

Memorandum

TO: Jay Hill, PE, Schoell & Madson, Inc.
FROM: Erik Seiberlich, AICP
 John Crawford, PE, PTOE
DATE: February 2, 2007
SUBJECT: *DRAFT South East Town of Hassan AUAR Traffic Analysis*

EXECUTIVE SUMMARY

The following document reports the results of the traffic analysis portion of the South East Town of Hassan AUAR. The proposed Stones Throw development covers about 65% of the 1,043 gross acres of the AUAR area which is generally bordered by Interstate 94 to the north, Brockton Lane to the east, Fletcher Lane to the west, and the City of Corcoran to the south.

The traffic study focused on intersection and roadway operation during the a.m. and p.m. peak hours in 2015 and 2030. Three scenarios were analyzed for comparative purposes and to determine what level of mitigation is needed in order for the five study intersections to operate in an acceptable manner. Hassan Township’s Comprehensive Plan identifies the land uses for Scenario 1. Scenario 2 and 3 incorporate the land uses of the Stones Throw development. Scenario 2 has a more commercial oriented development plan, as this scenario assumes that a new interchange near the development site will be constructed to provide access to Interstate-94. Scenario 3 assumes no new freeway access, and is a more residential development, although there are office, industrial and retail land uses in this development plan as well. Trip generation estimates for the three scenarios are shown in Table E-1.

Table E-1. Trip Generation by Scenario

SCENARIO	2015			2030		
	AM PEAK	PM PEAK	DAILY	AM PEAK	PM PEAK	DAILY
1 - Comprehensive Plan	3,330	3,970	41,040	8,140	9,420	97,240
2 - Stones Throw with New Access	3,140	3,910	40,830	6,830	9,800	104,330
3 - Stones Throw no New Access	3,140	3,910	40,830	6,740	9,020	95,410

Trips were distributed and assigned to movements in the study intersections based on distribution percentages identified by running the Metropolitan Council’s Regional Travel Demand Model, and reviewing the distribution of the traffic analysis zones (TAZ) in the vicinity of the AUAR study area. The newly distributed and assigned trips were then added to the appropriate background traffic levels for the given scenario. Background traffic was established by using current turning movement counts performed at each intersection, applying a growth factor to

represent continual increase in through traffic from growth in outer exurbs, and then adding in trips from expected Rogers residential and commercial development. These background trips were unique for each time period during both peak hour periods. In addition, background traffic was redistributed for Scenario 2 in order to emulate changes in commuting patterns that would occur if a new Interstate-94 interchange was constructed between CSAH 30 in Maple Grove and TH 101 in Rogers.

Capacity analysis was performed for each study intersection for each Scenario during both peak hour periods. Level of Service and delay were identified for the following conditions:

- Existing conditions
- 2015 with existing geometry and traffic control
- 2015 with mitigated geometry and traffic control
- 2030 with further mitigated geometry and traffic control

The levels of service for each intersection in each of these conditions are shown in Table E-2.

Table E-2. Intersection Level of Service

Scenario	Peak Hour Period	Fletcher Lane at 109th Ave. N	Fletcher Lane at Territorial Road	Brockton Lane at Territorial Road	Brockton Lane at 97th Ave. N	Brockton Lane at CSAH 81
EXISTING	AM	D	C	F	D	D
EXISTING	PM	C	F	F	F	D
2015 Existing Geometry and Traffic Control						
SCENARIO 1	AM	F	F	F	F	F
SCENARIO 1	PM	F	F	F	F	F
SCENARIO 2&3	AM	F	F	F	F	F
SCENARIO 2&3	PM	F	F	F	F	F
2015 Mitigated Geometry and Traffic Control						
SCENARIO 1	AM	B	B	C	C	C
SCENARIO 1	PM	C	C	C	C	C
SCENARIO 2&3	AM	B	B	C	C	C
SCENARIO 2&3	PM	B	C	C	C	C
2030 Mitigated Geometry and Traffic Control						
SCENARIO 1	AM	C	D	D	D	C
SCENARIO 1	PM	D	D	E	E	C
SCENARIO 3	AM	C	C	C	D	C
SCENARIO 3	PM	C	D	E	E	C
SCENARIO 2	AM	C	C	C	D	E
SCENARIO 2	PM	B	D	C	D	C

PURPOSE AND BACKGROUND

The purpose of this document is to report the results of the traffic study for the South East Town of Hassan Alternative Urban Areawide Review (AUAR) in Hassan Township, Minnesota. This study focused on the ability of the future roadway system to accommodate traffic generated by alternative developments. The following roadways are analyzed in this study:

- Brockton Lane (CSAH 101)
- Fletcher Lane (CSAH 116)
- CSAH 81
- 109TH Avenue North (CSAH 117)
- Territorial Road
- 97th Avenue North (CSAH 30)

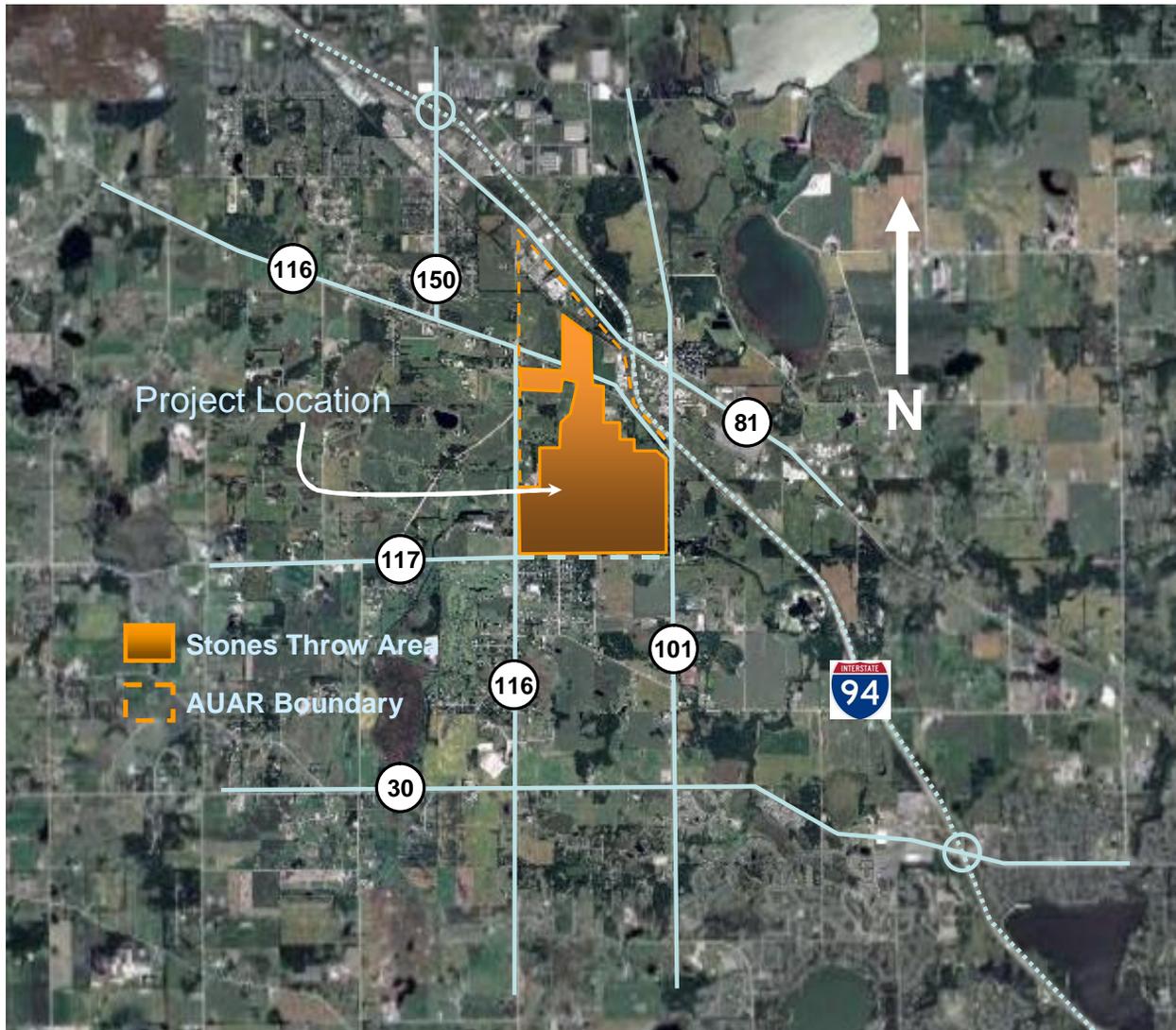
Volume, level of service (LOS) and delay were studied for the following impacted intersections:

- Fletcher Lane at 109th Avenue North
- Fletcher Lane at Territorial Road / New Territorial Road
- Brockton Lane at Territorial Road / New Territorial Road
- Brockton Lane at 97th Avenue North
- Brockton Lane at CSAH 81

The intersections identified above were chosen for analysis based on input from the Town of Hassan, the developer and because these five intersections are the most likely to have a significant impact from the development compared to their total future traffic volumes. Four other intersections were identified as candidates for analysis. A volume comparison of these intersections is included later in the document.

The study forecasted traffic conditions for the year 2015 and 2030. The study dealt with land uses in the project area as described by Town of Hassan's Comprehensive Plan, and development scenarios for the Stones Throw portions of the development area. The study area is shown in Figure 1.

Figure 1. Project Location



Study Area

The South East Town of Hassan AUAR study area comprises approximately 1,043 gross acres of land; and is generally bordered by Interstate 94 to the north, Brockton Lane to the east, Fletcher Lane to the west, and the City of Corcoran to the south. The complete study area is divided into two main components: the anticipated area of development referred to as the “Stones Throw” area, and the surrounding acreage predominantly to the north referred to as the “area of influence.” The boundaries studied as part of the AUAR were selected by the Town based on the anticipated areas of impact created by the development scenarios being studied. Land use of the surrounding communities was taken into account in the AUAR analysis.

STUDY APPROACH

Forecasting and analysis was done for three different development scenarios for the South East Town of Hassan AUAR. These three scenarios are:

- Scenario 1 – The first scenario is based on the existing Comprehensive Plan guidance for the land.
- Scenario 2 – The second scenario is based on the proposed Stones Throw development and its impact on the surrounding area assuming NEW freeway access to Interstate 94, thereby allowing for increased commercial land. This scenario is the greatest daily traffic generator. The existence of an Interstate interchange makes commercial and industrial land uses more appropriate and the higher and better use when compared to residential. The commercial – primarily retail – land uses generate far more daily and p.m. peak hour traffic than other uses. Although because of conventional business hours, less traffic is generated during the a.m. peak hour.
- Scenario 3 – The third scenario is based on the proposed Stones Throw development and its impact on the surrounding area assuming NO additional freeway access to Interstate 94, thereby resulting in increased residential land.

Note that the Stones Throw development area is a large portion of the AUAR area. For the land outside the Stones Throw development area, and within the AUAR area, the comprehensive plan guidance is used for the land.

For the purpose of comparing like development scenarios, this study will analyze Scenarios 1 and 3 together, as they use the same roadway network. Because there is no Comprehensive Plan scenario with a new freeway access, Scenario 2 analysis will be presented later as an alternative to Scenarios 1 and 3, but can not be directly compared because the roadway network, traveler distribution, and background traffic volumes will be different, and too many variables exist for direct comparison.

Several steps were taken so that analyses and comparison can be performed. A brief summary of these steps is outlined as follows:

- Turning movement counts were taken at the following intersections in September of 2006.
 - Fletcher Lane at 109th Avenue North
 - Fletcher Lane at Territorial Road / New Territorial Road
 - Brockton Lane at Territorial Road / New Territorial Road
 - Brockton Lane at 97th Avenue North
- Turning movement counts were taken at the intersection of Brockton Lane at CSAH 81 in November of 2006.
- There are essentially no existing trips generated by existing land uses in the study area for removal from the roadway system in order to arrive at future traffic volumes.
- Trip generation was estimated for the two different development scenarios based on future land uses. An extensive review of surrounding area developments (both residential and non-residential) were also included based on the City of Rogers development plans. These trips were then distributed onto the roadway network as background growth. In

addition to these specific background growth developments, 1% per year growth was added through the year 2015, and 2% per year growth was added between 2015 and 2030.

- Analyses were performed to determine the traffic impact of the developments for each of the three scenarios.
- A mitigation plan was identified so that each of the study intersections would provide enough capacity so that the intersections could operate in an acceptable manner. The intersections were then once again analyzed with the new geometries and traffic control that is identified in the mitigation plan.

EXISTING ROADWAY CONDITIONS

The location of the AUAR study area is mostly used for agricultural purposes at the present time. The roadways in the study area are mostly high speed, two-lane, rural cross sections with few accesses that see any significant amount of traffic. The geometry and traffic control of the five study intersections are shown in Figure 2, and detailed in the following:

- Fletcher Lane and 109th Avenue North - This is a three legged intersection which provides one shared lane for each approach. The west approach is stop controlled.
- Fletcher Lane and Territorial Road - This all-way stop controlled intersection is served by one shared left turn/through/right turn lane for each approach. The north leg of this four-legged intersection is paved for a short distance before becoming a dirt road.
- Brockton Lane and Territorial Road – This is a three legged intersection with one shared lane for all movements. The north approach has one shared through/right turn lane. The south approach has one shared through/left turn lane. The west approach has one shared left turn/right turn lane and is stop controlled.
- Brockton Lane and 97th Avenue North – The north and west approaches of this intersection provide one left turn lane, and one shared through/right turn lane. The south and east approaches provide one left turn lane, one through lane, and a channelized right turn lane. The intersection is traffic signal controlled and provides a protected left turn phase for each approach.
- Brockton Lane and CSAH 81 – This intersection is served on Brockton Lane by one shared through/left/right turn lane. The east and west approaches on CSAH 81 provide one left turn lane, one through lane, and one right turn lane. The intersection is traffic signal controlled.

Once the turning movement counts and other traffic data were gathered, the peak hours were determined. Based on the times where the most traffic was using the roadway system, the a.m. peak hour was identified as 6:45 – 7:45 a.m. and the p.m. peak hour from 4:15 - 5:15 pm. The a.m. peak hour volumes are presented in Figure 3, and the p.m. peak hour volumes in Figure 4.

