

Memorandum

To	Jim Alexander, Director of Design and Engineering	Page	1
CC	Kim Proia, PEC Project Manager Don Demers, PEC West Civil Lead		
Subject	SDEIS Traffic Analysis – Technical Issue #1		
From	Patrick Corkle, PEC West Traffic Lead		
Date	January 14, 2014		

This Technical Memorandum evaluates the traffic operations impacts of the Southwest Light Rail Transit (SWLRT) project for potential Eden Prairie alignment adjustments in the area called Technical Issue #1. The LRT alignment adjustments evaluated are in Hennepin County and the City of Eden Prairie. These adjustments span from 1,000 feet northeast of the intersection of Flying Cloud Drive and Valley View Road to the end of the line.

The purpose of this memorandum is to document the traffic analysis of the alignment adjustments included in the SWLRT Supplemental Draft Environmental Impact Statement (SDEIS) in a manner similar to the analysis completed in the DEIS section 6.2.2.3. The memorandum includes the technical methodology, assessment of impacts, analysis results and potential mitigation strategies of the traffic analysis for the Eden Prairie alignment adjustments.

1.0 Technical Methodology

1.1 Rules, Guidance, Standards, etc.

The analysis was conducted according to the Highway Capacity Manual (HCM) 2010 prepared by the Transportation Research Board (TRB) of the National Academies. Level of Service (LOS) is the measure used to evaluate intersection traffic conditions.

1.2 Data Sources

The following data sources were used in the analysis:

- Existing (2013) and forecast traffic volumes
- Existing roadway geometrics and intersection configurations
- Existing traffic signal timing and phasing
- Proposed LRT schedule
- Proposed LRT alignments and adjustments

1.3 Methodologies for SDEIS

The steps followed in assessing the traffic impacts of the Eden Prairie alignment adjustment for the SDEIS are as follows:

- 1) Identified study area intersection/crossing locations for evaluation (Appendix A –Intersections Evaluated)
- 2) Collected existing baseline data (Appendix B – Existing Traffic Volumes and Geometry)
 - Traffic volumes, roadway geometric/intersection configurations, signal timing/phasing
- 3) Determined analysis scenarios
- 4) Developed roadway forecasts (Appendix C – 2018 and 2030 Traffic Volumes and Geometry)
- 5) Defined potential Build alignment adjustments (Appendix D – Alignment Adjustment)
 - LRT schedule, crossing location, crossing time, and LRT defined geometric and operational improvements
- 6) Determined intersection operations (Appendix E – LOS Description Table)
- 7) Defined potential mitigation measures

1.3.1 Study Area Intersection/Crossing Locations for Evaluation

The DEIS analyzed any at-grade LRT/roadway intersections with one of the following characteristics:

- Signalized intersections within 200 feet of the LRT crossing
- Signal, roundabout, or stop sign controlled intersections within 600 feet of the LRT crossing and daily volume over 5,000 vehicles per day
- Adjacent intersection(s), if part of a coordinated system
- LRT crossing a roadway with daily traffic volumes over 5,000 vehicles per day

In addition to the factors above, this analysis includes all proposed at-grade LRT crossings of proposed full access roadways and intersections (including private driveway crossings at intersections with public roadways) directly impacted by LRT operations regardless of volume. This was done to provide a more complete understanding of the potential traffic and LRT operations impacts of the alignment adjustments.

1.3.2 Existing Baseline Data

The following baseline data was collected:

- Traffic volumes were collected from April through June of 2013
- Roadway geometrics and intersection lane configurations were confirmed in April through June of 2013
- Traffic signal phasing and timing were provided in Synchro/SimTraffic files from recent signal re-timing projects and adjusted for current conditions

1.3.3 Analysis Scenarios

The traffic analysis scenarios included:

- LRT Conditions:
 - No Build LRT – Existing geometric conditions

- Build LRT – Construction of LRT with geometric improvements and operational modifications to accommodate the construction and operation of LRT
- Horizon Years:
 - Existing – Current conditions and traffic volumes
 - Year 2018 – Traffic volume forecasts for year 2018 (considered year of opening)
 - Year 2030 – Traffic volume forecasts for year 2030 (considered the forecast year)
- Time Periods:
 - A.M. Peak Hour – Highest roadway volume in one hour in the morning (typically 7:00-8:00 a.m.)
 - P.M. Peak Hour – Highest roadway volume in one hour in the evening (typically 4:30-5:30 p.m.)

1.3.4 Roadway Forecasts for 2018 and 2030

The DEIS utilized a single 20-year growth factor of 1.12 for all traffic volumes. The growth factor was calculated by comparing the growth in traffic volumes adjacent to the Southwest Transitway, from a corridor wide perspective, in the Metropolitan Regional Model. The resulting annual growth rate to 2030 was approximately 0.6 percent. A slightly lower eight year growth rate of 1.03 (0.4 percent per year) was utilized to develop 2018 forecasts for the DEIS. (From Appendix H of the Southwest Transitway DEIS from 2012; the Technical Memorandum titled “Southwest Transitway DEIS- Traffic Analysis Update” completed by WSB in April 20, 2010 (Updated March 12, 2012; pg. 5 paragraph titled – Analysis Year, Traffic Growth Factor, Assumed Future Projects)

The basis for developing roadway forecasts for the SDEIS analysis was completed using the approved Eden Prairie Comprehensive Plan which includes the same Land Use and Socioeconomic assumptions included in the Metropolitan Council’s Regional Model. The forecast roadway volumes included in this memorandum were utilized at a more localized level to develop growth rates on a roadway segment by roadway segment basis. These volumes were then compared to existing and historic traffic counts to determine an annual growth rate for each roadway segment. This information was also reviewed in combination with recent project-level roadway forecasts and planned development to determine if different annual growth rates should be used for the 2013 to 2018 and the 2018 to 2030 time periods.

These growth rates were then applied to existing turning movement counts to generate 2018 and 2030 No Build traffic forecasts. Build traffic forecasts were developed by adding in traffic associated with the Southwest LRT Park and Ride facilities. In general, this process resulted in larger forecast growth rates than were utilized for the DEIS.

1.3.5 Build Alignment Adjustment

The Build alignment adjustment is shown in Appendix D. The LRT operational characteristics used for the analysis include:

- For the SDEIS, headways are 10 minutes in each direction, which is consistent with current operations on the Blue line and anticipated operations on the Green Line (Note - the DEIS used 7.5 minute headways). Headway is the time between each train traveling in the same direction. A 10-minute headway corresponds to 12 trains in the peak hour (six in each direction), which equates to one train approximately every five minutes.

