Traffic Analysis

Lake Elmo Village Area AUAR

City of Lake Elmo

February 2009

Project Number: 000038-08001-0

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I) INTRODUCTION

The Lake Elmo City Council recently authorized the undertaking of a city-wide transportation study and development of a traffic management plan that will address transportation needs across the city.

The AUAR traffic analysis will evaluate the scenarios presented in the Lake Elmo Village Area Master Plan and the City Comprehensive Plan. The analysis will consider the impact of the development scenarios on existing conditions, including impacts to the roadways utilized by Lake Elmo Elementary School traffic. Included in preliminary evaluations is the analysis of traffic-related existing conditions along the primary roadways and at selected critical intersections. The work tasks accomplished for the existing conditions analysis included the following:

- Area roadway/intersection reconnaissance;
- Conducting a.m. and p.m. peak period traffic counts at eight critical intersections;
- Gathering existing available lane data and traffic controls at the critical intersections;
- Calculating existing levels of service for the morning and afternoon peak hours at the critical intersections.

II) EXISTING AREA ROADWAY SYSTEM

The primary area roadway system for the study area is shown on Figure 21-1. This graphic also provides the available traffic lanes and intersection traffic control. Generally, the area is served by three primary facilities. These include

- Minnesota Trunk Highway (TH) 5,
- County State-Aid Highway (CSAH) 17, and
- County State-Aid Highway (CSAH) 15.

A. Functional Classification

TH 5 is functionally classified as an "A" minor arterial and provides for east-west travel through Lake Elmo. Minor arterial roadways are defined as roadways that connect the urban service area to cities and towns inside and outside the region and generally service medium to short trips. The emphasis for minor arterial roadways is on mobility (i.e., through trips) rather than on local land access (i.e., direct property access via driveways). In urban areas, direct land access along minor arterials is generally restricted to concentrations of commercial and industrial parcels. In Lake Elmo, TH 5 provides east-west travel through the city and also provides direct access to properties within the Village. This dual purpose functionality causes a conflict between regional and local traffic movements which can contribute to congestion and safety problems.

CSAH 17 (Lake Elmo Avenue) provides for north-south travel and contains an alignment jog as the facility intersects with TH 5. The north leg of CSAH 17 (Lake Elmo Avenue)

is classified as an “A” minor arterial expander. The south leg is classified as a “B” minor arterial between TH5 and 10th Street North. Lake Elmo Avenue between the south city limits and 10th Street North is a major collector. Collector streets are defined as roadways that provide more land access than arterials and provide connections to arterials. Collectors serve a dual function of accommodating traffic and providing more access to adjacent properties than arterials.

The third primary roadway is CSAH 15 (Manning Avenue). CSAH 15 (Manning Avenue) is a north-south route providing a connection between TH 5 and I-94 and then proceeding southerly through Washington County. The roadway is functionally classified as an "A" minor arterial.

The roadways in the AUAR study area are two-lane roadways with turn lanes and/or bypass lanes provided at several locations. Figure 21-2 shows the available traffic lanes.

B. Traffic Control

The only traffic signal within the study area is at the intersection of TH 5 with CSAH 15 (Manning Avenue). TH 5, as it passes through the AUAR study area, is afforded free flow as all roadways intersecting with TH 5, other than CSAH 15, have stop sign control. The intersection controls for the critical intersections analyzed are also shown on Figure 21-2.

C. Data Collection

To analyze existing traffic operations with regard to levels of service, intersection turning movement counts were conducted on Wednesday, June 6, 2007 from 7:00 – 9:00 a.m. and 4:00 p.m. to 6:00 p.m. at the study intersections listed below and shown in Figure 21-3. This timeframe represents the a.m. and p.m. peak traffic hours, which is when the most traffic is present on the roadway system.

- TH 5 and CSAH 17 (Lake Elmo Avenue) (North Leg)
- TH 5 and CSAH 17 (Lake Elmo Avenue) (South Leg)
- TH 5 and Laverne Avenue
- TH 5 and 39th Street
- TH 5 and CSAH 15 (Manning Avenue)
- CSAH 15 (Manning Avenue) and 30th Street
- CSAH 17 (Lake Elmo Avenue) and 30th Street
- CSAH 17 (Lake Elmo Avenue) and 39th Street

The intersection of TH 5 and 39th Street was counted on Wednesday, June 25, 2008 for the same a.m. and p.m. peak periods. These study intersections were determined to be the most critical intersections of minor arterials and collectors that would most likely be impacted by Village development.

The morning and afternoon peak hour volumes at these intersections are shown on Figure 21-3.

Daily traffic volumes were obtained from the 2007 Minnesota Department of Transportation (MnDOT) traffic flow map. These average annual daily traffic volumes (AADT) are also shown on Figure 21-3.

III) EXISTING TRAFFIC OPERATIONS

A. Roadway Segment Capacity Analysis

The daily capacity of any roadway is based upon many factors. These factors may include the:

- Number of lanes provided
- Number of access points per mile
- Number of signalized intersections per mile
- Percentage of truck traffic
- Slope of the roadway

However, for planning purposes, a generalized average daily traffic (ADT) threshold for roadways is used.

Table 21-1 shows generalized ADT volume thresholds by roadway type and number of lanes with corresponding levels of service (LOS). LOS is a qualitative measure describing operational conditions within a traffic stream, generally in terms of service measures such as speed, freedom to maneuver and traffic delay. LOS A represents the best conditions with little or no delay. A LOS F represents the worst conditions with excessive delay and queues. LOS D is considered acceptable by most government agencies.

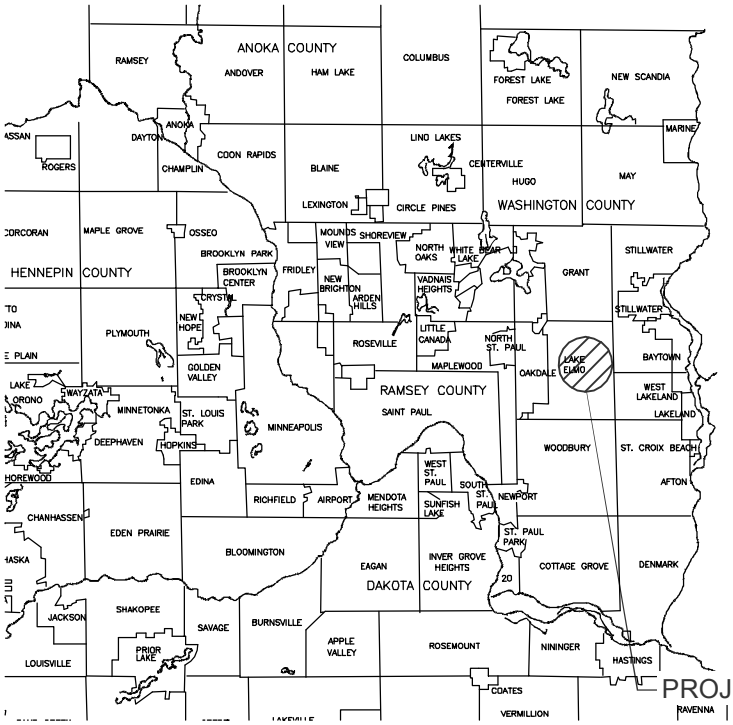
Table 21-1
Generalized Average Daily Traffic (ADT) Volume Thresholds

Facility Type	Maximum ADT Volume at Level of Service[1]				
	A	B	C	D[2]	E
2-Lane Roadway – (e.g., CSAH 17)					
Without Turn Lanes	3,000	4,500	6,500	8,500	10,000
With Right Turn Lanes	4,750	7,200	10,300	13,500	15,900
With Left Turn Lanes[3]	5,250	7,900	11,400	14,900	17,500
With Left and Right Turn Lanes[3]	7,500	11,250	16,250	21,250	25,000
4-Lane Roadway – (e.g., CSAH 15 near I-94)					
Without Turn Lanes	7,100	10,700	15,400	20,100	23,700
With Right Turn Lanes	9,600	14,400	20,700	27,100	31,900
With Left Turn Lanes[4]	10,100	15,200	21,900	28,600	33,700
With Left and Right Turn Lanes[4]	12,600	18,900	27,200	35,600	41,900

[1] ADT Volumes above the LOS E maximum threshold would be considered LOS F.
[2] LOS D is considered acceptable by most agencies within the metro area.
[3] Also considered the planning capacity for a 3-lane roadway (one through lane in each direction with a center, two-way left-turn lane) with or without a right-turn lane.
[4] Also considered the planning capacity for a 5-lane roadway (two through lanes in each direction with a center, two-way left-turn lane) with or without a right-turn lane.

Note: Approximate values based upon several assumptions:

- Capacity assumptions per lane
- Peak hour percentages
- Directional distribution
- ¼ mile signal spacing



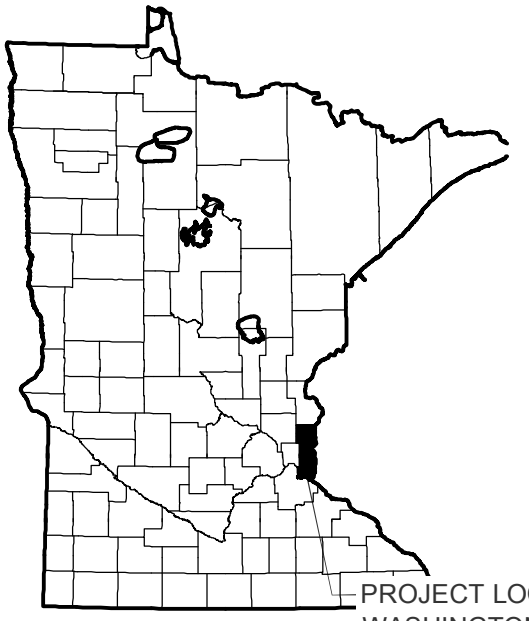


FIGURE 21-1

Study Area
Lake Elmo Village Area AUAR

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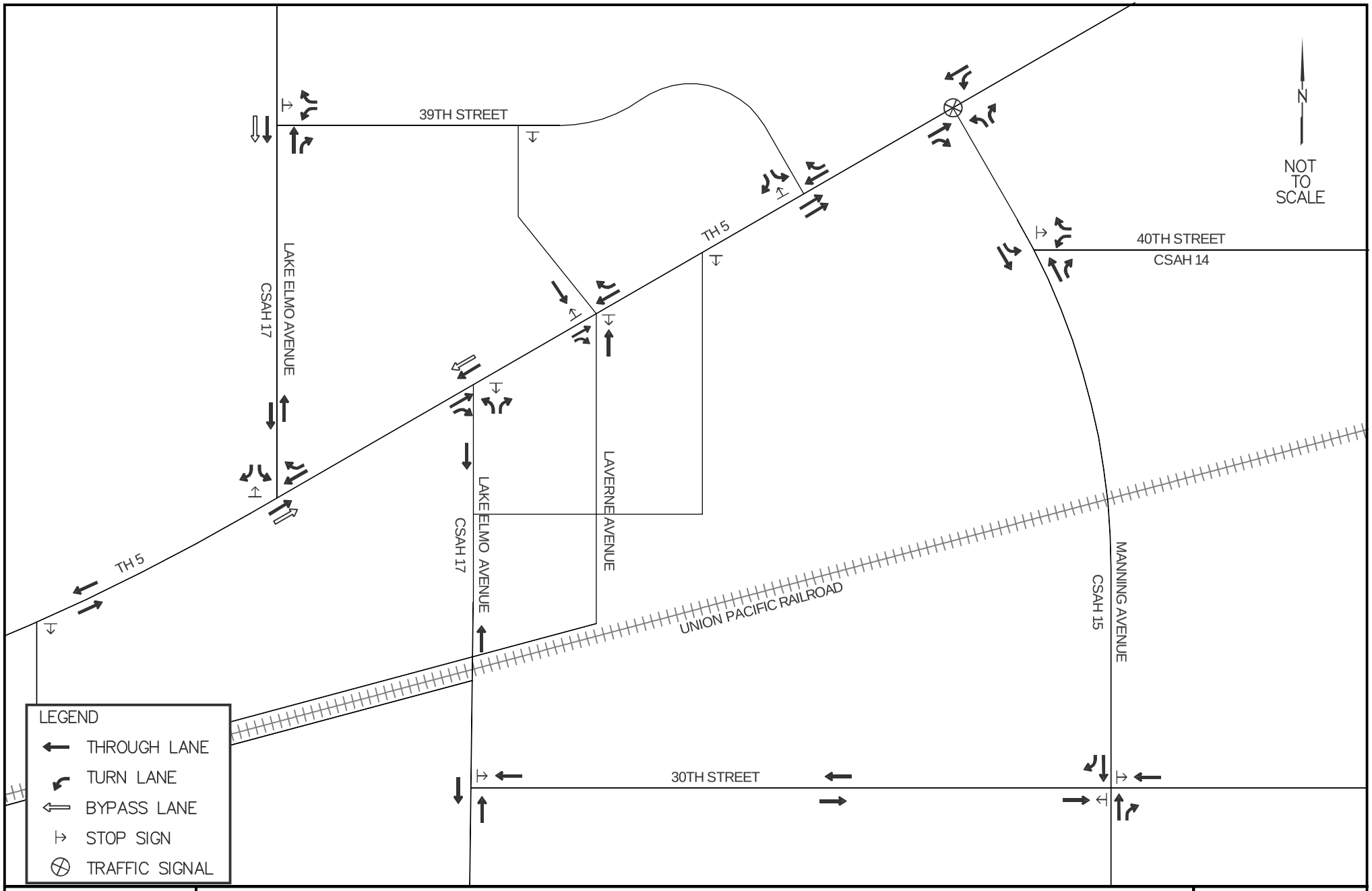

FIGURE 21-2

Primary Roadway System
Lake Elmo Village Area AUAR

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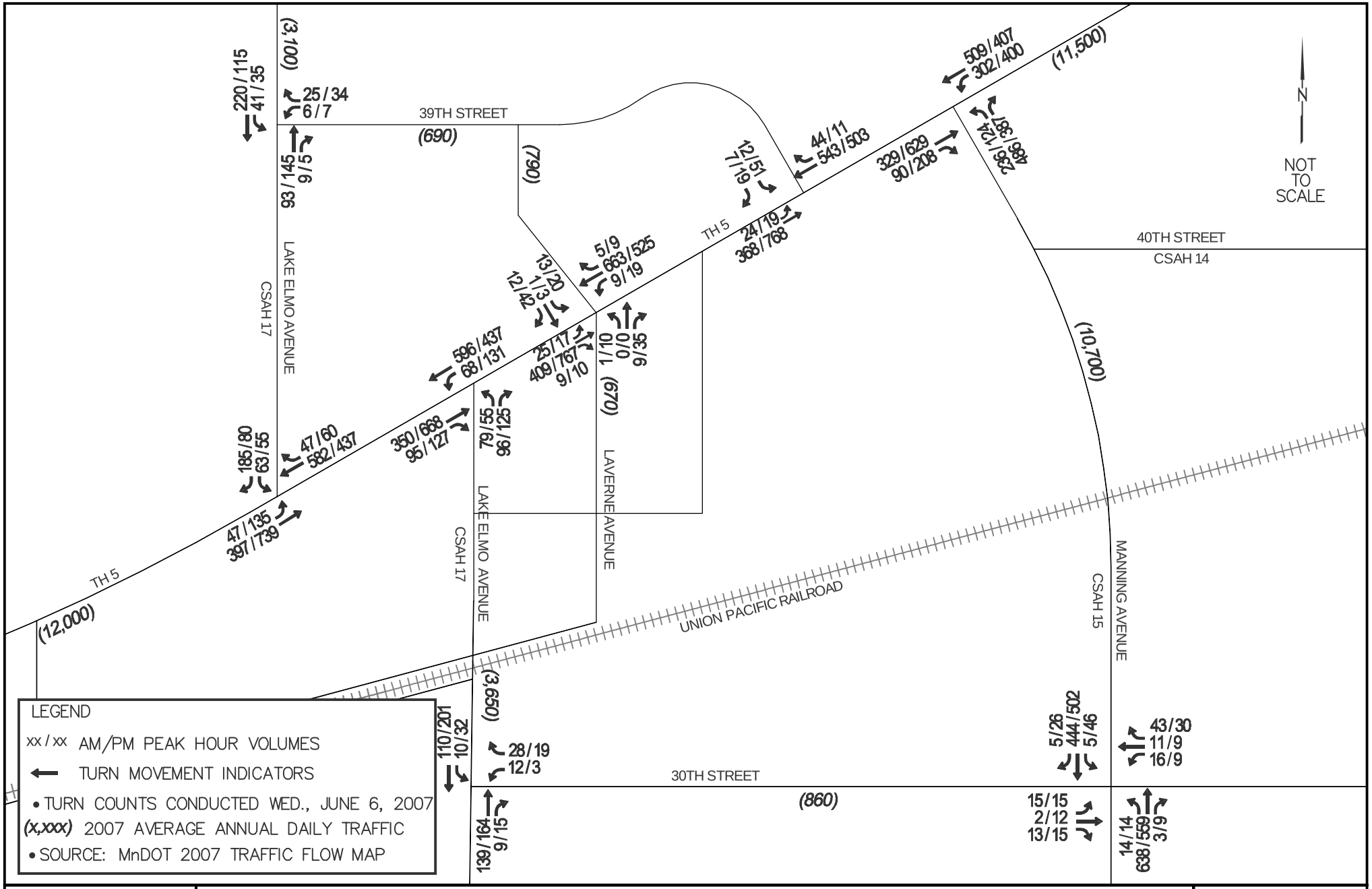

FIGURE 21-3

Existing AM Peak Hour,PM Peak Hour & Daily Volumes
Lake Elmo Village Area AUAR

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Based on the information presented in Table 21-1 and Figure 21-3, the LOS for each roadway can be determined. Table 21-2 shows the results of the roadway segment capacity analysis including existing LOS based on the thresholds shown in Table 21-1. As shown in the Table 21-2, the roadways within the Village AUAR area currently provide adequate capacity for their respective levels of traffic. For this reason, no capacity improvements are recommended for existing conditions.

Table 21-2
Existing Roadway Planning Levels of Service (LOS)

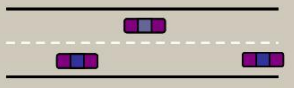
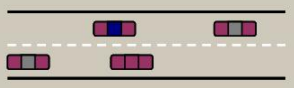
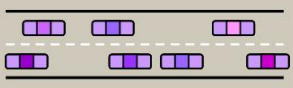
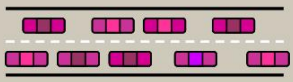
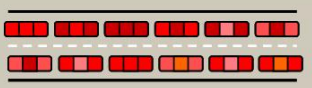
Roadway	Segment	2007 AADT Volume	Existing Lanes	Planning Level LOS
TH 5	West of CSAH 17 South	12,000	2	D
	Between CSAH 17 South & CSAH 15	11,500	2	D
	Northeast of CSAH 15	16,600	2	E[1]
CSAH 17	North of TH 5	3,100	2	A
	Between TH 5 & Upper 33rd St N	4,200	2	B
	Between Upper 33rd St N & 30th Street	3,650	2	B
	South of 30th Street	3,200	2	B
CSAH 15	Between TH 5 & CSAH 14	10,000	2	B
	Between CSAH 14 & 30th Street	10,700	2	B
	South of 30th Street	9,500	2	B
30th Street	Between CSAH 17 & Lisbon Ave	860	2	A
	Between Lisbon Ave & CSAH 15	700	2	A
39th Street	Between TH 5 & CSAH 17 North	690	2	A

[1] Located outside Village AUAR area

B. Intersection Capacity Analysis

Existing and future traffic operations are analyzed in this report in terms of levels of service. Level of service (LOS) is an estimate of the performance of transportation facility operations. Methodology presented in the *Highway Capacity Manual (HCM) (Transportation Research Board, 2000)* is commonly used to determine LOS. This analysis used the Synchro/SimTraffic software package to model the study intersections using the HCM LOS criteria. The degree of traffic congestion and delay is rated using the letter "A" for the least amount of congestion to the letter "F" for the highest congestion level (i.e., LOS A through LOS F). Table 21-3 provides general descriptions of the different levels of service as defined in the Highway Capacity Manual.

Table 21-3
Level of Service Description

Level of Service	Description	
A	Lower volumes Little to no delay Unimpeded movement	
B	Minor delays Reasonably unimpeded operation Slightly restricted movement	
C	Stable conditions More restricted movements Speeds controlled by higher volumes	
D	Higher density traffic Volumes near capacity Some noticeable congestion	
E	At capacity Major delays are common Lower speeds	
F	Failing condition Significant delays Very low speeds with stop and go traffic	

Though there are no hard and fast guidelines in Minnesota for what level of service is considered acceptable, it is typical for an intersection with an overall[1] LOS D to be acceptable in urban or developing communities. Intersections with some turn movements operating at LOS E or F during peak hours may be acceptable, as LOS E or F conditions do not typically correspond with safety problems. However, intersections with level of service concerns should also be monitored for potential safety problems. For complete LOS and queuing analysis results by intersection and by development scenario, please see the appendix.

The result of the existing LOS analysis for the critical intersections is shown on Figure 21-4. All movements performed at LOS D or better except the northbound approach at CSAH 17 (Lake Elmo Avenue) and TH 5, which operates at LOS F. At all stop-controlled intersections along TH 5, side street traffic controlled by stop signs is adversely affected by free-flowing traffic on TH 5. Vehicles are required to wait for acceptable gaps in TH 5 traffic which can create substantial delay for these movements during peak hours. Typically, only new traffic signals could improve these minor

[1] Overall intersection LOS is determined from the average seconds of delay experienced by all vehicles moving through the intersection.

movement levels of service, but the volumes for these movements are so small that the required warrants for a new signal would not be met.[2]

In addition, the northbound left turn at CSAH 15 (Manning Avenue) and TH 5 operates at LOS E in the p.m. peak hour, but the overall intersection operates at LOS C.

There are funds available to study "Safe Routes to School" needs such as improving the visibility and signing of crosswalks at key intersections. In addition, the county is investigating potential funding sources to improve the intersection of CSAH 15 (Manning Avenue) at 30th Street by adding north and southbound left turn lanes. Beyond these spot improvements, there are no plans to improve intersections or roadways within the AUAR area.

IV) EXISTING TRANSIT SERVICE

At the present time, there is Metro Transit (MTC) bus service in the AUAR area. Route 294 passes through the City on TH 5. There is one stop located at the intersection of TH 5 and CSAH 17 (Lake Elmo Avenue).

[2] Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.

