
Memorandum

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SUBJECT: PEC-West Traffic Technical Memorandum

1.0 INTRODUCTION

The Southwest Light Rail Transit (SWLRT) project is a 14.4-mile LRT project with 15 new stations that will operate from downtown Minneapolis through St. Louis Park, Hopkins, Minnetonka, and Eden Prairie. The SWLRT line will serve as an extension of the METRO Green Line (Central Corridor) and will also connect to the METRO Blue Line (Hiawatha Corridor) in downtown Minneapolis. The traffic analysis was completed based on the SWLRT Revised Preliminary Design Plans for Municipal Consent (MC) dated July 8, 2015. This memorandum includes reductions in the length of the SWLRT line, the number of stations, and the number and size of park-and-ride facilities.

1.1 Purpose of Memorandum

This technical memorandum has been prepared in support of the SWLRT project preliminary engineering (PE) design and the Final Environmental Impact Statement (FEIS). The objective of the traffic analysis is to define the scope of the project improvements and evaluate the project's potential traffic impacts, including the following:

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

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

1.2 Study Areas

The location of the overall SWLRT alignment and the East and West segments of the project are shown in **Figure 1**. The East segment of the SWLRT analysis includes all intersections and at-

grade crossings from east of 11th Ave in Hopkins to Target Field Station in Minneapolis. The West segment of the SWLRT analysis includes all intersections and at-grade crossings from SouthWest Station in Eden Prairie to east of 11th Ave in Hopkins. The proposed SWLRT guideway will be at-grade for most of its alignment and includes segments with the LRT operating in an exclusive guideway and semi-exclusive street running operation. In some portions of the East segment, the LRT guideway operates next to an active freight rail alignment.

1.3 Data Collection

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

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

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

In addition, existing gate timings at station and non-station intersections were collected along the METRO Blue Line for use in the modeling of the future SWLRT operations.

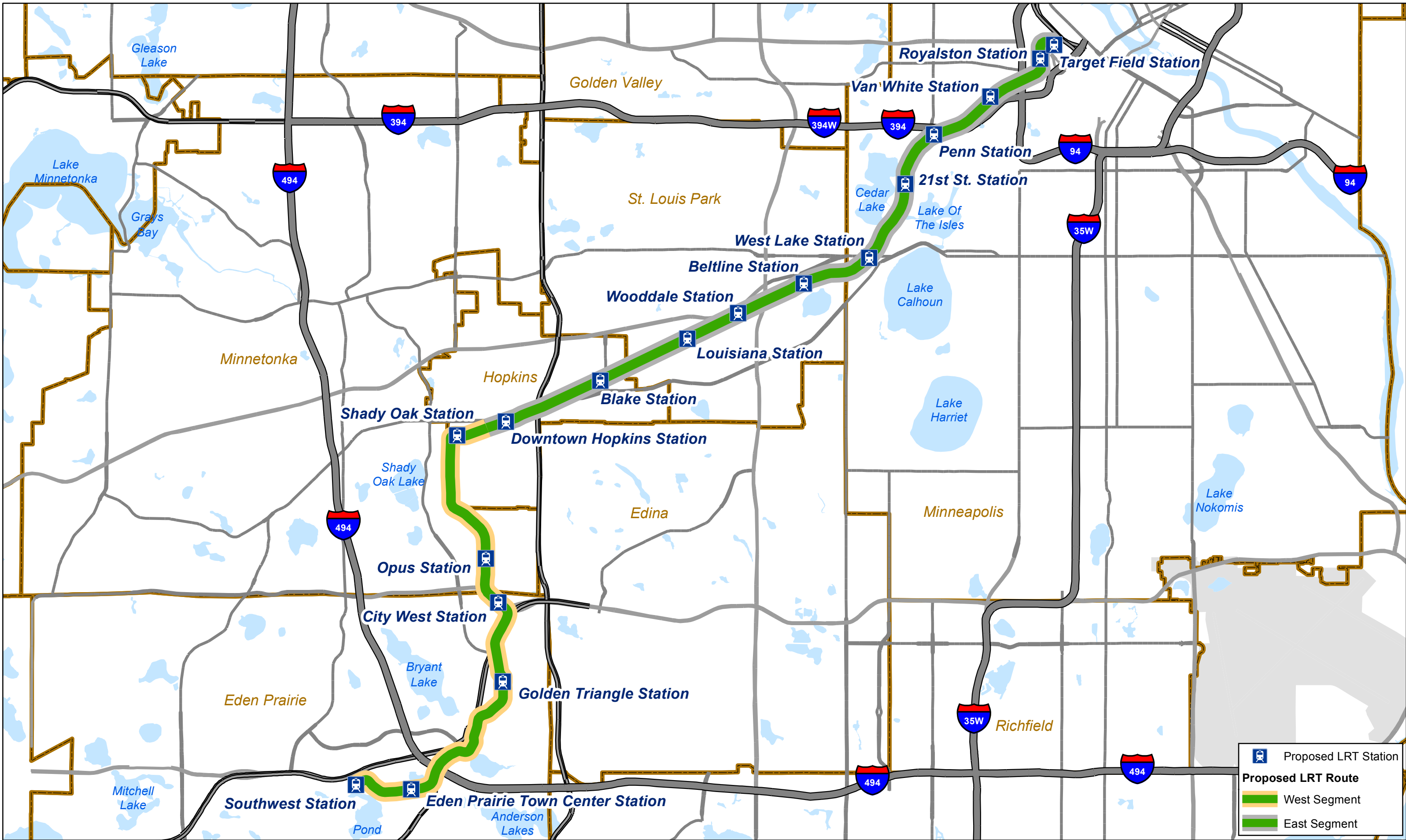


Figure 1. SWLRT Project Study Area

2.0 METHODOLOGY

2.1 Key Intersections and At-Grade Crossings

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

The intersections were analyzed using either VISSIM or SimTraffic microsimulation software. The decision on software program use was based on the location of the intersection and if LRT would either directly cross an intersection or impact the operation of the intersection. The PEC West traffic team was originally provided model files of much of the analysis area in Synchro format and that was the base starting point for the existing and future model scenarios. The Synchro and SimTraffic software packages are commonly used by agencies in Minnesota and provide an accepted methodology for analyzing signalized intersections and corridors. VISSIM models provide the capability of evaluating the impacts of transit movement in the corridor and at intersections (Synchro/SimTraffic does not have this capability)

2.2 Forecast Traffic Volumes

The development of 2040 traffic forecasts for use in the simulation modeling was based on the preliminary 2040 socioeconomic data prepared by local communities and consistent with the Metropolitan Council's Thrive MSP 2040. This data was used as input to the Metropolitan Council's Regional Travel Demand Model. The outputs from the 2040 Regional Travel Demand Model were then compared to existing and historic traffic counts, as well as to the previous 2030 forecast roadway volumes contained in the 2030 Comprehensive Plans of each city and Hennepin County. This information, combined with the expected changes in land use and density, was utilized at a localized level to develop growth rates for each roadway segment within the project area. This information was also reviewed in combination with anticipated developments within each city to determine if different annual growth rates should be applied in calculating the opening year forecast volumes compared to the 2040 forecast volumes. This would be done if, for example, more rapid growth were expected at the beginning or end of the forecast horizon. The growth rates were then applied to existing turning movement counts to generate opening year and 2040 No Build peak hour turning movement forecasts.

Following the development of the baseline No Build forecasts, forecast traffic volumes for the park-and-ride sites were added to produce the Build forecasts. The development of the park-and-ride trip generation rates is documented in the SWLRT technical memorandum *Park-and-Ride Trip Generation* dated August 25, 2014.

Sensitivity testing within the Regional Travel Demand Model showed that the SWLRT alignment would not be expected to significantly reduce traffic volumes on the roadways under study. Therefore, the traffic generated by the park-and-ride sites was added to the No Build forecasts to produce the Build forecasts, without any reduction in forecast traffic volumes due to LRT. This produces a conservative, worst case analysis in terms of the traffic volumes on the roadway network.

2.3 Traffic Analysis Methodology

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

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

The analysis periods included the highest hour of traffic volume during the weekday AM peak period (6-9 AM) and PM peak period (3-7 PM). The AM peak hour was generally identified as 7:30-8:30 AM and the PM peak was generally identified as 4:30-5:30 PM. The Midday volumes were determined to be lower than PM peak hour and were not used in the analysis. There were also no specific traffic generators that impacted the Midday that required analysis.

Table 2.1. Intersection Level of Service Definitions

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

Source: *Highway Capacity Manual 2010*

2.4 Design Criteria and Assumptions

All full access intersections with the LRT guideway, where all vehicular movements are allowed across the guideway, were assumed to be signalized and/or be controlled with automatic gates to provide safe movement of LRT and vehicles. All at-grade roadway/LRT crossings where LRT speeds are expected to exceed 35 miles per hour (mph) were assumed to have automatic gates in accordance with the guidance and standards contained in the *Minnesota Manual on Uniform Traffic Control Devices* (MMUTCD) updated in January 2014. The operation of automatic gates was also based on the standards in the MMUTCD, which includes:

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

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

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

2.5 Measures of Effectiveness

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

The level of service criteria used to identify a project impact were as follows:

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

Most intersections were mitigated to LOS D or better. If the overall intersection is LOS E or F in No Build Condition, the project mitigated the Build to match or be better than the No Build scenario. The criteria used to identify a queue issue were as follows:

- 95th percentile queue length that exceeds storage length, if any of the following are also met:
 - Average back-of-queue exceeds storage length
 - Movement operates at LOS E or LOS F
 - 95th percentile queue blocks upstream full-access intersection(s)

- 95th percentile queue length exceeds 500 feet on a stop-controlled approach

Then, for locations where a queuing issue was identified, the need for mitigation was based on a comparison to the No Build conditions, the severity of the issue, the potential safety/operations implications at the study intersection, and what impacts the queue had on the larger roadway network. Where the need for queue mitigation was identified based on these criteria, improvements were added to the Build modeling and have been incorporated into the SWLRT project. The improvements are listed in Section 5.3, along with all improvements that have been identified as part of the SWLRT project.

3.0 EXISTING CONDITIONS ANALYSIS

The existing conditions models for the West segment were developed to assess the current key intersection operation and validate the simulation models to ground conditions. After calibrating the existing models, they would be used to build future year conditions models. The assumptions, methodology, and results of the existing conditions analysis are presented in the following sections.

3.1 Assumptions

The existing conditions analysis was based on traffic volumes, roadway geometrics, rail crossing treatments, and signal operations as existed in 2013 when the data collection was completed. No improvements were assumed in the existing analysis. The existing peak hour traffic volumes, which are based on the counts conducted in 2013, are provided in **Appendix A**. The geometrics and intersection control for the existing conditions are shown in the intersection layout tables provided in **Appendix B**.

The AM peak hour was assumed to be 7:30-8:30 AM and the PM peak hour was assumed to be 4:30-5:30 PM for all intersections, based on the turning movement data collected within the study area.

3.2 Traffic Modeling Overview and Results

The West study area includes segments in Eden Prairie, Minnetonka, and Hopkins where the SWLRT alignment crosses and/or impacts intersection operation. The intersections analyzed in the existing conditions analysis are detailed in this section. The following corridor areas/segments were analyzed for all alternatives for the West segment of the SWLRT project:

- Southwest Station Area
- Eden Road/Main Street Area
- Flying Cloud Drive Area
- Golden Triangle Area
- Bren Road Area
- Excelsior Boulevard Area

The existing conditions analysis results for each corridor area are presented in the following sections.

3.2.1 Southwest Station Area

The Southwest Station area includes the TH 212 ramp terminals, parts of Mitchell Road and Southwest Station access drives that are impacted by park-and-ride traffic. This area was modeled in Synchro/SimTraffic, as it will not include interaction with the future LRT. The results of the existing AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios. The overall intersection results are shown in **Table 3.1** below.

Table 3.1 Southwest Station Area – Existing Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Mitchell Road / WB TH 5 /TH 212 Ramp	13.9 B	21.9 C
Mitchell Road / EB TH 5 / TH 212 Ramp	7.8 A	11.4 B
Mitchell Road / Lone Oak Road	3.1 A	7.0 A
Mitchell Road / Technology Drive	20.3 C	21.1 C
Technology Drive / Southwest Station Bus Access *	0.5 A	0.4 A
Technology Drive / Southwest Station West Access	1.3 A	1.2 A
Technology Drive / Southwest Station East Access *	7.1 A	9.6 A
Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp)	22.3 C	28.5 C
Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp)	24.9 C	34.3 C
Technology Drive / Prairie Center Drive	18.2 B	26.7 C

* Side street stop controlled intersection

No queuing issues were identified in the existing conditions.

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

3.2.2 Eden Road/Main Street Area

The Eden Road and Main Street area includes a section of Eden Road from Flying Cloud Drive to Main Street and the additional intersection of Singletree Lane and Main Street. The intersection with Flying Cloud Drive is a key intersection for evaluation due to the high volumes on Flying Cloud Drive that may be impacted by future LRT on Eden Road.

The segment of Eden Road was modeled in VISSIM to account for the future LRT interaction. The Main Street and Singletree Lane intersection was modeled in Synchro/SimTraffic as it will not include interaction with the future LRT. The results of the existing AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios. The overall intersection results are shown in **Table 3.2** below.

Table 3.2. Eden/Main Area – Existing Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Main Street / Singletree Lane *	0.9 A	2.5 A
Eden Road / Glen Lane*	0.6 A	2.4 A
Eden Road / Leona Drive / Flying Cloud Drive	9.4 A	19.3 B

* Side street stop controlled intersection

No queuing issues were identified in the existing conditions.

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

3.2.3 Flying Cloud Drive Area

Flying Cloud Drive is a major arterial corridor in Eden Prairie that includes the segment from Valley View Road to Singletree Lane. This segment includes the I-494 ramp terminals.

This area was modeled in VISSIM to account for the future LRT interaction at Viking Drive. The overall intersection results are shown in **Table 3.3** below. The results of the Existing Conditions AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios with the exception of the following:

- Flying Cloud Drive and Valley View Road in the AM peak hour. The area is generally congested, including the TH 212 ramps.

Table 3.3. Flying Cloud Drive Area – Existing Conditions Results

Intersection	Overall Intersection Delay and LOS (s)	
	AM Peak Hour	PM Peak Hour
Flying Cloud Drive / Valley View Road	58.4 E	29.2 C
Flying Cloud Drive / Viking Drive *	3.6 A	20.4 C
Flying Cloud Drive / WB I-494 Ramp	15.4 B	31.4 C
Flying Cloud Drive / EB I-494 Ramp / Technology Drive	9.1 A	19.6 B
Flying Cloud Drive / Eden Road / Leona Drive	9.4 A	19.3 B
Flying Cloud Drive / Singletree Lane	13.3 B	31.1 C

* Side street stop controlled intersection

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

- Flying Cloud Drive and Valley View Road – AM peak hour Southbound left turn; PM peak hour Westbound left turn.
- Flying Cloud Drive and WB I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.

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

3.2.4 Golden Triangle Area

The Golden Triangle area includes intersections that are impacted by the future park-and-ride. The evaluation will compare the impacts of the existing intersection operation to both a future No Build and Build scenario to determine the impacts of changes in traffic.

This area was modeled in Synchro/SimTraffic, as it will not include interaction with the future LRT. The results of the existing AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios. The overall intersection results are shown in **Table 3.4** below.

Table 3.4. Golden Triangle Area – Existing Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Shady Oak Road / Valley View Road *	2.4 A	5.5 A
Shady Oak Road / W 70 th Street *	1.3 A	2.1 A
Shady Oak Road / WB TH 62 Ramp	11.1 B	12.6 B
Shady Oak Road / EB TH 62 Ramp/W 62 nd Street	12.9 B	7.2 A
Shady Oak Road / City West Parkway	21.1 C	21.9 C

* Side street stop controlled intersection

No queuing issues were identified in the existing conditions.

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

3.2.5 Bren Road Area

The Bren Road area includes intersections that area generally yield control and provide access to the Opus Campus.

This area was modeled in VISSIM for consistency with future LRT interaction. The overall intersection results are shown in **Table 3.5** below.

The results of the Existing Conditions AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios with the exception of the following:

- Bren Road East and Red Circle drive in the AM peak hour. This is mainly at the merge point with the unsignalized single lane configuration.

Table 3.5. Bren Road Area – Existing Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Bren Road East / Red Circle Drive +	56.2 F	3.0 A
Bren Road East / Bren Road West +	2.8 A	3.2 A

+ Side street yield controlled intersection

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

- Bren Road East and Red Circle Drive - AM peak hour Eastbound right turn.

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

3.2.6 Excelsior Boulevard Area

The Excelsior Boulevard area includes intersections that may be impacted by the future LRT and park-and-ride.

The Excelsior intersections at Shady Oak and 17th Avenue S were modeled in Synchro/SimTraffic to evaluate the future impacts of a park and ride facility. The intersections on 11th Avenue S were modeled in VISSIM to account for the future interaction of LRT. The results of the existing AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios. The overall intersection results are shown in **Table 3.6** below.

Table 3.6. Excelsior Boulevard Area – Existing Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Excelsior Boulevard / Shady Oak Road	31.6 C	32.3 C
Excelsior Boulevard / 17 th Avenue S	9.3 A	12.4 B
Excelsior Boulevard / 11 th Avenue S	18.5 B	23.1 C
11 th Avenue S / 5 th Street S	8.6 A	13.1 B

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

- Excelsior Boulevard and Shady Oak Road –AM peak hour southbound left turn; PM peak hour Northbound left turn; Southbound left turn.

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

3.3 Existing Conditions Summary

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

- Flying Cloud Drive and Valley View Road (AM peak hour).
- Bren Road East and Red Circle Drive (AM peak hour).

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

- Flying Cloud Drive and Valley View Drive – AM peak hour Southbound left turn; PM peak hour Westbound left turn.
- Flying Cloud Drive and WB I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.
- Bren Road East and Red Circle Drive - AM peak hour Eastbound right turn.
- Excelsior Boulevard and Shady Oak Road –AM peak hour Southbound left turn; PM peak hour Northbound left turn; Southbound left turn.

4.0 NO BUILD ANALYSIS

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

4.1 Assumptions

Opening Year and 2040 forecast peak hour volumes were based on the forecast daily traffic volumes for key roadway segments within the study area. **Table 4.1** shows the existing and forecast daily traffic volumes for the West segment.

