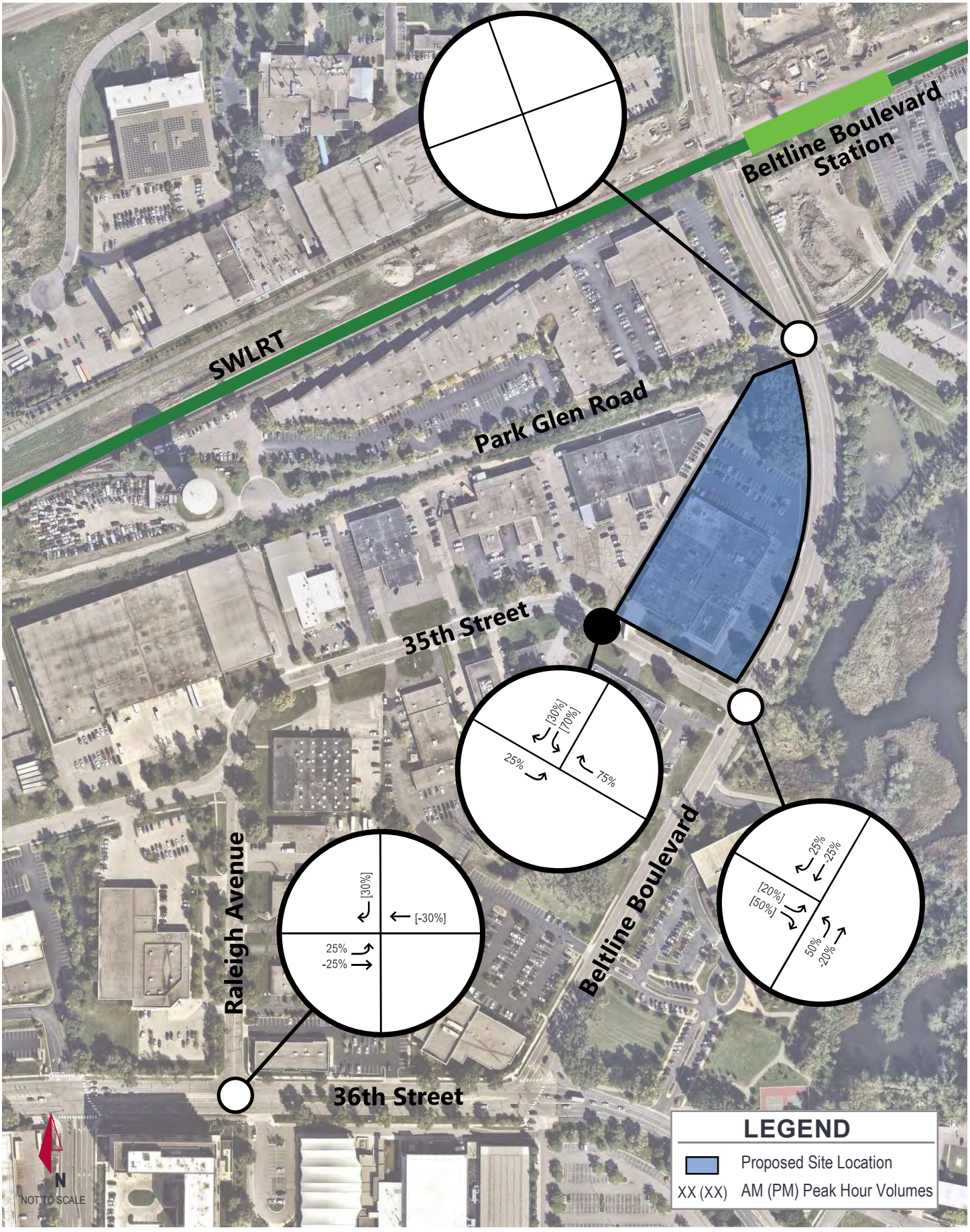

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EXHIBIT 6

PASS-BY TRIP DISTRIBUTION

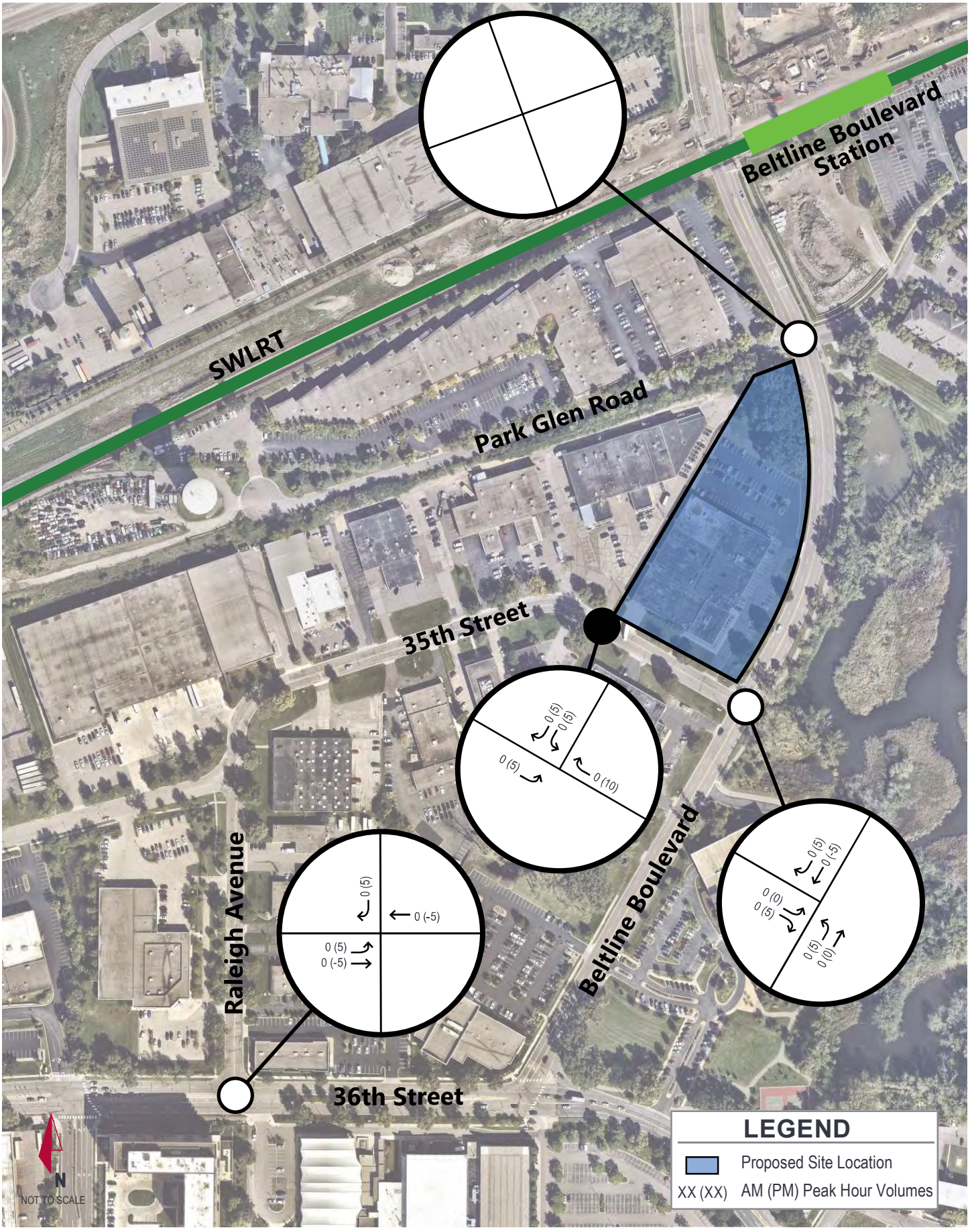

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EXHIBIT 7

PASS-BY TRIP ASSIGNMENT

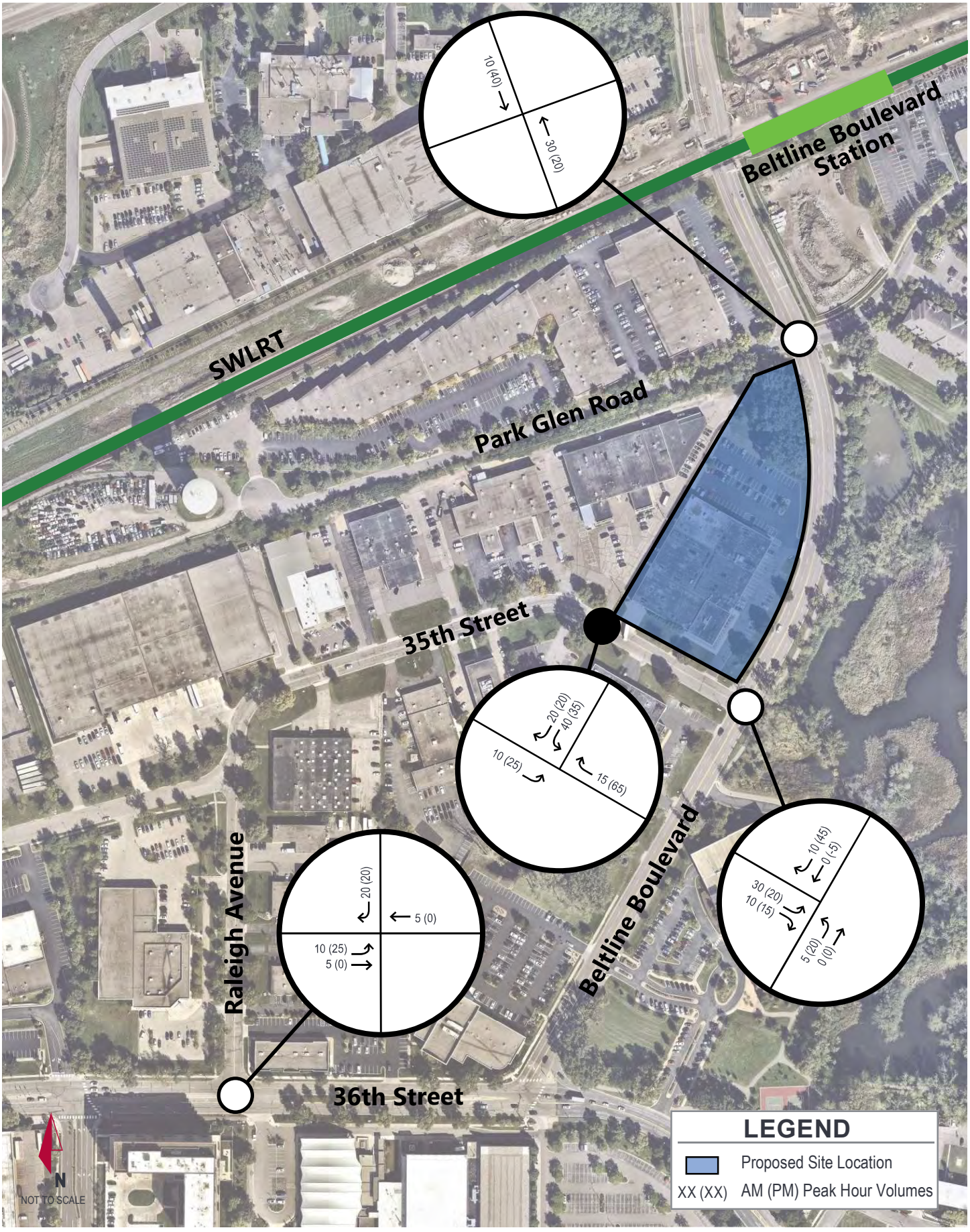

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EXHIBIT 8

TOTAL TRIP ASSIGNMENT

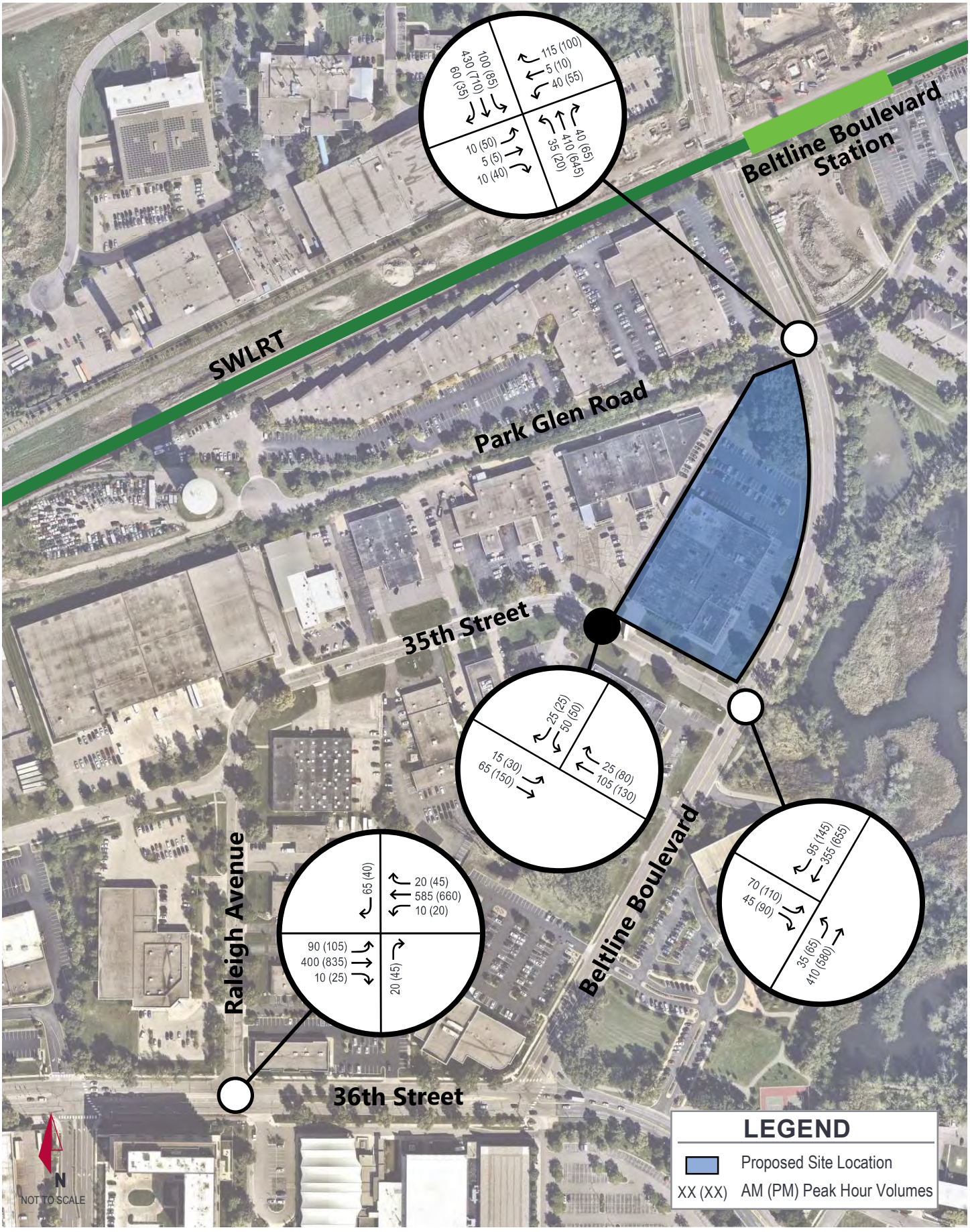

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EXHIBIT 9

OPENING YEAR (2023) BUILD TRAFFIC VOLUMES
SCENARIO 1

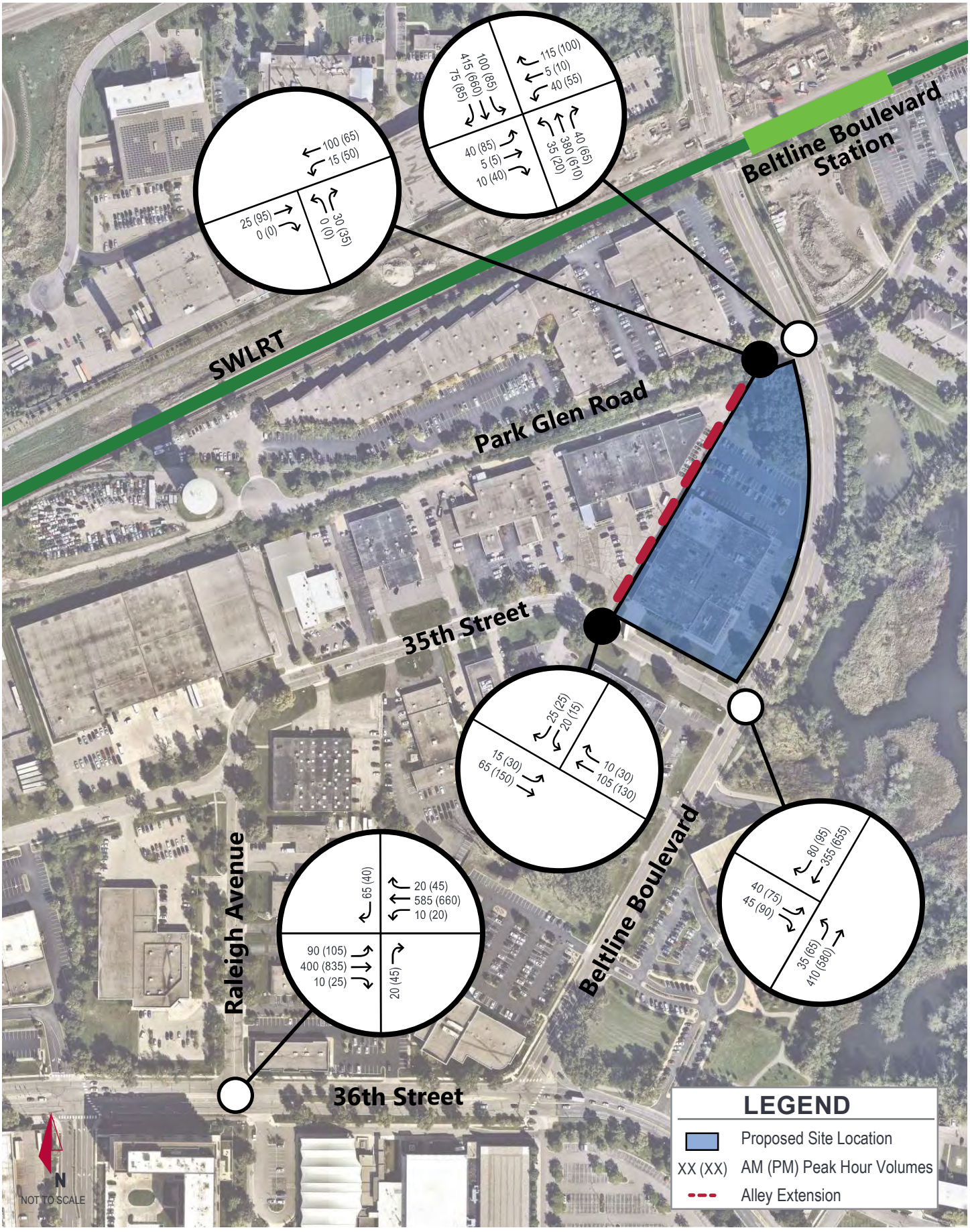

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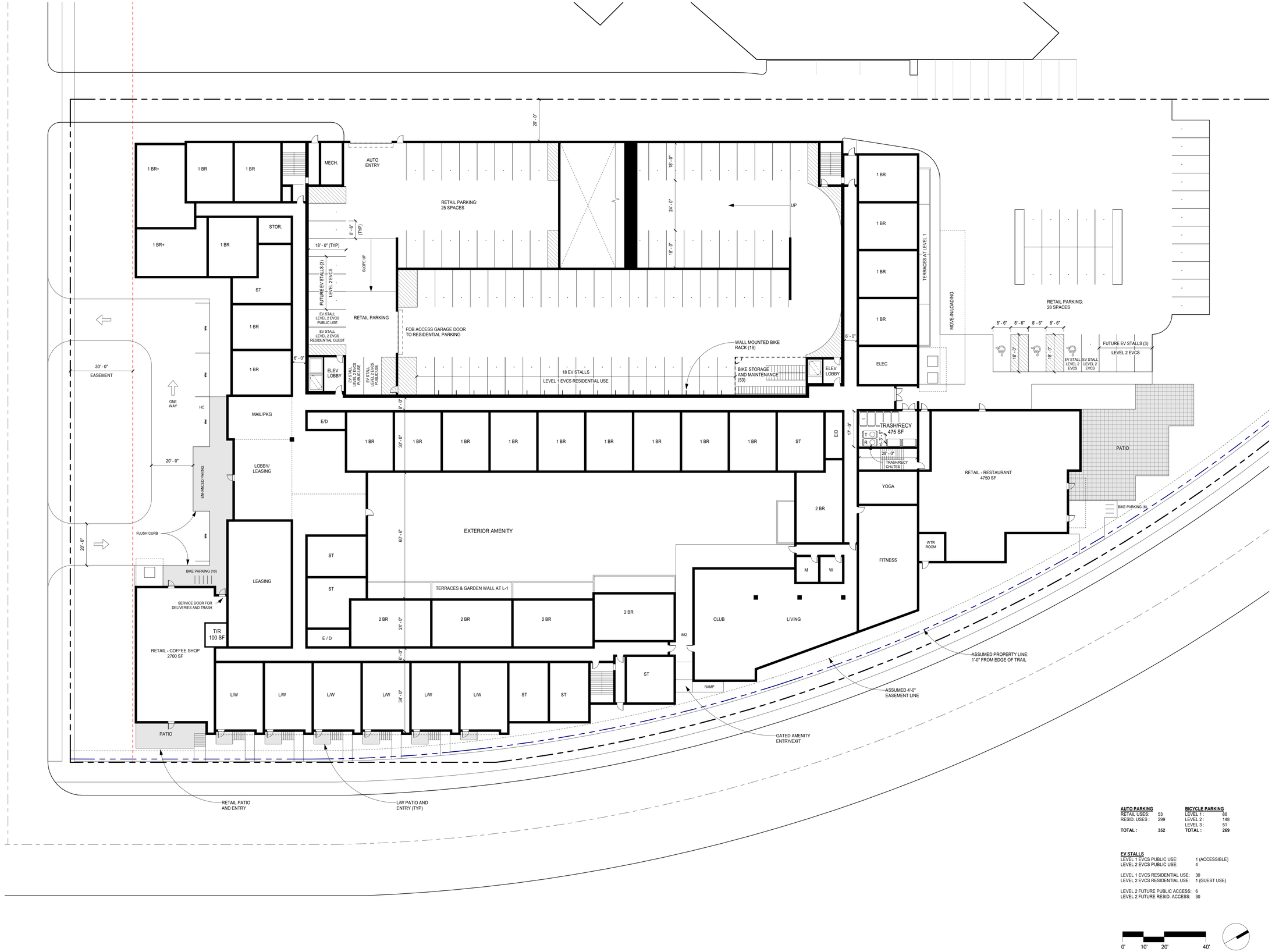
EXHIBIT 10

OPENING YEAR (2023) BUILD TRAFFIC VOLUMES
SCENARIO 2

Attachments

1. Conceptual Site Plan
2. Beltline Boulevard Multimodal Feasibility Study (SRF)
3. 36th Street Multimodal Feasibility Study (SRF)
4. Turning Movement Count Data (April 2021)
5. SimTraffic Reports



AUTO PARKING

RETAIL USES:	53
RESID. USES :	299
TOTAL :	**352**

BICYCLE PARKING

LEVEL 1 :	86
LEVEL 2 :	148
LEVEL 3 :	51
TOTAL :	**269**

EV STALLS

LEVEL 1 EVCS PUBLIC USE: 1 (ACCESSIBLE)
LEVEL 2 EVCS PUBLIC USE: 4

LEVEL 1 EVCS RESIDENTIAL USE: 30
LEVEL 2 EVCS RESIDENTIAL USE: 1 (GUEST USE)

LEVEL 2 FUTURE PUBLIC ACCESS: 6
LEVEL 2 FUTURE RESID. ACCESS: 30

0' 10' 20' 40'

PLOT DATE: 5/20/2021 11:25:08 PM

OPUS
THE OPUS GROUP

Opus AE Group, L.L.C.
10350 Bren Road West
Minnetonka, MN 55343-0110
952-656-4444

Opus Design Build, L.L.C.
10350 Bren Road West
Minnetonka, MN 55343-0110
952-656-4444

CONSULTANT

PROJECT
3440 Beltline Boulevard

PROJECT ADDRESS
St. Louis Park, MN

PROJECT NUMBER
31815000

ISSUE RECORD

2021-04-19	PUD Submittal 1
2021-05-17	PUD Submittal 2

DATE
05/20/21
PROJECT MANAGER
T. Callahan
DRAWN BY
T. Grothe
CHECKED BY
D. Newins

REGISTRATION

SHEET TITLE
Concept Level 1

SHEET NUMBER
A.01

Memorandum

SRF No. 12007.00

To: Jack Sullivan, Senior Engineering Project Manager
City of St. Louis Park

From: Matt Pacyna, PE, Principal
Brent Clark, PE, Senior Engineer

Date: October 22, 2019

Subject: Beltline Boulevard Multimodal Feasibility Study

Introduction

SRF has completed a multimodal feasibility study for Beltline Boulevard between Park Glen Road and 36th Street in the City of St. Louis Park (see Figure 1: Study Area). With the current City of St. Louis Park Connect the Park planning initiatives and the upcoming opening of the Southwest Light Rail (SWLRT) Beltline Boulevard Station, the City is considering modifications to Beltline Boulevard to improve multimodal transportation within the area. These planned multimodal improvements include the addition of on-street bike lanes, sidewalk/trail enhancements, and roadway/traffic control modifications to better accommodate all modes of transportation within the area.

The main objectives of this study are to review existing conditions within the study area, identify and evaluate roadway alternatives that improve multimodal transportation, develop a future corridor layout and vision, and provide preliminary cost estimates. Once completed, the Beltline Boulevard multimodal feasibility study will provide the City a basis for improving multimodal transportation within the area. The following sections provide the assumptions, analysis, and study findings offered for consideration.

Project Priorities and Goals

With the planned Connect the Park vision as well as the future SWLRT line, there is a critical need to provide safe and efficient pedestrian and bicycle connections within the area and community. Therefore, the following project priorities and goals were identified early in the study process to provide guidance as alternatives were identified and evaluated.

1. **Walkability/Bikeability** - Address a bicycle facility gap or enhance multimodal trail/sidewalk linkages through providing a separation of bicycle facilities from the sidewalk and/or roadway
2. **Safety** - Provide a safe design for pedestrians/bicycles as well as other modes of transportation
3. **Capacity/Mobility** - Balance capacity and mobility for all modes of transportation
4. **Preliminary Costs** - Identify a cost-effective alternative(s)

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SRF Consulting Group, Inc.

Study Area

Beltline Blvd Multimodal Feasability Study
City of St. Louis Park

Figure 1

01912007
July 2019

Existing Conditions

Existing conditions were reviewed to establish a baseline condition to identify potential issues and opportunities, as well as to compare alternatives. The study area focuses on the segment of Beltline Boulevard between Park Glen Road and 36th Street, but does consider future changes planned up to CSAH 25. The evaluation of existing conditions includes a review of current bicycle facilities, as well as other various data collection efforts including hourly traffic volumes, roadway characteristics, crash history, and intersection capacity, which are summarized in the following sections.

Bicycle Facilities

The *St. Louis Park Comprehensive Plan* was used to identify current local and regional bicycle facilities within the area. Pedestrian facilities and other key area destinations, such as the planned SWLRT transit route and stations were also identified. A summary of the current pedestrian and bicycle facilities in the area, as well as the planned SWLRT route and stations are illustrated in Figure 2.

