

Met-Con Development Traffic Study

Mankato, MN

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Prepared For:
Met-Con Companies

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I hereby certify that this plan, specification, or report was prepared by me, or under my direct supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota:



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Table of Contents

1	Introduction	1
1.1	Proposed Access	1
1.2	Study Purpose.....	1
2	Existing Conditions.....	1
2.1	Study Area	1
2.2	Traffic Volumes.....	2
2.3	Crash History	2
3	No-Build Traffic Conditions.....	3
3.1	Background Traffic Growth	3
3.2	Future Roadway Projects.....	3
4	Build Traffic Conditions	4
4.1	Site-Generated Traffic	4
4.2	Access Driveway Geometrics.....	4
4.3	Trip Distribution and Assignment.....	4
4.4	Build Traffic Volumes.....	4
5	Traffic Operational Analysis	5
5.1	Operational Analysis Methodology	5
5.2	Operational Analysis Results	5
5.2.1	Existing Conditions Overview.....	7
5.2.2	2030 No-Build Conditions Overview.....	7
5.2.3	2030 Build Conditions Overview.....	7
5.2.4	2030 Build Conditions with Adams St Traffic Growth	7
6	Turn Lane review	7
7	Multi-Modal Traffic Review.....	8
8	Summary & Recommendations	8

List of Tables

Table 1.	Intersection Crash Data	3
Table 2.	Trip Generation.....	4
Table 3.	Level of Service Grading Criteria.....	5
Table 4.	Traffic Operational Results - AM Peak Hour	6
Table 5.	Traffic Operational Results - PM Peak Hour	6

List of Figures

Figure 1.	Conceptual Site Plan	10
Figure 2.	Existing Traffic Volumes	11
Figure 3.	2030 No-Build Traffic Volumes.....	12
Figure 4.	Trip Distribution and Assignment.....	13
Figure 5.	2030 Build Traffic Volumes.....	14

1 INTRODUCTION

The Met-Con Mankato development, referred to as the “Proposed Project” in this study, is planned in Mankato, Blue Earth County, Minnesota. 16.61 acres are planned to be developed into retail and industrial uses. One outlot is designated for Met-Con Companies office and shop. At this time, tenants have not yet been secured for the remaining outlots and likely land uses are assumed. The Proposed Project is located south of Adams St and the TA Travel Center and Truck Stop, east of CSAH 12 (589th Ave) and north of CSAH 17 (Madison Ave).

1.1 Proposed Access

Main full access serving the west side of the site is proposed on Adams St at the westerly TA Travel Center Driveway (Driveway 1) through construction of a southern leg. This existing driveway/proposed access is spaced approximately 280 feet from the CSAH 12/Adams St roundabout. A second full access serving the eastern 20,000 SF industrial building outlot is proposed on Adams St at the TA Travel Center Driveway 2. The Proposed Project’s location, layout, likely land uses and access are illustrated in Figure 1.

1.2 Study Purpose

The purpose of this study is to evaluate the impact of traffic generated by the Proposed Project on the operations and safety of the adjacent roadway network and access locations. This study reviews existing conditions and year 2030 conditions without the Proposed Project (termed No-Build conditions) and with the Proposed Project (termed Build conditions). Intersection and access operations and queuing are detailed. Queueing on Adams St between the CSAH 12/Adams St roundabout and Driveway 1/Access 1 is reviewed. Recommendations are provided for roadway and safety improvements to manage site-generated traffic and projected background traffic growth.

2 EXISTING CONDITIONS

2.1 Study Area

Input from the City of Mankato helped define the following existing study area intersections.

1. CSAH 12 (589th Ave) & CSAH 17 (Madison Ave) - Roundabout
2. CSAH 12 (589th Ave) & Adams St - Roundabout
3. CSAH 12 (589th Ave) & US Highway 14/MN Highway 60 Eastbound Ramps - Roundabout
4. CSAH 12 (589th Ave) & US Highway 14/MN Highway 60 Westbound Ramps - Roundabout
5. Adams St & Travel Center Driveway 1 - Side-Street Stop-Control
6. Adams St & Travel Center Driveway 2 - Side-Street Stop-Control
7. Adams St & Travel Center Driveway 3 - Side-Street Stop-Control
8. Adams St & Travel Center Driveway 4 - Side-Street Stop-Control

The study area roadway traffic characteristics are noted below.

CSAH 12 (589th Ave)

<i>Jurisdiction:</i>	Blue Earth County
<i>Functional Class:</i>	Major Collector north of CSAH 17, Minor Arterial south of CSAH 17
<i>Parking:</i>	No parking
<i>Speed:</i>	45 MPH
<i>ADT:</i>	5,781 vehicles/day (Year 2024)
<i>Bike:</i>	Off-street shared path on east side
<i>Pedestrian:</i>	Off-street shared path on east side
<i>Transit:</i>	None

CSAH 17 (Madison Ave)

<i>Jurisdiction:</i>	Blue Earth County
<i>Functional Class:</i>	Minor Collector
<i>Typical Section:</i>	4-lane divided west of CSAH 12, 3-lane w/center left turn lane east of CSAH 12
<i>Parking:</i>	No parking
<i>Speed:</i>	55 MPH
<i>ADT:</i>	4,887 vehicles/day (Year 2024)
<i>Bike:</i>	Off-street shared path on north side
<i>Pedestrian:</i>	Off-street shared path on north side
<i>Transit:</i>	None

Adams St

<i>Jurisdiction:</i>	Municipal, City of Mankato
<i>Functional Class:</i>	Minor Collector west of CSAH 12, Local east of CSAH 12
<i>Typical Section:</i>	3-lane w/center left turn lane
<i>Parking:</i>	No parking
<i>Speed:</i>	30 MPH
<i>ADT:</i>	Not available
<i>Bike:</i>	On-street bike lanes both sides
<i>Pedestrian:</i>	Off-street shared path on north side, sidewalk on south side
<i>Transit:</i>	None

2.2 Traffic Volumes

Turning movement counts for both AM and PM peak periods, including trucks as well as pedestrians and bicycles, were collected at study area intersections on Tuesday, April 7, 2026. The study area's morning peak hour is from 7:15 AM to 8:15 AM, while the evening peak hour is from 4:00 PM to 5:00 PM. Figure 2 illustrates the existing peak hour traffic volumes at study area intersections. Detailed count data is available in the Appendix.

2.3 Crash History

A review of intersection crash records was conducted to evaluate the safety of the study area intersection and to determine if the addition of future traffic growth could exacerbate existing safety issues. Historical crash data was obtained from MnDOT's Crash Mapping Analysis Tool (MnCMAT2). The most recent 5 years of data (2021 to 2025) was considered for the CSAH 12/CSAH 17 roundabout and the CSAH 12/Hwy 14 Ramps roundabouts. Due to the construction of the CSAH 12/Adams St roundabout and the TA travel center, the most recent 3 years of data (2023 to 2025) was considered for the Adams St intersections. The crash analysis considered two factors:

- **Crash Rate** - Crashes are a function of exposure. Roadways with higher traffic volumes experience more crashes than similar roadways with lower volumes and a crash rate is considered to normalize the locations and accurately assess safety. Intersection crash rates are defined by the number of crashes occurring per million entering vehicles (MEV).
- **Critical Crash Rate** - Critical crash rate comparison identifies locations that have a crash rate higher than similar facilities by a statistically significant amount. The critical crash rate is calculated by adjusting the system-wide average crash rate based on the amount of exposure and a statistical constant indicating the level of confidence (95th % confidence interval). At locations where the actual crash rate exceeds the critical crash rate (critical index >1.0), it is likely that the crashes are a result of deficiencies in the intersection design or other existing factors and further study is recommended.

