Appendix E

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MEMORANDUM

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To: **I-35E AUAR Copy: File: Appendix E.**

From: Jack Forslund, AICP

Date: August 30, 2005

Subject: Appendix E: 2030 No-Build Traffic Analysis

INTRODUCTION

The purpose of this technical memorandum is to provide information on the operation of traffic within the AUAR Study Area for a 2030 No-Build Transportation Scenario using the population and employment information for that area as forecast by the Metropolitan Council. The intent of this analysis is to determine whether the transportation system is adequate to accommodate the projected future travel demand. The transportation system used in the analysis assumes only those projects currently funded would be built. Major potential improvements **not** assumed in this analysis include:

. • Northerly Bypass and new interchanges at I-35W and at 80th Street/I-35E
. • Reconstructed interchange at CSAH 14/I-35E
. • Expansion of I-35E to 6-lanes
. • Expansion of CSAH 21.

ANALYSIS PROCESS

The purpose of the analysis was to determine the performance of the transportation scenarios for existing and future year conditions. The following summarizes the study process and results.

Analysis Tool

Synchro5 is a traffic operations analysis software package that implements the

methodologies of the Highway Capacity Manual (HCM). Data from Synchro5 can be transferred to SimTraffic5, a detailed microscopic model that considers vehicle driver behavior, detailed interaction of vehicles with each other and the roadway between adjacent intersections, random behavior of drivers, and the delay for each individual vehicle throughout the entire peak hour. Synchro5 uses the HCM methodology to analyze intersection operations through one cycle of a traffic signal while

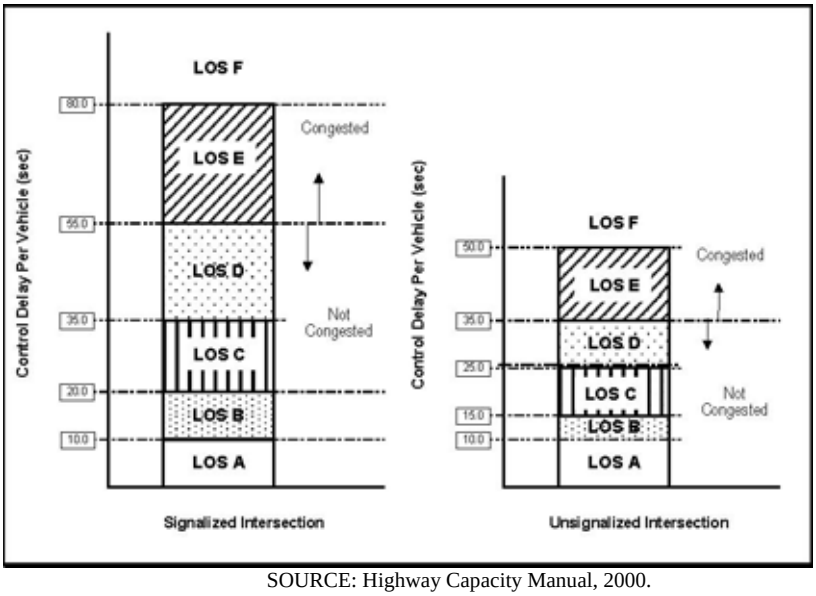
SimTraffic5 simulates the operation of the network of traffic signals through multiple cycles over a specified period of time (e.g., 60 minutes).

Intersection Level of Service

The ability of an intersection to process traffic is affected by the number and type of vehicles, desired turning movements, intersection geometrics, and traffic control devices. Intersection level of service (LOS) differs from segment level of service in that the quality of traffic operations is defined as the delay to vehicles caused by the intersection's traffic control rather than the ratio of vehicle volumes to roadway capacity. Intersection LOS typically focuses on operations during the periods of the day with the highest traffic volumes whereas segment LOS is based on traffic volumes over an average 24-hour period. Thus, the intersection LOS analysis gives a "worst-case" result for each intersection and more clearly identifies operational problems at the intersections.

The intersection operational analysis process includes determining the LOS for the key intersections under the existing peak hour traffic conditions. LOS D/E is generally considered an acceptable operating condition during peak hours in urban areas. Figure 1 presents the intersection LOS thresholds, in terms of seconds of vehicle delay, as defined in the HCM.

Figure 1. Intersection Level of Service Thresholds



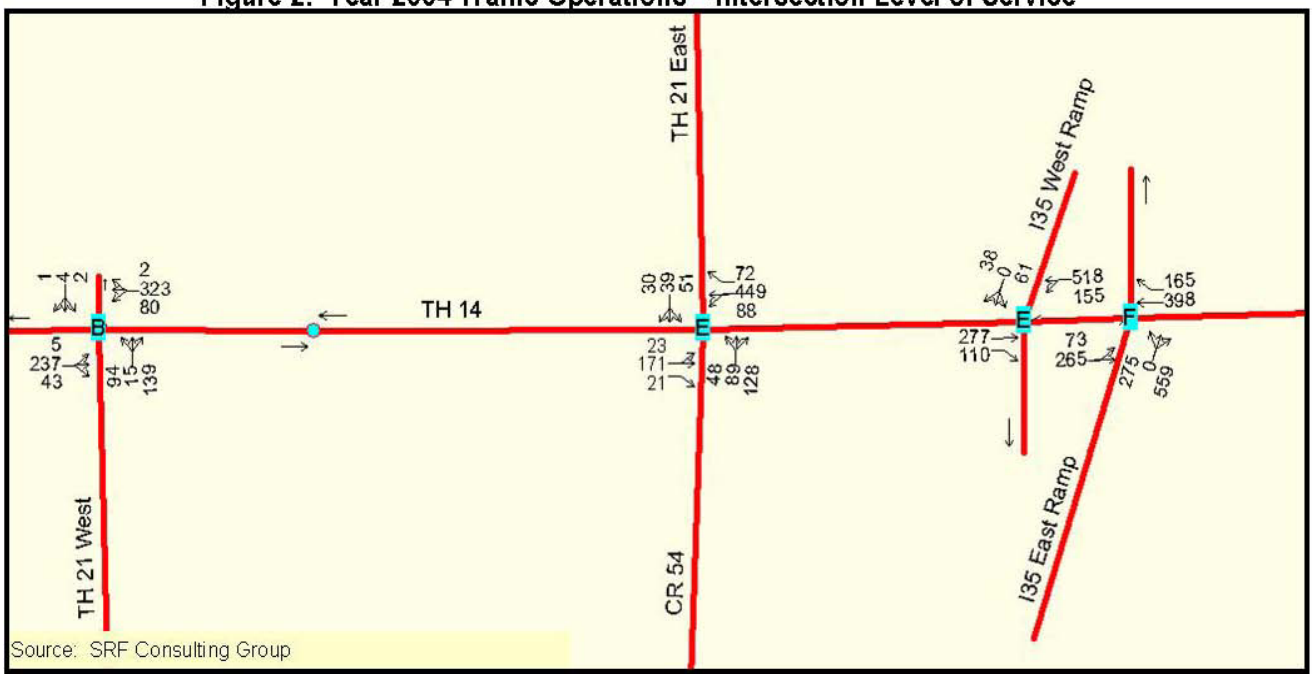
SOURCE: Highway Capacity Manual, 2000.