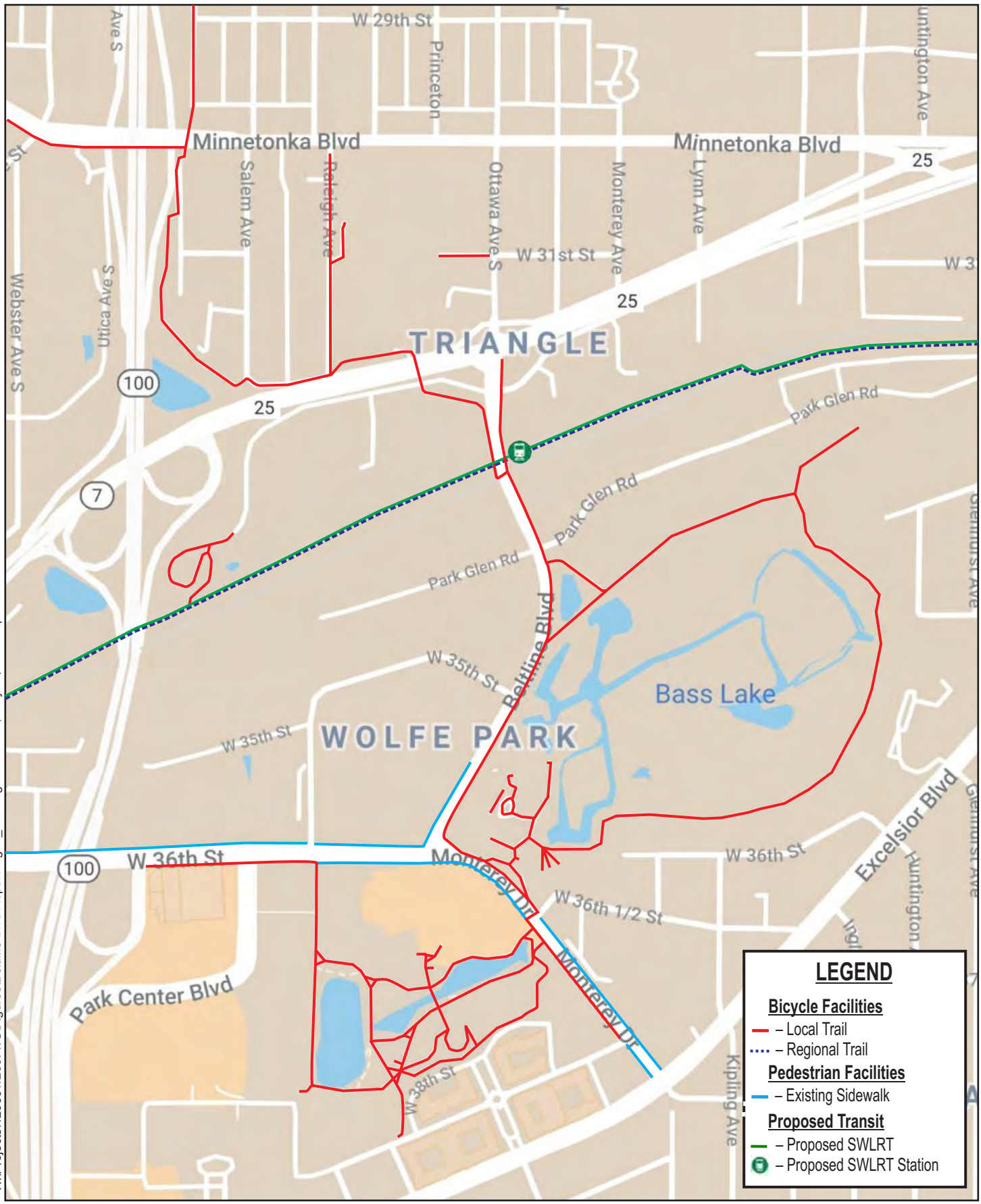
Within the study segment, there is an existing multi-use trail along the east side of the study corridor, but no on-street bicycle facility. There is also a large sidewalk gap on the west side of Beltline Boulevard, from approximately the Citizens Bank Access to the Cedar Lake Regional Trail crossing. As mentioned previously, it is important to address pedestrian facility gaps and enhance bicycle facilities, especially as future transit options are implemented within the area.

Data Collection

Weekday a.m. and p.m. peak period vehicular turning movement and pedestrian/bicyclist counts were collected along Beltline Boulevard at the following study intersections in late Fall 2018 during typical weekday conditions (i.e. a Tuesday, Wednesday, or Thursday). In addition, short duration (i.e. 10-minute) counts were collected at business driveways (i.e. Health Partners and Kenwood Gymnastics) to understand general activity and travel patterns. These short-duration counts were modified to reflect peak hour volumes based on the newly collected data in Fall 2018.

- Park Glen Road
- 35th Street

Given the time of year that data was collected, area pedestrian and bicycle activity observed was lower than typical summer conditions. Therefore, historical 13-hour vehicular turning movement and pedestrian/bicycle counts at the 36th Street/Beltline Boulevard intersection from July 2017 were utilized to better understand how area transportation activity changes within the area throughout the time of year. Furthermore, other historical vehicular turning movement counts from previous studies completed within the area were reviewed. The historical data included weekday peak hour data during various months of the year to help identify how traffic volumes and travel patterns change, as well as 13-hour intersection turning movement counts, which were used to develop hourly traffic volume profiles and average daily traffic (ADT) volumes. In general, traffic volumes have been relatively stable in the past 5 to 10-years along the Beltline Boulevard corridor.



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SRF Consulting Group, Inc.

Existing Pedestrian, Bicycle, and Proposed SWLRT Transit Facilities

Beltline Blvd Multimodal Feasability Study

City of St. Louis Park

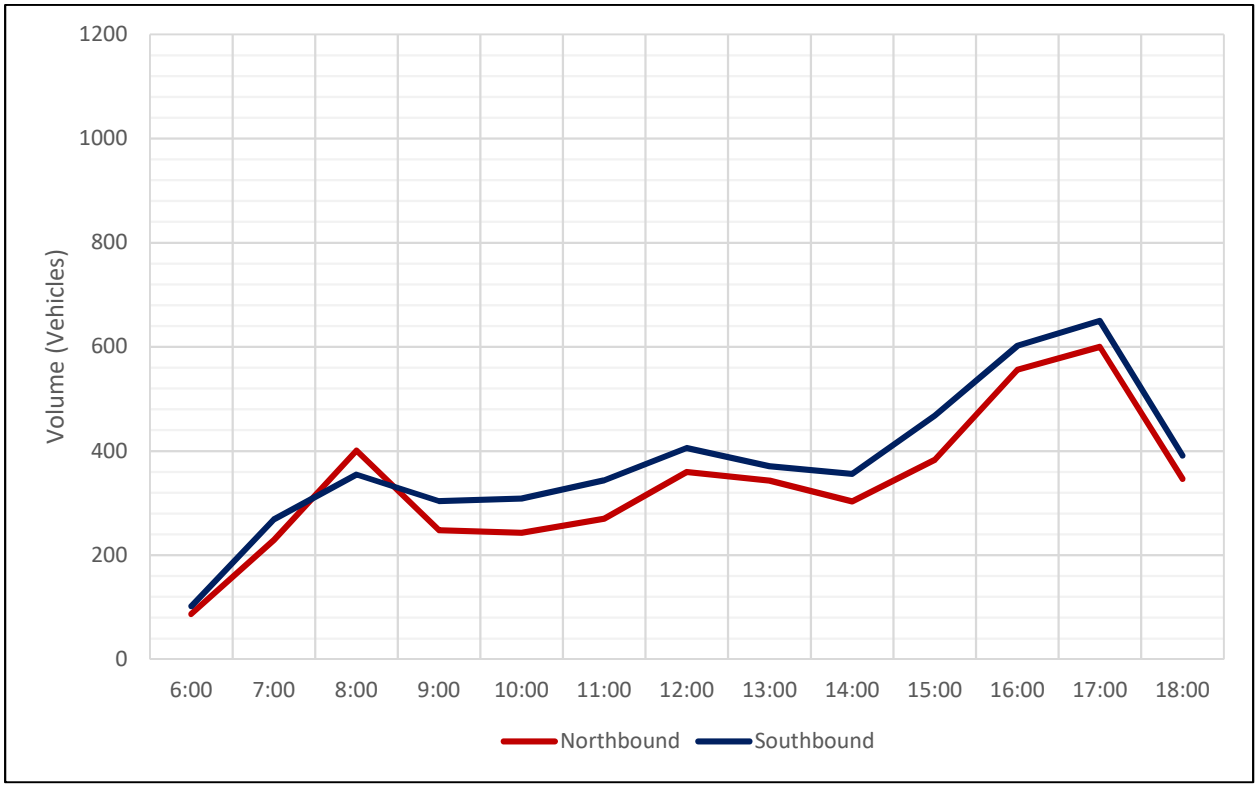
Figure 2

01912007
August 2019

Traffic Volumes

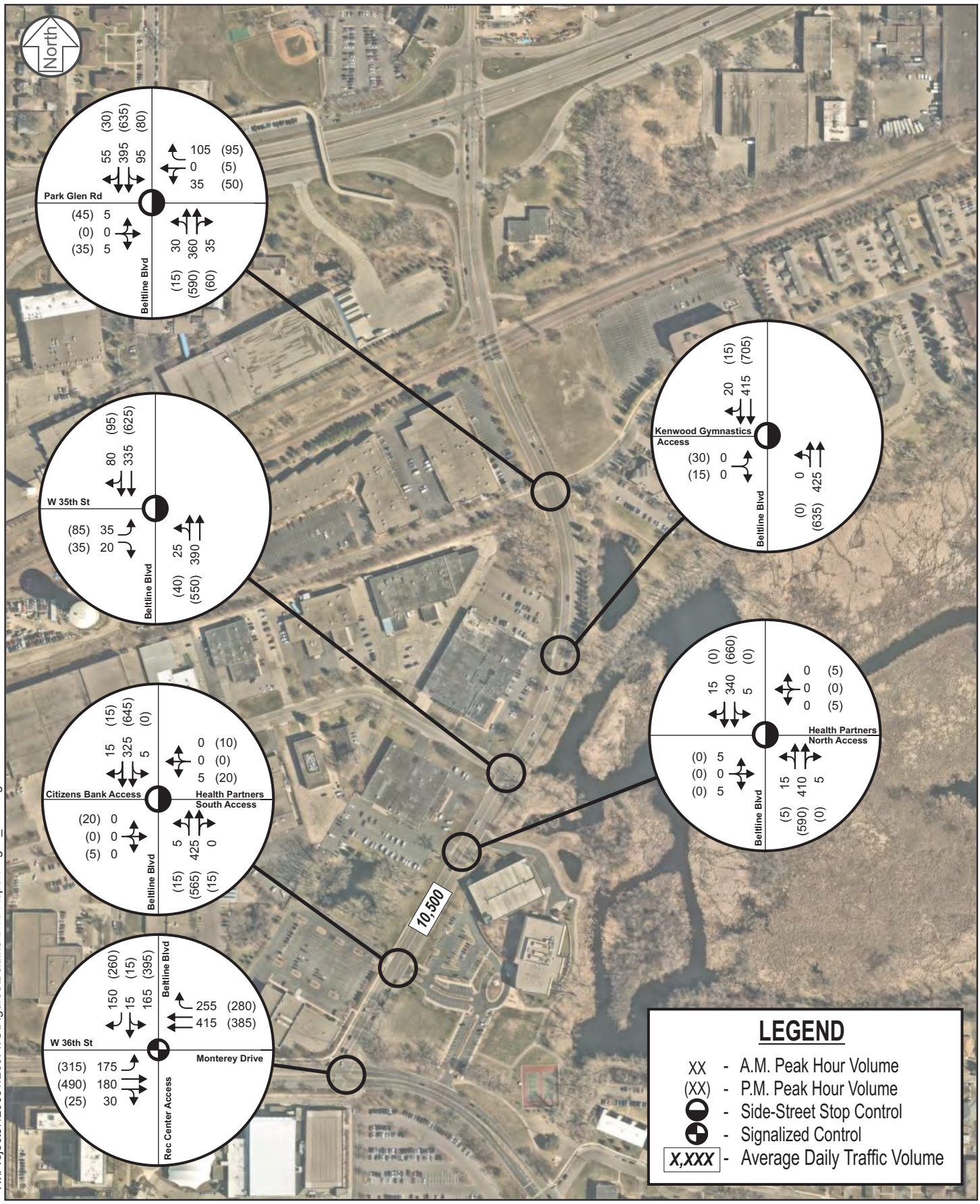
Intersection turning movement counts along Beltline Boulevard were utilized to develop hourly traffic volume profiles along the corridor, which are illustrated in Figure 3. Based on this data, traffic volumes along Beltline Boulevard peak between 4:00 and 6:00 p.m., while other hours of the day are approximately 70 percent or less of the p.m. peak period. Hourly traffic volumes along Beltline Boulevard are generally 650 vehicles per hour (vph) or less in each direction. This information will be leveraged as part of the alternative evaluation discussed later in this report. The average daily traffic (ADT) volume along Beltline Boulevard is approximately 10,500 vehicles per day (vpd).

Figure 3. Hourly Traffic Volumes on Beltline Boulevard



Roadway Characteristics

Observations were completed to identify roadway characteristics within the study area (i.e. roadway geometry, posted speed limits, and traffic controls). Currently, Beltline Boulevard is a four-lane undivided roadway with a posted speed limit of 30 miles per hour (mph). The Beltline Boulevard and 36th Street/Monterey Drive intersection is signalized, while all other study intersections are unsignalized with side-street stop control. Existing geometrics, traffic controls, and volumes are shown in Figure 4.



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SRF Consulting Group, Inc.

Existing Conditions

Beltline Boulevard Multimodal Feasability Study

City of St. Louis Park

Figure 4

01912007
August 2019

Crash History

A review of historical crashes was performed at the study intersections based on the most recent five-years of reported crashes using a combination of MnDOTs Crash Mapping Analysis Tool (MnCMAT) data from January 1, 2013 thru December 31, 2015, and data obtained from Hennepin County from January 1, 2016 thru December 31, 2017. Based on this data, there were a total of 45 crashes reported over the analysis period within the study area intersections. The majority of crashes were right angle and rear-end type crashes. The third highest crash type was bicycle crashes, which accounted for eight (8) of the total 45 crashes. The bicycles crashes were evenly distributed between intersections along Beltline Boulevard at Park Glen Road, 35th Street, and 36th Street.

Table 1. Crash Summary (2013-2017)

	Single Vehicle Crashes			Multiple Vehicle Crashes					Total
	Bike	Ped	Run Off Road	Left Turn/ Angle	Head On	Rear End	Side Swipe	Other	
Beltline Boulevard									
Park Glen Road	3	-	1	3	-	4	-	-	**11**
35th Street	2	-	-	2	-	2	-	-	**6**
36th Street	3	-	1	12	3	6	2	1	**28**
Totals	**8**	**-**	**2**	**17**	**3**	**12**	**2**	**1**	**45**

A detailed crash and severity rate analysis was completed to identify the crash and severity rates for each study intersection, which was then compared to statewide average rates for intersections with similar characteristics (i.e. traffic controls and volumes). This data was also compared to the critical crash and severity rates, which is a statistical measure that helps determine the significance above the average expected crash/severity rates for intersections with similar characteristics. The detailed crash and severity rates are included in the Appendix. Based on this approach, no study intersections were above the critical or severity crash rate. The amount of bicycle crashes, however, does indicate the need for an enhanced bicycle system. Although there is a trail on the east side of Beltline Boulevard, bicyclists were observed on-street. Therefore, a designated space/on-street bicycle lane is expected to improve the safety of bicyclists and improve driver/bicycle expectations along the corridor.

Intersection Capacity Analysis

An existing intersection capacity analysis was completed to establish a baseline condition to which future traffic operations can be compared. The capacity analysis was completed for the a.m. and p.m. peak hours using Synchro/SimTraffic software (V9.0). Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are graded from LOS A through LOS F, which are based on average delay per vehicle results from SimTraffic and correspond to the delay threshold values shown in Table 2. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. An overall intersection LOS A through D is generally considered acceptable by drivers in the Twin Cities Metropolitan Area.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

For side-street stop controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing capacity analysis, shown in Table 3, indicates that all study intersections currently operate at an acceptable overall LOS D or better during the weekday a.m. and p.m. peak periods. Side-street delays are also within expected levels, although left-turn maneuvers from the side-street approaches can be challenging during the p.m. peak hour. These results indicate that there is excess intersection capacity along Beltline Boulevard and there is opportunity to reconfigure the geometric configuration to provide an on-street bicycle facility. Further discussion regarding potential on-street bicycle facilities is provided later in this document.

Table 3. Existing Intersection Capacity Analysis

Beltline Boulevard Intersection	A.M. Peak Hour		P.M. Peak hour	
	LOS	Delay	LOS	Delay
Park Glen Road (1)	A/B	14 sec.	A/D	27 sec.
Kenwood Gymnastics Access (1)	A/A	1 sec.	A/B	14 sec.
West 35th Street (1)	A/A	7 sec.	A/C	16 sec.
Health Partners North Access (1)	A/A	6 sec.	A/A	1 sec.
Health Partners South Access (1)	A/B	12 sec.	A/C	19 sec.
36th Street/Monterey Drive	A	9 sec.	B	13 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

Year 2040 Conditions

When evaluating infrastructure, it is important to understand future operations and needs to help protect the infrastructure investment. Year 2040 conditions were reviewed to understand potential future operational issues and opportunities, particularly as they relate to creating a multimodal Beltline Boulevard corridor. The following information summarizes the year 2040 conditions.

Traffic Forecasts

To determine the level of traffic growth, a combination of resources were reviewed, including historical ADT volumes on area roadways, the *St. Louis Park Comprehensive Plan*, and previous traffic studies in the area. In general, historical ADT volumes have been flat or decreasing over the past 5 to 10-years along the Beltline Boulevard corridor. However, as identified in the *St. Louis Park Comprehensive Plan*, there is high-growth potential in the area associated with development and redevelopment within the area, particularly as a result of the future SWLRT line and stations.

To develop year 2040 forecasts, an annual growth rate of 0.9 percent was applied to the existing peak hour traffic volumes. This growth rate is consistent with traffic forecasts developed as part of the *St. Louis Park Comprehensive Plan*. A summary of the year 2040 forecasts is provided in Figure 5.

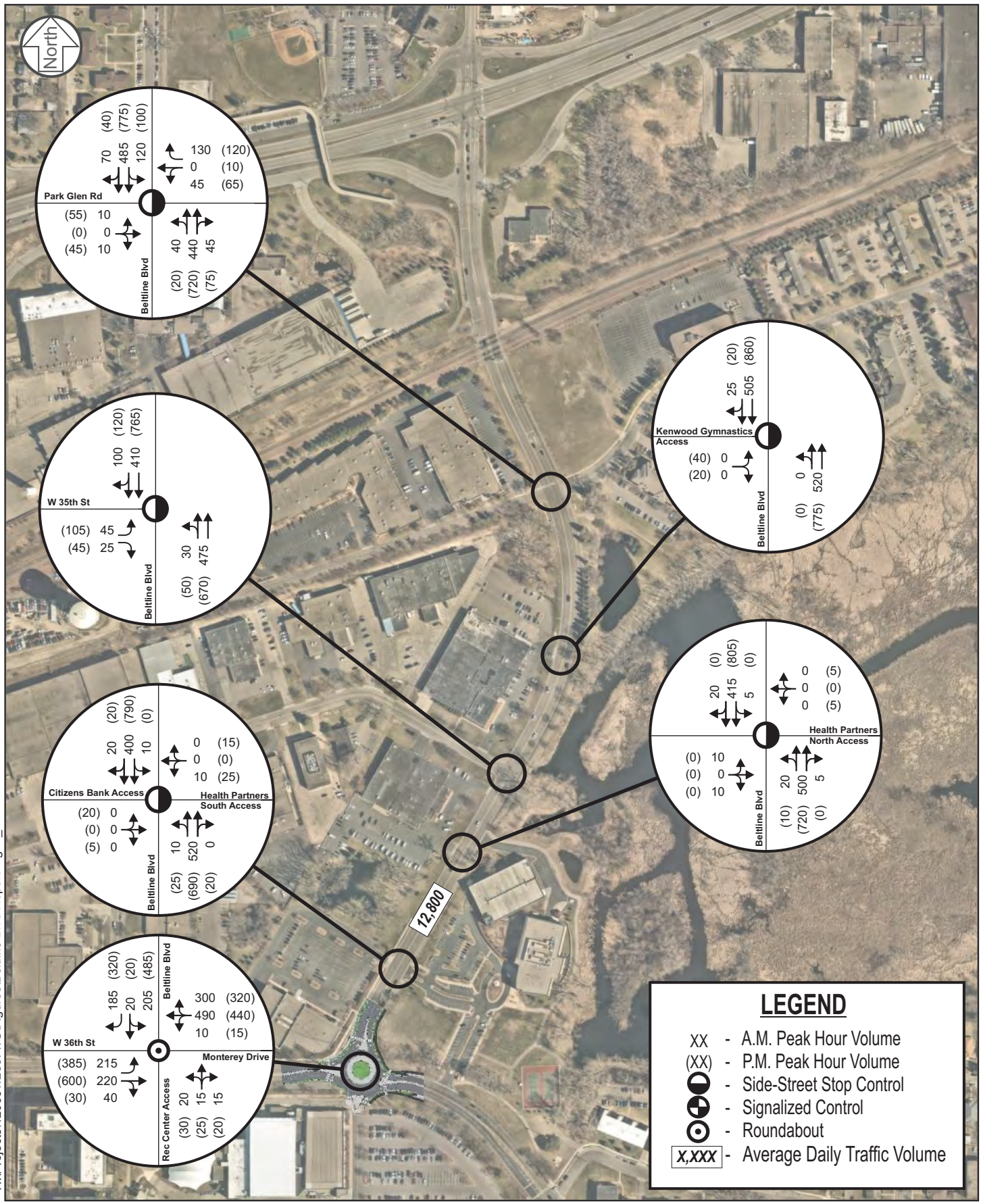
Note that although traffic forecasts are expected to grow, area pedestrian and bicycle activity is expected to significantly increase as a result of the future SWLRT. This growth is expected to outpace vehicular growth within the area, helping create the need for a multimodal vision for the Beltline Boulevard corridor. Year 2040 ADT volumes along Beltline Boulevard are expected to be approximately 12,800 vpd.

Monterey Drive/36th Street/Beltline Boulevard Roundabout

The *Monterey Drive Multimodal Corridor Study,* (2018) identified two traffic control options for the Monterey Drive/36th Street/Beltline Boulevard intersection; a traffic signal and a hybrid roundabout. Both options would facilitate the transition between the existing four-lane 36th Street corridor and the proposed 2-lane Monterey Drive corridor. Each traffic control option includes a modified Rec Center Access. However, with the lane reductions/modifications necessary to transition from 36th Street to Monterey Drive, City staff currently prefers the hybrid roundabout configuration, which provides acceptable future operations, lower vehicular delays, less queueing during peak and non-peak periods, as well as safety benefits. The latest roundabout configuration will be incorporated into the future year 2040 intersection capacity analysis and multimodal facility alternatives for the Beltline Boulevard corridor.

SWLRT Improvements

Beltline Boulevard, from north of Park Glen Road, is planned to be reconstructed as part of the SWLRT line and station project. Once completed, this segment of Beltline Boulevard will include on-street bike lanes and two travel lanes in both the northbound and southbound direction along Beltline Boulevard. All roadway configuration alternatives along Beltline Boulevard (south of Park Glen Road) need to be compatible and transition with this planned roadway improvement.



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Year 2040 Conditions

Beltline Boulevard Multimodal Feasability Study

City of St. Louis Park

Figure 5

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Year 2040 No Build Intersection Capacity

Year 2040 no build conditions were reviewed to understand how the study area would be expected to operate under future traffic volumes without any other changes to the transportation network, except for the planned roundabout at the 36th Street/Beltline Boulevard/Monterey Drive intersection and the reconstructed segment of Beltline Boulevard north of Park Glen Road as part of the SWLRT project. Results of the year 2040 no build intersection capacity analysis, shown in Table 4, indicates that all study intersections are expected to continue to operate at an acceptable overall LOS D or better during the weekday a.m. and p.m. peak hours.

Table 4. Year 2040 No Build Intersection Capacity Analysis

Beltline Boulevard Intersection	A.M. Peak Hour		P.M. Peak hour	
	LOS	Delay	LOS	Delay
Park Glen Road (1)	A/A	8 sec.	B/F	~ 2 min
Kenwood Gymnastics Access (1)	A/A	1 sec.	A/D	29 sec.
West 35th Street (1)	A/A	9 sec.	A/E	49 sec.
Health Partners North Access (1)	A/A	7 sec.	A/A	1 sec.
Health Partners South Access (1)	A/C	23 sec.	A/E	49 sec.
36th Street/Monterey Drive (2)	C	16 sec.	D	32 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates roundabout control.

However, as traffic volumes increase along Beltline Boulevard, side-street stop delays are also expected to increase, particularly for left-turn maneuvers during the peak periods. As such, the 35th Street and Health Partners South Access approaches are expected to operate at LOS E during the p.m. peak hour and the Park Glen Road approaches are expected to operate at LOS F during the p.m. peak hour. As noted earlier, these side-street delays are relatively common during peak periods. Although, the side-street delays at Park Glen Road are approaching the level such that a traffic control improvement should be considered.

Based on the capacity analysis results, a preliminary review of future traffic volumes at the Beltline Boulevard/Park Glen Road intersection indicates that a traffic signal may be warranted. If a traffic signal were to be installed, the overall intersection and side-street approaches would be expected to operate at acceptable levels of service. Note that other traffic controls, such as a roundabout, were considered in this location. However, with the planned SWLRT approximately 500 feet north of the Park Glen Road intersection and potential right-of-way impacts associated with a roundabout, the traffic signal appears to be the more cost-effective alternative in this location. Therefore, future alternatives will be evaluated with the assumption that a traffic signal may be needed at the Park Glen Road intersection with Beltline Boulevard.

Preliminary Alternatives

Preliminary Alternatives

Although there is not a gap in the bicycle facility along Beltline Boulevard, there is a desire to provide an enhanced bicycle facility along the corridor to better serve bicyclists of all abilities and provide separation from the existing pedestrian facilities along the corridor. As noted earlier there been eight (8) bicycle crashes along the corridor within the last five years, indicating that a number of bicyclists are riding on-street, even with the existing multi-use trail. Furthermore, there is reserve intersection/ roadway capacity along Beltline Boulevard, which provides flexibility in developing preliminary alternatives to enhance the current bicycle facilities while accommodating all modes of transportation. Therefore, to better accommodate bicycles and provide an enhanced bicycle facility type, the following roadway configuration options were investigated to understand potential opportunities.

- Option 1 - 4-Lane Facility (No Build)
- Option 2A - Unbalanced Facility (Travel Lanes: 2 NB + 1 SB)
- Option 2B - Unbalanced Facility (Travel Lanes: 2 SB + 1 NB)
- Option 3 - 3-Lane Facility (1 NB + 1 SB + 1 Center Left-Turn Lane)

Note that the addition of on-street bicycle lanes would likely come at the expense of a vehicular travel lane, rather than widening Beltline Boulevard which would come at a significant cost. Initial discussion with City Staff indicated a preference for buffered bike lanes to be implemented. Therefore, the following sections outline the preliminary alternative capacity analysis to determine which of the roadway cross-sections would be the most appropriate for the Beltline Boulevard corridor.