Table 4.1 – West Segment Existing and Forecast Daily Traffic Volumes

Roadway	Segment	Existing (2013) Daily Traffic	Opening Year Forecast Daily Traffic	2040 Forecasts	
				2040 Forecast Daily Traffic	2013 to 2040 Annual Growth Rate
Prairie Center Drive	Valley View Road to TH 212 North Ramps	15,600	17,800	24,600	1.7%
	TH 212 South Ramps to Technology Drive	33,000	35,600	44,300	1.1%
	Technology Drive to Singletree Lane	31,500	33,700	41,400	1.0%
	Valley View Road to Flying Cloud Drive	17,500	19,400	25,000	1.3%
Flying Cloud Drive	Fountain Place to Medcom Boulevard	26,000	29,800	39,000	1.5%
	Prairie Center Drive to Middleset Road	22,000	24,600	31,000	1.3%
	Leona Road to Technology Drive	31,400	33,600	40,900	1.0%
	Viking Drive to Prairie Center Drive	20,700	24,000	32,700	1.7%
Valley View Road	Market Place Drive to TH 212 North Ramps	16,200	18,200	24,700	1.6%
	Prairie Center Drive to Smetana Lane	8,400	9,800	13,000	1.6%
	Golden Triangle Drive to Shady Oak Road	5,600	6,500	9,500	2.0%
	Shady Oak Road to TH 169 West Ramps	11,400	12,500	15,800	1.2%
West 78 th Street	Flying Cloud Drive to Prairie Center Drive	5,300	6,500	9,500	2.2%

Table 4.1 – West Segment Existing and Forecast Daily Traffic Volumes

Singletree Lane	Prairie Center Drive to Eden Road	9,600	10,900	15,100	1.7%
Technology Drive	Wallace Road to Mitchell Road	4,100	5,500	9,000	3.0%
	Mitchell Road to Treatment Plant Access	8,100	9,500	13,000	1.8%
	Southwest Park and Ride to Prairie Center Drive	11,900	12,800	15,000	0.9%
	Prairie Center Drive to Flying Cloud Drive	8,800	9,400	11,000	0.8%
Wallace Road	TH 212 North Ramps to TH 212 South Ramps	2,600	3,200	4,800	2.3%
	TH 212 South Ramps to Technology Drive	2,300	3,700	7,000	4.2%
Scenic Heights Road	Tamarack Trail to Mitchell Road	4,250	5,200	7,400	2.1%
Mitchell Road	Martin Road to TH 212 North Ramps	12,000	13,100	15,600	1.0%
	TH 212 North Ramps to Lone Oak Road	19,300	21,700	27,500	1.3%
	Lone Oak Road to Technology Drive	19,200	21,300	26,400	1.2%
	Technology Drive to Anderson Lakes Parkway	14,000	14,800	16,800	0.7%
	Anderson Lakes Parkway to Tamarack Trail	7,100	8,000	10,300	1.4%
Shady Oak Road	Trunk Highway 7 to Lake Street Extension	10,700	12,100	15,600	1.4%
	Main Street to Excelsior Boulevard	10,000	11,800	16,200	1.8%
	Excelsior Boulevard to West 47 th Street	11,300	12,800	16,400	1.4%
	Red Circle Drive to TH 62	17,500	19,800	25,400	1.4%
	TH 62 to City West Parkway	14,400	17,500	25,000	2.1%
	West 70 th Street to Valley View Road	4,700	6,300	10,000	2.8%
Excelsior Boulevard	Church Lane to Shady Oak Road	10,400	11,300	14,100	1.1%
	Shady Oak Road to 20 th Avenue South	16,200	16,600	19,100	0.6%

Table 4.1 – West Segment Existing and Forecast Daily Traffic Volumes

Smetana Road	Shady Oak Road to Beachside Drive	4,300	5,800	9,300	2.9%
	Feltl Court to 11 th Avenue South	4,750	6,200	9,800	2.7%
Bren Road West	Bren Road East to Green Circle Drive	2,800	3,100	3,700	1.0%
Bren Road East	Yellow Circle Drive to Red Circle Drive	6,300	6,500	7,000	0.4%
11 th Avenue South	1 st Street South to Excelsior Boulevard	7,700	7,900	8,400	0.3%
	Excelsior Boulevard to 5 th Street South	15,700	16,100	17,200	0.3%
	5 th Street South to 6 th Street South	10,900	11,200	11,900	0.3%
17 th Avenue South	1st Street South to Excelsior Boulevard	3,200	3,300	3,500	0.3%
5 th Street South	15 th Avenue South to 11 th Avenue South	3,050	3,100	3,300	0.3%

The turning movement volumes for No Build AM and PM peak in the Opening Year and 2040 conditions are provided in **Appendix A**.

The No Build analysis was based on the future year No Build traffic volumes, existing roadway geometrics, and optimized signal operations. This also includes planned/programmed improvements listed below.

- West 70th Street and Shady Oak Road includes an Eastbound right turn lane and Northbound left turn lane.
- Shady Oak Road and Valley View Road includes a Southbound right turn lane and traffic signal (between 2030 and 2040).
- Main Street is extended from Eden Road to Technology Drive between 2020 and 2040 with traffic signal at Main Street and Singletree Lane.

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

4.2 Traffic Modeling Overview and Results

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

4.2.1 Southwest Station Area

The results of the Opening Year No Build AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios.

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

- Technology Drive and Southwest Station East Access Driveway in the PM peak hour. The intersection is signalized and the poor operation is for left turning vehicle delay from the driveway. This is caused by the poorly operating interchange area of TH 212 / TH 5 and Prairie Center Drive. The intersection would operate at LOS B without the congestion and queue spill-back caused by those intersections.
- Prairie Center Drive / Technology Drive (& WB TH 5/TH 212 Ramp) in the PM peak hour has high levels of congestion at the ramp terminals.
- Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp) in the PM peak hour has high levels of congestion at the ramp terminals.
- Prairie Center Drive and Technology Drive in the PM peak hour is a generally congested intersection.

The overall intersection results for Opening Year are shown in **Table 4.1** and the overall intersection results for 2040 are shown in **Table 4.2** below.

Table 4.1. Southwest Station Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Mitchell Road / WB TH 5 /TH 212 Ramp	14.3 B	21.9 C
Mitchell Road / EB TH 5 / TH 212 Ramp	8.5 A	12.0 B
Mitchell Road / Lone Oak Road	4.1 A	7.0 A
Mitchell Road / Technology Drive	24.6 C	28.1 C

Table 4.1. Southwest Station Area – Opening Year No Build Conditions Results (cont.)

Technology Drive / Southwest Station Bus Access *	0.5 A	0.5 A
Technology Drive / Southwest Station West Access	1.4 A	1.3 A
Technology Drive / Southwest Station East Access *	7.3 A	10.5 B
Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp)	23.9 C	36.3 D
Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp)	24.9 C	46.2 D
Technology Drive / Prairie Center Drive	17.5 B	33.4 C

* Side street stop controlled intersection

Table 4.2. Southwest Station Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Mitchell Road / WB TH 5 /TH 212 Ramp	18.5 B	21.8 C
Mitchell Road / EB TH 5 / TH 212 Ramp	12.6 B	13.2 B
Mitchell Road / Lone Oak Road	6.9 A	20.0 B
Mitchell Road / Technology Drive	31.0 C	46.6 D
Technology Drive / Southwest Station Bus Access *	0.7 A	0.7 A
Technology Drive / Southwest Station West Access	1.7 A	17.9 C
Technology Drive / Southwest Station East Access *	9.8 A	66.1 E
Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp)	47.2 D	101.2 F
Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp)	27.1 C	90.1 F
Technology Drive / Prairie Center Drive	19.3 B	68.9 E

* Side street stop controlled intersection

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Mitchell Road and Technology Drive – PM peak hour Eastbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212/Plaza Drive – PM peak hour Westbound left turn.
- Prairie Center Drive and Eastbound TH 5/TH 212/Technology – PM peak hour Northbound left turn and right turn; Southbound left turn, Eastbound left turn.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Mitchell Road and Technology Drive – AM peak hour Southbound left turn; PM peak hour Westbound right turn; Southbound left turn and through lanes; Eastbound left turn.
- Technology Drive and Southwest Station East Drive – PM peak hour Southbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212/Plaza Drive – AM peak hour Eastbound right turn; PM peak hour Eastbound right turn; Southbound through lane and right turn; Westbound left turn and through lane.
- Prairie Center Drive and Eastbound TH 5/TH 212/Technology – PM peak hour Northbound left turn, through lanes and right turn; Eastbound left turn and through lanes; Southbound left turn, through lanes and right turn; Westbound through lane and right turn.
- Prairie Center Drive and Technology Drive – PM peak hour Northbound left turn; Eastbound left turn, through lanes and right turn; and Southbound right turn.

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

4.2.2 Eden Road/Main Street Area

The results of the Opening Year No Build AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios.

The overall intersection results for Opening Year are shown in **Table 4.3** and the overall intersection results for 2040 are shown in **Table 4.4** below.

Table 4.3. Eden / Main Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Main Street / Singletree Lane	1.6 A	5.9 A
Eden Road / Glen Lane *	1.3 A	2.8 A
Eden Road/Leona Drive /Flying Cloud Drive	10.6 B	23.1 C

* Side street stop controlled intersection

Table 4.3. Eden / Main Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Main Street / Singletree Lane	6.2 A	16.6 B
Eden Road / Glen Lane *	1.3 A	7.1 A
Eden Road/Leona Drive /Flying Cloud Drive	11.8 B	25.2 C

* Side street stop controlled intersection

No queuing issues were identified in the Opening Year and 2040 No Build conditions.

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

4.2.3 Flying Cloud Drive Area

The results of the Opening Year No Build AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios.

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

- Flying Cloud Drive and Valley View Road in the AM peak hour is a congested area in the vicinity of TH 212 and along Flying Cloud Drive.

The overall intersection results for Opening Year are shown in **Table 4.5** and the overall intersection results for 2040 are shown in **Table 4.6** below.

Table 4.5. Flying Cloud Drive Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Flying Cloud Drive / Valley View Road	45.0 D	29.4 C
Flying Cloud Drive /Viking Drive *	5.1 A	20.6 C
Flying Cloud Drive / WB I-494 Ramp	17.1 B	26.2 C
Flying Cloud Drive / EB I-494 Ramp/Technology Drive	10.7 B	24.2 C
Flying Cloud Drive / Eden Road/Leona Drive	10.6 B	23.1 C
Flying Cloud Drive / Singletree Lane	13.7 B	32.5 C

* Side street stop controlled intersection

Table 4.6. Flying Cloud Drive Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Flying Cloud Drive / Valley View Road	60.1 E	33.9 C
Flying Cloud Drive /Viking Drive *	16.9 C	26.7 D
Flying Cloud Drive / WB I-494 Ramp	19.2 B	39.2 D
Flying Cloud Drive / EB I-494 Ramp/Technology Drive	13.1 B	28.1 C
Flying Cloud Drive / Eden Road/Leona Drive	11.8 B	25.2 C
Flying Cloud Drive / Singletree Lane	16.7 B	37.2 D

* Side street stop controlled intersection

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes; Southbound left turn; PM peak hour Westbound left turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour Northbound left turn.
- Flying Cloud Drive and Westbound I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Eden Road/Leona Drive – PM peak hour Southbound left turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes; Southbound left turn; PM peak hour Westbound left turn.
- Flying Cloud Drive and Viking Drive – AM peak hour Eastbound through lanes; PM peak hour Westbound right turn.
- Flying Cloud Drive and Westbound I-494 Ramp – AM peak hour Westbound right turn; PM peak hour Westbound right turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour Northbound left turn.
- Flying Cloud Drive and Eden/Leona – PM peak hour Northbound left turn and Eastbound left turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn and through lanes; Westbound left turn and through lanes.

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

4.2.4 Golden Triangle Area

The results of the Opening Year No Build AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios.

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

- Shady Oak Road and Valley View Road in the PM peak hour. This is an unsignalized intersection and the delay from southbound left turning vehicles is the source of the delay.
- Shady Oak Road and West 70th Street in the PM peak hour.

Anticipated growth in the Golden Triangle area causes 2040 No Build conditions to operate poorly. The overall intersection results for Opening Year are shown in **Table 4.7** and the overall intersection results for 2040 are shown in **Table 4.8** below.

Table 4.7. Golden Triangle Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Shady Oak Road / Valley View Road	3.7 A	27.4 D
Shady Oak Road / West 70 th Street *	2.6 A	5.1 A
Shady Oak Road / WB TH 62 Ramp	24.1 C	18.4 B
Shady Oak Road / EB TH 62 Ramp/W 62 nd Street	41.7 D	30.9 C
Shady Oak Road / City West Parkway	16.6 B	18.5 B

* Side street stop controlled intersection

Table 4.8. Golden Triangle Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Shady Oak Road / Valley View Road	13.5 B	62.6 E
Shady Oak Road / West 70 th Street *	10.4 B	200+ F
Shady Oak Road / WB TH 62 Ramp	27.0 C	20.6 C
Shady Oak Road / EB TH 62 Ramp/W 62 nd Street	43.6 D	38.2 D
Shady Oak Road / City West Parkway	30.2 C	25.9 C

* Side street stop controlled intersection

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Shady Oak Drive and Valley View Road – PM peak hour Southbound left turn, through lanes, and right turn.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Shady Oak Drive and West 70th Street – PM peak hour Northbound through lanes; Eastbound left turn.

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

4.2.5 Bren Road Area

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

- Bren Road East and Red Circle Drive in the AM peak hour. This is an unsignalized intersection with yield control and the delay is from merging vehicles from a single lane.

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

- Bren Road East and Red Circle Drive in the AM peak hour. This is an unsignalized intersection with yield control and the delay is from merging vehicles in a single lane.

The overall intersection results for Opening Year are shown in **Table 4.9** and the overall intersection results for 2040 are shown in **Table 4.10** below.

Table 4.9. Bren Road Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Bren Road East / Red Circle Drive +	90.7 F	3.4 A
Bren Road East / Bren Road West +	2.9 A	3.4 A

+ Side street yield controlled intersection

Table 4.10. Bren Road Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Bren Road East / Red Circle Drive +	122.3 F	5.7 A
Bren Road East / Bren Road West +	3.2 A	4.1 A

+ Side street yield controlled intersection

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Bren Road East and Red Circle Drive – AM peak hour Eastbound right turn.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Bren Road East and Red Circle Drive – AM peak hour Eastbound right turn.

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

4.2.6 Excelsior Boulevard Area

The results of the Opening Year No Build AM and PM peak hour analysis showed that all intersections currently operate at LOS D or better during the peak hour scenarios.

The overall intersection results for Opening Year are shown in **Table 4.11** and the overall intersection results for 2040 are shown in **Table 4.12** below.

Table 4.11. Excelsior Boulevard Area – Opening Year No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Excelsior Boulevard / Shady Oak Road	33.2 C	32.8 C
Excelsior Boulevard / 17 th Avenue S	9.4 A	11.3 B
Excelsior Boulevard / 11 th Avenue S	18.8 B	23.3 C
11 th Avenue S / 5 th Street S	8.9 A	13.7 B

Table 4.12. Excelsior Boulevard Area – 2040 No Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Excelsior Boulevard / Shady Oak Road	37.7 D	39.0 D
Excelsior Boulevard / 17 th Avenue S	9.7 A	14.6 B
Excelsior Boulevard / 11 th Avenue S	20.2 C	25.1 C
11 th Avenue S / 5 th Street S	9.6 A	15.1 B

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Excelsior Boulevard and Shady Oak Road – PM peak hour Northbound left turn.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn.

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

4.3 No Build Conditions Summary

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

- Bren Road East and Red Circle Drive (AM peak hour).

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

- Technology Drive and Southwest Station East Driveway (PM peak hour).
- Prairie Center Drive / Technology Drive & WB TH 5/TH 212 Ramp (PM peak hour).
- Prairie Center Drive / Technology Drive & EB TH 5/TH 212 Ramp (PM peak hour).
- Prairie Center Drive and Technology Drive (PM peak hour).
- Flying Cloud Drive and Valley View Road (AM peak hour).

- Shady Oak Road and West 70th Street (PM peak hour).
- Shady Oak Drive and Valley View Road (PM peak hour).
- Bren Road East and Red Circle Drive (AM peak hour).

Movements for which queuing issues were identified in one or more Opening Year No Build scenarios were as follows:

- Mitchell Road and Technology Drive – PM peak hour Eastbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212/Plaza Drive – PM peak hour Westbound left turn.
- Prairie Center Drive and Eastbound TH 5/TH 212/Technology – PM peak hour Northbound left turn and right turn; Southbound left turn, Eastbound left turn.
- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes; Southbound left turn; PM peak hour Westbound left turn.
- Flying Cloud Drive and Westbound I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour Northbound left turn.
- Flying Cloud Drive and Eden Road/Leona Drive.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.
- Bren Road East and Red Circle Drive – AM peak hour Eastbound right turn.
- Excelsior Boulevard and Shady Oak Road – PM peak hour Northbound left turn.

Movements for which queuing issues were identified in one or more 2040 No Build scenarios were as follows:

- Mitchell Road and Technology Drive – AM peak hour southbound left turn; PM peak hour Westbound right turn; Southbound left turn, through lanes; Eastbound left turn.
- Technology and Southwest Station East Drive – PM Southbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212/Plaza Drive – AM peak hour Eastbound right turn; PM peak hour Eastbound right turn; Southbound through lane and right turn; Westbound left turn and through lane.
- Prairie Center Drive and Eastbound TH 5/TH 212/Technology – PM peak hour Northbound left turn, through lanes and right turn; Eastbound left turn and through lanes; Southbound left turn, through lanes, and right turn; Westbound through lane and right turn.
- Prairie Center Drive and Technology Drive – PM peak hour Northbound left turn; Eastbound left turn, through lanes, and right turn; and Southbound right turn.
- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes; Southbound left turn; PM peak hour Westbound right turn.
- Flying Cloud Drive and Viking Drive – AM Eastbound through lanes; PM peak hour Westbound right turn.
- Flying Cloud Drive and Westbound I-494 Ramp – AM peak hour Westbound right turn; PM peak hour Westbound right turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour Northbound left turn.

- Flying Cloud Drive and Eden/Leona – PM peak hour Northbound left turn and Eastbound left turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn and through lanes; Westbound left turn and through lanes.
- Shady Oak Drive and West 70th Street – PM Northbound through lanes; Eastbound left turn.
- Shady Oak Drive and Valley View Road – PM Southbound left turn, through lanes, and right turn.
- Bren Road East and Red Circle Drive – AM peak hour Eastbound right turn.
- Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn.

5.0 BUILD ANALYSIS

The Build modeling was conducted to identify the expected traffic operations at the Opening Year of the SWLRT project and for the forecast horizon year (2040), with the LRT operating. The assumptions, methodology, and results of the Build conditions analysis are presented in the following sections. Several improvements were identified in order to provide LOS D or better operations at all intersections in the Build conditions and to provide safe and efficient traffic and LRT operations. These improvements are incorporated into the scope of the project and included in the Build Traffic Analysis in conjunction with the Intersection Layouts in Appendix B

5.1 Assumptions

Traffic volumes for the Build conditions were based on the same growth forecasts as the No Build conditions. At LRT stations, additional pedestrian volumes were incorporated into the modeling and additional vehicle traffic was added to the roadway network to account for traffic generated by park-and-ride facilities. The control of each of the LRT crossings was identified based on the proximity to the freight rail alignment and adjacent signalized intersections. Traffic signal control also provides the opportunity to implement transit signal priority (TSP) at intersections with no railroad gate control. TSP helps promote more efficient LRT operation by typically providing an early or extended green to LRT and vehicles if there is time available in the signal cycle. TSP is not pre-emption, so LRT will not get an automatic signal, but will instead get some priority for better operation. **Table 5.1** below displays the existing and proposed control of the LRT crossings along the SWLRT alignment.