Table 1 summarizes the crash data for the study area intersections and provides a comparison of crash rates to critical crash rates through the critical index. All study area intersections have a crash rate under the critical crash rate (critical index <1.0), indicating existing conditions are not currently contributing to an overall safety problem. It is noted the one crash on Adams St at TA Driveway 3 involved two trucks parked on Adams St with one truck backing up into the other truck.

Table 1. Intersection Crash Data

Intersection	Control	Years of Data	Crash Details		Entering ADT	Intersection Crash Rates (CR)			
			Total	F&A*		CR	MnDOT Ave. CR**	Critical CR	Critical Index
CSAH 12 (589 th Ave) & CSAH 17 (Madison Ave)	RAB	5	13	0	9,528	0.75	0.986	1.63	0.46
CSAH 12 (589 th Ave) & Adams St	RAB	3	4	0	6,000	0.61	0.986	2.06	0.30
CSAH 12 (589 th Ave) & Hwy 14 EB Ramps	RAB	5	4	0	6,522	0.34	0.986	1.77	0.19
CSAH 12 (589 th Ave) & Hwy 14 WB Ramps	RAB	5	3	0	5,805	0.28	0.986	1.82	0.16
Adams St & TA Driveway 1	Side Street Stop	3	0	0	680	0.00	0.151	1.98	0.00
Adams St & TA Driveway 2	Side Street Stop	3	0	0	380	0.00	0.151	2.90	0.00
Adams St & TA Driveway 3	Side Street Stop	3	1	0	330	2.77	0.151	3.20	0.86
Adams St & TA Driveway 4	Side Street Stop	3	0	0	130	0.00	0.151	6.32	0.00

* Fatal and "A" type serious injury crashes.

** System-wide average crash rates from MnDOT's Intersection Green Sheets

3 NO-BUILD TRAFFIC CONDITIONS

To assess how the Proposed Project affects the study area, traffic conditions for year 2030 without the project (the No-Build scenario) are used as a baseline. These are then compared to scenarios where the project is included (the Build scenario). Background traffic growth, planned developments and future roadway projects are considered to develop the No-Build scenarios.

3.1 Background Traffic Growth

A background traffic growth rate for study area roadways was developed by reviewing forecast 2050 daily traffic volumes from the **Mankato/North Mankato Area Planning Organization (MAPO) 2050 Metropolitan Transportation Plan**¹. A 1.5% annual growth rate was established and used to project existing 2026 traffic volumes forward to anticipated 2030 levels. Figure 3 shows the estimated 2030 No-Build traffic volumes.

3.2 Future Roadway Projects

The **MAPO 2050 Metropolitan Transportation Plan** identifies the future extension of Adams Rd from the cul-de-sac east of the TA Truck Stop to CSAH 17 (Madison Ave) in the 2031-2035 timeline. This roadway project will be dependent on development of the parcels to the east of the Proposed Project. Adams St is designated for a functional class change from a local street to a minor collector with the extension. This extension is not fully modeled in this traffic study, but a sensitivity analysis is provided in Section 5 reviewing access operations with increased through traffic on Adams St.

¹ **MAPO 2050 Metropolitan Transportation Plan**, November 2025, [Link](#).

4 BUILD TRAFFIC CONDITIONS

4.1 Site-Generated Traffic

The Proposed Project includes a 10,016 SF building designated for Met-Con Companies office and shop. There are no secured tenants for the remaining outlots and likely land uses are assumed. Retail land uses including a fast food restaurant, auto parts store and strip retail are assumed on the west side of the site due to higher visibility and easy accessibility, and industrial uses are assumed on the east side of the site (see Figure 1). The fast food restaurant and strip retail uses are high traffic generators, offering a cautious basis for analysis.

The volume of vehicle site generated trips has been estimated for the weekday AM and PM peak hours and on a daily basis using the data and methodology described in the Institute of Transportation Engineers' (ITE) **Trip Generation Manual (TGM)**². Shared trips and pass-by trips for the retail uses were considered in the trip generation estimate. Shared trips account for the complementary nature of the land uses (i.e., visiting both strip retail and the fast food restaurant during the same trip). Pass-by trips are trips that are attracted to the site from existing traffic already passing on adjacent roadways. Table 2 summarizes the trip generation estimate.

Table 2. Trip Generation

Land Use	ITE Land Use Code	Size	Trips Generated:				
			AM Peak		PM Peak		Weekday ADT
			Enter	Exit	Enter	Exit	
Met-Con Office (Specialty Trade Contractor)	180	10,016 s.f.	12	4	6	13	98
Fast Food - w/Drive Thru	934	2,500 s.f.	42	41	41	38	1,120
Automobile Parts Sales	843	8,500 s.f.	12	10	20	21	464
Strip Retail Plaza (<40k)	822	17,000 s.f.	37	30	53	53	926
Industrial	130	20,000 s.f.	3	1	1	3	54
Industrial	130	20,000 s.f.	3	1	1	3	54
Totals - Gross			109	87	122	131	2,716
			196		253		
Shared Trips ¹			9	8	11	11	251
			17		22		
Pass-By Trips ²			17	17	23	23	1,130
			34		46		
Totals - Net			83	62	88	97	1,335
			145		185		

¹ 10% shared trips between the retail uses was assumed.

² 50% of pass-by trips from Hwy14/60, 40% from CSAH 12 and 10% from Adams St.

4.2 Access Driveway Geometrics

Both access driveways are planned for full-movement, side-street stop-controlled with single entry and exit lanes. Adams St will retain its current layout: one eastbound shared through/right turn lane and westbound left turns from the center left turn lane. This setup was used for operational analysis. Section 6 provides more discussion on the need for an eastbound right turn lane on Adams St at Driveway 1/Access 1.

4.3 Trip Distribution and Assignment

Site-generated traffic was distributed to the study area network according to current volume patterns and expected site traffic origins and destinations. Figure 4 illustrates the distribution percentages and how site-generated traffic flows in and out of the study area network and access intersections.

4.4 Build Traffic Volumes

When combined, the site-generated traffic volumes and No-Build scenario traffic volumes result in the 2030 Build scenario traffic volumes shown in Figure 5.