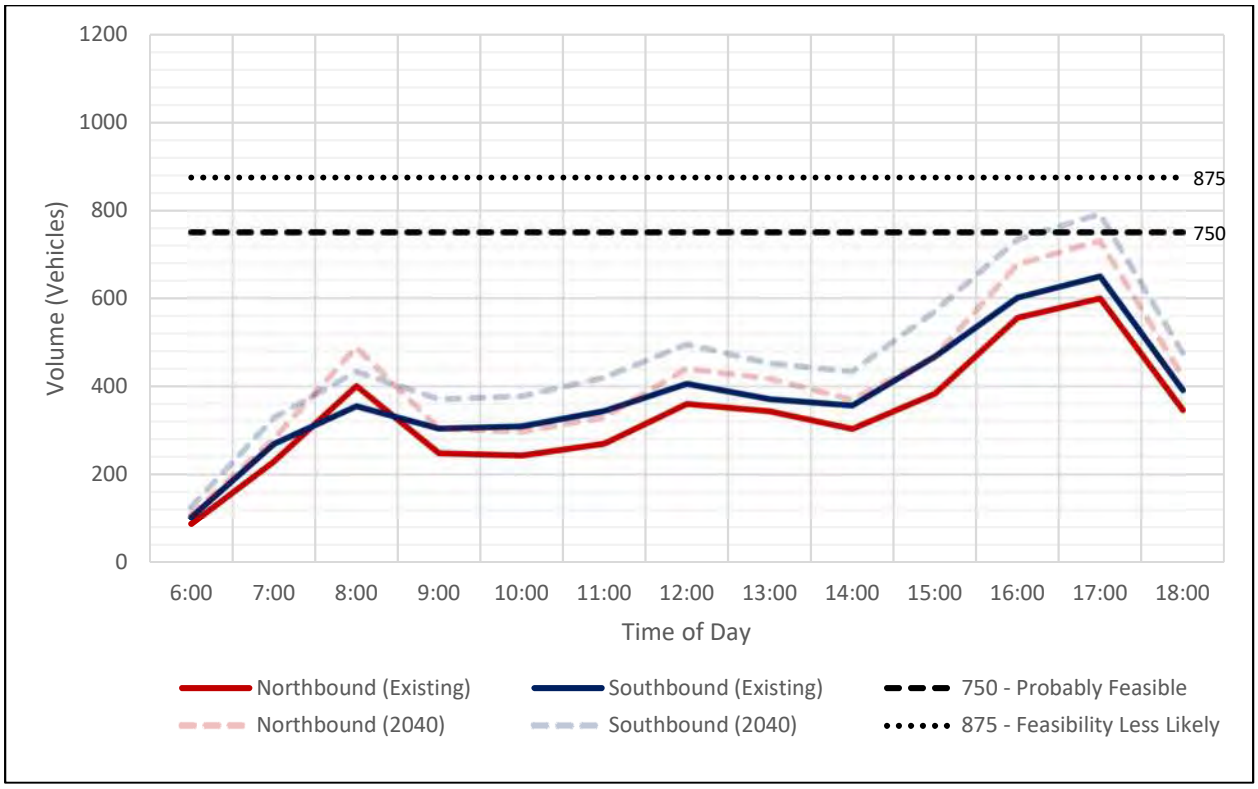
Corridor Capacity

A planning-level review of the Beltline Boulevard corridor capacity was completed based on existing and year 2040 hourly traffic volumes. This analysis leveraged guidance from *FHWA's Road Diet Informational Guide*, which looks at the feasibility of reduced lane conditions from a capacity perspective base on the hourly directional traffic volumes. The guide states the following:

- "Probably Feasible" at or below 750 vehicles per hour per direction (vphpd)
- "Consider Cautiously" between 750 and 875 vphpd
- "Feasibility Less Likely" above 875 vphpd

These thresholds were used to determine a per lane traffic volume threshold that could be used to understand the hourly corridor capacity for the preliminary alternatives. The hourly traffic volume profiles were reviewed relative to the thresholds from the FHWA guidance, which are illustrated in Figure 6. Although this is a planning-level review, this approach helps understand how many hours per day each alternative may be over and/or near capacity.

Figure 6. Planning Level Capacity Analysis



Results of the corridor capacity review indicates that the corridor falls within the "Probably Feasible" category for the majority of the day, other than a portion of the p.m. peak hour. Under future year 2040 conditions during the p.m. peak hour, volumes in the southbound direction fall in the "Consider Cautiously" category for approximately 30 minutes. Although from a high-level perspective the corridor appears feasible for lane reductions, additional detailed capacity analysis was performed to determine the effect of lane reductions on corridor and side-street approach operations.

Detailed Capacity Analysis and Sensitivity Tests

In addition to the planning-level corridor capacity analysis, detailed intersection capacity analysis and sensitivity tests were performed using Synchro/SimTraffic software under year 2040 p.m. peak hour conditions. This analysis was used to identify specific operational issues and test potential alternative refinements to better understand potential opportunities to create a better multimodal facility along Beltline Boulevard. These sensitivity tests also helped structure the alternative screening process and are discussed in further detail within the following Alternatives Screening Evaluation section.

Alternative Screening Evaluation

The corridor was evaluated to determine a roadway cross-section that could accommodate an enhanced bicycle facility. The evaluation included considerations and corridor capacities that were utilized to develop an evaluation matrix, which summarizes how each alternative addresses the project priorities and goals previously identified. The following information summarizes the alternative screening and evaluation process for the Beltline Boulevard corridor.

Considerations

Key considerations for the Beltline Boulevard corridor are illustrated in Figure 7. These considerations, along with the corridor capacity analysis results, were incorporated into the evaluation matrix as part of the alternative screening evaluation. Based on the findings, the alternative that best meets the priorities and goals of the study was identified. The following information provides an overview of key corridor considerations which correspond to Figure 7.

1. Beltline Boulevard, from north of Park Glen Road, is planned to be reconstructed as part of the SWLRT line and station project. Once completed, this segment of Beltline Boulevard will include on-street bike lanes and two travel lanes in both the northbound and southbound direction along Beltline Boulevard. All roadway configuration alternatives along Beltline Boulevard (south of Park Glen Road) need to be compatible and transition into the planned roadway configuration to the north of Park Glen Road.
2. Monterey Drive, including the Beltline Boulevard/36th Street intersection, are planned to be reconstructed between year 2020 and year 2021 to improve multimodal connectivity and access to/from the Rec Center. As previously noted, this project includes a hybrid roundabout configuration at the 36th Street/Monterey Drive/Beltline Boulevard intersection, which is assumed as part of the alternative screening evaluation.
3. There is an existing multi-use trail along the east side of Beltline Boulevard within the study area. Although there is not an existing bicycle gap along Beltline Boulevard, an on-street bicycle facility north of Park Glen Road is planned as part of the SWLRT project. Once completed, there will be an on-street bicycle facility gap between Park Glen Road and 36th Street/Monterey Drive.
4. There are private driveways located along the Beltline Boulevard corridor within the study area and with the potential for a reduced lane roadway configuration, delays while accessing Beltline Boulevard during the peak periods for these motorists are expected to increase. In addition, it is important to consider how motorists enter these driveways (in addition to the public streets) to limit potential conflicts between turning and through motorists.
5. Given the expected side-street delays at Park Glen Road and desire to provide an enhanced pedestrian crossing of Beltline Boulevard, the Beltline Boulevard/Park Glen Road intersection is a potential candidate for future signalization.
6. There is an existing sidewalk gap along the west side of Beltline Boulevard that has received funding to implement. Extending the existing sidewalk to complete this gap is included as part of each alternative.

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Corridor Considerations

Beltline Boulevard Multimodal Feasability Study

City of St. Louis Park

Figure 7

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Alternative Evaluation

Based on the planning level capacity review, the following three preliminary alternatives provide a significant amount of reserve capacity or conflict with other project priorities.

- Option 1 - 4-Lane Facility (No Build)
- Option 2A - Unbalanced Facility (Travel Lanes: 2 NB + 1 SB)
- Option 2B - Unbalanced Facility (Travel Lanes: 2 SB + 1 NB)

Alternative Option 1, which is the current Beltline Boulevard configuration, would not address the bicycle crashes or meet the project priorities and goals as it would not provide on-street bicycle facilities lanes without significant corridor expansion. Alternative Options 2A and 2B would provide unbalanced facilities to better accommodate directional traffic volumes. However, directional traffic volumes along Beltline Boulevard are generally balanced throughout the day and providing two travel lanes in a particular direction, without providing a center left-turn lane, would not result in any additional operational and/or safety benefit. Thus, Alternatives Option 1, 2A, and 2B do not meet the priorities and goals of the project and are not considered cost-effective.

Alternative Option 3, the 3-lane configuration, would provide the desired roadway space to accommodate buffered bike lanes in a design that is common and would be consistent with driver and bicyclist expectations. Existing and forecast traffic volumes are within the acceptable range for a 3-lane roadway, although side-street delays are expected to increase during the peak periods as a result of the roadway reconfiguration. It is important to note that the higher side-street delays are only anticipated during the p.m. peak hour (i.e. for approximately one hour of the day). Therefore, given that the City of St. Louis Park Comprehensive Plan prioritizes pedestrians, bicycles, and transit over vehicular traffic, Alternative Option 3 best meets the project priorities in a cost-effective manner.

Evaluation Matrix

A summary of the effectiveness of each alternative to meet the priorities and goals identified for the project is provided in the evaluation matrix in Table 5. Alternatives that meet the key priority or goal identified is highlighted in green, while alternatives that do not meet the key priority are highlighted in red. For alternatives that fall somewhere between these two areas, they are highlighted in orange, yellow, or light green, depending on how well the alternative meets the priority.

Table 5. Beltline Boulevard Evaluation Matrix

Alternative	Evaluation Criteria				
	Bikeability	Safety	Capacity	Side Street Operations	Costs
Option 1 – 4-Lane					
Option 2A – 2N+1S					
Option 2B – 1N+2S					
Option 3 – 3-Lane					

Preferred Alternative Concept

Alternative Refinement

Based on the findings summarized within the evaluation matrix, Alternative Option 3 (3-lane) best balances the corridor needs for Beltline Boulevard in a cost-effective manner. As mentioned previously, it is important to have a smooth transition to the section of Beltline Boulevard north of Park Glen Road, which will be reconstructed as part of the SWLRT project. Several options were reviewed for how to provide the transition from the two (2) northbound and two (2) southbound Beltline Boulevard travel lanes north of Park Glen Road to the proposed 3-lane facility to the south.

The options varied but focused on a desire to provide bicycle lane continuity, acceptable operations at the Park Glen Road intersection, and sufficient vehicular storage to accommodate queues from the SWLRT crossing. Based on this review, it was determined that the transition should occur at Park Glen Road, by terminating one of the southbound travel lanes at Park Glen Road and beginning the second northbound lane approximately 150 feet north of Park Glen Road. This configuration would require curb-reconstruction in the southwest quadrant of the Beltline Boulevard/Park Glen Road intersection but would better align the buffered bike lanes. The curb reconstruction would also provide space for late merging vehicles. Based on the alternative concept refinements, the preferred alternative is illustrated in Figure 8.

Preferred Alternative Intersection Capacity Analysis

To illustrate how the preferred alternative is expected to operate, as compared to the no build condition, an additional intersection capacity analysis was completed. Results of this comparison, shown in Table 6, indicate that study intersections and driveways are expected to operate relatively similar between the no build and preferred alternative (3-lane) Beltline Boulevard configurations. The primary difference between the two configurations is that side-street delays are expected to increase under the preferred alternative configuration, which was mentioned previously. However, the higher side-street delays are only expected to occur during the p.m. peak hour and are generally common for this type of facility to experience during peak periods. A traffic signal was assumed at Park Glen Road.

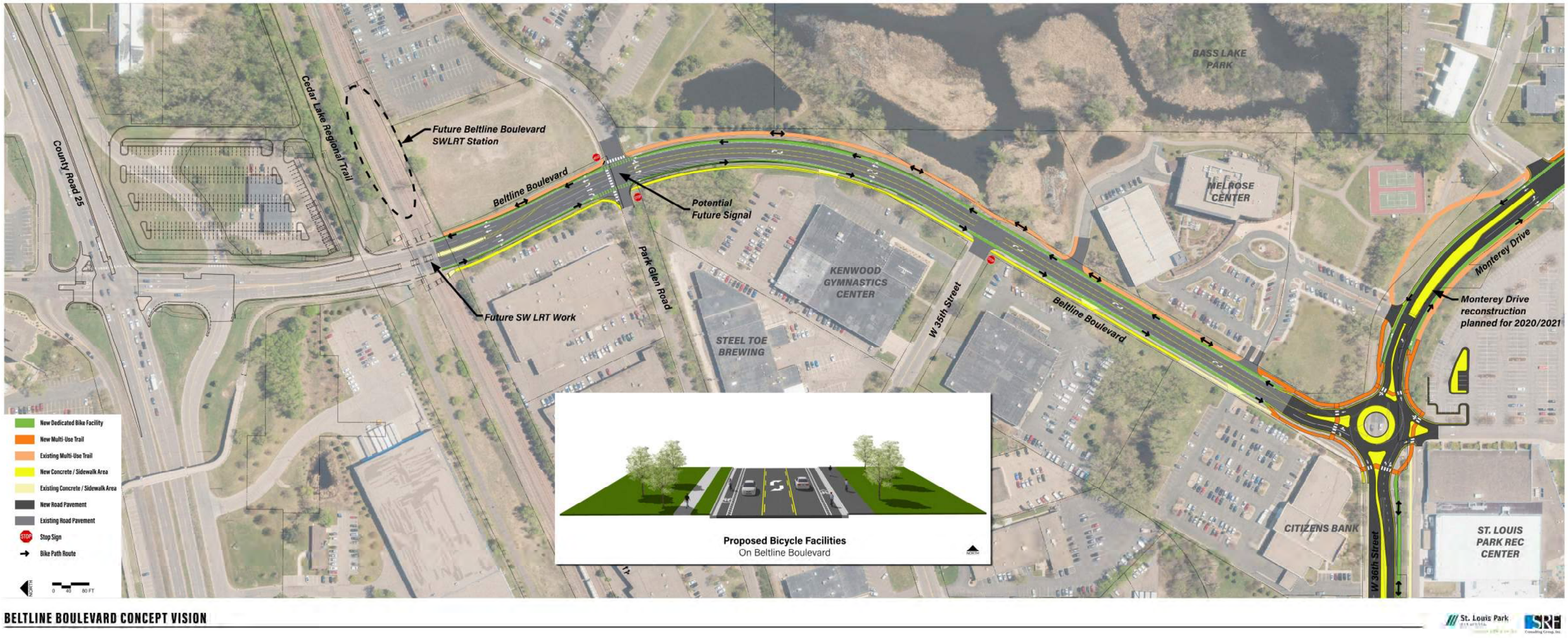
Table 6. Year 2040 Preferred Alternative Intersection Capacity Analysis Comparison

Beltline Boulevard Intersection	Level of Service			
	A.M. Peak Hour		P.M. Peak hour	
	No Build	3-Lane	No Build	3-Lane
Park Glen Road	A/A	A	B/F	B
Kenwood Gymnastics Access (1)	A/A	A/A	A/D	A/E
West 35th Street (1)	A/A	A/B	A/E	A/F
Health Partners North Access (1)	A/A	A/A	A/A	A/A
Health Partners South Access (1)	A/C	A/D	A/E	A/F
36th Street/Monterey Drive (2)	C	C	D	D

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates roundabout control.

Figure 8. Beltline Boulevard Preferred Alternative Conceptual Layout



BELTLINE BOULEVARD CONCEPT VISION

Cost Estimate

A detailed cost estimate for the preferred alternative shown in Figure 8 was developed to assist with future capital improvement planning. Based on the preliminary cost estimate, the preferred alternative is expected to cost approximately $425,000 to implement. Note that the cost does not include design engineering, construction administration, and contingency. Specific costs for the proposed alternative is included in the Appendix.

Next Steps

As the project proceeds into the next phase, there are steps that must be taken to further refine the design. These include working with area stakeholders, through both public and private business meetings, to ensure comprehensive community feedback is received. This feedback will help users of the facilities shape the final design concepts. Additionally, as the final design development is completed, there is a need to identify funding opportunities, which may occur potentially through grants.

Appendix

Safety Analysis
Beltline Boulevard Multimodal Feasibility Study
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Crash Rate Summary

Intersection	Traffic Control	Total Crashes	Crash Rate	Statewide Average	Critical Crash Rate	Crash Rate > Critical Crash Rate	Fatal & Serious Issue Crash Rate	Critical Crash Rate	Fatal & Serious Issue Crash Rate > Critical Crash Rate
W. 36th St/Beltline Blvd	Traffic Signal	28	0.74	0.70	1.06	No	2.65	3.91	No
Beltline Blvd/Raleigh Ave	Thru-Stop	6	0.28	0.18	0.44	No	0.00	4.20	No
Beltline Blvd/Park Glen Rd	Thru-Stop	11	0.42	0.18	0.42	No	0.00	3.65	No

2040 PM Beltline Blvd Alternatives

Beltline Blvd Intersection	No Build (1)		3 - Lane		2 NB+1 SB		2 SB+1 NB	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Park Glen Road	B	11 sec	B	12 sec	B	18 sec	B	12 sec
Kenwood Gymnastics Access (1)	A/C	21 sec	A/E	36 sec	A/D	33 sec	A/D	26 sec
West 35th Street (1)	A/E	44 sec	A/F	79 sec	A/F	83 sec	B/F	125 sec
Health Partners North Access (1)	A/A	1 sec.	A/A	1 sec.	A/A	1 sec.	A/A	1 sec.
Health Partners South Access (1)	A/E	39 sec.	A/F	61 sec	A/F	59 sec	B/F	101 sec

(1) No Build condition includes a signal at the Park Glen Road intersection.

(2) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

Year 2040 Preferred Alternative Intersection Capacity Analysis

Beltline Boulevard Intersection	A.M. Peak Hour		P.M. Peak hour	
	LOS	Delay	LOS	Delay
Park Glen Road	A	7 sec.	B	12 sec.
Kenwood Gymnastics Access (1)	A/A	1 sec.	A/E	36 sec.
West 35th Street (1)	A/B	11 sec.	A/F	79 sec.
Health Partners North Access (1)	A/A	7 sec.	A/A	1 sec.
Health Partners South Access (1)	A/D	31 sec.	A/F	61 sec.
36th Street/Monterey Drive (2)	C	16 sec.	D	32 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates roundabout control.

City of St. Louis Park -Beltline Boulevard: Monterey Drive Roundabout to SWLRT Rail Crossing (1)						
NOTES	**ITEM NO.**	**BASE BID ITEM DESCRIPTION**	**UNIT**	**BASE BID UNIT PRICE**	**TOTALS**	
					QUANTITY	**AMOUNT**
	2021.501	MOBILIZATION	LUMP SUM	$20,000.00	1.0	$20,000.00
	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.50	395	$1,382.50
	2104.503	REMOVE CURB & GUTTER	LIN FT	$4.00	385	$1,540.00
	2104.518	REMOVE BITUMINOUS PAVEMENT	SQ FT	$5.00	780	$3,900.00
		RELOCATE UTILITY BOX AREA	Each	$25,000.00	1	$25,000.00
	2105.507	SELECT GRANULAR BORROW (CV)	CU YD	$30.00	40	$1,200.00
(2),(3)	2211.507	AGGREGATE BASE (CV) CLASS 5	CU YD	$25.00	40	$1,000.00
(2)	2360.509	TYPE SP 12.5 NON WEARING COURSE MIXTURE (3,C)	TON	$90.00	30	$2,700.00
(2)	2360.509	TYPE SP 12.5 WEARING COURSE MIXTURE (3,C)	TON	$90.00	70	$6,300.00
	2531.503	CONCRETE CURB AND GUTTER	LIN FT	$22.00	380	$8,360.00
	2573.502	STORM DRAIN INLET PROTECTION	EACH	$250.00	3	$750.00
	2104.502	REMOVE SIGN TYPE C	EACH	$35.00	20	$700.00
	2564.618	SIGN TYPE C	SQ FT	$40.00	315	$12,600.00
	2565.501	TRAFFIC CONTROL INTERCONNECT SYSTEM B	LUMP SUM	$23,000.00	1	$23,000.00
	2565.516	TRAFFIC CONTROL SIGNAL SYSTEM D	SYSTEM	$250,000.00	1	$250,000.00
	2102.503	PAVEMENT MARKING REMOVAL	LIN FT	$1.00	3900	$3,900.00
	2102.518	PAVEMENT MARKING REMOVAL	SQ FT	$2.20	140	$308.00
	2582.503	4" SOLID LINE MULTI-COMPONENT GR IN	LIN FT	$0.60	11400	$6,840.00
	2582.503	12" SOLID LINE MULTI-COMPONENT GR IN	LIN FT	$7.00	220	$1,540.00
	2582.503	24" SOLID LINE MULTI-COMPONENT GR IN	LIN FT	$15.00	40	$600.00
	2582.503	4" BROKEN LINE MULTI-COMPONENT GR IN	LIN FT	$0.50	750	$375.00
	2582.503	4" DOUBLE SOLID LINE MULTI-COMPONENT GR IN	LIN FT	$1.35	200	$270.00
	2582.518	PAVEMENT MESSAGE PREF THERMO GR IN	SQ FT	$26.00	580	$15,080.00
	2582.518	CROSSWALK PREF THERMO GR IN	SQ FT	$13.00	324	$4,212.00
(4)	2582.518	PAVEMENT MARKING SPECIAL	SQ FT	$35.00	925	$32,375.00
ESTIMATED TOTAL COSTS						**$423,932.50**

NOTES

(1) Items based on Concept layout and 2019 pricing; Assumed construction year of 2020

(2) Assumes Pavement Section of 8.0" Bit (2.5" Wear+5.5" Base)/ 9" Agg Base / 15" Select Granular in full Reconstruction Areas

(3) Includes 6" Agg Base for Walks/Trails

(4) Green Pavement Markings

Memorandum

SRF No. 12007.00

To: Jack Sullivan, Senior Engineering Project Manager
City of St. Louis Park

From: Matt Pacyna, PE, Principal
Brent Clark, PE, Senior Engineer

Date: October 22, 2019

Subject: 36th Street Multimodal Feasibility Study

Introduction

SRF has completed a multimodal feasibility study for 36th Street between Wooddale Avenue and Beltline Boulevard in the City of St. Louis Park. With the current City of St. Louis Park Connect the Park planning initiatives and the upcoming opening of two Southwest Light Rail (SWLRT) stations within the immediate study area, the City is considering modifications to 36th Street to improve multimodal transportation within the area. These planned multimodal improvements include the addition of on-street bike lanes, sidewalk/trail enhancements, and roadway/traffic control modifications to better accommodate all modes of transportation within the area.

The main objectives of this study are to review existing conditions within the study area, identify and evaluate roadway alternatives that improve multimodal transportation, develop a future corridor layout and vision, and provide preliminary cost estimates. Once completed, the 36th Street multimodal feasibility study will provide the City a basis for improving multimodal transportation within the area. The following sections provide the assumptions, analysis, and study findings offered for consideration.

Project Priorities and Goals

With the planned Connect the Park vision as well as the future SWLRT stations, there is a critical need to provide safe and efficient pedestrian and bicycle connections within the area and community. Therefore, the following project priorities and goals were identified early in the study process to provide guidance as alternatives were identified and evaluated.

1. **Walkability/Bikeability** - Address a bicycle facility gap or enhance multimodal trail/sidewalk linkages through providing a separation of bicycle facilities from the sidewalk and/or roadway
2. **Safety** - Provide a safe design for pedestrians/bicycles as well as other modes of transportation
3. **Capacity/Mobility** - Balance capacity and mobility for all modes of transportation
4. **Preliminary Costs** - Identify a cost-effective alternative(s)
5. **Requests** - Improvement addresses another request/desire for the corridor

Existing Conditions

Existing conditions were reviewed to establish a baseline condition to identify potential issues and opportunities, as well as to compare alternatives. The study area, which is shown in Figure 1, was broken down into three primary segments; the West Segment (Wooddale Avenue to the Highway 100 Bridge), the Center Segment (the Highway 100 Bridge to Park Center Blvd), and the East Segment (Park Center Boulevard to Beltline Boulevard). The evaluation of existing conditions includes a review of current bicycle facilities, as well as other various data collection efforts including hourly traffic volumes, roadway characteristics, crash history, and intersection capacity, which are summarized in the following sections.

Bicycle Facilities

The *St. Louis Park Comprehensive Plan* was used to identify current local and regional bicycle facilities within the area. Other key area destinations, such as the planned SWLRT transit route and stations, and potential future north/south regional trails recognized in the *2040 Regional Parks Policy Plan* were also identified. A summary of the existing bicycle facilities is illustrated in Figure 2.

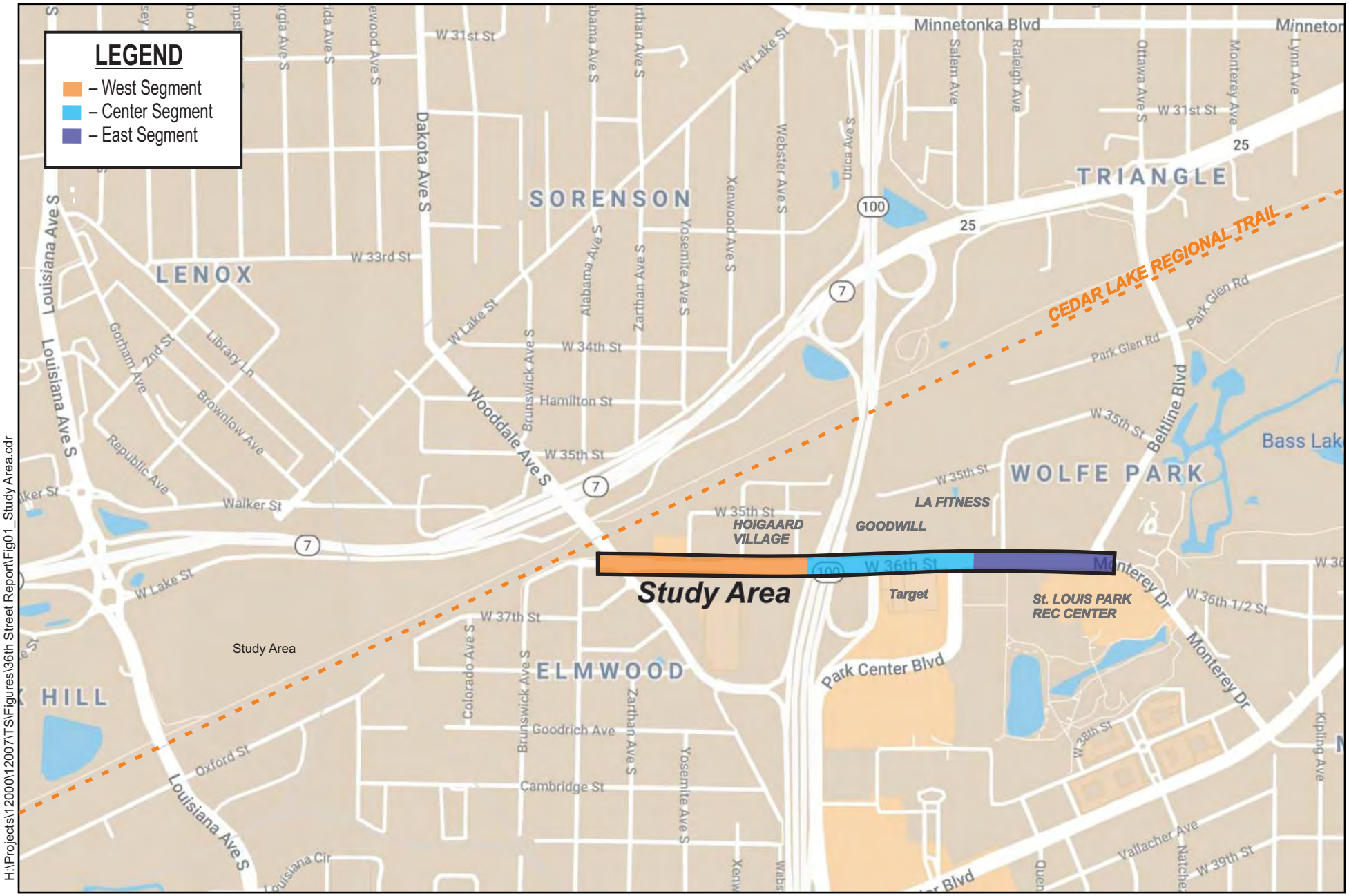
Note that there is a relatively significant east-west bicycle facility gap along 36th Street between Wooddale Avenue and Beltline Boulevard. The only bicycle facility along 36th Street today is a multi-use trail along the south side of 36th Street from the Northbound Mn Highway 100 Ramps to the west driveway serving the ROC area, near Raleigh Avenue. It is important to address these bicycle facility gaps, especially as future transit locations and regional trails are developed on each end of the study area.

Data Collection

Weekday a.m. and p.m. peak period vehicular turning movement and pedestrian/bicyclist counts were collected along 36th Street at the following locations in late Fall 2018, during typical weekday conditions (i.e. a Tuesday, Wednesday, or Thursday).