EXISTING CONDITIONS

To establish a baseline from which to compare future levels of traffic operation, it is helpful to present the existing conditions. Using the Synchro/SimTraffic Model developed for the AUAR; current traffic conditions were analyzed and documented. Currently, the AUAR is largely free of congestion, with the only area experiencing degraded mobility levels being CSAH 14 and it's intersections with CSAH 21 (20th Avenue North), and at it's intersections with the freeway on/off ramps of I-35E. Figure 4 displays the Synchro/SimTraffic Network developed for the CSAH 14 Alternatives Analysis Study conducted for Anoka County.[1] As shown in this figure, the west and east interstate ramp junctures with CSAH 14 operate at poor levels of service (E and F, respectively) during the p.m. peak hour. Figure 2 displays the delays experienced in the interchange area.

[1] CSAH 14 Traffic Study, July 2, 2004. SRF Consulting Group.

Figure 2. Year 2004 Traffic Operations – Intersection Level of Service



FUTURE LAND USE SCENARIOS

The following summarizes the characteristics of the Met Council land use scenario. The Met Council has allocated socioeconomic information to Traffic Analysis Zones (TAZs), which are used in the distribution and assignment of trips. As part of the Anoka County Modeling Project, URS has further divided the TAZs to provide more detail and more accurate traffic assignments.

Figure 3 displays the transportation network and TAZs within the Twin Cities Metropolitan Area. Within the AUAR Study area, there are six TAZs that represent the geographic area of the AUAR Area. These zones, 2090, 2097, 2098, 2099, 2100, and 2101; are shown in Figure 4.