Figure 2. Existing Intersection Geometry

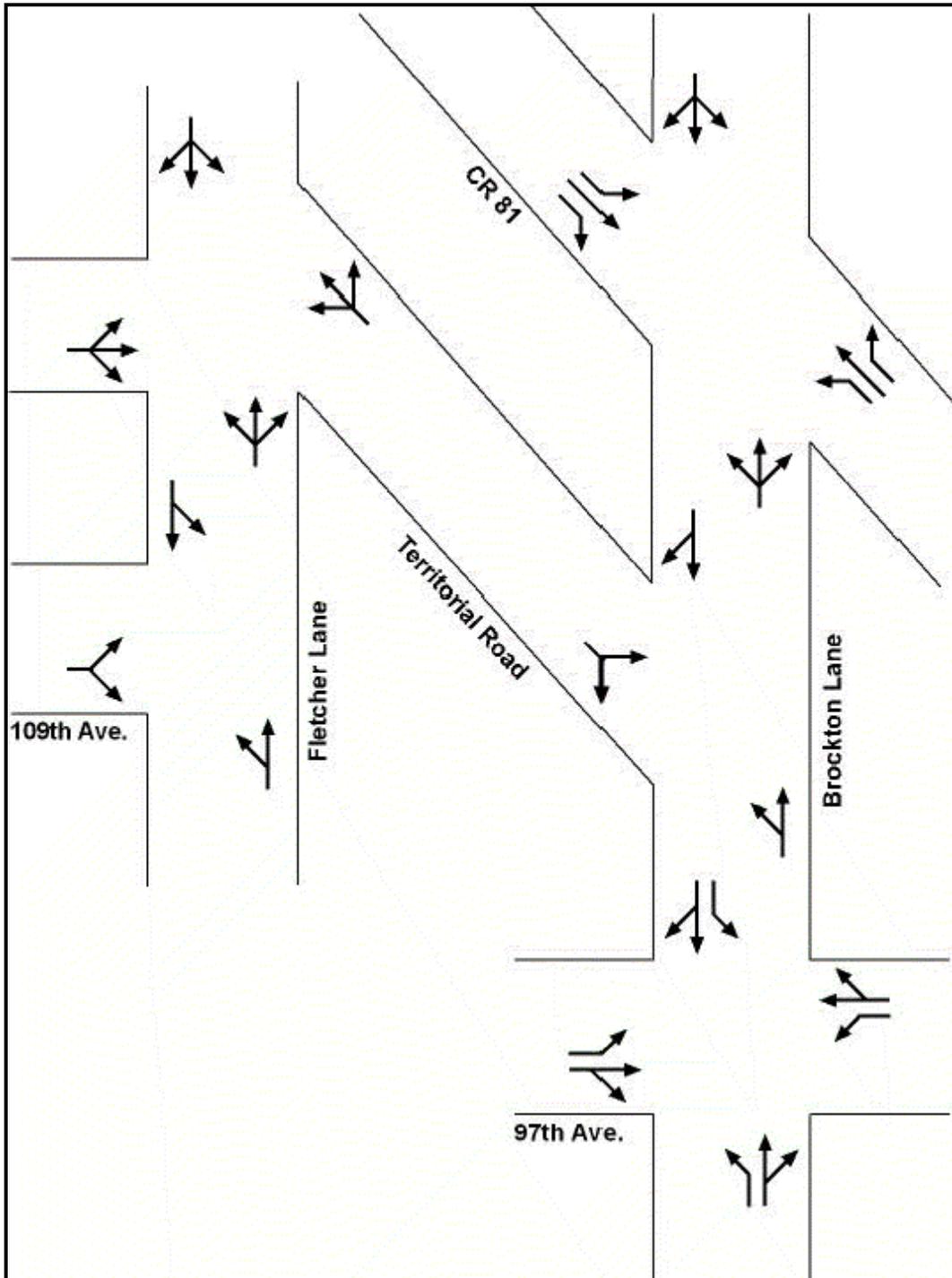


Figure 3. 2006 A.M. Peak Hour Volumes

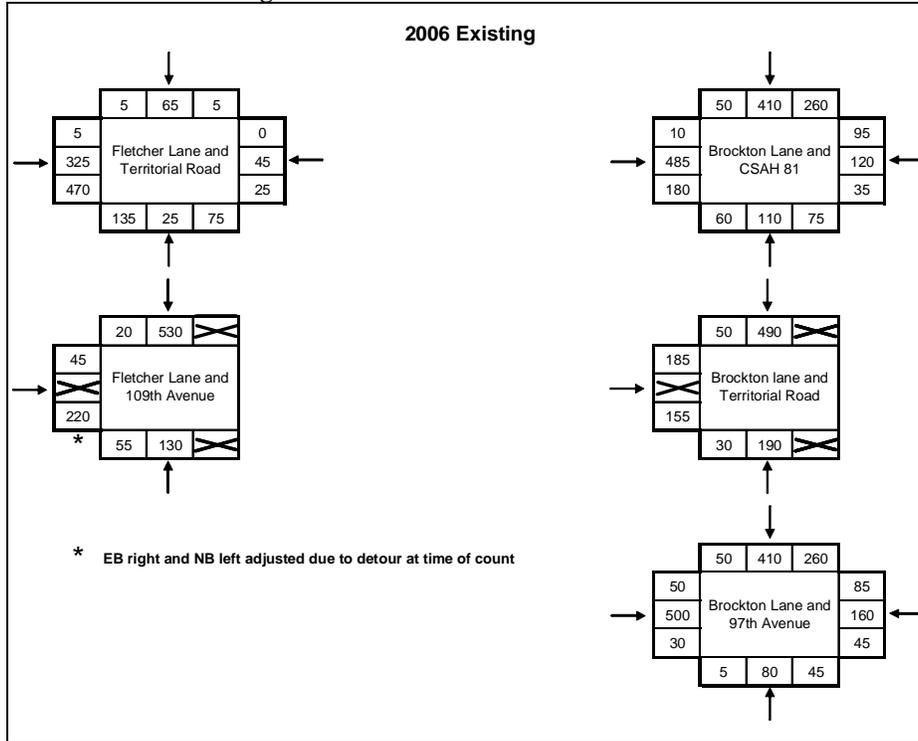
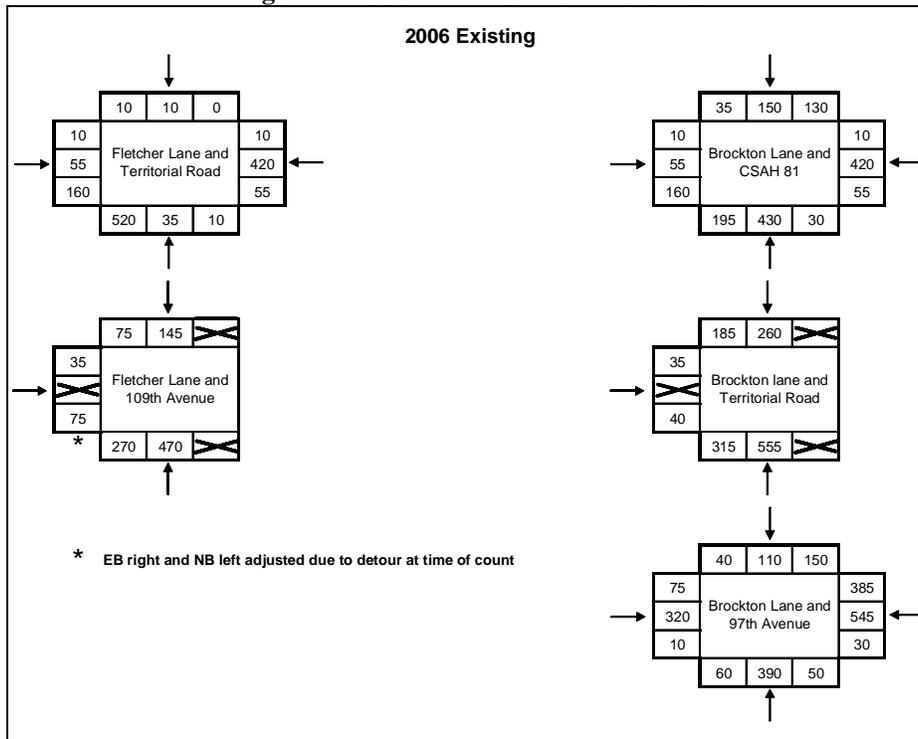


Figure 4. 2006 P.M. Peak Hour Volumes



Capacity Analyses were performed for the five subject intersections during the two peak hours. The traffic analysis software program Synchro was used to perform the analyses. Each intersection was modeled individually with random platooning because of the large distance between intersections.

Capacity analysis results are presented in terms of LOS which ranges from A to F. LOS A represents the best intersection operation, with very little delay for each vehicle using the intersection. LOS F represents the worst intersection operation with excessive delay. Results of the capacity analyses for the existing scenario are presented in Table 1.

Table 1. Existing Peak Hour Level of Service and Delay

EXISTING		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM PEAK HOUR	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		D				A	A			A	A	-
	Control Delay per Vehicle (sec)	25							<10			-		
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	F	F	B	B	B	B	B	B	B	B	B	C
	Control Delay per Vehicle (sec)		105			10			15			10		75
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				A	A			A	A	-
	Control Delay per Vehicle (sec)	60							<10			-		
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	D	D	D	D	C	C	D	C	C	D	C	C	D
	Control Delay per Vehicle (sec)	50	45		50	20		45	30		50	35		40
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	E	A	E	C	A	D	D	B	D	D	A	D	
Control Delay per Vehicle (sec)	55	60	<10	75	25	<10		50	10		55	<10	45	
PM PEAK HOUR	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	C		C				A	A			A	A	-
	Control Delay per Vehicle (sec)	25							<10			-		
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	B	B	B	F	F	F	F	F	F	B	B	B	F
	Control Delay per Vehicle (sec)		15			50			105			10		65
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				A	A			A	A	-
	Control Delay per Vehicle (sec)	65							<10			-		
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	C	C	F	F	F	E	F	F	F	D	D	F
	Control Delay per Vehicle (sec)	185	20		85	95		75	110		150	45		90
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	C	A	D	E	B	D	D	A	E	E	B	D	
Control Delay per Vehicle (sec)	45	35	<10	45	60	15		55	<10		60	10	50	

Depending on several variables including type of roadway, traffic control, location, etc., a level of service D is generally the desired minimum operating condition. Analyses of the five study intersections indicate that many of the movements operate at a less than desirable level of service under existing conditions during the peak hour.

2015 and 2030 BASELINE VOLUMES

The next step in the process was to incorporate other potential developments and background growth into the turning movement volumes. Using information provided for the City of Rogers, future traffic was forecasted for undeveloped areas in the City. Trips were generated for both residential and non-residential uses, including a 500 student elementary school. Based on information presented in the Institute of Traffic Engineers' *Trip Generation, Seventh Edition*, 2003, average trip generation rates for both peak hours were applied for all of the expected land uses based on type and intensity. These trips were then assigned through the study intersections based on distribution percentages which took into consideration the proximity of these land uses to the I-94 interchange at TH 101. The trip generation tables are shown on Tables 2-4.

Table 2. Expected Rogers 2015 Residential Development Trip Generation

DEVELOPMENT AREAS		OTHER RESIDENTIAL TRIP GENERATION													
Z HERATIGE II-V		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	552	17%	83%	0.44	41	202	243	67%	33%	0.52	192	95	287	5.86	3,235
Single Family	404	25%	75%	0.75	76	227	303	63%	37%	1.01	257	151	408	9.57	3,866
TOTAL					115	430	545				450	245	695		7,101
Y MANLEY		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	152	25%	75%	0.75	29	86	115	63%	37%	1.01	97	57	154	9.57	1,455
TOTAL					30	85	115				95	55	150		1,455
X FLETCHER HILLS II		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	25	25%	75%	0.75	5	14	19	63%	37%	1.01	16	9	25	9.57	239
TOTAL					5	15	20				15	10	25		239
W DOWNTOWN		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	55	17%	83%	0.44	4	20	24	67%	33%	0.52	19	9	28	5.86	322
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
TOTAL					5	20	25				20	10	30		322
V GOULD		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	58	25%	75%	0.75	11	33	44	63%	37%	1.01	37	22	59	9.57	555
TOTAL					10	35	45				35	20	55		555
U BUSCH		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	40	17%	83%	0.44	3	15	18	67%	33%	0.52	14	7	21	5.86	234
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
TOTAL					5	15	20				15	5	20		234
T GREENINGER		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	11	25%	75%	0.75	2	6	8	63%	37%	1.01	7	4	11	9.57	105
TOTAL					-	5	5				5	5	10		105
S ERICKSON/KING		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	80	17%	83%	0.44	6	29	35	67%	33%	0.52	28	14	42	5.86	469
Single Family	77	25%	75%	0.75	14	43	57	63%	37%	1.01	49	29	78	9.57	737
TOTAL					20	75	95				75	45	120		1,206
R WEBER/KINGHORN		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	133	25%	75%	0.75	25	75	100	63%	37%	1.01	85	50	135	9.57	1,273
TOTAL					25	75	100				85	50	135		1,273
Q WEBER		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	15	17%	83%	0.44	1	5	6	67%	33%	0.52	5	3	8	5.86	88
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
TOTAL					-	5	5				5	5	10		88
P GMACH		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	86	25%	75%	0.75	16	48	64	63%	37%	1.01	55	32	87	9.57	823
TOTAL					15	50	65				55	30	85		823
O SUNDERLAND		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	40	25%	75%	0.75	8	23	31	63%	37%	1.01	25	15	40	9.57	383
TOTAL					10	25	35				25	15	40		383
N WELLSTEAD IV		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
	DU/1kSF	In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
Condo/Townhome	40	17%	83%	0.44	3	15	18	67%	33%	0.52	14	7	21	5.86	234
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
TOTAL					5	15	20				15	5	20		234
DEVELOPMENT TOTAL					245	850	1,095				895	500	1,395		14,019

Note:

¹ Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

² The development data is based on information provided by the City of Rogers, through SRF Consulting on November 15, 2006.

Table 3. Expected Rogers 2030 Residential Development Trip Generation

DEVELOPMENT AREAS		OTHER RESIDENTIAL TRIP GENERATION													
J	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
PULTE															
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	70	25%	75%	0.75	13	39	52	63%	37%	1.01	45	26	71	9.57	670
TOTAL					15	40	55				45	25	70		670
K	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
POHLIG															
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	37	25%	75%	0.75	7	21	28	63%	37%	1.01	24	14	38	9.57	354
TOTAL					5	20	25				25	15	40		354
L	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
VEIT															
Condo/Townhome	30	17%	83%	0.44	2	11	13	67%	33%	0.52	10	5	15	5.86	176
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
TOTAL					-	10	10				10	5	15		176
M	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
GRASS LAKE															
Condo/Townhome	50	17%	83%	0.44	4	18	22	67%	33%	0.52	17	9	26	5.86	293
Single Family	105	25%	75%	0.75	20	59	79	63%	37%	1.01	67	39	106	9.57	1,005
TOTAL					25	75	100				85	50	135		1,298
DEVELOPMENT TOTAL					45	145	190				165	95	260		2,498

Note:

¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by the City of Rogers, through SRF Consulting on November 15, 2006.