- Wooddale Avenue
- Xenwood Avenue
- Mn Highway 100 Ramp
- Park Center Boulevard
- Raleigh Avenue/ROC Access

In addition, short-duration (i.e. 15-minute) counts were collected along 36th Street at Yosemite Avenue, Webster Avenue, and business driveways to understand general activity and travel patterns. These short-duration counts were modified to reflect peak hour volumes based on the newly collected data in Fall 2018.



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Study Area

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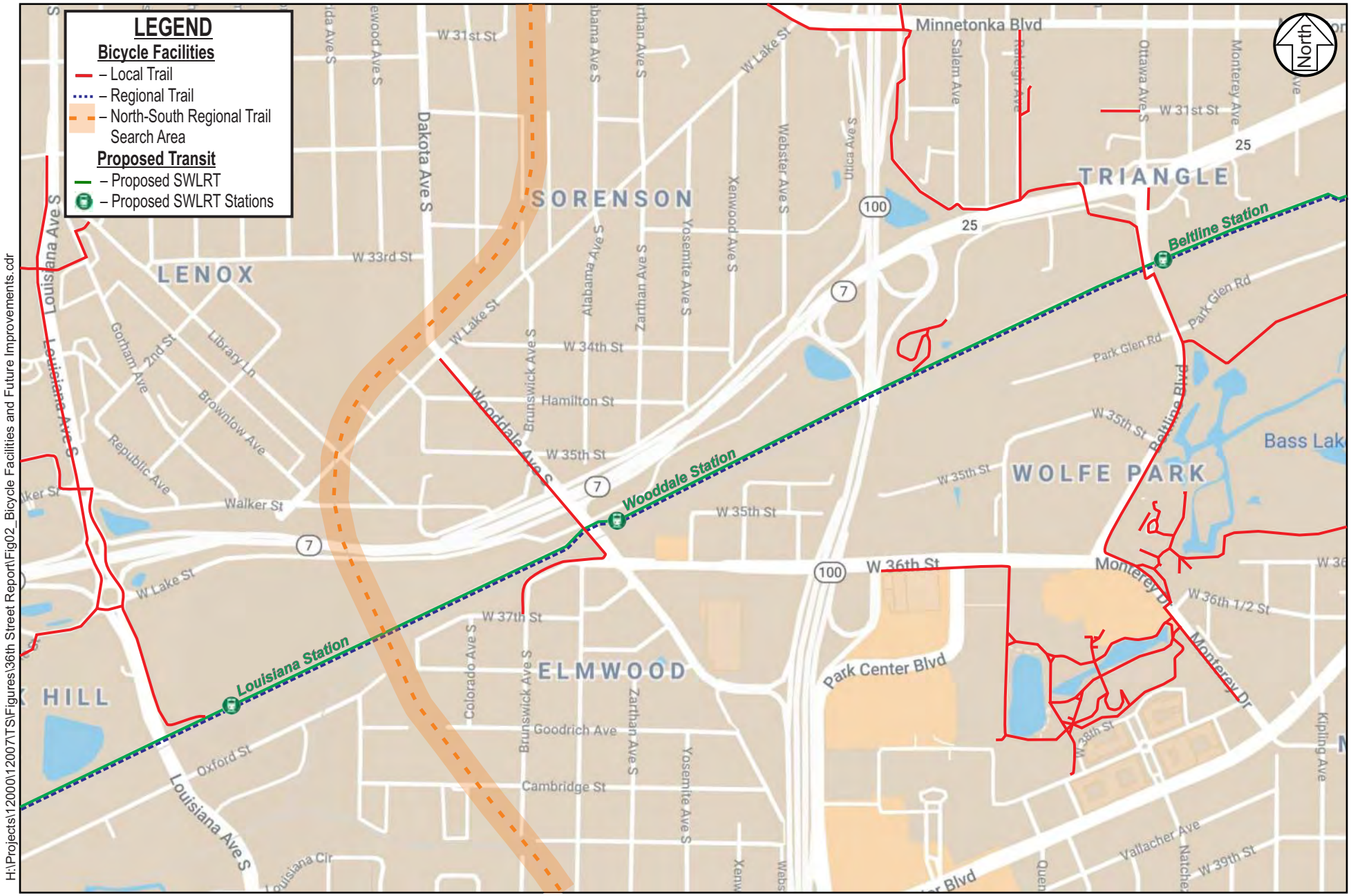
Figure 1



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Existing Bicycle Facilities

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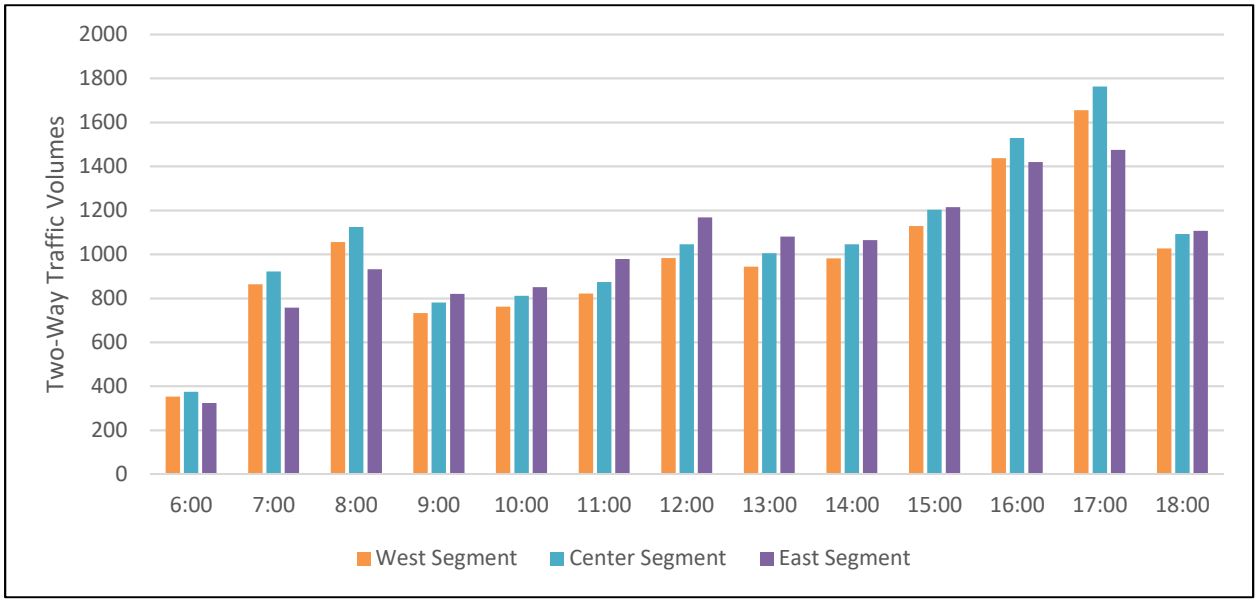
Figure 2

Given the time of year that data was collected, area pedestrian and bicycle activity observed was lower than typical summer conditions. Therefore, historical 13-hour vehicular turning movement and pedestrian/bicycle counts at the 36th Street/Beltline Boulevard intersection from July 2017 were utilized to better understand how area transportation activity changes within the area throughout the time of year. Furthermore, other historical vehicular turning movement counts from previous studies completed within the area were reviewed. The historical data included weekday peak hour data during various months of the year to help identify how traffic volumes and travel patterns change, as well as 13-hour intersection turning movement counts, which were used to develop hourly traffic volume profiles and average daily traffic (ADT) volumes. In general, traffic volumes have been relatively stable in the past 5 to 10-years along the 36th Street corridor.

Traffic Volumes

Intersection turning movement counts along 36th Street were utilized to develop hourly traffic volume profiles along the three primary segments along 36th Street (i.e. the west, center, and east segments), which are illustrated in Figure 3. Based on this data, traffic volumes peak between 4:00 and 6:00 p.m., while other hours of the day are approximately 80 percent or less of the p.m. peak period. It is important to note that the center segment carries the highest volume within the 36th Street corridor, which includes access to key roadways such as Mn Highway 100 and Park Center Boulevard. The hourly traffic volumes will be leveraged as part of the alternative evaluation discussed later in this report. Average daily traffic (ADT) volumes along 36th Street range from approximately 14,700 to 15,600 vehicles per day (vpd), which.

Figure 3. Hourly Traffic Volumes on 36th Street



Roadway Characteristics

Observations were completed to identify roadway characteristics within the study area (i.e. roadway geometry, posted speed limits, and traffic controls). Currently, 36th Street varies in general roadway cross-section within the study area. The west 36th Street segment is a four-lane undivided roadway, while the center and east segments are a four-lane divided facility. The posted speed limit along 36th Street is 30 miles per hour (mph).

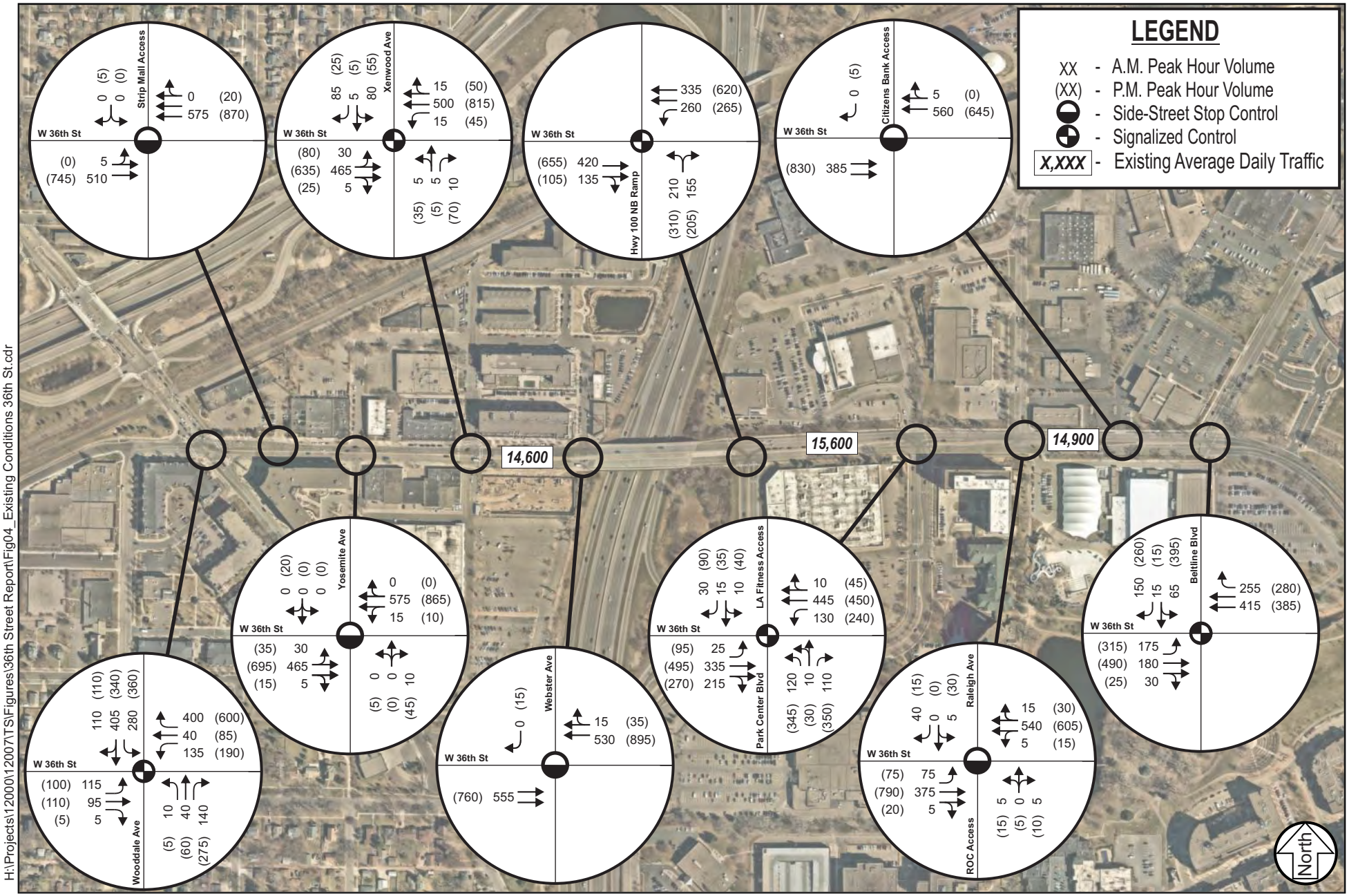
There are signalized intersections along 36th Street at Wooddale Avenue, Xenwood Avenue, the Northbound Mn Highway 100 Ramps, Park Center Boulevard, and Beltline Boulevard. All other study intersections are unsignalized with side-street stop control. Access is to private development is generally limited to a few locations along the west and east segments of the corridor. Existing geometrics, traffic controls, and volumes are summarized in Figure 4.

Crash History

A review of historical crashes was performed at the study intersections based on the most recent five-years of reported crashes using a combination of MnDOTs Crash Mapping Analysis Tool (MnCMAT) data from January 1, 2013 thru December 31, 2015, and data obtained from Hennepin County from January 1, 2016 thru December 31, 2017. Based on this data, there were a total of 146 crashes reported over the analysis period within the study area intersections. The majority of crashes were rear-end and right-angle type crashes. There were eight (8) bicycle crashes and two (2) pedestrian crashes along the corridor, which are noted within the following table.

Table 1. Crash Summary (2013-2017)

	Single Vehicle Crashes			Multiple Vehicle Crashes					Total
	Bike	Ped	Run Off Road	Left Turn/ Angle	Head On	Rear End	Side Swipe	Other	
36th Street Intersection									
Wooddale Avenue	1	-	6	16	3	9	2	2	39
Yosemite Avenue	-	1	-	-	-	4	1	1	7
Xenwood Avenue	-	1	-	7	-	7	1	3	19
TH 100 NB Ramp	1	-	-	2	-	7	1	1	12
Park Center Boulevard	3	-	1	6	1	16	2	3	32
Raleigh Avenue	-	-	1	6	1	1	-	-	9
Beltline Boulevard	3	-	1	12	3	6	2	1	28
Total	8	2	9	49	8	50	9	11	146



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Existing Conditions

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Figure 4

A detailed crash and severity rate analysis was completed to identify the crash and severity rates for each study intersection, which were then compared to statewide averages for intersections with similar characteristics (i.e. traffic controls and volumes). This data was also compared to critical crash and severity rates, which is a statistical measure that helps determine the statistical significance of the above average crash/severity rates for intersections with similar characteristics. Based on this approach, there were two (2) study intersections (36th Street/Wooddale Avenue and 36th Street/Xenwood Avenue) that had crash rates above the critical crash rate. There was also one (1) study intersection (36th Street/ Xenwood Avenue) intersection that has a severity rate above the critical severity rate, which was a result of a pedestrian fatal crash.

Note that in July 2015, both intersections with the crash issues were improved. A cursory review was performed on the crash data from 2016 and 2017 (i.e. after improvements), which determined that the amount and severity of crashes after the improvements were no longer above the critical crash rate or critical severity rate. Therefore, there is currently no significant crash issue along the 36th Street corridor. Detailed crash and severity rates are included in the Appendix.

Intersection Capacity Analysis

An existing intersection capacity analysis was completed to establish a baseline condition to which future traffic operations and alternatives can be compared. The capacity analysis was completed for the a.m. and p.m. peak hours using Synchro/SimTraffic software (V9.0). Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are graded from LOS A through LOS F. The LOS results are based on average delay per vehicle results from SimTraffic, which correspond to the delay threshold values shown in Table 2. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. An overall intersection LOS A through D is generally considered acceptable by drivers in the Twin Cities Metropolitan Area.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

For side-street stop controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes.

Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (i.e. poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing intersection capacity analysis, illustrated in Table 3, indicate that all study intersections currently operate at an acceptable overall LOS D or better during the weekday a.m. and p.m. peak periods. The busiest intersection from a capacity perspective is the 36th Street/Park Center Boulevard intersection, which operates near the LOS C/D threshold. These results indicate there is sufficient capacity along the 36th Street corridor to investigate alternative roadway configurations that could help support a broader multimodal 36th Street corridor.

Table 3. 36th Street Intersection Capacity Analysis

36th Street Intersection	A.M. Peak Hour		P.M. Peak hour	
	LOS	Delay	LOS	Delay
Wooddale Avenue	B	14 sec.	B	16 sec.
Strip Mall Access (1)	A/A	3 sec.	A/C	21 sec.
Yosemite Avenue (1)	A/A	3 sec.	A/A	10 sec.
Xenwood Avenue	A	5 sec.	A	9 sec.
Webster Avenue (1)	A/A	1 sec.	A/A	8 sec.
Northbound Highway 100 Ramps	B	20 sec.	C	23 sec.
Park Center Boulevard	C	25 sec.	D	36 sec.
Raleigh Avenue (1)	A/A	7 sec.	A/E	42 sec.
Citizens Bank Access (1)	A/A	2 sec.	A/A	4 sec.
Beltline Boulevard	A	9 sec.	B	13 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

From an overall intersection capacity perspective, there are no significant issues along the 36th Street corridor. However, the following information summarizes key existing operational and/or queuing issues that warrant consideration as multimodal alternatives are investigated.

1) <u>36th Street and Wooddale Avenue</u>

- Southbound queues extend into to the Mn Highway 7 Service Road approximately 5 percent of the time during both the a.m. and p.m. peak hours.
- Eastbound left-turn vehicles were observed to make aggressive movements during the permissive phase due to the heavy amount of westbound right-turning movements.
- Westbound right-turn queues can extend beyond Xenwood Avenue during the p.m. peak hour; these queues are dynamic and are often a result of either a freight train or increased pedestrian/bicycle activity at the Wooddale Avenue Cedar Lake Regional Trail crossing.

2) 36th Street and Xenwood Avenue

- There are approximately 30 a.m. and 80 p.m. peak hour eastbound left-turn maneuvers at this intersection; when these maneuvers occur, there is corridor congestion due to the lack of an eastbound left-turn lane.

3) 36th Street and Park Center Boulevard

- Eastbound thru queues block the left-turn lane approximately 20 percent of the a.m. peak hour and 40 percent of the p.m. peak hour.
- Westbound left-turn queues extend beyond the turn lane storage approximately five (5) percent of the a.m. peak hour and 40 percent of the p.m. peak hour; westbound queues extend into Raleigh Avenue approximately five (5) percent of the p.m. peak hour.

4) 36th Street and Raleigh Avenue/ROC Access

1) Northbound and southbound left-turn movements are difficult to make during the p.m. peak hour; vehicles were observed to make aggressive movements.

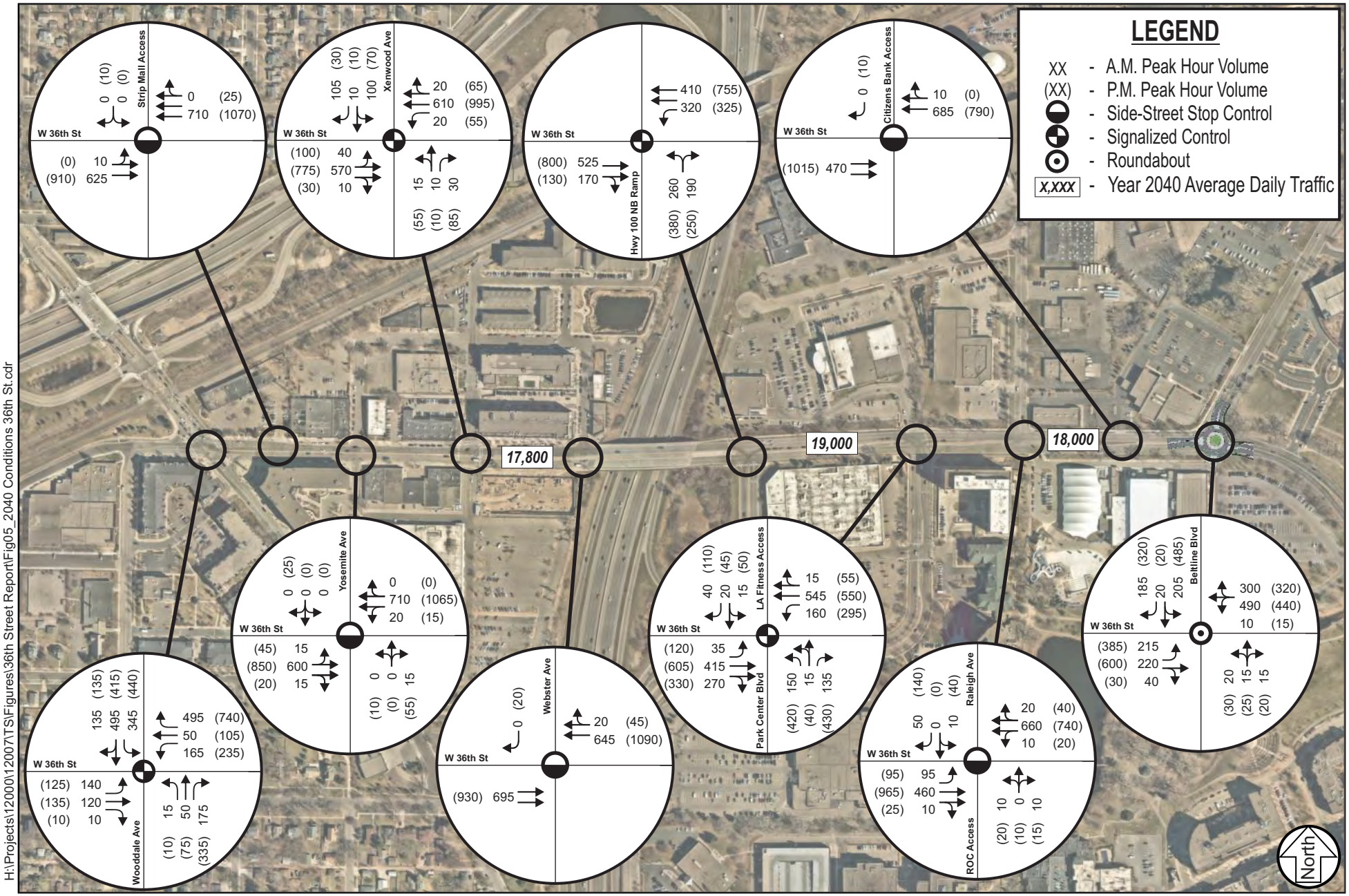
Year 2040 Conditions

When evaluating infrastructure, it is important to understand future operations and needs to help protect the infrastructure investment. Therefore, year 2040 conditions were reviewed to understand potential future operational issues and opportunities, particularly as they relate to creating a multimodal 36th Street corridor. The following information summarizes the year 2040 conditions.

Traffic Forecasts

To determine the level of traffic growth, a combination of resources were reviewed, including historical average daily traffic (ADT) volumes on area roadways, the *St. Louis Park Comprehensive Plan*, and previous traffic studies in the area. In general, historical ADT volumes have been flat or decreasing over the past 5 to 10-years along the 36th Street corridor. However, as identified in the *St. Louis Park Comprehensive Plan*, there is high growth potential in the area associated with development and redevelopment within the area, particularly as a result of the future SWLRT stations planned at Wooddale Avenue and Beltline Boulevard.

To develop year 2040 forecasts, an annual growth rate of 0.9 percent was applied to the existing peak hour traffic volumes. This growth rate is consistent with traffic forecasts developed as part of the *St. Louis Park Comprehensive Plan*. A summary of the year 2040 forecasts is provided in Figure 5. Note that although traffic forecasts are expected to grow, area pedestrian and bicycle activity is expected to significantly increase as a result of the future SWLRT. This growth is expected to outpace vehicular growth within the area, helping create the need for a multimodal vision for the 36th Street corridor. Year 2040 ADT volumes along 36th Street are expected to range from 17,800 to 19,000 vpd.



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Year 2040 Conditions

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Figure 5

36th Street/Beltline Boulevard/Monterey Drive Roundabout

The *Monterey Drive Multimodal Corridor Study,* (2018) identified two traffic control options for the Monterey Drive/36th Street/Beltline Boulevard intersection; a traffic signal and a hybrid roundabout. Both options would facilitate the transition between the existing four-lane 36th Street corridor and the proposed 2-lane Monterey Drive corridor. Each traffic control option includes a modified Rec Center Access. However, with the lane reductions/modifications necessary to transition from 36th Street to Monterey Drive, City staff currently prefers the hybrid roundabout configuration, which provides acceptable future operations, lower vehicular delays, less queueing during peak and non-peak periods, as well as safety benefits. The latest roundabout configuration will be incorporated into the future year 2040 intersection capacity analysis and multimodal facility alternatives for the 36th Street corridor.

2040 No Build Intersection Capacity

Year 2040 no build conditions were reviewed to understand how the 36th Street corridor would be expected to operate under future traffic volumes without any other changes to the transportation network, except for the planned roundabout at the 36th Street/Beltline Boulevard/Monterey Drive intersection. Results of the year 2040 no build intersection capacity analysis, shown in Table 4, indicates that all study intersections are expected to continue to operate at an acceptable overall LOS D or better during the weekday a.m. and p.m. peak hours. However, access from Raleigh Avenue onto 36th Street is expected to be difficult during the p.m. peak hour, particularly the left-turn movement. To address this issue, converting the 36th Street/Raleigh Avenue intersection to a three-quarter access (no left-turn from Raleigh Avenue to 36th Street) should be considered to reduce potential conflicts, while ensuring safe and efficient operations along the corridor.

Table 4. Year 2040 No Build Intersection Capacity Analysis

36th Street Intersection	A.M. Peak Hour		P.M. Peak hour	
	LOS	Delay	LOS	Delay
Wooddale Avenue	B	17 sec.	B	19 sec.
Strip Mall Access (1)	A/A	3 sec.	A/C	16 sec.
Yosemite Avenue (1)	A/A	3 sec.	A/B	14 sec.
Xenwood Avenue	A	6 sec.	B	11 sec.
Webster Avenue (1)	A/A	1 sec.	A/A	10 sec.
Northbound Highway 100 Ramps	B	20 sec.	C	33 sec.
Park Center Boulevard	B	14 sec.	C	36 sec.
Raleigh Avenue (1)	A/C	21 sec.	D/F	> 3 min
Citizens Bank Access (1)	A/A	2 sec.	A/A	6 sec.
Beltline Boulevard (2)	C	16 sec.	D	32 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates roundabout control.

Preliminary Alternatives

Preliminary Alternatives

In an urban environment like 36th Street, excess space and right-of-way (ROW) is a luxury that is not very common. Throughout the corridor there are various space limitations such as right-of-way, building footprints, bridge decks, and steep-grades. These limitations, which are identified later in this document, make the goal of implementing a bicycle facility difficult. There are often trade-offs that need to occur to achieve the desired goal of providing a multimodal 36th Street corridor. Therefore, to better understand potential opportunities within the constrained 36th Street corridor, a capacity analysis was completed that focused on the following preliminary alternative roadway configurations:

- Option 1 - 4-Lane Facility (No Build)
- Option 2A - Unbalanced Facility (Travel Lanes: 2 WB + 1 EB)
- Option 2B - Unbalanced Facility (Travel Lanes: 2 EB + 1 WB)
- Option 3 - 3-Lane Facility (1 WB + 1 EB + 1 Center Left-Turn Lane)

These roadway configurations were developed with the understanding that the existing 36th Street corridor is constrained and in order to provide a bicycle facility along the entire length of the corridor, it would likely need to come at the expense of a vehicular travel lane. Therefore, these preliminary alternatives were reviewed to determine the benefits and impacts associated with removing various travel lanes along the corridor. The following sections provide a summary of this preliminary review.