Figure 3. Met Council Model Network

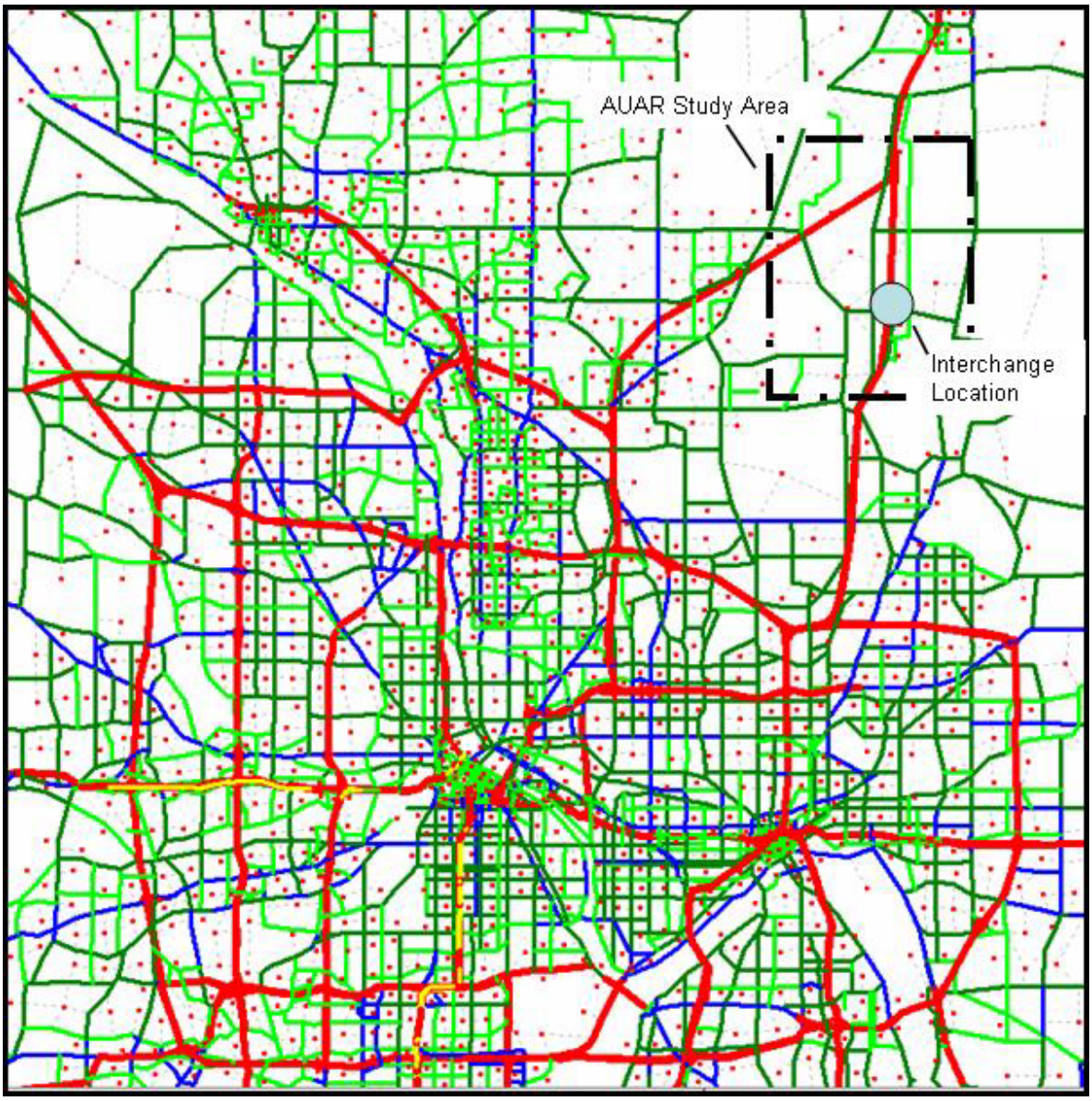


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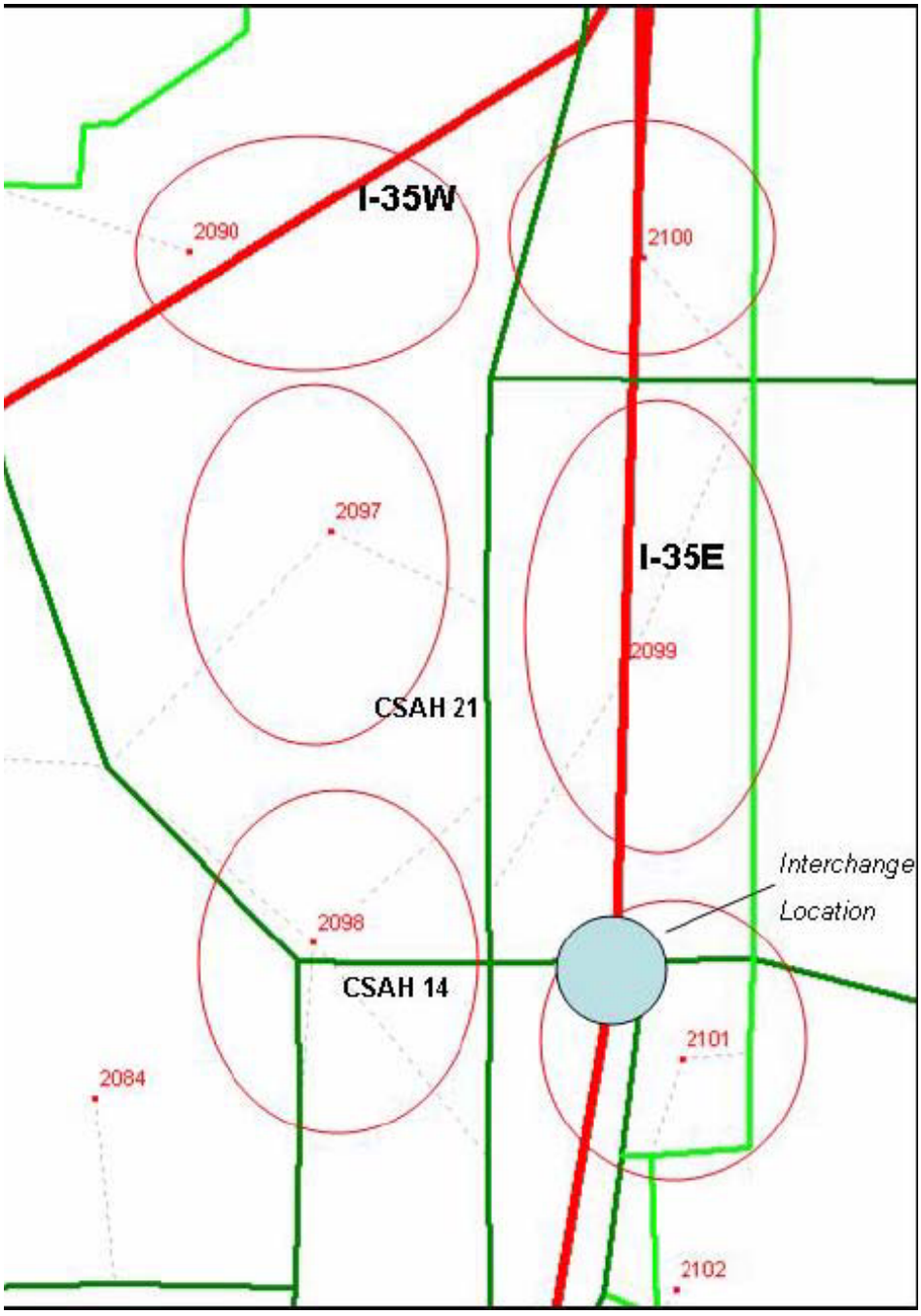
Figure 4. TAZs within the AUAR Study Area



Comparison of Met Council Scenario and AUAR Development Scenarios.

The projected 2030 land use as identified by the Met Council is considerably less aggressive than the AUAR scenarios in development assumptions.

For the travel demand forecasting model, trips are determined based on several variables including population and employment data by TAZ. Table 1 presents the population and employment data for the TAZ's comprising the AUAR study area. Met Council projections indicate that population will increase by approximately 2,400 and

employment by approximately 1,100 between the year 2000 and year 2030. This compares to population increases of approximately 6,000 for AUAR Scenario 1 to over 20,000 for Scenarios 2 and 3. Employment increases for all three AUAR Scenarios were approximately 15,000.

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Table 1. Met Council Projections for TAZs within AUAR.