Table 5.1. West Segment LRT Crossing Treatments

Crossing Location	Existing Control	Build Conditions Control
Eden Road and Main Street	No intersection, road segment	Year of opening is no intersection. 2040 conditions include Traffic Signal with Gates and Pre-empt, no LRT delay
Eden Road and Eden Extension/Redstone Driveway	No intersection	Traffic Signal with Gates and Pre-empt, no LRT delay
Eden Road and Glen Lane	Unsignalized intersection	Side street stop and no north approach
Flying Cloud Drive and Viking Drive	Unsignalized intersection	Traffic Signal with Gates and Pre-empt; no LRT delay
Flying Cloud Drive and EB I-494 Ramp / Technology Drive	Signalized intersection	Traffic Signal with Gates and Pre-empt; no LRT delay
West 70 th Street	Road Segment	LRT at-grade crossing with gates
Bren Road East / Yellow Circle Drive	Reconfigured roadway	LRT at-grade crossing with gates
Bren Road West	Road segment	LRT at-grade crossing with gates
K-Tel Drive	Road segment	LRT at-grade crossing with gates
11 th Avenue South	Road segment	LRT at-grade crossing with gates

Several improvements were identified as part of the scope of the project in order to provide control of the LRT at intersections and to provide adequate facilities for park-and-ride traffic. These project elements were incorporated into the Build conditions modeling and are listed in detail in Section 5.3.

Locally Requested Capital Investments (LRCIs) were also modeled at several locations, based on the improvement projects identified by the local agencies. The projects that were incorporated into the traffic modeling are included in Section 6.0.

Signal phasing was also modified at several locations to provide protected-only turn phasing for turn movements across the tracks and to provide the ability to run track clearance phases where signal preemption was modeled. Signal timing was assumed to be optimized for all traffic signals in the Build conditions.

The Build conditions modeled for each intersection and at-grade crossing, including all intersection control changes, are shown in the intersection layout tables in **Appendix B**.

As previously discussed in Section 2.2, vehicle traffic expected to be generated by the park-and-ride facilities was added to the base No Build volumes to produce the Build conditions peak hour volumes. The location and size of park-and-ride facilities included in the traffic modeling are summarized in **Table 5.2** and were approved by the Metropolitan Council on July 8, 2015. The number of parking spaces analyzed correlate to the estimated demand of the facility. The

difference between the analyzed number of parking spaces and those in the plans would not impact the results of the analysis.

Table 5.2. Park-and-Ride Facility Summary

Location	Number of Parking Spaces Analyzed	Parking Spaces in the Revised Preliminary Design Plans for Municipal Consent
Southwest Station (additional spaces)	450	450
Golden Triangle Station	200	200
City West Station	300	160
Opus Station	60	80
Shady Oak Station	700	700

Additional vehicle and pedestrian volumes generated by the feeder bus network and the pedestrians at each station were also added into the peak hour modeling. The modeled AM and PM peak hour Build turning movement volumes for the Opening Year and 2040 conditions are provided in **Appendix A**.

Park-and-ride trip generation methodology was documented in the Park-and-Ride Trip Generation memorandum dated August 14, 2014. The following is the summary of the trips generated:

- AM Peak hour generates 55.2 trips per 100 parking stalls of which 88 percent are inbound and 12 percent are outbound.
- PM Peak hour generates 51.2 trips per 100 parking stalls of which 16 percent are inbound and 84 percent are outbound.
- Daily trip generation is 297.0 trips per 100 parking spaces.

Park-and-ride direction of approach is documented in the Park-and-Ride Sizing and Location memorandum dated September 30, 2014. The developed direction of approach is summarized below:

Southwest Station Park-and-Ride

SW Station is more complex because of the routing choices given to park-and-ride patrons coming from TH 212 and TH 5. The basic direction of approach is:

- 55 percent from TH 212 and TH 5 west of Mitchell Road (35 percent from TH 212 and 20 percent from TH 5).
- 18 percent on Mitchell Road south of Technology Drive.
- 9 percent on Flying Cloud Drive south of Prairie Center Drive.
- 6 percent on Prairie Center Drive east of Flying Cloud Drive.
- 4 percent on Mitchell Road north of TH 212/TH 5.
- 4 percent local trips within the immediate area.

- 3 percent on Prairie Center Drive north of TH 212/TH 5.
- 1 percent on Technology Drive west of Mitchell Road.

Detailed travel time analysis was completed to determine the routes to/from TH 212 and TH 5. The following were the results:

- TH 5 – AM Peak Hour
 - 95 percent use Prairie Center Drive
 - 5 percent use Mitchell Road
- TH 5 – PM Peak Hour
 - 50 percent use Prairie Center Drive
 - 50 percent use Mitchell Road
- TH 212 – AM Peak Hour
 - 80 percent use Prairie Center Drive
 - 15 percent use Wallace Road
 - 5 percent use Eden Prairie Road
- TH 212 – PM Peak Hour
 - 50 percent use Prairie Center Drive
 - 40 percent use Wallace Road
 - 10 percent use Eden Prairie Road

For the additional 450 parking spaces at Southwest Station, Technology Drive east of Mitchell Road is expected to carry 32 percent of the AM Peak Hour inbound trips (70 trips) and 50 percent of the PM Peak hour outbound trips (100 trips).

Golden Triangle Park-and-Ride

A vast majority of these park-and-ride patrons are destined for TH 169 south of I-494 and therefore a high directionality to the south and east.

- 90 percent would be going to the Shady Oak Road and Valley View Road intersection.
- 10 Percent would be going to the Flying Cloud Drive and Valley View Drive intersection.

City West Station Park-and-Ride

For the United Health Group (UHG) Site adjacent this station, a large-comprehensive traffic study was done for the development including assumptions of a park-and-ride facility. This analysis was completed using the UHG traffic volumes and the assumption of using 300 spaces. This is a conservative analysis since the current project scope approved on July 8, 2015 allows for 160 park-and-ride spaces at the City West Station site.

Opus Station Park-and-Ride

With the small park-and-ride facility at this location, these trips were not generated and added to the system for evaluation.

Shady Oak Station Park-and-Ride

The direction of approach changes from the original work with the removal of Mitchell Station; with more park-and-ride trips coming from the south and west. The direction of approach breaks down:

- 45 percent on Shady Oak Road, north of Excelsior Boulevard.
- 30 percent on Excelsior Boulevard, west of Shady Oak Road.
- 15 percent on Shady Oak Road, south of Excelsior Boulevard.
- 5 percent on 17th Avenue South, north of Excelsior Boulevard.
- 3 percent on 11th Avenue South, south of Excelsior Boulevard.
- 2 percent on 11th Avenue South, north of Excelsior Boulevard.

5.2 Build Traffic Modeling Overview and Results

The same nine modeling areas created for the existing and No Build conditions modeling were used for the Build analysis. All Build improvements are based on the Revised Preliminary Design Plans for Municipal Consent as approved by the Metropolitan Council on July 8, 2015. The Build operations results are presented by modeling area in the following sections.

5.2.1 Southwest Station Area

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

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

- Technology Drive and Southwest Station East Access in the PM peak hour.
- Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp) in the PM peak hour has high levels of congestion at the ramp terminals.
- Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp) in the PM peak hour has high levels of congestion at the ramp terminals.
- Prairie Center Drive and Technology Drive in the PM peak hour is a generally congested intersection.

The overall intersection results for Opening Year are shown in **Table 5.3** and the overall intersection results for 2040 are shown in **Table 5.4** below.

Table 5.3 Southwest Station Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Mitchell Road / WB TH 5 /TH 212 Ramp	14.7 B	22.7 C
Mitchell Road / EB TH 5 / TH 212 Ramp	8.5 A	12.6 B
Mitchell Road / Lone Oak Road	4.4 A	6.8 A
Mitchell Road / Technology Drive	25.3 C	27.4 C
Technology Drive / Southwest Station Bus Access *	0.6 A	0.6 A
Technology Drive / Southwest Station West Access	1.8 A	2.8 A
Technology Drive / Southwest Station East Access *	8.7 A	9.1 A
Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp)	18.7 B	29.8 C
Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp)	24.9 C	35.7 D
Technology Drive / Prairie Center Drive	22.5 C	32.2 C

* Side street stop controlled intersection

Table 5.4. Southwest Station Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Mitchell Road / WB TH 5 /TH 212 Ramp	18.8 B	23.3 C
Mitchell Road / EB TH 5 / TH 212 Ramp	13.1 B	15.2 B
Mitchell Road / Lone Oak Road	7.5 A	23.8 C
Mitchell Road / Technology Drive	32.6 C	51.4 D
Technology Drive / Southwest Station Bus Access *	0.7 A	0.8 A
Technology Drive / Southwest Station West Access	2.7 A	22.8 C

Table 5.4. Southwest Station Area – 2040 Build Conditions Results (cont.)

Technology Drive / Southwest Station East Access *	12.5 B	66.2 E
Prairie Center Drive / Plaza Drive (& WB TH 5/TH 212 Ramp)	20.5 C	91.9 F
Prairie Center Drive / Technology Drive (& EB TH 5/TH 212 Ramp)	30.4 C	68.3 E
Technology Drive / Prairie Center Drive	25.4 C	73.6 E

* Side street stop controlled intersection

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

- Mitchell Road and Technology Drive – AM peak hour Southbound left turn; PM peak hour Eastbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212 Ramp/Plaza Drive – PM peak hour Westbound left turn.
- Prairie Center Drive and Eastbound TH 5/TH 212 Ramp/Technology Drive – PM peak hour Southbound left turn.

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

- Mitchell Road and Technology Drive – AM peak hour Southbound left turn; PM peak hour Southbound left turn and through lanes; Westbound right turn.
- Technology Drive and Southwest Station East Drive – PM peak hour Eastbound through lanes; Southbound left turn lanes.
- Prairie Center Drive and Westbound TH 5/TH 212 Ramp/Plaza Drive – PM peak hour Southbound through lanes and right turn; Westbound left turn and through lanes.
- Prairie Center Drive and Eastbound TH 5/TH 212 Ramp/Technology Drive – PM peak hour Northbound left turn, through lanes, and right turn; Eastbound left turn; Southbound left turn, through lanes and right turn.
- Prairie Center Drive and Technology Drive – AM peak hour Southbound right turn; PM peak hour Northbound left turn; Eastbound left turn, through lanes and right turn; Southbound right turn; Westbound right turn.

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

5.2.2 Eden Road /Main Street Area

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

The overall intersection results for Opening Year are shown in **Table 5.5** and the overall intersection results for 2040 are shown in **Table 5.6** below.

Table 5.5. Eden / Main Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Main Street / Singletree Lane	1.7 A	7.0 A
Eden Road / Eden Extension/Redstone Driveway	19.7 B	23.0 C
Eden Road / Glen Lane	0.9 A	2.3 A
Eden Road/Leona Drive /Flying Cloud Drive	15.8 B	23.8 C

Table 5.6. Eden / Main Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Main Street / Singletree Lane	6.9 A	20.4 C
Eden Road / Main Street	27.5 C	41.7 D
Eden Road / Eden Extension/Redstone Driveway	23.9 C	38.5 D
Eden Road / Glen Lane	1.0 A	5.2 A
Eden Road/Leona Drive /Flying Cloud Drive	19.1 B	27.8 C

No queuing issues were identified in the Opening Year and 2040 Build conditions.

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

5.2.3 Flying Cloud Drive Area

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

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

- Flying Cloud Drive and Valley View Road in the AM peak hour.

The overall intersection results for Opening Year are shown in **Table 5.7** and the overall intersection results for 2040 are shown in **Table 5.8** below.

Table 5.7. Flying Cloud Drive Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Flying Cloud Drive / Valley View Road	48.7 D	30.4 C
Flying Cloud Drive /Viking Drive	18.0 B	15.6 B
Flying Cloud Drive / WB I-494 Ramp	21.5 C	33.1 C
Flying Cloud Drive / EB I-494 Ramp/Technology Drive	20.6 C	32.9 C
Flying Cloud Drive / Eden Road/Leona Drive	15.8 B	23.8 C
Flying Cloud Drive / Singletree Lane	15.4 B	30.6 C

Table 5.8. Flying Cloud Drive Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Flying Cloud Drive / Valley View Road	55.6 E	33.2 C
Flying Cloud Drive /Viking Drive	21.3 C	18.2 B
Flying Cloud Drive / WB I-494 Ramp	25.4 C	51.7 D
Flying Cloud Drive / EB I-494 Ramp/Technology Drive	25.9 C	48.8 D
Flying Cloud Drive / Eden Road/Leona Drive	19.1 B	27.8 C
Flying Cloud Drive / Singletree Lane	18.8 B	40.0 D

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

- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes and Southbound left-turn lane; PM peak hour Westbound left turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour Eastbound left turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.

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

- Flying Cloud Drive and Valley View Road – AM peak hour Westbound left turn; Eastbound through lanes; Southbound left turn; PM peak hour Northbound left turn; Westbound left turn.
- Flying Cloud Drive and Westbound I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – AM peak hour Eastbound left turn; PM peak hour Eastbound left turn and right turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn and through lane; Westbound left turn and through lanes.

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

5.2.4 Golden Triangle Area

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

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

- Shady Oak Road and West 70th Street in the PM peak hour.

The overall intersection results for Opening Year are shown in **Table 5.9** and the overall intersection results for 2040 are shown in **Table 5.10** below.

Table 5.9. Golden Triangle Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Shady Oak Road / Valley View Road	6.9 A	11.6 B
Shady Oak Road / West 70 th Street *	3.8 A	5.4 A
West 70 th Street LRT Grade Crossing	3.5 A	3.4 A
Shady Oak Road / WB TH 62 Ramp	24.4 C	19.0 B
Shady Oak Road / EB TH 62 Ramp/W 62 nd Street	40.7 D	33.1 C
Shady Oak Road / City West Parkway	18.2 B	18.8 B

* Side street stop controlled intersection

Table 5.10. Golden Triangle Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Shady Oak Road / Valley View Road	14.3 B	32.2 C
Shady Oak Road / West 70 th Street *	10.3 B	68.1 F
West 70 th Street LRT Grade Crossing	4.2 A	3.2 A
Shady Oak Road / WB TH 62 Ramp	27.1 C	20.6 C
Shady Oak Road / EB TH 62 Ramp/W 62 nd Street	43.2 D	39.6 D
Shady Oak Road / City West Parkway	31.2 C	25.0 C

* Side street stop controlled intersection

No queuing issues were identified in the Opening Year Build scenarios.

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

- Shady Oak Road and Valley View Road – PM peak hour Southbound left turn.
- West 70th Street and Shady Oak Road – PM peak hour Southbound through lanes.

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

5.2.5 Bren Road Area

The results of the Opening Year Build AM and PM peak hour analysis showed that all intersections would be expected to operate at LOS D or better during the peak hour scenarios. The Bren Road area included several improvements and changes in road operation. This included incorporating the City of Minnetonka's "Red Circle Drive Traffic Flow Reversal" plan (a project to be completed by the City of Minnetonka in conjunction with SWLRT).

The overall intersection results for Opening Year are shown in **Table 5.11** and the overall intersection results for 2040 are shown in **Table 5.12** below.

Table 5.11. Bren Road Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Yellow Circle Drive / Red Circle Drive+	4.0 A	1.6 A
Bren Road East / Yellow Circle Drive LRT Grade Crossing	2.5 A	2.2 A
Yellow Circle Drive / Yellow Circle Drive +	0.0 A	0.0 A
Bren Road East / Bren Road West +	3.0 A	2.5 A
Bren Road West Grade Crossing	3.6 A	3.1 A

+ Side street yield control intersection

Table 5.12. Bren Road Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
Yellow Circle Drive / Red Circle Drive+	5.5 A	2.1 A
Bren Road East / Yellow Circle Drive LRT Grade Crossing	2.6 A	2.3 A
Yellow Circle Drive / Yellow Circle Drive +	0.0 A	0.1 A
Bren Road East / Bren Road West +	3.6 A	2.2 A
Bren Road West Grade Crossing	4.2 A	3.3 A

+ Side street yield control intersection

No queuing issues were identified in the Opening Year and 2040 Build conditions.

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

5.2.6 Excelsior Boulevard Area

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

The overall intersection results for Opening Year are shown in **Table 5.13** and the overall intersection results for 2040 are shown in **Table 5.14** below.

Table 5.13. Excelsior Boulevard Area – Opening Year Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
5 th Street/ K-Tel Drive Crossing	3.3 A	2.7 A
Excelsior Boulevard / Shady Oak Road	34.9 C	32.9 C
Excelsior Boulevard / 17 th Avenue S	11.9 B	17.9 B
Excelsior Boulevard / 11 th Avenue S	19.2 B	23.7 C
11 th Avenue S LRT Grade Crossing	4.1 A	4.7 A
11 th Avenue S / 5 th Street S	9.3 A	14.0 B

Table 5.14. Excelsior Boulevard Area – 2040 Build Conditions Results

Intersection	Overall Intersection Delay (s) and LOS	
	AM Peak Hour	PM Peak Hour
5 th Street/ K-Tel Drive Crossing	2.9 A	2.6 A
Excelsior Boulevard / Shady Oak Road	39.4 D	41.6 D
Excelsior Boulevard / 17 th Avenue S	12.5 B	19.3 B
Excelsior Boulevard / 11 th Avenue S	19.5 B	24.4 C
11 th Avenue S LRT Grade Crossing	4.4 A	5.2 A
11 th Avenue S / 5 th Street S	9.8 A	15.2 B

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

- Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn.
- Excelsior Boulevard and 17th Avenue S – AM peak hour Southbound left turn; PM peak hour Southbound left turn.

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

- Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn; Eastbound left turn.
- Excelsior Boulevard and 17th Avenue S – AM peak hour Southbound left turn; PM peak hour Southbound left turn; Eastbound left turn.

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

5.3 Summary of Improvements

The traffic analysis team tested several scenarios to develop a proposed plan for LRT corridor. The items listed below summarize the improvements and are included in the Intersection Layouts in Appendix B.

Technology Drive / SW Station Bus Access

- Stripe to provide two Southbound lanes at approach

Technology Drive / SW Station West Access

- Convert intersection to full movement (existing is right-in / right-out).
- Add Southbound left-turn lane.
- Add Eastbound left-turn lane.

Technology Drive / SW Station East Access

- Add second Southbound left-turn lane.

Prairie Center Drive / TH 212 WB Ramp / Plaza Drive

- Convert second Eastbound thru lane to a second right-turn lane.
- Add right-turn overlap phase.

Prairie Center Drive / TH 212 EB Ramp / Technology Drive

- Add second Westbound right-turn lane with overlap phase.

Prairie Center Drive / Technology Drive

- Add second Eastbound right-turn lane with overlap phase.

Singletree Lane / Main Street

- LRCI for 2040 – Main Street from Singletree Lane to Eden Road.
- With Main Street extension to Technology Drive (future City project), Northbound and Southbound approaches should have two lanes of approach and intersection controlled by traffic signal.

Eden Road / Main Street

- LRCI for 2040 - New intersection.
- With Main Street extension to Technology Drive (future City project), one lane of approach for each direction and intersection would be controlled by traffic signal with Right-Turn-On-Red restricted for westbound right-turn movement.

Eden Road / Eden Road Extension/Redstone Driveway

- New signalized intersection with Redstone West Access.

Eden Road / Glen Road

- Convert intersection to a “T” configuration with side street stop with closure of Redstone Driveway.

Flying Cloud Drive (north-south roadway) / Viking Drive

- Add traffic signal.
- Add Eastbound left-turn lane.
- Re-configure Westbound lane assignment to an exclusive left-turn lane and a shared thru/right-turn lane.
- Right-Turn-On-Red restricted for Southbound and Eastbound right-turn movements.

Flying Cloud Drive / I-494 EB Ramp / Technology Drive

- Add second Northbound left-turn lane.
- Add Eastbound left-turn lane.

- Add Eastbound right-turn lane.
- Right-Turn-On-Red restricted for Southbound and Eastbound right-turn movements.