Corridor Capacity

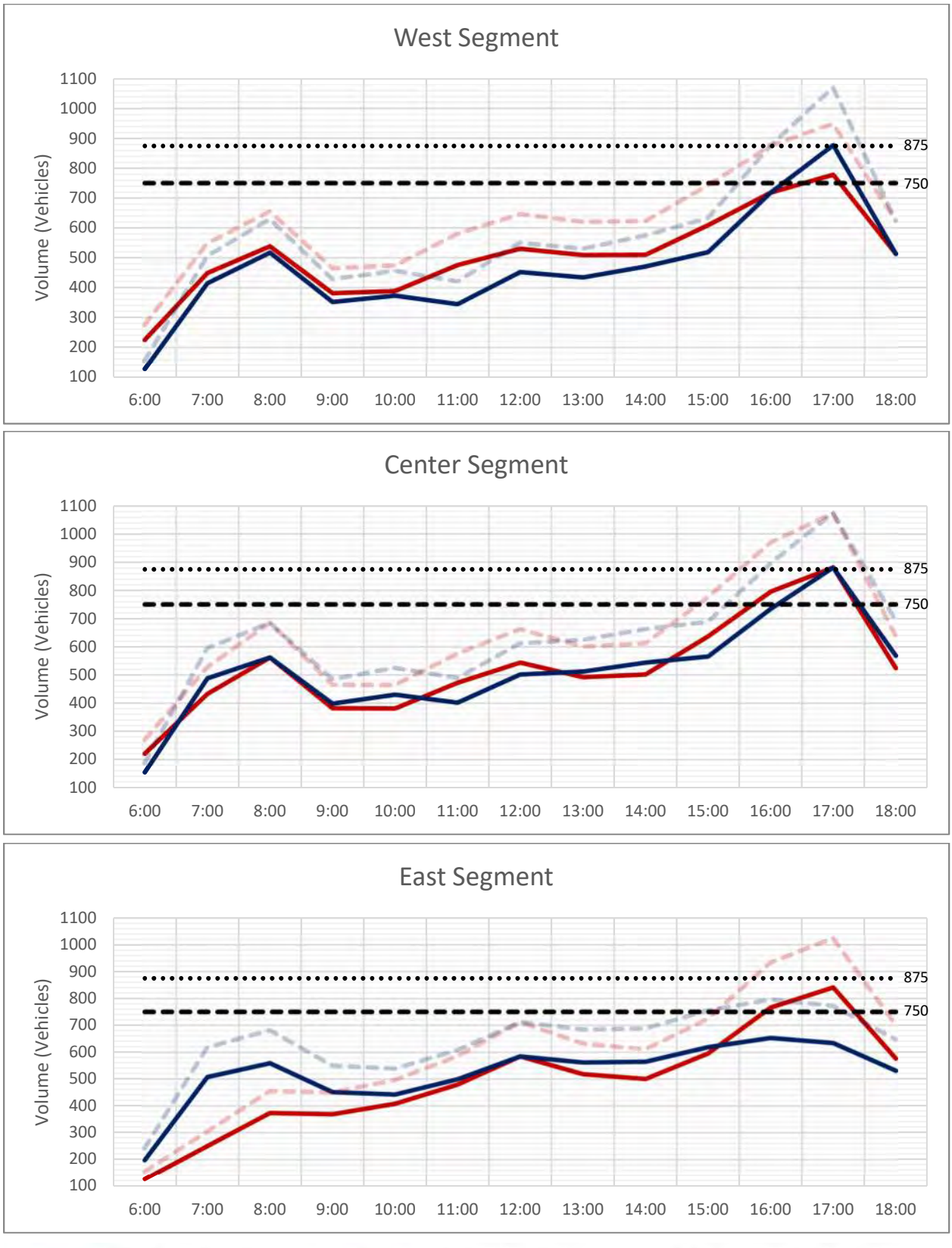
A planning-level review of the 36th Street corridor capacity was completed based on existing and year 2040 hourly traffic volumes. This analysis leveraged guidance from *FHWA's Road Diet Informational Guide*, which looks at the feasibility of reduced lane conditions from a capacity perspective base on the hourly directional traffic volumes. The guide states the following:

- "Probably Feasible" at or below 750 vehicles per hour per direction (vphpd)
- "Consider Cautiously" between 750 and 875 vphpd
- "Feasibility Less Likely" above 875 vphpd

These thresholds were used to determine a per lane traffic volume threshold that could be used to understand the hourly corridor capacity for the preliminary alternatives. The hourly traffic volume profiles for the three segments were reviewed relative to the thresholds from the FHWA guidance, which are illustrated in Figure 6. Although this is a planning-level review, this approach helps understand how many hours per day each alternative may be over and/or near capacity.

Results of the corridor capacity review indicates that each segment falls within the "Probably Feasible" category for the majority of the day, other than the p.m. peak hour. However, each segment had at least one direction of travel that fell within the "Feasibility Less Likely" category. In particular, the center segment had the highest volumes during the p.m. peak hour, with both eastbound and westbound volumes exceeding the "Feasibility Less Likely" threshold by 150 vehicles.

Figure 6. Planning Level Capacity Analysis



While from a high-level planning approach, the center segment does not appear feasible for a lane reduction, the west and east segments could potentially be feasible for a lane reduction depending on the direction of travel. As previously mentioned, the west and east segments are the areas along the 36th Street corridor that currently have a bicycle facility gap. Therefore, additional detailed capacity analysis is necessary to determine the effect of the potential lane reductions associated with the preliminary alternatives.

Detailed Capacity Analysis and Sensitivity Tests

In addition to the planning-level corridor capacity analysis, detailed intersection capacity analysis and sensitivity tests were performed using Synchro/SimTraffic software under year 2040 p.m. peak hour conditions. This analysis was used to identify specific operational issues and test potential alternative refinements to better understand potential opportunities to create a better multimodal facility along 36th Street. These sensitivity tests also helped structure the alternative screening process and are discussed in further detail within the following Alternatives Screening Evaluation section. A summary of the sensitivity test results is provided in the Appendix.

Alternative Screening Evaluation

Each segment was evaluated to determine a cross-section that could address a bicycle gap or enhance a multi-modal facility. The segment evaluation included segment specific considerations and corridor capacities that were utilized to develop an evaluation matrix, which summarizes how each alternative addresses the project priorities and goals previously identified. The following information summarizes the alternative screening and evaluation process for each segment of 36th Street.

West Segment (Wooddale Avenue to Mn Highway 100)

West Segment Key Considerations

Key segment considerations are illustrated in Figure 7, which include current businesses, right-of-way, and grades, amongst others. These considerations, along with the corridor capacity analysis results, were incorporated into the evaluation matrix. Based on the findings, the alternative that best meets the priorities and goals of the study was identified. The following information provides an overview of key segment considerations which correspond to Figure 7.

1. Wooddale Avenue is expected to be reconfigured as part of the SWLRT project. Once completed, Wooddale Avenue will include on-street bike lanes and two northbound and southbound lanes. With the construction and the needs identified in the *SWLRT PEC-East Traffic Technical Memorandum (2015),* no geometric changes are expected at the 36th Street/Wooddale Avenue intersection. Thus, any preliminary 36th Street alternatives will need to tie into the existing Wooddale Avenue/36th Street intersection configuration.
2. The most constricted space on the segment, and the entire 36th Street corridor, is between Yosemite Avenue and Xenwood Avenue, which is approximately 52 feet wide from curb face to curb face. There are also existing buildings in close proximity to the curbs within this area. This limits the potential alternatives that are possible, unless curb reconstruction is considered.

3. Based on discussions with City Staff, there is a desire to provide an eastbound left-turn lane at the 36th Street/Xenwood Avenue intersection. Note that when the traffic signal was constructed in July 2015, the signal mast arm included a mounting location for an eastbound left-turn signal head. This was not installed at that time since the eastbound left-turn lane did not exist.
4. Based on discussions with City staff, there is a desire to keep on-street parking along the corridor, which serves adjacent businesses and residences.
5. As mentioned in the existing conditions, the westbound right-turn movement at the 36th Street/ Wooddale Avenue intersection can queue beyond Xenwood Avenue during the p.m. peak hour. These queues are highly inconsistent, as they are often a result of a freight train or pedestrian/ bicycle activity at the Wooddale Avenue Cedar Lake Regional Trail crossing. Although an underpass for the Cedar Lake Regional trail is proposed as part of the SWLRT project, the addition of the SWLRT transit service will potentially operate similar to the existing trail crossing. Since queues are expected to extend beyond the right-turn storage, it is important to consider providing an additional lane for vehicles making a westbound thru/right movement at the 36th Street/ Wooddale Avenue intersection.

West Segment Alternative Evaluation

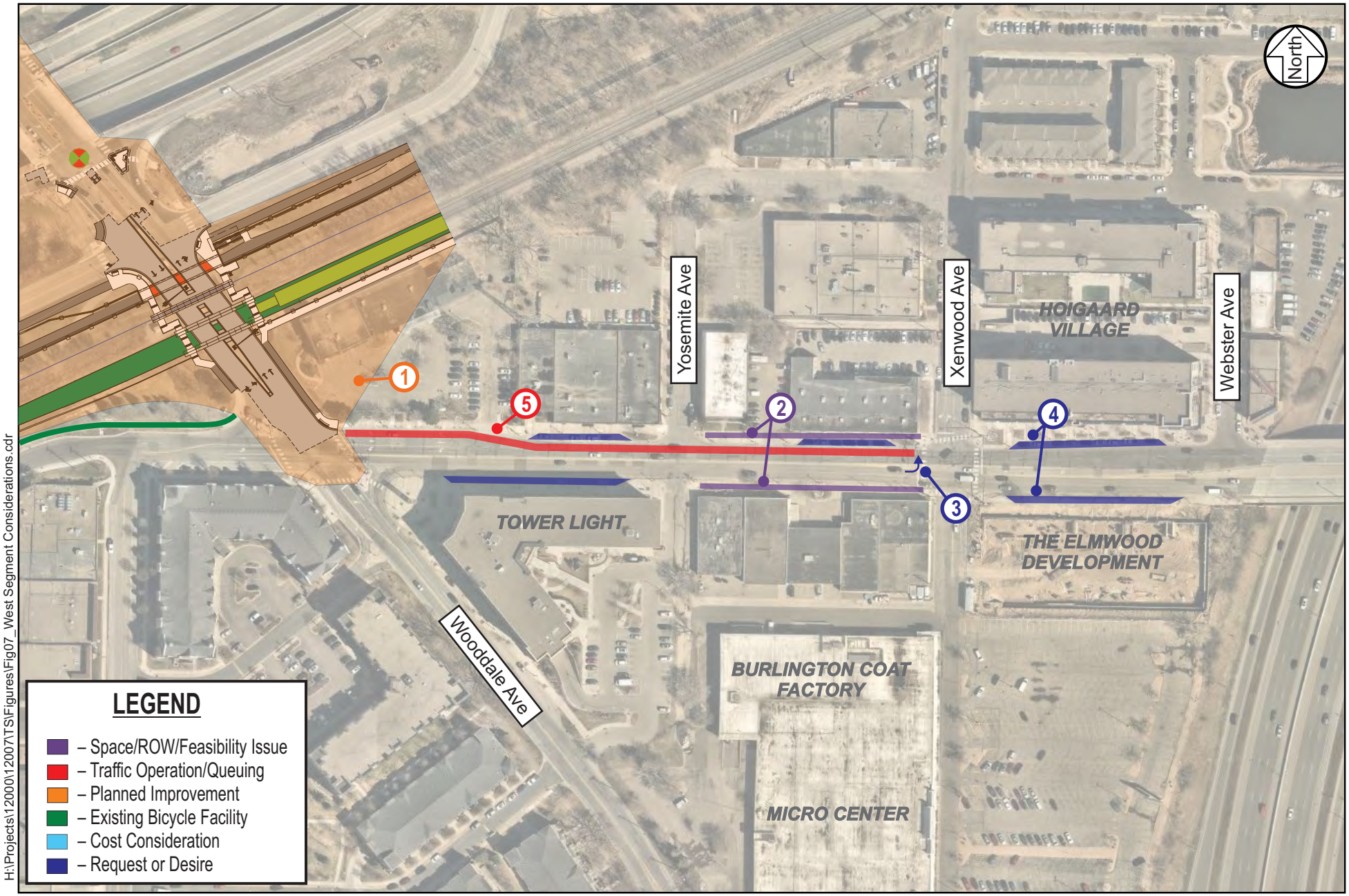
Based on the planning level review, the following two preliminary alternatives were not reviewed further for the west segment.

- Option 1 - 4-Lane Facility (No Build)
- Option 2B - Unbalanced Facility (Travel Lanes: 2 EB + 1 WB)

Alternative Option 1, which is the current 36th Street configuration, cannot accommodate a bicycle facility without significant impacts to parking or other infrastructure. Alternative Option 2B cannot accommodate the heavy westbound volume during the p.m. peak periods, which is not desirable. With Alternative Option 2B, potential queues from the Freight/SWLRT crossing on Wooddale Avenue are expected to block all westbound traffic, which results in queues that are expected to extend longer than previously identified (i.e. onto the 36th Street Bridge over Mn Highway 100). In addition, Alternative Option 2B would likely require curb reconstruction between Yosemite Avenue and Xenwood Avenue and present challenges in providing an eastbound left-turn lane at the 36th Street/Xenwood Avenue intersection. Alternatives Option 1 and Option 2B do not meet the priorities and goals of the project.

Therefore, the following Alternatives were evaluated further to determine which option best meets the priorities and goals for the project.

- Option 2A - Unbalanced Facility (Travel Lanes: 2 WB + 1 EB)
- Option 3 - 3-Lane Facility (1 WB + 1 EB + 1 Center Left-Turn Lane)



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36th Street Considerations - West Segment

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Figure 7

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The Alternative Option 2A configuration would allow for traffic to operate at acceptable levels of service, while providing the on-street bicycle facilities desired for this segment. This alternative accommodates potential queues from Freight/SWLRT services along Wooddale Avenue and provides the desired eastbound left-turn lane at the 36th Street/Xenwood Avenue intersection. This alternative would require curb reconstruction between Yosemite Avenue and Xenwood Avenue, but the length of reconstruction is relatively short.

The Alternative Option 3 configuration would provide an eastbound left-turn lane at the 36th Street/ Xenwood Avenue intersection and accommodate on-street bicycle lanes. Curb reconstruction would not be necessary under this alternative. However, the 3-lane configuration does not accommodate the heavy westbound volume during the p.m. peak period. Potential queues from the Freight/SWLRT crossing on Wooddale Avenue would block all westbound traffic, which may cause queues to extend longer than previously identified (i.e. onto the 36th Street Bridge over Mn Highway 100).

West Segment Evaluation Matrix

A summary of the effectiveness of each alternative to meet the priorities and goals identified for the project is provided in the evaluation matrix in Table 5. Alternatives that meet the key priority or goal identified is highlighted in green, while alternatives that do not meet the key priority are highlighted in red. For alternatives that fall somewhere between these two areas, they are highlighted in orange, yellow, or light green, depending on how well the alternative meets the priority.

Table 5. West Segment Evaluation Matrix

Alternative	Evaluation Criteria					
	Bikeability	Safety	Capacity	Queuing	Costs	Requests
Option 1 – 4-Lane						
Option 2A – 2W+1E						
Option 2B – 1W+2E						
Option 3 – 3-Lane						

Based on the findings summarized within the evaluation matrix in Table 5, Alternative Option 2A best balances the corridor needs for the West Segment. It is important to note that the 36th Street segment has an abundance of space from Xenwood Avenue to Webster Avenue, where the curb face to curb face distance is 65 feet or greater. If a lane were reduced in this segment, a potential off-street trail could be provided in conjunction with the sidewalk facility. In addition, the Elmwood senior housing development is in the process of being constructed in the southeast quadrant of the 36th Street/Xenwood Avenue intersection. The development plans to construct on-street parking along 36th Street, adjacent to the new building. The City should consider coordinating the bicycle facility vision with the Elmwood construction/design staff.

Center Segment (Mn Highway 100 to Park Center Blvd)

Center Segment Key Considerations

Key segment considerations are illustrated in Figure 8, which include current businesses, right-of-way, and grades, amongst others. These considerations, along with the corridor capacity analysis results, were incorporated into the evaluation matrix. Based on the findings, the alternative that best meets the priorities and goals of the study was identified. The following information provides an overview of key segment considerations which correspond to Figure 8.

1. There is an existing off-street trail on the south side of 36th Street, from the Mn Highway 100 bridge to Raleigh Avenue; There is a not a bicycle facility gap in this segment today.
2. There is a steep grade with several trees on the north side of 36th Street; this grade makes expanding the trail network outside of the roadway less feasible and not cost-effective.
3. Based on discussions with City staff, there is no desire to close or modify the LA Fitness access, which would have provided the opportunity for additional on-street bicycle facility alternatives.
4. Based on intersection operations, the dual northbound left-turn lanes at the 36th Street/Park Center Boulevard intersection are needed to ensure intersection operations and reduce queuing impacts to adjacent intersections.
    a. Note that if no modifications are made to the LA Fitness access, the eastbound approach needs left-, through, and right-turn lanes to provide adequate intersection operations; this restricts potential modifications to the roadway geometrics at this location.
5. The Mn Highway 100 Bridge plays an important role in transitioning the bicycle facility between the center and west segments. The bridge currently has an approximate eight (8) foot sidewalk on the north side and an approximate nine and a half (9.5) foot sidewalk on the south side. With the required two (2) foot buffer zone adjacent to parapet walls, per NACTO guidelines, the effective space is approximately six (6) feet on the north side, and approximately five and a half (5.5) feet on the south side. The desire is to expand this space and/or provide separate pedestrian/bicycle facilities in this area. It should be noted that the bridge was recently resurfaced in 2014, bridge modifications generally have a high cost, and require the authorization from the bridge owner, which is the Minnesota Department of Transportation (MnDOT).

Center Segment Alternative Evaluation

Based on the planning level review, the following preliminary alternatives were not reviewed further for the center segment.

- Option 2A - Unbalanced Facility (Travel Lanes: 2 WB + 1 EB)
- Option 2B - Unbalanced Facility (Travel Lanes: 2 EB + 1 WB)
- Option 3 - 3-Lane Facility (1 WB + 1 EB + 1 Center Left-Turn Lane)

None of the preliminary alternatives identified can accommodate traffic volumes during the p.m. peak periods, which is not desirable. Operations indicate that the dual northbound left-turn lanes at the 36th Street/Park Center Boulevard intersection are needed to ensure intersection operations and reduce queuing impacts to adjacent intersections, which makes Option 2B and Option 3 less feasible. The eastbound approach likely requires left-, through, and right-turn lanes to preserve operations, particularly if no modifications to the LA Fitness access are allowed. Therefore, these preliminary alternatives do not meet the priorities and goals of the project and are not considered feasible. Since the segment is currently served with an off-street trail on the south side, the following alternative is considered the best option to meet the priorities and goals for the project:

- Option 1 - 4-Lane Facility (No Build)

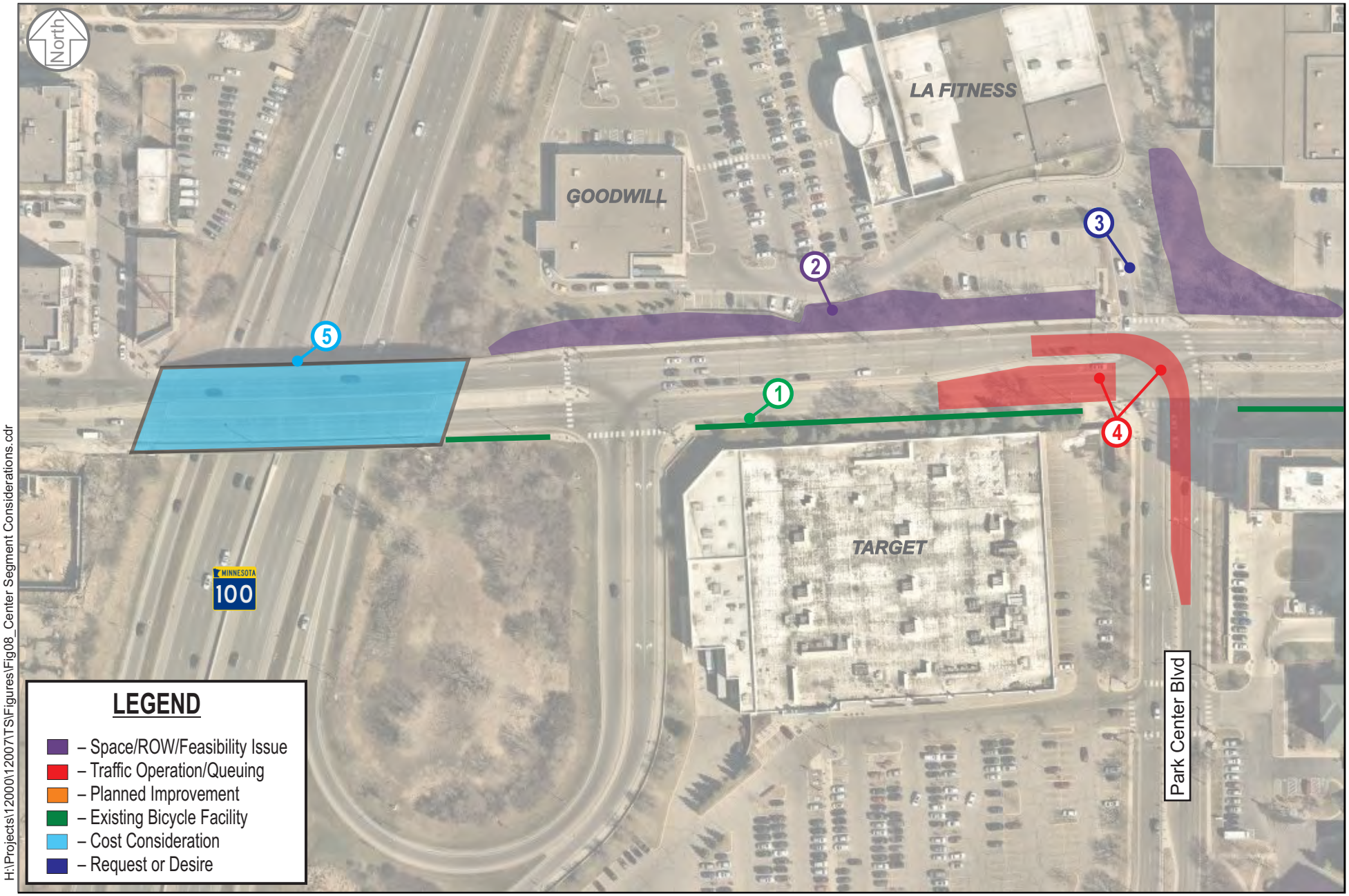
Center Segment Evaluation Matrix

A summary of the effectiveness of each alternative to meet the priorities and goals identified for the project is provided in the evaluation matrix in Table 6. Alternatives that meet the key priority or goal identified is highlighted in green, while alternatives that do not meet the key priority are highlighted in red. For alternatives that fall somewhere between these two areas, they are highlighted in orange, yellow, or light green, depending on how well the alternative meets the priority.

Table 6. Center Segment Evaluation Matrix

Alternative	Evaluation Criteria					
	Bikeability	Safety	Capacity	Queuing	Costs	Requests
Option 1 – 4-Lane						
Option 2A – 2W+1E						
Option 2B – 1W+2E						
Option 3 – 3-Lane						

Based on the findings summarized within the evaluation matrix in Table 6, Alternative Option 1, which is the current 36th Street configuration, best balances the corridor needs for the Center Segment. It should be noted that due to the heavy eastbound right-turn movement at the 36th Street/ Park Center Boulevard intersection, the eastbound configuration could be modified to include an eastbound through lane and an eastbound right-turn lane (in a trap configuration). This would provide the transition for an eastbound travel lane reduction in the east segment if necessary.



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36th Street Considerations - Center Segment

36th Street Multimodal Feasibility Study

City of St. Louis Park

Figure 8

01912007
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East Segment (Park Center Boulevard to Beltline Boulevard)

East Segment Key Considerations

Key segment considerations are illustrated in Figure 9, which include current businesses, right-of-way, and grades, amongst others. These considerations, along with the corridor capacity analysis results, were incorporated into the evaluation matrix. Based on the findings, the alternative that best meets the priorities and goals of the study was identified. The following information provides an overview of key segment considerations which correspond to Figure 9.

1. Monterey Drive is currently in the planning process for being reconstructed to provide improved multimodal accommodations. This project includes a roundabout at the 36th Street/Monterey Drive/Beltline Blvd intersection. It is important to consider this configuration when looking into potential alternatives along the east segment.
2. There is a steep grade on the south side and limited right-of-way and potential building footprint impacts on the north side; this makes expanding the bicycle network beyond the roadway width less feasible and not cost-effective.
3. There is a current off-street trail on the south side of 36th Street from Park Center Boulevard to Raleigh Avenue.
4. As mentioned in the existing conditions intersection capacity analysis, westbound left-turn queues from the 36th Street/Park Center Blvd intersection extend beyond Raleigh Avenue during the p.m. peak hour; it is important to consider this queue during lane reductions, as all westbound vehicles would be blocked from the intersection under this scenario.

East Segment Alternative Evaluation

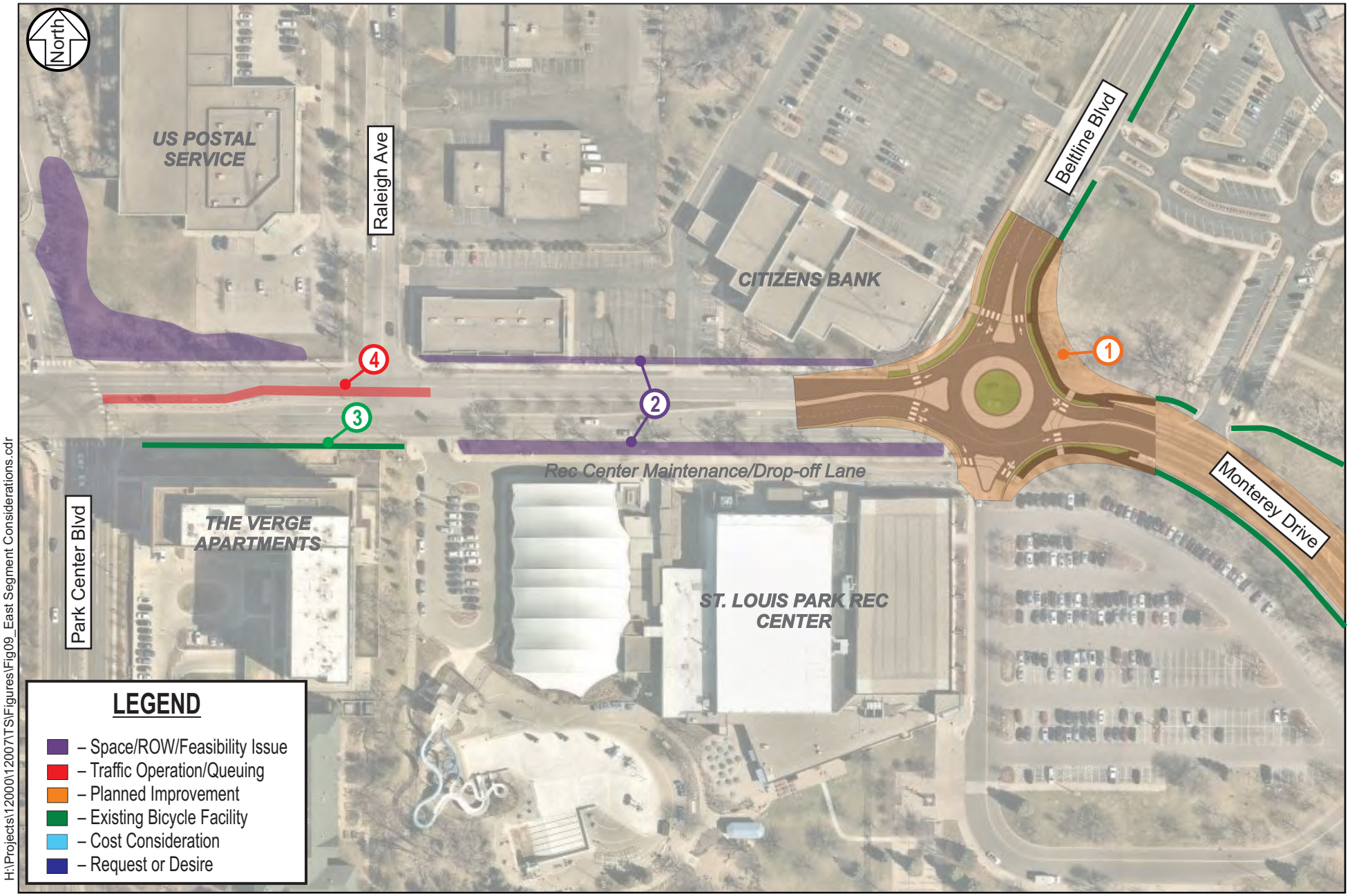
Based on the planning level review, the following two preliminary alternatives were not reviewed further for the west segment.