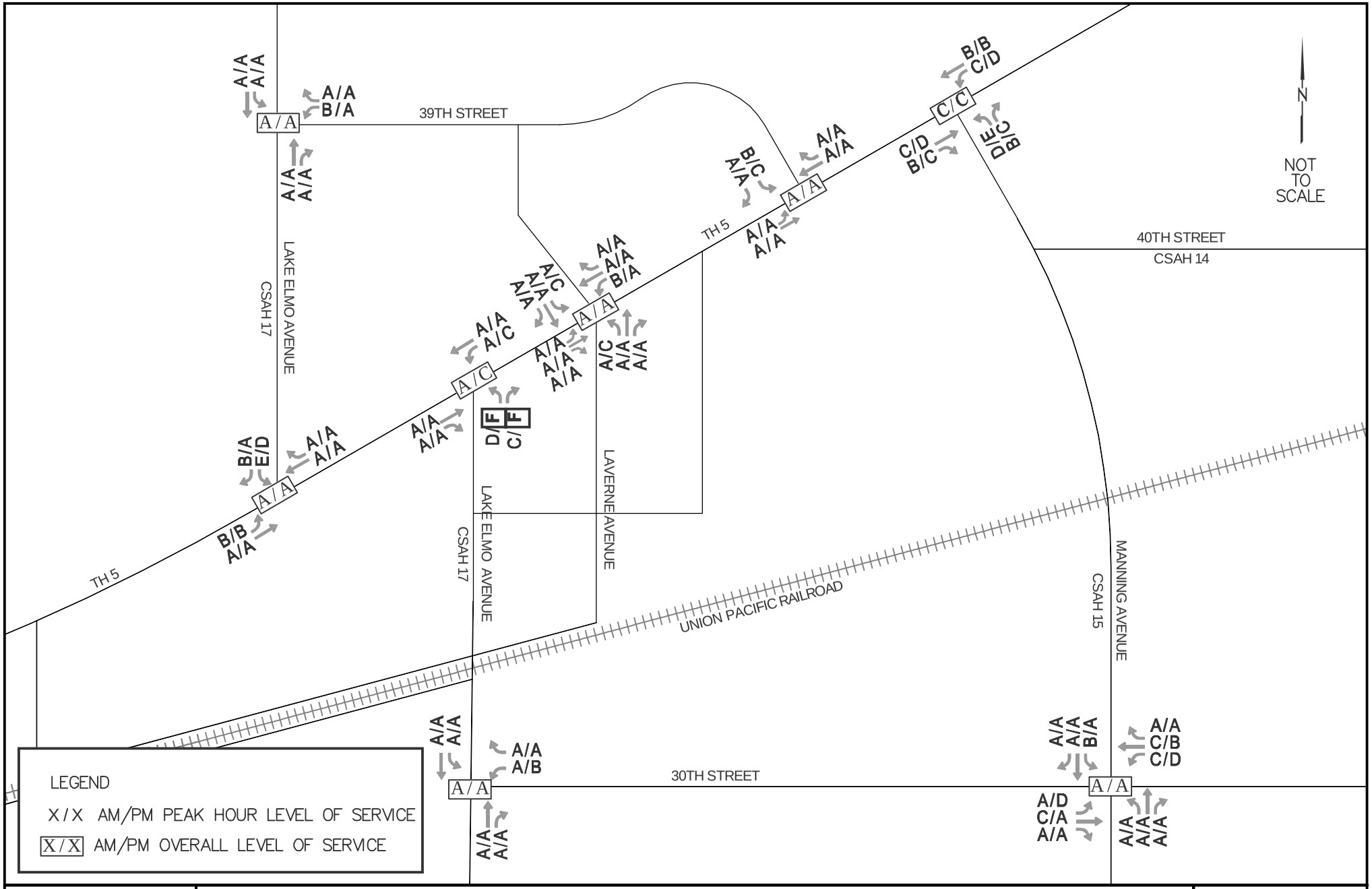


FIGURE 21-4

Existing Intersection Level of Service
Lake Elmo Village Area AUAR

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V) YEAR 2030 BACKGROUND CONDITIONS (WITHOUT VILLAGE DEVELOPMENT)

A. Future Traffic Projections

Year 2030 Background conditions were examined to determine the adequacy of the roadway network to accommodate general background growth in the community (i.e., increases in traffic without Village development). The year 2030 was chosen as the future analysis year to be consistent with the Metropolitan Council's Regional Transportation Model (which uses Year 2030 as the planning horizon year), the Metropolitan Council's 2030 Regional Development Framework, and the 25-year plan adopted in 2005 to guide the seven-county metropolitan area's future growth patterns. In addition, MnDOT and Washington County also use Year 2030 as their planning horizon for future travel demand forecasts and transportation system plans.

The existing traffic on the roadways was increased to account for background growth in the area not associated with Village development. Based on a review of historic average annual daily traffic volumes on area roadways and a comparison with the state-aid growth factor for Washington County, an average annual growth factor of two percent was determined. This factor was used to increase the existing traffic volumes to account for general population growth in the area and was applied to existing volumes to project the 2030 background volumes shown in Figure 21-5 for the a.m. and p.m. peak hours.

B. Roadway Segment Capacity Analysis

In order to assess the ability of the overall roadway to accommodate the daily volumes, projections of the daily volumes have been completed and were shown in previous figures. Tables 21-1 and 21-2 in this report provided the generalized daily volume thresholds for various roadway types and the existing roadway levels of service. Using the information from Table 21-1 compared to projected 2030 background daily volumes (without Village development) the LOS can be determined. LOS is used to determine the recommended improvements such as recommended number of lanes for each roadway. Table 21-4 shows the 2030 background planning LOS by roadway segment for existing and improved lane configurations.

Table 21-4 shows the existing number of lanes and the associated planning levels of service. In locations where the planning LOS is an E or F, improvements would be needed to reach an acceptable LOS D or better. The roadway was again examined with the planning LOS to determine the number of lanes required with a given traffic volume. The number of lanes needed to accommodate the 2030 background ADT is shown under the "Improved Lane Configuration" column along with the associated planning LOS.

Table 21-4
2030 Background Traffic Growth Planning Levels of Service

Roadway	Segment	2030 Background ADT	Existing Lanes		Improved Lane Configuration	
			No. of Lanes	Planning LOS	No. of Lanes	Planning LOS
TH 5	West of CSAH 17 South	18,920	2	**F**	4	C
	Bet. CSAH 17 & CSAH 15	18,140	2	**F**	4	C
	Northeast of CSAH 15	26,180	2	**F**	4	C
CSAH 17	North of TH 5	4,890	2	C	2	A[1]
	South of TH 5	5,760	2	C	2	A[1]
CSAH 15	South of TH 5	15,770	2	**E**	2	C[1]
30th Street	Between CSAH 17 & CSAH 15	1,360	2	A	2	A
39th Street	Between TH 5 & CSAH 17 North	1,090	2	A	2	A

[1] With added intersection turn lanes as described under "Peak Hour Analysis" below; with turn lane improvements for northbound approach, LOS E is improved to LOS C without widening roadway segment.

There have been discussions about the possibility of realigning the north leg of CSAH 17 to alleviate the jog at TH 5. This would entail extending the south leg of CSAH 17 through TH 5 to connect to CSAH 17 North near 39th Street. Another realignment possibility that was discussed with Washington County in response to their comments on the preliminary Draft AUAR is to shift the north leg of CSAH 17 and TH 5 intersection to the west of Lake Elmo Elementary. Thus creating a buffer between the school and CSAH 17 and providing access to the lands west of Gorman's restaurant. However, this AUAR does not take these realignment discussions of CSAH 17 into consideration as there are no approved plans for these improvements. This report assumes that the alignment of CSAH 17 remains as it is today, but these options should be reviewed by the city, county, and state in future transportation studies prior to development or redevelopment in this area.

As shown in the table, even without Village development, TH 5 will need to be upgraded from two lanes to four lanes with right and left turn lanes at intersections. Although the specific roadway improvements for TH 5 should be planned, traffic volumes should be monitored to determine the actual timing of any improvement. The City of Lake Elmo should coordinate with MnDOT, Washington County, and others, as necessary, to ensure the proper monitoring and roadway plans/designs are in place as development continues throughout the AUAR area.

C. Intersection Capacity Analysis

All analyses presented were completed using traditional intersection control (i.e., either a stop sign or traffic signal). Other potential methods of intersection control, such as roundabouts, are discussed later in this report.

With the 2030 background a.m. and p.m. peak hour volumes determined, the Synchro/SimTraffic software was used to evaluate traffic operations. The existing lane geometry was first analyzed to determine how the current roadway system would handle

the future volumes. Figure 21-6 shows 2030 levels of service using the existing lane configurations. Existing intersection geometry and lane configurations are also shown on these figures.

As shown in Figure 21-6, several individual turning movements would operate at LOS F during the a.m. and p.m. peak hours. Only the intersection of CSAH 17 (Lake Elmo Avenue) and 30th Street would operate at a satisfactory level during the a.m. and p.m. peak hours.

Based on these results, the existing lane geometry is not sufficient for projected background growth (without Village development) within the City. Physical capacity improvements will be needed to accommodate the expected traffic growth in this area.

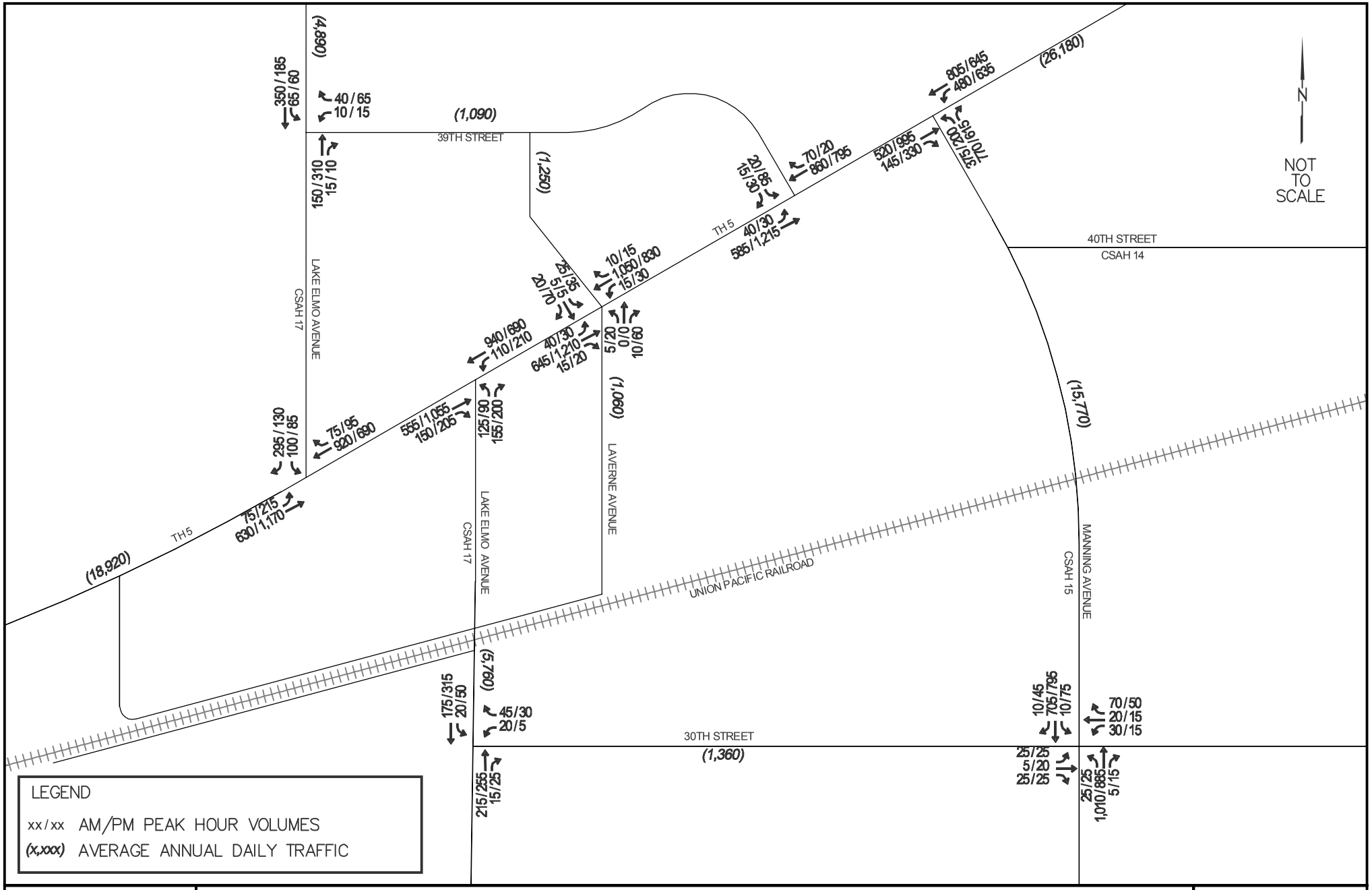

FIGURE 21-5

No Build - 2030 Projected Background Volumes
Lake Elmo Village Area AUAR

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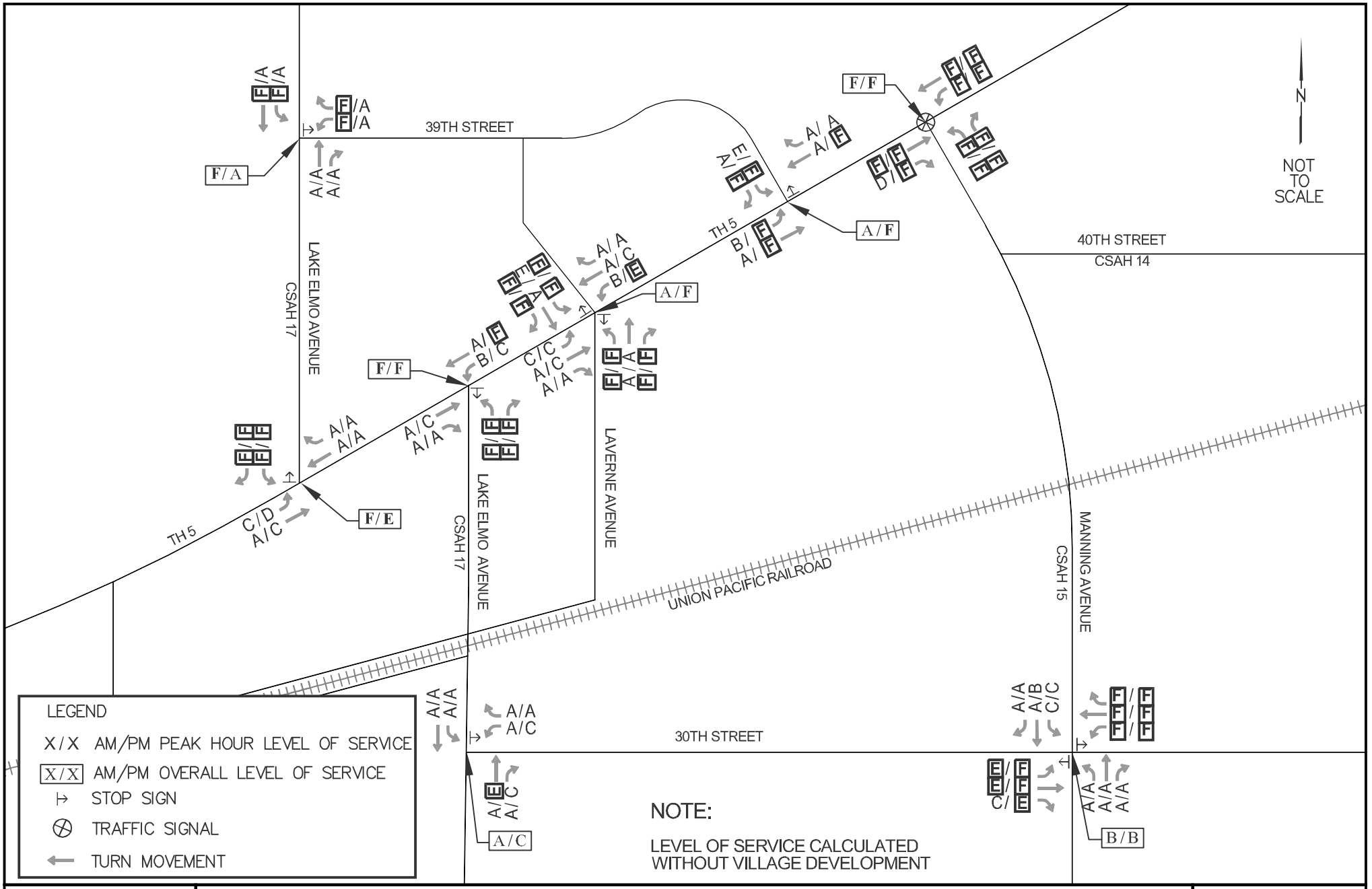

FIGURE 21-6

2030 Background LOS without Village Development
on Existing Roadway Network
Lake Elmo Village Area AUAR
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D. Recommended Roadway Network Improvements (without Village development)

Since the existing roadway geometry was not sufficient for the projected 2030 background traffic volumes (without Village AUAR development), additional analyses at the study intersections determined recommendations for improved lane geometry. The recommended number of lanes, as determined by the daily volume planning level analysis, was used as a starting point. This included the upgrade of TH 5 east of CSAH 17 (south) from two to four lanes as required under 2030 Background Conditions. An iterative process followed with the results of Synchro/SimTraffic analysis dictating the final lane geometry for improving levels of service at the intersections.

Recommended improvements for each individual study intersection are described in Table 21-5. The level of service results for Year 2030 Background Conditions with the suggested roadway improvements are shown on Figure 21-7. As shown in this figure, the turn movement levels of service have improved. Traffic control signals were assumed on TH 5 at both CSAH 17 intersections. This improvement alleviated congestion through the intersections with the improved street network. Another possible improvement option has been discussed between county and state officials that would realign TH 5 to intersect with Manning Avenue (CSAH 15) at the existing intersection with 40th Street North (CSAH 14), thereby creating a continuous north/south movement through the existing TH 5/CSAH 15 intersection. This option should be re-evaluated by city, county, and state officials in the future.

Table 21-5
Recommended Roadway Improvements – 2030 Background Conditions
(Without Village Development)

Intersection	Description[1]
TH 5 and CSAH 15 (Manning Avenue)	• Additional left-turn lane to create dual northbound left-turn lanes • Additional eastbound and westbound through lanes creating four-lane section. • Additional left-turn lane to create dual westbound left-turn lanes.
TH 5 and 39th Street	• Additional eastbound and westbound through lanes resulting in four-lane section. • Additional eastbound left-turn lane.
TH 5 and Laverne Avenue	• Additional eastbound and westbound through lanes. • Additional eastbound and westbound left-turn lanes..
TH 5 and CSAH 17 (Lake Elmo Avenue South)	• Install new traffic signal. • Additional eastbound and westbound through lanes creating four-lane section.
TH 5 and CSAH 17 (Lake Elmo Avenue North)	• Install new traffic signal. • Additional eastbound and westbound through lanes resulting in four-lane section. • Additional eastbound exclusive left-turn lane
CSAH 15 (Manning Avenue) and 30th St	• Install new traffic signal. • Additional eastbound and westbound exclusive left-turn lanes. • Additional northbound and eastbound exclusive left-turn lanes.

[1] Refer to Figure 21-7 for an illustration of the recommended improvements.

TH 5 and 39th Street

While the overall LOS at TH 5 and 39th Street is A (due to the predominantly heavy volumes on TH 5 that are not required to stop), the southbound left-turn movement of TH 5 and 39th Street would continue to operate at LOS F during both the a.m. and p.m. peak hours. Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. No additional measures short of installing a traffic signal or a roundabout would improve the LOS for the minor street left turns and

warrants[3] for a new signal would not be met due to the low volumes on 39th Street.

TH 5 and Laverne Avenue
At the intersection of TH 5 and Laverne Avenue, the northbound and southbound left turns, are expected to operate at LOS F in the p.m. peak hour. In addition the southbound through movement would operate at LOS E in the a.m. peak hour and the westbound left would function at LOS E in the p.m. peak hour. However, no additional measures short of installing a traffic signal or a roundabout would improve the LOS for these movements and warrants[4] for a signal or roundabout would not be met due to the low volumes on Laverne Avenue. In addition, this intersection would be too close to the recommended signal at CSAH 17 (south) to meet MnDOT spacing guidelines.

CSAH 15 (Manning Avenue) and 30th Street
The side-street, stop-controlled intersection of CSAH 15 (Manning Avenue) and 30th Street would have a all movements operating at LOS F on the side street in the p.m. peak hour and most movements at LOS E or F in the p.m. peak hour. Due to these low levels of service, a traffic signal is recommended at this intersection. The eastbound and westbound approaches would require one left-turn lane and one through-right lane. With the improvements outlined, the intersection is expected to operate at LOS B and all movements would function at LOS D or better during both the a.m. and p.m. peak hours.

[3] Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.
[4] Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.