Table 4. Expected Rogers Commercial Development Trip Generation

DEVELOPMENT AREAS		STONE'S THROW TRIP GENERATION													
Brockton Ln - S. Diamond Lake Rd	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Trip Rate	In	Out	Trips Total	In	Out	Trip Rate	In	Out	Trips Total	Rate	Trips
Office (Ind/Comm Area)	475	88%	12%	1.55	648	88	736	17%	83%	1.49	120	587	707	11.01	5,230
WH (Ind/Comm Area)	715	82%	18%	0.45	264	58	322	25%	75%	0.47	84	252	336	4.96	3,546
High School	500	69%	31%	0.41	141	64	205	47%	53%	0.14	33	37	70	1.71	855
WH (Moen & Leuer)	850	82%	18%	0.45	314	69	383	25%	75%	0.47	100	300	400	4.96	4,216
WH (Opus)	260	82%	18%	0.45	96	21	117	25%	75%	0.47	31	92	123	4.96	1,290
WH (Rogers Dist Ctr II)	260	82%	18%	0.45	96	21	117	25%	75%	0.47	31	92	123	4.96	1,290
WH (Rogers Ind Park)	130	82%	18%	0.45	48	11	59	25%	75%	0.47	15	46	61	4.96	645
Office (WJD II)	130	88%	12%	1.55	177	24	201	17%	83%	1.49	33	161	194	11.01	1,431
TOTAL					1,785	355	2,140				445	1,565	2,010		18,500
TH 101 - S. Diamond Lake Rd	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		In	Out	Trip Rate	In	Out	Trips Total	In	Out	Trip Rate	In	Out	Trips Total	Rate	Trips
Cub Foods	69	61%	39%	3.25	137	87	224	51%	49%	10.45	368	353	721	102.24	7,055
Lowe's	183	54%	46%	1.20	119	101	220	47%	53%	2.45	211	238	449	29.80	5,453
Strip Mall	25	61%	39%	1.82	28	18	46	44%	56%	2.71	30	38	68	44.32	1,108
Strip Mall	10	61%	39%	1.82	11	7	18	44%	56%	2.71	12	15	27	44.32	443
Strip Mall	10	61%	39%	1.82	11	7	18	44%	56%	2.71	12	15	27	44.32	443
Movie Theatre (screens)	12	0%	0%	0.00	0	0	0	45%	55%	13.64	74	90	164		-
Retail Store	26	61%	39%	1.03	16	10	26	48%	52%	3.75	47	51	98	42.94	1,116
Hampton Inn (rooms)	50	61%	39%	0.56	17	11	28	53%	47%	0.59	16	14	30	8.17	409
TOTAL					45	30	75				150	170	320		1,968
* .80 to account for 20% combined uses					35	25	60				120	135	255		1,575
TOTAL					1,820	380	2,200				565	1,700	2,265		20,075

Note:

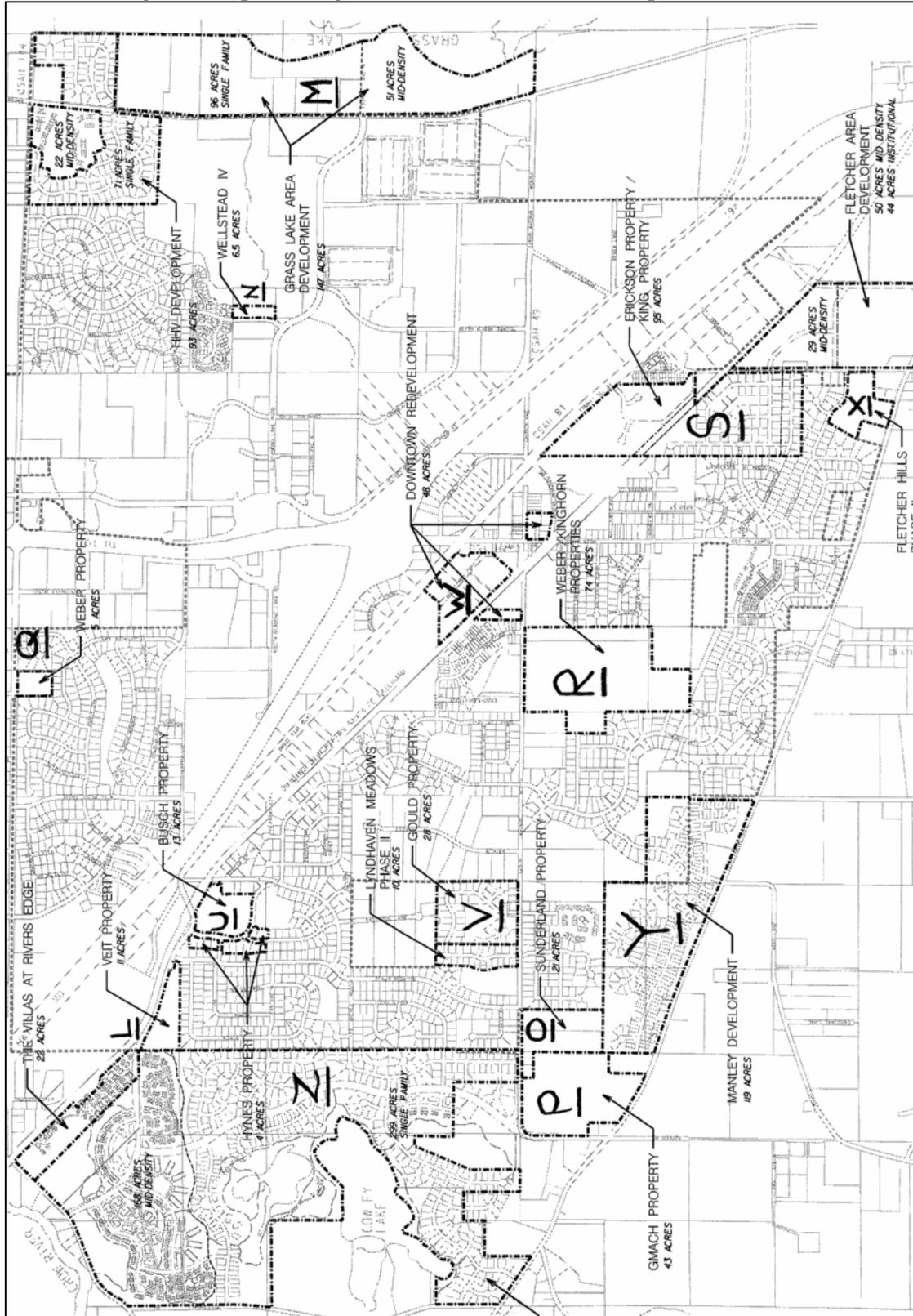
¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by the City of Rogers, through SRF Consulting on November 15, 2006.

KSF- Thousand Square Feet of Gross Floor Area

The different development areas identified in the Rogers Residential Development tables correspond with locations identified in Figure 5.

Figure 5. Expected Rogers 2015-2030 Residential Development Locations



In addition to the trips generated by the expected Rogers land uses, a growth factor was added to the 2006 existing volumes to account for increased traffic to/from locations north and west of

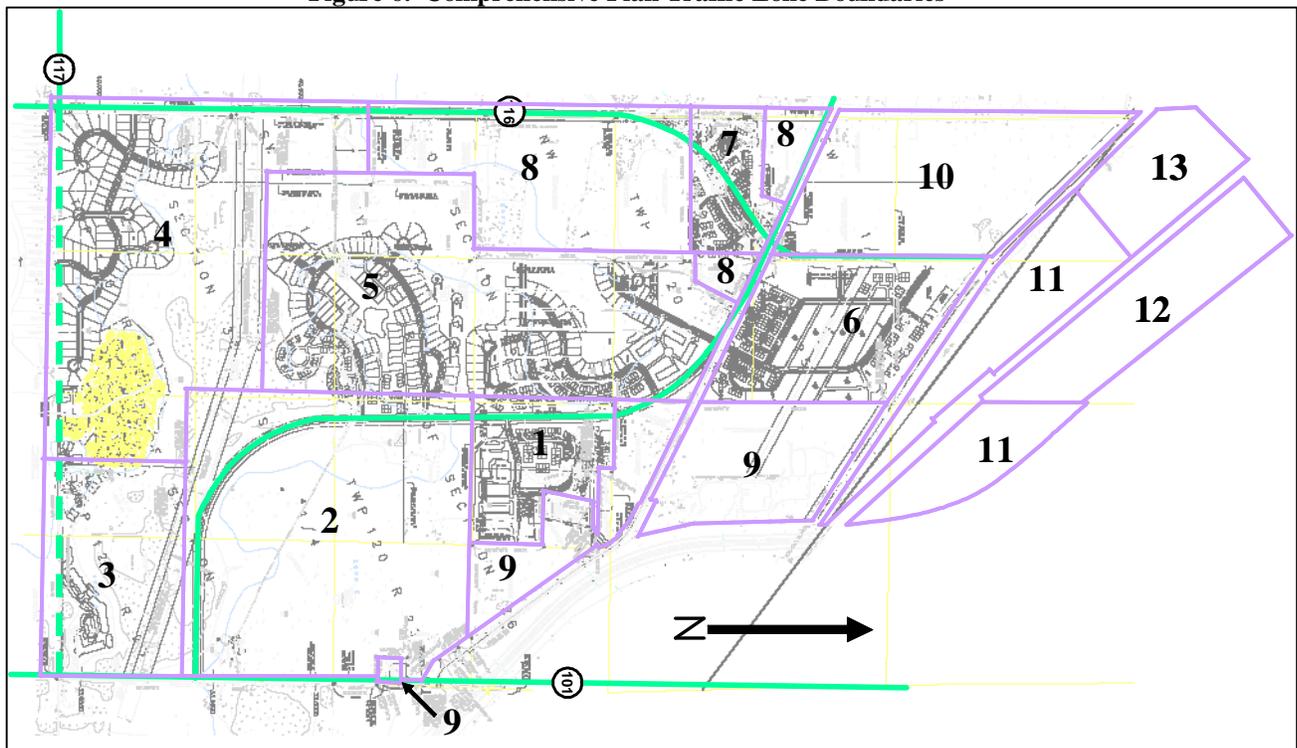
Rogers. This 1% per year growth rate was applied to the 2006 existing volumes, and then the expected Rogers trips were added. These are the volumes to which the 2015 Comprehensive Plan and Stones Throw scenario trips were added.

For the 2030 Comprehensive Plan and Stones Throw scenarios, additional background growth was added to the 2015 baseline volumes. Because development is expected to move farther and farther out from the core of the metropolitan area, the per year growth rate was increased to 2% for the years 2015-2030. This growth factor was applied to the existing (with 1% factor 2006-2015) trips and not the Rogers trips. The Rogers trips, including planned residential units to be developed between 2015 and 2030 as shown in Table 2, were then added on top of the growth to get to the 2030 Baseline volumes. These are the volumes to which the 2030 Comprehensive Plan and Stones Throw scenario trips were added.

2015 COMPREHENSIVE PLAN (Scenario 1) AND STONES THROW LAND USE SCENARIOS

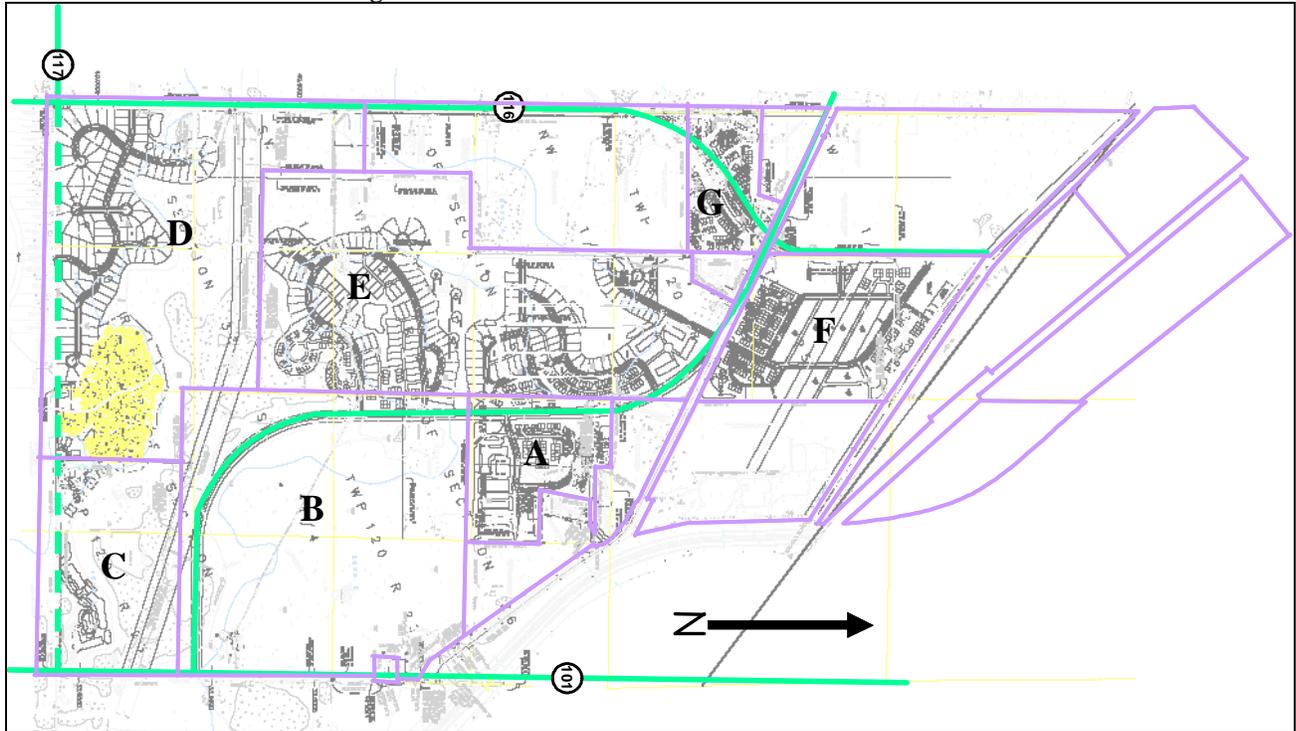
The AUAR area was divided up into 13 zones in order to separate land uses and to enable more detailed distribution and assignment of the trips generated by the land uses for each scenario. These zones are shown in Figure 6. The Stones Throw zones are Zones A-G, as shown in Figure 7. Zones 1-7 for the Comprehensive Plan scenario are interchangeable with zones A-G for the Stones Throw scenario. Zones 8-13 remain constant during each time period, as they are outside of the Stones Throw development area, but inside the AUAR boundary.