- Option 2B - Unbalanced Facility (Travel Lanes: 2 EB + 1 WB)
- Option 3 - 3-Lane Facility (1 WB + 1 EB + 1 Center Left-Turn Lane)

With Alternative Option 2B and Option 3, potential westbound left-turn queues are expected to block all westbound traffic, which results in queues that extend longer than previously identified (i.e. into the proposed roundabout). Also, the current bicycle facility is on the south side of the roadway. As mentioned previously, it is not desirable to provide lane reductions in the center segment to provide for a bicycle facility on the north side. Therefore, if a bicycle facility was provided on the north side, it would not tie into anything at the Center Segment. Therefore, Option 2B and Option 3 do not meet the priorities and goals of the project.

Therefore, the following Alternatives were evaluated further to determine which option best meets the priorities and goals for the project.

- Option 1 - 4-Lane Facility (No Build)
- Option 2A – Unbalanced Facility (Travel Lanes: 2 WB + 1 EB)



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SRF Consulting Group, Inc.

36th Street Considerations - East Segment

36th Street Multimodal Feasibility Study

City of St. Louis Park

Figure 9

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The Alternative Option 1, which is the current 36th Street configuration, is still considered because the bicycle facility gap in this segment could be addressed by making modifications to the St. Louis Park Rec Center maintenance/hockey drop-off lane. Potential modifications include an advisory bike lane (ABL) or curb adjustments to the north of the drop-off lane. If these modifications were made, Option 1 would address the bicycle facility gap at a minimal cost, while also allowing traffic to operate at acceptable levels of service.

The Alternative Option 3 configuration would be able to address the bicycle facility gap with an enhanced facility by providing a separate off-street cycle track/sidewalk for the segment. Curb reconstruction costs are anticipated to provide the off-street cycle track. The enhanced facility could be provided while also accommodating future traffic volumes. As mentioned previously, the lane reduction would tie-in well with the center segment. Although the hybrid roundabout includes two eastbound lanes, bicycles would be directed out of the roundabout prior to entering the roundabout to travel through the intersection before returning to the dedicated bicycle facilities.

East Segment Evaluation Matrix

A summary of the effectiveness of each alternative to meet the priorities and goals identified for the project is provided in the evaluation matrix in Table 7. Alternatives that meet the key priority or goal identified is highlighted in green, while alternatives that do not meet the key priority are highlighted in red. For alternatives that fall somewhere between these two areas, they are highlighted in orange, yellow, or light green, depending on how well the alternative meets the priority.

Table 7. East Segment Evaluation Matrix

Alternative	Evaluation Criteria					
	Bikeability	Safety	Capacity	Queuing	Costs	Requests
Option 1 – 4-Lane						N/A
Option 2A – 2W+1E						N/A
Option 2B – 1W+2E						N/A
Option 3 – 3-Lane						N/A

Based on the findings summarized within the evaluation matrix in Table 7 Alternative Option 1 and Alternative Option 2A both balance the corridor needs for the East Segment. Alternative Option 2A would provide a better bicycle facility, which is the highest of all priorities, therefore is considered the best option. It should be mentioned that in order to provide cost savings/efficiency and reduce construction fatigue, consider having the south bicycle facility and three-quarter access construction included in the future roundabout construction at Beltline Boulevard and Monterey Drive.

Preferred Alternative Concept

Based on the alternative screening evaluation, the preferred alternatives for each segment are summarized in Table 8 and illustrated in Figure 10. An iterative review process was completed to further refine the specific bicycle facility types for each segment and provide additional insight and considerations regarding the alternatives. Based on this process, preliminary construction cost estimates were developed for each segment. Note that the cost estimates do not include design engineering, construction administration, and any contingency. Detailed cost estimates for each alternative are included in the Appendix. Figure 11 provides a visual summary of the future bicycle facilities within the area, which incorporates the alternatives outlined within this study.

Next Steps

As the project proceeds into the next phase, further refinement of the preferred design is expected. Communication with area stakeholders, through both public and private business meetings, is needed to ensure comprehensive community feedback is provided to help refine the bicycle facility design. The City should also begin to identify funding opportunities, including regional solicitation grants and County pedestrian and bicycle funding, amongst others, to help support this infrastructure investment within the community.

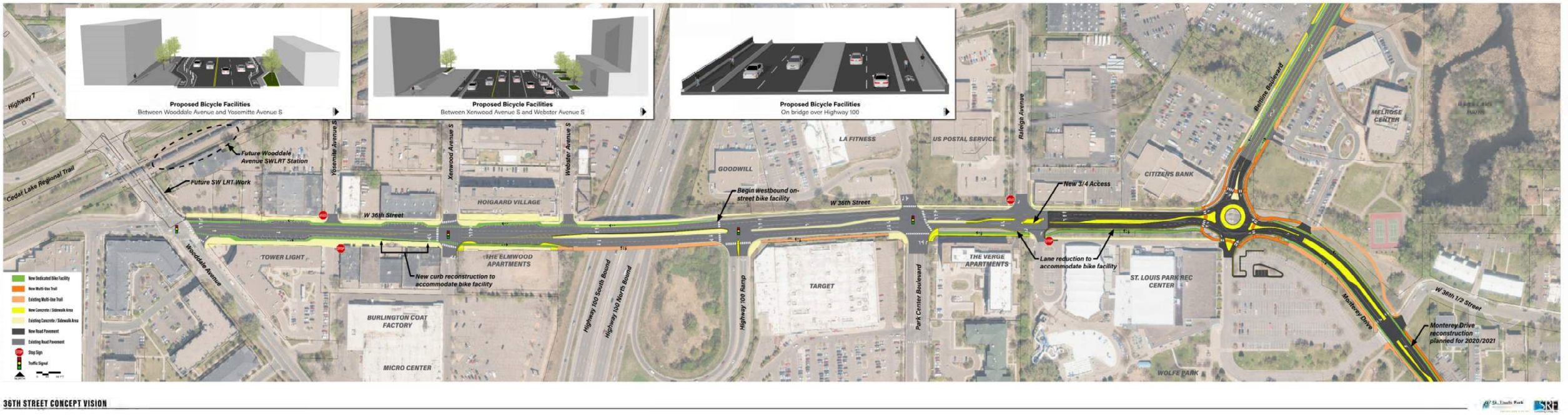
Summary

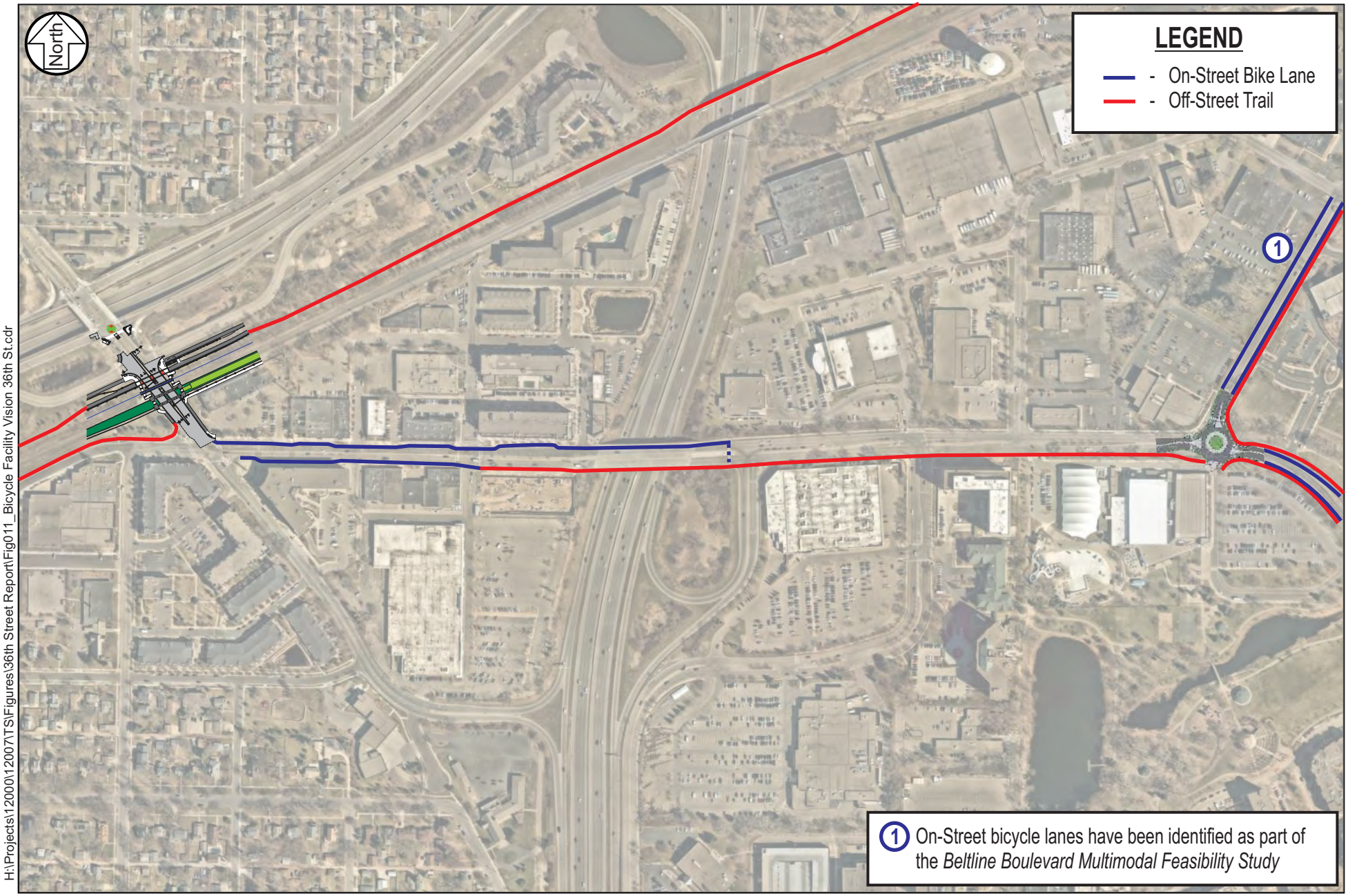
Based on the findings of the *36th Street Multimodal Feasibility Study*, a future corridor layout and vision was identified that balances the needs of all transportation modes within the area. Although there are other facility types that could be implemented that would provide a higher-level of bicycle facility, they would come at the expense of other modes of transportation or at a much higher cost and impact. Therefore, the preferred corridor layout identified provides the most cost-effective alternative for implementing an enhanced bicycle facility connection along 36th Street, while limiting impacts to existing area stakeholders.

Table 8. 36th Street Bicycle Facility Summary

Preferred Alternative	Bicycle Facility Type	Costs	Key Considerations
West Segment (Wooddale Avenue to Mn Highway 100)			
Option 2A - 2W+1E	On-Street Buffered Bike Lane	$265,000	• Provides an eastbound left-turn lane at the 36th Street/Xenwood Avenue intersection • Utilizes the excess space between Xenwood Avenue and Webster Avenue to provide separated off-street trail and sidewalk facilities on the south side • Consider providing a westbound right-turn overlap phase at the signal to provide more efficient westbound right-turn maneuvers
Center Segment (Mn Highway 100 to Park Center Boulevard)			
Mn Highway 100 (Bridge Only)	Buffered Bike Lane (WB) Multiuse Trail (EB)	$190,000	• Removes approximately four (4) feet of the center median to provide space to provide an on-street bicycle facility on the north side • On-street bicycle facility will be six (6) feet wide with a two (2) foot wide raised curb • The approximately 9.5-foot trail on the south side will remain. • In order to provide more space for the trail on the south side, the concrete barrier would need to be moved to the north, which for the purpose of this study is not considered a cost-effective solution
Option 1 - 4-Lane	Multiuse Trail	$140,000	• Consider converting the eastbound thru and shared thru-/right-turn lane configuration at the 36th Street and Park Center Boulevard intersection to an eastbound thru and dedicated right-turn lane (trap condition) to transition to the east segment • Assumes an eastbound right-turn overlap signal phase at Park Center Boulevard is added • Assumes the existing off-street trail on the south side is enhanced and repaved
East Segment (Park Center Boulevard to Beltline Boulevard)			
Option 2A - 2W+1E	Multiuse Trail / Off Street Cycle Track	$140,000	• Utilizes the southern eastbound lane to reconstruct and provide a separated off-street cycle track and sidewalk facilities on the south side • Includes the construction of a three-quarter access at the 36th Street/Raleigh Avenue/Rec Center Access and an extended westbound left turn lane at Park Center Blvd intersection • Construction costs does not include the roundabout
Total Project Cost		$735,000	

Figure 10. 36th Street Preferred Conceptual Layout





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Bicycle Facility Vision

W. 36th Street Multimodal Feasibility Study

City of St. Louis Park

Figure 11

01912007
August 2019

Appendix

Safety Analysis
36th Street Multimodal Feasibility Study
SRF Consulting Group

Crash Rate Summary

Intersection	Traffic Control	Total Crashes	Crash Rate	Statewide Average	Critical Crash Rate	Crash Rate > Critical Crash Rate	Fatal & Serious Issue Crash Rate	Critical Crash Rate	Fatal & Serious Issue Crash Rate > Critical Crash Rate
W. 36th St/Woodale Ave 2013-2015	Traffic Signal	24	1.29	0.52	0.98	Yes	0.00	5.11	No
W. 36th St/Woodale Ave 2016-2017 [1]	Traffic Signal [2]	15	0.81	0.52	0.98	No	0.00	5.11	No
W. 36th St/Woodale Ave 2013-2017	Traffic Signal	39	1.26	0.52	0.86	Yes	0.00	3.54	No
W. 36th St/Yosemite Ave	Thru-Stop	7	0.29	0.18	0.43	No	0.00	3.98	No
W. 36th St/Xenwood Ave 2013-2015	Thru-Stop	13	0.90	0.19	0.51	Yes	6.94	5.84	Yes
W. 36th St/Xenwood Ave 2016-2017 [1]	Traffic Signal [3]	6	0.42	0.52	1.05	No	0.00	6.15	No
W. 36th St/Xenwood Ave 2013-2017	Thru-Stop/Traffic Signal	19	0.79	0.52	0.91	No	4.16	4.21	No
W. 36th St/TH 100 NB Ramp	Traffic Signal	12	0.36	0.70	1.08	No	0.00	4.19	No
W. 36th St/Park Center Blvd	Traffic Signal	32	0.85	0.70	1.06	No	0.00	3.91	No
W. 36th St/Raleigh Ave	Thru-Stop	9	0.35	0.18	0.42	No	0.00	3.69	No
W. 36th St/Beltline Blvd	Traffic Signal	28	0.74	0.70	1.06	No	2.65	3.91	No

NOTES:
(1) Crash rate comparisons are determined in 3, 5, 10 years of data. Crashes shown are only two years of data.
(2) W. 36th St/Woodale Ave intersection had upgraded signal and turn lane modifications in July 2015
(3) W. 36th St/Xenwood Ave intersection was upgraded to a signal in July 2015

2040 PM 36th Street Center Segment Alternative Sensitivity Operations

	Split Phase (Existing)		NB/SB Aligned		Right Out/Enter Only		Enter Only		Access Removed	
	Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center
3 Lane	C (33 sec)	D (44 sec)	D (46 sec)	D (50 sec)	D (36 sec)	C (34 sec)	C (33 sec)	C (32 sec)	C (35 sec)	C (28 sec)
2 EB + 1 WB	D (51 sec)	D (53 sec)	D (41 sec)	D (47 sec)	C (34 sec)	C (33 sec)	D (37 sec)	C (31 sec)	D (35 sec)	C (32 sec)
2 WB + 1 EB	D (41 sec)	C (31 sec)	D (36 sec)	D (36 sec)	C (32 sec)	C (27 sec)	C (31 sec)	C (30 sec)	D (36 sec)	C (30 sec)

2040 PM 36th Street Center Segment Alternative Sensitivity 95th Percentile Queuing (1)

		Split Phase (Existing)		NB/SB Aligned		Right Out/Enter Only		Enter Only		Access Removed	
		Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center	Hwy 100	Park Center
3 Lane	EB	750	500	850	500	785	500	745	450	775	425
	NBL	425	650	600	830	500	530	475	475	425	400
	WBL/WBT	175	600	200	775	175	490	165	645	180	375
2 EB + 1 WB	EB	700	525	715	525	340	400	335	400	590	510
	NBL	500	875	400	650	425	685	525	600	400	375
	WBL/WBT	415	550	350	535	445	440	475	500	340	405
2 WB + 1 EB	EB	880	485	800	430	650	375	620	375	645	425
	NBL	300	525	300	250	250	275	275	430	300	315
	WBL/WBT	400	340	415	400	340	430	370	415	475	500

(1) Red shade indicates a 95th Percentile queue that is into the adjacent intersection.

Cityof St. Louis Park-36th Street: Wooddale Drive to Monterey Boulevard Roundabout (1)						
NOTES	ITEM NO.	BASE BID ITEM DESCRIPTION	UNIT	BASE BID UNIT PRICE	TOTALS	
					QUANTITY	AMOUNT
	2021.501	MOBILIZATION	$35,000.00	$35,000.00	1	$35,000.00
	2101.524	CLEARING	$145.00	$250.00	2	$500.00
	2101.524	GRUBBING	$175.00	$200.00	2	$400.00
	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	$3.50	$3.50	2050	$7,175.00
	2104.503	REMOVE CURB & GUTTER	$6.00	$4.00	1400	$5,600.00
	2104.518	REMOVE BITUMINOUS PAVEMENT	$3.00	$5.00	20478	$102,390.00
	2104.518	REMOVE CONCRETE WALK	$2.00	$2.00	4425	$8,850.00
	2104.502	REMOVE MANHOLE OR CATCH BASIN	$450.00	$500.00	1	$500.00
	2506.602	CONNECT INTO EXISTING DRAINAGE STRUCTURE	$1,500.00	$2,000.00	1	$2,000.00
	2506.602	CONSTRUCT DRAINAGE STRUCTURE	$4,000.00	$4,000.00	1	$4,000.00
		RELOCATE LIGHT POLE/MANHOLE	$5,000.00	$5,000.00	4	$20,000.00
(2)	2105.507	SELECT GRANULAR BORROW (CV)	$30.00	$30.00	200	$6,000.00
(2),(3)	2211.507	AGGREGATE BASE (CV) CLASS 5	$25.00	$25.00	64	$1,600.00
	2521.518	3" BITUMINOUS WALK	$2.00	$3.00	8915	$26,745.00
	2521.518	4" CONCRETE WALK	$9.00	$6.00	4900	$29,400.00
	2521.518	6" CONCRETE WALK	$11.00	$8.50	1159	$9,851.50
(2)	2360.509	TYPE SP 19.0 NON-WEARING COURSE MIXTURE (3,C)	$90.00	$90.00	125	$11,250.00
(2)	2360.509	TYPE SP 12.5 WEARING COURSE MIXTURE (3,C)	$90.00	$90.00	375	$33,750.00
	2531.503	CONCRETE CURB AND GUTTER	$20.00	$22.00	1825	$40,150.00
	2531.618	TRUNCATED DOMES	$50.00	$60.00	80	$4,800.00
	2573.502	STORM DRAIN INLET PROTECTION	$250.00	$250.00	9	$2,250.00
	2575.505	SEEDING	$2,000.00	$2,500.00	0.1	$150.00
SIGNALS/SIGNING STRIPING						
(5)	2565.501	TRAFFIC CONTROL INTERCONNECT SYSTEM A	$76,000.00	$76,000.00	1	$76,000.00
		SIGNAL TIMING UPDATES	$50,000.00	$50,000.00	1	$50,000.00
	2565.616	REVISE SIGNAL SYSTEM A	$8,000.00	$8,000.00	1	$8,000.00
	2565.616	REVISE SIGNAL SYSTEM B	$5,000.00	$5,000.00	1	$5,000.00
	2565.616	REVISE SIGNAL SYSTEM C	$8,000.00	$8,000.00	1	$8,000.00
	2104.502	REMOVE SIGN TYPE C	$37.00	$35.00	5	$175.00
	2564.618	SIGN TYPE C	$42.00	$40.00	270	$10,800.00
	2102.503	PAVEMENT MARKING REMOVAL	$0.76	$1.00	2500	$2,500.00
	2102.518	PAVEMENT MARKING REMOVAL	$2.21	$2.20	640	$1,408.00
	2582.503	4" SOLID LINE MULTI-COMPONENT GR IN	$0.60	$0.60	5700	$3,420.00
	2582.503	8" SOLID LINE MULTI-COMPONENT GR IN	$2.50	$2.50	760	$1,900.00
	2582.503	12" SOLID LINE MULTI-COMPONENT GR IN	$7.00	$7.00	525	$3,675.00
	2582.503	24" SOLID LINE MULTI-COMPONENT GR IN	$15.00	$15.00	115	$1,725.00
	2582.503	4" BROKEN LINE MULTI-COMPONENT GR IN	$0.50	$0.50	250	$125.00
	2582.503	4" DOUBLE SOLID LINE MULTI-COMPONENT GR IN	$1.35	$1.35	1700	$2,295.00
	2582.518	PAVEMENT MESSAGE PREF THERMO GR IN	$26.00	$26.00	200	$5,200.00
	2582.518	CROSSWALK PREF THERMO GR IN	$13.00	$13.00	432	$5,616.00
(4)	2582.518	PAVEMENT MARKING SPECIAL	$35.00	$35.00	1140	$39,900.00
	BRIDGE WORK					
	2401.503	TYPE MOD S (TL-4) 36" BARRIER CONC (3S52)	$120.00	$120.00	332	$39,840.00
	2401.508	REINFORCEMENT BARS (EPOXY COATED)	$1.25	$1.25	6700	$8,375.00
	2404.618	CONCRETE WEARING COURSE (3U17A) 2.0"	$10.00	$10.00	1330	$13,300.00
	2433.502	ANCH TYPE REINF BARS (TYPE H)	$50.00	$50.00	666	$33,300.00
	2433.518	REMOVE CONCRETE WEARING COURSE	$20.00	$20.00	500	$10,000.00
	2433.518	REMOVE CONCRETE MDEIAN	$25.00	$25.00	1330	$33,250.00
	2433.603	RECONSTRUCT EXPANSION JOINT TYPE A	$850.00	$850.00	22	$18,700.00
ESTIMATED TOTAL COSTS						**$734,866.00**

NOTES

(1) Items based on Concept layout and 2019 pricing; Assumed construction year of 2022
(2) Assumes Pavement Section of 8.0" Bit (2.5" Wear+5.5" Base)/ 9" Agg Base / 15" Select Granular in full Reconstruction Areas
(3) Includes 6" Agg Base for Walks/Trails
(4) Green Pavement Markings
(5) Coordinate Corridor Traffic Signal Systems

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021

Turning Movement Data

Start Time	Eastbound W 35th Street Eastbound				Northbound Beltline Boulevard Northbound				Southbound Beltline Boulevard Southbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
12:00 AM	1	0	0	1	0	1	0	1	3	0	0	3	5
12:15 AM	0	0	0	0	0	3	0	3	1	1	0	2	5
12:30 AM	0	0	0	0	0	2	0	2	1	0	0	1	3
12:45 AM	1	0	0	1	0	1	0	1	1	1	0	2	4
Hourly Total	2	0	0	2	0	7	0	7	6	2	0	8	17
1:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
1:15 AM	0	0	0	0	0	2	0	2	1	0	0	1	3
1:30 AM	3	0	0	3	0	2	0	2	0	0	0	0	5
1:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	1
Hourly Total	3	0	0	3	0	5	0	5	2	0	0	2	10
2:00 AM	0	0	0	0	0	1	0	1	2	1	0	3	4
2:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
2:30 AM	0	0	0	0	0	2	0	2	1	0	0	1	3
2:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	1
Hourly Total	0	0	0	0	0	4	0	4	4	1	0	5	9
3:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	2
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
3:45 AM	0	0	0	0	1	1	0	2	1	0	0	1	3
Hourly Total	0	0	0	0	1	1	0	2	4	0	0	4	6
4:00 AM	0	0	0	0	0	1	0	1	2	1	0	3	4
4:15 AM	0	0	0	0	0	1	0	1	1	0	0	1	2
4:30 AM	0	0	0	0	1	0	0	1	1	2	0	3	4
4:45 AM	0	0	0	0	0	6	0	6	2	2	0	4	10
Hourly Total	0	0	0	0	1	8	0	9	6	5	0	11	20
5:00 AM	1	0	0	1	1	1	0	2	1	2	0	3	6
5:15 AM	1	0	0	1	0	1	0	1	8	5	0	13	15
5:30 AM	1	1	0	2	0	5	0	5	8	12	0	20	27
5:45 AM	0	2	0	2	4	6	0	10	17	16	0	33	45
Hourly Total	3	3	0	6	5	13	0	18	34	35	0	69	93
6:00 AM	3	1	0	4	1	4	0	5	15	17	0	32	41
6:15 AM	2	1	0	3	0	9	0	9	13	15	0	28	40
6:30 AM	2	1	0	3	1	5	0	6	16	5	0	21	30
6:45 AM	8	1	0	9	0	15	0	15	30	13	0	43	67
Hourly Total	15	4	0	19	2	33	0	35	74	50	0	124	178
7:00 AM	6	4	0	10	1	9	0	10	26	9	0	35	55
7:15 AM	4	1	0	5	3	15	0	18	34	19	0	53	76
7:30 AM	1	2	0	3	0	18	0	18	50	12	0	62	83
7:45 AM	5	1	0	6	2	24	0	26	64	18	0	82	114