² **Trip Generation Manual (TGM)**, Institute of Transportation Engineers (ITE), 12th Edition

5 TRAFFIC OPERATIONAL ANALYSIS

5.1 Operational Analysis Methodology

Intersection performance is measured by driver delay and vehicle queues, which depend on capacity relative to traffic volume. Industry standards for evaluating capacity and resulting driver delay are detailed in the **Highway Capacity Manual**³. Driver delay is represented as a Level of Service (LOS) grade with "A" as the best conditions and "F" as the worst. Table 3 summarizes the LOS and delay criteria for unsignalized/roundabout and signalized intersections. Typically, LOS "D" represents the threshold for acceptable overall intersection operations, and LOS "E" represents the acceptable individual movement threshold operating during a peak hour. For side-street stop-controlled movements on high volume mainline roads, it is common for side-streets to operate at LOS "D" or "E".

Table 3. Level of Service Grading Criteria

LOS	A	B	C	D	E	F
Unsignalized/Roundabout Intersection Delay	0-10 seconds	>10-15 seconds	>15-25 seconds	>25-35 seconds	>35-50 seconds	>50 seconds
Signalized Intersection Delay	0-10 seconds	>10-20 seconds	>20-35 seconds	>35-55 seconds	>50-80 seconds	>80 seconds
Description	 Free-flow operation	 Unimpeded operation	 Stable operation	 Less stable & more delay	 Unstable & high delay	 Congested & back-ups

The operational analyses also considers vehicle queuing. An intersection can operate with acceptable LOS, but if queues extend back to block entrances to turn lanes or access driveways, unsafe operating conditions could result. 95th % queue lengths are considered in this study. The 95th % queue length refers to the length of vehicle queue that has a five-percent probability of occurring during an analysis hour.

The Synchro/SimTraffic software package (12th Edition) was used to evaluate the side-street stop-controlled intersections on Adams St and reported operations are from Synchro's HCM 7 reports. For side-street stop-controlled intersections, the worst opposing left or side-street movement delay is reported rather than the overall intersection delay. Overall intersection delay for side-street stop-controlled intersections can misrepresent operations, since most mainline free-flowing vehicles experience no delay. Rodel software was used to evaluate roundabout-controlled intersections. Existing truck percentages and peak hour factors were used in the analysis.

5.2 Operational Analysis Results

The results of the operational analysis for Existing, 2030 No-Build and 2030 Build conditions are summarized for the AM and PM peak hour. Table 4 summarizes the AM peak hour and Table 5 summarizes the PM peak hour. Proposed access driveway intersections are shaded light blue and critical movement operations and queues are noted. Westbound queues on Adams St at the CSAH 12/Adams St roundabout are noted to ensure they do not extend more than 280' to Driveway 1/Access 1. Detailed operational analysis tables are included in the Appendix.

³ **Highway Capacity Manual (HCM)**, Transportation Research Board, 7th Edition

Table 4. Traffic Operational Results - AM Peak Hour

Intersection	Control	MOE	Existing	2030 No-Build	2030 Build
CSAH 12 & CSAH 17 (Madison Ave)	Roundabout	Overall LOS	A-5.0	A-5.2	A-5.2
		Worst LOS	A-8.3 (WBLT)	A-8.7 (WBLT)	A-8.7 (WBLT)
		Queuing Notes	None	None	None
CSAH 12 & Adams St	Roundabout	Overall LOS	A-3.3	A-3.3	A-4.1
		Worst LOS	A-6.8 (WBLT)	A-7.0 (WBLT)	A-8.9 (WBLT)
		Queuing Notes	2' WBLT, 2' WBR	2' WBLT, 3' WBR	5' WBLT, 8' WBR
CSAH 12 & Hwy 14 EB Ramps	Roundabout	Overall LOS	A-5.0	A-5.0	A-5.5
		Worst LOS	A-8.4 (NBT)	A-8.7 (NBT)	A-9.1 (NBT)
		Queuing Notes	None	None	None
CSAH 12 & Hwy 14 WB Ramps	Roundabout	Overall LOS	A-4.3	A-4.4	A-4.7
		Worst LOS	A-6.2 (SBT)	A-6.4 (SBT)	A-6.7 (NBLT)
		Queuing Notes	None	None	None
Adams St & TA Driveway 1/ Proposed Access	Side-Street Stop	NBLTR LOS/Q			B-10.3 / 8'
		WBL LOS/Q			A-0.0 / 0'
		SBLTR LOS/Q	A-8.6 / 2'	A-8.6 / 2'	A-8.7 / 2'
		EBL LOS/Q	A-7.3 / 0'	A-7.3 / 0'	A-8.7 / 0'
Adams St & TA Driveway 2/ Proposed Access	Side-Street Stop	NBLTR LOS/Q			A-0.0 / 0'
		WBL LOS/Q			A-0.0 / 0'
		SBLTR LOS/Q	A-8.5 / 0'	A-8.5 / 0'	A-8.5 / 0'
		EBL LOS/Q	A-7.3 / 0'	A-7.3 / 0'	A-7.3 / 0'
Adams St & TA Driveway 3	Side-Street Stop	Worst LOS	A-9.3 (SBLTR)	A-9.4 (SBLTR)	A-9.4 (SBLTR)
		Queuing Notes	None	None	None
Adams St & TA Driveway 4	Side-Street Stop	Worst LOS	A-9.3 (SBLTR)	A-9.3 (SBLTR)	A-9.3 (SBLTR)
		Queuing Notes	None	None	None

Table 5. Traffic Operational Results - PM Peak Hour

Intersection	Control	MOE	Existing	2030 No-Build	2030 Build
CSAH 12 & CSAH 17 (Madison Ave)	Roundabout	Overall LOS	A-4.9	A-5.1	A-5.1
		Worst LOS	A-7.1 (SBLT)	A-7.3 (SBLT)	A-7.4 (SBLT)
		Queuing Notes	None	None	None
CSAH 12 & Adams St	Roundabout	Overall LOS	A-3.5	A-3.6	A-4.4
		Worst LOS	A-6.3 (WBLT)	A-6.4 (WBLT)	A-9.0 (WBLT)
		Queuing Notes	1' WBLT, 2' WBR	1' WBLT, 2' WBR	6' WBLT, 11' WBR
CSAH 12 & Hwy 14 EB Ramps	Roundabout	Overall LOS	A-4.8	A-5.0	A-5.4
		Worst LOS	A-7.1 (NBT)	A-7.3 (NBT)	A-8.0 (NBT)
		Queuing Notes	None	None	None
CSAH 12 & Hwy 14 WB Ramps	Roundabout	Overall LOS	A-4.7	A-4.9	A-5.0
		Worst LOS	A-8.0 (SBT)	A-8.3 (SBT)	A-8.6 (SBT)
		Queuing Notes	None	None	None
Adams St & TA Driveway 1/ Proposed Access	Side-Street Stop	NBLTR LOS/Q			B-10.6 / 12'
		WBL LOS/Q			A-0.0 / 0'
		SBLTR LOS/Q	A-8.5 / 2'	A-8.5 / 2'	A-8.6 / 2'
		EBL LOS/Q	A-7.3 / 0'	A-7.3 / 0'	A-8.6 / 0'
Adams St & TA Driveway 2/ Proposed Access	Side-Street Stop	NBLTR LOS/Q			A-0.0 / 0'
		WBL LOS/Q			A-0.0 / 0'
		SBLTR LOS/Q	A-8.4 / 0'	A-8.4 / 0'	A-8.4 / 0'
		EBL LOS/Q	A-7.2 / 0'	A-7.2 / 0'	A-7.2 / 0'
Adams St & TA Driveway 3	Side-Street Stop	Worst LOS	A-9.3 (SBLTR)	A-9.3 (SBLTR)	A-9.3 (SBLTR)
		Queuing Notes	None	None	None
Adams St & TA Driveway 4	Side-Street Stop	Worst LOS	A-9.3 (SBLTR)	A-9.3 (SBLTR)	A-9.3 (SBLTR)
		Queuing Notes	None	None	None