- LRT crossing time was calculated to typically be between 40 to 50 seconds depending on the speed of the LRT vehicle and the length of the crossing. The DEIS estimated a signalized intersection would be disrupted for 45 seconds. This value included 30 seconds for track clearance and 15 seconds for the actual crossing. This calculation is very similar to the crossing time. The crossing time is dependent on LRT speed at the crossing, the length of the crossing and the amount of time needed prior to LRT arriving. Both of these calculations are estimating the time vehicular traffic would be delayed at the LRT crossing.
- Traffic Operations
 - The DEIS states that Traffic Signal Priority operation would be assumed for all LRT crossings at signalized intersections within the Eden Prairie study area. Priority operation provides a traffic signal timing preference to LRT through pre-defined timing parameters that work to minimize the impact to traffic operations.
 - For the SDEIS, a preemption strategy was used for LRT crossings with traffic signals and mid-block crossings without traffic signals. This LRT operation strategy was evaluated because it has the biggest impact on vehicular traffic. This is because it transfers the right-of-way to LRT and only traffic compatible with the LRT movement through the intersection. This results in LRT experiencing no delay. As part of the SDEIS evaluation, it is acknowledged that preemption operations will have more impact than priority operation on those movements not compatible with LRT. If unacceptable intersection operations are identified in the build condition, potential mitigation strategies would include the use of priority operation.

1.3.6 Intersection LOS Analysis

The DEIS evaluation of intersections was based on a Level of Service (LOS) analysis utilizing established criteria documented in the HCM (Highway Capacity Manual). Synchro/SimTraffic software was the primary modeling tool used in the DEIS to complete the LOS analysis. LOS is defined in Appendix E.

The SDEIS analysis uses the same established HCM criteria for the LOS analysis and also utilizes the Synchro/Sim-Traffic software and the HCS (Highway Capacity Software) as the primary modeling tools.

Acceptable operations are defined as overall intersection Level of Service (LOS) results ranging from A through D. Unacceptable operations are defined as overall intersection Level of Service (LOS) results of E or F.

1.3.7 Potential Mitigation Measures

The traffic analysis for the SDEIS has identified unacceptable operations at several LRT/vehicle crossing locations. This memorandum identifies potential measures which would improve the operations to acceptable levels. Individual movements or approaches are not always mitigated for poor LOS. These potential improvements along with other potential mitigation measures will be further evaluated for the FEIS to determine specific recommended mitigation measures to implement with the project.

The need for mitigation will be identified for the following conditions:

- The No Build overall intersection LOS is at acceptable operations (LOS A-D) and under the Build condition, operations are unacceptable (LOS E or F). Potential mitigation measures will be identified to provide acceptable operations (LOS A-D).
- The No Build overall intersection LOS is at unacceptable operations (LOS E or F) and the Build condition is also at an unacceptable operation (LOS E or F). Potential mitigation measures will be identified to provide a similar level of operation as the unmitigated No Build condition.

2.0 Description of Alignment Adjustment

The following provides a general description of the alignment adjustment segments evaluated in this memorandum. Base improvements needed to accommodate LRT were included in the Build analysis and are described in following sections. All of these modifications will need to be confirmed as part of the design process. Descriptions of the alignments will be from east to west. A graphical representation of the alignment is shown in Appendix D. Existing geometry, traffic volumes and control are shown in Appendix B, with future traffic volumes and geometry in Appendix C.

2.1 LRT 3A-EP-A1 (Comp Plan Alignment)

LRT 3A-EP-A1 is sometimes referred to as the “Comp Plan” alignment because it is the LRT alignment segment that most closely matches the alignment shown in the City of Eden Prairie’s Comprehensive Plan. The alignment starts with a grade separation of LRT over the Valley View Road and Flying Cloud Drive intersection bringing LRT from the east side to the west side of Flying Cloud Drive. Once on the ground along the west side of Flying Cloud Drive, the LRT alignment crosses at-grade on the west leg (private driveway) of the Viking Drive at Flying Cloud Drive intersection.

The alignment would change directions from north-south to east-west just prior to the Eden Road intersection. It runs along the north side of Eden Road resulting in two at-grade crossings of private driveway entrances at the Glen Lane and Eden Road intersections. A third at-grade crossing along this portion of the alignment could occur with a future north-south roadway called “Main Street” planned by the City of Eden Prairie within the Town Center area.

Following this east-west alignment on the north side of Eden Road, the LRT will be at a higher elevation than Prairie Center Drive and remain grade-separated over Prairie Center Drive and Technology Drive. This segment of the alignment would end on the north side of the existing SW Transit Station Bus Facility. This LRT alignment segment would continue along LRT 3A-EP-B2.

In total, this alignment would cross four roadways or private driveways (five including the future “Main Street” crossing) at-grade, all of which are anticipated to be signalized in the Build condition. In order to accommodate LRT on Eden Road between Glen Lane and “Main Street” (future north-south roadway identified in city planning documents connecting Technology Drive to Regional Center Road and located midway between Flying Cloud Drive and Prairie Center Drive.). Eden Road would be re-constructed and re-configured from a two-lane roadway to a three-lane roadway (one thru lane in each direction and a left-turn lane) with right-turn lanes for movements crossing the LRT tracks.

2.2 LRT 3A-EP-B2 (Technology Drive)

LRT 3A-EP-B2 is sometimes referred to as the “Technology Drive” alignment, as it primarily runs along the south side of Technology Drive. The alignment would begin on the north side of the existing SW Transit Station Bus Facility as a continuation of the LRT 3A-EP-A1 segment, crossing to the south side of Technology Drive at the west bus access to SW Transit Station. This would result in a diagonal crossing and likely require a traffic signal to control the movements. It would continue along the south side of Technology Drive to Eden Prairie City Center. Along the way, it would cross two private driveways on the south side of Technology Drive and Mitchell Road at-grade.

Once at the Eden Prairie City Center, the alignment may stop with a station at this location or cross diagonally to the north side of Technology Drive at a new combined access intersection on the west side of the Eden Prairie City Center property which is herein referred to as future Hiawatha Avenue. This alignment extension would continue along the north side of Technology Drive to serve an alternate station location and/or a LRT Operations and Maintenance Facility (OMF) near Wallace Road. This assumes the closure of the eastern Eden Prairie City Center access to Technology Drive.