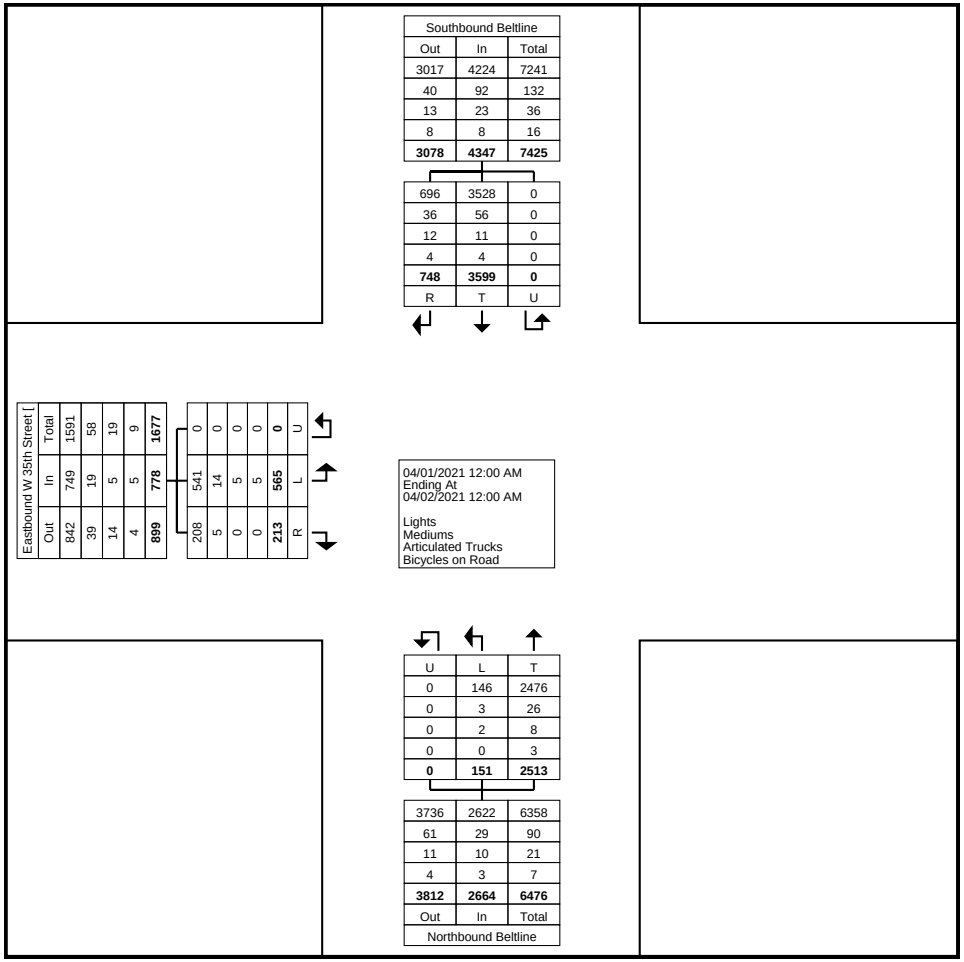
Hourly Total	16	8	0	24	6	66	0	72	174	58	0	232	328
8:00 AM	8	5	0	13	4	18	0	22	47	9	0	56	91
8:15 AM	9	2	0	11	2	28	0	30	43	10	0	53	94
8:30 AM	8	1	0	9	3	34	0	37	49	6	0	55	101
8:45 AM	5	0	0	5	1	46	0	47	63	10	0	73	125
Hourly Total	30	8	0	38	10	126	0	136	202	35	0	237	411
9:00 AM	9	2	0	11	2	37	0	39	40	14	0	54	104
9:15 AM	5	2	0	7	3	24	0	27	42	10	0	52	86
9:30 AM	5	3	0	8	3	33	0	36	66	10	0	76	120
9:45 AM	8	3	0	11	2	34	0	36	71	9	0	80	127
Hourly Total	27	10	0	37	10	128	0	138	219	43	0	262	437
10:00 AM	8	4	0	12	4	48	0	52	59	8	0	67	131
10:15 AM	11	0	0	11	5	35	0	40	49	11	0	60	111
10:30 AM	9	5	0	14	1	26	0	27	56	7	0	63	104
10:45 AM	9	5	0	14	1	39	0	40	68	13	0	81	135
Hourly Total	37	14	0	51	11	148	0	159	232	39	0	271	481
11:00 AM	10	5	0	15	3	47	0	50	69	11	0	80	145
11:15 AM	7	2	0	9	1	52	0	53	59	12	0	71	133
11:30 AM	6	7	0	13	2	54	0	56	73	12	0	85	154
11:45 AM	5	7	0	12	2	56	0	58	76	14	0	90	160
Hourly Total	28	21	0	49	8	209	0	217	277	49	0	326	592
12:00 PM	12	5	0	17	4	60	0	64	80	8	0	88	169
12:15 PM	10	3	0	13	3	45	0	48	77	16	0	93	154
12:30 PM	8	3	0	11	1	61	0	62	80	19	0	99	172
12:45 PM	9	5	0	14	4	47	0	51	63	12	0	75	140
Hourly Total	39	16	0	55	12	213	0	225	300	55	0	355	635
1:00 PM	10	1	0	11	3	43	0	46	55	11	0	66	123
1:15 PM	7	5	0	12	4	51	0	55	72	9	0	81	148
1:30 PM	12	4	0	16	1	41	0	42	68	8	0	76	134
1:45 PM	13	3	0	16	3	63	0	66	67	10	0	77	159
Hourly Total	42	13	0	55	11	198	0	209	262	38	0	300	564
2:00 PM	10	2	0	12	1	48	0	49	78	13	0	91	152
2:15 PM	11	0	0	11	2	61	0	63	75	9	0	84	158
2:30 PM	5	3	0	8	1	44	0	45	68	8	0	76	129
2:45 PM	12	3	0	15	4	47	0	51	58	16	0	74	140
Hourly Total	38	8	0	46	8	200	0	208	279	46	0	325	579
3:00 PM	8	5	0	13	4	51	0	55	88	12	0	100	168
3:15 PM	14	3	0	17	2	55	0	57	69	11	0	80	154
3:30 PM	16	5	0	21	5	53	0	58	85	14	0	99	178
3:45 PM	10	2	0	12	3	50	0	53	63	12	0	75	140
Hourly Total	48	15	0	63	14	209	0	223	305	49	0	354	640
4:00 PM	11	7	0	18	6	52	0	58	87	19	0	106	182
4:15 PM	8	5	0	13	5	42	0	47	81	15	0	96	156
4:30 PM	20	10	0	30	4	72	0	76	92	29	0	121	227
4:45 PM	18	6	0	24	3	50	0	53	85	24	0	109	186
Hourly Total	57	28	0	85	18	216	0	234	345	87	0	432	751
5:00 PM	12	8	0	20	7	70	0	77	67	15	0	82	179
5:15 PM	12	4	0	16	3	67	0	70	84	17	0	101	187
5:30 PM	8	7	0	15	3	63	0	66	74	14	0	88	169
5:45 PM	11	2	0	13	1	43	0	44	69	12	0	81	138
Hourly Total	43	21	0	64	14	243	0	257	294	58	0	352	673
6:00 PM	12	2	0	14	1	41	0	42	58	13	0	71	127

6:15 PM	11	5	0	16	2	45	0	47	69	12	0	81	144
6:30 PM	9	3	0	12	3	45	0	48	53	12	0	65	125
6:45 PM	9	0	0	9	4	34	0	38	37	15	0	52	99
Hourly Total	41	10	0	51	10	165	0	175	217	52	0	269	495
7:00 PM	18	7	0	25	2	33	0	35	49	4	0	53	113
7:15 PM	10	4	0	14	1	32	0	33	46	4	0	50	97
7:30 PM	6	5	0	11	2	30	0	32	36	5	0	41	84
7:45 PM	9	4	0	13	0	32	0	32	28	9	0	37	82
Hourly Total	43	20	0	63	5	127	0	132	159	22	0	181	376
8:00 PM	8	1	0	9	2	26	0	28	25	4	0	29	66
8:15 PM	8	0	0	8	1	22	0	23	29	5	0	34	65
8:30 PM	3	0	0	3	1	28	0	29	23	2	0	25	57
8:45 PM	3	1	0	4	0	23	0	23	15	1	0	16	43
Hourly Total	22	2	0	24	4	99	0	103	92	12	0	104	231
9:00 PM	8	2	0	10	0	14	0	14	13	1	0	14	38
9:15 PM	6	2	0	8	0	10	0	10	19	2	0	21	39
9:30 PM	4	2	0	6	0	12	0	12	22	2	0	24	42
9:45 PM	5	1	0	6	0	10	0	10	7	2	0	9	25
Hourly Total	23	7	0	30	0	46	0	46	61	7	0	68	144
10:00 PM	3	3	0	6	0	12	0	12	9	1	0	10	28
10:15 PM	2	0	0	2	0	9	0	9	8	2	0	10	21
10:30 PM	0	1	0	1	0	9	0	9	8	0	0	8	18
10:45 PM	0	1	0	1	0	6	0	6	6	0	0	6	13
Hourly Total	5	5	0	10	0	36	0	36	31	3	0	34	80
11:00 PM	1	0	0	1	1	3	0	4	9	1	0	10	15
11:15 PM	2	0	0	2	0	1	0	1	5	0	0	5	8
11:30 PM	0	0	0	0	0	8	0	8	3	1	0	4	12
11:45 PM	0	0	0	0	0	1	0	1	3	0	0	3	4
Hourly Total	3	0	0	3	1	13	0	14	20	2	0	22	39
Grand Total	565	213	0	778	151	2513	0	2664	3599	748	0	4347	7789
Approach %	72.6	27.4	0.0	-	5.7	94.3	0.0	-	82.8	17.2	0.0	-	-
Total %	7.3	2.7	0.0	10.0	1.9	32.3	0.0	34.2	46.2	9.6	0.0	55.8	-
Lights	541	208	0	749	146	2476	0	2622	3528	696	0	4224	7595
% Lights	95.8	97.7	-	96.3	96.7	98.5	-	98.4	98.0	93.0	-	97.2	97.5
Mediums	14	5	0	19	3	26	0	29	56	36	0	92	140
% Mediums	2.5	2.3	-	2.4	2.0	1.0	-	1.1	1.6	4.8	-	2.1	1.8
Articulated Trucks	5	0	0	5	2	8	0	10	11	12	0	23	38
% Articulated Trucks	0.9	0.0	-	0.6	1.3	0.3	-	0.4	0.3	1.6	-	0.5	0.5
Bicycles on Road	5	0	0	5	0	3	0	3	4	4	0	8	16
% Bicycles on Road	0.9	0.0	-	0.6	0.0	0.1	-	0.1	0.1	0.5	-	0.2	0.2

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021



Turning Movement Data Plot

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Eastbound W 35th Street Eastbound				Northbound Beltline Boulevard Northbound				Southbound Beltline Boulevard Southbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
8:00 AM	8	5	0	13	4	18	0	22	47	9	0	56	91
8:15 AM	9	2	0	11	2	28	0	30	43	10	0	53	94
8:30 AM	8	1	0	9	3	34	0	37	49	6	0	55	101
8:45 AM	5	0	0	5	1	46	0	47	63	10	0	73	125
Total	30	8	0	38	10	126	0	136	202	35	0	237	411
Approach %	78.9	21.1	0.0	-	7.4	92.6	0.0	-	85.2	14.8	0.0	-	-
Total %	7.3	1.9	0.0	9.2	2.4	30.7	0.0	33.1	49.1	8.5	0.0	57.7	-
PHF	0.833	0.400	0.000	0.731	0.625	0.685	0.000	0.723	0.802	0.875	0.000	0.812	0.822
Lights	29	8	0	37	10	122	0	132	199	34	0	233	402
% Lights	96.7	100.0	-	97.4	100.0	96.8	-	97.1	98.5	97.1	-	98.3	97.8
Mediums	1	0	0	1	0	3	0	3	3	1	0	4	8
% Mediums	3.3	0.0	-	2.6	0.0	2.4	-	2.2	1.5	2.9	-	1.7	1.9
Articulated Trucks	0	0	0	0	0	1	0	1	0	0	0	0	1
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.8	-	0.7	0.0	0.0	-	0.0	0.2
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

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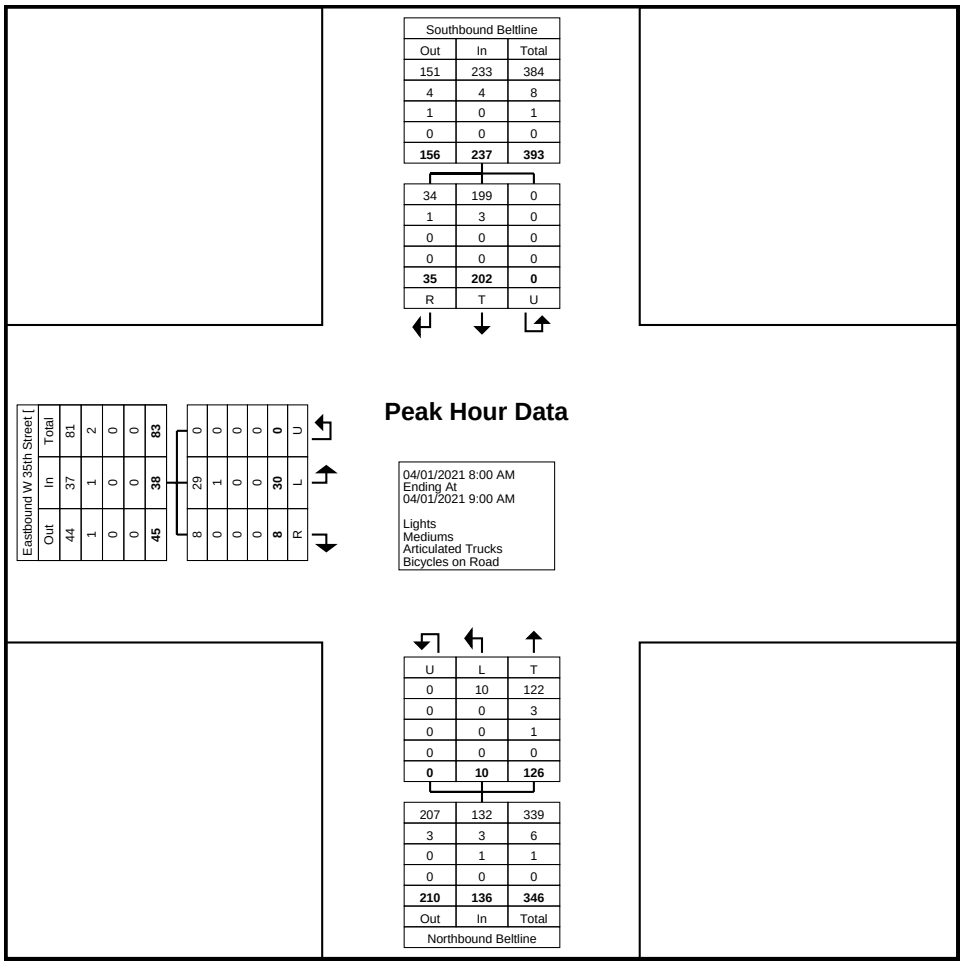
Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021



Turning Movement Peak Hour Data Plot (8:00 AM)

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
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Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021

Turning Movement Peak Hour Data (4:30 PM)

Start Time	Eastbound W 35th Street Eastbound				Northbound Beltline Boulevard Northbound				Southbound Beltline Boulevard Southbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
4:30 PM	20	10	0	30	4	72	0	76	92	29	0	121	227
4:45 PM	18	6	0	24	3	50	0	53	85	24	0	109	186
5:00 PM	12	8	0	20	7	70	0	77	67	15	0	82	179
5:15 PM	12	4	0	16	3	67	0	70	84	17	0	101	187
Total	62	28	0	90	17	259	0	276	328	85	0	413	779
Approach %	68.9	31.1	0.0	-	6.2	93.8	0.0	-	79.4	20.6	0.0	-	-
Total %	8.0	3.6	0.0	11.6	2.2	33.2	0.0	35.4	42.1	10.9	0.0	53.0	-
PHF	0.775	0.700	0.000	0.750	0.607	0.899	0.000	0.896	0.891	0.733	0.000	0.853	0.858
Lights	62	28	0	90	17	257	0	274	326	78	0	404	768
% Lights	100.0	100.0	-	100.0	100.0	99.2	-	99.3	99.4	91.8	-	97.8	98.6
Mediums	0	0	0	0	0	0	0	0	2	5	0	7	7
% Mediums	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.6	5.9	-	1.7	0.9
Articulated Trucks	0	0	0	0	0	2	0	2	0	0	0	0	2
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.8	-	0.7	0.0	0.0	-	0.0	0.3
Bicycles on Road	0	0	0	0	0	0	0	0	0	2	0	2	2
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	2.4	-	0.5	0.3

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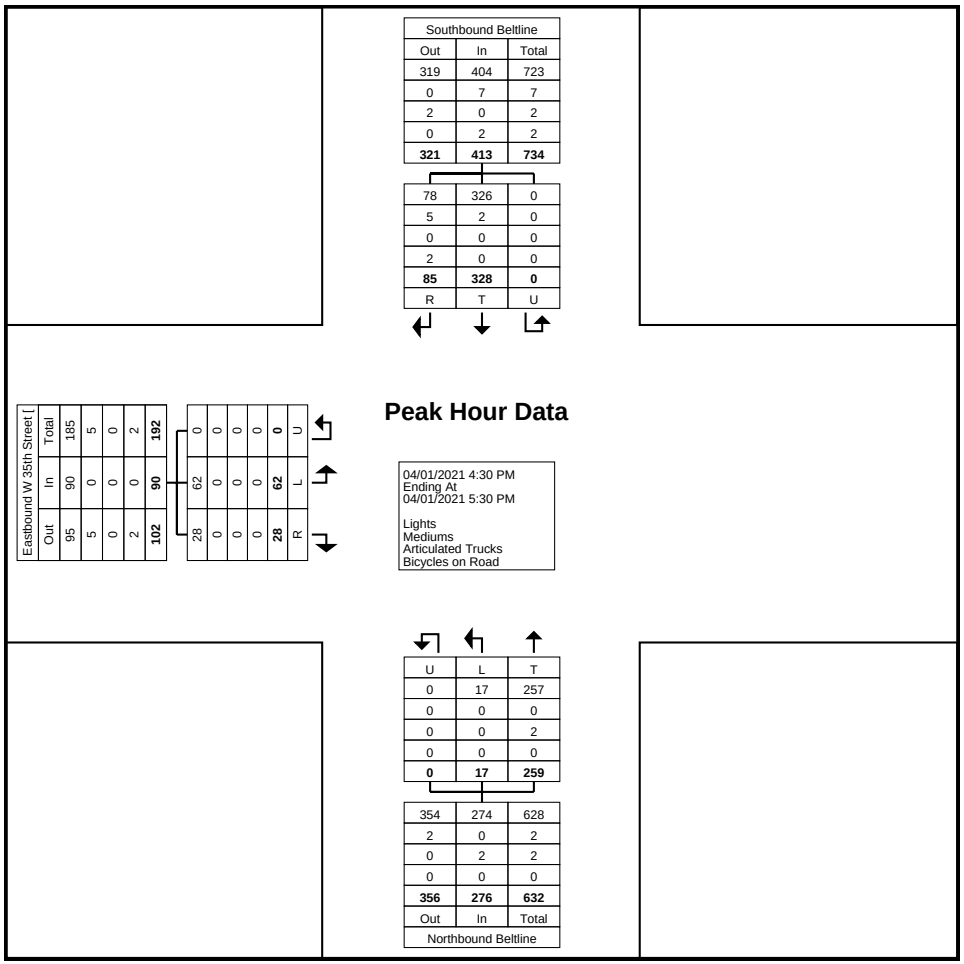
Count Name: West 35th Street & Beltline Boulevard
Site Code:
Start Date: 04/01/2021



Turning Movement Peak Hour Data Plot (4:30 PM)

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
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Count Name: Raleigh Avenue & West 36th Street*
Site Code:
Start Date: 04/01/2021

Turning Movement Data

Start Time	Eastbound 36th Street Eastbound					Westbound 36th Street Westbound					Northbound ROC Driveway Northbound					Southbound Raleigh Avenue Southbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	15	31	0	0	46	2	44	6	0	52	0	0	0	0	0	0	0	11	0	11	109
7:15 AM	12	33	0	0	45	0	44	7	0	51	0	1	0	0	1	0	0	5	0	5	102
7:30 AM	10	28	1	0	39	0	57	0	0	57	0	0	1	0	1	0	1	3	0	4	101
7:45 AM	18	46	1	0	65	0	73	2	0	75	1	0	0	0	1	1	0	6	0	7	148
Hourly Total	55	138	2	0	195	2	218	15	0	235	1	1	1	0	3	1	1	25	0	27	460
8:00 AM	14	40	0	1	55	1	54	4	0	59	0	0	0	0	0	5	0	20	0	25	139
8:15 AM	20	42	2	0	64	1	38	12	0	51	0	0	0	0	0	4	0	12	0	16	131
8:30 AM	14	48	1	0	63	0	53	8	0	61	0	0	0	0	0	4	0	13	0	17	141
8:45 AM	12	50	0	0	62	3	65	10	2	80	0	0	1	0	1	7	0	12	0	19	162
Hourly Total	60	180	3	1	244	5	210	34	2	251	0	0	1	0	1	20	0	57	0	77	573
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	27	88	0	0	115	0	97	11	0	108	0	0	0	0	0	7	0	25	0	32	255
4:15 PM	18	80	2	1	101	0	122	15	0	137	0	0	0	0	0	3	0	28	0	31	269
4:30 PM	16	103	1	0	120	0	147	7	0	154	1	0	0	0	1	6	0	41	0	47	322
4:45 PM	22	99	1	0	122	0	122	8	0	130	1	0	0	0	1	6	0	31	0	37	290
Hourly Total	83	370	4	1	458	0	488	41	0	529	2	0	0	0	2	22	0	125	0	147	1136
5:00 PM	18	119	0	1	138	0	126	6	0	132	0	0	0	0	0	5	0	24	0	29	299
5:15 PM	7	110	2	0	119	0	113	2	0	115	0	0	0	0	0	4	0	21	0	25	259
5:30 PM	10	115	1	0	126	0	109	5	0	114	0	0	0	0	0	4	0	29	0	33	273
5:45 PM	10	105	1	0	116	1	107	4	0	112	0	0	1	0	1	4	0	12	0	16	245
Hourly Total	45	449	4	1	499	1	455	17	0	473	0	0	1	0	1	17	0	86	0	103	1076
Grand Total	243	1137	13	3	1396	8	1371	107	2	1488	3	1	3	0	7	60	1	293	0	354	3245
Approach %	17.4	81.4	0.9	0.2	-	0.5	92.1	7.2	0.1	-	42.9	14.3	42.9	0.0	-	16.9	0.3	82.8	0.0	-	-
Total %	7.5	35.0	0.4	0.1	43.0	0.2	42.2	3.3	0.1	45.9	0.1	0.0	0.1	0.0	0.2	1.8	0.0	9.0	0.0	10.9	-
Lights	235	1120	11	3	1369	6	1352	107	2	1467	3	1	1	0	5	60	0	277	0	337	3178
% Lights	96.7	98.5	84.6	100.0	98.1	75.0	98.6	100.0	100.0	98.6	100.0	100.0	33.3	-	71.4	100.0	0.0	94.5	-	95.2	97.9
Mediums	6	11	2	0	19	2	13	0	0	15	0	0	2	0	2	0	1	14	0	15	51
% Mediums	2.5	1.0	15.4	0.0	1.4	25.0	0.9	0.0	0.0	1.0	0.0	0.0	66.7	-	28.6	0.0	100.0	4.8	-	4.2	1.6
Articulated Trucks	2	3	0	0	5	0	2	0	0	2	0	0	0	0	0	0	0	2	0	2	9
% Articulated Trucks	0.8	0.3	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-	0.0	0.0	0.0	0.7	-	0.6	0.3
Bicycles on Road	0	3	0	0	3	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	7
% Bicycles on Road	0.0	0.3	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.2

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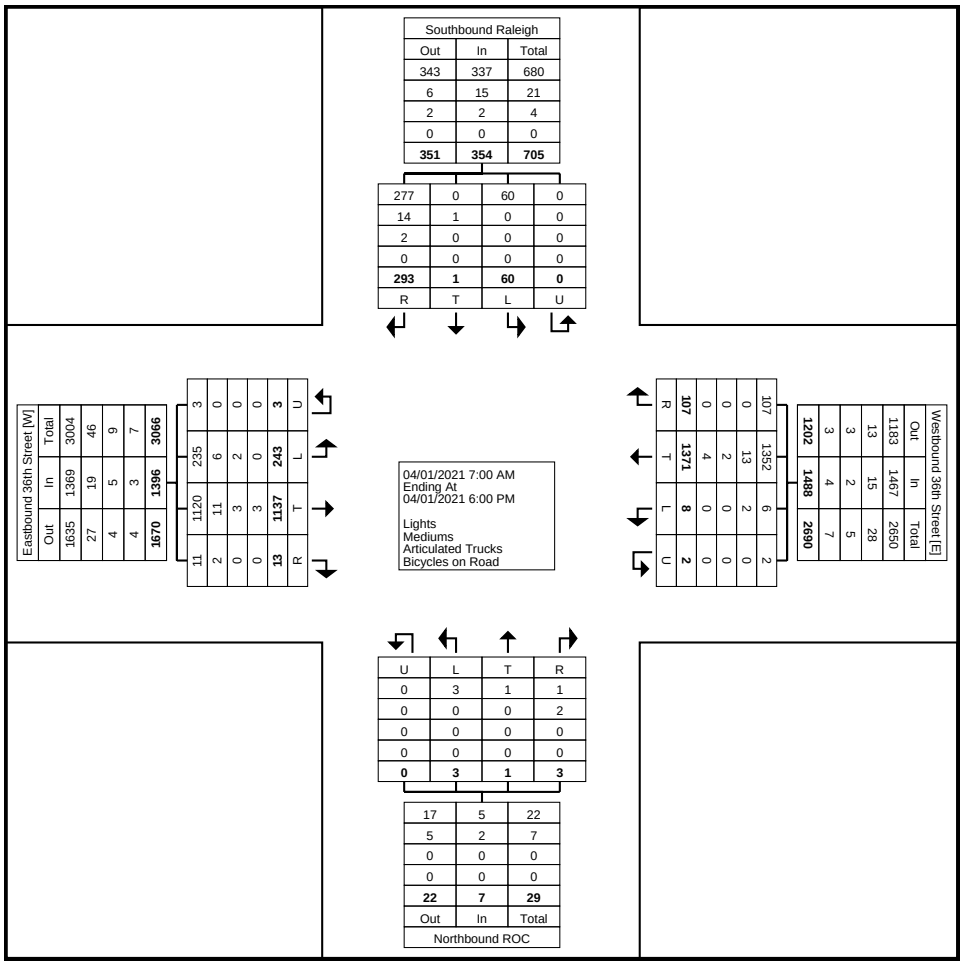
Count Name: Raleigh Avenue & West 36th Street*
Site Code:
Start Date: 04/01/2021



Turning Movement Data Plot

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: Raleigh Avenue & West 36th Street*
Site Code:
Start Date: 04/01/2021

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Eastbound 36th Street Eastbound					Westbound 36th Street Westbound					Northbound ROC Driveway Northbound					Southbound Raleigh Avenue Southbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
8:00 AM	14	40	0	1	55	1	54	4	0	59	0	0	0	0	0	5	0	20	0	25	139
8:15 AM	20	42	2	0	64	1	38	12	0	51	0	0	0	0	0	4	0	12	0	16	131
8:30 AM	14	48	1	0	63	0	53	8	0	61	0	0	0	0	0	4	0	13	0	17	141
8:45 AM	12	50	0	0	62	3	65	10	2	80	0	0	1	0	1	7	0	12	0	19	162
Total	60	180	3	1	244	5	210	34	2	251	0	0	1	0	1	20	0	57	0	77	573
Approach %	24.6	73.8	1.2	0.4	-	2.0	83.7	13.5	0.8	-	0.0	0.0	100.0	0.0	-	26.0	0.0	74.0	0.0	-	-
Total %	10.5	31.4	0.5	0.2	42.6	0.9	36.6	5.9	0.3	43.8	0.0	0.0	0.2	0.0	0.2	3.5	0.0	9.9	0.0	13.4	-
PHF	0.750	0.900	0.375	0.250	0.953	0.417	0.808	0.708	0.250	0.784	0.000	0.000	0.250	0.000	0.250	0.714	0.000	0.713	0.000	0.770	0.884
Lights	56	175	1	1	233	3	206	34	2	245	0	0	0	0	0	20	0	51	0	71	549
% Lights	93.3	97.2	33.3	100.0	95.5	60.0	98.1	100.0	100.0	97.6	-	-	0.0	-	0.0	100.0	-	89.5	-	92.2	95.8
Mediums	2	4	2	0	8	2	4	0	0	6	0	0	1	0	1	0	0	5	0	5	20
% Mediums	3.3	2.2	66.7	0.0	3.3	40.0	1.9	0.0	0.0	2.4	-	-	100.0	-	100.0	0.0	-	8.8	-	6.5	3.5
Articulated Trucks	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
% Articulated Trucks	3.3	0.6	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	1.8	-	1.3	0.7
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0