5.2.1 Existing Conditions Overview

All study area intersections operate acceptably for Existing Conditions. Overall intersection LOS is A and no individual lane group operates below LOS A. Queuing is acceptable and accommodated by existing geometry for all intersections. The westbound queues on Adams St at the CSAH 12/Adams St roundabout are very short and range from 1' to 2' and there are no back-up concerns related to the 280' spacing to Driveway 1. There are no recommendations to improve Existing Conditions.

5.2.2 2030 No-Build Conditions Overview

All intersections operate acceptably for 2030 No-Build Conditions. Overall intersection LOS is A and no individual lane group operates below LOS A. Queuing is acceptable and accommodated by existing geometry for all intersections. The westbound queues on Adams St at the CSAH 12/Adams St roundabout are very short and range from 1' to 3' and there are no back-up concerns related to the 280' spacing to Driveway 1. There are no recommendations to improve 2030 No-Build Conditions.

5.2.3 2030 Build Conditions Overview

All intersections operate acceptably for 2030 Build Conditions with the Proposed Project. Overall intersection LOS is A and no individual lane group operates below LOS B. Queuing is acceptable and accommodated by existing/proposed geometry for all intersections. The westbound queues on Adams St at the CSAH 12/Adams St roundabout are very short and range from 5' to 11' and there are no back-up concerns related to the 280' spacing to Driveway 1/Proposed Access 1.

The Adams St/Driveway 1/Access 1 intersection operates acceptably. The single lane northbound approach experiences LOS B with a 12' queue in the PM peak hour.

The Adams St/Driveway 2/Access 2 intersection operates acceptably. The single lane northbound approach experiences LOS A with no queueing in both peak hours.

There are no recommended development related mitigation measures to improve 2030 Build Conditions based on traffic operations.

5.2.4 2030 Build Conditions with Adams St Traffic Growth

A sensitivity analysis was conducted at the Adams St/Driveway 1/Proposed Access 1 intersection to evaluate the threshold for additional traffic growth beyond the Proposed Project on Adams St before operational performance becomes unacceptable (defined as reaching the LOS D/E boundary for the northbound left movement and/or roundabout queues extending to the driveway). The results indicate that through traffic on Adams St can accommodate an increase of 500-600 vehicles (depending on vehicle type) during peak hours before operations degrade. Notably, the northbound left turn operations reach failure prior to roundabout queue lengths extending to the driveway. Unacceptable operations could also occur if there is a statistically significant crash increase at the Adams St/Access 1 intersection.

If operations or safety at Access 1 deteriorate to unacceptable levels, the recommended mitigation would be to restrict Access 1 to right-in/right-out only movements by extending the median on Adams St. The Developer would agree to this restriction only if Adams St is extended to CSAH 17.

6 TURN LANE REVIEW

The need for an eastbound right turn lane at the Adams St/Driveway 1/Access 1 intersection was evaluated as part of the Proposed Project. 2030 Build traffic volumes show that there will be 96 eastbound right turns during the morning peak hour, 109 during the evening peak hour with steady retail traffic turning right all day. Although through traffic heading east is light, most vehicles are semi-trailer trucks headed to the truck stop. Operational analyses indicate LOS and queuing are adequate with a shared through/right turn lane. However, considering the high percentage of trucks and speed differential, safety concerns arise. Research indicates that providing

dedicated turn lanes on mainline roads at intersections with side streets controlled by stop signs helps reduce crashes. Given the relatively low cost to construct (available ROW and 13' boulevard), notable safety advantages, and retail tenant marketability, constructing an eastbound right turn lane on Adams St at Driveway 1/Access 1 is recommended. The right turn lane should be constructed with the initial phase of the site due to mobilization costs and to safely accommodate construction traffic as the outlots develop.

7 MULTI-MODAL TRAFFIC REVIEW

As noted in the Existing Conditions summary, the study area includes existing shared-use paths, sidewalks, and on-street bicycle facilities. It is recommended a sidewalk be constructed along the Access 1 roadway and connected to the existing sidewalk on Adams St. This sidewalk should remain continuous regardless of outlot development phasing. Connections to the existing shared-use paths along CSAH 12 and CSAH 17 should be considered during detailed site plan reviews for the outlots.

8 SUMMARY & RECOMMENDATIONS

The previous analysis assessed traffic impacts for the 16.61-acre Met-Con Mankato retail and industrial development. The traffic and safety review indicates:

- ★ The development includes a 10,016 SF building designated for Met-Con Companies' office and shop. There are no secured tenants for the remaining outlots and likely land uses were assumed. Retail land uses including a fast food restaurant, auto parts store and strip retail are assumed on west side of the site for higher visibility and easy accessibility and industrial uses are assumed on the east side of the site. The fast food restaurant and strip retail uses are high traffic generators, offering a cautious basis for analysis.
- ★ The project is estimated to generate 145 new trips (83 entering and 62 exiting) during the morning traffic peak hour, 185 new trips (88 entering and 97 exiting) during the evening traffic peak hour and 1,335 new daily trips to the study area. The retail component of the site includes pass-by trips, which are trips that are attracted to the site from existing traffic already passing on adjacent roadways.
- ★ Two full movement access driveways are proposed on Adams St. Main full access serving the west side of the site is proposed at the westerly TA Travel Center Driveway (Driveway 1) through construction of a southern leg. This access is spaced approximately 280 feet from the CSAH 12/Adams St roundabout. A second full access for an industrial outlot is proposed on Adams St at the TA Travel Center Driveway 2.
- ★ Traffic operations analysis were conducted for existing conditions, year 2030 conditions without the project (No-Build conditions) and year 2030 conditions with the project (Build conditions).
- ★ Traffic operations for Existing and 2030 No-Build conditions without the project are acceptable and there are no improvement recommendations.
- ★ 2030 Build conditions with the project are acceptable. Westbound queues on Adams St at the CSAH 12/Adams St roundabout are very short and there are no back-up concerns related to the 280' spacing to Driveway 1/Proposed Access 1.
- ★ A sensitivity analysis shows Adams St can accommodate an increase of up to 500-600 vehicles during peak hours (depending on vehicle type) before the Adams St/Driveway 1/Access 1 intersection operates unacceptably. Unacceptable operations could also occur if there is a statistically significant crash increase at the Adams St/Access 1 intersection.
- ★ If operations or safety at Access 1 deteriorate to unacceptable levels, the recommended mitigation would be to restrict Access 1 to right-in/right-out only movements by extending the median on Adams St. The Developer would agree to this restriction only if Adams St is extended to CSAH 17.