In total, this segment of the alignment would cross four roadways or private driveways (five including the Hiawatha Avenue intersection) at-grade, all of which are anticipated to be signalized in the build condition. Left-turn and right-turn lanes would be provided for those movements across the LRT tracks. In order to accommodate LRT, Technology Drive is anticipated to be re-constructed and re-configured from a four-lane undivided roadway to a three-lane roadway (one thru lane in each direction with left-turn lanes) between Optum west driveway and SW Transit Station bus access. Another four driveways would be impacted by the roadway modifications. One of them, MTS east driveway, could potentially realign with the Optum east driveway to allow a full signalized access.

3.0 Results

The Level of Service (LOS) results for the SDEIS analysis for the a.m. and p.m. peak hour are shown in Tables 3.1 and 3.2. The analysis results for signalized intersections are shown with one LOS. The analysis results for unsignalized intersections are shown with two LOS. The first LOS is for the overall intersection, while the second represents the worse approach. Poor LOS on the worse approach does not always mean a mitigation measure is appropriate, but further analysis and investigation is warranted.

For comparison purposes, the DEIS results of the common intersections between the SDEIS and the DEIS are shown in Table 3.3. These are taken from the DEIS Chapter 6; Section 6.2.2.3 and the DEIS Appendix H (Traffic Analysis Update dated March 21, 2012).

When comparing the No Build and Build operations results, note that the Build condition will have improvements that are inherent to an LRT Build condition. As described in the description of the alignment adjustments (Section 2.0) these improvements typically include traffic signals to control the LRT and vehicle movements, turn lanes for any movements crossing the LRT tracks and restricted right-turn movements across the tracks. Assumed lane geometry for the Build condition can be seen in Appendix C with the forecast traffic volumes. Both the Build and No Build conditions assume updated traffic signal timing.

Potential mitigation strategies to address unacceptable operations are identified at the end of this section. These strategies will be considered during the design phase of the project and mitigations will be proposed in the FEIS.

**TABLE 3.1
Intersection LOS – A.M. Peak Hour (SDEIS)**

Intersection	Existing	2018 No Build	2018 Build	2030 No Build	2030 Build	2030 Mitigated
LRT 3A-EP-A1 (Comp Plan)						
Flying Cloud Drive/ Viking Drive	A/C	A/D	B	B/F	B	-
Flying Cloud Drive / I-494 North Ramp	B	B	B	B	C	-
Flying Cloud Drive / Technology Drive / I-494 South Ramp	B	B	C	B	D	-
Flying Cloud Drive / Eden Road	B	B	B	B	B	-
Eden Road /Glen Lane	A/A	A/A	B	A/B	B	-
Eden Road /Eden Road	A/A	A/A	B	A/A	B	-
LRT 3A- EP-B2 (Technology Drive)						
Mitchell Road/TH 212/5 North Ramp	C	C	C	C	C	-
Mitchell Road / TH 212/5 South Ramp	B	B	B	B	C	-
Mitchell Road/Lone Oak Road	A	A	A	A	B	-
Mitchell Road / Technology Drive	C	C	D	D	F	D
Technology Drive/SW Station west bus access	A/B	A/B	C	A/B	C	-
Technology Drive/Southwest Condos (East Driveway)	A/B	A/C	A/C	A/C	A/D	-
Technology Drive/Southwest Condos (West Driveway)	A/B	A/B	A/B	A/C	A/C	-
Technology Drive/St Andrews (East Driveway)	A/B	A/B	A/B	A/C	A/C	-
Technology Drive/MTS (East Driveway)	A/B	A/B	(1)	A/C	(1)	-
Technology Drive/Optum (East Driveway)	A/B	A/C	C	A/C	C	-
Technology Drive/ Optum (West Driveway)	A/A	A/B	B	A/B	C	-
Technology Drive/Hiawatha Avenue	A/B	A/B	B	A/C	B	-

(1) Combine intersection with Optum East Driveway

**Table 3.2
Intersection LOS – P.M. Peak Hour (SDEIS)**

Intersection	Existing	2018 No Build	2018 Build	2030 No Build	2030 Build	2030 Mitigated
LRT 3A-EP-A1 (Comp Plan)						
Flying Cloud Drive / Viking Drive	A/E	A/F	B	C/F	B	-
Flying Cloud Drive / I-494 North Ramp	C	C	C	D	D	-
Flying Cloud Drive / Technology Drive / I-494 South Ramp	C	C	E	D	E	D
Flying Cloud Drive / Eden Road	C	C	C	C	C	-
Eden Road/Glen Lane	A/B	A/B	B	A/C	C	-
Eden Road/Eden Road	A/A	A/A	B	A/B	B	-
LRT 3A- EP-B2 (Technology Drive)						
Mitchell Road/TH 212/5 North Ramp	C	C	C	D	D	-
Mitchell Road/ TH 212/5 South Ramp	B	B	B	B	B	-
Mitchell Road/Lone Oak Road	A	A	A	A	B	-
Mitchell Road/ Technology Drive	C	C	D	D	F	D
Technology Drive/SW Station west access	A/B	A/B	C	A/B	C	-
Technology Drive/Southwest Condos (East Driveway)	A/B	A/C	A/C	A/C	A/E	-
Technology Drive/Southwest Condos (West Driveway)	A/B	A/B	A/B	A/B	A/C	-
Technology Drive/St Andrews (East Driveway)	A/B	A/B	A/C	A/C	A/C	-
Technology Drive/MTS (East Driveway)	A/B	A/C	(1)	A/D	(1)	-
Technology Drive/Optum (East Driveway)	A/B	A/B	C	A/B	C	-
Technology Drive/Optum (West Driveway)	A/B	A/C	B	E/F	C	-
Technology Drive/Hiawatha Avenue	A/B	A/B	B	A/C	C	-

(1) Combine intersection with Optum East Driveway

**Table 3.3
Intersection LOS from DEIS⁽¹⁾**

Intersection	Existing	2018 No Build	2018 Build	2030 No Build	2030 Build
LRT 3A (A.M. Peak Hour)					
Mitchell Road/ TH212/ 5 North Ramp	B	B	C	B	C
Mitchell Road/ TH 212/5 South Ramp	B	B	B	B	B
Mitchell Road/Lone Oak Road	A	A	A	A	A
Mitchell Road/ Technology Drive	C	C	C	C	C
LRT 3A (P.M. Peak Hour)					
Mitchell Road/TH 212/5 North Ramp	C	B	B	B	B
Mitchell Road/ TH 212/5 South Ramp	B	B	B	B	B
Mitchell Road/Lone Oak Road	A	A	A	A	A
Mitchell Road/ Technology Drive	C	B	C	C	C