ZONE	ORIG_METC_ZONE	2030POP	2030HH	2030RET	2030NRET
YEAR 2030 Land Use					
2090	97	997	359	0	2
2097	98	1758	692	0	66
2098	98	1468	577	110	1148
2099	98	1409	554	0	58
2100	98	552	215	0	33
2101	99	406	146	0	499
TOTAL		**6,590**	**2,543**	**110**	**1,806**

ZONE	ORIG_METC_ZONE	2000 POP	2000 HH	2000 RET	2000 Non-RET
YEAR 2000 Land Use					
2090	97	470	151	0	2
2097	98	1185	398	0	18
2098	98	990	332	23	315
2099	98	950	319	0	16
2100	98	372	124	0	9
2101	99	192	58	0	418
TOTAL		**4,159**	**1,382**	**23**	**778**

ZONE	ORIG_METC_ZONE	Net Pop Growth	NEW2030HH	NEW2030RET	NEW2030NRET Net Growth (Year 2030 - Year 2000)
2090	97	527	208	0	0
2097	98	573	294	0	48
2098	98	478	245	87	833
2099	98	459	235	0	42
2100	98	180	91	0	24
2101	99	214	88	0	81
TOTAL		**2,431**	**1,161**	**87**	**1,028**

SOURCE: Met Council, Anoka County and URS Corporation R:\31809732\[Stuff for Interchange Memo.xls]Trip Generation To be consistent with the analysis completed in the AUAR, this data had to be converted into six land use descriptions as defined in the ITE Trip Generation, *7th Edition* guide. The land use categories and assignment of development type is consistent with the City of Lino Lakes Comprehensive Plan. However the magnitude of the projected development represents approximately 15 percent of the City's Comprehensive Plan as presented in the AUAR (Scenario 1).

Table 2 presents the intensity and associated trip generation for each land use category.

Table 2. Met Council 2030 Scenario Trip Generation Characteristics

	Land Use	Intensity	A.M. Peak Hour			P.M. Peak Hour			Daily Total		
			In	Out	Total	In	Out	Total	In	Out	Total
Met Council Scenario	Rural Land Use (du)	70	13	39	52	45	26	71	335	335	670
	Low Density (du)	267	50	150	200	170	100	270	1,278	1,278	2,556
	Medium Density (du)	580	39	175	214	169	85	254	1,561	1,561	3,122
	High Density (du)	244	25	100	125	98	53	151	820	820	1,640
	Commercial (1ksf)[1]	135	187	43	230	104	202	306	1,438	1,438	2,876
	Industrial (1ksf)[2]	335	200	37	237	46	202	248	1,032	1,032	2,064
	TOTAL		**514**	**544**	**1,058**	**632**	**668**	**1,300**	**6,464**	**6,464**	**12,928**

R:\31809732\[Stuff for Interchange Memo.xls]Trip Generation

[1] Assumes a ratio of 300 feet for every employee (commercial). [2] Assumes a ratio of 500 feet for every employee (industrial).

Source: DSU, City of Lino Lakes, and URS Corporation.

2030 No-Build Traffic Assignment and Operation

The trips generated from the Met Council 2030 Land Use were assigned to existing transportation network based on the distribution derived from the Anoka County Version of the Met Council Travel Demand Model. While the overall traffic level is considerably lower than any of the three development scenarios of the AUAR, the impact on the transportation is significant. With respect to the roadway network, the only significant roadway improvement within the study area would be the expansion of CSAH 14 and the extension of Otter Lake Road to Elmcrest. The only signalized intersections would be located on CSAH 14 with CSAH 21 (20th Avenue North) and with Otter Lake Road, respectively. For the analysis, it is assumed that the local frontage road system would be constructed serve the new development areas. This would alleviate to accommodate local trips. Figures 5 and 6, respectively, display the a.m. and p.m. peak traffic assignments to the area roadway network. Figures 7 and 8 display the resulting Level of Service (LOS) for a.m. and p.m. the peak hours.

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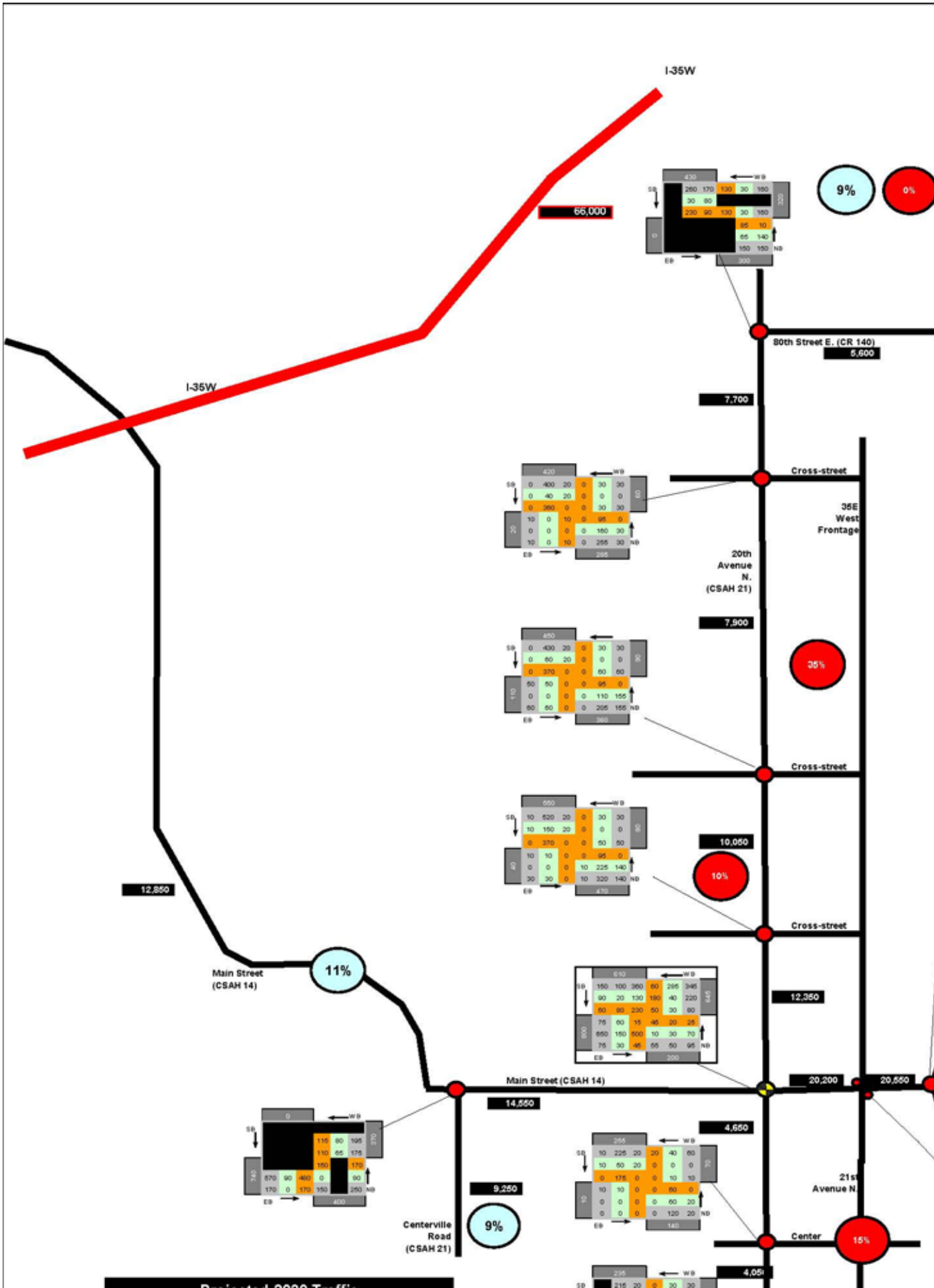
I-35W
I-35W
66,000
9%
0%
80th Street E. (CR 140)
5,600
7,700
Cross-street
35E
West
Frontage
20th
Avenue
N.
(CSAH 21)
7,900
35%
Cross-street
10,050
10%
Cross-street
12,850
Main Street
(CSAH 14)
11%
12,350
Main Street (CSAH 14)
20,200
20,550
14,550
4,650
9,250
9%
Centerville
Road
(CSAH 21)
21st
Avenue N.
Center
15%