Figure 6. Comprehensive Plan Traffic Zone Boundaries



Note: Concept development plan shown above is for Scenario 2, and has not been approved.

Figure 7. Stones Throw Traffic Zone Boundaries



Note: Concept development plan shown above is for Scenario 2, and has not been approved.

Trip Generation

For the 2015 analysis, land uses for both Stones Throw Scenarios 2 and 3 are the same. It is during the 2015-2030 timeframe that these scenarios differ. Because of this, there is only one Stones Throw scenario for 2015. It is referred to as Scenario 3 for the ease of continuity with the 2030 comparison of Scenarios 1 and 3.

Based on information provided by the Town of Hassan and the developer, trips were generated for both scenarios during both peak hour periods for the build year of 2015. Based on information presented in the Institute of Traffic Engineers' *Trip Generation, Seventh Edition*, 2003, average trip generation rates for both peak hours were applied for all land use zones based on land use type and intensity. The trip generation for the 2015 Comprehensive Plan scenario is shown in Table 5. Trip generation for zones A-G of the 2015 Stones Throw scenario (8-13 maintain Comprehensive Plan land uses) is shown in Table 6.

Table 5. 2015 Comprehensive Plan (Scenario 1) Land Use and Trip Generation

ZONE 1		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	1	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	6
Single Family	3	25%	75%	0.75	1	2	3	63%	37%	1.01	2	1	3	9.57	29
Local Retail	3	61%	39%	1.03	2	1	3	48%	52%	3.75	5	6	11	42.94	129
Office/Comm/Ind	21	84%	16%	1.43	25	5	30	23%	77%	1.29	6	21	27	12.76	268
TOTAL	4 du, 24 ksf				30	10	40				15	30	45		431

ZONE 2		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	17	61%	39%	1.03	11	7	18	48%	52%	3.75	31	33	64	42.94	730
Office/Comm/Ind	107	84%	16%	1.43	129	24	153	23%	77%	1.29	32	106	138	12.76	1,365
TOTAL	124 ksf				140	30	170				60	140	200		2,095

ZONE 3		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	1	25%	75%	0.75	0	1	1	63%	37%	1.01	1	0	1	9.57	10
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	1 du				-	-	-				-	-	-		10

ZONE 4		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	4	17%	83%	0.44	0	1	1	67%	33%	0.52	1	1	2	5.86	23
Single Family	17	25%	75%	0.75	3	10	13	63%	37%	1.01	11	6	17	9.57	163
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	21 du				5	10	15				10	5	15		186

ZONE 5		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	1	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	6
Single Family	5	25%	75%	0.75	1	3	4	63%	37%	1.01	3	2	5	9.57	48
Local Retail	8	61%	39%	1.03	5	3	8	48%	52%	3.75	14	16	30	42.94	344
Office/Comm/Ind	49	84%	16%	1.43	59	11	70	23%	77%	1.29	15	49	64	12.76	625
Elementary School	0	54%	46%	4.69	0	0	0	43%	57%	1.04	0	0	0	7.34	-
TOTAL	6 du, 57 ksf				65	20	85				30	65	95		1,022

ZONE 6		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	89	61%	39%	1.03	56	36	92	48%	52%	3.75	160	174	334	42.94	3,822
Office/Comm/Ind	550	84%	16%	1.43	661	126	787	23%	77%	1.29	163	546	709	12.76	7,018
TOTAL	639 ksf				715	160	875				325	720	1,045		10,840

ZONE 7		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	9	17%	83%	0.44	1	3	4	67%	33%	0.52	3	2	5	5.86	53
Single Family	37	25%	75%	0.75	7	21	28	63%	37%	1.01	24	14	38	9.57	354
Local Retail	2	61%	39%	1.03	1	1	2	48%	52%	3.75	4	4	8	42.94	86
Office/Comm/Ind	10	84%	16%	1.43	12	2	14	23%	77%	1.29	3	10	13	12.76	128
TOTAL	46 du, 12 ksf				20	25	45				35	30	65		620

ZONE 8		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	6	17%	83%	0.44	0	2	2	67%	33%	0.52	2	1	3	5.86	35
Single Family	22	25%	75%	0.75	4	12	16	63%	37%	1.01	14	8	22	9.57	211
Local Retail	13	61%	39%	1.03	8	5	13	48%	52%	3.75	23	25	48	42.94	558
Office/Comm/Ind	80	84%	16%	1.43	96	18	114	23%	77%	1.29	24	79	103	12.76	1,021
TOTAL	28 du, 93 ksf				110	40	150				65	115	180		1,825

ZONE 9		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	1	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	6
Single Family	4	25%	75%	0.75	1	2	3	63%	37%	1.01	3	1	4	9.57	38
Local Retail	8	61%	39%	1.03	5	3	8	48%	52%	3.75	14	16	30	42.94	344
Office/Comm/Ind	52	84%	16%	1.43	62	12	74	23%	77%	1.29	15	52	67	12.76	664
TOTAL	5 du, 60 ksf				70	20	90				35	70	105		1,051

ZONE 10	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	108	61%	39%	1.03	68	43	111	48%	52%	3.75	194	211	405	42.94	4,638
Office/Comm/Ind	669	84%	16%	1.43	804	153	957	23%	77%	1.29	198	665	863	12.76	8,536
TOTAL	777 ksf				870	195	1,065				395	875	1,270		13,174

ZONE 11	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	71	61%	39%	1.03	45	29	74	48%	52%	3.75	128	138	266	42.94	3,049
Office/Comm/Ind	442	84%	16%	1.43	531	101	632	23%	77%	1.29	131	439	570	12.76	5,640
TOTAL	523 ksf				575	130	705				260	575	835		8,689

ZONE 12	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	5	61%	39%	1.03	3	2	5	48%	52%	3.75	9	10	19	42.94	215
Office/Comm/Ind	33	84%	16%	1.43	40	8	48	23%	77%	1.29	10	33	43	12.76	421
TOTAL	38 ksf				45	10	55				20	45	65		636

ZONE 13	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	4	61%	39%	1.03	3	2	5	48%	52%	3.75	7	8	15	42.94	172
Office/Comm/Ind	23	84%	16%	1.43	28	5	33	23%	77%	1.29	7	23	30	12.76	293
TOTAL	27 ksf				30	5	35				15	30	45		465

DEVELOPMENT TOTAL	111 du, 2,374 ksf				2,675	655	3,330				1,265	2,700	3,965		41,044
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Note:

¹ Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

² The development data is based on information provided by Schoell Madson, Inc. on December 1, 2006.

KSF- Thousand Square Feet of Gross Floor Area

Table 6. 2015 Stones Throw (Scenarios 2 and 3) Land Use and Trip Generation

ZONE A	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	602	17%	83%	0.44	45	220	265	67%	33%	0.52	210	103	313	5.86	3,528
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	38	61%	39%	1.03	24	15	39	48%	52%	3.75	68	73	141	42.94	1,610
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	602 du, 38 ksf				70	235	305				275	175	450		5,138

ZONE B	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	75	84%	16%	1.43	89	17	106	23%	77%	1.29	22	74	96	12.76	951
TOTAL	75 ksf				90	15	105				20	75	95		951

ZONE C	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	198	17%	83%	0.44	15	72	87	67%	33%	0.52	69	34	103	5.86	1,160
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	198 du				15	70	85				70	35	105		1,160

ZONE D	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	177	25%	75%	0.75	33	100	133	63%	37%	1.01	113	66	179	9.57	1,694
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	177 du				35	100	135				115	65	180		1,694

ZONE E	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	206	25%	75%	0.75	39	116	155	63%	37%	1.01	131	77	208	9.57	1,971
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
Elementary School	0	54%	46%	4.69	0	0	0	43%	57%	1.04	0	0	0	7.34	-
TOTAL	206 du				40	115	155				130	75	205		1,971

ZONE F	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	385	17%	83%	0.44	29	141	170	67%	33%	0.52	134	66	200	5.86	2,256
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	24	61%	39%	1.03	15	10	25	48%	52%	3.75	43	47	90	42.94	1,031
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	385 du, 24 ksf				45	150	195				175	115	290		3,287

ZONE G	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	82	25%	75%	0.75	15	46	61	63%	37%	1.01	52	31	83	9.57	785
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	82 du				15	45	60				50	30	80		785

Total below includes Zones 8-13 from the Comprehensive Plan Land Use

DEVELOPMENT TOTAL	1,683 du, 1,645 ksf	2,010	1,130	3,140		1,625	2,280	3,905	40,825
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Note:

¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by Schoell Madson, Inc. on December 1, 2006.

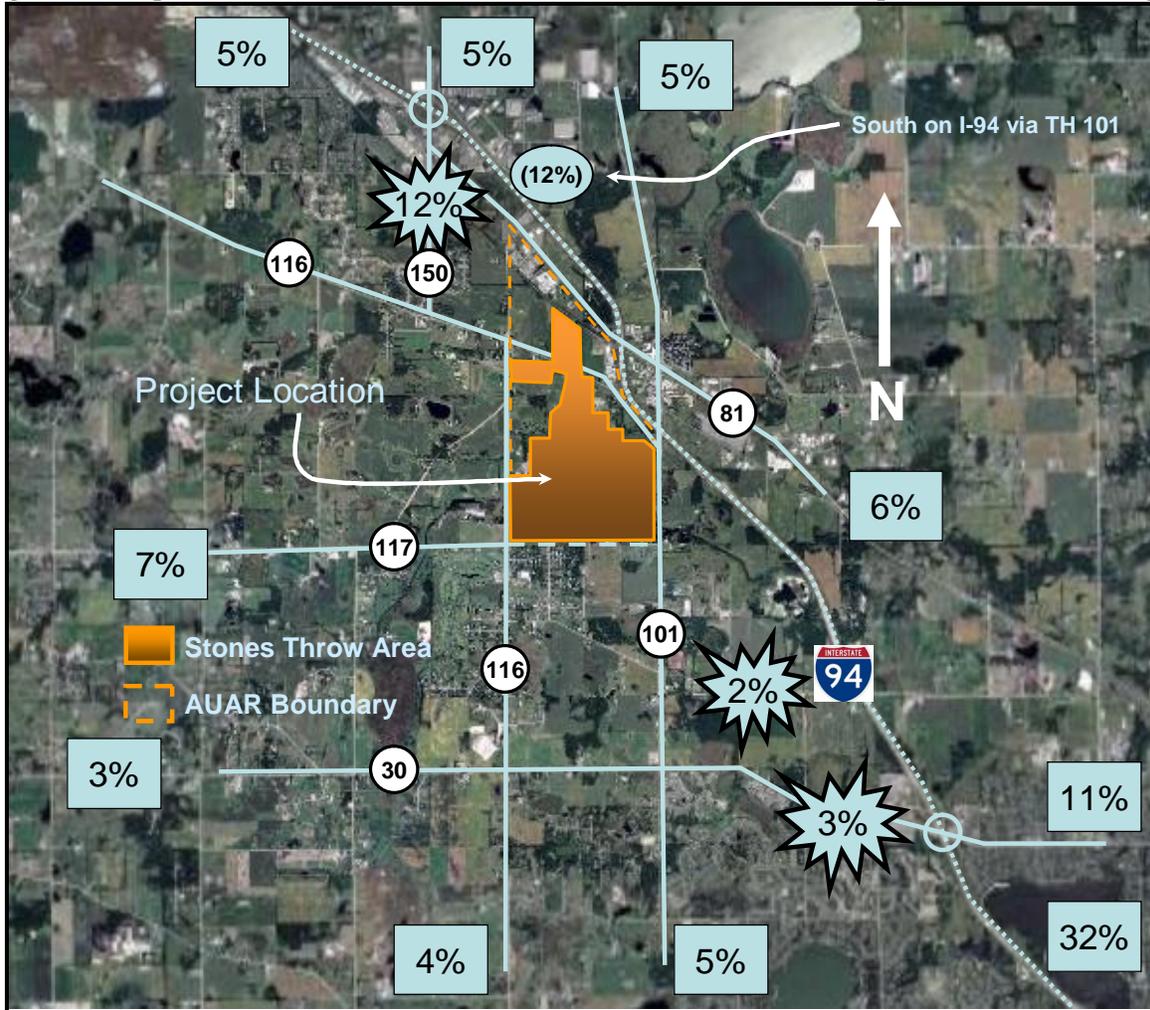
KSF- Thousand Square Feet of Gross Floor Area

Trip Distribution

Roadway distribution percentages were obtained by running the Metropolitan Council’s Regional Travel Demand Model, and reviewing the distribution of the traffic analysis zones (TAZ) in the vicinity of the AUAR study area. Using the results of the model, the existing traffic counts and with consideration of future commuting patterns, trip distribution percentages were developed. These distribution percentages are shown in Figure 8.

Based on the distribution percentages identified below, trips generated for each scenario and peak hour period were disseminated across the roadway network, and assigned to intersection movements on a zone by zone basis. The end origin/destination did not change, but the particular path changed for each zone based on its location in the AUAR area and its access to major roadways.

Figure 8. Comprehensive Plan (Scenario 1) and Stones Throw (Scenario 3) Trip Distribution Percentages



The distributed and assigned trips are then added to the 2015 baseline volumes to arrive at the 2015 Comprehensive Plan and 2015 Stones Throw turning movement volumes. These volumes are compared, along with the existing volumes, for both peak hour periods in Figure 9 (a.m. peak hour) and Figure 10 (p.m. peak hour).