(1) From DEIS Appendix H – Traffic analysis memorandum Tables 2 and 3

3.1 Traffic Results LRT 3A – EP – A1 (Comp Plan)

Under the 2018 and 2030 No Build p.m. peak hour conditions and 2030 No Build a.m. peak hour conditions, the Viking Drive approaches at the Flying Cloud Drive/Viking Drive intersection operate at unacceptable LOS. This intersection has high volumes on Flying Cloud Drive in 2018 and 2030. With side-street stop control, motorists on Viking Drive would find it very difficult to cross or make a left-turn onto Flying Cloud Drive during the peak hour periods. The Build condition assumes a traffic signal at this location to accommodate LRT. By providing signal controlled access onto Flying Cloud Drive, side-street operations improve to acceptable levels. Traffic signal warrants and priority ratings will need to be evaluated to determine if a traffic signal is justified.

Under the 2018 and 2030 Build p.m. peak hour conditions, the Flying Cloud Drive/Technology Drive/I-494 South Ramp intersection operates at unacceptable LOS E. This result is caused by additional delays and queuing for the eastbound right-turn movement which is restricted to no right turns on red because of the LRT crossing. The eastbound left-turn and through movements and the northbound left-turn movement will also be impacted as these movements cannot occur concurrently with an LRT vehicle passing through the intersection. Potential improvements include providing a separate eastbound left-turn lane and an additional northbound left-turn lane at the intersection. By providing these improvements, the intersection would have acceptable operations. These potential improvements along with other potential mitigation measures will be further evaluated for the FEIS to determine specific recommended mitigation measures.

All other intersections evaluated for this segment operate at acceptable conditions in the No-Build and Build scenarios.

3.2 Traffic Results LRT 3A – EP – B2 (Technology Drive)

Under the 2030 No Build p.m. peak hour conditions, the private roadway approach at the Technology Drive/Optum (west driveway) intersection operates at an unacceptable LOS as a side street stop controlled intersection. This is caused by the heavy p.m. peak hour departure of employee vehicles leaving the site, resulting in high delays for northbound left-turn movements. It is recommended that the City evaluate this intersection with any future development of adjacent vacant property in this area.

Under the 2030 Build a.m. and p.m. peak hour conditions, the Mitchell Road/Technology Drive intersection operates at an unacceptable LOS F. The Mitchell Road/Technology Drive intersection will experience poor LOS under the Build condition with 2030 volumes. This is a result of longer delays and queuing for several movements including:

- Northbound left-turn. The existing turn lanes are short and the LRT tracks crossing on the south side of the intersection will decrease their length. In addition, this movement will experience higher volumes with the park and ride traffic. The northbound right-turn lane storage length is also being reduced by the LRT tracks and Right-Turn-On-Red (RTOR) will not be allowed.
- Eastbound left-turn. Volumes will increase with park and ride generated traffic during the p.m. peak period.
- Southbound left-turn. The existing turn lanes are short in length and longer storage will be needed to accommodate future traffic and LRT operations.

Potential improvements to provide acceptable operation could include extension of the northbound left-turn and right-turn lanes, providing an additional eastbound right-turn lane, extending the southbound left-turn lanes, adding a second eastbound and westbound left-turn lane and operating the traffic signal in priority operation. By providing these improvements, the intersection would have acceptable operations. These potential improvements along with other potential mitigation measures will be further evaluated for the FEIS to determine specific recommended mitigation measures..

Under the 2030 p.m. peak hour conditions, the Technology Drive/Southwest Condos (east driveway) intersection operates at an overall LOS A and cross-street LOS E. The poor LOS for the cross-street is partially caused by the close spacing (approximately 150 feet) to the SW Station west bus access. The SW Station west bus access would likely be signalized under Build conditions to allow LRT to cross from the north side to the south side of Technology Drive. Vehicles waiting for LRT will block this driveway, causing additional delay. It should be noted that the delay is very close to the LOS D/E threshold and mitigation measures might not be practical, feasible or justified. Further evaluation will be completed for the FEIS.

All other intersections evaluated for this segment operate at acceptable conditions in the No-Build and Build scenarios.

3.3 Potential Mitigation Strategies

As previously described, the need for mitigation will be identified for the following conditions:

- The No Build overall intersection LOS is at acceptable operations (LOS A-D) and under the Build condition the operation is unacceptable (LOS E or F). Potential mitigation measures will be identified to provide acceptable operations (LOS A-D).
- The No Build overall intersection LOS is at unacceptable operations (LOS E or F) and the Build condition is also in an unacceptable operation (LOS E or F). Potential mitigation measures will be identified to provide a similar level of operation as the unmitigated No Build condition.

The following are general mitigation strategies which could be used to improve the operations of impacted signalized intersections.

- Optimization of signal splits (green time) and offsets
- New traffic signal controllers, pedestrian controllers and signage at crossings
- Modify LRT crossing operation from preemption to a priority strategy

In addition, mitigation measures that could be implemented to address impacts at intersections analyzed to operate at LOS E or F under build conditions include:

- Adding left or right-turn lanes
- Lengthening left or right-turn lanes
- Adding lanes to the cross-street approaches
- Providing a grade separation between the roadway and LRT guideway
- Restricting or removing full access

The traffic analysis in this memorandum identified unacceptable operations at several intersections in which mitigation would be required in the LRT Build condition. At these locations potential improvements consistent with the above mitigation measures were evaluated and it was determined that the intersection operations with LRT can be improved to acceptable levels. These potential improvements along with other potential mitigation measures will be further evaluated for the FEIS to determine specific recommended mitigation measures to implement with the project.