- ★ Construction of an eastbound right turn lane on Adams St at Driveway 1/Access 1 is recommended with the initial phase of the site. The right turn lane is cost-effective to construct due to available right-of-way and boulevard space, offers significant safety benefits, and enhances the marketability of retail tenants.
- ★ It is recommended a sidewalk be constructed along the Access 1 roadway and connected to the existing sidewalk on Adams St. This sidewalk should remain continuous regardless of outlot development phasing. Connections to the existing shared-use paths along CSAH 12 and CSAH 17 should be considered during detailed site plan reviews for the outlots.
- ★ It is recommended the City requires a traffic study for the development of the parcels located east of the project, as well as for the future extension of Adams Street to CSAH 17. While traffic patterns on Adams Street are expected to change, high level reviews suggest that traffic operations will remain within acceptable ranges.

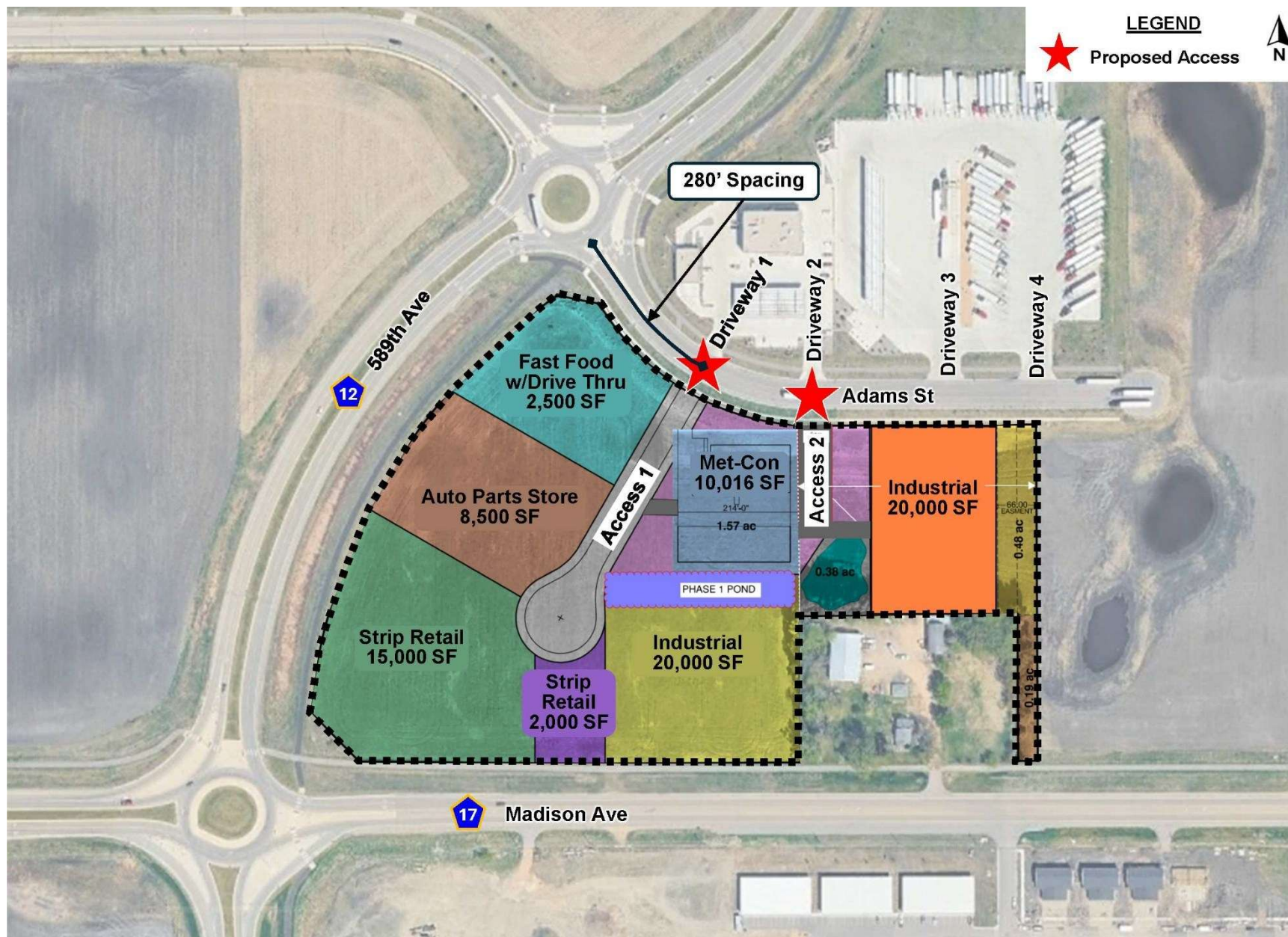


Figure 1. Conceptual Site Plan

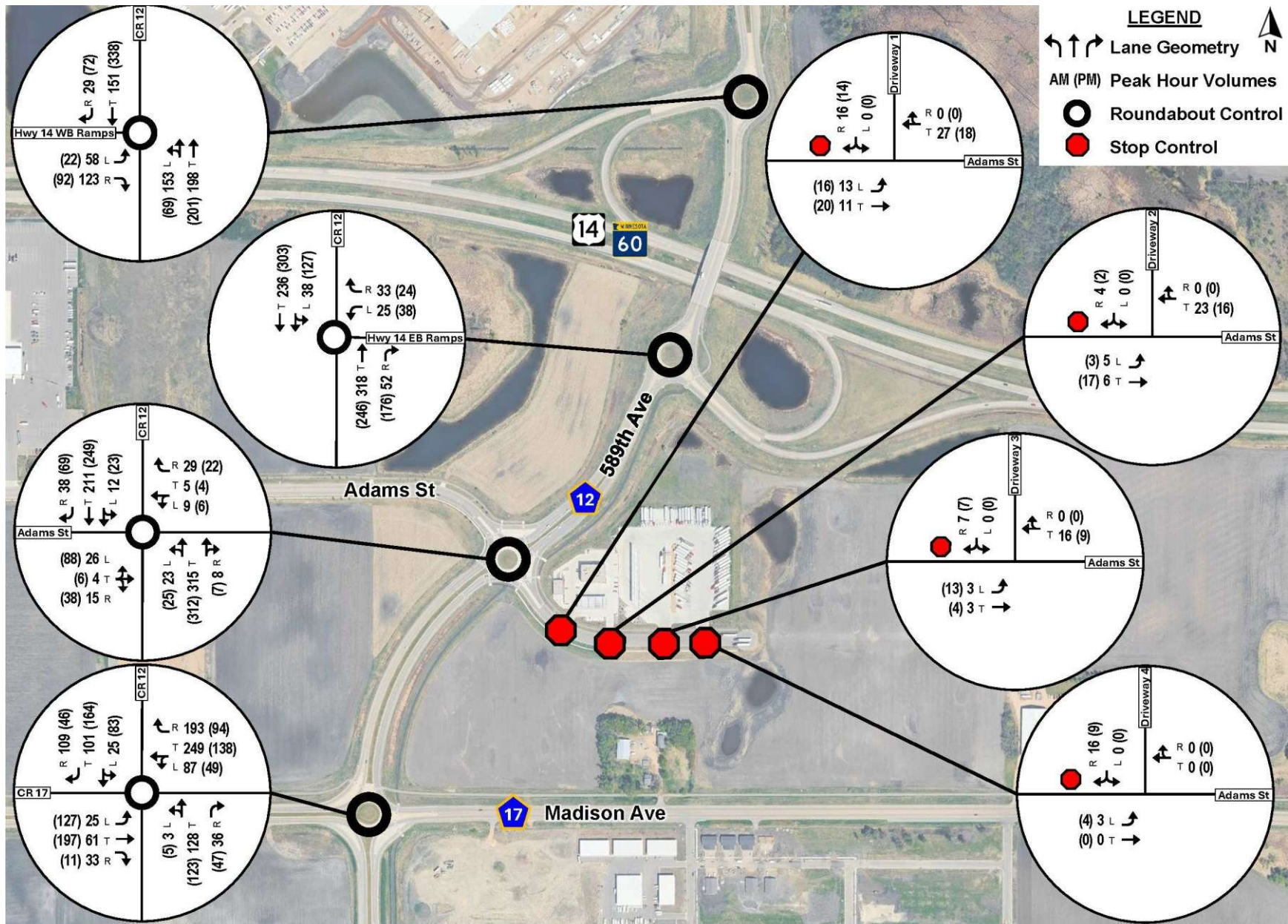


Figure 2. Existing Traffic Volumes

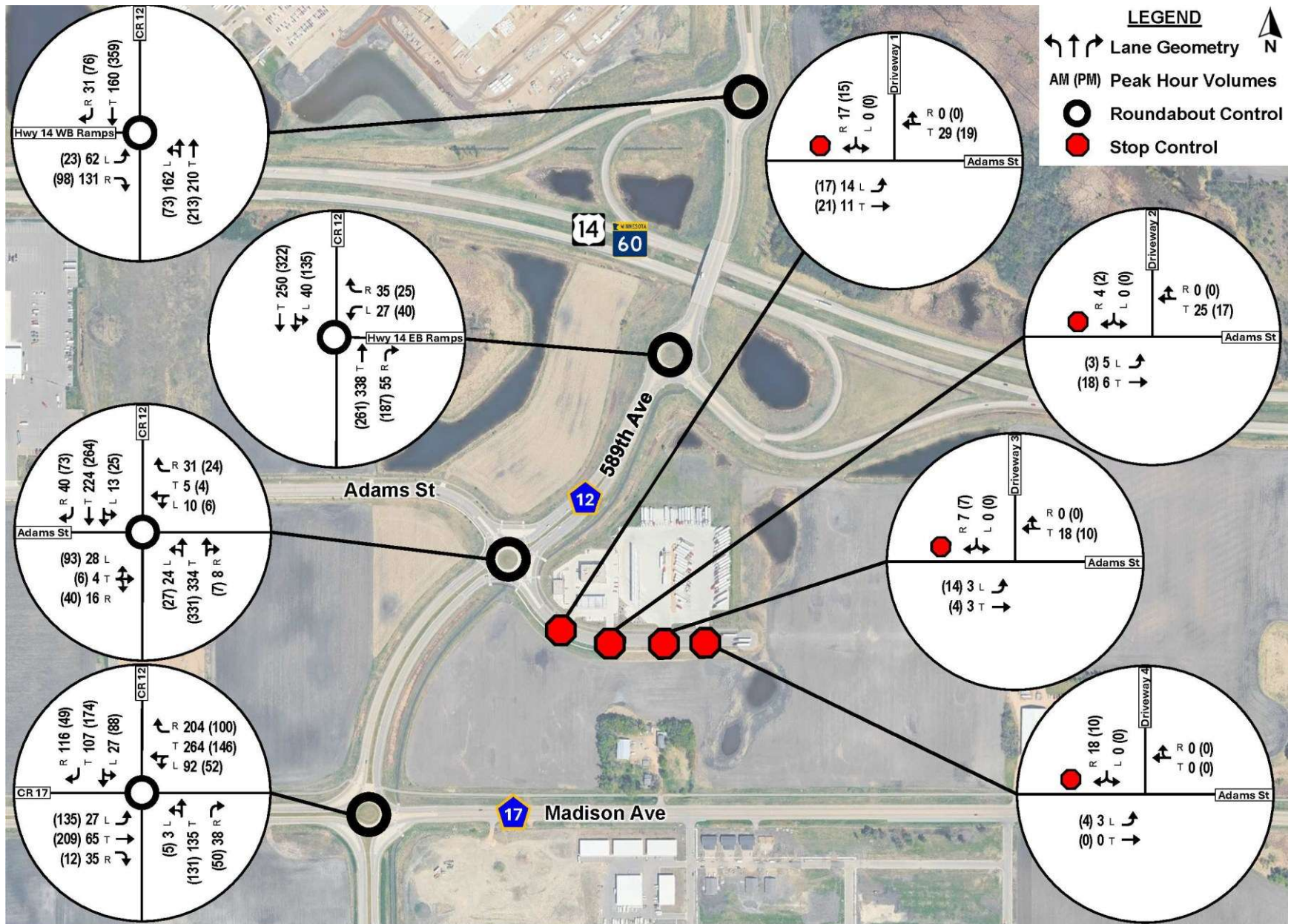


Figure 3. 2030 No-Build Traffic Volumes

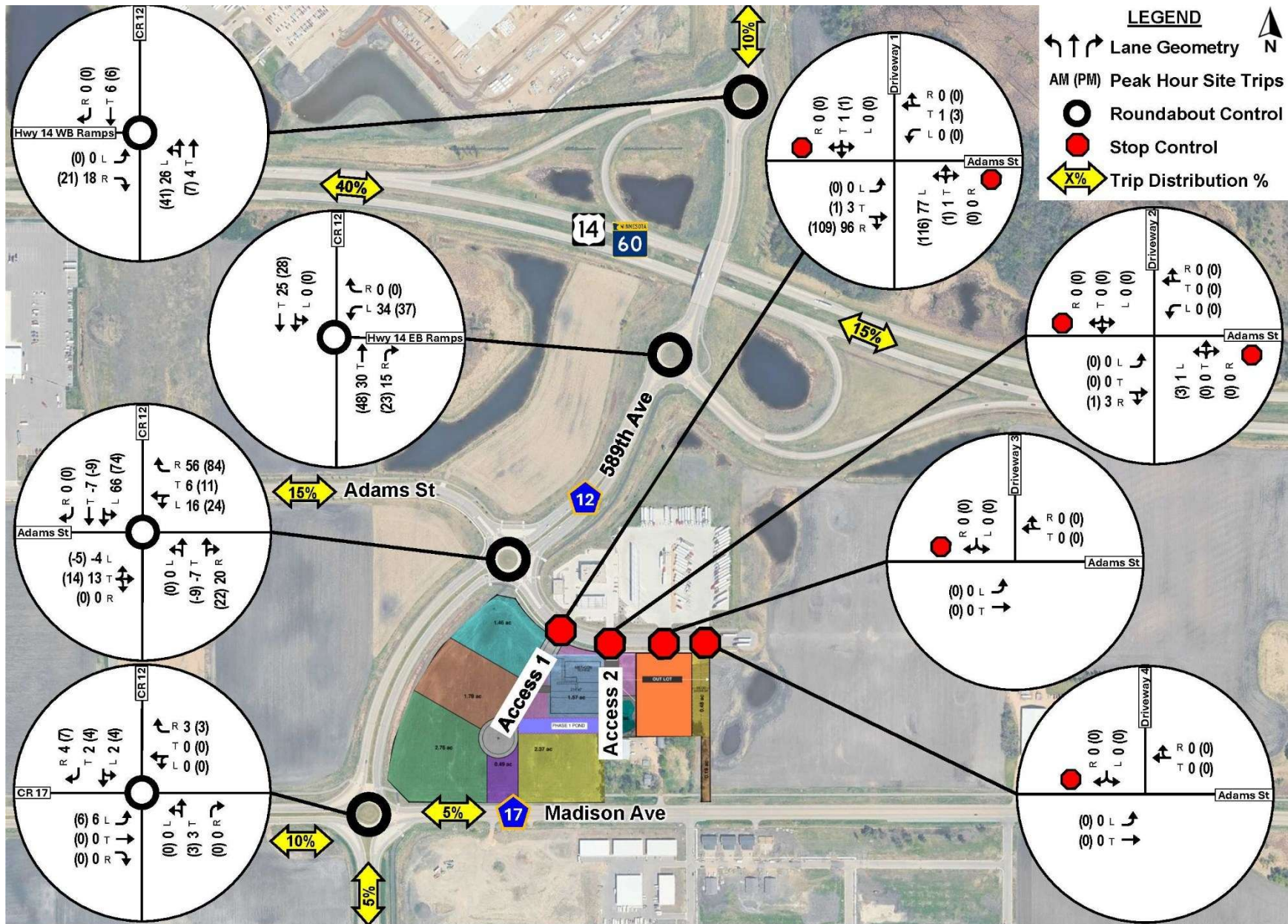


Figure 4. Trip Distribution and Assignment