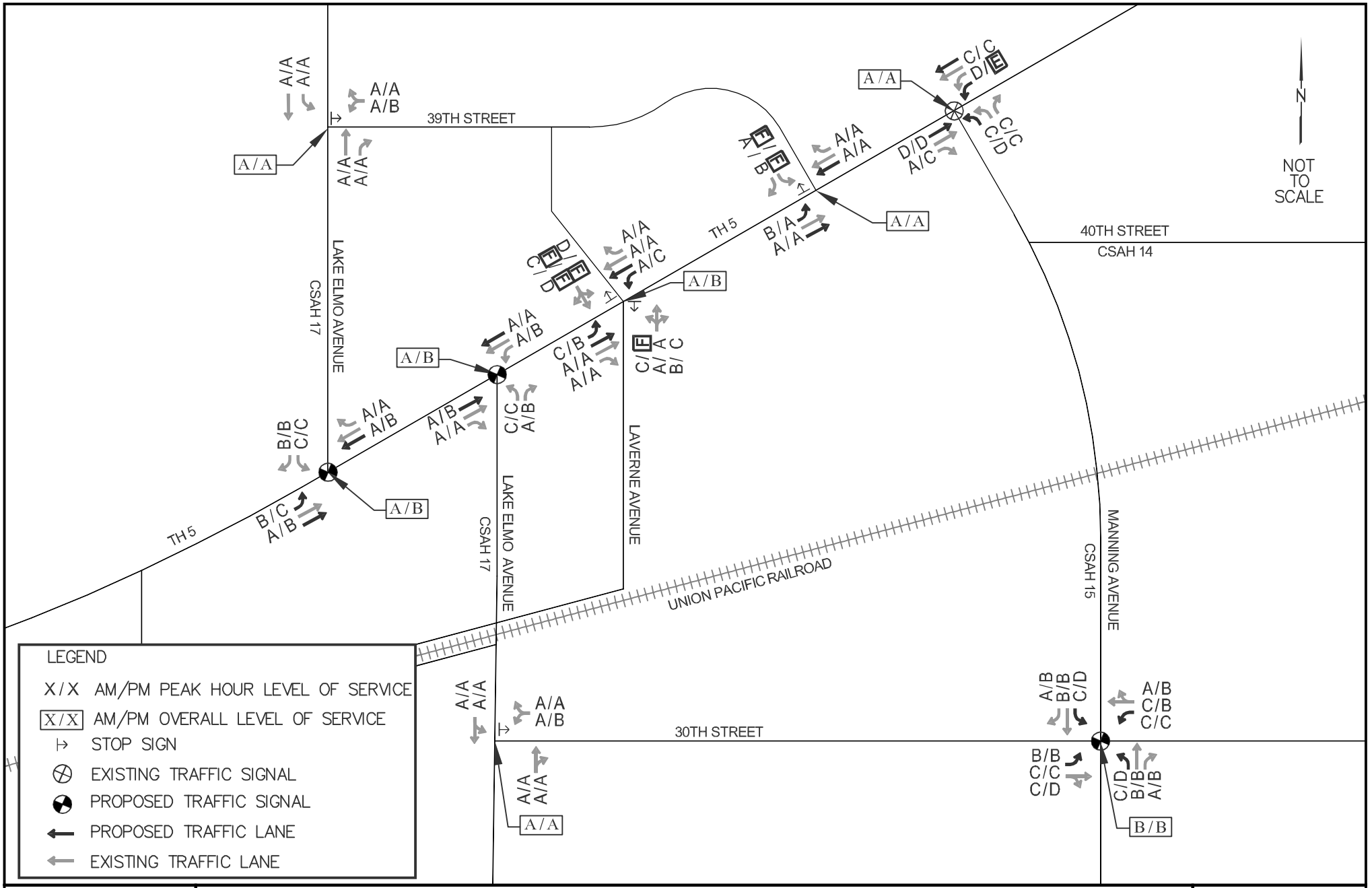

FIGURE 21-7

2030 LOS Background without Village Development
on Improved Roadway Network
Lake Elmo Village Area AUAR
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VI) YEAR 2030 CUMULATIVE CONDITIONS (WITH VILLAGE DEVELOPMENT)

The year 2030 was chosen as the future analysis year to be consistent with the Metropolitan Council's Regional Transportation Model (which uses Year 2030 as the planning horizon year) and their 2030 Regional Development Framework, the 25-year plan adopted in 2005 to guide the seven-county metropolitan area's future growth patterns. In addition, MnDOT and Washington County also use Year 2030 as their planning horizon for future travel demand forecasts and transportation system plans.

A. Village Master Plan Land Use Scenarios

There are four land use scenarios developed and analyzed as a part of this AUAR. The AUAR area covers 1,275 acres. Three of the scenarios developed are based on the Village Masterplan. The only difference between the three scenarios is the number of residential units. The four land use scenarios are described below.

- Scenario A is based on the Village Masterplan and contains 600 residential units and 300,000 square feet of commercial space, 150,000 square feet of office space, and 200,000 square feet of public/semi public space.

- Scenario B is based on the Village Masterplan and contains 1,000 residential units and 300,000 square feet of commercial space, 150,000 square feet of office space, and 200,000 square feet of public/semi public space.

- Scenario C is based on the Village Masterplan and contains 1,600 residential units and 300,000 square feet of commercial space, 150,000 square feet of office space, and 200,000 square feet of public/semi public space.

- Scenario D is based on the Lake Elmo Comprehensive Plan and contains 906 residential units, 300,000 square feet of commercial space, 150,000 square feet of office space and 200,000 square feet of public/semi public space.

Figure 21-8 shows the Village Master Plan land use Scenarios A through C. Figure 21-9 shows the land use plan for Scenario D.

B. Village Development Trip Generation

The determination of the trip generation characteristics of the development begins with assumptions concerning the expected type of land use (i.e., residential, commercial, office) and intensity of each land use (i.e., number of residential units, square feet of commercial and office space). Information contained in the Village Master Plan and Comprehensive Plan identified the land use characteristics of the study area.

Using the land use and intensity information provided, the projected trip generation was determined using the Institute of Transportation Engineers' (ITE) *Trip Generation, 7th Edition, 2003*. This industry standard publication provides average trip rates of land uses based upon studies completed across the nation. Table 21-6, below, provides the estimated trip generation for each Village Master Plan scenario.

Table 21-6
Year 2030 Estimated Trip Generation

Scenario	Land Use	AM Peak Hour		PM Peak Hour		Daily
		Entering	Exiting	Entering	Exiting	(2-Way)
Scenario A	Residential	93	274	315	186	4,860
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips[1]	776	531	925	1,107	26,510
	Net Vehicle Trips[2]	**665**	**465**	**803**	**950**	**22,785**
Scenario B	Residential	121	401	441	252	7,070
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips[1]	804	658	1,051	1,173	28,730
	Net Vehicle Trips[2]	**690**	**579**	**916**	**1,010**	**24,774**
Scenario C	Residential	183	661	721	410	11,420
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips[1]	866	918	1,331	1,331	33,080
	Net Vehicle Trips[2]	**746**	**813**	**1,170**	**1,152**	**28,689**
Scenario D	Residential	115	368	403	245	6,780
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips[1]	798	625	1,013	1,166	28,440
	Net Vehicle Trips[2]	**685**	**549**	**882**	**1,004**	**24,513**

[1] Gross trip generation before reductions for pass-by, multi-use, and internal trips.
[2] This traffic will increase the existing volumes on the study roadways.

Only the "net vehicle trips" totals shown in the table represent new traffic on the roadway system in the study area. These trips are established by reducing the total development trip generation to account for the following factors:

- Pass-By – Pass-by trips account for trips that are already on the road but divert from their primary trip route to patronize retail stores. These trips would already be on the road and are not considered new trips, although they affect local inbound and outbound turn volumes at access point intersections. Gross commercial trips were reduced by 10% to account for pass-by trips.

- Multi-Use – Multi-use trips account for those that make multiple stops within the project area and are already accounted for by adjacent or nearby trip generators. An example of this behavior is a driver that makes several stops at various stores in different locations. Gross commercial and residential trips were reduced by 5% to account for multi-use trips.

- Internal – Trips between residential and commercial land uses within the new development that do not occur on the primary roadways analyzed. Gross residential trips were reduced by 5% to account for internal development trips.

C. Village Development Trip Distribution

With the potential new traffic quantified, the volumes were then distributed to the study area roadway system based upon knowledge of the area, existing flows of traffic, and input from the City of Lake Elmo and Washington County. Figure 21-10 shows the trip distribution percentages for the study roadways. Based on an examination of existing traffic patterns, TH 5 serves as a commuter route during the a.m. and p.m. peak periods. For this reason, two trip distributions were established. The first set of distribution rates was for the distribution of residential trips. This breakdown distributed almost half of the trips southwest towards the metropolitan area, consistent with the existing traffic patterns. The second set of distribution rates was for the remaining commercial, office, and institutional land uses. This breakdown still shows a majority of traffic heading southwest on TH 5 toward the metropolitan area, but also reflects a draw into Lake Elmo for these commercial and office land uses. New traffic was distributed to the roadway system based upon these percentages.

The generated trips were assigned to the roadway system for each Scenario. Figures 21-11 through 21-14 show the projected 2030 Village development-generated traffic for a.m. and p.m. peak hours at the study intersections. Projected daily volumes are also included on these figures. All peak hour and daily volumes shown represent full development of the Village area by the year 2030. These volumes do not include any existing or other potential development traffic, but only represent expected future traffic generated by a particular AUAR Scenario. General growth of the area was captured in the 2030 background growth analysis. The study roadways and intersections were determined to be the most critical intersections of minor arterials and collectors that would most likely be impacted by Village development.

Figures 21-15 through 21-18 show the 2030 projected a.m. and p.m. peak hour and daily volumes for each AUAR Scenario.

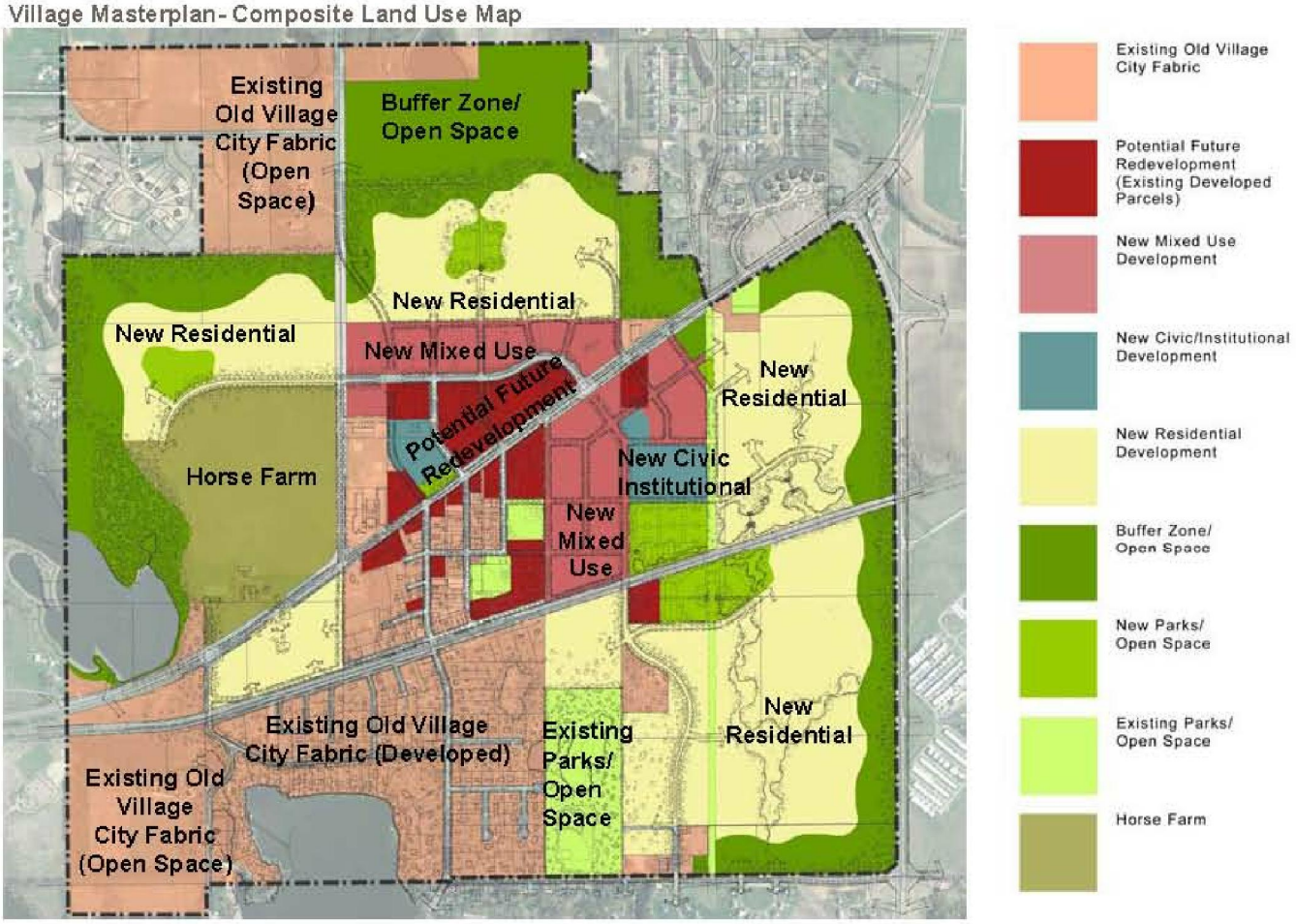
D. Roadway Segment Capacity Analysis

Under 2030 Background Conditions future roadway improvements are necessary (as shown in Figure 21-17). Scenarios A and C were analyzed first on this improved network and again for Village development-based mitigation. As previously mentioned, Scenario A will contribute the least amount of traffic and Scenario C will contribute the most traffic to the roadway network. Because of this, only these two scenarios were analyzed. The results of the Scenario A and C analyses under Year 2030 Background Conditions with the recommended improved roadway network are discussed below.

Table 21-6 shows that Scenario A will have the least impact to the roadway network with about 22,800 new vehicular trips per day. Scenario C will have the greatest impact to the area roadways with about 28,700 new vehicular trips per day. Scenarios B and D each fall in the moderate impact range in comparison to the other scenarios. Scenario B will increase the area roadways by about 24,800 vehicles per day and Scenario D will increase the roadway network by about 24,500 vehicles per day.

Village Masterplan AUAR Development Scenarios (A, B, & C)

Village Masterplan- Composite Land Use Map



Masterplan Composite Land Use	Acres	Scenario A - 600	Scenario B -1,000	Scenario C - 1,600
New Mixed Use	72.46	-	-	-
* Mixed Use (Non-Residential[1]) 16.46 acres	-	200,000 ft^2	200,000 ft^2	200,000 ft^2
* Mixed Use (Residential) 56.0 acres	-	100 units	200 units	400 units
New Residential	308.55	450 units	700 units	1015 units
Potential Future Redevelopment	44.52	-		-
* Non-Residential[1]		250,000 ft^2	250,000 ft^2	250,000 ft^2
* Residential		50 units	100 units	185 units
New Civic/Institutional Development	16.47	200,000 ft^2	200,000 ft^2	200,000 ft^2
Buffer Zone, Open Space	226.02	No development	No development	No development
Existing Old Village City Fabric	305.67	No development	No development	No development
Existing Open Space	45.29	No development	No development	No development
Horse Farm	74.10	No development	No development	No development
New Parks/Open Space	35.35	No development	No development	No development
Total Residential Units		**600 units**	**1,000 units**	**1,600 units**
Total Square Footages of Non-Residential Uses		**650,000 ft^2**	**650,000 ft^2**	**650,000 ft^2**

[1] Non-residential includes 300,000 ft^2 of commercial and 150,000 ft^2 of office use

FIGURE 21-8

AUAR Development Scenarios A, B, and C
Lake Elmo Village Area AUAR

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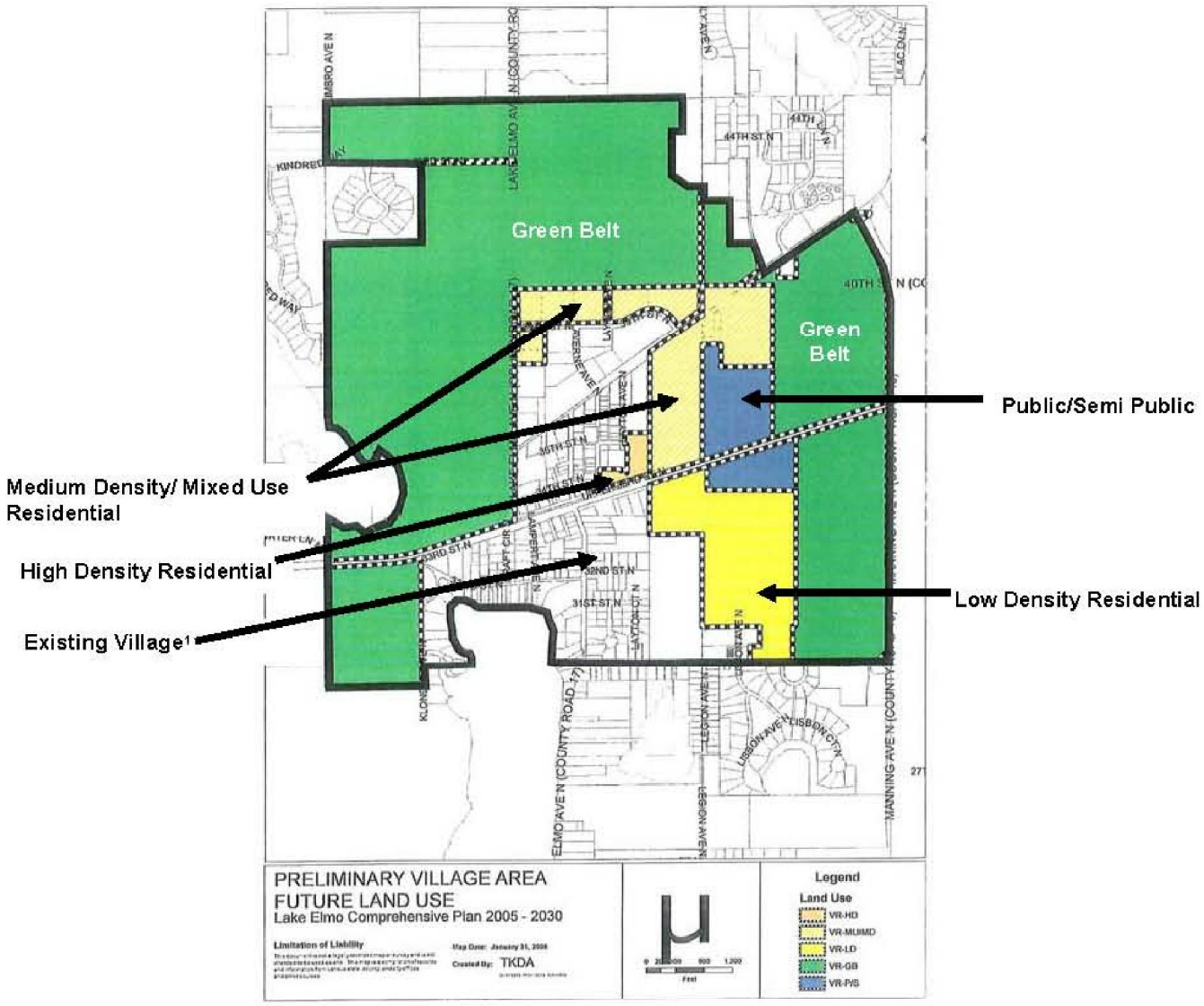
Required Lake Elmo Comprehensive Plan
AUAR Development Scenario (Scenario D)



Village Future Land Use Designation	Acres	Housing Units	Commercial/Office (ft^2)	Institutional (ft^2)
Village Residential High Density (VR/HD)	7	102	-	-
Village Residential Low Density (VR/LD)	77	339	-	-
Village Residential Mixed Use/Medium Density (VR MU/MD)	86	465	450,000	
Village Residential Public/Semi Public (VR P/S)	43	-	-	200,000
Village Residential Green Belt (VR GB)	717	-	-	-
No designation (existing Village Area)[1]	199	-	-	-
Total	**1,129**	**906**	**450,000**	**200,000**

[1] Refers to the "white" areas on the Village Area Future Land Use Map

FIGURE 21-9

AUAR Development Scenario D
Lake Elmo Village Area AUAR

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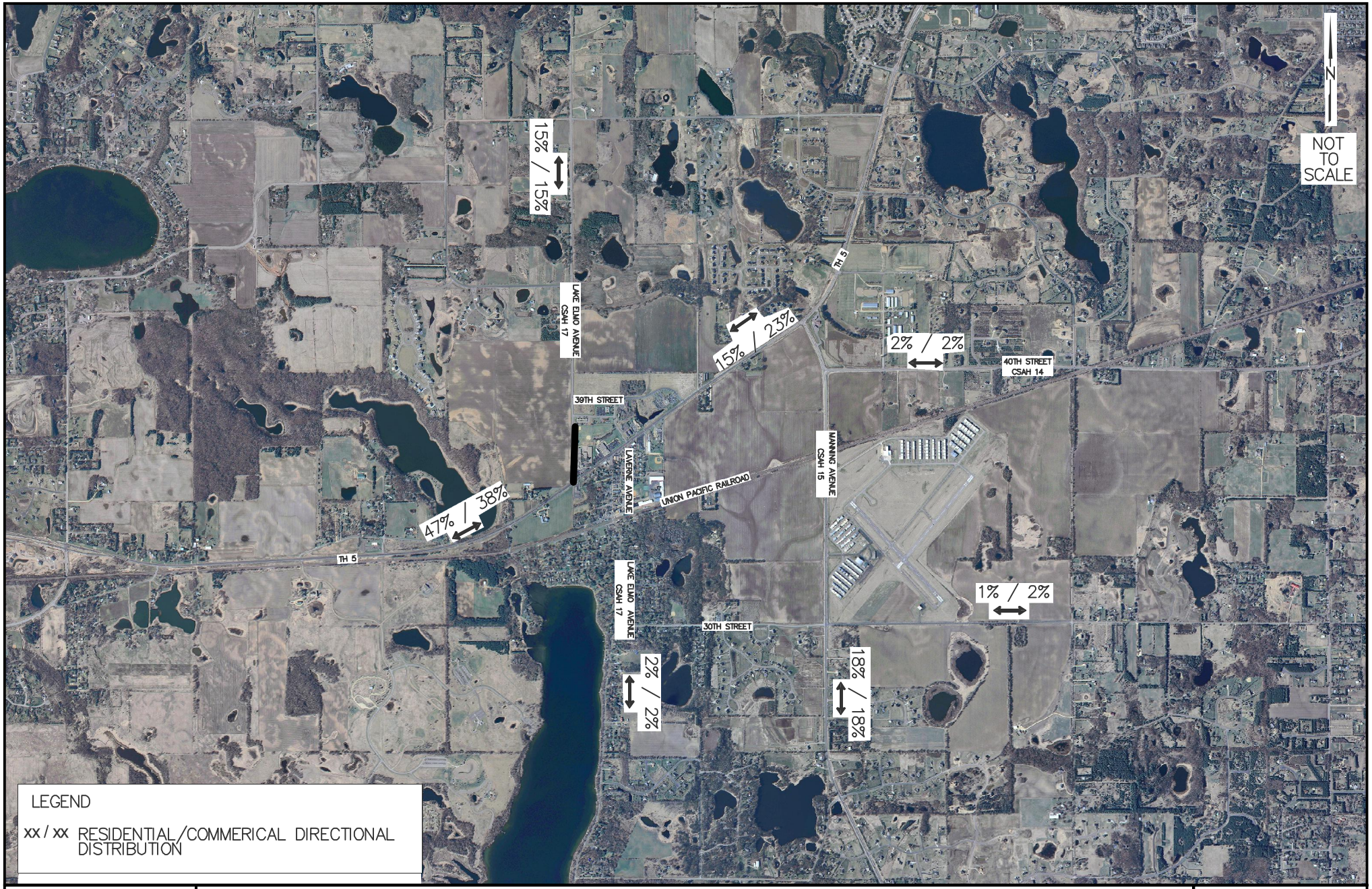