Flying Cloud Drive / I-494 WB Ramp

- Lengthen ramp shared left/right-turn lane.

Shady Oak Road / West 70th Street

- City project add eastbound right-turn lane.
- Add northbound left-turn lane and All-Way Stop control for 2040 analysis.

Shady Oak Road / Valley View Road

- Add All-Way Stop for opening year.
- City project adds southbound left turn lane and traffic signal (or roundabout) between opening year and 2040.

5th Street / K-Tel Drive / 17th Avenue S

- New signalized intersection (LRCI).

Excelsior Boulevard / 17th Avenue S

- Add Eastbound right-turn lane.
- Add Eastbound left-turn lane.
- Add Northbound approach (left turn lane and thru-right lane).
- Reconfigure Southbound approach to a left turn lane and thru-right lane.

5.4 Build Conditions Summary

The SWLRT traffic analysis goal was to mitigate all intersections to LOS D or better in the project area. The exceptions would be when No Build scenarios are either LOS E or F where the goal is to mitigate the intersections to meet the No Build scenario.

For the build conditions in the Opening Year AM and PM peak hours, all intersections would be expected to operate at LOS D or better. This includes any proposed operational and geometric changes incorporated into the PE Plans. The 2040 Build conditions resulted in improvements to the No Build operation based on the goal of mitigating to LOS D or meeting/exceeding the No Build LOS. All intersections would be expected to operate at LOS D or better in the 2040 Build AM and PM peak conditions, with the following exceptions:

- Technology Drive and Southwest Station East Driveway (PM peak hour).
- Technology Drive and Prairie Center Drive (PM peak hour).

- Prairie Center Drive / Technology Drive & EB TH 5/TH 212 Ramp (PM peak hour).
- Flying Cloud Drive and Valley View Road (AM peak hour).
- Shady Oak Road and West 70th Street (PM peak hour).

Overall, there are fewer failing intersections in the Build conditions than in the No Build conditions due to the improvements made as part of the SWLRT project. The intersections on Technology Drive and Prairie Center Drive experience congestion during the AM and PM peak hours during the existing and future No Build scenarios. The Flying Cloud Drive and Valley View Road intersection is also in a high congestion area under existing and No Build conditions. The Shady Oak and West 70th Street is primarily impacted by the park-and-ride traffic and increase in volumes caused by 2040 projected land use intensification. Movements for which queuing issues were identified in one or more Opening Year Build scenarios were as follows:

- Mitchell Road and Technology Drive – AM peak hour Southbound left turn; PM peak hour Eastbound left turn.
- Prairie Center Drive and Westbound TH 5/TH 212 Ramp/Plaza Drive – PM peak hour Westbound left turn.
- Prairie Center Drive and Eastbound TH 5/TH 212 Ramp/Technology Drive – PM peak hour Eastbound left turn.
- Prairie Center Drive and Technology Drive – PM peak hour Westbound left turn.
- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes and Southbound left turn lane; PM peak hour Westbound left turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – PM peak hour eastbound left turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn; Westbound left turn and through lanes.
- Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn.
- Excelsior Boulevard and 17th Avenue S – AM peak hour Southbound left turn; PM peak hour Southbound left turn.

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

- Mitchell Road and Technology Drive – AM peak hour Southbound left turn; PM peak hour Southbound left turn and through lanes; Westbound right turn.
- Technology Drive and Southwest Station East Drive – PM peak hour Southbound left turn lanes; Eastbound through lanes.
- Prairie Center Drive and Westbound TH 5/TH 212 Ramp/Plaza Drive – PM peak hour Southbound through lanes and right turn; Westbound left turn and through lanes.
- Prairie Center Drive and Eastbound TH 5/TH 212 Ramp/Technology Drive – AM peak hour southbound right turn; PM peak hour Northbound left turn, through lanes, and right turn; Eastbound left turn; Southbound left turn, through lanes and right turn.
- Prairie Center Drive and Technology Drive – AM peak hour Southbound right turn; PM peak hour Northbound left turn; Eastbound left turn, through lanes and right turn; Southbound right turn; Westbound right turn.

- Flying Cloud Drive and Valley View Road – AM peak hour Eastbound through lanes; Westbound right turn; Eastbound through lanes; Southbound left turn; PM peak hour Northbound left turn; Westbound left turn.
- Flying Cloud Drive and Westbound I-494 Ramp – PM peak hour Westbound right turn.
- Flying Cloud Drive and Eastbound I-494 Ramp/Technology Drive – AM peak hour Eastbound left turn; PM peak hour Eastbound left turn and right turn.
- Flying Cloud Drive and Singletree Lane – PM peak hour Eastbound left turn and through lane; Westbound left turn and through lanes.
- Shady Oak Road and Valley View Road – PM peak hour Southbound left turn.
- West 70th Street and Shady Oak Road – PM peak hour Southbound through lanes. Excelsior Boulevard and Shady Oak Road – AM peak hour Southbound left turn; PM peak hour Northbound left turn; Eastbound left turn.
- Excelsior Boulevard and 17th Avenue S – AM peak hour Southbound left turn; PM peak hour Southbound left turn; Eastbound left turn.

6.0 SENSITIVITY TESTING

In addition to the Build modeling completed for the project, several additional scenarios were modeled for the purposes of sensitivity testing and to document the operations of alternatives. These additional analyses were conducted for the 2040 Build conditions only. The following sections present the assumptions and analysis results for the modeling of the alternative scenarios.

6.1 Locally Requested Capital Investment (LRCI) Analysis

LRCI improvements requested and funded by the local agencies were incorporated into the modeling of the Build scenarios presented in Section 5. The LRCI projects included the following improvements:

- LRCI #01 in Eden Prairie - Build Main Street from Singletree Lane to Eden Road.
- LRCI #12 in Hopkins/Minnetonka - 17th Avenue extension to K-Tel Drive includes new intersection of 17th Avenue S/5th Street S and K-Tel Drive.

LRCI #01 results in changes in volumes that are small and did not impact the measures of effectiveness results when incorporated into the models.

LRCI #12 results in a new intersection of 17th Avenue S / 5th Street S / K-Tel Drive. A traffic signal is proposed as a safety improvement based on the proximity of the LRT crossing to the new intersection, since it would be within 200 feet of the intersection. The intersection was modeled with one lane on each approach to the intersection and would result in acceptable LOS. This LRCI would also reduce the number of trips going through the Excelsior Boulevard intersections of 17th Avenue S and Shady Oak Road. This includes 15 percent of the park-and-ride trip generation.

6.2 Operations and Maintenance Facility (OMF)

A traffic/trip generation analysis was completed for a potential operations and maintenance facility (OMF) located in the southwest quadrant of the K-Tel Drive and 15th Avenue S intersection in City of Hopkins. The main objective of this analysis was to determine the existing trip generation of the existing land uses removed by the construction of the OMF and compare that to the trip generation of the proposed OMF. A traffic analysis would be completed if the OMF generated more than the existing land uses.

The existing buildings have been identified as an industrial park type land use. A trip generation estimate for the existing industrial park land uses was completed using the *ITE Trip Generation Manual, Ninth Edition*. This estimate assumed that all existing industrial park buildings would be fully occupied, with a total of 223,000 square feet. The trip generation for the proposed OMF was assumed to be similar to the trip generation of the existing OMF in Minneapolis, located along Franklin Avenue between MN 55 (Hiawatha Avenue) and I-94, currently operating for the Blue Line LRT. Data for the Minneapolis OMF was collected the week of July 29, 2013 over two full days.

A comparison between the existing industrial park land use and the proposed OMF facility is shown in Table 5.15. The OMF peak arrival and departure times occur prior to the adjacent street AM and PM peak hours of 7:30 AM to 8:30 AM and 4:30 PM to 5:30 PM. The OMF peak hours occurred at approximately 5:15 AM to 6:15 AM and 1:15 PM to 2:15 PM. Therefore, the comparison of the AM and PM peak for both the generator and of the adjacent street times was completed.

Table 5.15 Trip Generation Estimates –Adjacent Developments

Land Use Type (ITE Code)	Size	AM Peak Hour Trips		PM Peak Hour Trips		Daily Trips
		In	Out	In	Out	
Existing Industrial Park						
Industrial Park (130) – Adjacent Street Peak Hour (7:30AM - 8:30 AM and 4:30 PM - 5:30 PM)	223,000 SF	150	33	40	150	1,523
Industrial Park (130) – AM and PM Peak Generator (Typically similar to adjacent street peak hour)	223,000 SF	155	23	39	148	1,523
Proposed Hopkins OMF						
Operations Maintenance Facility – Adjacent Street Peak Hour (7:30 AM - 8:30 AM and 4:30 PM - 5:30 PM)	--	16	6	7	16	650
Operations Maintenance Facility – AM and PM Peak Generator (5:15 AM – 6:15 AM and 1:15 PM – 2:15 PM)	--	45	12	22	41	650
Trip Generation Comparison						
Adjacent Street Peak Hour		(134)	(27)	(33)	(134)	(873)
AM and PM Peak Generator		(110)	(11)	(17)	(107)	(873)

Based on the findings of the trip generation comparison, it is expected that during the adjacent street peak hours the OMF will generate 161 fewer AM peak hour, 177 fewer PM peak hour, and 873 fewer daily trips.

From the trip generation comparison results, it was determined that the proposed OMF facility is expected to generate significantly fewer trips than the existing land use and therefore a full traffic impact analysis is not needed for the OMF.

7.0 SUMMARY AND CONCLUSION

This technical memorandum has been prepared in support of the SWLRT project preliminary engineering (PE) design and the Final Environmental Impact Statement (FEIS). The objective of the traffic analysis is to define the scope of the project improvements and evaluate the project's potential traffic impacts of the project, including the following:

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

The West segment of the SWLRT analysis includes all intersections and at-grade crossings from SouthWest Station in Eden Prairie to east of 11th Ave in Hopkins. The proposed SWLRT guideway will be at-grade for most of its alignment and includes segments with the LRT operating in an exclusive guideway and semi-exclusive street running operation.

The overall impact of the LRT crossings on the roadway systems has been mitigated by the roadway improvements at several locations in the corridor. This includes targeted intersection improvements that will improve overall intersection operation with the introduction of LRT in the corridor

Appendix A – Existing and Forecast Traffic Volumes

AM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			AM			AM			AM			AM			AM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
1	Mitchell Road & WB TH 5 / TH 212 Ramp ¹	NB	110	405	-	128	458	-	129	459	-	170	585	-	170	590	-
		WB	368	2	199	424	1	204	424	1	204	560	0	215	560	0	215
		SB	-	480	44	-	548	47	-	557	47	-	710	55	-	720	55
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Mitchell Road & EB TH 5 / TH 212 Ramp ¹	NB	-	442	388	-	502	447	-	504	447	-	645	590	-	650	590
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	150	698	-	172	800	-	172	809	-	225	1045	-	225	1055	-
		EB	73	8	161	84	6	225	84	6	227	110	0	380	110	0	385
3	Mitchell Road & Lone Oak Road ¹	NB	54	812	-	54	914	-	54	916	-	55	1160	-	55	1165	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	801	58	-	952	73	-	963	73	-	1315	110	-	1330	110
		EB	18	-	22	35	-	23	35	-	23	75	-	25	75	-	25
4	Mitchell Road & Technology Drive ¹	NB	85	781	135	88	854	147	88	854	191	95	1030	175	95	1030	220
		WB	33	32	63	42	43	84	49	46	86	65	70	135	75	75	140
		SB	295	401	127	377	452	146	388	452	146	575	575	190	590	575	190
		EB	22	68	40	30	144	55	30	158	55	50	325	90	50	340	90
5	Technology Drive / Southwest Station Bus Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	447	10	-	536	10	-	548	10	-	750	10	-	765	10
		SB	5	-	5	5	-	5	5	-	5	5	-	5	5	-	5
		EB	10	302	-	10	318	-	10	387	-	10	355	-	10	425	-
6	Technology Drive & Southwest Station West Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	422	17	-	510	18	-	510	169	-	720	25	-	725	175
		SB	-	-	25	-	-	26	18	-	38	-	-	30	20	-	40
		EB	-	302	-	-	318	-	69	318	-	-	355	-	70	355	-
7	Technology Drive & Southwest Station East Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	436	315	-	524	316	-	675	316	-	740	340	-	890	340
		SB	77	-	3	79	-	4	79	-	4	100	-	5	100	-	5
		EB	138	164	-	145	173	-	145	173	-	165	190	-	165	190	-
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive ¹	NB	227	265	143	247	300	154	247	300	154	315	420	190	315	420	190
		WB	88	56	27	93	59	29	93	59	29	110	70	40	110	70	40
		SB	7	319	33	8	365	38	8	382	38	10	505	55	10	525	55
		EB	96	45	698	109	46	765	109	46	765	150	55	965	150	55	965
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive ¹	NB	148	382	79	151	415	81	151	415	81	165	535	90	165	505	90
		WB	-	-	-	69	26	97	79	26	97	75	30	125	85	30	155
		SB	157	827	121	173	909	141	173	926	141	220	1155	205	220	1175	205
		EB	196	-	325	189	210	346	189	210	406	265	255	410	265	255	515
10	Prairie Center Drive & Technology Drive ¹	NB	222	464	52	251	498	54	330	498	54	330	620	60	410	590	60
		WB	10	8	9	10	9	9	10	9	9	10	10	10	10	10	10
		SB	50	648	521	53	691	580	53	691	667	70	830	740	70	880	825
		EB	136	25	80	140	26	86	140	26	96	160	30	100	160	30	110

AM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			AM			AM			AM			AM			AM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
11	Main Street & Singletree Lane ¹	NB	11	1	22	12	11	24	12	11	24	15	35	30	15	35	30
		WB	28	99	11	30	100	14	30	100	14	40	140	20	40	140	20
		SB	11	-	6	20	16	24	20	16	24	40	55	55	30	55	30
		EB	-	161	22	11	172	26	11	173	26	35	220	35	100	220	35
12	Eden Road & Main Street	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	125	20
		WB	-	-	-	-	-	-	-	-	-	-	-	-	75	-	15
		SB	-	-	-	-	-	-	-	-	-	-	-	-	40	90	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Eden Road & Eden Road Extension / Redstone Driveway	NB	2	47	-	5	10	20	0	25	50	5	10	25	20	15	25
		WB	-	-	-	25	45	5	65	0	10	45	65	10	45	60	15
		SB	-	51	-	5	5	5	10	20	0	5	5	5	10	10	10
		EB	-	-	32	5	35	15	0	0	0	5	40	10	10	35	15
14	Eden Road & Glen Lane	NB	2	1	9	5	5	10	5	-	10	5	5	15	5	-	15
		WB	38	49	3	40	65	5	40	70	-	45	110	5	45	115	-
		SB	1	-	-	5	5	5	-	-	-	5	5	5	-	-	-
		EB	-	44	3	5	50	5	-	55	5	5	60	5	-	65	5
15	Flying Cloud Drive & Valley View Road	NB	325	612	120	365	697	148	365	697	148	485	915	220	485	915	220
		WB	45	350	223	56	376	239	56	376	239	85	470	280	85	470	280
		SB	244	20	31	274	24	32	274	24	32	345	40	35	345	40	35
		EB	83	754	450	85	835	519	85	835	519	95	1100	700	95	1100	700
16	Flying Cloud Drive & Viking Drive	NB	9	998	110	9	1141	118	9	1141	118	10	1520	145	10	1520	145
		WB	47	1	36	49	2	42	49	2	42	60	5	60	60	5	60
		SB	42	468	5	49	544	6	49	544	6	70	745	10	70	745	10
		EB	23	7	30	27	8	31	27	8	31	40	10	35	40	10	35
17	Flying Cloud Drive & WB I-494 Ramp	NB	-	1101	-	-	1207	-	-	1207	-	-	1485	-	-	1485	-
		WB	455	-	16	467	-	61	467	-	61	525	-	190	525	-	190
		SB	-	545	-	-	624	-	-	624	-	-	840	-	-	840	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	53	1018	343	56	1101	366	56	1101	366	75	1320	445	75	1310	445
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	13	791	196	17	844	230	17	844	230	25	1025	315	25	1025	315
		EB	83	68	93	106	85	97	106	85	97	165	135	120	175	135	120
19	Flying Cloud Drive & Eden Road / Leona Road	NB	16	1266	58	25	1363	79	25	1363	79	45	1640	135	45	1630	135
		WB	24	12	102	36	20	110	36	20	110	65	35	140	65	35	140
		SB	70	752	62	70	807	65	70	807	65	70	995	80	70	995	80
		EB	46	3	5	50	5	10	50	5	10	60	5	15	60	5	15
20	Flying Cloud Drive & Singletree Lane	NB	28	1169	22	33	1288	27	33	1288	27	40	1585	30	50	1585	30
		WB	6	28	32	7	35	34	7	35	34	10	45	50	10	45	50
		SB	33	602	95	35	662	112	35	662	112	50	805	180	50	805	180
		EB	99	50	6	108	59	7	108	60	7	150	80	10	140	80	10

AM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			AM			AM			AM			AM			AM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
21	Shady Oak Road & Valley View Road ¹	NB	1	1	2	1	1	3	1	1	3	5	5	5	5	5	5
		WB	2	309	258	3	321	285	3	321	369	5	395	345	5	395	430
		SB	103	1	81	159	2	101	169	2	102	295	5	155	305	5	155
		EB	33	93	12	45	110	14	50	110	14	80	175	20	85	175	20
22	W 70th Street & Shady Oak Road ¹	NB	43	218	-	55	241	-	144	241	-	65	315	-	155	315	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	211	58	-	212	89	-	212	89	-	245	150	-	245	150
		EB	9	-	5	93	-	65	93	-	76	275	-	185	275	-	195
23	70th Street LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	146	-	-	-	-	-	252	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	171	-	-	-	-	-	518	-
24	Shady Oak Road & WB TH 62 Ramp ¹	NB	108	1073	-	138	1152	-	138	1152	-	210	1340	-	210	1340	-
		WB	87	1	441	266	2	455	266	2	455	695	5	490	695	5	490
		SB	-	599	110	-	702	117	-	702	117	-	950	135	-	950	135
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street ¹	NB	-	713	7	-	789	60	-	789	60	-	970	190	-	970	190
		WB	4	-	24	10	-	52	10	-	52	25	-	120	25	-	120
		SB	12	405	-	213	477	-	213	477	-	695	650	-	695	650	-
		EB	547	13	410	593	136	471	593	136	471	705	430	615	705	430	615
26	Shady Oak Road & City West Parkway ¹	NB	76	509	4	79	586	225	79	586	225	85	770	755	85	770	755
		WB	13	10	66	30	10	114	30	10	114	70	10	230	70	10	230
		SB	112	547	160	191	601	166	191	601	166	380	730	180	380	730	180
		EB	145	11	71	149	12	74	149	12	74	160	15	80	160	15	80
27	Bren Road East / Red Circle Drive ²	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	293	-	-	336	-	-	336	-	-	440	-	-	440	-
		EB	-	-	796	-	-	844	-	-	844	-	-	960	-	-	960
28	Yellow Circle Drive / Red Circle Drive ³	NB	-	-	-	-	-	-	510	-	-	-	-	-	680	-	-
		WB	-	-	-	-	-	-	-	65	-	-	-	-	-	80	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Bren Road East / Yellow Circle Drive LRT Grade Crossing ³	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	65	-	-	-	-	-	80	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	600	-	-	-	-	-	800	-
30	Yellow Circle Drive / Yellow Circle Drive ³	NB	-	-	-	-	-	-	5	-	-	-	-	-	10	-	-
		WB	-	-	-	-	-	-	35	60	-	-	-	-	40	70	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			AM			AM			AM			AM			AM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
31	Bren Road East / Bren Road West	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	80	313	-	90	352	-	90	352	-	115	445	-	115	445	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	213	-	-	246	-	-	246	-	-	325	-	-	325	-
32	Bren Road West LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	350	-	-	-	-	-	520	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	5th Street S / K-Tel Drive LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	171	-	-	-	-	-	220	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	52	-	-	-	-	-	65	-
34	Excelsior Boulevard & Shady Oak Road ¹	NB	51	196	172	62	216	173	62	216	223	90	260	195	90	260	245
		WB	196	187	83	200	188	90	207	202	111	235	205	110	245	220	130
		SB	189	461	44	205	540	53	358	540	53	250	715	70	405	715	70
		EB	64	475	139	64	481	175	64	582	175	60	535	260	60	635	260
35	Excelsior Boulevard & 17th Avenue S ¹	NB	-	-	-	-	-	-	42	3	2	-	-	-	42	5	5
		WB	-	431	105	-	444	108	16	444	108	-	495	115	20	495	115
		SB	90	-	34	93	-	34	93	18	34	100	-	55	100	20	55
		EB	66	770	-	67	792	-	67	792	304	95	885	-	95	885	305
36	Excelsior Boulevard & 11th Avenue S	NB	138	66	230	146	69	231	155	69	231	185	75	225	185	75	225
		WB	211	351	54	212	357	54	212	357	54	215	370	55	215	370	55
		SB	73	77	47	74	79	49	74	79	56	75	85	55	75	85	60
		EB	80	583	197	83	594	208	84	594	209	95	640	250	100	640	250
37	11th Avenue S LRT Grade Crossing	NB	-	-	-	-	-	-	-	446	-	-	-	-	-	475	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		SB	-	-	-	-	-	-	-	499	-	-	-	-	-	535	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	11th Avenue S & 5th Street S	NB	42	398	-	62	411	-	62	420	-	125	460	-	135	460	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	375	110	-	390	109	-	391	109	-	460	90	-	460	90
		EB	35	-	11	35	-	17	35	-	17	25	-	40	25	-	40

Analysis Notes:

All intersections modeled in VISSIM unless otherwise noted

¹ - Intersection noted in Synchro/SimTraffic Software

² - Analysis of only Existing and No Build conditions. With Red Circle Drive traffic flow reversal intersection converted from merge control to diverging roadways with no delay.