SOURCE: URS Corporation

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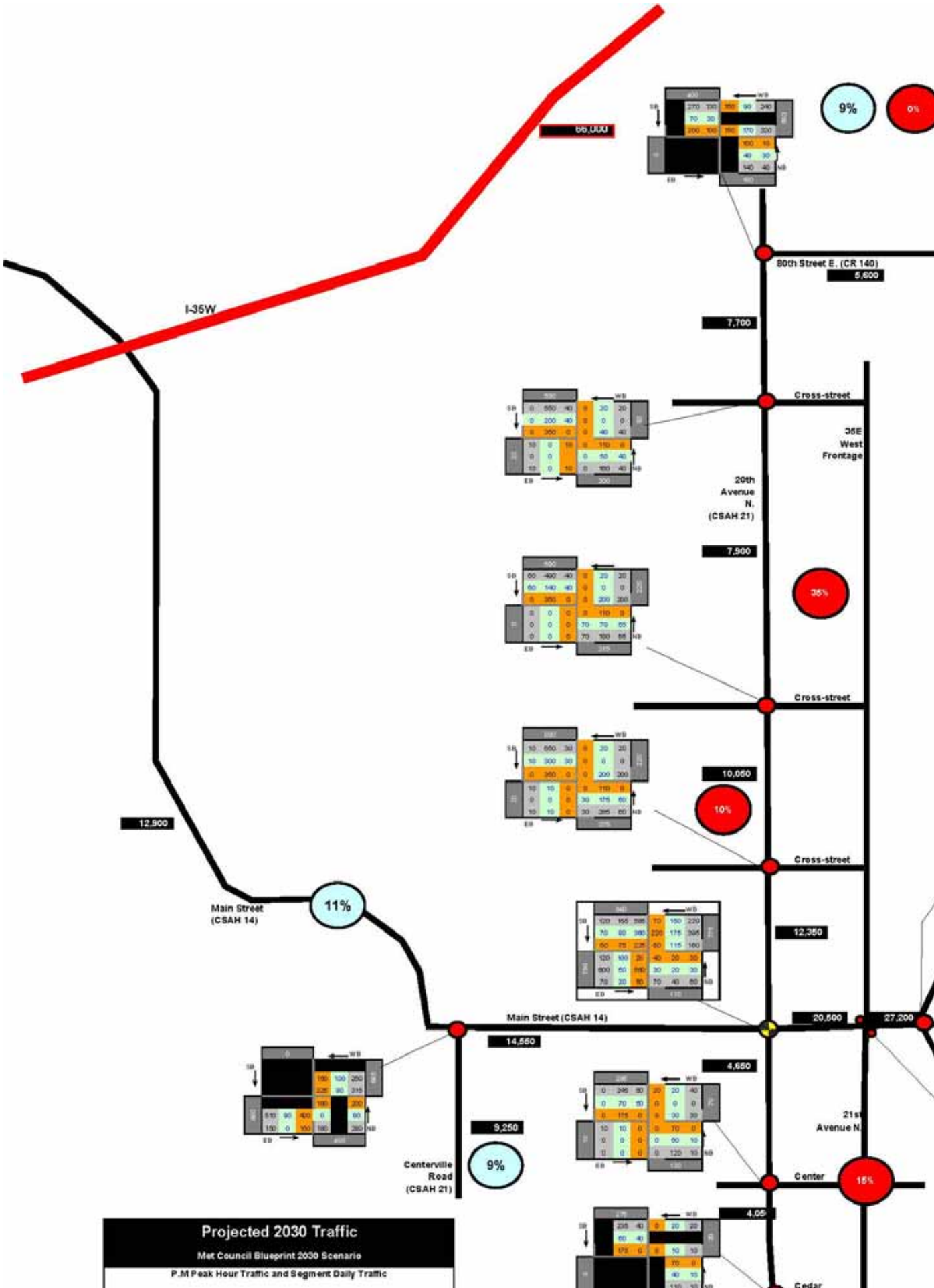
I-35W I-35E