FIGURE 21-10

Trip Distribution Percentages
Lake Elmo Village Area AUAR

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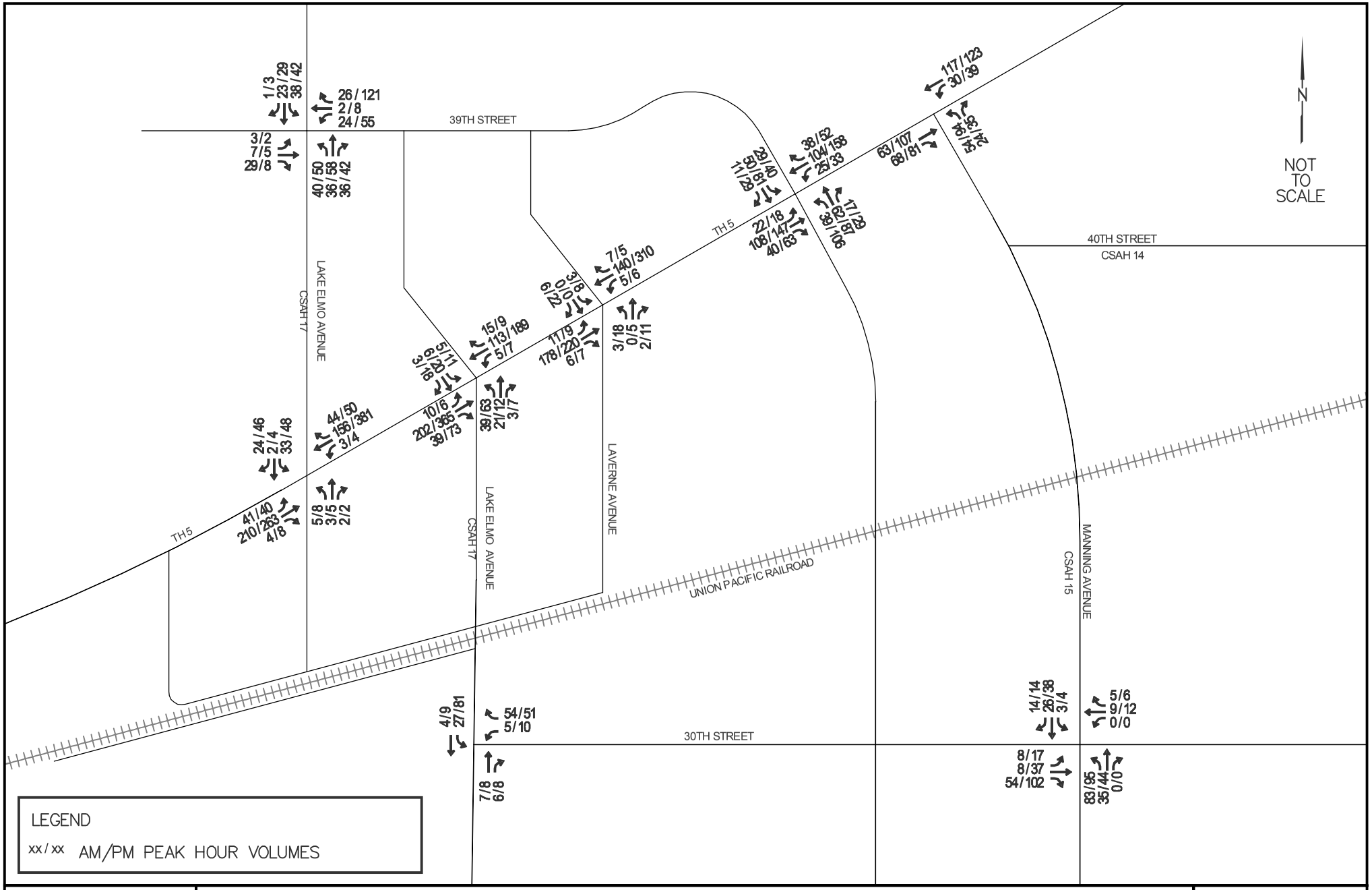

FIGURE 21-11

Scenario A - Development Only Volumes
Lake Elmo Village Area AUAR

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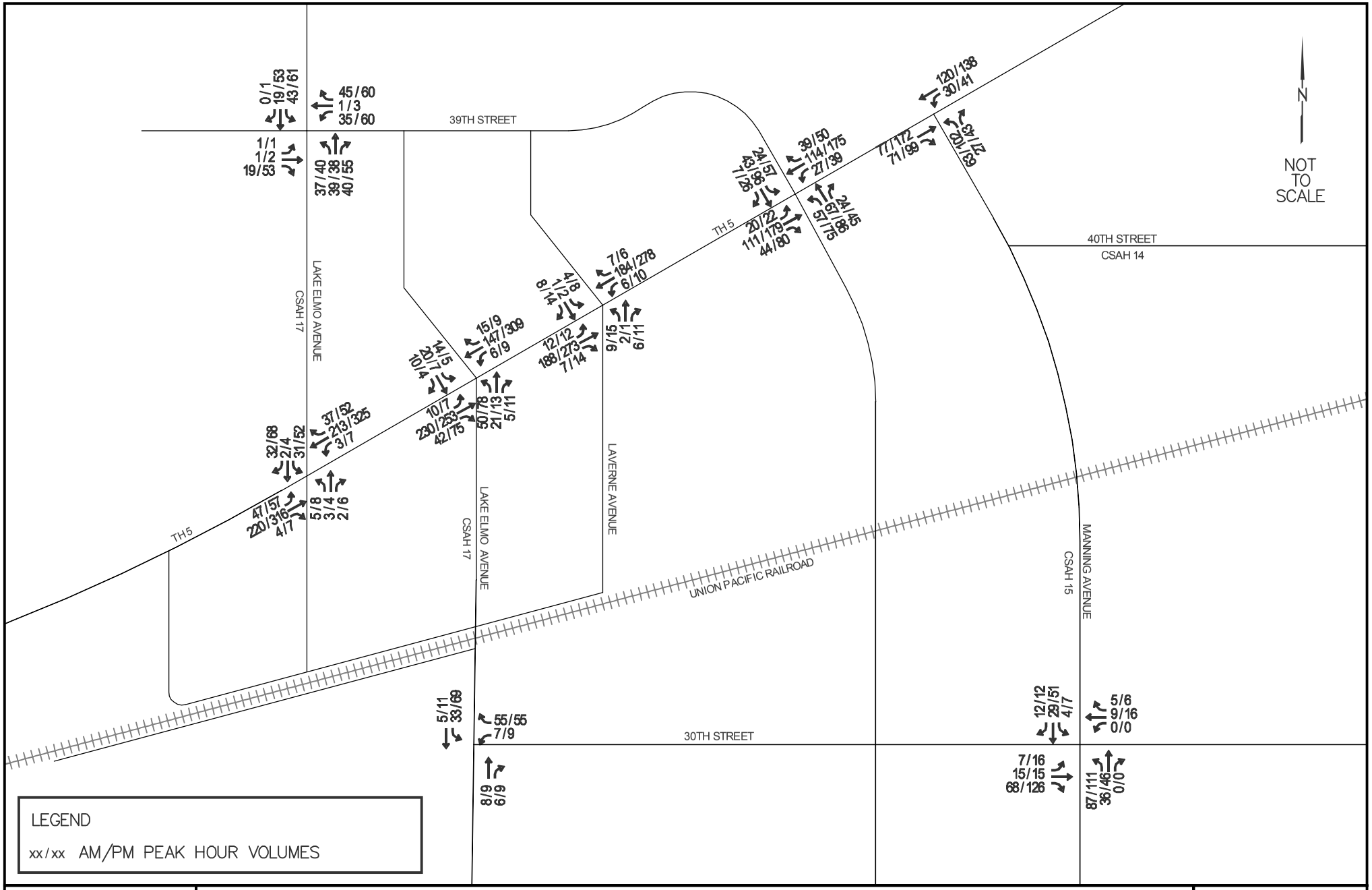

FIGURE 21-12

Scenario B - Development Only Volumes
Lake Elmo Village Area AUAR

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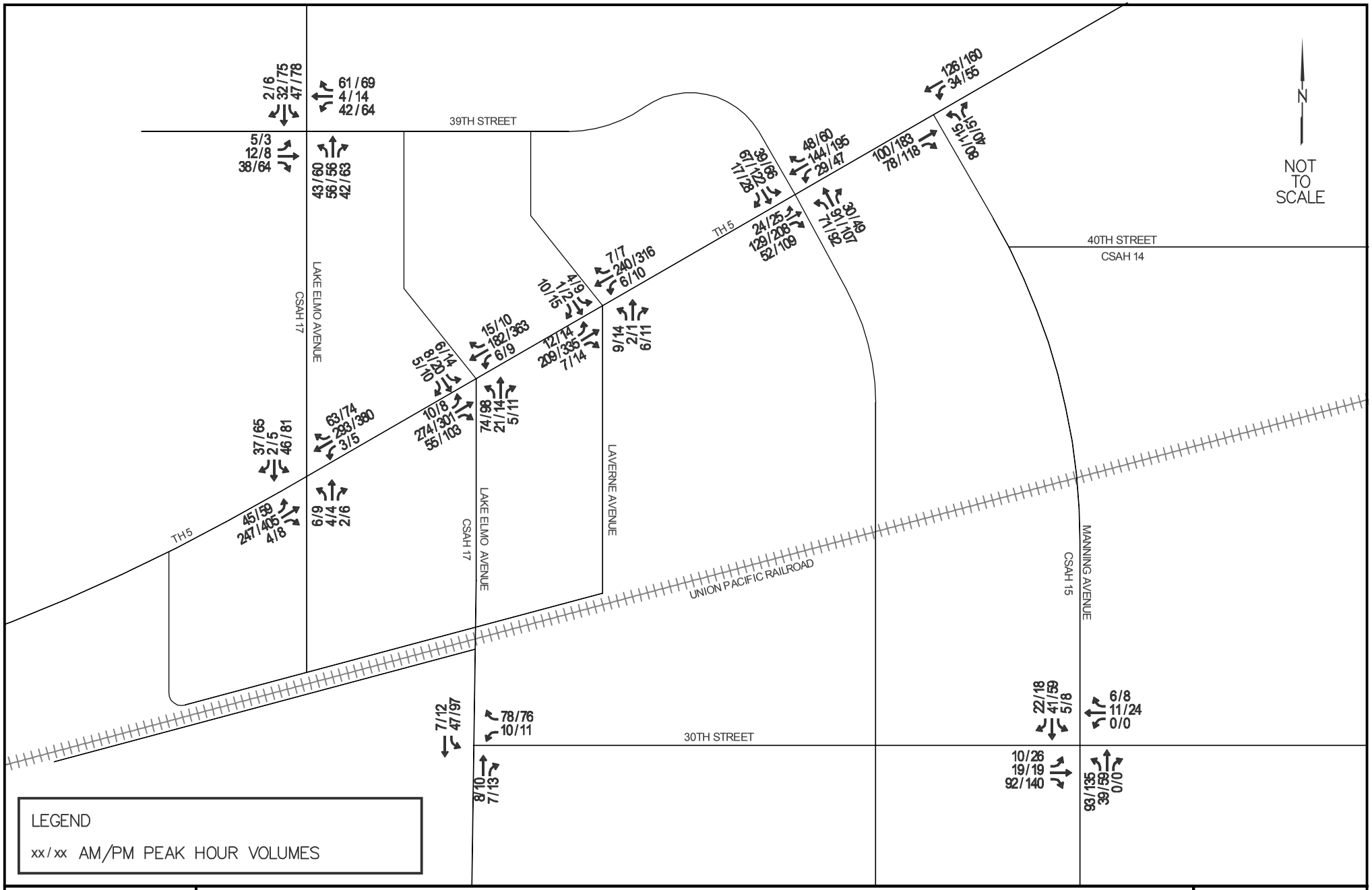

FIGURE 21-13

Scenario C - Development Only Volumes
Lake Elmo Village Area AUAR

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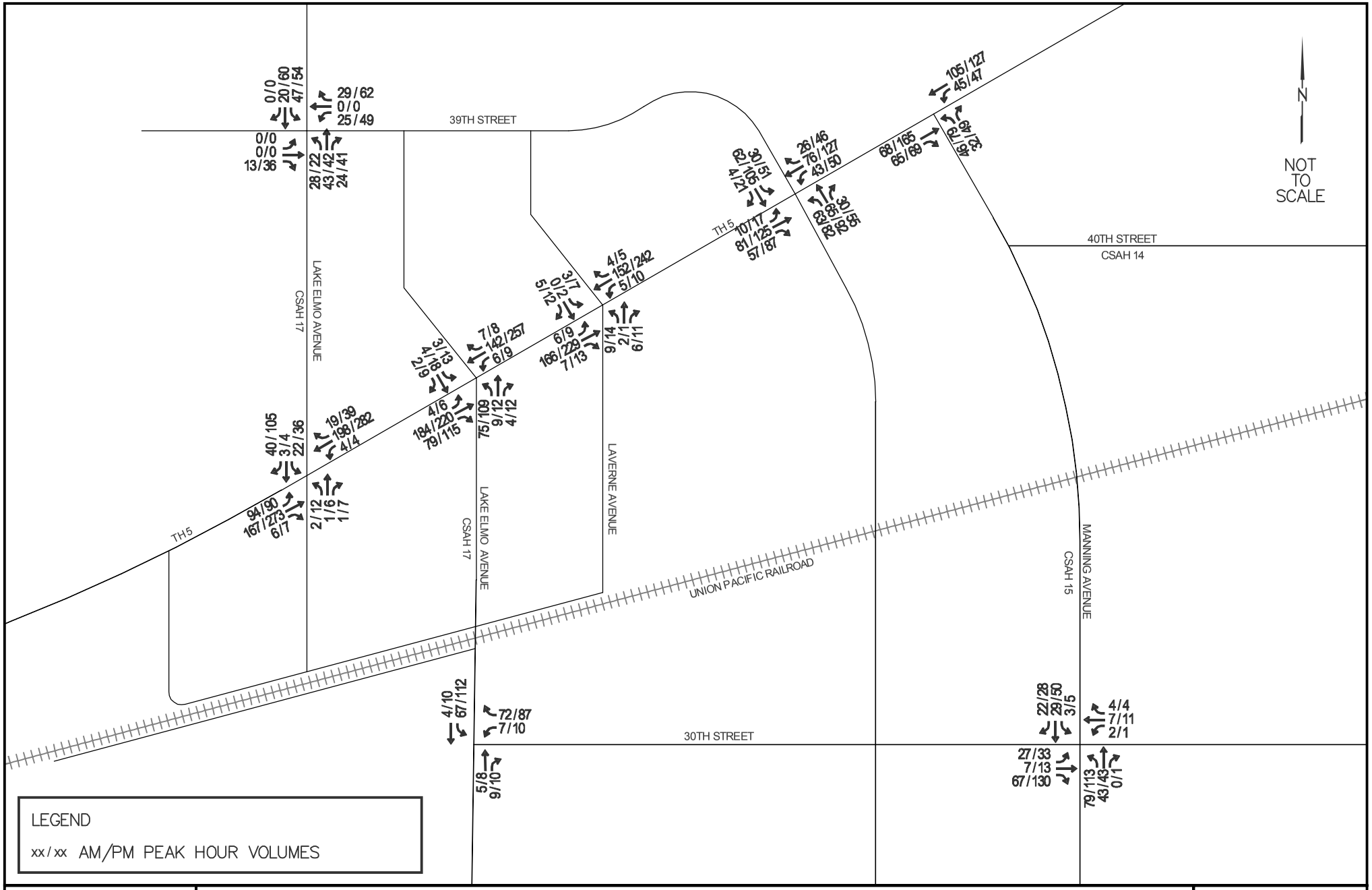

FIGURE 21-14

Scenario D - Development Only Volumes
Lake Elmo Village Area AUAR

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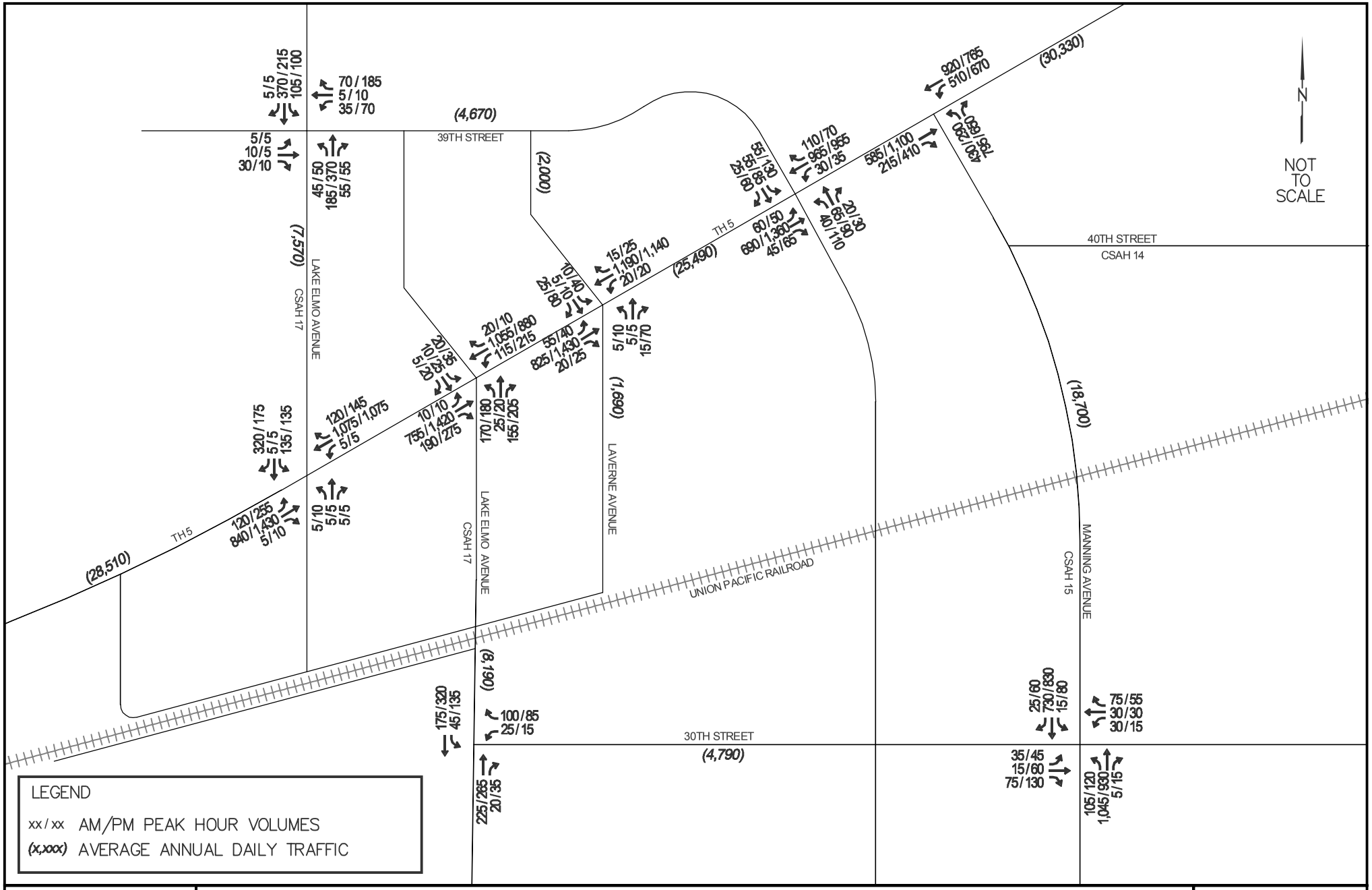

FIGURE 21-15

Scenario A - 2030 Cumulative Volumes
Lake Elmo Village Area AUAR

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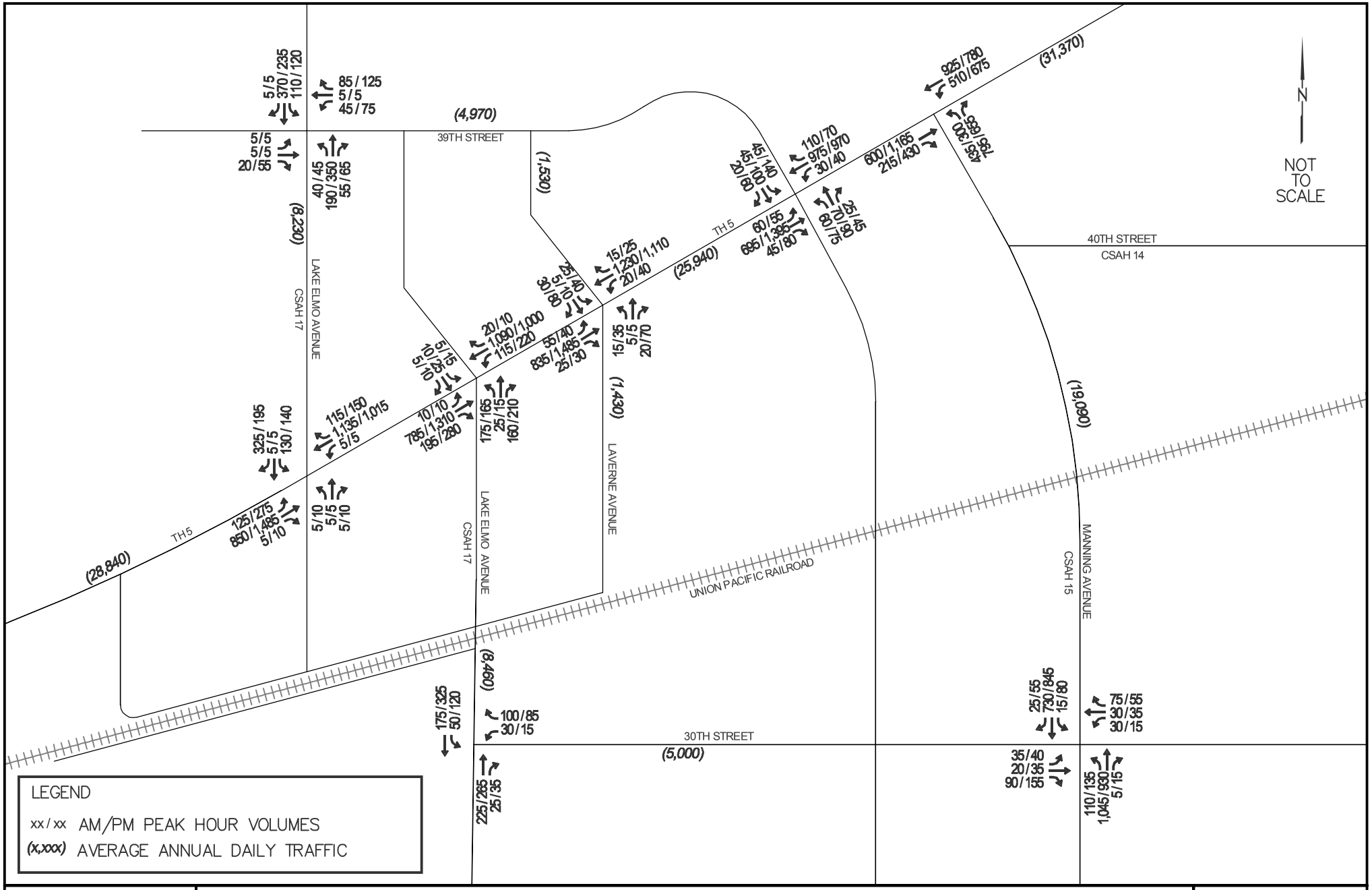