4.0 References

- HCM 2010 (Highway Capacity Manual), TRB (Transportation Research Board of the National Academies)
- Synchro/Sim-Traffic Studio 8 Traffic Signal Software User Guide, Trafficware

Appendix A

Intersections Evaluated



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SOUTHWEST LIGHT RAIL

TI-1: EDEN PRAIRIE ALIGNMENT
INTERSECTIONS EVALUATED

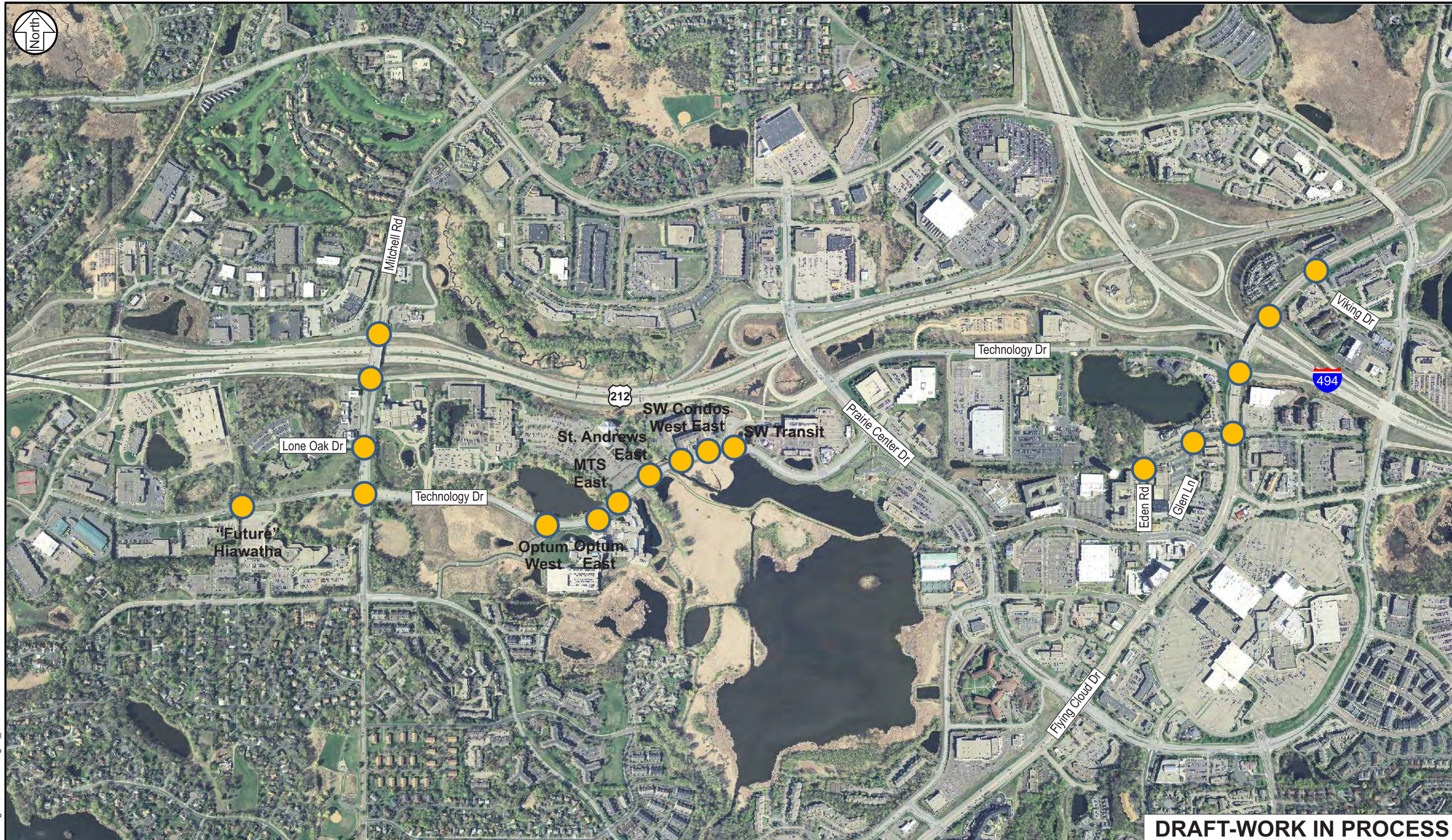
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DATE: 09/19/13



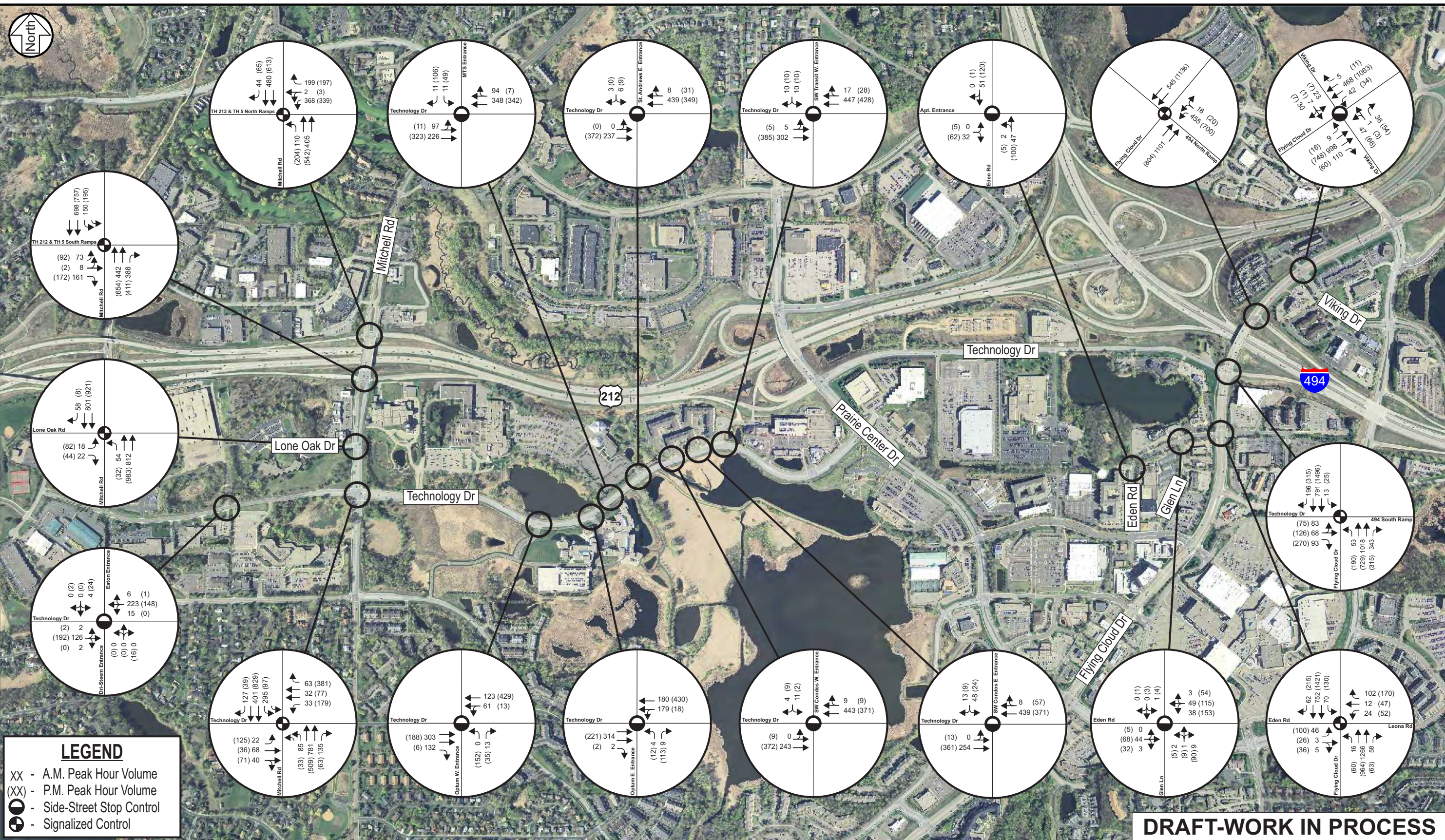
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Appendix B