³ - Analysis of only LRT build conditions. With Red Circle Drive traffic flow reversal this is a new intersection with merge or stop control in close proximity to the LRT crossing.

PM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			PM			PM			PM			PM			PM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
1	Mitchell Road & WB TH 5 / TH 212 Ramp ¹	NB	204	542	-	232	603	-	250	611	-	300	750	-	315	760	-
		WB	339	3	197	416	4	200	416	4	200	600	5	205	600	5	205
		SB	-	613	65	-	672	66	-	674	66	-	815	65	-	820	65
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Mitchell Road & EB TH 5 / TH 212 Ramp ¹	NB	-	654	411	-	729	466	-	755	466	-	910	600	-	935	600
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	195	757	-	221	867	-	221	869	-	285	1130	-	285	1135	-
		EB	92	2	172	106	3	190	106	3	193	140	5	235	140	5	235
3	Mitchell Road & Lone Oak Road ¹	NB	32	983	-	34	1092	-	34	1182	-	40	1355	-	40	1380	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	921	8	-	1037	20	-	1042	20	-	1315	50	-	1320	50
		EB	82	-	44	103	-	46	103	-	46	155	-	50	155	-	50
4	Mitchell Road & Technology Drive ¹	NB	33	509	63	42	521	77	42	521	85	65	550	110	65	550	115
		WB	179	77	381	215	169	449	257	200	475	300	390	615	340	420	640
		SB	97	829	39	120	900	63	125	900	63	175	1070	120	180	1070	120
		EB	125	36	71	156	47	75	156	52	75	230	75	85	230	80	85
5	Technology Drive / Southwest Station Bus Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	428	5	-	513	5	-	612	5	-	705	5	-	805	5
		SB	10	-	10	10	-	10	10	-	10	10	-	10	10	-	10
		EB	5	385	-	5	486	-	5	506	-	5	730	-	5	750	-
6	Technology Drive & Southwest Station West Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	353	28	-	432	30	-	432	45	-	610	55	-	610	75
		SB	-	-	75	-	-	81	96	-	180	-	-	95	-	-	195
		EB	-	385	-	-	486	-	20	486	-	-	730	-	20	730	-
7	Technology Drive & Southwest Station East Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	210	205	-	282	206	-	297	206	-	425	240	-	445	240
		SB	376	-	171	382	-	180	382	-	180	435	-	240	435	-	240
		EB	59	326	-	63	423	-	63	582	-	95	635	-	95	735	-
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive ¹	NB	785	589	189	859	667	200	889	682	200	1085	930	245	1150	950	245
		WB	177	178	26	187	189	29	187	189	29	225	230	40	225	230	40
		SB	11	602	152	12	685	173	12	685	173	15	940	240	15	940	240
		EB	81	63	537	92	67	582	92	67	582	130	80	720	130	80	720
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive ¹	NB	324	991	160	371	1089	169	371	1134	179	500	1415	190	500	1500	200
		WB	-	-	-	110	168	442	110	168	442	110	155	610	110	155	610
		SB	148	1006	162	165	1100	189	165	1100	189	215	1395	275	265	1345	275
		EB	187	-	510	195	204	564	195	204	574	235	255	725	235	255	740
10	Prairie Center Drive & Technology Drive ¹	NB	144	1092	8	163	1162	9	178	1162	9	210	1420	10	225	1460	10
		WB	60	18	55	60	20	64	60	20	64	65	25	90	65	25	90
		SB	25	1348	253	26	1443	305	26	1443	315	35	1765	430	35	1720	440
		EB	328	7	367	403	8	394	458	8	464	595	10	465	650	10	535

PM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			PM			PM			PM			PM			PM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
11	Main Street & Singletree Lane ¹	NB	58	8	70	69	51	78	69	51	78	95	155	100	95	155	100
		WB	96	363	56	112	384	85	112	384	85	140	490	145	140	490	105
		SB	20	-	17	26	28	34	26	28	34	65	95	75	75	95	130
		EB	30	425	99	61	444	113	61	444	113	140	560	145	100	560	145
12	Eden Road & Main Street	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	380	40
		WB	-	-	-	-	-	-	-	-	-	-	-	-	120	-	40
		SB	-	-	-	-	-	-	-	-	-	-	-	-	60	160	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Eden Road & Eden Road Extension / Redstone Driveway	NB	5	100	-	10	10	60	0	35	80	15	10	120	15	20	120
		WB	-	-	-	90	90	10	175	0	70	185	140	20	185	135	85
		SB	-	120	1	10	5	5	20	20	0	10	10	5	20	15	10
		EB	5	-	62	10	30	10	0	0	0	10	55	30	15	55	30
14	Eden Road & Glen Lane	NB	5	9	90	10	10	95	10	-	100	10	10	150	10	-	150
		WB	153	115	54	150	175	60	150	235	-	180	330	65	180	395	-
		SB	4	3	1	10	5	5	-	-	-	10	5	5	-	-	-
		EB	5	68	32	5	90	5	-	95	5	5	130	50	-	145	50
15	Flying Cloud Drive & Valley View Road	NB	320	455	34	366	518	43	366	518	43	505	695	65	505	695	65
		WB	156	844	241	195	921	263	195	921	263	290	1170	320	290	1170	320
		SB	42	40	11	47	46	11	47	46	11	60	60	15	60	60	15
		EB	105	633	912	105	697	1031	105	697	1031	115	905	1365	115	905	1365
16	Flying Cloud Drive & Viking Drive	NB	16	748	60	17	856	61	17	856	61	20	1165	70	20	1165	70
		WB	66	3	54	67	4	63	67	4	63	75	5	90	75	5	90
		SB	34	1063	11	40	1218	14	40	1218	14	60	1635	20	60	1635	20
		EB	7	1	7	8	2	8	8	2	8	10	5	10	10	5	10
17	Flying Cloud Drive & WB I-494 Ramp	NB	-	804	-	-	870	-	-	870	-	-	1065	-	-	1065	-
		WB	700	-	20	722	-	64	722	-	64	835	-	190	835	-	190
		SB	-	1136	-	-	1293	-	-	1293	-	-	1720	-	-	1720	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	190	729	315	199	779	331	199	779	331	230	925	400	230	925	400
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	25	1496	315	30	1610	375	30	1610	375	40	1980	535	40	1940	575
		EB	75	126	270	91	153	291	91	153	291	140	215	340	140	215	340
19	Flying Cloud Drive & Eden Road / Leona Road	NB	60	964	63	85	1020	83	85	1020	83	150	1205	130	150	1205	130
		WB	52	47	170	69	65	182	69	65	182	110	110	210	110	110	210
		SB	130	1421	215	139	1528	235	139	1528	235	160	1845	315	160	1805	315
		EB	100	26	36	110	35	50	110	35	50	140	60	90	140	65	90
20	Flying Cloud Drive & Singletree Lane	NB	55	694	50	62	756	57	62	756	57	80	910	65	80	910	65
		WB	105	149	75	119	165	84	119	165	84	145	215	110	145	215	110
		SB	115	1087	226	125	1195	250	125	1195	250	155	1465	345	155	1465	305
		EB	208	198	100	226	221	113	226	221	113	310	285	145	310	285	155

PM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT			
			PM			PM			PM			PM			PM			
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume			
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	
21	Shady Oak Road & Valley View Road ¹	NB	5	4	14	8	7	16	8	7	16	15	15	20	15	15	20	
		WB	-	125	130	-	150	210	-	150	224	-	240	395	-	240	410	
		SB	253	1	58	297	2	75	370	2	79	390	5	115	465	5	120	
		EB	77	321	2	148	365	3	149	365	3	330	535	5	330	535	5	
22	W 70th Street & Shady Oak Road ¹	NB	29	244	-	135	280	-	150	280	-	345	405	-	360	405	-	
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	188	33	-	208	153	-	208	153	-	300	405	-	300	405	
		EB	58	-	78	129	-	126	129	-	203	270	-	200	270	-	280	
23	70th Street LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		WB	-	-	-	-	-	-	-	300	-	-	-	-	-	842	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		EB	-	-	-	-	-	-	-	257	-	-	-	-	-	542	-	
24	Shady Oak Road & WB TH 62 Ramp ¹	NB	338	709	-	503	814	-	503	814	-	900	1065	-	900	1065	-	
		WB	75	1	281	107	2	290	107	2	290	185	5	310	185	5	310	
		SB	-	759	367	-	800	406	-	800	406	-	900	500	-	900	500	
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street ¹	NB	-	943	11	-	1138	15	-	1138	15	-	1605	25	-	1605	25	
		WB	5	-	45	77	-	332	77	-	332	250	-	1020	250	-	1020	
		SB	28	575	-	46	622	-	46	622	-	90	735	-	90	735	-	
		EB	117	13	126	127	25	148	127	25	148	150	55	200	150	55	200	
26	Shady Oak Road & City West Parkway ¹	NB	53	671	15	55	724	46	55	724	46	60	850	120	60	850	120	
		WB	24	15	165	98	15	307	98	15	307	275	15	650	275	15	650	
		SB	98	502	106	140	597	110	140	597	110	240	825	120	240	825	120	
		EB	118	11	68	122	12	70	122	12	70	130	15	75	130	15	75	
27	Bren Road East / Red Circle Drive ²	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		SB	-	381	-	-	437	-	-	437	-	-	570	-	-	570	-	
		EB	-	-	243	-	-	257	-	-	257	-	-	290	-	-	290	
28	Yellow Circle Drive / Red Circle Drive ³	NB	-	-	-	-	-	-	190	-	-	-	-	-	250	-	-	
		WB	-	-	-	-	-	-	-	310	-	-	-	-	-	350	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
29	Bren Road East / Yellow Circle Drive LRT Grade Crossing ³	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		WB	-	-	-	-	-	-	-	310	-	-	-	-	-	350	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		EB	-	-	-	-	-	-	-	375	-	-	-	-	-	500	-	
30	Yellow Circle Drive / Yellow Circle Drive ³	NB	-	-	-	-	-	-	35	-	-	-	-	-	50	-	-	
		WB	-	-	-	-	-	-	5	275	-	-	-	-	10	300	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

PM Turning Movement Volumes

10-Sep-15

Scenario			2013			2018 No Build			2018 Build LRT			2040 No Build			2040 Build LRT		
			PM			PM			PM			PM			PM		
#	Intersection	Appr	Volume			Volume			Volume			Volume			Volume		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
31	Bren Road East / Bren Road West	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	110	433	-	122	482	-	122	482	-	150	600	-	150	600	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	271	-	-	315	-	-	315	-	-	420	-	-	420	-
32	Bren Road West LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	490	-	-	-	-	-	600	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	5th Street S / K-Tel Drive LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	41	-	-	-	-	-	45	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	186	-	-	-	-	-	195	-
34	Excelsior Boulevard & Shady Oak Road ¹	NB	165	473	385	205	590	379	205	590	388	300	860	405	300	870	415
		WB	171	608	160	177	612	172	222	703	308	215	660	215	260	750	350
		SB	127	226	94	141	268	128	167	268	128	185	370	200	210	370	200
		EB	61	366	55	83	382	73	83	399	73	135	445	115	135	465	115
35	Excelsior Boulevard & 17th Avenue S ¹	NB	-	-	-	-	-	-	272	15	15	-	-	-	275	15	15
		WB	-	876	143	-	899	147	3	899	147	-	1005	160	5	1005	160
		SB	88	-	61	90	-	62	90	3	62	95	-	85	95	5	85
		EB	121	755	-	125	777	-	125	777	52	170	865	-	170	860	55
36	Excelsior Boulevard & 11th Avenue S	NB	220	204	303	233	212	304	235	212	304	295	230	310	295	230	310
		WB	253	693	127	255	704	128	255	704	128	255	740	125	255	740	125
		SB	88	154	105	89	161	109	89	161	110	90	175	130	90	175	135
		EB	105	638	99	111	650	106	118	650	114	135	695	130	140	700	130
37	11th Avenue S LRT Grade Crossing	NB	-	-	-	-	-	-	-	749	-	-	-	-	-	805	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	-	-	-	-	-	-	522	-	-	-	-	-	555	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	11th Avenue S & 5th Street S	NB	11	594	-	12	613	-	12	615	-	25	690	-	30	690	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	479	28	-	493	29	-	501	29	-	530	30	-	530	30
		EB	132	-	50	136	-	50	136	-	50	145	-	50	145	-	60

Analysis Notes:

All intersections modeled in VISSIM unless otherwise noted

¹ - Intersection noted in Synchro/SimTraffic Software

² - Analysis of only Existing and No Build conditions. With Red Circle Drive traffic flow reversal intersection converted from merge control to diverging roadways with no delay.

³ - Analysis of only LRT build conditions. With Red Circle Drive traffic flow reversal this is a new intersection with merge or stop control in close proximity to the LRT crossing.

Appendix B – Intersection Layout Tables

PEC West Intersection Layout Table - September 10, 2015

Intersection	Existing	No Build	Build LRT	Notes
#1 Mitchell Road & WB TH 5 /TH 212 Ramp SimTraffic	 Mitchell Rd Prot-Perm WB TH 5/ TH 212 Perm	 Mitchell Rd Prot-Perm WB TH 5/ TH 212 Perm	 Mitchell Rd Prot-Perm WB TH 5/ TH 212 Perm	
#2 Mitchell Road & EB TH 5 /TH 212 Ramp SimTraffic	 Mitchell Rd Prot EB TH 5/ TH 212 Perm	 Mitchell Rd Prot EB TH 5/ TH 212 Perm	 Mitchell Rd Prot EB TH 5/ TH 212 Perm	
#3 Mitchell Road & Lone Oak Road SimTraffic	 Mitchell Rd Prot-Perm Lone Oak Perm	 Mitchell Rd Prot-Perm Lone Oak Perm	 Mitchell Rd Prot-Perm Lone Oak Perm	
#4 Mitchell Road & Technology Drive SimTraffic	 Mitchell Rd Prot Technology Dr Prot-Perm	 Mitchell Rd Prot Technology Dr Prot-Perm	 Mitchell Rd Prot Technology Dr Prot-Perm	
#5 Technology Drive & Southwest Station Bus Access SimTraffic	 Technology Dr	 Technology Dr	 Technology Dr	
#6 Technology Drive & Southwest Station West Access SimTraffic	 Technology Dr	 Technology Dr	 Technology Dr	
#7 Technology Drive & Southwest Station East Access SimTraffic	 SW Sta E Access Perm Technology Dr Prot-Perm	 SW Sta E Access Perm Technology Dr Prot-Perm	 SW Sta E Access Perm Technology Dr Prot-Perm	
#8 Prairie Center Drive & WB TH 5 / TH 212 / Ramp / Plaza Drive SimTraffic	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	All scenarios have EB right turn overlap

Legend

Traffic Signal Lane Use LRT

Stop Control Lane Use Change No Turn on Red **NTOR**

PEC West Intersection Layout Table - September 10, 2015

Intersection	Existing	No Build	Build LRT	Notes
#9 Prairie Center Drive & EB TH 5 / TH 212 / Ramp / Technology Dr SimTraffic	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	 Prairie Ctr Dr Prot WB TH 5/ TH 212 Prot	Build LRT has WB right turn overlap
#10 Prairie Center Drive & Technology Drive SimTraffic	 Prairie Ctr Dr Prot Technology Dr - Split	 Prairie Ctr Dr Prot Technology Dr - Split	 Prairie Ctr Dr Prot Technology Dr - Split	Build LRT has EB right turn overlap
#11 Main Street & Singletree Lane SimTraffic	 Main St Singletree Ln	 Main St Singletree Ln	 Main St Singletree Ln	Opening Year Build LRT and No Build has two way stop control on Main Street
#12 Eden Road & Main Street VISSIM	Intersection Does not Exist		 Main St Split Eden Rd Split	Main Street extended to Technology between 2020 & 2040
#13 Eden Road & Eden Road Extension / Redstone Driveway VISSIM	Existing Curve	Existing Curve	 Eden Rd Ext. Split Eden Rd Split	Opening year, eastbound approach is an access driveway
#14 Eden Road & Glen Road VISSIM				
#15 Flying Cloud Drive & Valley View Road VISSIM	 Flying Cloud Dr Prot Valley View Rd Prot	 Flying Cloud Dr Prot Valley View Rd Prot	 Flying Cloud Dr Prot Valley View Rd Prot	
#16 Flying Cloud Drive & Viking Drive VISSIM	 Flying Cloud Dr Viking Dr		 Flying Cloud Dr Prot Viking Dr Split	