Figure 9. 2015 A.M. Peak Hour Turning Movement Volumes (Scenarios 1 and 3)

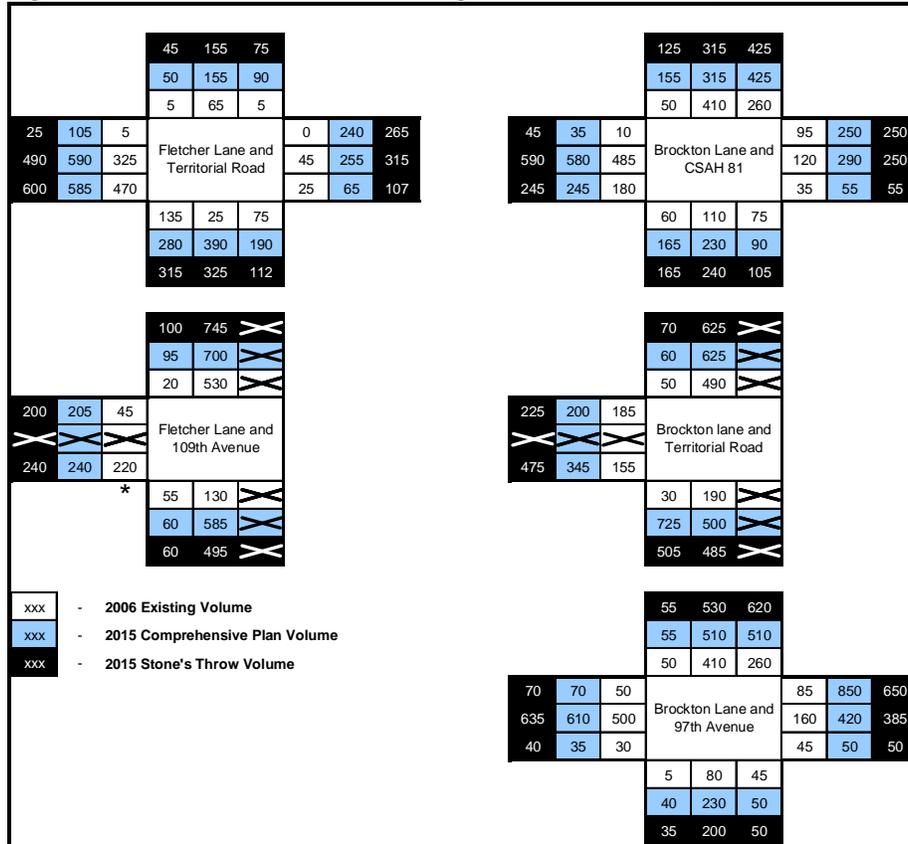
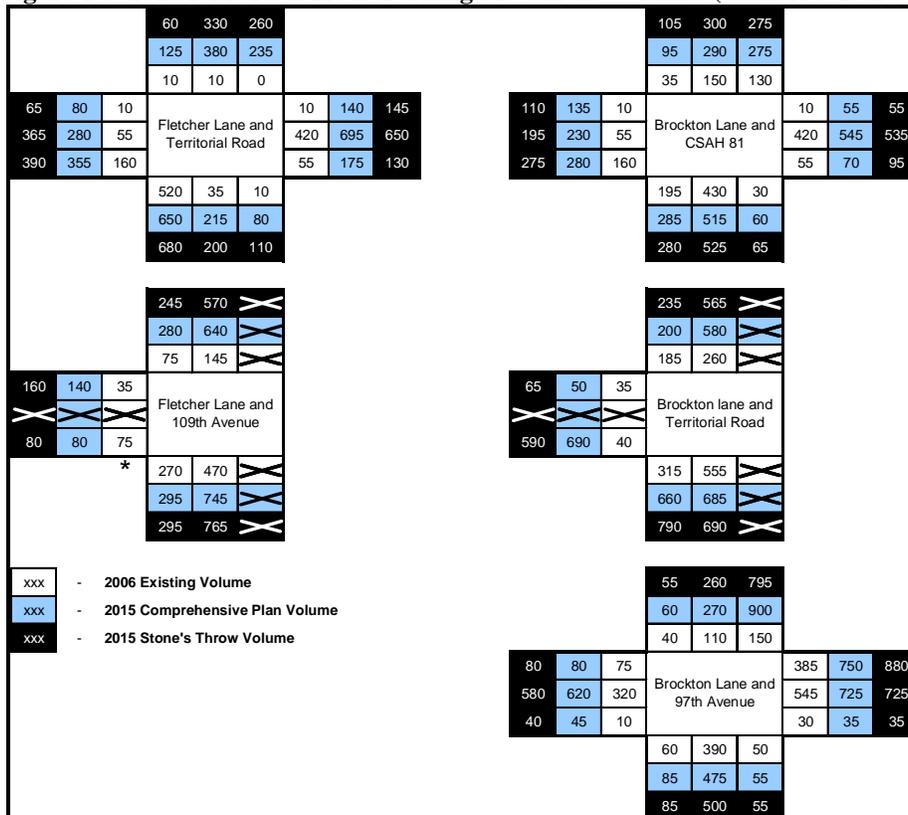


Figure 10. 2015 P.M. Peak Hour Turning Movement Volumes (Scenarios 1 and 3)



The new 2015 Comprehensive Plan and Stones Throw volumes were then analyzed in the same manner as the 2006 existing volumes, using the same geometry and traffic control previously described. It is quickly apparent that existing roadway capacity is not adequate for the forecasted 2015 volumes. Analysis results for both peak hour periods are shown in Tables 7 and 8.

Table 7. 2015 A.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

2015 AM PEAK HOUR		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	F		F				A	A			A	A	-
	Control Delay per Vehicle (sec)	>200						<10				-		
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	F	F	F	F	F	F	F	F	E	E	E	F
	Control Delay per Vehicle (sec)		>200			>200			>200		50			>200
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				E	E			A	A	-
	Control Delay per Vehicle (sec)	>200						40				-		
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	D	D	F	F	F	F	F	F	F	F	F	F
	Control Delay per Vehicle (sec)	>200	35		105	>200		175	145		>200	95		190
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at CSAH 81													
	Level of Service (LOS)	F	F	A	F	D	A	F	F	B	F	F	B	F
	Control Delay per Vehicle (sec)	80	145	<10	>200	55	<10		130	10		150	15	100
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	F		F				A	A			A	A	-
	Control Delay per Vehicle (sec)	>200						<10						
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	F	F	F	F	F	F	F	F	E	E	E	F
	Control Delay per Vehicle (sec)		>200			>200			>200		40			>200
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				C	C			A	A	-
	Control Delay per Vehicle (sec)	>200						15				-		
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	D	F	F	F	F	F	F	F	F	E	E	F
	Control Delay per Vehicle (sec)	>200	50		105	>200		155	140		>200	65		150
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at CSAH 81													
	Level of Service (LOS)	E	F	A	F	D	A	F	F	B	F	F	B	F
	Control Delay per Vehicle (sec)	75	150	<10	>200	50	<10		135	10		160	15	105

Table 8. 2015 A.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

2015 PM PEAK HOUR		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	F		F				B	B			A	A	-
	Control Delay per Vehicle (sec)	>200						15				-		
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	F	F	F	F	F	F	F	F	F	F	F	F
	Control Delay per Vehicle (sec)		>200			>200			>200		>200			>200
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				E	E			A	A	-
	Control Delay per Vehicle (sec)	>200						50				-		
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	E	E	F	F	F	E	F	F	F	D	D	F
	Control Delay per Vehicle (sec)	>200	55		155	>200		75	>200		>200	45		>200
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at CSAH 81													
	Level of Service (LOS)	F	E	A	F	F	B	F	F	B	F	F	B	F
	Control Delay per Vehicle (sec)	>200	60	<10	80	>200	10		>200	15		>200	20	165
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	F		F				B	B			A	A	-
	Control Delay per Vehicle (sec)	>200						10				-		
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	F	F	F	F	F	F	F	F	F	F	F	F
	Control Delay per Vehicle (sec)		>200			>200			>200		>200			>200
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at Territorial Road													
	Level of Service (LOS)	F		F				F	F			A	A	-
	Control Delay per Vehicle (sec)	>200						>200				-		
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	D	D	F	F	F	E	F	F	F	D	D	F
	Control Delay per Vehicle (sec)	>200	45	45	115	>200		75	>200		>200	50	50	>200
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at CSAH 81													
	Level of Service (LOS)	F	E	A	E	F	B	F	F	B	F	F	B	F
	Control Delay per Vehicle (sec)	>200	60	<10	75	>100	10		195	15		>200	20	160

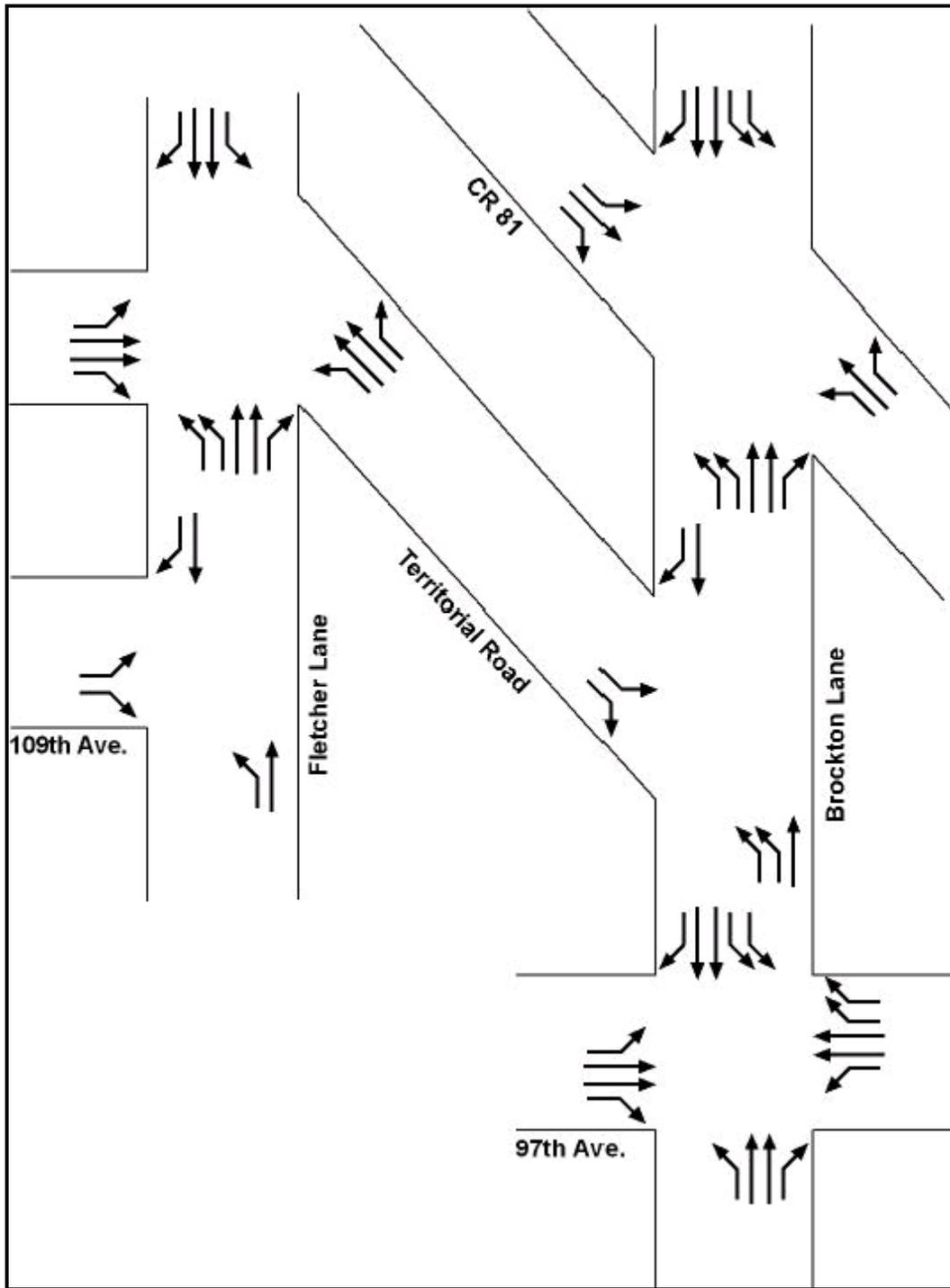
CONGESTION MITIGATION AND ROADWAY IMPROVEMENTS FOR 2015 SCENARIOS 1 AND 3

For the year 2015 forecasts, the study intersections experience similar levels of traffic for both the Comprehensive Plan and Stones Throw scenarios. Specific movements vary, but the overall intersection volumes are similar.

Because existing geometry and traffic control does not provide sufficient capacity for the volumes forecasted for 2015, minimum roadway improvements (identified as keeping the level of service of the intersection and most individual movements at LOS D or better) were determined for the five study intersections. The minimum improvements are shown in Figure 11 and detailed as follows:

- Fletcher Lane and 109th Avenue North – Upgrade to semi-actuated traffic signal control, with a protected left turn phase for the northbound movement. The eastbound approach will have exclusive left turn and right turn lanes, the northbound approach is served by one through and one left turn lane, and the southbound movement has one through and one right turn lane.
- Fletcher Lane and Territorial Road – This intersection requires the installation of an actuated traffic signal with protected left turns for each approach. All approaches will be served by one left turn, two through and one right turn lane with the exception of northbound which requires two left turn lanes.
- Brockton Lane and Territorial Road – Upgrade to semi-actuated traffic signal control, with a protected left turn phase for the northbound movement. The eastbound approach will have exclusive left turn and right turn lanes, the northbound approach is served by one through and two left turn lanes, and the southbound movement has one through and one right turn lane.
- Brockton Lane and 97th Avenue North – Presently under traffic signal control, this intersection requires expansion only. All approaches will be served by one left turn, two through and one right turn lane with the exception of southbound which requires two left turn lanes, and westbound which requires two right turn lanes.
- Brockton Lane and CSAH 81 – This traffic signal at this intersection will need to be upgraded to provide a protected left turn arrow for all movements. Geometry for CSAH 81 can remain unchanged, but Brockton Lane will need to provide two left turn lanes, two through lanes and one right turn lane in both directions.

Figure 11. 2015 Recommended Intersection Geometry (Scenarios 1 and 3)



New capacity analyses were performed in order to identify the level of service and delay for the intersections with the improved geometry and traffic control shown above. The results of these capacity analyses are shown in Tables 9 (a.m. peak hour) and 10 (p.m. peak hour).

All movements operate at LOS D or better in the a.m. peak hour with the exception of westbound left turns at the Fletcher Lane/Territorial Road intersection for the Stones Throw scenario. This movement operates at LOS E.