Existing Traffic Volumes and Geometry

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SOUTHWEST LIGHT RAIL
 TI-1: EDEN PRAIRIE ALIGNMENT
 EXISTING VOLUMES AND GEOMETRY

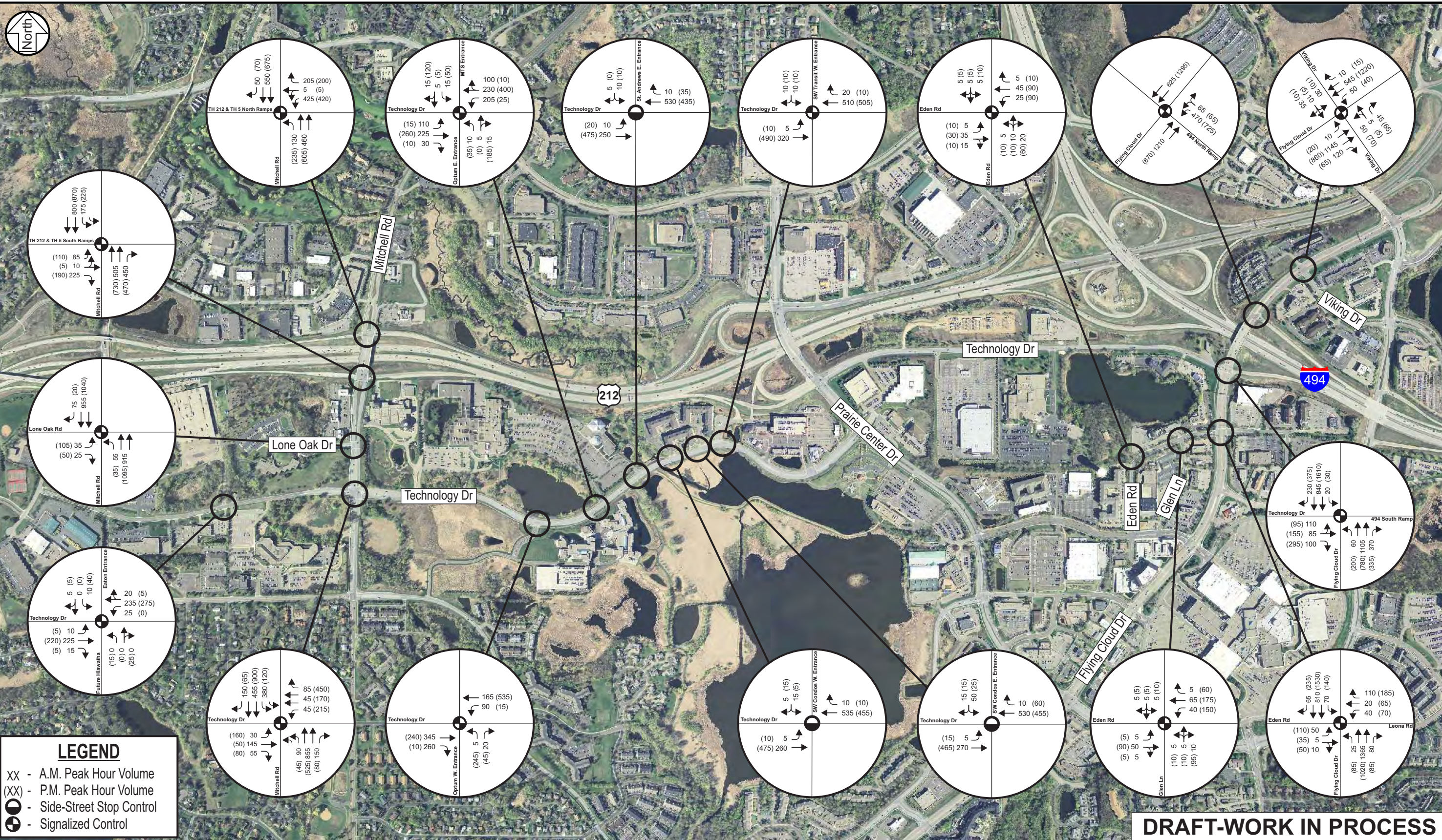
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Appendix C