FIGURE 21-16

Scenario B - 2030 Cumulative Volumes
Lake Elmo Village Area AUAR

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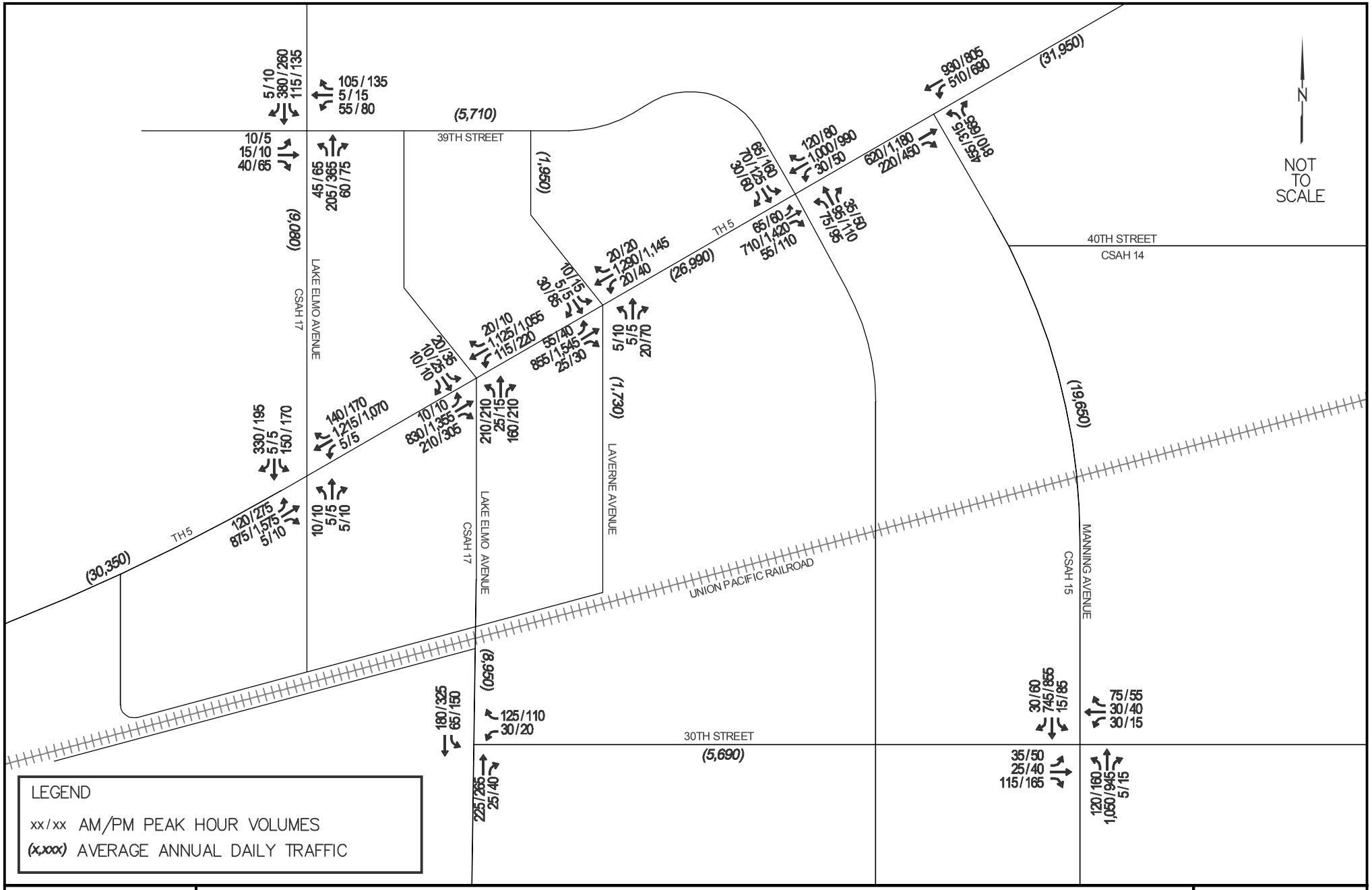

FIGURE 21-17

Scenario C - 2030 Cumulative Volumes
Lake Elmo Village Area AUAR

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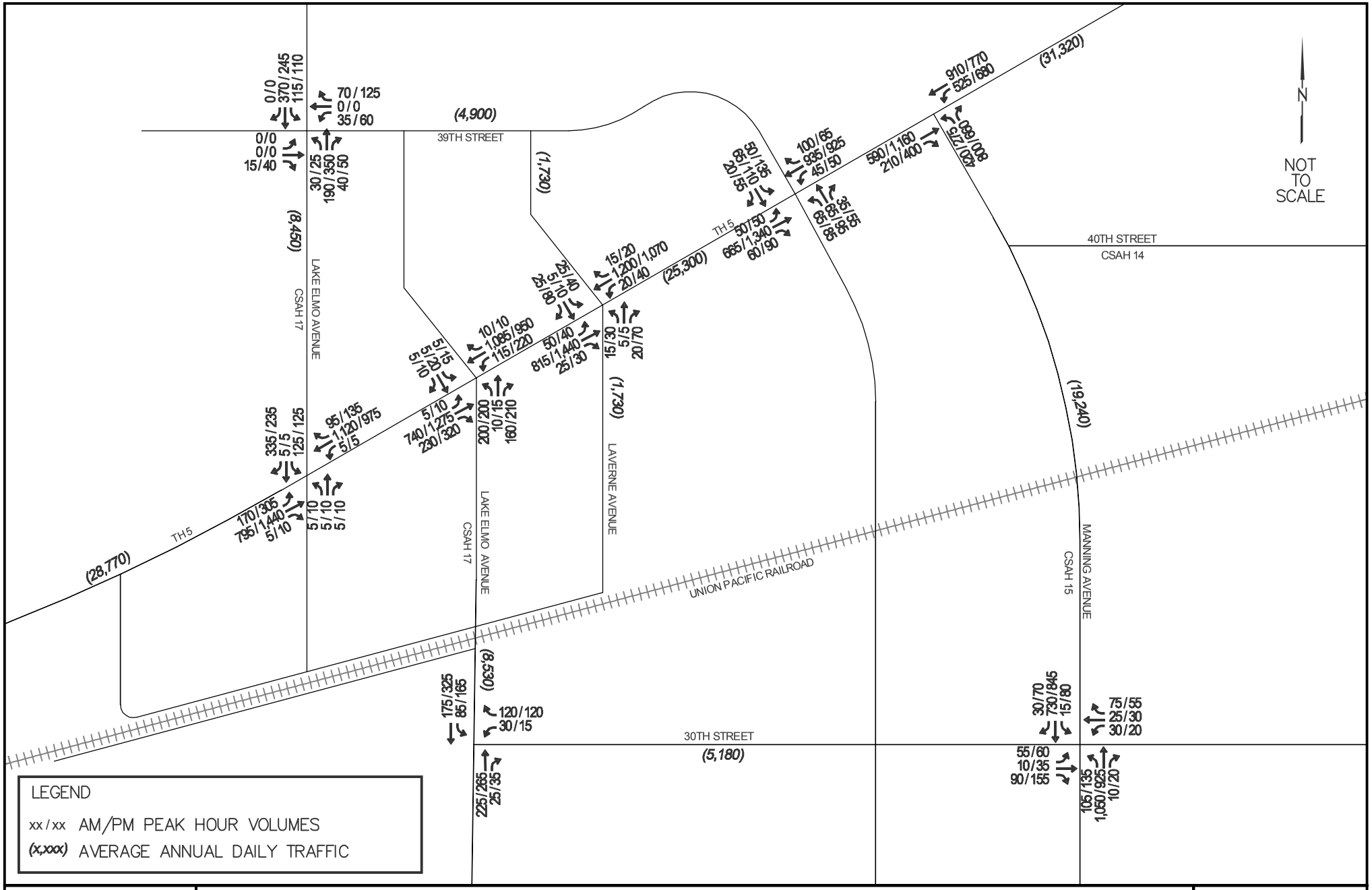

FIGURE 12-18

Scenario D - 2030 Cumulative Volumes
Lake Elmo Village Area AUAR

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E. Intersection Capacity Analysis

As previously determined, the impacts from Scenarios A and C will have the least and greatest impacts to the roadway network, respectively. Impacts from Scenario B and D will be within the range of impacts resulting from Scenarios A and C. For this reason, Scenarios B and D were not analyzed in detail but recommendations for improvements were inferred from the results of Scenarios A and C. Scenarios A and C were analyzed assuming the 2030 Background recommended improvements, previously described in Table 21-5, were in place.

1. 2030 Scenario A – with 2030 Background Improved Roadway Network

The 2030 Scenario A was first analyzed on the improved roadway network, as outlined in Table 21-5 for 2030 background conditions. The LOS results are shown in Figure 21-19 and discussed below.

TH 5 and 39th Street

The intersection of TH 5 and 39th Street operates at an overall LOS E during the a.m. peak hour and LOS F during the p.m. peak hour. During the a.m. and p.m. peak hour, all northbound and southbound movements are projected to operate at LOS F. This suggests that some mitigation to the intersection will be necessary.

TH 5 and Laverne Avenue

The intersection of TH 5 and Laverne Avenue operates at an overall LOS A and E during the a.m. and p.m. peak hour, respectively. However, some of the side-street movements operate at LOS F during the peak periods. This failing LOS during the peak hours is because this intersection is controlled with side-street stop control. However, due to the close proximity of recommended signals at TH 5 and CSAH 17 and at TH 5 and 39th Street, additional control (all-way stop or traffic signal) is not recommended. There is an existing roadway network for northbound traffic to utilize the TH 5 and CSAH 17 intersection, which is assumed to be signalized under 2030 background conditions. This analysis assumed a portion of left-turn and through moving trips will divert to that signalized intersection.

CSAH 17 (Lake Elmo Avenue north leg) and 39th Street

This intersection is shown to operate at LOS F during the p.m. peak hour and LOS A during the a.m. peak hour. This failing LOS exhibited for the p.m. peak hour conditions is not due to insufficiencies at this intersection . It is due, in this instance, to back-ups experienced at the TH 5 and 39th Street intersection. Improvements are not recommended for this intersection since the observed congestion will be alleviated by improving the intersection of TH 5 and 39th Street.

The remaining intersections operate at LOS D or better for this scenario.

2. 2030 Scenario C – with 2030 Background Improved Roadway Network

As the scenario with the greatest trips generated, Scenario C was also analyzed on the improved roadway network from 2030 background conditions. The LOS results are shown in Figure 21-20 and discussed below.

TH 5 and 39th Street
The intersection of TH 5 and 39th Street operates at an overall LOS F during the a.m. and p.m. peak hours. Each of the side-street northbound and southbound movements also operate at LOS F. This implies that mitigation will be needed at this intersection.

TH 5 and Laverne Avenue
Similarly at the intersection of TH 5 and Laverne Avenue, most movements of the side-street northbound and southbound approaches operate at LOS F during the a.m. and p.m. peak hours. Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. The overall LOS at the intersection is at LOS A during the a.m. peak hour and LOS C during the p.m. peak hour. No additional measures, short of installing a traffic signal or a roundabout, would improve the LOS for the minor street left turns and thru movements and warrants for a signal or roundabout would not be met due to the low volumes on Laverne Street; therefore, no further mitigation is recommended for this scenario.

CSAH 17 (Lake Elmo Avenue, north leg) and 39th Street
The intersection of CSAH 17 (Lake Elmo Avenue) and 39th Street would have some movements at LOS F during the p.m. peak hour. However, this is due to traffic backing up into the intersection from the excessive delays at the intersection of 39th Street and TH 5, not because of excessive volumes or insufficient lane configurations at the CSAH 17 intersection. Once mitigation improvements (new signal) are made at the intersection of 39th Street and TH 5, it is expected that the intersection with CSAH 17 (Lake Elmo Avenue) will operate at satisfactory levels. Because the congestion is stemming from a nearby intersection, no further intersection improvements are recommended.

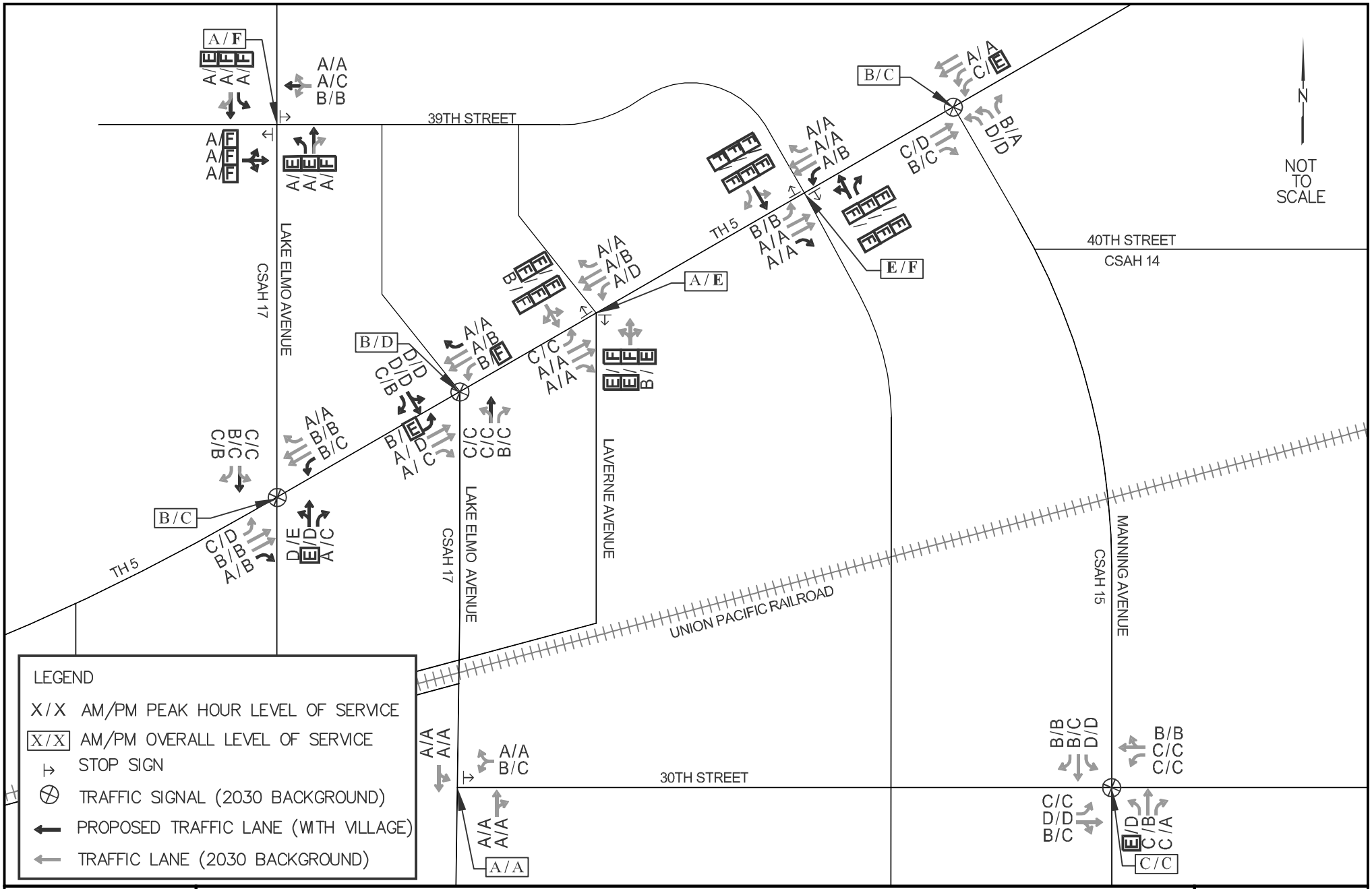

FIGURE 21-19

Scenario A 2030 LOS on Improved Roadway Network
Lake Elmo Village Area AUAR

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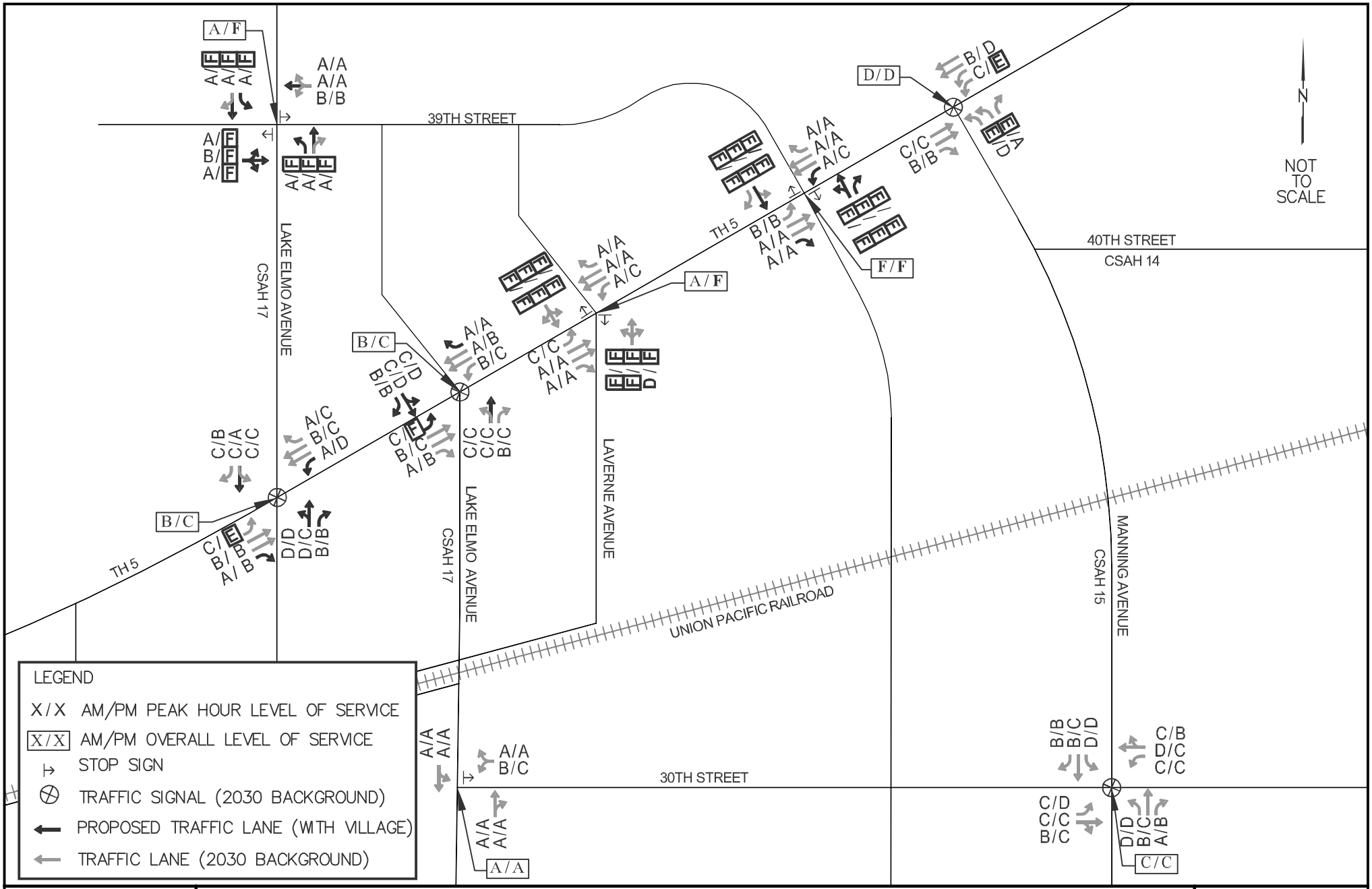

FIGURE 21-20

Scenario C 2030 LOS on Improved Roadway Network
Lake Elmo Village Area AUAR

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VII) 2030 VILLAGE DEVELOPMENT MITIGATION

A. Mitigation Roadway Network

As identified in the improved roadway network analysis, some mitigation will be necessary to accommodate the planned Village development. The recommended mitigation roadway improvements are identical for all AUAR development scenarios and are described below for each individual study intersection. Future traffic operations should be monitored based on new turn movement counts prior to construction of any intersection improvements.

Table 21-7
Recommended Village Development Mitigation Improvements

Intersection	Description
TH 5 and 39th Street	•Install new traffic signal. •Additional eastbound right-turn lane. •Additional westbound left-turn lane. •New northbound approach with one through-left and an exclusive right-turn lane.
TH 5 and Laverne Ave	•Additional northbound and southbound right-turn lanes.
TH 5 and CSAH 17 (Lake Elmo Avenue South)	•Additional westbound right-turn lane to match eastbound approach. •Additional eastbound left-turn lane to match westbound approach. •New southbound approach with single through-right and left-turn lanes.
TH 5 and CSAH 17 (Lake Elmo Avenue North)	•Additional eastbound right-turn lane to match westbound approach. •Additional westbound left-turn lane to match eastbound approach. •.New northbound approach with single through-right and left-turn lanes.
CSAH 17 (Lake Elmo Avenue North) and 39th Street	•New eastbound approach with single lane for all movements. •Additional northbound and southbound left-turn lanes.

B. Intersection Capacity Analysis

1. 2030 Village Master Plan Scenario A – Mitigated Roadway Network
   The LOS results for Scenario A on the mitigated roadway network yield better results compared to unmitigated conditions. The LOS results for each intersection can be seen in Figure 21-21. All intersections now operate at acceptable levels of service during the a.m. and p.m. peak hours with the exception of some movements at the TH 5 and Laverne Avenue intersection.