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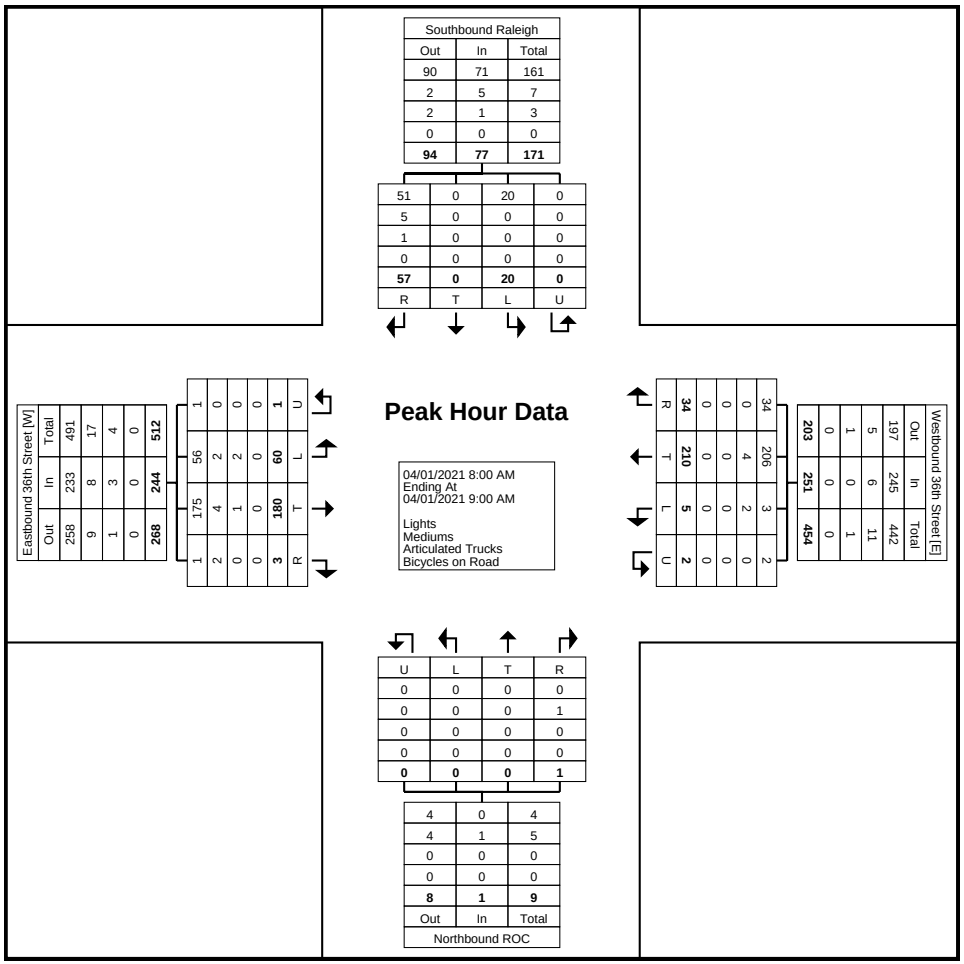

Turning Movement Peak Hour Data Plot (8:00 AM)

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350

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Count Name: Raleigh Avenue & West 36th Street*
Site Code:
Start Date: 04/01/2021

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Eastbound 36th Street Eastbound					Westbound 36th Street Westbound					Northbound ROC Driveway Northbound					Southbound Raleigh Avenue Southbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:15 PM	18	80	2	1	101	0	122	15	0	137	0	0	0	0	0	3	0	28	0	31	269
4:30 PM	16	103	1	0	120	0	147	7	0	154	1	0	0	0	1	6	0	41	0	47	322
4:45 PM	22	99	1	0	122	0	122	8	0	130	1	0	0	0	1	6	0	31	0	37	290
5:00 PM	18	119	0	1	138	0	126	6	0	132	0	0	0	0	0	5	0	24	0	29	299
Total	74	401	4	2	481	0	517	36	0	553	2	0	0	0	2	20	0	124	0	144	1180
Approach %	15.4	83.4	0.8	0.4	-	0.0	93.5	6.5	0.0	-	100.0	0.0	0.0	0.0	-	13.9	0.0	86.1	0.0	-	-
Total %	6.3	34.0	0.3	0.2	40.8	0.0	43.8	3.1	0.0	46.9	0.2	0.0	0.0	0.0	0.2	1.7	0.0	10.5	0.0	12.2	-
PHF	0.841	0.842	0.500	0.500	0.871	0.000	0.879	0.600	0.000	0.898	0.500	0.000	0.000	0.000	0.500	0.833	0.000	0.756	0.000	0.766	0.916
Lights	71	396	4	2	473	0	511	36	0	547	2	0	0	0	2	20	0	121	0	141	1163
% Lights	95.9	98.8	100.0	100.0	98.3	-	98.8	100.0	-	98.9	100.0	-	-	-	100.0	100.0	-	97.6	-	97.9	98.6
Mediums	3	3	0	0	6	0	3	0	0	3	0	0	0	0	0	0	0	2	0	2	11
% Mediums	4.1	0.7	0.0	0.0	1.2	-	0.6	0.0	-	0.5	0.0	-	-	-	0.0	0.0	-	1.6	-	1.4	0.9
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
% Articulated Trucks	0.0	0.2	0.0	0.0	0.2	-	0.0	0.0	-	0.0	0.0	-	-	-	0.0	0.0	-	0.8	-	0.7	0.2
Bicycles on Road	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
% Bicycles on Road	0.0	0.2	0.0	0.0	0.2	-	0.6	0.0	-	0.5	0.0	-	-	-	0.0	0.0	-	0.0	-	0.0	0.3

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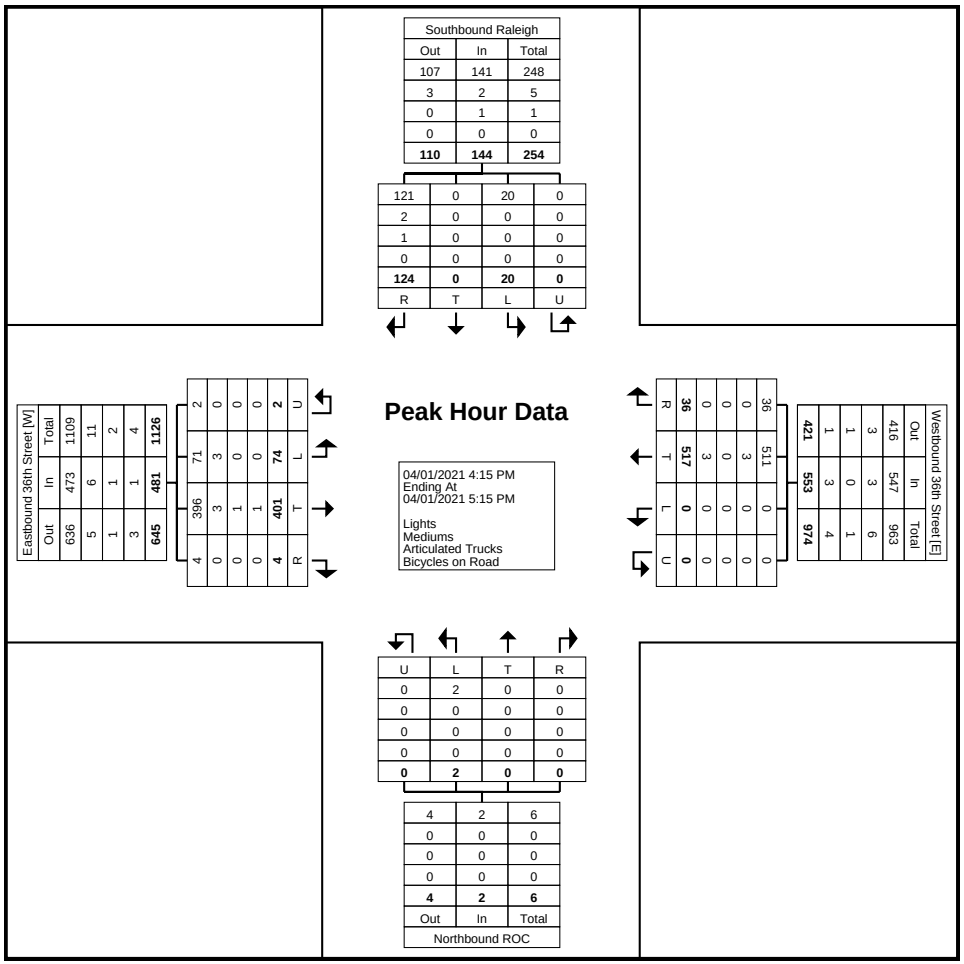

Turning Movement Peak Hour Data Plot (4:15 PM)

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.4	0.2	3.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	19.2	18.1	4.9	19.4	28.8	5.9	4.5	1.4	0.8	4.1	0.6	0.5

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	2.7

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.4	0.0	0.0	0.3
Total Del/Veh (s)	11.1	0.1	4.0	5.0	0.8	1.3	1.0	1.6

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.5	3.4	0.0	0.0	0.0	0.0	1.4
Total Del/Veh (s)	5.5	0.6	0.2	0.0	0.2	6.4	0.9

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	3.1	0.5	0.1	0.3
Total Del/Veh (s)	0.1	0.0	2.9	0.8	3.5	0.6

Total Zone Performance

Denied Del/Veh (s)	1.5
Total Del/Veh (s)	40.8

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	L	TR	L
Maximum Queue (ft)	49	75	93	43	20	60
Average Queue (ft)	16	32	45	14	0	25
95th Queue (ft)	41	68	76	39	4	53
Link Distance (ft)	693	795			786	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			200	200		110
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	62	54	40	12
Average Queue (ft)	28	21	12	0
95th Queue (ft)	55	50	38	5
Link Distance (ft)	312	312		786
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	66	9	66
Average Queue (ft)	27	0	27
95th Queue (ft)	56	5	55
Link Distance (ft)		8	668
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	1		

Intersection: 6: ROC Access & W 36th Street

Movement	WB	NB
Directions Served	L	R
Maximum Queue (ft)	25	26
Average Queue (ft)	3	11
95th Queue (ft)	17	29
Link Distance (ft)		185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Zone Summary

Zone wide Queuing Penalty: 1

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.2	0.2	0.4	0.2	3.0	0.4	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	114.7	96.3	89.4	106.7	144.2	13.4	6.9	2.2	1.6	7.4	0.9	0.7

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	11.9

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	4.7	1.9	2.7	0.7	0.0	0.0	0.7
Total Del/Veh (s)	71.5	8.3	8.0	1.3	2.1	1.3	6.3

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.4	0.0	0.0	0.0	0.0	1.8
Total Del/Veh (s)	7.0	1.5	0.2	0.1	0.2	5.6	1.2

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.8	0.7	0.1	0.3
Total Del/Veh (s)	0.1	0.0	7.8	1.0	8.4	0.9

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	191.3

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	R
Maximum Queue (ft)	271	215	145	46	4	63	4
Average Queue (ft)	105	75	49	10	0	27	0
95th Queue (ft)	246	191	108	35	4	58	3
Link Distance (ft)	693	795			786		
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200	200		110	110
Storage Blk Time (%)		2	0				
Queuing Penalty (veh)		2	0				

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	222	109	58	21
Average Queue (ft)	80	36	22	1
95th Queue (ft)	183	73	53	10
Link Distance (ft)	312	312		786
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	66	22	29	40
Average Queue (ft)	29	1	1	14
95th Queue (ft)	57	16	12	40
Link Distance (ft)			8	668
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	75	75		
Storage Blk Time (%)	0			
Queuing Penalty (veh)	1			

Intersection: 6: ROC Access & W 36th Street

Movement	EB	WB	WB	NB
Directions Served	T	L	T	R
Maximum Queue (ft)	4	40	20	56
Average Queue (ft)	0	11	1	21
95th Queue (ft)	4	36	11	43
Link Distance (ft)	8			185
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		50	50	
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		1	0	

Zone Summary

Zone wide Queuing Penalty: 5

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.3	0.3	3.3	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.3	24.6	11.2	22.3	22.6	5.6	4.6	1.3	1.1	4.1	0.6	0.5

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	2.7

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.3	0.4	0.0	0.0	0.3
Total Del/Veh (s)	14.8	0.6	4.8	3.9	0.9	1.3	1.0	2.2

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.6	3.4	0.0	0.0	0.0	0.0	1.4
Total Del/Veh (s)	5.9	0.7	0.2	0.1	0.3	6.2	1.1

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.5	0.2	0.5	0.2	4.5	3.2	1.3

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.9	0.5	0.1	0.3
Total Del/Veh (s)	0.1	0.0	3.2	0.8	3.9	0.6

Total Zone Performance

Denied Del/Veh (s)	1.5
Total Del/Veh (s)	45.9

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	R
Maximum Queue (ft)	50	78	86	42	10	61	7
Average Queue (ft)	17	31	40	11	0	25	0
95th Queue (ft)	44	66	65	35	4	53	4
Link Distance (ft)	693	795			785		
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200	200		110	110
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	86	56	39	8
Average Queue (ft)	37	25	14	0
95th Queue (ft)	69	51	40	3
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	69	13	62
Average Queue (ft)	29	0	33
95th Queue (ft)	60	6	57
Link Distance (ft)		8	668
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	1		

Intersection: 4: 35th Street & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	30	64
Average Queue (ft)	2	32
95th Queue (ft)	14	55
Link Distance (ft)	123	485
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: ROC Access & W 36th Street

Movement	EB	WB	NB
Directions Served	T	L	R
Maximum Queue (ft)	4	31	35
Average Queue (ft)	0	4	10
95th Queue (ft)	3	21	28
Link Distance (ft)	8		185
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Zone Summary

Zone wide Queuing Penalty: 1

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.2	0.2	0.4	0.5	3.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	128.2	160.5	101.2	113.7	143.6	13.2	6.3	2.0	1.5	6.5	1.1	0.8

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	13.2

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	10.5	0.0	5.8	2.9	0.7	0.0	0.0	1.4
Total Del/Veh (s)	117.5	1.1	8.8	9.8	1.3	2.5	2.0	10.3

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.5	3.3	0.0	0.0	0.0	0.0	1.8
Total Del/Veh (s)	8.3	1.7	0.3	0.0	0.3	6.8	1.5

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.7	0.6	0.0	0.0	0.1	0.1	0.2
Total Del/Veh (s)	3.4	3.2	6.7	3.6	24.0	17.7	7.2

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.9	0.6	0.1	0.3
Total Del/Veh (s)	0.1	0.0	8.0	1.1	7.6	0.8

Total Zone Performance

Denied Del/Veh (s)	2.3
Total Del/Veh (s)	249.5

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	R
Maximum Queue (ft)	285	202	144	33	20	61	3
Average Queue (ft)	121	78	49	10	1	27	0
95th Queue (ft)	310	173	108	32	10	54	2
Link Distance (ft)	693	795			785		
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200	200		110	110
Storage Blk Time (%)		3	0				
Queuing Penalty (veh)		3	0				

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	299	107	77	33
Average Queue (ft)	124	43	28	2
95th Queue (ft)	272	88	61	18
Link Distance (ft)	300	300		785
Upstream Blk Time (%)	6			
Queuing Penalty (veh)	6			
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	EB	EB	WB	SB
Directions Served	L	T	T	TR	R
Maximum Queue (ft)	77	112	47	17	63
Average Queue (ft)	36	5	2	1	26
95th Queue (ft)	67	42	34	8	55
Link Distance (ft)			790	8	668
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	75	75			
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	4	0			

Intersection: 4: 35th Street & Site Access

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	74	83	124
Average Queue (ft)	9	43	16
95th Queue (ft)	56	68	109
Link Distance (ft)	123	300	485
Upstream Blk Time (%)	1		
Queuing Penalty (veh)	2		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: ROC Access & W 36th Street

Movement	WB	WB	NB
Directions Served	L	T	R
Maximum Queue (ft)	44	10	52
Average Queue (ft)	13	0	19
95th Queue (ft)	39	7	41
Link Distance (ft)			185
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	50	50	
Storage Blk Time (%)	0	0	
Queuing Penalty (veh)	1	0	

Zone Summary

Zone wide Queuing Penalty: 16

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.5	3.2	0.2	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	21.3	29.9	5.3	18.5	26.3	6.4	4.9	1.4	0.9	4.0	0.7	0.6

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	3.2

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.5	0.0	0.0	0.3
Total Del/Veh (s)	13.8	0.2	4.4	4.5	0.8	1.3	0.9	1.8

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.4	0.0	0.0	0.0	0.0	1.4
Total Del/Veh (s)	5.4	0.7	0.2	0.0	0.2	5.6	1.0

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.6	0.1	0.5	0.2	4.3	2.9	1.0

5: Site Access & Park Glen Road Performance by movement

Movement	EBT	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.0	1.2	0.3	2.5	0.7

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	3.1	0.5	0.1	0.3
Total Del/Veh (s)	0.1	0.0	3.0	0.8	3.9	0.6

Total Zone Performance

Denied Del/Veh (s)	1.5
Total Del/Veh (s)	45.8

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	L	L	R
Maximum Queue (ft)	74	86	87	37	60	3
Average Queue (ft)	28	32	41	13	25	0
95th Queue (ft)	57	65	69	36	52	3
Link Distance (ft)	105	795				
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)			200	200	110	110
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	70	63	47	10
Average Queue (ft)	27	25	13	0
95th Queue (ft)	59	51	40	3
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	66	4	61
Average Queue (ft)	29	0	33
95th Queue (ft)	57	3	57
Link Distance (ft)		8	668
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 4: 35th Street & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	24	60
Average Queue (ft)	2	26
95th Queue (ft)	12	50
Link Distance (ft)	123	577
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Site Access & Park Glen Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	18	46
Average Queue (ft)	1	18
95th Queue (ft)	9	44
Link Distance (ft)	105	577
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: ROC Access & W 36th Street

Movement	WB	NB
Directions Served	L	R
Maximum Queue (ft)	30	27
Average Queue (ft)	3	11
95th Queue (ft)	18	29
Link Distance (ft)		185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Zone Summary

Zone wide Queuing Penalty: 1

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.2	0.0	0.4	0.3	0.5	3.2	0.3	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	100.9	128.9	85.2	85.9	106.2	14.6	8.6	2.0	1.4	6.7	1.0	0.7

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	12.3

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.6	0.0	0.0	0.4
Total Del/Veh (s)	48.0	0.3	7.9	8.0	1.2	2.1	1.5	4.4

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.5	0.0	0.0	0.0	0.0	1.8
Total Del/Veh (s)	8.0	1.7	0.3	0.0	0.3	6.9	1.6

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.2	0.4	6.1	3.5	0.3	0.2	0.1	2.6

5: Site Access & Park Glen Road Performance by movement

Movement	EBT	WBL	WBT	NBT	NBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	99.7	1.4	0.4	0.1	154.2	55.0

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	3.0	0.7	0.1	0.3
Total Del/Veh (s)	0.2	0.0	8.3	1.1	8.4	0.9

Total Zone Performance

Denied Del/Veh (s)	1.8
Total Del/Veh (s)	224.8

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	115	202	127	37	31	56	13	7
Average Queue (ft)	96	73	52	11	1	28	0	0
95th Queue (ft)	135	172	115	34	15	55	8	3
Link Distance (ft)	106	795			785		310	
Upstream Blk Time (%)	50							
Queuing Penalty (veh)	65							
Storage Bay Dist (ft)			200	200		110		110
Storage Blk Time (%)		3	0					
Queuing Penalty (veh)		3	0					

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	159	80	62	33
Average Queue (ft)	55	41	29	2
95th Queue (ft)	112	69	55	17
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	79	44	18	50
Average Queue (ft)	36	2	1	25
95th Queue (ft)	65	28	8	54
Link Distance (ft)			8	668
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	75	75		
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	2	0		

Intersection: 4: 35th Street & Site Access

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	11	68	4
Average Queue (ft)	0	37	0
95th Queue (ft)	4	54	3
Link Distance (ft)	123	300	568
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Site Access & Park Glen Road

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	230	44	144
Average Queue (ft)	86	5	49
95th Queue (ft)	280	25	126
Link Distance (ft)	535	106	568
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: ROC Access & W 36th Street

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	R
Maximum Queue (ft)	8	13	45	21	60
Average Queue (ft)	0	0	10	1	19
95th Queue (ft)	4	6	35	11	40
Link Distance (ft)	8	8			185
Upstream Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)			50	50	
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			2	0	

Zone Summary

Zone wide Queuing Penalty: 73

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.4	12.3	4.6	10.4	11.6	5.5	11.5	5.0	3.7	8.9	4.2	1.7

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	5.3

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.3	0.4	0.0	0.0	0.3
Total Del/Veh (s)	15.6	0.6	5.1	4.1	0.9	2.1	1.6	2.6

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.6	3.4	0.0	0.0	0.0	0.0	1.4
Total Del/Veh (s)	5.9	0.7	0.2	0.1	0.2	6.8	1.1

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.6	0.2	0.6	0.2	4.5	3.3	1.3

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.9	0.5	0.1	0.3
Total Del/Veh (s)	0.1	0.0	3.2	0.8	4.1	0.6

Total Zone Performance

Denied Del/Veh (s)	1.3
Total Del/Veh (s)	66.6

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	TR	L	T	R
Maximum Queue (ft)	50	112	56	192	66	164	71
Average Queue (ft)	14	49	18	72	33	66	12
95th Queue (ft)	37	89	47	143	62	124	46
Link Distance (ft)	693	795		785		316	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200		110		110
Storage Blk Time (%)				0		1	
Queuing Penalty (veh)				0		2	

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	97	56	42	8
Average Queue (ft)	38	25	14	0
95th Queue (ft)	73	50	40	4
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	69	13	64
Average Queue (ft)	29	0	34
95th Queue (ft)	60	6	58
Link Distance (ft)		8	668
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	1		

Intersection: 4: 35th Street & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	30	68
Average Queue (ft)	2	32
95th Queue (ft)	16	56
Link Distance (ft)	123	485
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: ROC Access & W 36th Street

Movement	EB	WB	NB
Directions Served	T	L	R
Maximum Queue (ft)	4	31	35
Average Queue (ft)	0	4	10
95th Queue (ft)	3	21	28
Link Distance (ft)	8		185
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Zone Summary

Zone wide Queuing Penalty: 2

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	22.5	22.2	13.8	25.2	18.6	14.5	17.5	7.5	5.9	17.0	6.3	2.7

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	9.0

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	8.1	0.0	0.9	2.9	0.7	0.0	0.1	0.9
Total Del/Veh (s)	108.8	12.5	9.5	11.9	1.3	3.5	2.9	10.3

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.3	0.0	0.0	0.0	0.0	1.8
Total Del/Veh (s)	8.3	1.7	0.3	0.0	0.2	6.8	1.5

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	1.8	1.8	6.6	3.8	4.9	0.6	3.8

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.9	0.6	0.1	0.3
Total Del/Veh (s)	0.1	0.0	8.0	1.1	7.7	0.8

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	210.1

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	TR	L	T	R
Maximum Queue (ft)	124	162	45	284	167	282	114
Average Queue (ft)	51	73	12	133	43	128	11
95th Queue (ft)	96	137	37	230	101	233	58
Link Distance (ft)	693	795		785		316	
Upstream Blk Time (%)						0	
Queuing Penalty (veh)						0	
Storage Bay Dist (ft)			200		110		110
Storage Blk Time (%)				1	0	6	
Queuing Penalty (veh)				0	0	7	

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	281	96	86	36	19
Average Queue (ft)	118	43	29	1	1
95th Queue (ft)	256	79	65	26	11
Link Distance (ft)	300	300		871	785
Upstream Blk Time (%)	4				
Queuing Penalty (veh)	4				
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			0		
Queuing Penalty (veh)			3		

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	EB	EB	WB	SB
Directions Served	L	T	T	TR	R
Maximum Queue (ft)	77	112	47	17	59
Average Queue (ft)	36	5	2	1	25
95th Queue (ft)	67	42	34	8	55
Link Distance (ft)			790	8	668
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	75	75			
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	3	0			

Intersection: 4: 35th Street & Site Access

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	78	86	50
Average Queue (ft)	6	44	5
95th Queue (ft)	42	70	30
Link Distance (ft)	123	300	485
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: ROC Access & W 36th Street

Movement	WB	WB	NB
Directions Served	L	T	R
Maximum Queue (ft)	44	10	52
Average Queue (ft)	13	0	20
95th Queue (ft)	39	7	41
Link Distance (ft)			185
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	50	50	
Storage Blk Time (%)	0	0	
Queuing Penalty (veh)	1	0	

Zone Summary

Zone wide Queuing Penalty: 19

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.1	0.2	0.2	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	11.9	14.2	3.8	11.0	9.8	6.1	11.6	5.6	3.8	10.1	4.8	2.0

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	6.0

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.5	0.0	0.0	0.3
Total Del/Veh (s)	13.6	0.2	4.4	5.0	0.8	2.2	1.7	2.2

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.4	0.0	0.0	0.0	0.0	1.4
Total Del/Veh (s)	5.3	0.7	0.2	0.0	0.3	5.9	1.1

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.7	0.2	0.5	0.2	4.3	2.8	1.0

5: Site Access & Park Glen Road Performance by movement

Movement	EBT	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.0	1.3	0.4	2.5	0.8

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	3.1	0.5	0.1	0.3
Total Del/Veh (s)	0.1	0.0	3.0	0.8	3.9	0.6

Total Zone Performance

Denied Del/Veh (s)	1.3
Total Del/Veh (s)	68.1

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	TR	L	T	R
Maximum Queue (ft)	66	108	62	175	126	183	70
Average Queue (ft)	24	51	19	73	40	74	17
95th Queue (ft)	53	89	49	135	88	139	51
Link Distance (ft)	105	795		785		317	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200		110		110
Storage Blk Time (%)				0	0	1	
Queuing Penalty (veh)				0	0	2	

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	65	63	43	4
Average Queue (ft)	26	25	14	0
95th Queue (ft)	56	50	42	3
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	66	9	74
Average Queue (ft)	28	0	33
95th Queue (ft)	57	5	58
Link Distance (ft)		8	668
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 4: 35th Street & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	28	55
Average Queue (ft)	2	26
95th Queue (ft)	14	49
Link Distance (ft)	123	577
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Site Access & Park Glen Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	12	44
Average Queue (ft)	1	18
95th Queue (ft)	8	43
Link Distance (ft)	105	577
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: ROC Access & W 36th Street

Movement	WB	NB
Directions Served	L	R
Maximum Queue (ft)	30	27
Average Queue (ft)	3	11
95th Queue (ft)	18	29
Link Distance (ft)		185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Zone Summary

Zone wide Queuing Penalty: 3

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.3	0.2	0.4	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	23.1	22.7	15.7	21.5	27.1	12.9	19.4	7.7	5.3	19.2	6.4	2.9

1: Beltline Boulevard & Park Glen Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	9.3

2: Beltline Boulevard & 35th Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.6	0.0	0.0	0.4
Total Del/Veh (s)	39.8	0.3	9.5	10.0	1.2	3.1	2.5	4.7

3: W 36th Street & Raleigh Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBT	SBR	All
Denied Del/Veh (s)	3.4	3.5	0.0	0.0	0.0	0.0	1.8
Total Del/Veh (s)	8.0	1.7	0.3	0.0	0.2	6.7	1.5

4: 35th Street & Site Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.2	0.4	6.2	3.6	0.4	0.1	0.1	2.6

5: Site Access & Park Glen Road Performance by movement

Movement	EBT	WBL	WBT	NBT	NBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	1.6	0.4	0.1	2.9	0.9

6: ROC Access & W 36th Street Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	3.0	0.7	0.1	0.3
Total Del/Veh (s)	0.2	0.0	8.4	1.1	8.0	0.9

Total Zone Performance

Denied Del/Veh (s)	1.7
Total Del/Veh (s)	141.0

Intersection: 1: Beltline Boulevard & Park Glen Road

Movement	EB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	TR	L	T	R
Maximum Queue (ft)	107	179	80	269	136	293	142
Average Queue (ft)	53	74	15	120	41	124	27
95th Queue (ft)	97	140	55	216	91	232	91
Link Distance (ft)	106	795		785		317	
Upstream Blk Time (%)	2					0	
Queuing Penalty (veh)	3					1	
Storage Bay Dist (ft)			200		110		110
Storage Blk Time (%)				1	0	6	
Queuing Penalty (veh)				0	0	9	

Intersection: 2: Beltline Boulevard & 35th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	140	96	69	23
Average Queue (ft)	52	42	30	2
95th Queue (ft)	102	77	59	14
Link Distance (ft)	300	300		785
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 3: W 36th Street & Raleigh Avenue

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	79	44	18	50
Average Queue (ft)	36	2	1	24
95th Queue (ft)	65	28	8	52
Link Distance (ft)			8	668
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	75	75		
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	2	0		

Intersection: 4: 35th Street & Site Access

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	15	71	9
Average Queue (ft)	0	38	0
95th Queue (ft)	7	57	6
Link Distance (ft)	123	300	568
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Site Access & Park Glen Road

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	31	39	37
Average Queue (ft)	1	4	18
95th Queue (ft)	15	22	39
Link Distance (ft)	535	106	568
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: ROC Access & W 36th Street

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	R
Maximum Queue (ft)	8	13	45	21	57
Average Queue (ft)	0	0	10	1	19
95th Queue (ft)	4	6	35	11	39
Link Distance (ft)	8	8			185
Upstream Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)			50	50	
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			2	0	

Zone Summary

Zone wide Queuing Penalty: 18