2018 and 2030 Traffic Volumes and Geometry

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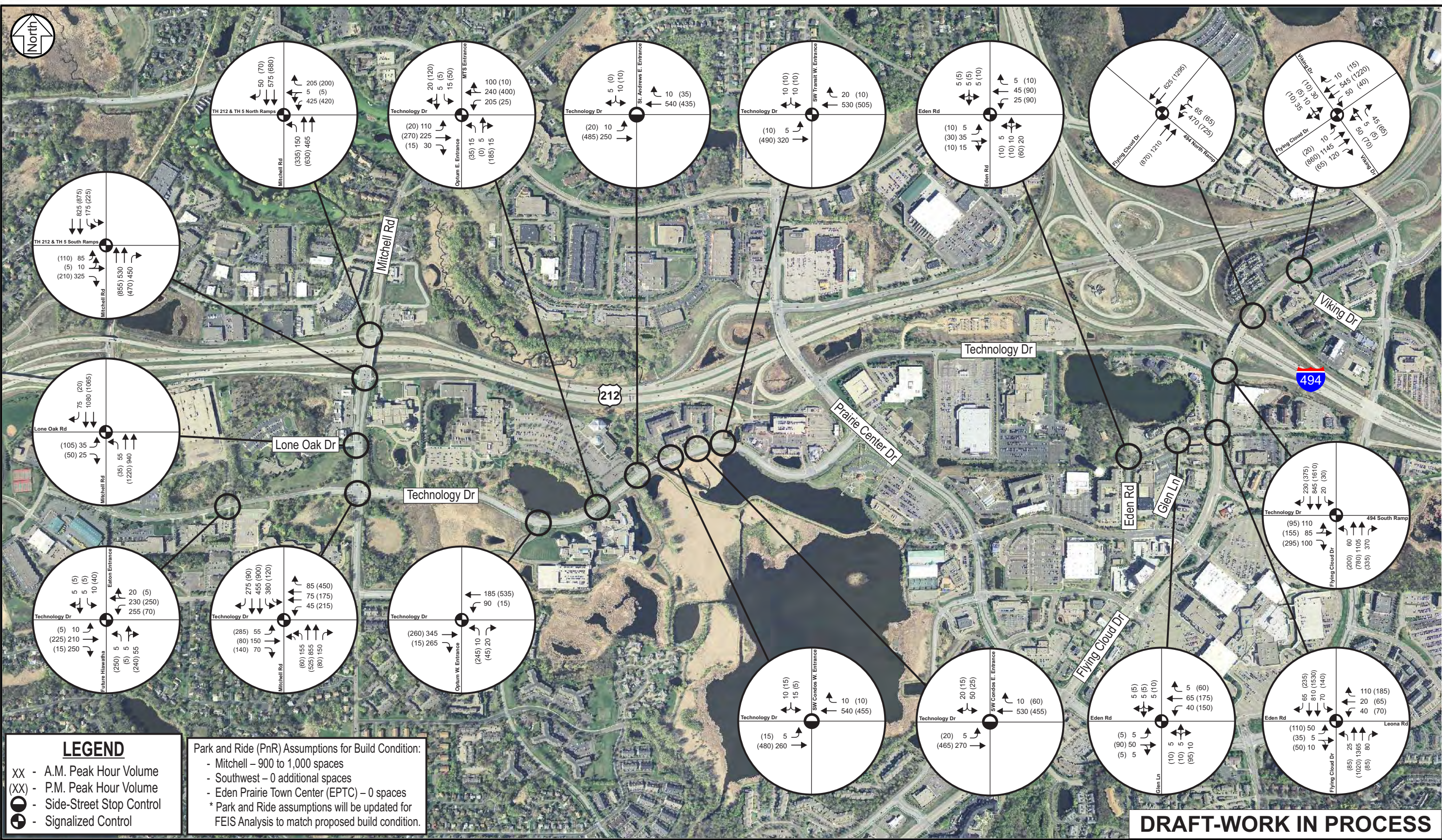


SOUTHWEST LIGHT RAIL
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 2018 NO BUILD TRAFFIC VOLUMES AND GEOMETRY

IRT: #1
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 DATE: 12/10/2013



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LEGEND

- XX - A.M. Peak Hour Volume
- (XX) - P.M. Peak Hour Volume
- - Side-Street Stop Control
- ⊕ - Signalized Control

Park and Ride (PnR) Assumptions for Build Condition:

- Mitchell – 900 to 1,000 spaces
- Southwest – 0 additional spaces
- Eden Prairie Town Center (EPTC) – 0 spaces
- * Park and Ride assumptions will be updated for FEIS Analysis to match proposed build condition.

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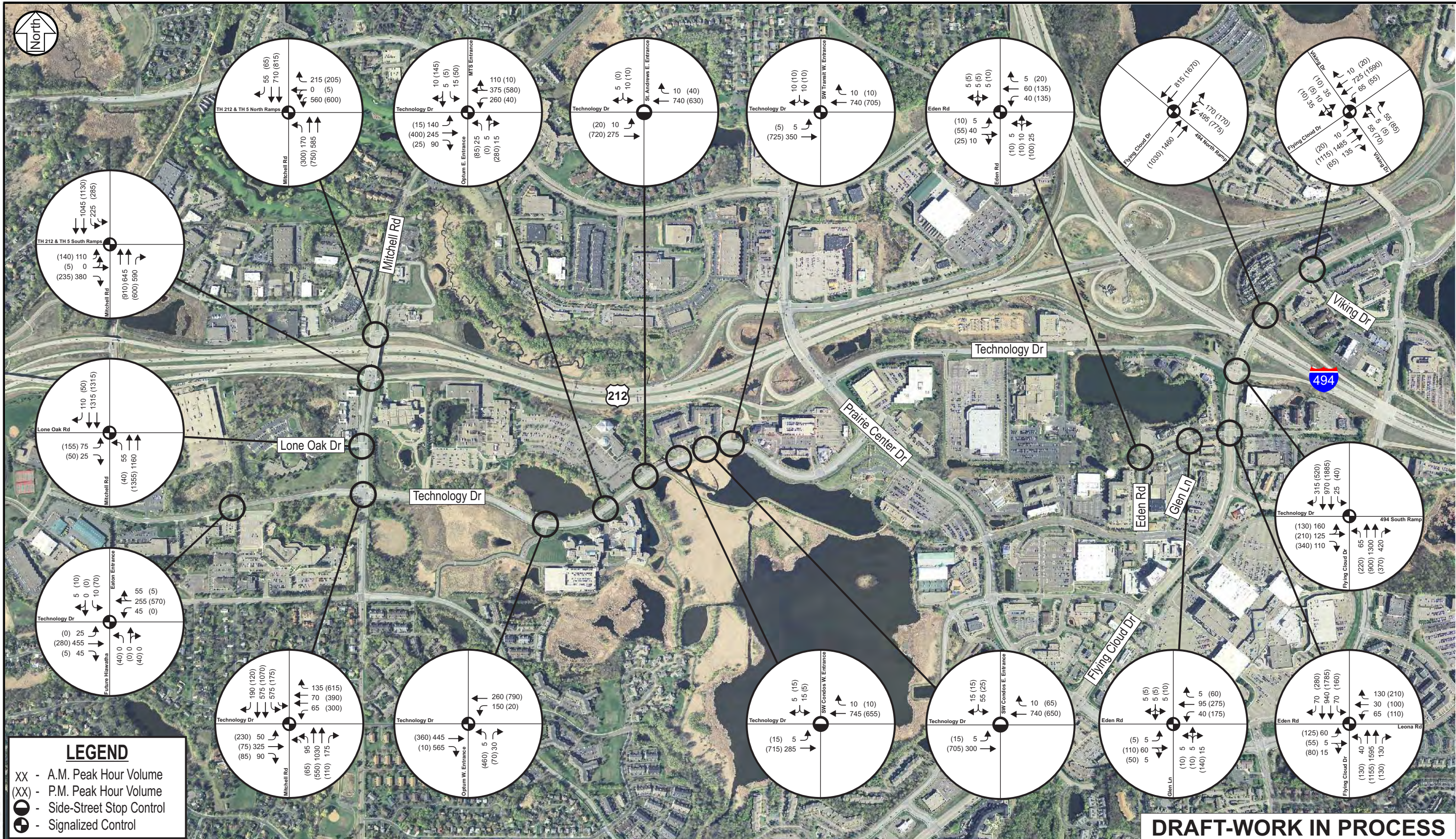