Legend

Traffic Signal



Lane Use



LRT

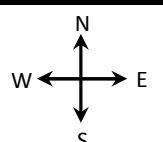
Stop Control



Lane Use Change



No Turn on Red **NTOR**

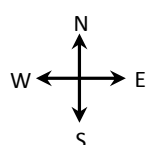


PEC West Intersection Layout Table - September 10, 2015

Intersection	Existing	No Build	Build LRT	Notes
#17 Flying Cloud Drive & WB I-494 Ramp VISSIM				2040 Build lengthen westbound I-494 Ramp
#18 Flying Cloud Drive & EB I-494 Ramp / Technology Drive VISSIM				Build alternatives have eastbound right turn overlap
#19 Flying Cloud Drive & Eden Road / Leona Road VISSIM				
#20 Flying Cloud Drive & Singletree Lane VISSIM				
#21 Shady Oak Road & Valley View Road SimTraffic				2040 No Build and Build configuration shown Opening Year Build has existing geometry with all-way stop
#22 W 70th Street & Shady Oak Road SimTraffic				2040 No Build and Build configuration shown Opening Year Build and No Build has existing geometry with an EB right turn added The intersection maintains existing stop control on W. 70th
#23 70th Street LRT Grade Crossing VISSIM	Crossing Does not Exist	Crossing Does not Exist		
#24 Shady Oak Road & WB TH 62 Ramp SimTraffic				Existing geometrics and volumes were collected prior to interchange reconstruction and UHG campus construction Existing analysis completed with this geometry

Legend

- Traffic Signal
- Stop Control
- Lane Use
- Lane Use Change
- LRT
- No Turn on Red



PEC West Intersection Layout Table - September 10, 2015

Intersection	Existing	No Build	Build LRT	Notes
#25 Shady Oak Road & EB TH 62 Ramp / W 62nd Street SimTraffic	 Shady Oak Rd Prot EB TH 62 Ramp Perm	 Shady Oak Rd Prot EB TH 62 Ramp Prot	 Shady Oak Rd Prot EB TH 62 Ramp Prot	Existing geometrics and volumes were collected prior to interchange reconstruction and UHG campus construction. Existing analysis completed with this geometry.
#26 Shady Oak Road & City West Parkway SimTraffic	 Shady Oak Rd Split City West Parkway Perm	 Shady Oak Rd Prot-Perm City W Pwy Prot-Perm	 Shady Oak Rd Prot-Perm City W Pwy Prot-Perm	Existing geometrics and volumes were collected prior to interchange reconstruction and UHG campus construction. Existing analysis completed with this geometry.
#27 Bren Road East / Red Circle Drive VISSIM	 Red Cir Dr Bren Rd East	 Red Cir Dr Bren Rd East	Intersection Does not Exist with Realignment	Yield Control on Red Circle Drive
#28 Yellow Circle Drive / Red Circle Drive VISSIM	Intersection Does not Exist	Intersection Does not Exist	 Red Cir Dr Yellow Cir Dr	Yield Control on Red Circle Drive
#29 Bren Road East / Yellow Circle Drive LRT Grade Crossing VISSIM	Crossing Does not Exist	Crossing Does not Exist	 Bren Rd East Yellow Cir LRT Crossing	
#30 Yellow Circle Drive / Yellow Circle Drive VISSIM	Intersection Does not Exist	Intersection Does not Exist	 Yellow Cir Dr Yellow Cir Dr	Yield Control on Yellow Circle Drive northbound
#31 Bren Road East / Bren Road West VISSIM	 Bren Rd East Bren Rd West	 Bren Rd East Bren Rd West	 Bren Rd East Bren Rd West	Yield Control on Bren Road West
#32 Bren Road West LRT Grade Crossing VISSIM	Crossing Does not Exist	Crossing Does not Exist	 Bren Rd West	

Legend

Traffic Signal



Lane Use



LRT



Stop Control

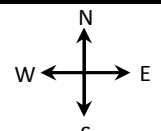


Lane Use Change



No Turn on Red

NTOR



PEC West Intersection Layout Table - September 10, 2015

Intersection	Existing	No Build	Build LRT	Notes
#33 5th Street S /K-Tel Drive LRT Grade Crossing VISSIM	Crossing Does not Exist	Crossing Does not Exist		
#34 Excelsior Boulevard & Shady Oak Road SimTraffic				Opening Year and 2040 northbound include extended southbound left turn lane (County project)
#35 Excelsior Boulevard & 17th Avenue S SimTraffic				
#36 Excelsior Boulevard & 11th Avenue S VISSIM				
#37 11th Avenue S LRT Grade Crossing VISSIM	Crossing Does not Exist	Crossing Does not Exist		
#38 11th Avenue S & 5th Street S VISSIM				

Legend

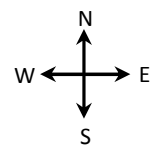
Traffic Signal



Lane Use



LRT



Stop Control



Lane Use Change



No Turn on Red

NTOR

Appendix C – Traffic Analysis Detailed Results

AM Level of Service and Intersection Delay

9/10/2015

Scenario		2013			Opening Year						2040						
		Existing Condition			No Build			Build LRT			No Build			Build LRT			
		LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	
#	Intersection	Appr	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
1	Mitchell Road & WB TH 5 / TH 212 Ramp ¹	NB	A	B	13.9	A	B	14.3	A	B	14.7	B	B	18.5	B	B	18.8
		WB	C			C			C			C			C		
		SB	A			A			A			A			B		
		EB	--			--			--			--			--		
2	Mitchell Road & EB TH 5 / TH 212 Ramp ¹	NB	A	A	7.8	A	A	8.5	A	A	8.5	A	B	12.6	A	B	13.1
		WB	--			--			--			--			--		
		SB	A			A			A			A			B		
		EB	B			B			B			B			C		
3	Mitchell Road & Lone Oak Road ¹	NB	A	A	3.1	A	A	4.1	A	A	4.4	A	A	6.9	A	A	7.5
		WB	--			--			--			--			--		
		SB	A			A			A			A			A		
		EB	C			C			C			C			D		
4	Mitchell Road & Technology Drive ¹	NB	B	C	20.3	B	C	24.6	B	C	25.3	C	C	31.0	C	C	32.6
		WB	C			C			C			C			C		
		SB	B			C			C			C			C		
		EB	D			D			D			D			D		
5	Technology Drive / Southwest Station Bus Access ¹	NB	--	A	0.5	--	A	0.5	--	A	0.6	--	A	0.7	--	A	0.7
		WB	A			A			A			A			A		
		SB	A			A			A			B			B		
		EB	A			A			A			A			A		
6	Technology Drive & Southwest Station West Access ¹	NB	--	A	1.3	--	A	1.4	--	A	1.8	--	A	1.7	--	A	2.7
		WB	A			A			A			A			A		
		SB	A			A			A			A			A		
		EB	A			A			A			A			A		
7	Technology Drive & Southwest Station East Access ¹	NB	--	A	7.1	--	A	7.3	--	A	8.7	--	B	9.8	--	B	12.5
		WB	A			A			A			B			B		
		SB	B			B			B			B			C		
		EB	A			A			A			A			A		
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive ¹	NB	B	C	22.3	B	C	23.9	B	B	18.7	B	D	47.2	B	C	20.5
		WB	D			D			D			E			D		
		SB	C			C			C			D			C		
		EB	C			C			B			E			B		
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive ¹	NB	C	C	24.9	C	C	24.9	B	C	24.9	C	C	27.1	C	C	30.4
		WB	C			C			C			C			C		
		SB	C			C			C			C			C		
		EB	C			C			C			D			C		
10	Prairie Center Drive & Technology Drive ¹	NB	C	B	18.2	C	B	17.5	C	C	22.5	C	B	19.3	C	C	25.4
		WB	C			C			D			D			C		
		SB	B			B			B			B			C		
		EB	C			C			C			C			C		

AM Level of Service and Intersection Delay

9/10/2015

Scenario		2013			Opening Year						2040							
		Existing Condition			No Build			Build LRT			No Build			Build LRT				
		LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay		
#	Intersection	Appr	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	
11	Main Street & Singletree Lane ¹	NB	A			A			A			A			A			A
		WB	A	A	0.9	A	A	1.6	A	A	1.7	A	A	6.2	A	A	6.9	A
		SB	A			A			A			A			A			A
		EB	A			A			A			A			A			A
12	Eden Road & Main Street	NB	--	--	--	--	--	--	--	--	--	--	--	--	C			
		WB	--	--	--	--	--	--	--	--	--	--	--	--	C	C	27.5	
		SB	--	--	--	--	--	--	--	--	--	--	--	--	C			
		EB	--	--	--	--	--	--	--	--	--	--	--	--	C			
13	Eden Road & Eden Road Extension / Redstone Driveway	NB	--	--	--	--	--	--	B			--	--	--	C			
		WB	--	--	--	--	--	--	B	B	19.7	--	--	--	C	C	23.9	
		SB	--	--	--	--	--	--	C			--	--	--	C			
		EB	--	--	--	--	--	--	--			--	--	--	C			
14	Eden Road & Glen Lane	NB	A			A			A			A			A			A
		WB	A	A	0.6	A	A	1.3	A	A	0.9	A	A	1.3	A	A	1.0	A
		SB	A			A			--			A			--			
		EB	A			A			A			A			A			A
15	Flying Cloud Drive & Valley View Road	NB	C			D			C			D			D			D
		WB	C	E	58.4	D	D	45.0	D	D	48.7	D	E	60.1	D	E	55.6	D
		SB	F			E			E			F			F			E
		EB	C			D			D			D			D			D
16	Flying Cloud Drive & Viking Drive	NB	A			A			B			A			B			B
		WB	D	A	3.6	E	A	5.1	D	B	18.0	F	C	16.9	D	C	21.3	D
		SB	A			A			B			A			B			B
		EB	C			E			E			F			E			E
17	Flying Cloud Drive & WB I-494 Ramp	NB	A			A			A			A			B			B
		WB	E	B	15.4	D	B	17.1	E	C	21.5	D	B	19.2	E	C	25.4	E
		SB	A			B			B			B			B			B
		EB	--			--			--			--			--			--
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	A			A			B			A			B			B
		WB	--	A	9.1	--	B	10.7	--	C	20.6	--	B	13.1	--	C	25.9	--
		SB	A			A			B			A			B			B
		EB	D			D			E			D			E			E
19	Flying Cloud Drive & Eden Road / Leona Road	NB	A			A			B			A			B			B
		WB	C	A	9.4	C	B	10.6	C	B	15.8	C	B	11.8	D	B	19.1	D
		SB	A			A			B			A			B			B
		EB	E			D			E			D			D			D
20	Flying Cloud Drive & Singletree Lane	NB	B			B			B			B			B			B
		WB	C	B	13.3	C	B	13.7	D	B	15.4	C	B	16.7	C	B	18.8	C
		SB	A			A			A			A			B			B
		EB	E			D			D			D			D			D

AM Level of Service and Intersection Delay

9/10/2015

Scenario		2013			Opening Year						2040						
		Existing Condition			No Build			Build LRT			No Build			Build LRT			
#	Intersection	Appr	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay
			by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters
21	Shady Oak Road & Valley View Road ¹	NB	A		2.4	A	A	3.7	A	A	6.9	C	B	13.5	C	B	14.3
		WB	A	A		A	A		A	A		B	B		B	B	
		SB	A			B	A		A	A		B	B		B	B	
		EB	A			A	A		A	A		B	B		B	B	
22	W 70th Street & Shady Oak Road ¹	NB	A		1.3	A	A	2.6	A	A	3.8	A	B	10.4	B	B	10.3
		WB	--	A		--	A		--	A		--	B		--	B	
		SB	A			A	A		A	A		A	B		B	B	
		EB	A			A	A		A	A		C	B		A	B	
23	70th Street LRT Grade Crossing	NB	--		--	--	--	--	--	A	3.5	--	--	--	--	A	4.2
		WB	--	--		--	--		--	A		--	--	--	--	A	
		SB	--	--		--	--		--	A		--	--	--	--	A	
		EB	--	--		--	--		--	A		--	--	--	--	A	
24	Shady Oak Road & WB TH 62 Ramp ¹	NB	A		11.1	B	C	24.1	B	C	24.4	B	C	27.0	B	C	27.1
		WB	B	B		D	C		D	C		D	C		D	C	
		SB	B	B		C	C		C	C		C	C		C	C	
		EB	--	--		--	--		--	--		--	--		--	--	
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street ¹	NB	A		12.9	D	D	41.7	D	D	40.7	D	D	43.6	D	D	43.2
		WB	A	B		D	D		D	D		D	D		D	D	
		SB	A	B		D	D		D	D		D	D		D	D	
		EB	B	B		D	D		D	D		D	D		D	D	
26	Shady Oak Road & City West Parkway ¹	NB	C		21.1	B	B	16.6	C	B	18.2	C	B	30.2	C	B	31.2
		WB	A	C		B	B		B	B		B	C		B	C	
		SB	B	C		B	B		B	B		D	C		C	C	
		EB	C	C		C	C		C	C		C	C		C	C	
27	Bren Road East / Red Circle Drive ²	NB	--	F	56.2	--	F	90.7	--	--	--	--	F	122.3	--	--	--
		WB	--	F		--	F		--	--		--	F		--	--	
		SB	A	F		A	F		--	--		A	F		--	--	
		EB	F	F		F	F		--	--		F	F		--	--	
28	Yellow Circle Drive / Red Circle Drive ³	NB	--	--	--	--	--	--	A	A	4.0	--	--	--	A	A	5.5
		WB	--	--		--	--		A	A		--	--		A	A	
		SB	--	--		--	--		--	A		--	--		--	A	
		EB	--	--		--	--		--	A		--	--		--	A	
29	Bren Road East / Yellow Circle Drive LRT Grade Crossing ³	NB	--	--	--	--	--	--	A	A	2.5	--	--	--	A	A	2.6
		WB	--	--		--	--		A	A		--	--		A	A	
		SB	--	--		--	--		--	A		--	--		--	A	
		EB	--	--		--	--		A	A		--	--		A	A	
30	Yellow Circle Drive / Yellow Circle Drive ³	NB	--	--	--	--	--	--	A	A	0.0	--	--	--	A	A	0.0
		WB	--	--		--	--		A	A		--	--		A	A	
		SB	--	--		--	--		--	A		--	--		--	A	
		EB	--	--		--	--		--	A		--	--		--	A	

AM Level of Service and Intersection Delay

9/10/2015

Scenario		2013		Opening Year						2040								
		Existing Condition			No Build			Build LRT			No Build			Build LRT				
#	Intersection	Appr	LOS		Delay		LOS		Delay		LOS		Delay		LOS		Delay	
			by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	
31	Bren Road East / Bren Road West	NB	--			--			--			--			--			
		WB	A	A	2.8	A	A	2.9	A	A	3.0	B	A	3.2	A	A	3.6	
		SB	A			A			A			A			A			
		EB	--			--			--			--			--			
32	Bren Road West LRT Grade Crossing	NB	--			--			--			--			--			
		WB	--	--	--	--	--	--	A	A	3.6	--	--	--	A	A	4.2	
		SB	--			--			--			--			--			
		EB	--			--			--			--			--			
33	5th Street S / K-Tel Drive LRT Grade Crossing	NB	--			--			--			--			--			
		WB	--	--	--	--	--	--	A	A	3.3	--	--	--	A	A	2.9	
		SB	--			--			--			--			--			
		EB	--			--			A			--			A			
34	Excelsior Boulevard & Shady Oak Road ¹	NB	C			C			C			D			D			
		WB	C	C	31.6	C	C	33.2	C	C	34.9	C	D	37.7	C	D	39.4	
		SB	D			D			D			D			D			
		EB	C			C			C			C			C			
35	Excelsior Boulevard & 17th Avenue S ¹	NB	--			--			D			--			D			
		WB	A	A	9.3	A	A	9.4	A	B	11.9	A	A	9.7	A	B	12.5	
		SB	D			D			D			D			D			
		EB	A			A			A			A			A			
36	Excelsior Boulevard & 11th Avenue S	NB	B			B			B			B			B			
		WB	C	B	18.5	C	B	18.8	C	B	19.2	C	C	20.2	C	B	19.5	
		SB	C			C			C			C			C			
		EB	B			B			B			B			B			
37	11th Avenue S LRT Grade Crossing	NB	--			--			A			--			A			
		WB	--	--	--	--	--	--	--	A	4.1	--	--	--	--	A	4.4	
		SB	--			--			A			--			A			
		EB	--			--			--			--			--			
38	11th Avenue S & 5th Street S	NB	A			A			A			A			A			
		WB	--	A	8.6	--	A	8.9	--	A	9.3	--	A	9.6	--	A	9.8	
		SB	B			B			B			B			B			
		EB	B			B			B			B			B			

Analysis Notes:

All intersections modeled in VISSIM unless otherwise noted.

¹ - Intersection modeled in Synchro/SimTraffic Software.

² - Analysis of only Existing and No Build conditions. With Red Circle Drive traffic flow reversal intersection converted from merge control to diverging roadways with no delay.

³ - Analysis of only LRT build conditions. With Red Circle Drive traffic flow reversal this is a new intersection with merge or stop control in close proximity to the LRT crossing.