   Even though Laverne Avenue still experiences some individual movements at lower levels of service during the peak hours, the intersection is not recommended for signalization. This intersection is located too close to the future signalized intersection of CSAH 17 (Lake Elmo Avenue South) to meet MnDOT spacing guidelines. It was assumed that some traffic (particularly left turns and through movements) would divert to the adjacent signalized intersections during the peak hours.

2. 2030 Village Master Plan Scenario B – Mitigated Roadway Network
   Scenario B was not fully analyzed, however the results can be inferred to fall between Scenarios A and C. The recommended mitigated roadway network for

Scenario B is the same as the recommended network for 2030 Scenario C, shown in Figure 21-22.

3. 2030 Village Master Plan Scenario C – Mitigated Roadway Network
   Overall, the study intersections are expected to operate at satisfactory levels of service during the peak periods. The LOS results for each intersection can be seen in Figure 21-22. Some individual movements at the TH 5 and Laverne Avenue intersection are expected to operate at LOS F during the a.m. and p.m. peak hours. This intersection is recommended to remain side-street, stop-controlled due to the close proximity to the adjacent future signal at the CSAH 17 (south leg) intersection. It was assumed that a portion of drivers making left turns and through movements at the TH 5 and Laverne Avenue intersection would divert to the nearby signalized intersections.

   Although this report recommends signalized intersections, an Intersection Control Evaluation (ICE) report should be completed for each intersection as improvements are needed. Additional turn lanes not identified for capacity reasons may also be desired at the study intersections. Turn lanes improve safety by removing the turning traffic from the through lane. For this reason, serious consideration should be given to providing left and right-turn lanes at future signalized intersections even if not required for capacity reasons.

4. 2030 Village Master Plan Scenario D – Mitigated Roadway Network
   Scenario D was not fully analyzed, however the results can be inferred to fall between Scenarios A and C. The recommended mitigated roadway network for Scenario D is the same as the recommended network for 2030 Scenario C, shown in Figure 21-22.

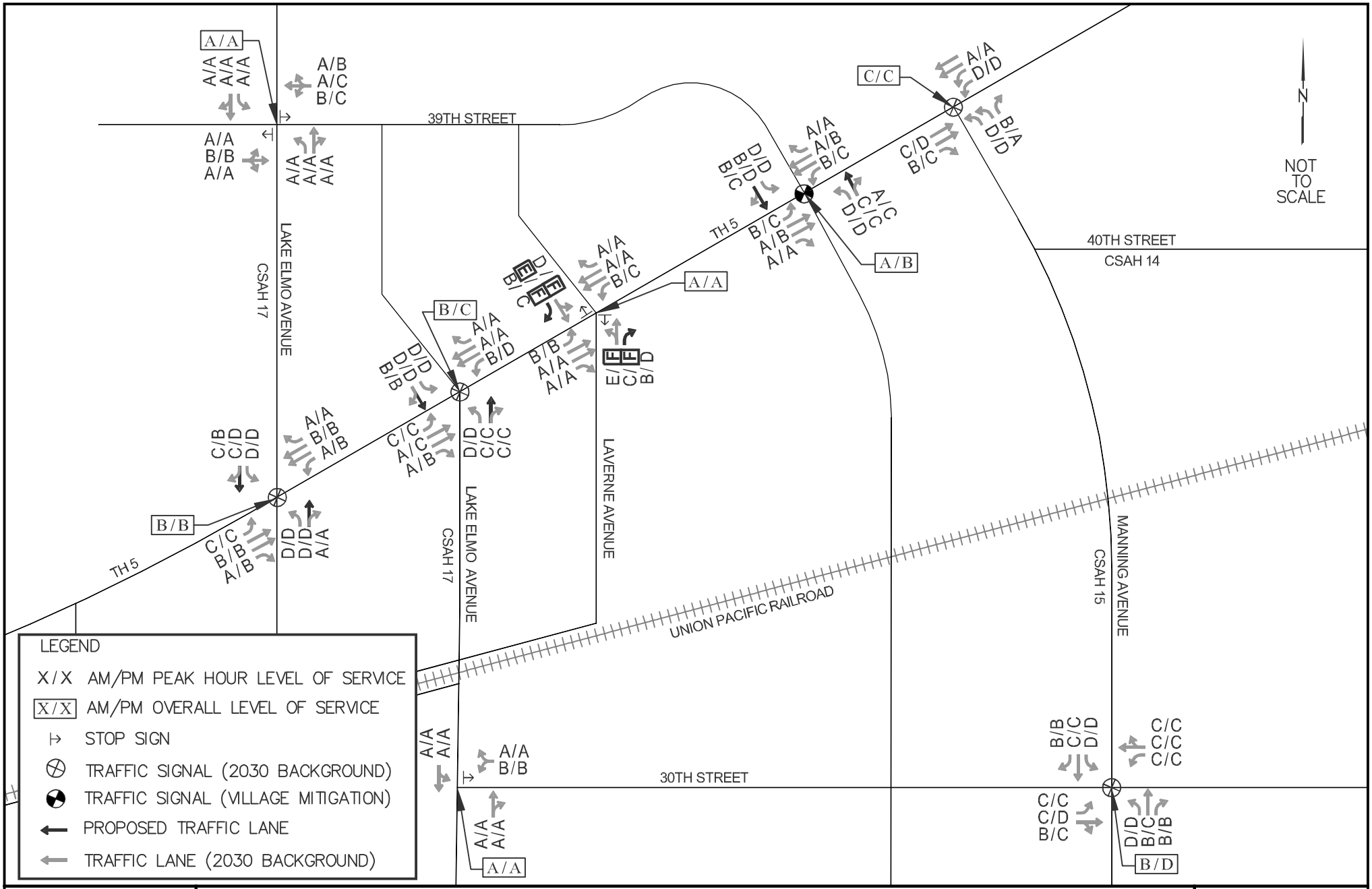

FIGURE 21-21

Scenario A 2030 LOS on Mitigated Roadway Network
Lake Elmo Village Area AUAR

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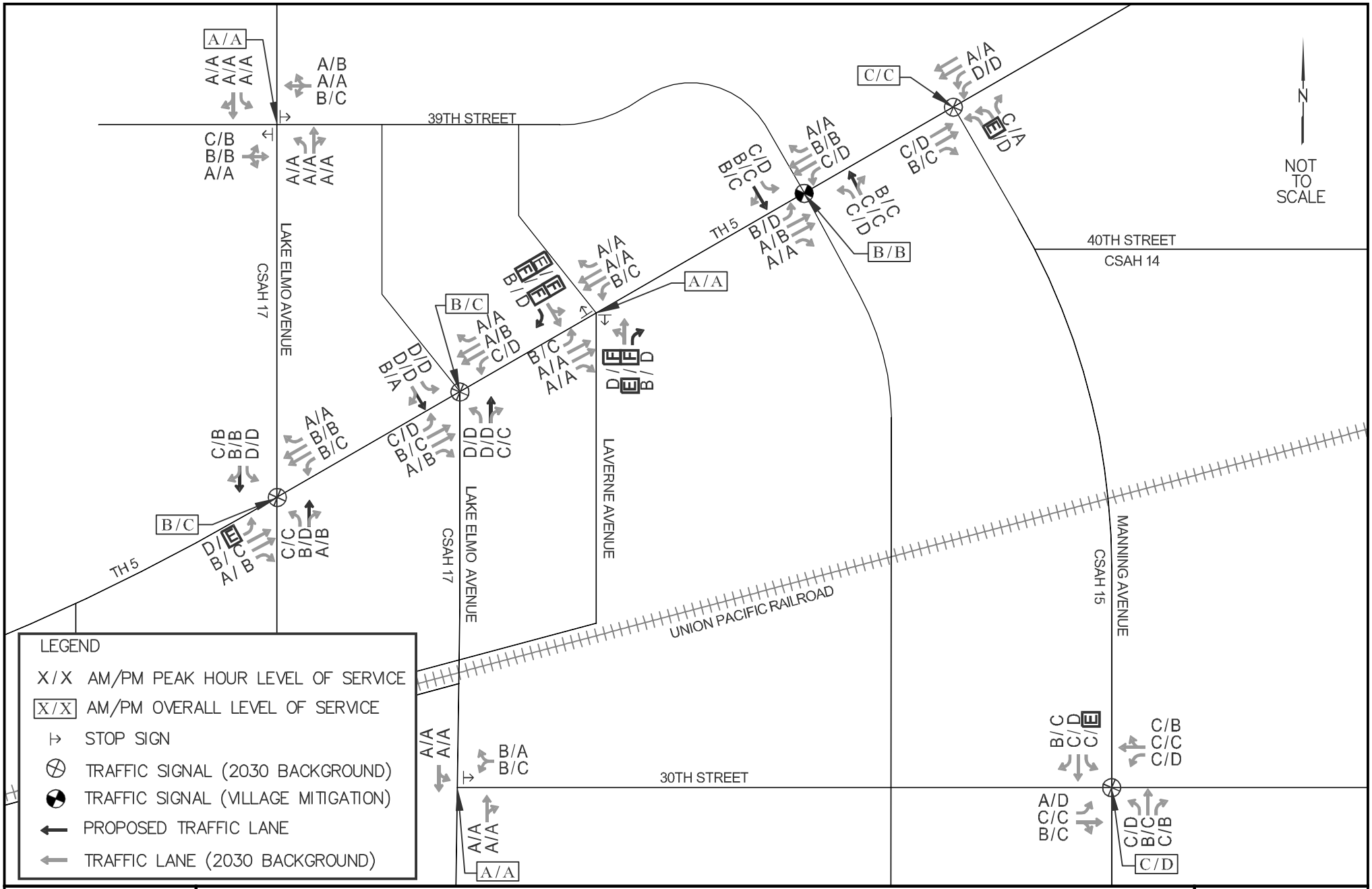

FIGURE 21-22

Scenario C 2030 LOS on Mitigated Roadway Network
Lake Elmo Village Area AUAR

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VIII) OTHER TRANSPORTATION SYSTEM IMPROVEMENT CONSIDERATIONS

The considerations outlined below apply to any of the Village development scenarios.

A. Access Management

The management of driveway and street access along roadways, particularly arterial and collector streets, is a very important component of maximizing the capacity and decreasing the crash potential along these road facilities. MnDOT and national studies have shown that as the density of access points increases, the traffic carrying capacity of the roadway decreases and the vehicular crash rate increases.

The development of an efficient network of local streets in the Village area could help alleviate the need for some of the access points that now exist on arterial roadways. Also, as major intersections are modified to improve operational efficiency and safety, it may be possible to consolidate or modify adjacent accesses. The City of Lake Elmo will need to work with MnDOT and Washington County to achieve the proper balance between access to future development and maintaining traffic flow. In Lake Elmo, TH 5 provides east-west travel through the city and also provides direct access to properties within the Village. This dual purpose causes a conflict between regional and local traffic movements which can contribute to congestion and safety problems. Continued access management on TH 5 through the city is necessary to provide safety and capacity through the AUAR area. Specifically, TH 5 is classified as a Minor Arterial, the purpose of which is to emphasize mobility through the AUAR study area over land access.

B. Non-Traditional Types of Intersection Control

The peak hour analyses in this report focused on traditional intersection improvements and controls such as additional turn lanes and traffic signal systems. There are, however, other types of intersection control that could provide the necessary capacity to accommodate the projected 2030 volumes.

Before the implementation of any type of intersection control (signal, roundabout, or other), an Intersection Control Evaluation (ICE) report should be completed to address the appropriate measure of control for that specific intersection. This detailed report would identify the impacts and benefits of using different types of intersection control and discern the differences between them. The results and recommendations from this type of report will lead to the best intersection control for each particular intersection and its individual characteristics.

1. Single-Lane/Multi-Lane Roundabout
   An increasingly used alternative to a traffic signal is a roundabout, with either a single lane or multiple lanes. Roundabouts in Minnesota have experienced a growth in use due to safety and capacity benefits. In particular, a roundabout has benefits that traditional intersections do not, including:

   - **Lower speeds** – the physical design of the roundabout forces drivers to slow through the intersection.

- **Safer** – low speeds combined with vehicles moving in the same direction contribute to fewer and less severe crashes.
- **Less delay** – in the right situations, roundabouts can significantly reduce delays and queues since vehicles are not required to stop. This is particularly beneficial during non-peak hours.
- **Potentially less right-of-way impact** – compared to an equivalent traditional signalized intersection, roundabouts could require less right-of-way. A traditional signal may require more right-of-way to accommodate the right and left-turn lanes and appropriate storage bays. Since roundabouts do not require turn lanes, right-of-way requirements are often reduced. However, a roundabout will require more right-of-way in the center of the intersection compared to signalized intersections. The cumulative effects of necessary right-of-way are generally less with a roundabout.

Although roundabouts are not the answer in every situation, they have been shown to be a viable option that should be considered, specifically since roundabouts are discussed in the Village Masterplan.

C. Transit Opportunities

Future planning should consider future transit service for this area. Regularly scheduled transit, if properly accommodated, would help to reduce traffic volumes on the main roadways and provide people with more transportation options. The planned development in the AUAR area presents both the opportunity for transit and the development to support it.

Currently in this area, transit is available. The potential Village development and potential riders within those developments will help the City in discussions for future transit service expansions.

In an area without fixed route service, park-and-pool lots can provide motorists with non-traditional transportation alternatives. Park-and-pool activities have increased historically when dedicated parking facilities are provided. Coordination between the City of Lake Elmo and transit service providers will help to determine suitable transit facilities and services. As an initial step in reducing single-occupant vehicles and developing transit demand, the City of Lake Elmo could also promote vanpool programs, such as those available through Metro Commuter Services. The City's upcoming city-wide transportation plan should further explore transit options throughout Lake Elmo.

D. Trail Systems

Future development should provide a trail system that will connect to other area trail systems. A fully developed trail system in this area would help to encourage walk and bicycle trips in order to help reduce certain types of vehicle trips. In addition, trails are increasingly seen as a recreation amenity desirable for residents of a community.

It is desirable to develop off-road trails that provide facilities for both bicyclists and pedestrians. Trails through parks and natural areas are always highly desirable routes as they provide a more scenic experience for the user. An off-road trail is one that is

physically separated from motorized vehicular traffic by open space a barrier either within the roadway right-of-way or within an independent right-of-way.

In cases where funding of right-of-way is limited, an on-road bicycle lane or signed route can present a more economical solution. The provision of on-road bicycle lanes can be accomplished by re-striping existing roadways or with extra consideration during the design of a new roadway.

A distinction can also be made between pedestrian/commuter trails and recreational trails. Pedestrian/commuter trails generally connect residential areas to commercial, retail, or school facilities. Pedestrian/commuter trails tend to follow collector and arterial roadways, used by motor vehicle commuters, since the users of these trails generally seek out the most direct path to their destination.

Conversely, recreational trails tend to be off-road trails, which connect residential areas to parks, natural areas, and/or greenway corridors. These trails can provide a connection between parks and neighborhoods, as well as meander within parks. Recreation trails generally do not travel a direct route and are often located along rivers and streams or contained within parks and greenway corridors.

Trail crossing locations of arterial and collector roadways should be carefully considered to maximize trail user safety. Appropriate consideration should be given to signed crosswalks, signals, or grade separated crossing at each trail crossing.

IX) FINDINGS AND RECOMMENDATIONS

Table 21-7 provides a summary of existing, 2030 background, and 2030 cumulative levels of service and highlights the recommended background improvements and Village development mitigation measures by study intersection and roadway segment.

This AUAR traffic study contains discussion, analysis, and recommendations regarding the land uses, trip generation, trip distribution, and intersection geometry of the area contained within the project boundaries.

The AUAR development scenarios were assigned vehicular trips based on the number of residential units and the square footage of related non-residential space within the area. Below is a summary of the new trips generated daily as part of each scenario that will increase traffic on the study roadway.

Land Use Scenario	Village Development Daily Trips
A	22,800
B	24,800
C	28,700
D	24,500

As shown, Scenarios A and C will have the least and greatest impacts to the roadway network, respectively. For that reason, only Scenarios A and C were analyzed with the Synchro/SimTraffic

model for this report. Scenarios B and D will have similar network impacts as Scenarios A and C and the requirements for those scenarios were inferred from the modeled scenarios.

The future planning roadway network was reviewed with the projected 2030 background volumes (without the Village development) and found to need improvements (see Table 21-5 and Figure 21-7). The resulting improved roadway network formed the base network used to analyze Scenarios A and C. Analysis of Scenarios A and C on the improved roadway network showed that mitigation was still necessary to accommodate the proposed development in addition to the improvements needed to address 2030 background (without Village development). This resulted in the mitigated roadway network. The mitigated roadway network improvements are the final recommendations for the study area.

Based upon the results of the analyses, the following improvements and actions are recommended for planning the transportation system in this study area:

A. Improvements for 2030 Background Conditions (without Village development)

- Trunk Highway 5 should be widened to a four-lane roadway section with right and left-turn lanes on the mainline approaches at each intersection through the City of Lake Elmo.

- New signals are recommended at the following intersections:
  - TH 5 and CSAH 17 (Lake Elmo Avenue) south leg
  - TH 5 and CSAH 17 (Lake Elmo Avenue) north leg
  - CSAH 15 (Manning Avenue) and 30th Street

These intersections have been analyzed as signalized intersections. However, an Intersection Control Evaluation (ICE) report should be conducted to determine the most appropriate type of intersection control, specifically roundabout or traffic signal. Traffic volumes at the above intersections should also be monitored so that the installation of new traffic signals can be appropriately timed prior to 2030.

B. Improvements and Actions for Village AUAR Scenarios

1. <u>General Recommendations For All Scenarios</u>
   - On the Village Masterplan Composite Land Use Map, it appears that 39th Street is extended to 30th Street. As further plans are developed, this connection should be maintained as it alleviates traffic at the intersection of TH 5 and CSAH 15 (Manning Avenue).

   - The City should work with other agencies to monitor the actual growth in traffic on the study roadways and intersections to determine the appropriate timing on any improvements.

   - The City should work with other agencies and developers to provide access management on the study roadways. Proper access management will increase the capacity and safety of roadways.

   - Other types of intersection control should be considered for the study intersections in an Intersection Control Evaluation (ICE) report. This report

would determine whether a traffic signal is the best type of control, or if an alternate type, such as a roundabout, would provide better traffic operations.

- The City should work with other agencies to provide transit opportunities to existing and future residents and commuters. Other transit opportunities should be explored to provide transportation options and help reduce travel demand on the area roadways.

- The City should work with other agencies and developers to provide a trail system in the AUAR area. These trails would provide a connected system throughout the study area and to other outside local and regional trails. A fully developed trail system would be used for both recreation and commuting and help reduce the travel demand on the area roadways.

2. Recommended Mitigation for Development Scenarios A, B, and D
   - The intersection of TH 5 and 39th Street should be monitored for the installation of a traffic signal. This intersection has been analyzed as a signalized intersection. However, an Intersection Control Evaluation (ICE) report should be conducted to determine the most appropriate type of intersection control, specifically roundabout or traffic signal. Traffic volumes should also be monitored to determine specific timing of the proposed improvement.

   - The eastbound and westbound approaches of 30th Street at the intersection with CSAH 15 should be expanded to one left turn lane and one through-right lane.

   - Assuming traffic signal control at the above intersections, the geometry shown on Figures 21-21 and 21-22 should be planned for the study intersections.

   - Other types of intersection control should be considered for the study intersections in an Intersection Control Evaluation (ICE) report. This report would determine whether a traffic signal is the best type of control, or if an alternate type, such as a roundabout, would provide better traffic operations.

3. Recommended Mitigation for Village Master Plan Development Scenario C
   - All recommendations for Scenarios A, B, and D apply.
   - Table 21-8 summarizes all future recommended roadway improvements and Village development mitigation measures.

Table 21-8 Level of Service and Mitigation Summary

Intersection	EXISTING	2030 Background (without Village Development)		2030 Cumulative with Scenario A		2030 Cumulative with Scenario B		2030 Cumulative with Scenario C		2030 Cumulative with Scenario D	
	LOS (Critical movements)	LOS (Critical movements)	Recommended Improvements	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation
TH 5/CSAH 15 (Manning Avenue)	AM: Overall C PM: Overall C	AM: Overall **F** PM: Overall **F**	Add second northbound left turn lane; add 2nd wesbound left turn lane; add eastbound and westbound through lanes.	AM: Overall B PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall D PM: Overall D	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.
TH 5/39th Street	AM: SB Left B PM: SB Left C	AM: SB Left **E** PM: **F**	Add westbound left-turn lane; add eastbound and westbound through lanes.	AM: NB/SB **F** PM: NB/SB **F**	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: NB/SB **F** PM: NB/SB **F**	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.
TH 5/Laverne Avenue	AM: WB Left B PM: NB and SB Left C	AM: NB **E**/SB **F** PM: NB/SB **F** WB Left **E**	Add eastbound/westbound right and left-turn lanes; add eastbound & westbound through lanes	AM: SB Left/thru **F** PM: NB/SB **F**	Add northbound and southbound right-turn lanes.[1]	Similar to Scenario C	Add northbound and southbound right-turn lanes.[1]	AM: NB/SB **F** PM: NB/SB **F**	Add northbound and southbound right-turn lanes.[1]	Similar to Scenario C	Add northbound and southbound right-turn lanes.[1]
TH 5/CSAH 17 (Lake Elmo Ave S)	AM: NB Left D PM: NB F	AM: NB **F** PM: NB **F** WB Left **F**	Install traffic signal; add eastbound and westbound through lanes.	AM: Overall B PM: Overall D	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	AM: Overall B PM: Overall C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.
TH 5/CSAH 17 (Lake Elmo Ave N)	AM: SB Left **E** PM: SB Left D	AM: SB **F** PM: SB **F**	Install traffic signal; add eastbound and westbound through lanes.	AM: Overall B NB Left E PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: Overall B PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.
CSAH 17 (Lake Elmo Ave N)/39th Street	AM: Overall A PM: Overall A	AM: Overall **F** PM: Overall A	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	AM: Overall A PM: Overall **F**	No mitigation required.	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.	AM: Overall A PM: Overall **F**	Long delays due to downstream congestion on 39th Street; no mitigation required.	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.
CSAH 15 (Manning Avenue)/30th Street	AM: WB Left & Thru C PM: EB & WB Left D	AM: EB LT **E** WB **F** PM: EB/WB **F**	Install traffic signal; add EB and WB exclusive left-turn lanes; add NB and SB exclusive left-turn lanes.	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.
CSAH 17 (Lake Elmo Ave S)/30th Street	AM: Overall A PM: Overall A	AM: Overall A PM: NB **E**	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	No mitigation required.
Roadway Segment											
TH 5: West of CSAH 17 (Lake Elmo Avenue S)	D	**F**	Widen to four through lanes.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.
TH 5: CSAH 17 (south) to CSAH 15 (Manning Ave)	D	**F**	Widen to four through lanes.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.
TH 5: NE of CSAH 15 (Manning Ave)	**E**	**F**	Widen to four through lanes.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.
CSAH 17: North of TH 5	A	C	No mitigation required.	B	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.
CSAH 17: South of TH 5	B	D	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.
CSAH 15 (Manning Ave): South of TH 5	B	**E**	Add second northbound left turn lane at TH 5.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.
30th Street: Between CSAH 17 & CSAH 15	A	A	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.
39th Street: Between TH 5 & CSAH 17 (north)	A	A	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.