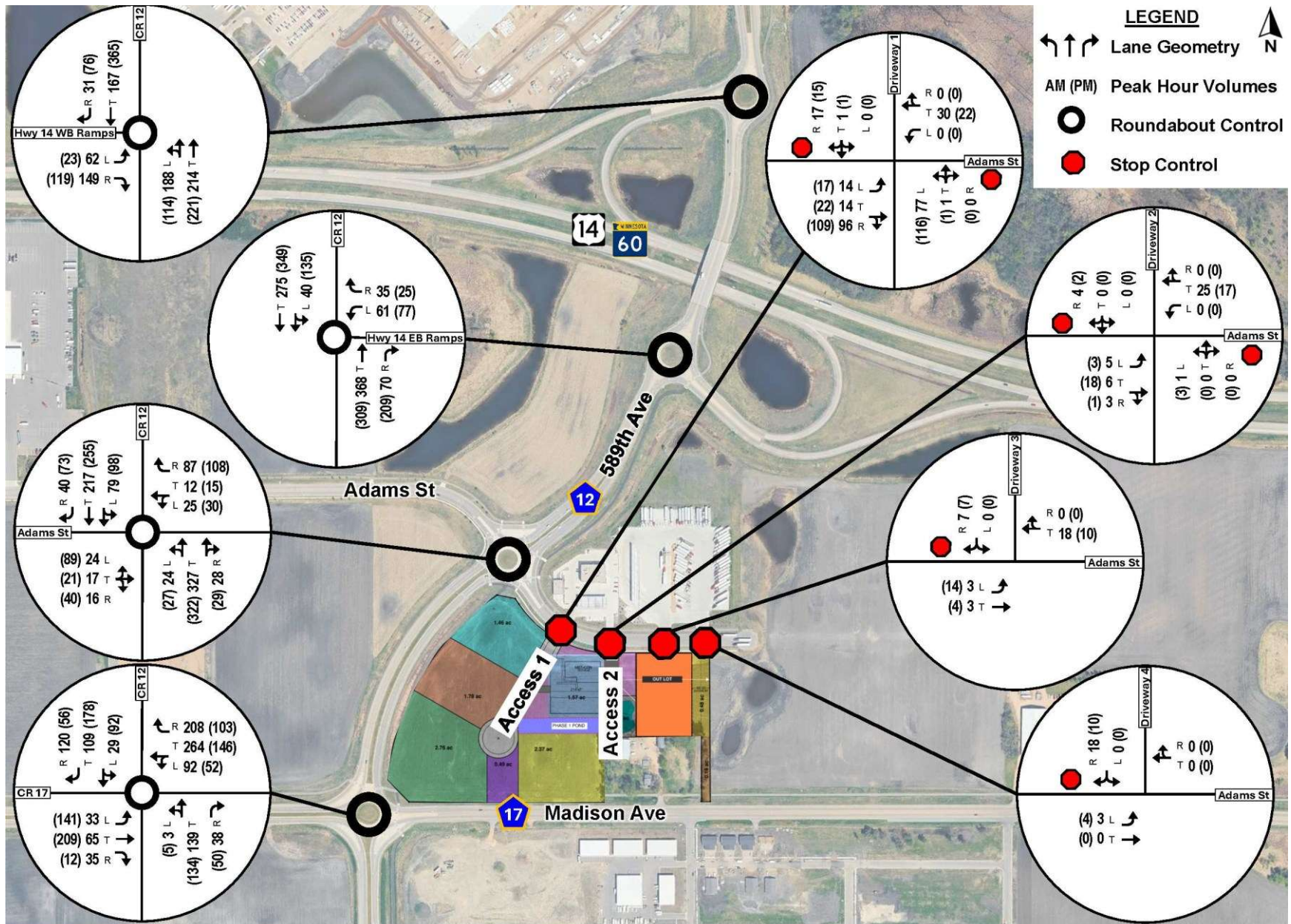


Figure 5. 2030 Build Traffic Volumes

Appendix A - Detailed Operational Analysis Tables

Table A- 1. AM Peak Hour Operations

Intersection	Lane Group	Bay	Existing			2030 No-Build			2030 Build		
			LOS	Delay	95 th % Q	LOS	Delay	95 th % Q	LOS	Delay	95 th % Q
CSAH 12 & CSAH 17 (Madison Ave) (Roundabout)	NBLT		A	5.4	10	A	5.5	10	A	5.6	11
	NBR		A	4.0	2	A	4.1	2	A	4.1	2
	WBLT		A	8.3	36	A	8.7	40	A	8.7	40
	WBR	220'	A	6.5	16	A	6.7	17	A	6.8	18
	SBLT		A	6.2	11	A	6.4	12	A	6.5	12
	SBR		A	0.9	0	A	0.9	0	A	1.0	0
	EBLT		A	3.3	4	A	3.4	5	A	3.6	5
	EBR		A	0.3	0	A	0.3	0	A	0.3	0
	Overall		A	5.0		A	5.2		A	5.2	
CSAH 12 & Adams St (Roundabout)	NBLTR		A	4.1	13	A	4.2	14	A	4.5	16
	WBLT		A	6.8	2	A	7.0	2	A	8.9	5
	WBR	220'	A	5.5	2	A	5.6	3	A	7.1	8
	SBLT		A	3.2	8	A	3.3	8	A	4.3	14
	SBR		A	4.0	2	A	4.0	2	A	4.1	2
	EBLTR		A	4.5	3	A	4.6	3	A	4.9	4
	Overall		A	3.3		A	3.3		A	4.1	
CSAH 12 & Hwy 14 EB Ramps (Roundabout)	NBT		A	8.4	31	A	8.7	35	A	9.1	40
	NBR		A	4.5	3	A	4.6	4	A	4.8	5
	WBL		A	5.4	2	A	5.6	2	A	6.3	6
	WBR	230'	A	0.3	0	A	0.3	0	A	0.4	0
	SBLT		A	3.6	11	A	3.7	11	A	3.9	13
	Overall		A	5.0		A	5.0		A	5.5	
CSAH 12 & Hwy 14 WB Ramps (Roundabout)	NBLT		A	6.1	28	A	6.2	30	A	6.7	36
	SBT		A	6.2	13	A	6.4	14	A	6.6	16
	SBR		A	4.2	2	A	4.3	2	A	4.4	2
	EBL		A	5.3	5	A	5.4	6	A	5.7	6
	EBR	220'	A	1.1	0	A	1.1	0	A	1.3	0