During the p.m. peak hour period, eastbound left turn movements at the Brockton Lane/97th Avenue and Brockton Lane/CSAH 81 intersections operate at LOS E for both scenarios. All other movements operate at LOS D or better.

Table 9. Mitigated 2015 A.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

Intersection		Movement													
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT	
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N	C		A				D	A				B	A	B
	Level of Service (LOS)	27		<10				47	<10				18	<10	15
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at Territorial Road	C	B	A	D	C	A	C	C	A	C	C	A	A	B
	Level of Service (LOS)	34	20	<10	44	20	<10	33	24	<10	34	23	<10	<10	19
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at Territorial Road	D		A				D	A				C	A	C
	Level of Service (LOS)	44		<10				52	<10				34	<10	30
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at 97th Ave. N	D	C	A	D	C	A	D	C	B	D	C	A	A	C
	Level of Service (LOS)	51	25	<10	47	24	<10	49	33	11	38	21	<10	<10	22
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at CSAH 81	D	C	A	D	B	A	D	D	B	D	C	A	A	C
	Level of Service (LOS)	44	35	<10	49	18	<10	37	36	10	37	31	<10	<10	26
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N	C		A				D	A				B	A	B
	Level of Service (LOS)	27		<10				47	<10				20	<10	15
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at Territorial Road	C	B	A	E	B	A	C	C	A	C	C	A	A	B
	Level of Service (LOS)	30	19	<10	61	15	<10	33	21	<10	32	23	<10	<10	18
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at Territorial Road	D		B				D	A				C	A	C
	Level of Service (LOS)	46		12				40	<10				30	<10	25
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at 97th Ave. N	D	C	A	D	C	A	D	C	B	D	C	A	A	C
	Level of Service (LOS)	50	30	<10	45	26	<10	48	34	11	41	24	<10	<10	26
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at CSAH 81	D	D	A	D	B	A	D	D	B	D	C	A	A	C
	Level of Service (LOS)	47	36	<10	49	18	<10	37	36	10	38	31	<10	<10	27

Table 10. Mitigated 2015 P.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

Intersection		Movement													
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT	
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N	C		A				D	A				C	A	C
	Level of Service (LOS)	34		<10				41	<10				32	<10	21
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at Territorial Road	D	C	A	D	C	A	D	C	A	D	C	A	A	C
	Level of Service (LOS)	50	28	<10	52	30	<10	39	23	<10	45	30	<10	<10	29
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at Territorial Road	C		D				D	B				D	A	C
	Level of Service (LOS)	28		43				44	10				40	<10	32
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at 97th Ave. N	E	C	A	D	D	A	D	D	B	D	B	A	A	C
	Level of Service (LOS)	77	35	<10	48	41	<10	46	44	10	50	20	<10	<10	34
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at CSAH 81	E	C	A	D	D	A	D	D	A	D	C	A	A	C
	Level of Service (LOS)	66	21	<10	47	45	<10	39	44	10	39	33	<10	<10	35
2015 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N	D		A				D	A				C	A	B
	Level of Service (LOS)	36		<10				42	<10				27	<10	20
2015 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at Territorial Road	D	C	A	D	C	A	D	C	A	D	C	A	A	C
	Level of Service (LOS)	42	27	<10	41	31	<10	36	23	<10	45	29	<10	<10	28
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at Territorial Road	C		C				D	A				C	A	C
	Level of Service (LOS)	30		25				47	<10				34	<10	27
2015 - SCENARIO 1 - Comprehensive Plan	Brockton Lane at 97th Ave. N	E	C	A	D	D	A	D	D	B	D	B	A	A	C
	Level of Service (LOS)	77	34	<10	48	41	<10	46	46	10	38	20	<10	<10	30
2015 - SCENARIO 3 - STONES THROW	Brockton Lane at CSAH 81	E	C	A	D	D	A	D	D	A	D	C	A	A	C
	Level of Service (LOS)	56	21	<10	52	44	<10	38	44	10	38	33	<10	<10	34

2030 COMPREHENSIVE PLAN (Scenario 1) AND STONES THROW (Scenario 3) LAND USE SCENARIOS

In order to forecast the year 2030 volumes for both the Comprehensive Plan and Stones Throw (WITHOUT AN ADDITIONAL INTERSTATE ACCESS) scenarios, the two percent per year background growth rate was factored on to the 2015 background traffic. Then all of the Rogers residential and commercial trips, shown in Tables 2, 3 and 4, were added to arrive at the full 2030 baseline volumes. Trips were then generated for the new land uses and intensities for both scenarios based on the 2030 information provided by the Town of Hassan and the developer in a similar fashion as for 2015. Trip generation for the 2030 Comprehensive Plan scenario is shown in Table 11. Trip generation for zones A-G of the 2030 Stones Throw No Access scenario (zones 8-13 maintain Comprehensive Plan land uses) is shown in Table 12.

Table 11. 2030 Comprehensive Plan (Scenario 1) Land Use and Trip Generation

ZONE 1	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	7	17%	83%	0.44	1	3	4	67%	33%	0.52	2	1	3	5.86	41
Single Family	29	25%	75%	0.75	5	16	21	63%	37%	1.01	18	11	29	9.57	278
Local Retail	33	61%	39%	1.03	21	13	34	48%	52%	3.75	59	64	123	42.94	1,417
Office/Comm/Ind	206	84%	16%	1.43	247	47	294	23%	77%	1.29	61	205	266	12.76	2,629
TOTAL	36 du, 239 ksf				275	80	355				140	280	420		4,364
ZONE 2	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	173	61%	39%	1.03	109	69	178	48%	52%	3.75	311	337	648	42.94	7,429
Office/Comm/Ind	1,072	84%	16%	1.43	1,288	245	1,533	23%	77%	1.29	318	1,065	1,383	12.76	13,679
TOTAL	1,245 ksf				1,395	315	1,710				630	1,400	2,030		21,107
ZONE 3	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	2	17%	83%	0.44	0	1	1	67%	33%	0.52	1	0	1	5.86	12
Single Family	10	25%	75%	0.75	2	6	8	63%	37%	1.01	6	4	10	9.57	96
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	12 du				-	5	5				5	5	10		107
ZONE 4	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	42	17%	83%	0.44	3	15	18	67%	33%	0.52	15	7	22	5.86	246
Single Family	169	25%	75%	0.75	32	95	127	63%	37%	1.01	108	63	171	9.57	1,617
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	211 du				35	110	145				120	70	190		1,863
ZONE 5	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	13	17%	83%	0.44	1	5	6	67%	33%	0.52	5	2	7	5.86	76
Single Family	51	25%	75%	0.75	10	29	39	63%	37%	1.01	32	19	51	9.57	488
Local Retail	79	61%	39%	1.03	50	32	82	48%	52%	3.75	142	154	296	42.94	3,392
Office/Comm/Ind	490	84%	16%	1.43	589	112	701	23%	77%	1.29	145	487	632	12.76	6,252
Elementary School	65	54%	46%	4.69	165	140	305	43%	57%	1.04	29	39	68	7.34	477
TOTAL	64 du, 569 ksf, 1 school				815	320	1,135				355	700	1,055		10,686
ZONE 6	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
				Trip	Trips					Trip	Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	89	61%	39%	1.03	56	36	92	48%	52%	3.75	160	174	334	42.94	3,822
Office/Comm/Ind	553	84%	16%	1.43	664	127	791	23%	77%	1.29	164	549	713	12.76	7,056
TOTAL	642 ksf				720	160	880				325	725	1,050		10,878

ZONE 7	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	9	17%	83%	0.44	1	3	4	67%	33%	0.52	3	2	5	5.86	53
Single Family	37	25%	75%	0.75	7	21	28	63%	37%	1.01	24	14	38	9.57	354
Local Retail	2	61%	39%	1.03	1	1	2	48%	52%	3.75	4	4	8	42.94	86
Office/Comm/Ind	9	84%	16%	1.43	11	2	13	23%	77%	1.29	3	9	12	12.76	115
TOTAL	46 du, 11 ksf				20	25	45				35	30	65		608

ZONE 8	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	31	17%	83%	0.44	2	11	13	67%	33%	0.52	11	5	16	5.86	182
Single Family	123	25%	75%	0.75	23	69	92	63%	37%	1.01	78	46	124	9.57	1,177
Local Retail	13	61%	39%	1.03	8	5	13	48%	52%	3.75	23	25	48	42.94	558
Office/Comm/Ind	80	84%	16%	1.43	96	18	114	23%	77%	1.29	24	79	103	12.76	1,021
TOTAL	154 du, 93 ksf				130	105	235				135	155	290		2,938

ZONE 9	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	10	17%	83%	0.44	1	4	5	67%	33%	0.52	3	2	5	5.86	59
Single Family	40	25%	75%	0.75	8	23	31	63%	37%	1.01	25	15	40	9.57	383
Local Retail	84	61%	39%	1.03	53	34	87	48%	52%	3.75	151	164	315	42.94	3,607
Office/Comm/Ind	522	84%	16%	1.43	627	119	746	23%	77%	1.29	155	519	674	12.76	6,661
TOTAL	50 du, 606 ksf				690	180	870				335	700	1,035		10,709

ZONE 10	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	108	61%	39%	1.03	68	43	111	48%	52%	3.75	194	211	405	42.94	4,638
Office/Comm/Ind	670	84%	16%	1.43	805	153	958	23%	77%	1.29	199	666	865	12.76	8,549
TOTAL	778 ksf				875	195	1,070				395	875	1,270		13,187

ZONE 11	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	79	61%	39%	1.03	50	32	82	48%	52%	3.75	142	154	296	42.94	3,392
Office/Comm/Ind	487	84%	16%	1.43	585	111	696	23%	77%	1.29	144	484	628	12.76	6,214
TOTAL	566 ksf				635	145	780				285	640	925		9,606

ZONE 12	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	54	61%	39%	1.03	34	22	56	48%	52%	3.75	97	105	202	42.94	2,319
Office/Comm/Ind	332	84%	16%	1.43	399	76	475	23%	77%	1.29	99	330	429	12.76	4,236
TOTAL	386 ksf				435	100	535				195	435	630		6,555

ZONE 13	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	38	61%	39%	1.03	24	15	39	48%	52%	3.75	68	74	142	42.94	1,632
Office/Comm/Ind	235	84%	16%	1.43	282	54	336	23%	77%	1.29	70	233	303	12.76	2,999
TOTAL	273 ksf				305	70	375				140	310	450		4,630

DEVELOPMENT TOTAL		AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips				
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total	Rate	Trips
573 du, 5,408 ksf		6,330	1,810	8,140				3,095	6,325	9,420					97,239

Note:

¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by Schoell Madson, Inc. on December 1, 2006.

KSF- Thousand Square Feet of Gross Floor Area

Table 12. 2030 Stones Throw (Scenario 3) Land Use and Trip Generation

ZONE A	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip			Trips			Trip			Trips			Rate	Trips
		In	Out	Rate	In	Out	Total	In	Out	Rate	In	Out	Total		
Condo/Townhome	602	17%	83%	0.44	45	220	265	67%	33%	0.52	210	103	313	5.86	3,528
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	375	61%	39%	1.03	236	151	387	48%	52%	3.75	675	731	1,406	42.94	16,103
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	602 du, 375 ksf				280	370	650				885	835	1,720		19,630

ZONE B	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Rate				In	Out
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	745	84%	16%	1.43	895	170	1,065	23%	77%	1.29	221	740	961	12.76	9,506
TOTAL	745 ksf				895	170	1,065				220	740	960		9,506

ZONE C	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Total					
Condo/Townhome	198	17%	83%	0.44	15	72	87	67%	33%	0.52	69	34	103	5.86	1,160
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	198 du				15	70	85				70	35	105		1,160

ZONE D	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Total					
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	177	25%	75%	0.75	33	100	133	63%	37%	1.01	113	66	179	9.57	1,694
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	177 du				35	100	135				115	65	180		1,694

ZONE E	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Total					
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	206	25%	75%	0.75	39	116	155	63%	37%	1.01	131	77	208	9.57	1,971
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
Elementary School	65	54%	46%	4.69	165	140	305	43%	57%	1.04	29	39	68	7.34	477
TOTAL	206 du, 1 school				205	255	460				160	115	275		2,449

ZONE F	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Total					
Condo/Townhome	385	17%	83%	0.44	29	141	170	67%	33%	0.52	134	66	200	5.86	2,256
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	240	61%	39%	1.03	151	96	247	48%	52%	3.75	432	468	900	42.94	10,306
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	385 du, 240 ksf				180	235	415				565	535	1,100		12,562

ZONE G	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips		Total	Trip		Trips		Total	Rate	Trips		
		In	Out	Rate	In		Out	In	Out	Total					
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	82	25%	75%	0.75	15	46	61	63%	37%	1.01	52	31	83	9.57	785
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	82 du				15	45	60				50	30	80		785

Total below includes Zones 8-13 from the Comprehensive Plan Land Use

DEVELOPMENT TOTAL	1,854 du, 4,062 ksf	4,695	2,040	6,735	3,550	5,470	9,020	95,411
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Note:

¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by Schoell Madson, Inc. on December 1, 2006.