[1] Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. No additional measures short of installing a traffic signal or a roundabout would improve the LOS for the minor street left turns and thru movements. Warrants for a signal or roundabout would not be met due to the low volumes on Laverne Street.

TRAFFIC APPENDIX

Vehicle Delay and Queue Analysis Tables

Lake Elmo Village Area AUAR
Existing Intersection Level of Service
Existing Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	236		486					329	90	302	509		
	Delay	41.1		19.4					30.4	11.5	20.8	14.9		22.7
	LOS	**D**	**A**	**B**	**A**	**A**	**A**	**A**	**C**	**B**	**C**	**B**	**A**	**C**
	Lanes	1		1					1	1	1	1		
	Queues	201		228					274	101	170	266		
PM Peak Hour	**Volume**	124		387					629	208	400	407		
	Delay	56.0		32.9					38.9	23.9	43.9	15.6		32.8
	LOS	**E**	**A**	**C**	**A**	**A**	**A**	**A**	**D**	**C**	**D**	**B**	**A**	**C**
	Lanes	1	0	1				0	1	1	1	1	0	
	Queues	210		361					647	253	265	466		

Stop Control

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**				12		7	24	368			543	44	
	Delay				12.8		2.7	7	1.5			5.3	4	4.0
	LOS	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1		1	1	1			1	1	
	Queues				38		21	38	-			-	-	
PM Peak Hour	**Volume**				51		19	19	768			503	11	
	Delay				21.5		8.8	6.6	2.5			4.9	3.7	4.2
	LOS	**A**	**A**	**A**	**C**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1	0	1	1	1	0	0	1	1	
	Queues				61		35	28	-			-	-	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	1		6	13		12	25	409	9	9	663	5	
	Delay	6.6		4.3	7.5		4.0	4.1	1.2	0.3	11.2	6.7	2.2	4.8
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1			1	1		1	1	
	Queues		16			27			47	-		54	-	
PM Peak Hour	**Volume**	10		35	20		42	17	767	10	19	525	9	
	Delay	16.7		7.1	17.6		6.1	2.9	1.6	0.4	9.7	5.7	3.4	3.7
	LOS	**C**	**A**	**A**	**C**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	1	1	0	1	1	
	Queues		44			50			47	-		30	-	

Stop Control

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	79		96					350	95	68	596		
	Delay	27.5		16.2					1.5	0.8	6.3	1.4		4.2
	LOS	**D**	**A**	**C**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	1		1					1	1	1	1		
	Queues	115		115					-	-	47	-		
PM Peak Hour	**Volume**	55		125					668	127	131	437		
	Delay	115.0		101.8					2.5	1.4	18.3	1.5		15.2
	LOS	**F**	**A**	**F**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**A**	**A**	**C**
	Lanes	1	0	1				0	1	1	1	1	0	
	Queues	321		321					-	17	124	-		

Stop Control

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**				63		185	47	397			582	47	
	Delay				47.7		12.7	12.2	2.4			2.0	0.8	6.3
	LOS	**A**	**A**	**A**	**E**	**A**	**B**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1		1	1	1			1	1	
	Queues				98		88	55	-			-	-	
PM Peak Hour	**Volume**				55		80	135	739			437	60	
	Delay				28.9		8.0	12.4	7.1			1.6	0.7	6.7
	LOS	**A**	**A**	**A**	**D**	**A**	**A**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1	0	1	1	1	0	0	1	1	
	Queues				53		37	82	54			-	-	

Lake Elmo Village Area AUAR
Existing Intersection Level of Service
Existing Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**		93	9	41	220					6		25	
	Delay		0.8	0.5	2.9	1.5					5.6		2.7	1.6
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1	1	1	1						1		
	Queues		-	-	14	-						35		
PM Peak Hour	**Volume**		195	5	35	115					7		34	
	Delay		1	0.5	4.1	2.9					12.7		3.8	2.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes	0	1	1	1	1	0				0	1	0	
	Queues		-	-	48	-						37		

Stop Control

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	14	638	3	5	444	5	15	2	13	16	11	43	
	Delay	2.9	2.9	4.2	10.2	5.2	1.3	9.1	15.3	5	15.6	17.3	5.7	4.3
	LOS	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**C**	**A**	**C**	**C**	**A**	**A**
	Lanes		1	1		1	1		1			1		
	Queues		38	-		39	-		35			47		
PM Peak Hour	**Volume**	14	559	9	46	502	26	15	12	15	9	9	30	
	Delay	3.5	2.8	3.4	10	7.9	4.1	28.9	5.7	5.4	30.7	12.8	6.9	5.8
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**D**	**A**	**A**	**D**	**B**	**A**	**A**
	Lanes	0	1	1	0	1	1	0	1	0	0	1	0	
	Queues		37	-		93	-		62			38		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**		139	9	10	110					12		28	
	Delay		0.2	0.2	4.1	1.1					5.3		2.7	1.1
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			-						44		
PM Peak Hour	**Volume**		164	15	32	201					3		19	
	Delay		0.4	0.2	3.7	2.3					10.2		4.2	1.7
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0				0	1	0	
	Queues		-			38						48		

Lake Elmo Village Area AUAR
2030 Background
Existing Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	375	0	770	0	0	0	0	520	145	480	805	0	
	Delay	90.5		84.4					96.1	35.9	529.8	458		243.1
	LOS	**F**	**A**	**F**	**A**	**A**	**A**	**A**	**F**	**D**	**F**	**F**	**A**	**F**
	Lanes	1		1					1	1	1	1		
	Queues	395		1633					940	291	369	1507		
PM Peak Hour	**Volume**	200		615					995	330	635	645		
	Delay	141.4		128.4					367.2	336.7	1162.1	1130.8		520.8
	LOS	**F**	**A**	**F**	**A**	**A**	**A**	**A**	**F**	**F**	**F**	**F**	**A**	**F**
	Lanes	1	0	1				0	1	1	1	1	0	
	Queues	344		2,044					3641	338	349	1618		

Stop Control

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	0	0	20	0	15	40	585	0	0	860	70	
	Delay				49.7		10	12.9	2.5			7.2	6.3	6.2
	LOS	**A**	**A**	**A**	**E**	**A**	**A**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1		1	1	1			1	1	
	Queues				56		29	52	-			-	7	
PM Peak Hour	**Volume**	0	0	0	85	0	30	30	1,215	0	0	795	20	
	Delay				3654.1		2203.7	70.6	77.4			77.4	4.3	149.8
	LOS	**A**	**A**	**A**	**F**	**A**	**F**	**F**	**F**	**A**	**A**	**F**	**A**	**F**
	Lanes	0	0	0	1	0	1	1	1	0	0	1	1	
	Queues				1,712	1,828	85	29	1,828			-	-	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	5	0	10	25	5	20	40	645	15	15	1,050	10	
	Delay	123.3		7.4	98.3	40.2	63.6	17.5	5.2	0.6	11.7	3.8	2.3	7.5
	LOS	**F**	**A**	**A**	**F**	**E**	**F**	**C**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1			1	1		1	1	
	Queues		17			108			241	-		129	-	
PM Peak Hour	**Volume**	20	0	60	35	5	70	30	1,210	20	30	830	15	
	Delay	948.5		795	3471		2187.7	20.9	16.5	7.1	49.1	21.7	6.3	120.0
	LOS	**F**	**A**	**F**	**F**	**A**	**F**	**C**	**C**	**A**	**E**	**C**	**A**	**F**
	Lanes	0	1	0	0	1	0	0	1	1	0	1	1	
	Queues		662			434			521	6		649	-	

Stop Control

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	125	0	155	0	0	0	0	555	150	110	940	0	
	Delay	712.8		305.9					2.3	1.7	9.3	1.5		70.4
	LOS	**F**	**A**	**F**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**F**
	Lanes	1		1					1	1	1	1		
	Queues	1,763		561					11	-	77	-		
PM Peak Hour	**Volume**	90	0	200	0	0	0	0	1,055	205	210	690	0	
	Delay	2,531.4		1,591.1					16.7	6.9	68.5	2.6		180.5
	LOS	**F**	**A**	**F**	**A**	**A**	**A**	**A**	**C**	**A**	**F**	**A**	**A**	**F**
	Lanes	1		1					1	1	1	1		
	Queues	4,095		527					742	250	193	-		

Stop Control

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	0	0	100	0	295	75	630	0	0	920	75	
	Delay				2,131.2		1231.8	24.6	8.5			2.3	1.2	183.9
	LOS	**A**	**A**	**A**	**F**	**A**	**F**	**C**	**A**	**A**	**A**	**A**	**A**	**F**
	Lanes				1		1	1	1			1	1	
	Queues				546		2011	67	-			-	-	
PM Peak Hour	**Volume**	0	0	0	85	0	130	215	1,170	0	0	690	95	
	Delay				707.4		91.7	26.8	17.8			1.8	1	43.5
	LOS	**A**	**A**	**A**	**F**	**A**	**F**	**D**	**C**	**A**	**A**	**A**	**A**	**E**
	Lanes				1		1	1	1			1	1	
	Queues				920		401	130	80			-	10	

Lake Elmo Village Area AUAR
2030 Background
Existing Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	150	15	65	350	0	0	0	0	10	0	40	
	Delay		0.9	1.1	485.9	588.7					779		574.9	374.4
	LOS	**A**	**A**	**A**	**F**	**F**	**A**	**A**	**A**	**A**	**F**	**A**	**F**	**F**
	Lanes		1	1	1	1						1		
	Queues		-	-	287	3,033						368		
PM Peak Hour	**Volume**	0	310	10	60	185	0	0	0	0	15	0	65	
	Delay		1.7	1.3	3.7	2.1					6.1		3.6	2.3
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	0	1	1	1	1	0					1		
	Queues		-	-	32	-						44		

Stop Control

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	25	1,010	5	10	705	10	25	5	25	30	20	70	
	Delay	5.9	4.5	4.2	16.6	8.3	7.6	46.2	42	16.9	74.1	111.2	79.9	11.5
	LOS	**A**	**A**	**A**	**C**	**A**	**A**	**E**	**E**	**C**	**F**	**F**	**F**	**B**
	Lanes		1	1		1	1		1			1		
	Queues		39	-		27	-		70			223		
PM Peak Hour	**Volume**	25	885	15	75	795	45	25	20	25	15	15	50	
	Delay	6.6	5.2	4.3	16.8	12.8	8.4	110.4	58.1	36.4	95.9	63.2	61.9	13.2
	LOS	**A**	**A**	**A**	**C**	**B**	**A**	**F**	**F**	**E**	**F**	**F**	**F**	**B**
	Lanes	0	1	1	0	1	1	0	1	0	0	1	0	
	Queues		136	-		208	-		110			143		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	215	15	20	175	0	0	0	0	20	0	45	
	Delay		1	0.1	5.2	2.6					7.2		6.2	2.4
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			14						61		
PM Peak Hour	**Volume**	0	255	25	50	315	0	0	0	0	5	0	30	
	Delay		42	23.3	7	3.2					15.1		0.9	23.9
	LOS	**A**	**E**	**C**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**A**	**A**	**C**
	Lanes	0	1	0	0	1	0				0	1	0	
	Queues		374			35						133		

Lake Elmo Village Area AUAR
2030 Background
Improved Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	375	0	770	0	0	0	0	520	145	480	805	0	
	Delay	26.6		22.8					36.3	9.7	46.5	18.9		27.5
	LOS	**C**	**A**	**C**	**A**	**A**	**A**	**A**	**D**	**A**	**D**	**B**	**A**	**C**
	Lanes	2		1					2	1	2	2		
	Queues	113-275		373					188-198	79	187-204	190-207		
PM Peak Hour	**Volume**	200		615					995	330	635	645		
	Delay	47.8	10.1	45.1					60.5	22.3	54.7	22.1		43.3
	LOS	**D**	**B**	**D**	**A**	**A**	**A**	**A**	**E**	**C**	**D**	**C**	**A**	**D**
	Lanes	2		1					2	1	2	2		
	Queues	107-409		801					557-607	398	241-258	151-155		

Stop Control

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	0	0	20	0	15	40	585	0	0	860	70	
	Delay				21.7	0.3	6.1	10.8	0.9			5.4	6.4	4.3
	LOS	**A**	**A**	**A**	**C**	**A**	**A**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1		1	1	2			2	1	
	Queues				43		26	54	-			-	7	
PM Peak Hour	**Volume**	0	0	0	85	0	30	30	1,215	0	0	795	20	
	Delay				97.2		11.7	6.6	1.8			4.9	3.6	7.0
	LOS	**A**	**A**	**A**	**F**	**A**	**B**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	0	0	0	1	0	1	1	2	0	0	2	1	
	Queues				182		58	45	-			-	-	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	5	0	10	25	5	20	40	645	15	15	1,050	10	
	Delay	35.9		12.7	26.4	23.7	13.5	13.6	2.2	1.0	6.9	1.3	1.6	2.5
	LOS	**E**	**A**	**B**	**D**	**C**	**B**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1			1			2	1		2	1	
	Queues		10			47			69-43	6		28-0	10	
PM Peak Hour	**Volume**	20	0	60	35	5	70	30	1,210	20	30	830	15	
	Delay	49.5		21.3	56.9	87.2	27.9	10.0	2.6	2.0	18.6	2.3	1.2	5.5
	LOS	**E**	**A**	**C**	**F**	**F**	**D**	**A**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	2	1	0	2	1	
	Queues		84			141			48-27	-		113-45	-	

Signalized

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	125	0	155	0	0	0	0	555	150	110	940	0	
	Delay	27.0		8.7					7.8	4.2	9.3	4.7		7.5
	LOS	**C**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	1		1					2	1	1	2		
	Queues	96		49					94-118	62	60	111-138		
PM Peak Hour	**Volume**	90	0	200	0	0	0	0	1,055	205	210	690	0	
	Delay	29.8		13.9					10.8	6.3	20.1	4.3		10.3
	LOS	**C**	**A**	**B**	**A**	**A**	**A**	**A**	**B**	**A**	**C**	**A**	**A**	**B**
	Lanes	1		1					2	1	1	2		
	Queues	81		104					139-156	76	141	86-117		

Signalized

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	0	0	100	0	295	75	630	0	0	920	75	
	Delay				25.1		16.6	17.0	8.4			7.1	3.1	9.6
	LOS	**A**	**A**	**A**	**C**	**A**	**B**	**B**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes				1		1	1	2			2	1	
	Queues				96		147	60	110-138			95-130	33	
PM Peak Hour	**Volume**	0	0	0	85	0	130	215	1,170	0	0	690	95	
	Delay				26.1		10.3	19.7	12.4			9.3	4.8	12.3
	LOS	**A**	**A**	**A**	**C**	**A**	**B**	**B**	**B**	**A**	**A**	**A**	**A**	**B**
	Lanes				1		1	1	2			2	1	
	Queues				69		61	131	132-164			108-139	52	

Lake Elmo Village Area AUAR
2030 Background
Improved Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	150	15	65	350	0	0	0	0	10	0	40	
	Delay		0.9	0.6	4.7	2.8					7.2	0.2	3.4	2.4
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1	1	1	1						1		
	Queues		-	-	37	-						42		
PM Peak Hour	**Volume**	0	310	10	60	185	0	0	0	0	15	0	65	
	Delay		2.1	1.2	4.1	1.6					9.3		3.5	2.4
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1	1	1	1						1		
	Queues		-	-	42	-						46		

Signalized

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	25	1,010	5	10	705	10	25	5	25	30	20	70	
	Delay	31.7	10.9	4.6	34.0	13.7	9.0	26.6	32.9	7.8	23.9	25.3	15.4	13.1
	LOS	**C**	**B**	**A**	**C**	**B**	**A**	**C**	**C**	**A**	**C**	**C**	**B**	**B**
	Lanes	1	1	1	1	1	1	1	1		1	1		
	Queues	56	235	10	28	221	14	37	34		56	71		
PM Peak Hour	**Volume**	25	885	15	75	795	45	25	20	25	15	15	50	
	Delay	36.7	17.3	15.0	42.9	15.1	10.7	26.8	18.2	14.5	35.2	26.9	15.3	17.7
	LOS	**D**	**B**	**B**	**D**	**B**	**B**	**C**	**B**	**B**	**D**	**C**	**B**	**B**
	Lanes	1	1	1	1	1	1	1	1	0	1	1	0	
	Queues	48	415	30	106	228	20	48	44		20	61		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	215	15	20	175	0	0	0	0	20	0	45	
	Delay		1.2	1.0	4.8	2.4					11.3		5.4	2.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			19						58		
PM Peak Hour	**Volume**	0	255	25	50	315	0	0	0	0	5	0	30	
	Delay		1.4	0.7	6.7	4.7					7.4	1.1	4.5	3.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0				0	1	0	
	Queues		-			68						48		

Lake Elmo Village Area AUAR
Scenario A 2030 Analysis
2030 Improved Roadway Network

	Manning Ave & TH 5	NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Signalized	**AM Peak Hour**													
	Volume	430	0	795	0	0	0	0	585	215	510	920	0	
	Delay	38.9		14.6					30.5	11.8	27.6	6.3		19.7
	LOS	**D**	**A**	**B**	**A**	**A**	**A**	**A**	**C**	**B**	**C**	**A**	**A**	**B**
	Lanes	2		1					2	1	2	2		
	Queues	142-154		-					173-192	110	185-201	124-148		
	PM Peak Hour													
	Volume	290	0	650	0	0	0	0	1,100	410	670	765	0	
	Delay	44.4		6.6					51.9	24.8	66.8	5		34.3
	LOS	**D**	**A**	**A**	**A**	**A**	**A**	**A**	**D**	**C**	**E**	**A**	**A**	**C**
	Lanes	2	0	1	0	0	0	0	2	1	2	2	0	
	Queues	131-138		-					503-544	341	378-440	297-622		

	TH 5 & 39th Street	NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Stop Control	**AM Peak Hour**													
	Volume	40	65	20	50	50	25	60	690	45	30	965	110	
	Delay	486.5	483.6	109.8	552.2	295.4	112.2	13	1.4	2	8	4.5	4.6	46.0
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**B**	**A**	**A**	**A**	**A**	**A**	**E**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		707	290		701	411	57	-	-	26	-	9	
	PM Peak Hour													
	Volume	110	90	30	120	85	60	50	1,360	65	35	955	70	
	Delay	5460.3	5059.5	4975	3856.8	3672	2434.1	10.6	2.5	2.7	11.9	4.4	3.9	234.2
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**B**	**A**	**A**	**B**	**A**	**A**	**F**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		877	395		2,042	432	46	5	5	46	-	-	

	TH 5 & Laverne Ave	NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Stop Control	**AM Peak Hour**													
	Volume	5	5	15	25	5	25	55	825	20	20	1,190	15	
	Delay	44.6	40.5	10.4	80.7	67.1	14.1	15.5	1.7	1.2	7.5	1.3	1.6	3.2
	LOS	**E**	**E**	**B**	**F**	**F**	**B**	**C**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		16	3		59	31	44	-	-	24	7	-	
	PM Peak Hour													
	Volume	35	10	70	40	10	90	40	1,430	25	40	1,140	20	
	Delay	920.1	822.1	39.2	1153.2	1483.5	572	21.8	3.9	3.5	25.7	11.7	2	42.9
	LOS	**F**	**F**	**E**	**F**	**F**	**F**	**C**	**A**	**A**	**D**	**B**	**A**	**E**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		459	255		403	368	41	8	7	41	209-265	-	

	TH 5 & Lake Elmo Ave S	NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Signalized	**AM Peak Hour**													
	Volume	165	25	155	5	10	5	10	755	190	115	1,055	20	
	Delay	34.4	34.6	11.7	54.9	39	20.6	16.2	9.9	4.3	15.8	8.1	1.8	11.1
	LOS	**C**	**C**	**B**	**D**	**D**	**C**	**B**	**A**	**A**	**B**	**A**	**A**	**B**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		161	72		27	8	5	122-144	54	56	173-218	19	
	PM Peak Hour													
	Volume	155	15	205	15	20	20	10	1,420	275	215	880	10	
	Delay	31.5	27.3	22.8	48.1	44.6	11.7	56.2	45	26.5	259.5	10.9	3	44.0
	LOS	**C**	**C**	**C**	**D**	**D**	**B**	**E**	**D**	**C**	**F**	**B**	**A**	**D**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		136	144		49	18	138	677-732	431	195	450-497	108	

	TH 5 & Lake Elmo Ave N	NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Signalized	**AM Peak Hour**													
	Volume	5	5	5	135	5	320	120	840	5	5	1,075	120	
	Delay	42.4	59.5	8.2	31.8	11.7	32	24.2	10.7	4.5	17.8	11.4	5	15.0
	LOS	**D**	**E**	**A**	**C**	**B**	**C**	**C**	**B**	**A**	**B**	**B**	**A**	**B**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		10	-		91	243	53	107-132	14	1	189-211	45	
	PM Peak Hour													
	Volume	10	5	5	135	5	175	255	1,430	10	5	1,075	145	
	Delay	55.8	54.1	23	34.7	34.9	13.1	36	19.3	12.7	42.9	36.5	11.5	26.1
	LOS	**E**	**D**	**C**	**C**	**C**	**B**	**D**	**B**	**B**	**D**	**D**	**B**	**C**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		21	-		106	70	185	265-270	11	2	380-382	222	