	Overall		A	4.3		A	4.4		A	4.7	
Adams St & TA Driveway 1/Proposed Access (Side-Street Stop)	NBLTR		NA			NA			B	10.3	8
	WBL	50'							A	0	0
	SBLTR		A	8.6	2	A	8.6	2	A	8.7	2
	EBL	100'	A	7.3	0	A	7.3	0	A	7.3	0
	Worst Mvmnt.		A	8.6		A	8.6		B	10.3	
Adams St & TA Driveway 2/Proposed Access (Side-Street Stop)	NBLTR		NA			NA			A	8.9	0
	WBL	50'							A	0.0	0
	SBLTR		A	8.5	0	A	8.5	0	A	8.5	0
	EBL	50'	A	7.3	0	A	7.3	0	A	7.3	0
	Worst Mvmnt.		A	8.5		A	8.5		A	8.9	
Adams St & TA Driveway 3 (Side-Street Stop)	SBLTR		A	9.3	0	A	9.4	0	A	9.4	0
	EBL	50'	A	8.2	0	A	8.2	0	A	8.2	0
	Worst Mvmnt.		A	9.3		A	9.4		A	9.4	
Adams St & TA Driveway 4 (Side-Street Stop)	SBLTR		A	9.3	2	A	9.3	2	A	9.3	2
	EBL	50'	A	8.1	0	A	8.1	0	A	8.1	0
	Worst Mvmnt.		A	9.3		A	9.3		A	9.3	

Table A- 2. PM Peak Hour Operations

Intersection	Lane Group	Bay	Existing			2030 NB			2030 Build		
			LOS	Delay	95 th % Q	LOS	Delay	95 th % Q	LOS	Delay	95 th % Q
CSAH 12 & CSAH 17 (Madison Ave) (Roundabout)	NBLT		A	5.8	10	A	6.0	10	A	6.0	11
	NBR		A	4.5	3	A	4.6	3	A	4.6	3
	WBLT		A	6.5	15	A	6.8	16	A	6.8	16
	WBR	220'	A	5.1	7	A	5.2	7	A	5.3	7
	SBLT		A	7.1	20	A	7.3	22	A	7.4	23
	SBR		A	0.4	0	A	0.4	0	A	0.4	0
	EBLT		A	5.5	20	A	5.7	22	A	5.8	23
	EBR		A	0.1	0	A	0.1	0	A	0.1	0
	Overall		A	4.9		A	5.1		A	5.1	
CSAH 12 & Adams St (Roundabout)	NBLTR		A	4.0	14	A	4.2	15	A	4.4	17