PM Level of Service and Intersection Delay

9/10/2015

Scenario		2013			Opening Year						2040							
		Existing Condition			No Build			Build LRT			No Build			Build LRT				
		LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay		
#	Intersection	Appr	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	
1	Mitchell Road & WB TH 5 / TH 212 Ramp ¹	NB	C			B			B			B			B			
		WB	B	C	21.9	C	C	21.9	C	C	22.7	D	C	21.8	D	C		23.3
		SB	C			C			C			B			B			
		EB	--			--			--			--			--			
2	Mitchell Road & EB TH 5 / TH 212 Ramp ¹	NB	A			A			A			A			A			
		WB	--	B	11.4	--	B	12.0	--	B	12.6	--	B	13.2	--	B		15.2
		SB	B			B			B			B			B			
		EB	C			C			C			C			C			
3	Mitchell Road & Lone Oak Road ¹	NB	A			A			A			A			A			
		WB	--	A	7.0	--	A	7.0	--	A	6.8	--	B	20.0	--	C		23.8
		SB	A			A			A			C			D			
		EB	C			D			C			D			E			
4	Mitchell Road & Technology Drive ¹	NB	B			C			C			C			C			
		WB	C	C	21.1	C	C	28.1	C	C	27.4	D	D	46.6	D	D		51.4
		SB	B			B			B			D			D			
		EB	D			E			E			D			D			
5	Technology Drive / Southwest Station Bus Access ¹	NB	--			--			--			--			--			
		WB	A	A	0.4	A	A	0.5	A	A	0.6	A	A	0.7	A	A		0.8
		SB	A			A			A			B			C			
		EB	A			A			A			A			A			
6	Technology Drive & Southwest Station West Access ¹	NB	--			--			--			--			--			
		WB	A	A	1.2	A	A	1.3	A	A	2.8	A	C	17.9	A	C		22.8
		SB	A			A			A			F			F			
		EB	A			A			A			D			D			
7	Technology Drive & Southwest Station East Access ¹	NB	--			--			--			--			--			
		WB	A	A	9.6	B	B	10.5	A	A	9.1	C	E	66.1	B	E		66.2
		SB	A			A			A			E			F			
		EB	A			B			A			F			F			
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive ¹	NB	C			C			C			C			C			
		WB	D	C	28.5	E	D	36.3	D	C	29.8	F	F	101.2	F	F		91.9
		SB	C			D			D			F			F			
		EB	C			C			C			E			D			
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive ¹	NB	D			D			D			E			E			
		WB	D	C	34.3	E	D	46.2	D	D	35.7	F	F	90.1	D	E		68.3
		SB	C			D			C			F			F			
		EB	D			D			D			F			E			
10	Prairie Center Drive & Technology Drive ¹	NB	C			D			C			E			E			
		WB	D	C	26.7	D	C	33.4	D	C	32.2	E	E	68.9	E	E		73.6
		SB	B			B			B			C			C			
		EB	D			E			D			F			F			

PM Level of Service and Intersection Delay

9/10/2015

Scenario		2013						Opening Year						2040					
		Existing Condition			No Build			Build LRT			No Build			Build LRT					
		LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay			
#	Intersection	Appr	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters		
11	Main Street & Singletree Lane ¹	NB	A		2.5	C		5.9	D		7.0	B		16.6	C		20.4		
		WB	A	A		A	A		A	A		B	B		C	C			
		SB	A			C			C				B		B				
		EB	A			A			A			B		B		B			
12	Eden Road & Main Street	NB	--		--	--		--	--		--	--		--	D		41.8		
		WB	--	--		--	--		--	--		--	--		C	D			
		SB	--			--			--			--			D				
		EB	--			--			--			--			--				
13	Eden Road & Eden Road Extension / Redstone Driveway	NB	--		--	--		--	B		23.0	--		--	C		38.5		
		WB	--	--		--	--		C	C		--	--		D	D			
		SB	--			--			C			--	--		D				
		EB	--			--			--			--			C				
14	Eden Road & Glen Lane	NB	A		2.4	A		2.8	A		2.3	C		7.1	B		5.2		
		WB	A	A		A	A		A	A		A	A		A	A			
		SB	A			A			--			--	B		--				
		EB	A			A			A			A		A		A			
15	Flying Cloud Drive & Valley View Road	NB	C		29.2	D		29.4	D		30.4	D		33.9	D		33.2		
		WB	C	C		C	C		C	C		C	C		C	C			
		SB	E			E			E			E		E		E			
		EB	C			C			C			C		C		C			
16	Flying Cloud Drive & Viking Drive	NB	A		20.4	A		20.6	B		15.6	A		26.7	B		18.2		
		WB	F	C		F	C		D	B		F	D		D	B			
		SB	A			A			B			A		B		B			
		EB	E			F			E			F		E		E			
17	Flying Cloud Drive & WB I-494 Ramp	NB	A		31.4	A		26.2	B		33.1	B		39.2	B		51.7		
		WB	F	C		D	C		E	C		F	D		F	D			
		SB	B			B			C			B		D		C			
		EB	--			--			--			--			--				
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	B		19.6	B		24.2	C		32.9	C		28.1	C		48.8		
		WB	--	B		--	C		--	C		--	C		--	D			
		SB	B			B			C			B		C		C			
		EB	D			E			E			E		E		F			
19	Flying Cloud Drive & Eden Road / Leona Road	NB	B		19.3	B		23.1	B		23.8	C		25.2	B		27.9		
		WB	C	B		C	C		D	C		D	C		D	C			
		SB	B			C			C			B		C		C			
		EB	E			E			D			E		E		E			
20	Flying Cloud Drive & Singletree Lane	NB	B		31.1	C		32.5	C		30.6	C		37.2	C		40.0		
		WB	D	C		D	C		D	C		E	D		E	D			
		SB	B			C			B			B		D		B			
		EB	E			E			E			E		E		F			

PM Level of Service and Intersection Delay

9/10/2015

Scenario		2013											Opening Year											2040										
		Existing Condition						No Build			Build LRT			No Build				Build LRT																
		LOS		Delay		LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay														
#	Intersection	Appr	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters														
21	Shady Oak Road & Valley View Road ¹	NB	A			B			A			D			E			E																
		WB	A	A	5.5	F	D	27.4	A	B	11.6	D	E	62.6	B	C	32.2																	
		SB	B			F			C			C			D																			
		EB	A			A			B			F			D																			
22	W 70th Street & Shady Oak Road ¹	NB	A			A			A			F			C			C																
		WB	--	A	2.1	--	A	5.1	--	A	5.4	--	F	200+	--	F	68.1	F	F															
		SB	A			A			A			A			F																			
		EB	A			B			B			F			B																			
23	70th Street LRT Grade Crossing	NB	--	--	--	--	--	--	--			--			--			--																
		WB	--	--	--	--	--	--	A	A	3.4	--	--	--	A	A	3.2																	
		SB	--	--	--	--	--	--	--			--			--																			
		EB	--	--	--	--	--	--	A			--			A																			
24	Shady Oak Road & WB TH 62 Ramp ¹	NB	B			B			B			B			B			B																
		WB	B	B	12.6	C	B	18.4	C	B	19.0	C	C	20.6	C	C	20.6																	
		SB	B			C			C			C			C																			
		EB	--			--			--			--			--																			
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street ¹	NB	A			C			C			D			D			D																
		WB	B	A	7.2	D	C	30.9	D	C	33.1	D	D	38.2	D	D	39.6																	
		SB	A			A			A			A			A																			
		EB	C			C			C			C			C																			
26	Shady Oak Road & City West Parkway ¹	NB	C			B			B			C			C			C																
		WB	B	C	21.9	C	B	18.5	C	B	18.8	C	C	25.9	C	C	25.0																	
		SB	B			B			B			C			B																			
		EB	C			D			D			D			D																			
27	Bren Road East / Red Circle Drive ²	NB	--	--	--	--	--	--	--			--			--			--																
		WB	--	A	3.0	--	A	3.4	--	--	--	--	A	5.7	--	--	--																	
		SB	A			A			--			A			--																			
		EB	A			A			--			B			--																			
28	Yellow Circle Drive / Red Circle Drive ³	NB	--	--	--	--	--	--	A	A	1.6	--	--	--	A	A	2.1																	
		WB	--			--			A			--			--																			
		SB	--			--			--			--			--																			
		EB	--			--			--			--			--																			
29	Bren Road East / Yellow Circle Drive LRT Grade Crossing ³	NB	--	--	--	--	--	--	--			--			--			--																
		WB	--			--			A	A	2.2	--	--	--	A	A	2.3																	
		SB	--			--			--			--			--																			
		EB	--			--			A			--			A																			
30	Yellow Circle Drive / Yellow Circle Drive ³	NB	--	--	--	--	--	--	A	A	0.0	--	--	--	A	A	0.1																	
		WB	--			--			A			--			A																			
		SB	--			--			--			--			--																			
		EB	--			--			--			--			--																			

PM Level of Service and Intersection Delay

9/10/2015

Scenario		Opening Year																	
		2013			No Build						Build LRT						2040		
		Existing Condition			No Build			Build LRT			No Build			Build LRT					
#	Intersection	Appr	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay		
			by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters	by Appr	by Inters	by Inters		
31	Bren Road East / Bren Road West	NB	--			--			--			--			--			--	
		WB	A	A	3.2	B	A	3.4	A	A	2.5	B	A	4.1	A	A	2.2		
		SB	A			A			A			A			A				
		EB	--			--			--			--			--			--	
32	Bren Road West LRT Grade Crossing	NB	--			--			--			--			--			--	
		WB	--	--	--	--	--	--	A	A	3.1	--	--	--	A	A	3.3		
		SB	--			--			--			--			--			--	
		EB	--			--			--			--			--			--	
33	5th Street S / K-Tel Drive LRT Grade Crossing	NB	--			--			--			--			--			--	
		WB	--	--	--	--	--	--	A	A	2.7	--	--	--	A	A	2.6		
		SB	--			--			--			--			--			--	
		EB	--			--			A			--			A			--	
34	Excelsior Boulevard & Shady Oak Road ¹	NB	D			D			D			D			D			D	
		WB	C	C	32.3	C	C	32.8	C	C	32.9	C	D	39.0	D	D	41.6		
		SB	D			D			D			D			D				
		EB	C			C			D			D			D				
35	Excelsior Boulevard & 17th Avenue S ¹	NB	--			--			D			--			D			D	
		WB	B	B	12.4	A	B	11.3	B	B	17.9	B	B	14.6	B	B	19.3		
		SB	D			D			D			C			D				
		EB	A			A			B			B			B				
36	Excelsior Boulevard & 11th Avenue S	NB	B			B			C			C			C			C	
		WB	C	C	23.1	C	C	23.3	C	C	23.7	C	C	25.1	C	C	24.4		
		SB	C			C			C			C			C				
		EB	C			C			C			C			C				
37	11th Avenue S LRT Grade Crossing	NB	--			--			A			--			A			A	
		WB	--	--	--	--	--	--	--	A	4.7	--	--	--	--	A	A	5.2	
		SB	--			--			A			--			A				
		EB	--			--			--			--			--			--	
38	11th Avenue S & 5th Street S	NB	A			A			A			A			A			A	
		WB	--	B	13.1	--	B	13.7	--	B	14.0	--	B	15.1	--	B	15.2		
		SB	B			B			C			C			C				
		EB	B			B			B			B			B				

Analysis Notes:

All intersections modeled in VISSIM unless otherwise noted.

¹ - Intersection modeled in Synchro/SimTraffic Software.

² - Analysis of only Existing and No Build conditions. With Red Circle Drive traffic flow reversal intersection converted from merge control to diverging roadways with no delay.

³ - Analysis of only LRT build conditions. With Red Circle Drive traffic flow reversal this is a new intersection with merge or stop control in close proximity to the LRT crossing.

⁴ - Poor operations are a result of queue spillback from poor operations at the TH 212 / Prairie Center Drive interchange. Without queue spillback from the interchange, analysis results indicate LOS B for overall intersection operations under both 2040 No Build and Build scenarios.

Storage Length

9/10/2015

Scenario			2013			Opening Year						2040					
			Existing Condition			No Build			Build LRT			No Build			Build LRT		
#	Intersection	Appr	Effective Storage			Effective Storage			Effective Storage			Effective Storage			Effective Storage		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
1	Mitchell Road & WB TH 5 / TH 212 Ramp ¹	NB	340	340	-	340	340	-	340	340	-	340	340	-	340	340	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	700	210	-	700	210	-	700	210	-	700	210	-	700	210
		WB	560	1350	530	560	1350	530	560	1350	530	560	1350	530	560	1350	530
2	Mitchell Road & EB TH 5 / TH 212 Ramp ¹	NB	-	640	340	-	640	340	-	640	340	-	640	340	-	640	340
		EB	365	1850	355	365	1850	355	365	1850	355	365	1850	355	365	1850	355
		SB	340	340	-	340	340	-	340	340	-	340	340	-	340	340	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Mitchell Road & Lone Oak Road ¹	NB	150	390	-	150	390	-	150	390	-	150	390	-	150	390	-
		EB	200	-	610	200	-	610	200	-	610	200	-	610	200	-	610
		SB	-	640	185	-	640	185	-	640	185	-	640	185	-	640	185
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Mitchell Road & Technology Drive ¹	NB	185	950	150	185	950	150	185	950	150	185	950	150	185	950	150
		EB	220	3240	-	220	3240	-	220	3240	-	220	3240	-	220	3240	-
		SB	230	390	245	230	390	245	230	390	245	230	390	245	230	390	245
		WB	370	1840	370	370	1840	370	370	1840	370	370	1840	370	370	1840	370
5	Technology Drive / Southwest Station Bus Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	1000	-	-	1000	-	-	1000	-	-	1000	-	-	1000	-
		SB	280	-	280	280	-	280	280	-	85	280	-	280	280	-	85
		WB	-	450	-	-	450	-	-	450	-	-	450	-	-	450	-
6	Technology Drive & Southwest Station West Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	415	-	-	415	-	215	415	-	-	415	-	215	415	-
		SB	-	-	210	-	-	210	200	-	300	-	-	210	200	-	300
		WB	-	410	-	-	410	-	-	430	-	-	410	-	-	430	-
7	Technology Drive & Southwest Station East Access ¹	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	270	950	-	270	950	-	270	450	-	270	950	-	270	450	-
		SB	250	-	250	250	-	250	250	-	250	250	-	250	250	-	250
		WB	-	550	320	-	550	320	-	550	320	-	550	320	-	550	320
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive ¹	NB	400	730	460	400	730	460	400	730	460	400	730	460	400	730	460
		EB	370	1470	420	370	1470	420	370	1470	420	370	1470	420	370	1470	420
		SB	250	360	210	250	360	210	250	360	210	250	360	210	250	360	210
		WB	240	330	-	240	330	-	240	330	-	240	330	-	240	330	-
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive ¹	NB	360	560	270	360	560	270	360	560	270	360	560	270	360	560	270
		EB	280	890	1610	280	890	1610	280	890	1610	280	890	1610	280	890	1610
		SB	300	790	610	300	790	610	300	790	610	300	790	610	300	790	610
		WB	260	1220	1220	260	1220	1220	260	1220	350	260	1220	1220	260	1220	350
10	Prairie Center Drive & Technology Drive ¹	NB	330	1570	300	330	1570	300	330	1570	300	330	1570	300	330	1570	300
		EB	350	570	570	350	570	570	350	570	570	350	570	570	350	570	570
		SB	200	570	250	200	570	250	200	570	250	200	570	250	200	570	250
		WB	70	140	140	70	140	140	70	140	140	70	140	140	70	140	140

Storage Length

9/10/2015

Scenario			2013			Opening Year						2040					
			Existing Condition			No Build			Build LRT			No Build			Build LRT		
#	Intersection	Appr	Effective Storage			Effective Storage			Effective Storage			Effective Storage			Effective Storage		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
11	Main Street & Singletree Lane ¹	NB	-	150	-	-	150	-	-	150	-	-	150	-	-	150	-
		EB	-	760	-	-	760	-	-	760	-	-	760	-	-	760	-
		SB	-	440	-	-	440	-	-	440	-	-	440	-	-	440	-
		WB	-	700	-	-	700	-	-	700	-	-	700	-	-	700	-
12	Eden Road & Main Street	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	800	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	1050	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	800	-	800
13	Eden Road & Eden Road Extension / Redstone Driveway	NB	-	-	-	-	-	-	-	740	-	-	-	-	-	740	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	800	-	
		SB	-	-	-	-	-	-	-	250	-	-	-	-	-	250	-
		WB	-	-	-	-	-	-	460	-	460	-	-	-	-	460	-
14	Eden Road & Glen Lane	NB	-	950	-	-	950	-	950	-	950	-	950	-	950	-	950
		EB	-	1240	-	-	1240	-	-	460	-	-	1240	-	-	460	-
		SB	-	210	-	-	210	-	-	-	-	-	210	-	-	-	-
		WB	-	330	-	-	330	-	-	320	-	-	330	-	-	320	-
15	Flying Cloud Drive & Valley View Road	NB	575	960	550	575	960	550	575	960	550	575	960	550	575	960	550
		EB	320	470	520	320	470	520	320	470	520	320	470	520	320	470	520
		SB	320	2400	320	320	2400	320	320	2400	320	320	2400	320	320	2400	320
		WB	150	340	260	150	340	260	150	340	260	150	340	260	150	340	260
16	Flying Cloud Drive & Viking Drive	NB	300	590	200	300	590	200	300	590	200	300	590	200	300	590	200
		EB	-	200	-	-	200	-	100	150	-	-	200	-	100	150	-
		SB	350	980	350	350	980	350	350	980	350	350	980	350	350	980	350
		WB	-	1020	165	-	1020	165	1020	165	-	-	1020	165	1020	165	-
17	Flying Cloud Drive & WB I-494 Ramp	NB	-	510	-	-	510	-	-	510	-	-	510	-	-	510	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	620	-	-	620	-	-	620	-	-	620	-	-	620	-
		WB	1430	-	300	1430	-	300	1430	-	450	1430	-	300	1430	-	450
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	240	550	550	240	550	550	280	550	300	240	550	550	280	550	300
		EB	-	4180	500	-	4180	500	240	4180	340	-	4180	500	240	4180	340
		SB	400	540	470	400	540	470	400	540	470	400	540	470	400	540	470
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Flying Cloud Drive & Eden Road / Leona Road	NB	200	520	560	200	520	560	200	520	560	200	520	560	200	520	560
		EB	200	330	-	200	330	-	250	330	-	200	330	-	250	330	-
		SB	240	590	230	240	590	230	255	565	370	240	590	230	255	565	370
		WB	240	575	220	240	575	220	240	575	220	240	575	220	240	575	220
20	Flying Cloud Drive & Singletree Lane	NB	300	800	340	300	800	340	300	800	340	300	800	340	300	800	340
		EB	170	240	-	170	240	-	170	240	-	170	240	-	170	240	-
		SB	300	510	260	300	510	260	300	510	260	300	510	260	300	510	260
		WB	130	130	200	130	130	200	130	130	200	130	130	200	130	130	200

Storage Length

9/10/2015

Scenario			2013			Opening Year						2040					
			Existing Condition			No Build			Build LRT			No Build			Build LRT		
#	Intersection	Appr	Effective Storage			Effective Storage			Effective Storage			Effective Storage			Effective Storage		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
21	Shady Oak Road & Valley View Road ¹	NB	-	100	-	-	100	-	-	100	-	-	100	-	-	100	-
		EB	-	1460	-	-	1460	-	-	1460	-	-	1460	-	-	1460	-
		SB	-	1760	-	-	1760	-	-	1760	-	300	1760	-	300	1760	-
		WB	-	660	-	-	660	-	-	660	-	-	660	-	-	660	-
22	W 70th Street & Shady Oak Road ¹	NB	-	1760	-	-	1760	-	-	1760	-	-	1760	-	300	1760	-
		EB	1330	-	1330	1330	-	300	1330	-	300	1330	-	300	1330	-	300
		SB	-	540	-	-	540	-	-	540	-	-	540	-	-	540	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	70th Street LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	330	-	-	-	-	-	330	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	1220	-	-	-	-	-	1220	-
24	Shady Oak Road & WB TH 62 Ramp ¹	NB	300	700	-	700	700	-	700	700	-	700	700	-	700	700	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	740	450	-	740	450	-	740	450	-	740	450	-	740	450
		WB	500	-	500	500	-	500	500	-	500	500	-	500	500	-	500
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street ¹	NB	-	750	275	-	750	275	-	750	275	-	750	275	-	750	275
		EB	500	1520	375	1520	570	375	1520	570	375	1520	570	375	1520	570	375
		SB	175	715	-	625	715	-	625	715	-	625	715	-	625	715	-
		WB	200	-	200	420	-	420	420	-	420	420	-	420	420	-	420
26	Shady Oak Road & City West Parkway ¹	NB	1580	1580	1580	530	1580	530	530	1580	530	530	1580	530	530	1580	530
		EB	90	215	215	90	215	215	90	215	215	90	215	215	90	215	215
		SB	750	750	750	510	750	300	510	750	300	510	750	300	510	750	300
		WB	270	300	270	210	300	200	210	300	200	210	300	200	210	300	200
27	Bren Road East / Red Circle Drive ²	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	1200	-	-	1200	-	-	-	-	-	1200	-	-	-
		SB	-	1240	-	-	1240	-	-	-	-	-	1240	-	-	-	-
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	Yellow Circle Drive / Red Circle Drive ³	NB	-	-	-	-	-	-	840	-	-	-	-	-	840	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		WB	-	-	-	-	-	-	-	30	-	-	-	-	-	30	-
29	Bren Road East / Yellow Circle Drive LRT Grade Crossing ³	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	1290	-	-	-	-	-	1290	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	190	-	-	-	-	-	190	-
30	Yellow Circle Drive / Yellow Circle Drive ³	NB	-	-	-	-	-	-	630	-	-	-	-	-	630	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		WB	-	-	-	-	-	-	-	1020	-	-	-	-	-	1020	-

Storage Length

9/10/2015

Scenario			2013			Opening Year						2040					
			Existing Condition			No Build			Build LRT			No Build			Build LRT		
#	Intersection	Appr	Effective Storage			Effective Storage			Effective Storage			Effective Storage			Effective Storage		
			LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
31	Bren Road East / Bren Road West	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	560	-	-	560	-	-	520	-	-	560	-	-	520	-
		WB	1500	-	-	1500	-	-	180	-	-	1500	-	-	180	-	-
32	Bren Road West LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	1360	-	-	-	-	-	1360	-
33	5th Street S / K-Tel Drive LRT Grade Crossing	NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		EB	-	-	-	-	-	-	-	1030	-	-	-	-	1030	-	
		SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WB	-	-	-	-	-	-	-	340	-	-	-	-	340	-	
34	Excelsior Boulevard & Shady Oak Road ¹	NB	180	770	300	180	770	300	180	770	300	180	770	300	180	770	300
		EB	200	1900	250	200	1900	250	200	1900	250	200	1900	250	200	1900	250
		SB	110	1200	-	290	1200	-	290	1200	-	290	1200	-	290	1200	-
		WB	400	1250	250	400	1250	250	400	1250	250	400	1250	250	400	1250	250
35	Excelsior Boulevard & 17th Avenue S ¹	NB	-	-	-	-	-	-	300	225	-	-	-	-	300	225	-
		EB	250	910	-	250	910	-	250	910	150	250	910	-	250	910	150
		SB	550	-	50	550	-	50	120	550	-	550	-	50	120	550	-
		WB	-	960	140	-	960	140	100	960	140	-	960	140	100	960	140
36	Excelsior Boulevard & 11th Avenue S	NB	350	400	320	350	400	320	350	400	320	350	400	320	350	400	320
		EB	340	500	190	340	500	190	340	500	190	340	500	190	340	500	190
		SB	230	490	-	230	490	-	230	490	-	230	490	-	230	490	-
		WB	380	560	460	380	560	460	380	560	460	380	560	460	380	560	460
37	11th Avenue S LRT Grade Crossing	NB	-	-	-	-	-	-	-	850	-	-	-	-	850	-	
		EB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		SB	-	-	-	-	-	-	-	420	-	-	-	-	420	-	
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
38	11th Avenue S & 5th Street S	NB	-	590	-	-	590	-	-	590	-	-	590	-	-	590	-
		EB	1300	-	170	1300	-	170	1300	-	170	1300	-	170	1300	-	170
		SB	-	840	840	-	840	840	-	840	840	-	840	840	-	840	840
		WB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Analysis Notes:

All intersections modeled in VISSIM unless otherwise noted.