I-35W
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Avenue
N.
(CSAH 21)
7,900
35%
Cross-street
10,050
10%
Cross-street
12,900
Main Street
(CSAH 14)
11%
12,350
Main Street (CSAH 14)
20,500
27,200
14,550
4,650
9,250
9%
Centerville
Road
(CSAH 21)
21st
Avenue N.
Center
15%
4,05
Cedar
Projected 2030 Traffic
Met Council Blueprint 2030 Scenario
P.M Peak Hour Traffic and Segment Daily Traffic

I-35E

2030 No-Build PM Peak Hour Traffic Assignment

Met Council 2030 Projected Growth assigned based on City Comprehensive Plan

SOURCE: URS Corporation R:\31809732\DRAFT 2 of FINAL PLAN\TECH MEMO\[Lino Diamond.xls]Diamond PM

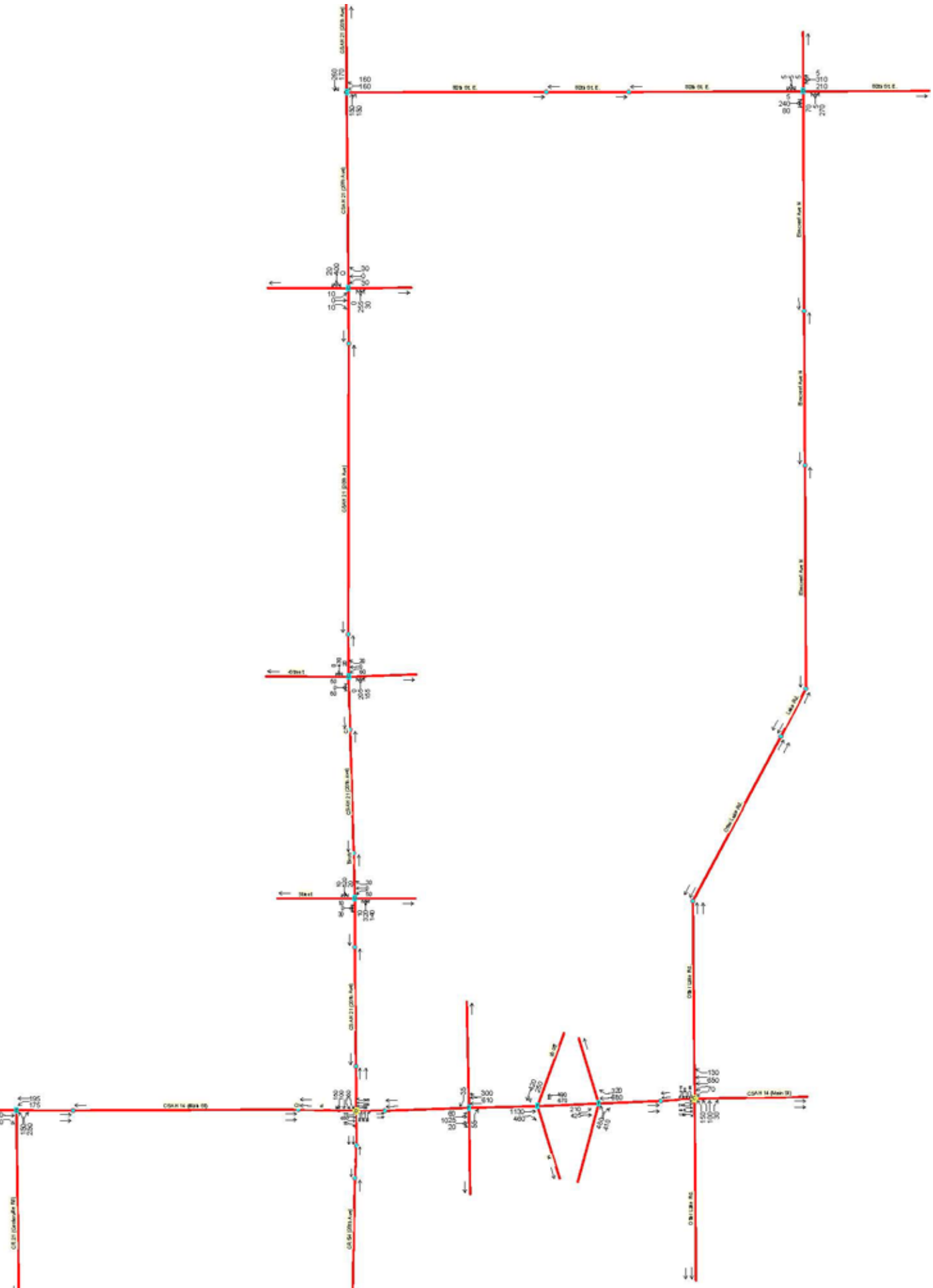

Figure 7. 2030 No-Build AM Peak Hour Level of Service

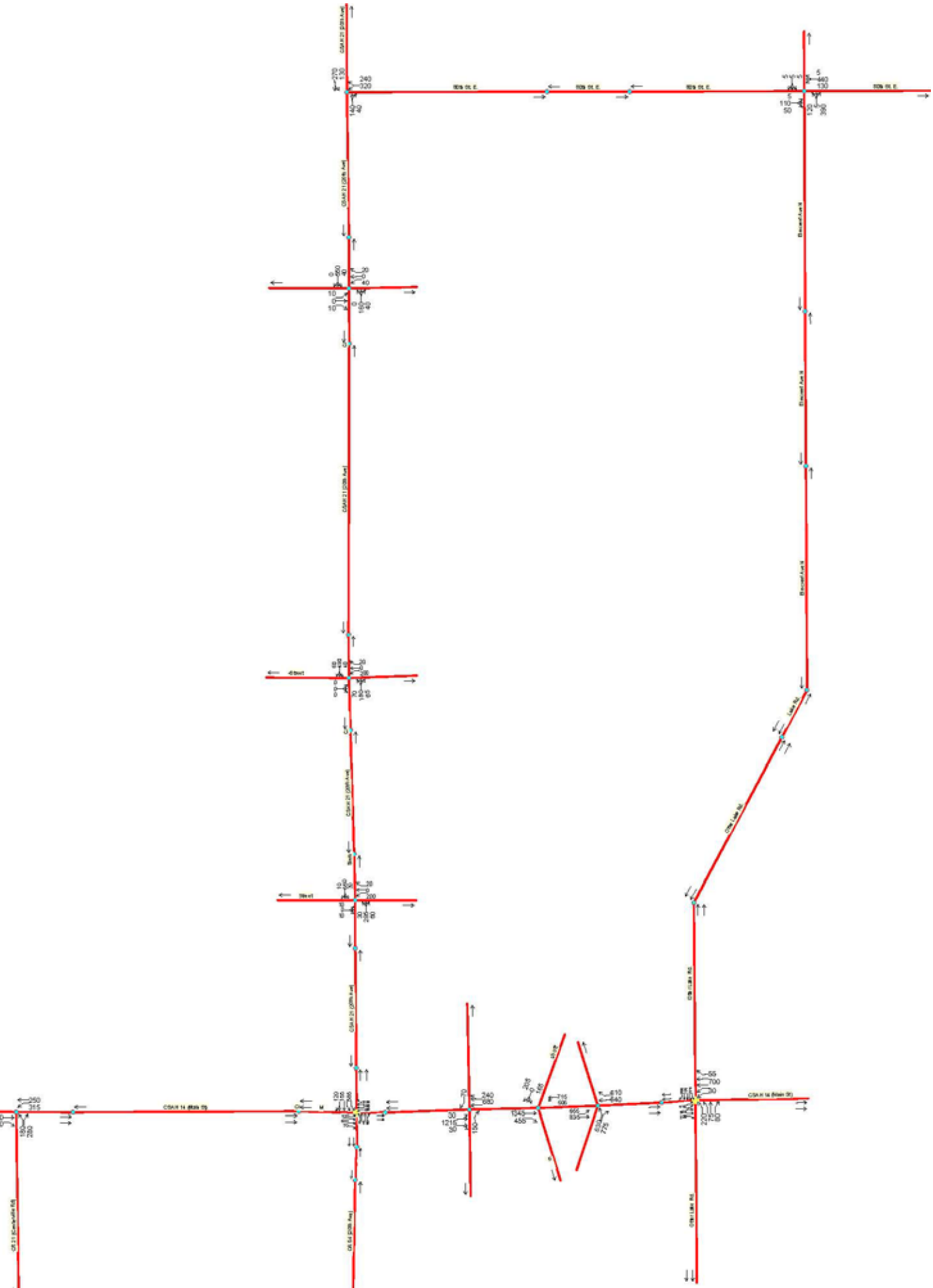

Figure 8. 2030 No-Build PM Peak Hour Level of Service

Traffic Operations Summary

Using the Met Council 2030 projected land use scenarios; several intersections will perform at LOS E or worse during the peak hours. Table 3 summarizes the level of service for the analyzed intersections.

Table 3. 2030 No-Build AM and PM Peak Hour Level of Service

Intersection	TIME PERIOD AM	PM
CR 140 (80th Street East)		
80th Street at CSAH 21	C	C
80th Street at Elmcrest Avenue	D	**F**
CSAH 14 (Main Street)		
CSAH 14 at CSAH 21 (Centerville Rd.)	E	E
CSAH 14 at CSAH 21	D	**F**
CSAH 14 at 21st Ave. N.	**F**	**F**
CSAH 14 at I-35E (west ramps)	**F**	**F**
CSAH 14 at I-35E (east ramps)	**F**	**F**