	WBLT		A	6.3	1	A	6.4	1	A	9.0	6
	WBR	220'	A	4.9	2	A	5.0	2	A	7.1	11
	SBLT		A	3.6	11	A	3.7	11	A	4.9	19
	SBR		A	4.5	5	A	4.5	5	A	4.6	5
	EBLTR		A	5.4	10	A	5.6	10	A	6.0	12
	Overall		A	3.5		A	3.6		A	4.4	
CSAH 12 & Hwy 14 EB Ramps (Roundabout)	NBT		A	7.1	24	A	7.3	27	A	8.0	35
	NBR		A	6.2	15	A	6.4	17	A	6.7	19
	WBL		A	5.5	4	A	5.6	4	A	6.6	8
	WBR	230'	A	0.3	0	A	0.3	0	A	0.3	0
	SBLT		A	5.2	26	A	5.3	29	A	5.4	31
	Overall		A	4.8		A	5.0		A	5.4	
CSAH 12 & Hwy 14 WB Ramps (Roundabout)	NBLT		A	4.1	14	A	4.2	15	A	4.9	21
	SBT		A	8.0	37	A	8.3	41	A	8.6	45
	SBR		A	4.5	5	A	4.6	6	A	4.7	6
	EBL		A	5.8	2	A	6.0	3	A	6.1	3
	EBR	220'	A	0.8	0	A	0.9	0	A	1.0	0
	Overall		A	4.7		A	4.9		A	5.0	
Adams St & TA Driveway 1 (Side-Street Stop)	NBLTR		NA			NA			B	10.6	12
	WBL	50'							A	0	0
	SBLTR		A	8.5	2	A	8.5	2	A	8.6	2
	EBL	100'	A	7.3	0	A	7.3	0	A	7.3	0
	Worst Mvmnt.		A	8.5		A	8.5		B	10.6	
Adams St & TA Driveway 2 (Side-Street Stop) Adams St & TA Driveway 3 (Side-Street Stop) Adams St & TA Driveway 4 (Side-Street Stop)	NBLTR		NA			NA			A	8.9	0
	WBL	50'							A	0.0	0
	SBLTR		A	8.4	0	A	8.4	0	A	8.4	0
	EBL	50'	A	7.2	0	A	7.2	0	A	7.2	0
	Worst Mvmnt.		A	8.4		A	8.4		A	8.9	
	SBLTR		A	9.3	0	A	9.3	0	A	9.3	0
	EBL	50'	A	8.2	0	A	8.2	0	A	8.2	0
	Worst Mvmnt.		A	9.3		A	9.3		A	9.3	
	SBLTR		A	9.3	0	A	9.3	0	A	9.3	0
	EBL	50'	A	8.1	0	A	8.1	0	A	8.1	0
	Worst Mvmnt.		A	9.3		A	9.3		A	9.3	