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

¹ - Intersection modeled in Synchro/SimTraffic Software.

Queuing Issues

9/10/2015

#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage				Identified as Issue?	Mitigation Proposed?		
					Existing Conditions	2013		2040				
						No Build	Build LRT	No Build			Build LRT	
2	Mitchell Road & EB TH 5 / TH 212 Ramp	NB	-	-					-	-		
		EB	-	-					-	-		
		SB	Through	AM					No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact through traffic or upstream signalized intersections.
				PM				X				
		WB	-	-						-	-	
EB	-	-						-	-			
3	Mitchell Road & Lone Oak Road	NB	-	-					-	-		
		EB	-	-					-	-		
		SB	Right-Turn	AM					No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact through traffic or upstream signalized intersections.
				PM				X				
WB	-	-						-	-			

Queuing Issues

9/10/2015

#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage				Identified as Issue?	Mitigation Proposed?		
					Existing Conditions	2013		Op Yr 2040				
						No Build	Build LRT	No Build			Build LRT	
4	Mitchell Road & Technology Drive	NB	Left-Turn	AM			X	X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change.
				PM								
			Right-Turn	AM			X	X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact through traffic or upstream signalized intersections.
				PM			X	X				
		EB	Left-Turn	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change.
				PM	X	X	X					
		SB	Left-Turn	AM		X	X	X	Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse in some scenarios.	No	Issues occur in No Build scenario and the project does not cause a significant change. Queuing has a potential to impact the upstream intersection. However, modeling shows that the queue does not cause gridlock conditions and does not result in congestion spreading through the network. In addition, the intersection continues to have acceptable LOS. Therefore, the queue is not considered an operational deficiency in need of mitigation.
				PM			X	X				
			Through	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse in some scenarios.	No	Issues occur in No Build scenario and the project does not cause a significant change. Queuing has a potential to impact the upstream intersection. However, modeling shows that the queue does not cause gridlock conditions and does not result in congestion spreading through the network. In addition, the intersection continues to have acceptable LOS. Therefore, the queue is not considered an operational deficiency in need of mitigation.
				PM			X	X				
		Right-Turn	AM					No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change. Queuing has a potential to impact the upstream intersection. However, modeling shows that the queue does not cause gridlock conditions and does not result in congestion spreading through the network. In addition, the intersection continues to have acceptable LOS. Therefore, the queue is not considered an operational deficiency in need of mitigation.	
			PM			X	X					
		WB	Right-Turn	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change.
				PM			X	X				

Queuing Issues

9/10/2015

#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage				Identified as Issue?	Mitigation Proposed?		
					Existing Conditions	2013		Op Yr 2040				
						No Build	Build LRT	No Build			Build LRT	
6	Technology Drive & Southwest Station West Access	NB	-	-					-	-		
		EB	Left-Turn	AM					No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact through traffic or upstream signalized intersections. Issues caused by TH 212/Prairie Center Drive Interchange.
				PM				X				
		SB	-	-						-	-	
		WB	-	-						-	-	
NB	-	-						-	-			
7	Technology Drive & Southwest Station East Access	EB	Left-Turn	AM					No	Average back of queue does not exceed storage length, and movement operates at LOS D or better.	No	Queuing caused by adjacent intersections (Prairie Center Drive). Intersection would operate at LOS B without adjacent queues. Also, similar issues between No Build and Build.
				PM			X	X				
		EB	Through	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Queuing caused by adjacent intersections (Prairie Center Drive). Intersection would operate at LOS B without adjacent queues. Also, similar issues between No Build and Build, Build condition happens to include a new full intersection at Southwest Station West Access.
				PM				X				
		SB	Left-Turn	AM					Yes	Average back of queue does exceed storage length and movement operates at LOS E or worse.	Yes	Queuing caused by adjacent intersections (Prairie Center Drive). Intersection would operate at LOS B without adjacent queues. Also, similar issues between No Build and Build. Project does include a 2nd southbound left-turn lane.
				PM			X	X				
WB	-	-						-	-			

Queuing Issues

9/10/2015

#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		Op Yr				2040		
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT	
8	Prairie Center Drive & WB TH 5 / TH 212 Ramp / Plaza Drive	NB	Left-Turn	AM						No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact upstream signalized intersections.	
				PM		X				X				
		EB	Right-Turn	AM					X		Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	Yes	Build project has a planned improvement converting one EB through lane to a second EB right-turn lane.
				PM					X					
		SB	Through	AM							Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement converting one EB through lane to a second right-turn lane.
				PM					X	X				
			Right-Turn	AM							Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement converting one EB through lane to a second right-turn lane.
				PM					X	X				
		WB	Left-Turn	AM							Yes	Average back of queue does exceed storage length and movement operates at LOS E or worse.	No	Issue occurs in No Build scenarios and the project does not cause a significant change. Build project has a planned improvement converting one EB through lane to a second right-turn lane.
				PM		X	X	X	X	X				
			Through	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement converting one EB through lane to a second right-turn lane.
				PM					X	X				

Queuing Issues

9/10/2015

#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		Op Yr					2040	
						No Build	Build LRT	No Build	Build LRT				No Build	Build LRT
9	Prairie Center Drive & EB TH 5 / TH 212 Ramp / Technology Drive	NB	Left-Turn	AM						Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.	
				PM		X		X	X					
			Through	AM						Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.	
				PM				X	X					
			Right-Turn	AM						Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.	
				PM		X		X	X					
		EB	Left-Turn	AM					Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.		
				PM		X	X	X	X					
		Through	AM						Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.		
			PM				X							
		SB	Left-Turn	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.		
				PM		X		X	X					
			Through	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.		
				PM				X	X					
		Right-Turn	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. Build project has a planned improvement adding a second WB right-turn lane.			
			PM				X	X						
WB	Through	AM					Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario. Build project has a planned improvement adding a second WB right-turn lane.				
		PM				X								
	Right-Turn	AM					Yes	Average back of queue exceeds storage length and movement operates at LOS E or worse.	Yes	Issues occur in No Build scenario. Build project has a planned improvement adding a second WB right-turn lane.				
		PM				X								

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?					
					Existing Conditions	2013		Op Yr				2040				
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT			
10	Prairie Center Drive / Technology Drive	NB	Left-Turn	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.		
				PM				X	X							
		EB	Left-Turn	AM									Yes	Average back of queue does exceed storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.
				PM				X	X							
			Through	AM									Yes	Average back of queue does exceed storage length and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.
				PM				X	X							
		Right-Turn	AM									Yes	Average back of queue does exceed storage length and movement operates at LOS E or worse.	Yes	Issues occur in No Build scenario and the project does not cause a significant change. Operation issues within the PCD/TH 212 interchange area. Build project includes 2nd eastbound right-turn lane.	
			PM				X	X								
		SB	Through	AM									No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.
				PM						X						
		Right-Turn	AM							X		Yes	Average back of queue exceeds storage length.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.	
			PM				X	X								
WB	Left-Turn	AM								No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.			
		PM	X	X	X	X	X									
Right-Turn	AM									Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change. TH 212 / PCD interchnage area operates poorly in future conditions. Improvement proposed in Build project to achieve No Build operations.			
	PM						X									
11	Main Street & Singletree Lane	NB	Through	AM							No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenarios and the project does not cause a significant change.		
				PM		X	X	X	X							
		EB	-	-	-	-	-	-	-	-	-	-	-	-		
		SB	-	-	-	-	-	-	-	-	-	-	-	-		
WB	-	-	-	-	-	-	-	-	-	-	-	-				

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?					
					Existing Conditions	2013		Op Yr				2040				
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT			
15	Flying Cloud Drive & Valley View Road	NB	Left-Turn	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Average queue significantly less than storage length.		
				PM						X						
		EB	Through	AM		X	X	X	X				Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change.
				PM												
		SB	Left-Turn	AM	X	X	X	X	X				Yes	Average back of queue exceeds storage length in some scenarios (Existing and 2040 No Build), and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change (reduced AM queue).
				PM												
		WB	Left-Turn	AM							X		Yes	Average back of queue does not exceed storage length and movement operates at LOS D or better (except AM).	No	Slight increase in queue in AM peak hour. Issues occur in No Build PM scenarios and the project does not cause a significant change.
				PM	X	X	X	X	X	X						
			Through	AM							No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenarios and the project does not cause a significant change.		
				PM	X	X	X	X	X							
16	Flying Cloud Drive & Viking Drive	NB	-	-							-	-	-	-		
		EB	Through	AM						X		Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project includes installation of a traffic signal, which will reduce delay and better manage queues.	
				PM												
		SB	-	-								-	-	-	-	
WB	Right-Turn	AM									Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project includes installation of a traffic signal, which will reduce delay and better manage queues.		
		PM						X								

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage				Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		2040					
						No Build	Build LRT	No Build			Build LRT		
17	Flying Cloud Drive & WB I-494 Ramp	NB	-	-					-	-			
		EB	-	-					-	-			
		SB	-	-					-	-			
		WB	Right-Turn	AM				X	Yes	Average back of queue exceeds storage length in some scenarios and movement operates at LOS E or worse.	Yes	Mitigation includes increasing the length of the two-lane section.	
			PM	X	X	X	X						
18	Flying Cloud Drive & EB I-494 Ramp / Technology Drive	NB	Left-Turn	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change.	
				PM		X		X					
		EB	Left-Turn	AM					X	Yes	Average back of queue exceeds storage length in some scenarios and movement operates at LOS E or worse.	No	Approach geometrics improved with two additional lanes and there is space to store vehicles in the through lane.
				PM				X	X				
			Right-Turn	AM						Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Approach geometrics improved with two additional lanes and there is space to store vehicles in the through lane.
				PM					X				
		SB	Through	AM						No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing has a potential to impact the upstream intersection. However, the modeling shows that the queue does not cause gridlock conditions and does not result in congestion spreading through the network. In addition, the intersection continues to have acceptable LOS. Therefore, the queue is not considered an operational deficiency in need of mitigation.
				PM				X	X				
		WB	-	-					-	-			

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		Op Yr				2040		
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT	
19	Flying Cloud Drive & Eden Road / Leona Road	NB	Left-Turn	AM						Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur only in 2040 No Build scenario and the project does not cause a significant change.	
				PM					X					
		EB	Left-Turn	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur only in 2040 No Build scenario and the project does not cause a significant change.
				PM					X					
		SB	Left-Turn	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur only in 2018 No Build scenario and the project does not cause a significant change.
				PM		X								
			Through	AM							No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing has a potential to impact the upstream intersection. However, the modeling shows that the queue does not cause gridlock conditions and does not result in congestion spreading through the network. In addition, the intersection continues to have acceptable LOS. Therefore, the queue is not considered an operational deficiency in need of mitigation.
PM							X							
		WB	-	-					-	-	-	-	-	
		NB	-	-					-	-	-	-	-	
20	Flying Cloud Drive & Singletree Lane	EB	Left-Turn	AM						Yes	Average back of queue exceeds storage length in some scenarios and movement operates at LOS E or worse.	No	Issues occur in No Build scenario and the project does not cause a significant change.	
				PM	X	X	X	X	X					
			Through	AM							Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Issues occur in 2040 No Build scenario and the project does not cause a significant change in 2040 Build.
				PM				X	X					
		WB	Left-Turn	AM							Yes	Average back of queue exceeds storage length in some scenarios (movement operates at LOS D or better).	No	Issues occur in No Build scenarios and the project does not cause a significant change.
				PM	X	X	X	X	X					
			Through	AM							Yes	Average back of queue exceeds storage length in some scenarios and movement operates at LOS E or worse.	No	Issues occur in No Build scenarios and the project does not cause a significant change.
PM	X			X	X	X	X							
		WB	-	-					-	-	-	-	-	

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage				Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		Op Yr 2040					
						No Build	Build LRT	No Build			Build LRT		
21	Shady Oak Road & Valley View Road	NB	-	-					-	-			
		EB	-	-					-	-			
		SB	Left-Turn	AM						Yes	No defined storage length, but movement operates at LOS E or worse and 95th percentile queues exceed 500 feet in No Build.	Yes	Issues occur in No Build scenario without All-Way Stop or traffic signal control. Conditions improved in Build Scenario for Opening Year with proposed All-Way Stop control. Future SB left-turn lane should be 300 to 400 feet. City project proposes traffic signal or roundabout between year of opening and 2040.
				PM		X			X				
		SB	Through	AM						Yes	No defined storage length, but movement operates at LOS E or worse and 95th percentile queues exceed 500 feet in No Build.	Yes	Issues occur in No Build scenario without All-Way Stop or traffic signal control. Conditions improved in Build Scenario for Opening Year with proposed All-Way Stop control. City project proposes traffic signal or roundabout between year of opening and 2040.
				PM		X							
		SB	Right-Turn	AM						Yes	No defined storage length, but movement operates at LOS E or worse and 95th percentile queues exceed 500 feet in No Build.	Yes	Issues occur in No Build scenario without All-Way Stop or traffic signal control. Conditions improved in Build Scenario for Opening Year with proposed All-Way Stop control. City project proposes traffic signal or roundabout between year of opening and 2040.
PM				X									
WB	-	-						-	-				
22	W 70th Street & Shady Oak Road	NB	Through	AM					Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	Yes	Issues occur only in 2040 No Build scenario. Mitigated in Build condition with addition of a northbound left-turn lane and All-Way Stop control.	
				PM				X					
		EB	Left-Turn	AM						Yes	No defined storage length, but movement operates at LOS E or worse and 95th percentile queues exceed 500 feet.	Yes	Issues occur only in 2040 No Build scenario. Mitigated in Build condition with addition of a northbound left-turn lane and All-Way Stop control.
				PM				X					
		SB	Through	AM						Yes	Average back of queue exceeds storage length (next public street) and movement operates at LOS E or worse.	No	Overall intersection operates at less delay in Build with All-Way Stop control and a northbound left-turn lane although it impacts the southbound movement.
				PM					X				
WB	-	-						-	-				
25	Shady Oak Road & EB TH 62 Ramp / W 62nd Street	EB	Right-Turn	AM			X	X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change.	
				PM									
		SB	-	-					-	-			
		WB	-	-					-	-			

Queuing Issues

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?		
					Existing Conditions	2013		Op Yr				2040	
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT
26	Shady Oak Road & City West Parkway	NB	-	-							-	-	
		EB	Left-Turn	AM	X	X	X	X	X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in Existing and No Build scenarios and the project does not cause a significant change.
				PM	X	X	X	X	X				
		SB	Left-Turn	AM					X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change.
				PM									
		WB	Left-Turn	AM						No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change.
				PM			X	X	X				
			Right-Turn	AM						No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Issues occur in No Build scenario and the project does not cause a significant change.
PM						X	X						
27	Bren Road East / Red Circle Drive	NB	-	-							-	-	
		EB	Right-Turn	AM	X	X		X		Yes	No defined storage length, but movement operates at LOS E or worse and 95th percentile queues exceed 500 feet.	No	Issues occur in No Build scenarios and the reconfigured roadways eliminate the problem in Build.
				PM									
		SB	-	-							-	-	
		WB	-	-							-	-	

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#	Intersection	Appr	Movement	Peak Period	Scenario(s) with 95th Percentile Queue > Storage					Identified as Issue?	Mitigation Proposed?			
					Existing Conditions	2013		Op Yr				2040		
						No Build	Build LRT	No Build	Build LRT			No Build	Build LRT	
34	Excelsior Boulevard & Shady Oak Road	NB	Left-Turn	AM						Yes	Average back of queue exceeds storage length, but movement operates at LOS D or better.	No	Issues occur in No Build scenarios and the project does not cause a significant change. This movement is not used by any trip generated by the project.	
				PM	X	X	X	X	X					
			Right-Turn	AM						No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Queuing is not expected to impact through traffic or upstream signalized intersections.	
				PM					X					
		EB	Left-Turn	AM						Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	No	Queuing is not expected to impact through traffic or upstream signalized intersections. This movement is not used by any trip generated by the project.	
				PM					X					
		SB	Left-Turn	AM	X		X	X	X	Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse in some scenarios.	No	County Project extended the SB left-turn lane from 100 to 290 feet. Project provided Hennepin County the following recommendations: 1) extension of the SB left-turn lane; 2) operation of the SB left-turn in lagging operation; 3) modification of the median design to allow for more left-turn storage; and 4) modification of the SB left-turn phase to protected/permisive.	
				PM	X									
35	Excelsior Boulevard & 17th Avenue S	SB	Left-Turn	AM			X	X	Yes	Average back of queue does not exceed storage length, but movement operates at LOS E or worse.	Yes	Project reconfigures approach to a through-right lane and a left-turn lane.		
				PM			X	X						
		Right-Turn	AM	X	X		X	No	Average back of queue does not exceed storage length and movement operates at LOS D or better.	No	Project reconfigures approach to a through-right lane and a left-turn lane.			
			PM	X	X		X							
		WB	-	-	-	AM					-	-	-	-
						PM						-	-	-

Analysis Notes:

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