CSAH 14 at Otter Lake Road	C	E
CSAH 21 (20th Avenue North)		
CSAH 21 at North Crossroad	B	C
CSAH 21 at Middle Crossroad	C	C
CSAH 21 at South Crossroad	C	C
CR 54 South of CSAH 14		
CR 54 at Center Street	B	C
CR 54 at Ceder Street	B	C
CR 54 at South Crossroad	B	C
CR 54 at Birch Street	B	C

SOURCE: URS Corporation. R:\31809732\Synchro\AUAR Analysis\Excel\[LOS Summary.xls]2030 No-Build LOS As displayed in Table 3, the existing interchange configuration at the I-35E/CSAH 14 interchange will perform well below an acceptable level of service. Perhaps even more importantly is the impact it may have on the operation of I-35E as the queue of vehicles on the exit ramps could back up onto the mainline. Figure 9 displays the queuing characteristics for the p.m. peak hour. As shown in this graphic, the average queuing distance of I-35E northbound exiting traffic backs up to mainline, or approximately 760 feet. Even with signalization of the ramps, they are projected to continue to operate at LOS F, with northbound off-ramp traffic continuing to back up onto the mainline. In addition, traffic queues on the bridge deck will also block adjacent intersections. Figure 10 displays the queuing information for the

CSAH 14/I-35E interchange area with the on/off ramp intersections signalized.

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Figure 9. 2030 No-Build PM Peak Hour Level of Service – I-35E NB Off-ramp Queuing