SOUTHWEST LIGHT RAIL
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 2018 BUILD TRAFFIC VOLUMES AND GEOMETRY

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 REV: 3
 DATE: 12/10/2013



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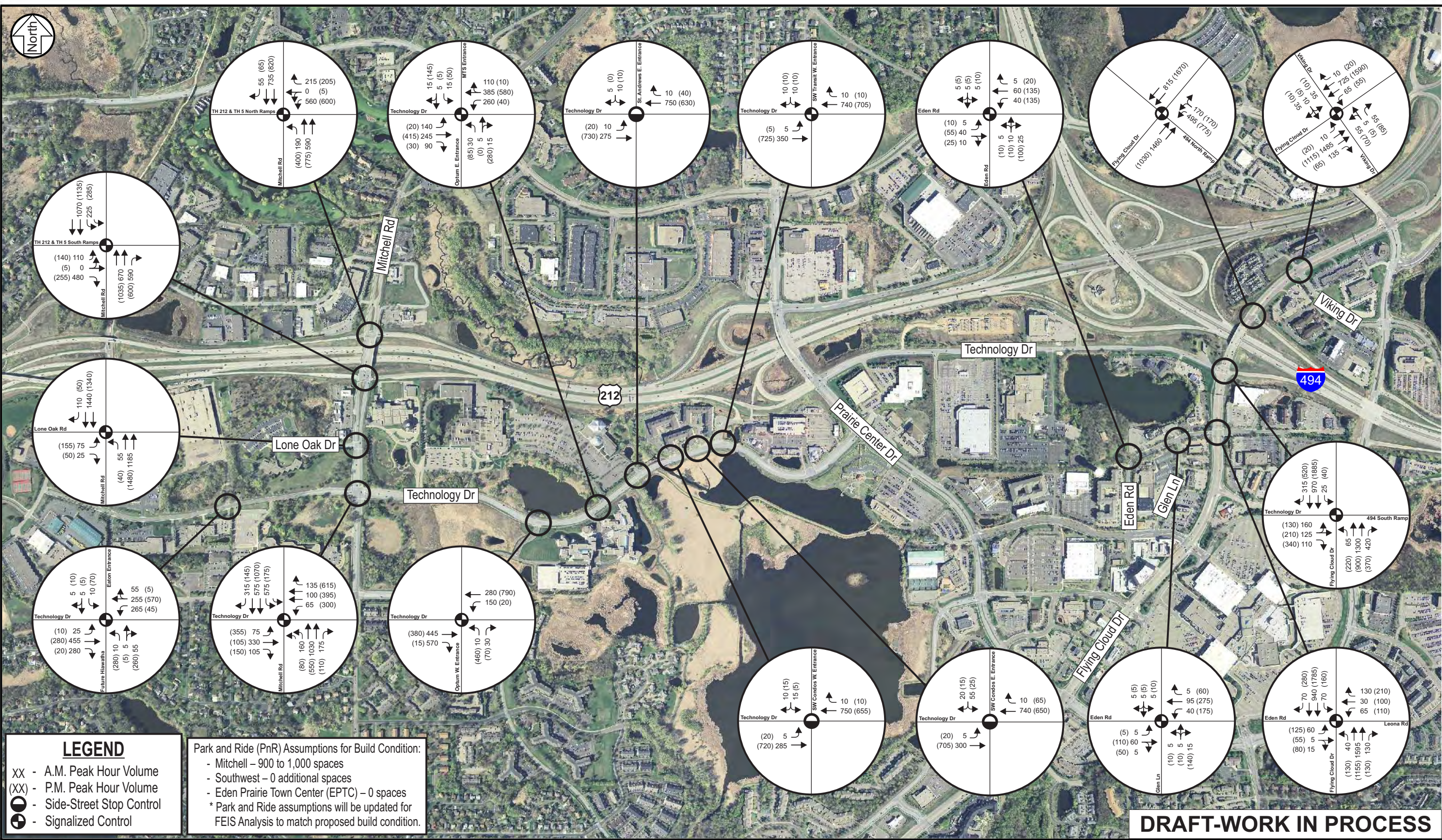


SOUTHWEST LIGHT RAIL
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IRT: #1
 REV: 3
 DATE: 12/10/2013



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LEGEND

- XX - A.M. Peak Hour Volume
- (XX) - P.M. Peak Hour Volume
- - Side-Street Stop Control
- ⊕ - Signalized Control

Park and Ride (PnR) Assumptions for Build Condition:

- Mitchell – 900 to 1,000 spaces
- Southwest – 0 additional spaces
- Eden Prairie Town Center (EPTC) – 0 spaces
- * Park and Ride assumptions will be updated for FEIS Analysis to match proposed build condition.

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SOUTHWEST LIGHT RAIL
 TI-1: EDEN PRAIRIE ALIGNMENT
 2030 BUILD TRAFFIC VOLUMES AND GEOMETRY

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 REV: 3
 DATE: 12/10/2013


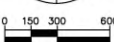


Appendix D

Alignment Adjustment

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 NORTH

 0 150 300 600
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SOUTHWEST LIGHT RAIL
 TI-1: EDEN PRAIRIE ALIGNMENT
 ALIGNMENT ADJUSTMENT

IRT: #1
 REV: 0
 DATE: 09/19/13



Appendix E

LOS Description Table

Level of Service Description for Signalized and Unsignalized Intersections

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

Source: Highway Capacity Manual

- Signalized: Volume 3 – Interrupted Flow – Chapter 18, exhibit 18-4 LOS Criteria: Automobile Mode
- Unsignalized Two-Way Stop Control: Volume 3 – Interrupted Flow – Chapter 19, exhibit 19-1 LOS Criteria: Automobile Mode

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