Lake Elmo Village Area AUAR
Scenario A 2030 Analysis
2030 Improved Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	45	185	55	105	370	5	5	10	30	35	5	70	
	Delay	4.5	2.1	1.6	5.2	3.4	5.1	7.6	8.6	5.5	12.8	0.7	4.6	3.6
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes	1	1		1	1			1			1		
	Queues	39	-		43	-			47			64		
PM Peak Hour	**Volume**	50	370	55	100	215	5	5	5	10	70	10	185	
	Delay	39	49.1	69.4	204.3	56.3	39.5	236.8	598	137.7	12.1	15.8	8.6	62.5
	LOS	**E**	**E**	**F**	**F**	**F**	**E**	**F**	**F**	**F**	**B**	**C**	**A**	**F**
	Lanes	1	1	0	1	1	0	0	1	0	0	1	0	
	Queues	143	787		291	897			127			104		

Signalized

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	105	1,045	5	15	730	25	35	15	75	30	30	75	
	Delay	68.2	28.2	24.6	42.8	19.1	11.3	29.9	37.6	13.7	32.6	21.4	20	26.8
	LOS	**E**	**C**	**C**	**D**	**B**	**B**	**C**	**D**	**B**	**C**	**C**	**B**	**C**
	Lanes	1	1	1	1	1	1	1	1		1	1		
	Queues	270	912	-	41	290	17	56	86		45	81		
PM Peak Hour	**Volume**	120	930	15	80	830	60	45	60	130	15	30	55	
	Delay	46.3	16	9	44	23.5	15.4	30.2	39.9	26.7	34.2	28.6	16.9	22.9
	LOS	**D**	**B**	**A**	**D**	**C**	**B**	**C**	**D**	**C**	**C**	**C**	**B**	**C**
	Lanes	1	1	1	1	1	1	1	1	0	1	1	0	
	Queues	126	289	23	109	313	36	51	153		36	78		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	225	20	45	175	0	0	0	0	25	0	100	
	Delay		1.3	1.3	5.7	2.5					10.5		2.7	3.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			37						73		
PM Peak Hour	**Volume**	0	265	35	135	320	0	0	0	0	15	0	85	
	Delay		1.8	0.6	9.7	6.3					21.6		8.2	5.3
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	0	0	0	1	0	
	Queues		-			113						69		

Lake Elmo Village Area AUAR
Scenario A 2030 Analysis
2030 Mitigated Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	430	0	795	0	0	0	0	585	215	510	920	0	
	Delay	54.9		14.5					28.9	13.5	42.9	6.4		24.0
	LOS	**D**	**A**	**B**	**A**	**A**	**A**	**A**	**C**	**B**	**D**	**A**	**A**	**C**
	Lanes	2		1					2	1	2	2		
	Queues	206-216		-					173-186	114	235-240	160-214		
PM Peak Hour	**Volume**	290	0	650	0	0	0	0	1,100	410	670	765	0	
	Delay	48.9		6.5					48.6	31.0	43.7	4.6		29.9
	LOS	**D**	**A**	**A**	**A**	**A**	**A**	**A**	**D**	**C**	**D**	**A**	**A**	**C**
	Lanes	2	0	1	0	0	0	0	2	1	2	2	0	
	Queues	147-167		-					553-604	352	347-375	128-142		

Signalized

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	40	65	20	55	55	25	60	690	45	30	965	110	
	Delay	38.6	30	9.4	38	13.8	12.1	17.4	5.9	2.7	13.8	9.2	7.6	10.0
	LOS	**D**	**C**	**A**	**D**	**B**	**B**	**B**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	64	110		92	83		63	116-142	33	28	136-152	32	
PM Peak Hour	**Volume**	110	90	30	130	85	60	50	1,360	65	35	955	70	
	Delay	50	30.2	30.6	55	40	26.6	23	11.4	6.1	30.1	12.9	5.7	17.0
	LOS	**D**	**C**	**C**	**D**	**D**	**C**	**C**	**B**	**A**	**C**	**B**	**A**	**B**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	102	145		195	166		68	206-246	34	50	195-198	38	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	5	5	15	10	5	25	55	825	20	20	1,190	15	
	Delay	41.7	19.2	13.8	30.9	37.5	14.4	12.9	1.6	0.8	11.7	2.4	2.4	3.1
	LOS	**E**	**C**	**B**	**D**	**E**	**B**	**B**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		12	9		42	37	40	-	7	23	-	-	
PM Peak Hour	**Volume**	10	5	70	10	5	90	40	1,430	25	40	1,140	20	
	Delay	201.7	164.5	25.4	138.1	153.7	24.2	11.2	3.5	2.4	21	2.9	2.8	6.5
	LOS	**F**	**F**	**D**	**F**	**F**	**C**	**B**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		62	59		56	106	26	5	-	62	-	-	

Signalized

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	170	25	155	20	10	5	10	755	190	115	1,055	20	
	Delay	50.2	24.6	20.4	37.8	38.4	11.4	21.4	7.8	3.5	14.4	5.3	1.4	11.3
	LOS	**D**	**C**	**C**	**D**	**D**	**B**	**C**	**A**	**A**	**B**	**A**	**A**	**B**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	111	116		34	25		-	107-109	42	54	130-175	9	
PM Peak Hour	**Volume**	180	20	205	35	25	20	10	1,420	275	215	880	10	
	Delay	50.1	34.1	28.1	48	37.2	17.4	30.3	25.4	12.3	44.9	6.7	1.6	21.8
	LOS	**D**	**C**	**C**	**D**	**D**	**B**	**C**	**C**	**B**	**D**	**A**	**A**	**C**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	181	179		59	36		-	550-566	307	191	137-179	8	

Signalized

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	5	5	5	135	5	320	120	840	5	5	1,075	120	
	Delay	38.5	35.4	5.7	41.7	28.4	27	30.4	10.9	1.8	8.2	10.2	3.8	14.5
	LOS	**D**	**D**	**A**	**D**	**C**	**C**	**C**	**B**	**A**	**A**	**B**	**A**	**B**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	4	-		126	259		59	114-177	7	5	207-221	35	
PM Peak Hour	**Volume**	10	5	5	135	5	175	255	1,430	10	5	1,075	145	
	Delay	41	38.6	10	49.7	43	18.4	41.5	17.6	12.8	19.5	13.1	6.9	18.8
	LOS	**D**	**D**	**A**	**D**	**D**	**B**	**D**	**B**	**B**	**B**	**B**	**A**	**B**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	18	2		151	139		213	285-336	-	5	212-235	57	

Lake Elmo Village Area AUAR
Scenario A 2030 Analysis
2030 Mitigated Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	45	185	55	105	370	5	5	10	30	35	5	70	
	Delay	4.9	1.5	1	5.6	3.5	3.7	9.1	10.2	3.9	11.1	1	6	3.6
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**B**	**A**	**A**	**A**
	Lanes	1	1		1	1			1			1		
	Queues	39	-		54	-			41			82		
PM Peak Hour	**Volume**	50	370	55	100	215	5	5	5	10	70	10	185	
	Delay	4.9	2.9	2.3	7	2.7	1.9	7	10.2	3.6	15.2	19	11.3	5.7
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**C**	**C**	**B**	**A**
	Lanes	1	1	0	1	1	0	0	1	0	0	1	0	
	Queues	39	-		69	-			34			130		

Signalized

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	105	1,045	5	15	730	25	35	15	75	30	30	75	
	Delay	37.6	12.7	11.2	43	20.1	13.9	27.5	32.7	12.4	30.4	32.4	21	17.8
	LOS	**D**	**B**	**B**	**D**	**C**	**B**	**C**	**C**	**B**	**C**	**C**	**C**	**B**
	Lanes	1	1	1	1	1	1	1	1		1	1		
	Queues	101	172	-	26	247	16	54	71		48	79		
PM Peak Hour	**Volume**	120	930	15	80	830	60	45	60	130	15	30	55	
	Delay	37	25.4	11.3	43.4	32.2	16.1	33.5	39.6	20.2	35	25.4	21.5	46.4
	LOS	**D**	**C**	**B**	**D**	**C**	**B**	**C**	**D**	**C**	**C**	**C**	**C**	**D**
	Lanes	1	1	1	1	1	1	1	1	0	1	1	0	
	Queues	106	517	17	306	1,882	254	71	156		36	64		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	225	20	45	175	0	0	0	0	25	0	100	
	Delay		1.3	1	6.6	2.9					10.2		8.3	3.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			74						71		
PM Peak Hour	**Volume**	0	265	35	135	320	0	0	0	0	15	0	85	
	Delay		1.7	1.2	8.7	7.3					12.1		8.5	5.5
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	0	0	0	1	0	
	Queues		8			128						73		

Lake Elmo Village Area AUAR
Scenario C 2030 Analysis
2030 Improved Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	455	0	810	0	0	0	0	620	220	510	930	0	
	Delay	80.0		55.1					25.1	11.9	36.1	14.5		36.7
	LOS	**E**	**A**	**E**	**A**	**A**	**A**	**A**	**C**	**B**	**D**	**B**	**A**	**D**
	Lanes	2		1					2	1	2	2		
	Queues	130-148		-					163-199	116	156-178	134-165		
PM Peak Hour	**Volume**	315	0	665	0	0	0	0	1,180	450	690	805	0	
	Delay	39.5	3.1	6.4					29.9	19.6	76.7	42.7		35.9
	LOS	**D**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**B**	**E**	**D**	**A**	**D**
	Lanes	2		1					2	1	2	2		
	Queues	116-113		-					299-318	189	210-224	93-94		

Stop Control

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	75	95	35	60	70	30	65	710	55	30	1,000	120	
	Delay	2840.8	2979.6	2617.9	1163.6	839.2	500.6	13.5	1.6	2.0	8.0	5.1	6.2	168.2
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**B**	**A**	**A**	**A**	**A**	**A**	**F**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		467	491		1,944	510	55	6	6	35	-	25	
PM Peak Hour	**Volume**	95	110	50	150	125	60	60	1,420	110	50	990	80	
	Delay	5804.0	4581.9	4363.0	5349.8	5302.4	5893.9	11.0	2.4	3.2	20.0	4.7	3.5	303.5
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**B**	**A**	**A**	**C**	**A**	**A**	**F**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		476	511		3,064	386	58	-	9	59	-	6	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	15	5	20	25	5	30	55	855	25	20	1,290	20	
	Delay	50.9	117.0	33.7	128.6	299.5	85.9	17.4	2.2	1.6	10.0	1.5	2.1	5.6
	LOS	**F**	**F**	**D**	**F**	**F**	**F**	**C**	**A**	**A**	**A**	**A**	**A**	**A**
	Lanes		1			1		1	2	1	1	2	1	
	Queues		60			142		25	-	-	11	5	-	
PM Peak Hour	**Volume**	35	5	70	45	10	85	45	1,545	30	40	1,145	25	
	Delay	798.1	855.7	847.4	1066.1	809.5	1188.2	16.0	3.6	3.0	17.9	2.0	1.7	73.9
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**C**	**A**	**A**	**C**	**A**	**A**	**F**
	Lanes	0	1	0	0	1	0	1	2	1	1	2	1	
	Queues		1,142			447		29	-	-	32	35-15	-	

Signalized

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	200	25	160	10	10	10	10	830	210	115	1,125	20	
	Delay	34.2	30.6	12.1	25.3	24.8	18.0	20.2	14.9	5.6	16.8	8.8	2.4	13.1
	LOS	**C**	**C**	**B**	**C**	**C**	**B**	**C**	**B**	**A**	**B**	**A**	**A**	**B**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		205	66		31	4	3	182-186	61	60	198-233	16	
PM Peak Hour	**Volume**	185	15	210	15	25	10	10	1,355	305	220	1,055	10	
	Delay	30.4	33.2	22.6	48.8	35.6	10.9	99.3	32.8	15.6	108.2	11.7	2.0	28.9
	LOS	**C**	**C**	**C**	**D**	**D**	**B**	**F**	**C**	**B**	**F**	**B**	**A**	**C**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		150	138		49	5	12	672-695	332	211	382-348	14	

Signalized

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	10	5	5	150	5	330	120	875	5	5	1,215	140	
	Delay	48.6	45.1	16.0	35.1	22.5	24.6	24.6	12.5	3.3		19.0	7.1	18.2
	LOS	**D**	**D**	**B**	**D**	**C**	**C**	**C**	**B**	**A**	**A**	**B**	**A**	**B**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		27	-		102	229	86	138-162	14	-	308-336	44	
PM Peak Hour	**Volume**	10	5	10	170	5	195	275	1,575	10	5	1,070	170	
	Delay	41.2	28.8	14.9	34.7	5.5	12.8	62.4	19.5	12.8	48.6	30.6	20.5	26.4
	LOS	**D**	**C**	**B**	**C**	**A**	**B**	**E**	**B**	**B**	**D**	**C**	**C**	**C**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		16	-		81	63	280	471-494	15	9	272-286	130	

Lake Elmo Village Area AUAR
Scenario C 2030 Analysis
2030 Improved Roadway Network

Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	45	205	60	115	380	5	10	15	40	55	5	105	
	Delay	5.3	2.5	1.5	6.3	3.4	0.5	9	11.8	4.8	12	1.5	5.6	4.0
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**B**	**A**	**A**	**A**
	Lanes	1	1		1	1			1			1		
	Queues	43	7		53	-			44			80		
PM Peak Hour	**Volume**	65	365	75	135	260	10	5	10	65	80	15	135	
	Delay	89.3	156.6	155.1	668.0	545.5	723.2	849.2	595.8	544.5	11.6	9.1	6.5	281.5
	LOS	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**B**	**A**	**A**	**F**
	Lanes	1	1	0	1	1	0	0	1	0	0	1	0	
	Queues	127	1,538		364	2,759			704			84		

Signalized

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	120	1,050	5	15	745	30	35	25	115	30	30	75	
	Delay	50.7	19.5	9.1	47.5	18.8	10.6	27.6	27.5	13.9	26.5	38.7	26.3	21.3
	LOS	**D**	**B**	**A**	**D**	**B**	**B**	**C**	**C**	**B**	**C**	**D**	**C**	**C**
	Lanes	1	1	1	1	1	1	1	1		1	1		
	Queues	148	370	-	50	288	15	47	87		36	108		
PM Peak Hour	**Volume**	160	945	15	85	855	60	50	40	165	15	40	55	
	Delay	50.6	23.9	14.1	41.9	21.8	13	36.2	34.2	24.5	32.6	26.4	17.2	25.2
	LOS	**D**	**C**	**B**	**D**	**C**	**B**	**D**	**C**	**C**	**C**	**C**	**B**	**C**
	Lanes	1	1	1	1	1	1	1	1	0	1	1	0	
	Queues	131	497	22	85	367	40	65	159		34	79		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	225	25	65	180	0	0	0	0	30	0	125	
	Delay		1.4	0.8	6.7	3.3					13.3	2.6	7.7	3.9
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1			1						1		
	Queues		-			67						74		
PM Peak Hour	**Volume**	0	265	40	150	325	0	0	0	0	20	0	110	
	Delay		1.8	0.7	8.9	6.4					21.2	2.1	9.8	5.4
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	0	0	0	1	0	
	Queues		-			93						79		

Lake Elmo Village Area AUAR
Scenario C 2030 Analysis
2030 Mitigated Roadway Network

Signalized

Manning Ave & TH 5		NB on Manning Ave			SB on Manning Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	455	0	810	0	0	0	0	620	220	510	930	0	
	Delay	75.8		30.8					28.4	16.1	42.4	6.7		31.1
	LOS	**E**	**A**	**C**	**A**	**A**	**A**	**A**	**C**	**B**	**D**	**A**	**A**	**C**
	Lanes	2		1					2	1	1	2		
	Queues	202-200		-					218-243	131	250-259	139-139		
PM Peak Hour	**Volume**	315	0	665	0	0	0	0	1,180	450	690	805	0	
	Delay	50.3	3.5	6.9					51.1	34.5	41.0	4.9		31.0
	LOS	**D**	**A**	**A**	**A**	**A**	**A**	**A**	**D**	**C**	**D**	**A**	**A**	**C**
	Lanes	2	0	1	0	0	0	0	2	1	1	2	0	
	Queues	155-158		-					444-472	379	313-330	290-118		

Signalized

TH 5 & 39th Street		NB on 39th Street			SB on 39th Street			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	75	95	35	65	70	30	65	710	55	30	1,000	120	
	Delay	27.6	24.3	12.0	34.4	15.9	11.4	15.6	9.7	4.1	25.4	11.0	8.0	12.3
	LOS	**C**	**C**	**B**	**C**	**B**	**B**	**B**	**A**	**A**	**C**	**B**	**A**	**B**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	62	86		87	81		159	200-229	48	63	127-160	52	
PM Peak Hour	**Volume**	95	110	50	160	125	60	60	1,420	110	50	990	80	
	Delay	41.9	31.1	25.6	43.2	30.8	21.3	44.1	16.6	8	47.2	15.3	8.7	19.8
	LOS	**D**	**C**	**C**	**D**	**C**	**C**	**D**	**B**	**A**	**D**	**B**	**A**	**B**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	99	141		195	187		99	344-377	152	76	201-221	47	

Stop Control

TH 5 & Laverne Ave		NB on Laverne Ave			SB on Laverne Ave			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	5	5	20	10	5	30	55	855	25	20	1,290	20	
	Delay	27.6	43.5	14.2	44.1	68.4	14.5	12.9	1.8	1.7	11.3	3.0	4.5	3.5
	LOS	**D**	**E**	**B**	**E**	**F**	**B**	**B**	**A**	**A**	**B**	**A**	**A**	**A**
	Lanes		1	1		1	1	1	2	1	1	2	1	
	Queues		25	12		32	32	38	-	-	16	-	-	
PM Peak Hour	**Volume**	10	5	70	15	5	85	45	1,545	30	40	1,145	25	
	Delay	118.2	205.8	26.0	223.0	267.4	29.1	19.0	3.6	2.8	23.4	3.3	1.5	7.8
	LOS	**F**	**F**	**D**	**F**	**F**	**D**	**C**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	1	0	1	1	1	2	1	1	2	1	
	Queues		45	32		112	81	32	-	-	44	9	-	

Signalized

TH 5 & Lake Elmo Ave S		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	210	25	160	20	10	10	10	830	210	115	1,125	20	
	Delay	53.6	37.3	20.6	42.2	42.5	10.2	30.0	11.9	5.0	22.7	8.1	1.6	14.5
	LOS	**D**	**D**	**C**	**D**	**D**	**B**	**C**	**B**	**A**	**C**	**A**	**A**	**B**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	274	163		19	18		-	178-208	71	104	205-216	18	
PM Peak Hour	**Volume**	210	15	210	35	25	10	10	1,355	305	220	1,055	10	
	Delay	49.8	44.4	24.8	44.6	35.1	6.4	49.8	20.5	10.6	43.4	10.6	1.7	20.2
	LOS	**D**	**D**	**C**	**D**	**D**	**A**	**D**	**C**	**B**	**D**	**B**	**A**	**C**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	227	174		54	36		-	404-429	271	157	242-284	15	

Signalized

TH 5 & Lake Elmo Ave N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on TH 5			WB on TH 5			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	10	5	5	150	5	330	120	875	5	5	1,215	140	
	Delay	31.9	19.1	2.7	47.1	10.3	29.4	36.8	11.9	9.8	10.2	14.7	5.9	17.6
	LOS	**C**	**B**	**A**	**D**	**B**	**C**	**D**	**B**	**A**	**B**	**B**	**A**	**B**
	Lanes	1	1		1	1		1	2	1	1	2	1	
	Queues	6	-		173	297		103	141-190	-	-	297-321	50	
PM Peak Hour	**Volume**	10	5	10	170	5	195	275	1,575	10	5	1,070	170	
	Delay	25.7	35.9	11.3	49.6	12.0	18.6	57.2	21.2	12.7	33.6	15.9	7.7	22.8
	LOS	**C**	**D**	**B**	**D**	**B**	**B**	**E**	**C**	**B**	**C**	**B**	**A**	**C**
	Lanes	1	1	0	1	1	0	1	2	1	1	2	1	
	Queues	3	-		178	134		314	359-405	17	-	289-324	63	

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Stop Control

Lake Elmo Ave N & 39th St N		NB on Lake Elmo Ave N			SB on Lake Elmo Ave N			EB on 39th St N			WB on 39th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	45	205	60	115	380	5	10	15	40	55	5	105	
	Delay	5.2	2.5	2.0	6.7	3.5	5.5	18.6	13.5	5.5	14.1	0.6	6.9	4.3
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**B**	**A**	**B**	**A**	**A**	**A**
	Lanes	1	1		1	1			1			1		
	Queues	35	7		59	-			73			83		
PM Peak Hour	**Volume**	65	365	75	135	260	10	5	10	65	80	15	135	
	Delay	5.7	3.1	2.6	7.6	3.2	2.1	13.3	14.4	5.1	19.9	9	10.3	5.7
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**A**	**C**	**A**	**B**	**A**
	Lanes	1	1	0	1	1	0	0	1	0	0	1	0	
	Queues	47	10		67	-			57			114		

Signalized

Manning Ave & 30th St N		NB on Manning Ave			SB on Manning Ave			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	120	1,050	5	15	745	30	35	25	115	30	30	75	
	Delay	27.8	18.8	20.7	32.6	23.0	15.8	8.3	26.5	14.6	31.4	29.9	21.7	21.3
	LOS	**C**	**B**	**C**	**C**	**C**	**B**	**A**	**C**	**B**	**C**	**C**	**C**	**C**
	Lanes	1	1	1	1	1	1	1	1		1	1		
	Queues	186	590	137	38	484	21	47	102		46	121		
PM Peak Hour	**Volume**	160	945	15	85	855	60	50	40	165	15	40	55	
	Delay	51.9	32.7	13.3	59.5	50.1	32.5	43.2	33.8	24.1	36.6	30.1	19.0	41.0
	LOS	**D**	**C**	**B**	**E**	**D**	**C**	**D**	**C**	**C**	**D**	**C**	**B**	**D**
	Lanes	1	1	1	1	1	1	1	1	0	1	1	0	
	Queues	254	649	17	275	1,468	251	95	170		30	71		

Stop Control

Lake Elmo Ave S & 30th St N		NB on Lake Elmo Ave S			SB on Lake Elmo Ave S			EB on 30th St N			WB on 30th St N			Total
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	**Volume**	0	225	25	65	180	0	0	0	0	30	0	125	
	Delay		1.3	2.2	5.9	3.6					14.0	2.1	11.9	4.8
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**A**	**B**	**A**
	Lanes		1			1						1		
	Queues		-			59						98		
PM Peak Hour	**Volume**	0	265	40	150	325	0	0	0	0	20	0	110	
	Delay		1.7	2.0	9.6	6.6					23.3	3.1	9.7	5.9
	LOS	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**A**	**A**	**A**
	Lanes	0	1	0	0	1	0	0	0	0	0	1	0	
	Queues		7			115						83		