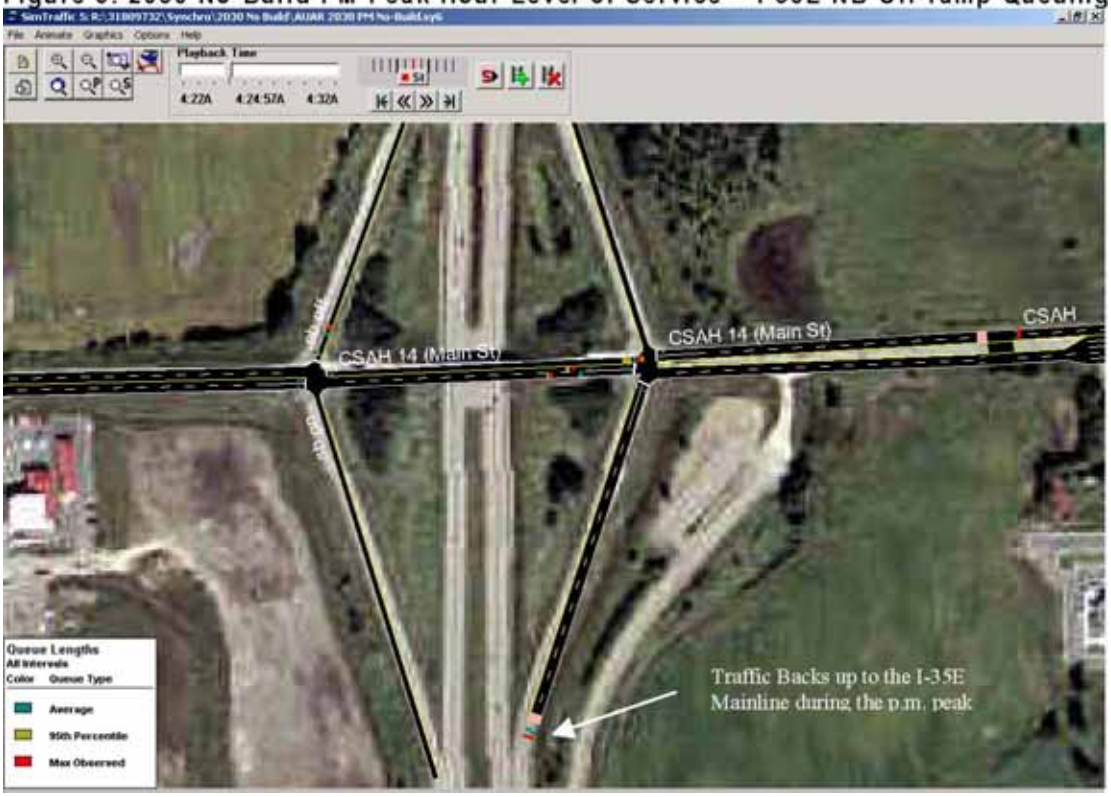
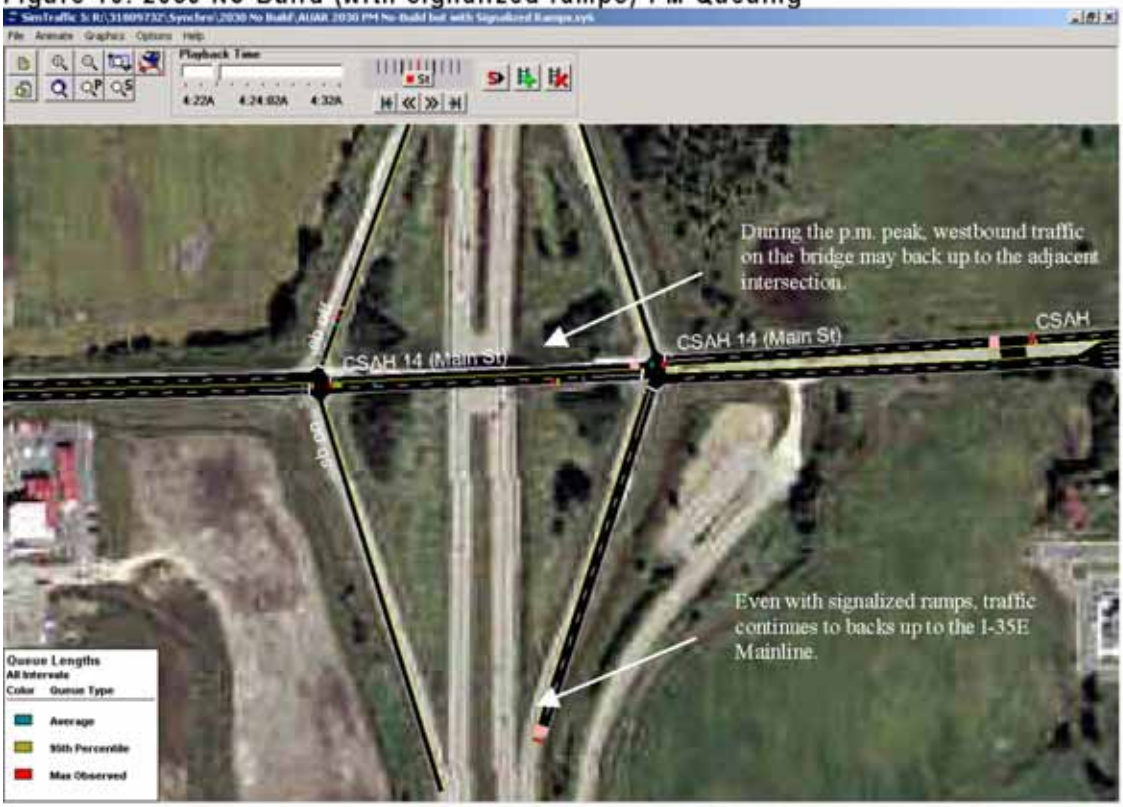


Figure 10. 2030 No-Build (with signalized ramps) PM Queuing



Conclusion

The purpose of this technical memorandum was to analyze the traffic operation within the AUAR Study Area for a 2030 No-Build Transportation Scenario using the population and employment data for that area as forecast by the Metropolitan Council. The analysis showed that even with a relatively modest increase in development (the Met Council development scenario represents approximately 15 percent of the trips in AUAR Scenario 1) the transportation system will experience areas of significant congestion. The area of greatest congestion is projected to be the CSAH 14/I-35E interchange area.

Under the No-Build Scenario, this interchange represents the only Interstate access point within the AUAR Study Area. Given the limited access to the Interstate system, traffic destined to the study area places additional pressure on the local roadway system. One such local roadway is CSAH 14, which through the City of Centerville is projected to carry nearly 13,000 trips per day, compared to 5,700 per day in 2004.

This analysis has shown that there is a need for additional infrastructure improvements to accommodate both local and regional traffic. The need for some of these improvements currently exist, such as at the interchange of CSAH 14/I-35E. Even with the relatively modest development scenario used to conduct this analysis (Met Council 2030 forecast); the transportation network will be negatively impacted. This is reflected by the increase in congestion at the intersection level, as well as the increase in daily traffic on local roadways such as CSAH 14.

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