KSF- Thousand Square Feet of Gross Floor Area

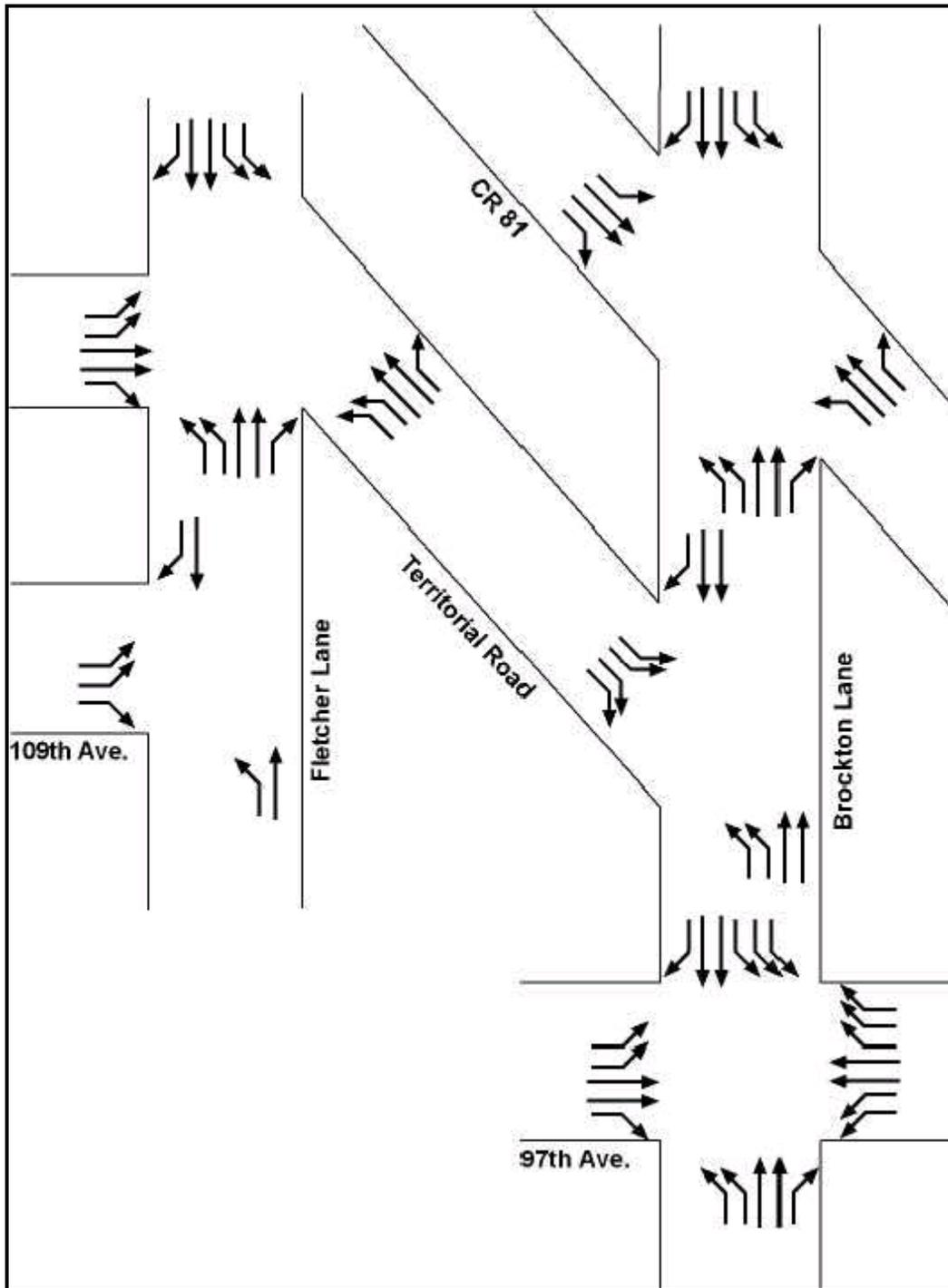
Trip Distribution

Based on the same distribution percentages used for the trips generated for 2015, identified in Figure 8, trips generated for each scenario and peak hour period were disseminated across the roadway network, and assigned to intersection movements on a zone by zone basis. The end origin/destination did not change, but the particular path changed for each zone based on its location in the AUAR area and its access to major roadways.

The distributed and assigned trips are then added to the 2030 baseline volumes to arrive at the 2030 Comprehensive Plan and 2030 Stones Throw turning movement volumes. These volumes are compared, along with the existing volumes, for both peak hour periods in Figure 12 (a.m. peak hour) and Figure 13 (p.m. peak hour).

- Brockton Lane and Territorial Road – Same traffic control as recommended in 2015. The eastbound approach requires two left turn lanes and two right turn lanes. Two left turn lanes and two through lanes are provided for the northbound approach, and two through lanes and one right turn lane are needed for the southbound approach.
- Brockton Lane and 97th Avenue North – The eastbound and northbound approaches provide two left turn lanes, two through lanes and one right turn lane. The southbound approach provides two through lanes, one right turn lane and three left turn lanes, and the westbound approach requires two left turn lanes, two through lanes and three right turn lanes. The issue with providing three turn lanes is that three receiving lanes will be required north and east of the intersection. If that were the case, a taper could be provided a certain distance down the road to return to two lanes.
- Brockton Lane and CSAH 81 – The only alteration to this intersection from 2015 is that an addition through lane is needed for eastbound and westbound CSAH 81. This likely would be needed in 2015 to accommodate the dual left turn lanes at the northbound and southbound approaches.

Figure 14. 2030 (No Additional Interstate Access) Recommended Intersection Geometry (Scenarios 1 and 3)



Capacity analyses were performed to identify the level of service and delay for the intersections with the improved geometry and traffic control shown above. The results of these capacity analyses are shown in Tables 13 (a.m. peak hour) and 14 (p.m. peak hour).

Table 13. Mitigated 2030 A.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

Intersection		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		A				D	B			D	A	C
	Control Delay per Vehicle (sec)	55		<10				45	10			44	<10	30
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	D	E	C	E	C	A	D	D	F	D	C	A	D
	Control Delay per Vehicle (sec)	46	74	28	65	21	<10	44	36	90	50	33	10	48
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	D		A				E	A			E	A	D
	Control Delay per Vehicle (sec)	47		<10				65	<10			66	<10	37
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	C	A	E	C	C	E	E	B	E	D	A	D
	Control Delay per Vehicle (sec)	96	26	<10	68	25	33	65	62	12	65	38	<10	41
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	D	B	E	C	A	D	D	A	D	D	A	C	
Control Delay per Vehicle (sec)	48	42	16	68	23	<10	41	36	<10	45	38	<10	33	
2030 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		A				D	A			D	A	C
	Control Delay per Vehicle (sec)	44		<10				45	<10			44	<10	28
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	D	C	C	E	B	A	D	D	C	D	C	A	C
	Control Delay per Vehicle (sec)	41	29	27	69	18	<10	41	35	23	41	34	10	29
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	D		A				C	A			D	A	C
	Control Delay per Vehicle (sec)	48		<10				34	<10			37	<10	22
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	E	C	A	E	C	A	E	D	B	F	D	A	D
	Control Delay per Vehicle (sec)	76	26	<10	68	25	<10	63	55	12	81	39	<10	37
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	D	A	D	C	A	D	D	A	D	D	A	C	
Control Delay per Vehicle (sec)	46	41	10	52	22	<10	39	36	<10	43	36	<10	30	

Table 14. Mitigated 2030 P.M. Peak Hour Level of Service and Delay (Scenarios 1 and 3)

Intersection		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 - SCENARIO 1 - Comprehensive Plan	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		A				D	A			E	A	D
	Control Delay per Vehicle (sec)	36		10				51	10			73	<10	35
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	E	D	A	E	D	A	D	D	A	D	E	B	D
	Control Delay per Vehicle (sec)	65	38	<10	58	40	<10	53	36	<10	54	64	16	41
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	D		F				E	A			F	B	E
	Control Delay per Vehicle (sec)	43		94				55	<10			118	12	69
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	D	A	E	F	B	E	F	B	E	B	A	E
	Control Delay per Vehicle (sec)	134	47	<10	66	102	11	64	95	12	72	16	<10	58
Brockton Lane at CSAH 81														
Level of Service (LOS)	E	C	A	D	C	A	D	D	A	D	C	A	C	
Control Delay per Vehicle (sec)	58	29	<10	43	35	<10	37	35	<10	37	35	<10	30	
2030 - SCENARIO 3 - STONES THROW	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		A				D	B			D	A	C
	Control Delay per Vehicle (sec)	41		10				50	11			53	<10	29
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	F	D	A	E	D	A	E	D	B	E	E	B	D
	Control Delay per Vehicle (sec)	81	47	<10	65	51	<10	57	39	17	61	70	14	47
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	D		E				F	A			E	B	E
	Control Delay per Vehicle (sec)	43		64				148	<10			77	11	71
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	D	A	E	F	E	E	F	B	D	B	A	E
	Control Delay per Vehicle (sec)	89	46	<10	66	106	62	65	124	12	45	16	<10	63
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	C	B	D	C	A	D	C	A	D	C	A	C	
Control Delay per Vehicle (sec)	52	30	13	48	35	<10	36	34	<10	37	35	<10	31	

All of the study intersections operate at level of service D or better during the a.m. peak hour. Several individual movements operate at LOS E, and some even at LOS F. In the p.m. peak hour the Brockton Lane/Territorial Road and Brockton Lane/97th Avenue intersections operate at LOS E, with many of the individual movements at those two intersections and the Fletcher Lane/Territorial Road intersection operating at LOS E or F. Interestingly, the intersections and movements where delay is at a less than desirable level are comparatively consistent between the two scenarios.

Because of the long-term forecasting required to get to 2030, the results of this analysis are not as reliable as for 2015. It is important to update the 2030 conditions incrementally as the baseline traffic (Rogers development and background growth) changes. The primary movement in question that was identified above is southbound Brockton Lane to eastbound 97th Avenue, and vice-versa. This is a very high volume movement as motorists from the Rogers and Hassan Township area get to/from the Interstate-94 interchange with CSAH 30 on their way to and from the nucleus of the Twin Cities Metropolitan Area. Because there is not another interstate access to the north until TH 101, six miles to the north, this intersection is bound to handle a very high volume of traffic.

Scenario 2, the Stones Throw development with an additional interstate access between CSAH 30 and TH 101 presents a comparative condition to Scenario 3 which was analyzed above.

2030 STONES THROW SCENARIO 2, WITH ADDITIONAL INTERSTATE ACCESS

Several variables for this scenario are significantly different from the previous scenario. These differences and the steps that were taken to address them are as follows:

- Shift of baseline traffic – With the construction of a new interstate access, many existing (and future growth) motorists will modify their travel pattern as more convenient and/or quicker routes present themselves. To address this, baseline traffic was shifted to represent this change.
- Different Stones Throw Land Use – To take advantage of a nearby Interstate access, land uses will change type, as it is more beneficial to have commercial, retail and industrial uses with easy access to the regional transportation system. Trip generation will be calculated for the different land uses the Stones Throw development would propose if an Interstate access was planned nearby the development site.
- New Directional Distribution – The directional distribution of the site generated trips differ from Scenarios 1 and 3 as the new interstate access provides a different means to access I-94, which is much closer to the development site. Details of this are provided below in the trip distribution section of Scenario 2 below.

In order to forecast the year 2030 volumes for the Stones Throw scenario with additional interstate access, the two percent per year background growth rate was factored on to the 2015 background traffic. Then all of the Rogers residential and commercial trips, shown in Tables 2, 3 and 4, were added to arrive at the full 2030 baseline volumes. The baseline volumes were adjusted to account for the new interstate access as described above. The Twin Cities Regional Travel Demand Model was used to evaluate conditions for the baseline volumes with and

without the new I-94 access. This comparison was used to adjust the baseline trips to represent the case with the new interstate access.

Trips were then generated for the new land uses and intensities for both scenarios based on the 2030 information provided by the Town of Hassan and the developer in a similar fashion as for 2015. This scenario with the additional interstate access has more commercial land uses, and less residential land use than the scenario without additional interstate access. The result is higher trip generating characteristics. Trip generation for zones A-G of the 2030 Stones Throw with additional interstate access scenario is shown in Table 15. Note that zones 8-13 maintain Comprehensive Plan land uses, and remain unchanged from data shown previously in Table 11.

Table 15. 2030 Stones Throw Scenario 2 (With Additional Interstate Access) Land Use and Trip Generation

ZONE A	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	189	17%	83%	0.44	14	69	83	67%	33%	0.52	66	32	98	5.86	1,108
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	117	61%	39%	1.03	74	47	121	48%	52%	3.75	211	228	439	42.94	5,024
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	189 du, 117 ksf				90	115	205				275	260	535		6,132

ZONE B	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	522	61%	39%	1.03	328	210	538	48%	52%	3.75	940	1018	1,958	42.94	22,415
Office/Comm/Ind	745	84%	16%	1.43	895	170	1,065	23%	77%	1.29	221	740	961	12.76	9,506
TOTAL	1,267 ksf				1,225	380	1,605				1,160	1,760	2,920		31,921

ZONE C	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	198	17%	83%	0.44	15	72	87	67%	33%	0.52	69	34	103	5.86	1,160
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	198 du				15	70	85				70	35	105		1,160

ZONE D	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	177	25%	75%	0.75	33	100	133	63%	37%	1.01	113	66	179	9.57	1,694
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	177 du				35	100	135				115	65	180		1,694

ZONE E	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	206	25%	75%	0.75	39	116	155	63%	37%	1.01	131	77	208	9.57	1,971
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
Elementary School	65	54%	46%	4.69	165	140	305	43%	57%	1.04	29	39	68	7.34	477
TOTAL	206 du, 1 school				205	255	460				160	115	275		2,449

ZONE F	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	385	17%	83%	0.44	29	141	170	67%	33%	0.52	134	66	200	5.86	2,256
Single Family	0	25%	75%	0.75	0	0	0	63%	37%	1.01	0	0	0	9.57	-
Local Retail	240	61%	39%	1.03	151	96	247	48%	52%	3.75	432	468	900	42.94	10,306
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	385 du, 240 ksf				180	235	415				565	535	1,100		12,562

ZONE G	DU/1kSF	AM Peak Hour (6:45 - 7:45)						PM Peak Hour (4:15 - 5:15)						Daily	
		Trip		Trips			Trip		Trips			Rate	Trips		
		In	Out	Rate	In	Out	Total	In	Out	Rate	In			Out	Total
Condo/Townhome	0	17%	83%	0.44	0	0	0	67%	33%	0.52	0	0	0	5.86	-
Single Family	82	25%	75%	0.75	15	46	61	63%	37%	1.01	52	31	83	9.57	785
Local Retail	0	61%	39%	1.03	0	0	0	48%	52%	3.75	0	0	0	42.94	-
Office/Comm/Ind	0	84%	16%	1.43	0	0	0	23%	77%	1.29	0	0	0	12.76	-
TOTAL	82 du				15	45	60				50	30	80		785

Total below includes Zones 8-13 from the Comprehensive Plan Land Use

DEVELOPMENT TOTAL	1,441 du, 4,326 ksf	4,835	1,995	6,830	3,880	5,915	9,795	104,327
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Note:

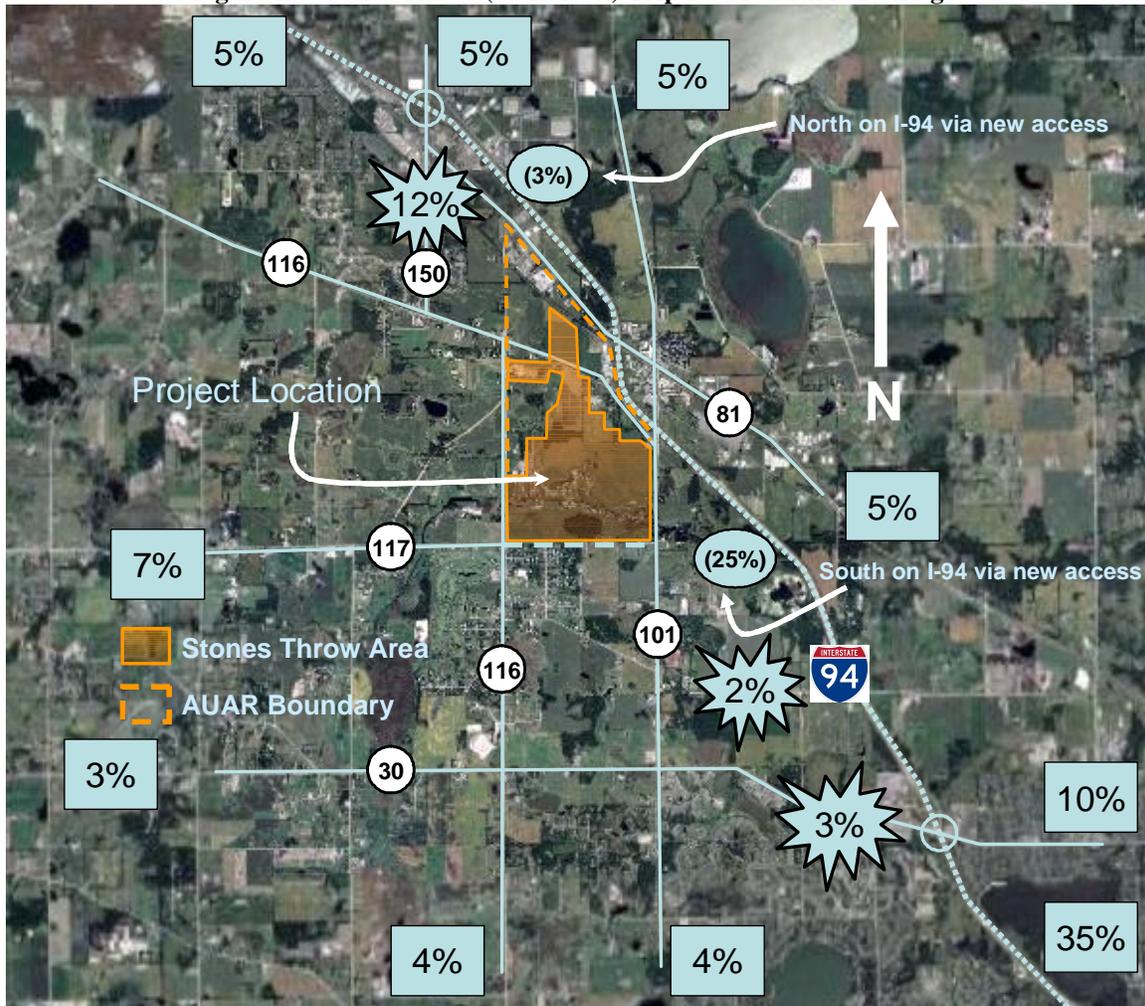
¹Trip Generation Manual, Seventh Edition, Institute of Transportation Engineers.

²The development data is based on information provided by Schoell Madson, Inc. on December 1, 2006.
KSF- Thousand Square Feet of Gross Floor Area

Trip Distribution

Trip distribution for Scenario 2 was conducted similarly to the method for Scenarios 1 and 3, using the Metropolitan Council’s Travel Demand Model, but with the inclusion of the new I-94 access. Using the distribution percentages identified in Figure 15, trips generated were disseminated across the roadway network, and assigned to intersection movements on a zone by zone basis. The end origin/destination did not change, but the particular path changed for each zone based on its location in the AUAR area and its access to major roadways.

Figure 15. Stones Throw (Scenario 2) Trip Distribution Percentages



The distributed and assigned trips are then added to the 2030 baseline volumes (adjusted to account for the new interstate access) to arrive at the 2030 Stones Throw turning movement

volumes. These volumes are compared, along with the existing volumes, for both peak hour periods in Figure 16 (a.m. peak hour) and Figure 17 (p.m. peak hour).

**Figure 16. 2030 A.M. Peak Hour Turning Movement Volumes
Stones Throw Scenario 2**

		65	215	105				170	770	470	
		5	65	5				50	410	260	
55	5	Fletcher Lane and Territorial Road			0	350		60	10	Brockton Lane and CSAH 81	
1155	325				45	530		780	485		
755	470				25	215		495	180		
		135	25	75				60	110	75	95
		265	455	460				1065	475	425	260
		180	985	XXX				860	780	XXX	
		20	530	XXX				50	490	XXX	
455	45	Fletcher Lane and 109th Avenue					1020	185	Brockton lane and Territorial Road		
325	220						475	155			
	*	55	130	XXX				30	190	XXX	
		80	580	XXX				625	980	XXX	
xxx	-	2006 Existing Volume									
xxx	-	2030 Stone's Throw w/New Access Volume									
*	EB right and NB left adjusted due to detour at time of count										
								115	725	635	
								50	410	260	
210	50	Brockton Lane and 97th Avenue			85	795		810	500		
810	500				160	405		55	30		
		5	80	45				25	355	65	65

**Figure 17. 2030 P.M. Peak Hour Turning Movement Volumes
Stones Throw Scenario 2**

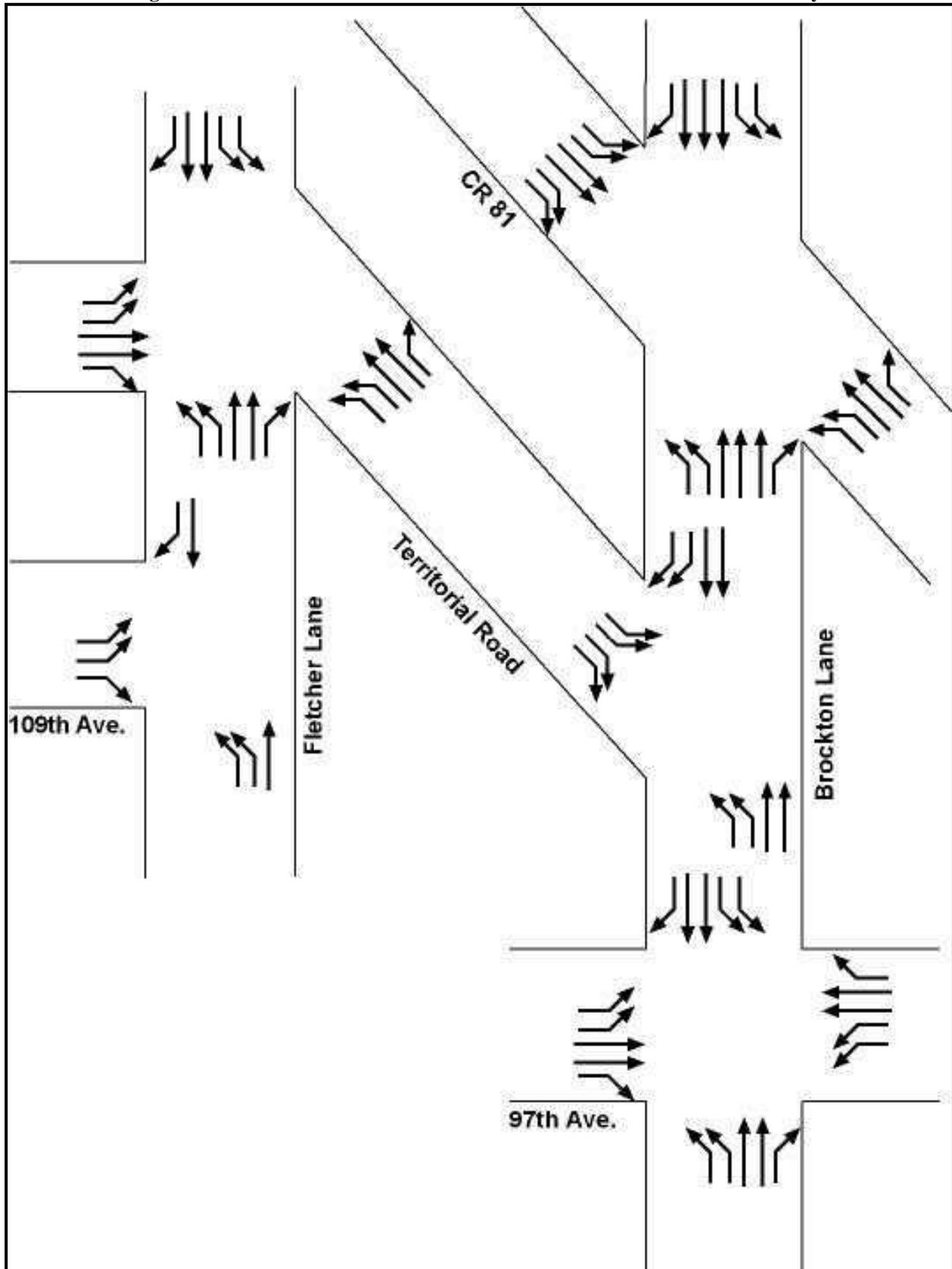
		85	465	345				135	540	175	
		10	10	0				35	150	130	
90	10	Fletcher Lane and Territorial Road			10	205		160	10	Brockton Lane and CSAH 81	
715	55				420	1125		230	55		
335	160				55	425		815	160		
		520	35	10				195	430	30	45
		540	285	345				610	770	430	565
		510	640	XXX				1080	875	XXX	
		75	145	XXX				185	260	XXX	
365	35	Fletcher Lane and 109th Avenue					1070	35	Brockton lane and Territorial Road		
80	75						865	40			
	*	270	470	XXX				315	555	XXX	
		295	715	XXX				790	955	XXX	
xxx	-	2006 Existing Volume									
xxx	-	2030 Stone's Throw w/New Access Volume									
*	EB right and NB left adjusted due to detour at time of count										
								220	370	1040	
								40	110	150	
190	75	Brockton Lane and 97th Avenue			385	940		540	320		
540	320				545	715		540	10		
		60	390	50				65	475	55	35

CONGESTION MITIGATION AND ROADWAY IMPROVEMENTS

For the Scenario 2 forecasts, the improvements shown in Figure 18 and detailed below present the best functionality for the intersections while maintaining realistic roadway improvements. Some movements operate at level of service E or F, but the entire intersections operate at level of service E or better. Best case roadway geometry and traffic control are described as follows:

- Fletcher Lane and 109th Avenue North – Same traffic signal control and geometry as in the 2030 Scenarios 1 and 3, with the exception of providing an additional northbound left turn lane.
- Fletcher Lane and Territorial Road – Same traffic signal control and geometry as in the 2030 Scenarios 1 and 3.
- Brockton Lane and Territorial Road – Same traffic control as recommended in 2030 Scenarios 1 and 3. The southbound approach requires an additional right turn lane.
- Brockton Lane and 97th Avenue North – Compared to 2030 Scenarios 1 and 3, provide one fewer southbound left, and provide two fewer westbound right turn lanes.
- Brockton Lane and CSAH 81 – Compared to 2030 Scenarios 1 and 3, one additional through lane is needed for the northbound and southbound through movements on Brockton Lane, one additional eastbound and westbound left turn lane is needed on CSAH 81, and one eastbound right turn lane is needed on CSAH 81.

Figure 18. 2030 Stones Throw Scenario 2 Recommended Intersection Geometry



Capacity analyses were performed to identify the level of service and delay for the intersections with the improved geometry and traffic control shown above. The results of these capacity analyses are shown in Table 16.

Table 16. Mitigated 2030 A.M. and P.M. Peak Hour Level of Service and Delay (Scenario 2)

2030 SCENARIO 2		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 - SCENARIO 2 - AM	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	D		C				D	A			C	A	C
	Control Delay per Vehicle (sec)	49		29				46	<10			26	<10	25
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	D	C	C	E	B	A	D	C	D	E	C	A	C
	Control Delay per Vehicle (sec)	48	31	31	66	19	<10	44	29	40	67	32	<10	31
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	D		A				D	B			C	D	C
	Control Delay per Vehicle (sec)	47		<10				50	12			33	38	32
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	E	C	A	D	C	D	D	D	A	E	C	A	D
	Control Delay per Vehicle (sec)	70	29	<10	51	23	53	50	37	10	60	23	<10	39
Brockton Lane at CSAH 81														
Level of Service (LOS)	E	F	B	F	C	A	F	D	B	E	F	B	E	
Control Delay per Vehicle (sec)	75	102	11	105	27	<10	100	37	17	69	104	11	70	
2030 - SCENARIO 2 - PM	Fletcher Lane at 109th Ave. N													
	Level of Service (LOS)	C		A				D	A			C	A	B
	Control Delay per Vehicle (sec)	34		<10				36	<10			23	<10	18
	Fletcher Lane at Territorial Road													
	Level of Service (LOS)	D	D	A	D	D	A	D	C	B	D	D	A	D
	Control Delay per Vehicle (sec)	54	38	<10	48	43	<10	48	29	15	52	46	10	37
	Brockton Lane at Territorial Road													
	Level of Service (LOS)	E		A				D	B			E	A	C
	Control Delay per Vehicle (sec)	62		<10				52	12			64	<10	33
	Brockton Lane at 97th Ave. N													
	Level of Service (LOS)	F	C	A	E	D	E	E	E	B	E	C	A	D
	Control Delay per Vehicle (sec)	101	28	<10	59	37	66	61	73	12	74	20	<10	54
Brockton Lane at CSAH 81														
Level of Service (LOS)	D	C	B	D	C	A	D	C	A	D	C	A	C	
Control Delay per Vehicle (sec)	42	32	11	40	30	<10	37	25	<10	37	34	<10	26	

All of the study intersections operate at level of service E or better during the a.m. peak hour. Several individual movements operate at LOS E, and the Brockton Lane/CSAH 81 intersection has some movements at LOS F. In the p.m. peak hour, all of the study intersections operate at level of service D or better. Some individual movements operate at LOS E, and the Brockton Lane/97th Avenue North intersection has one movement at LOS F.

Because of the long-term forecasting required to get to 2030, the results of this analysis are not as reliable as for 2015. It is important to update the 2030 conditions incrementally as the baseline traffic (Rogers development and background growth) changes.

New interstate access to I-94 has been considered as part of this Scenario 2 analysis for the project. It is recognized that this access will result in far reaching changes to the transportation system, and those changes are incorporated here. However, the planning process for the interchange, which would include community involvement, and regional analyses, is beyond the scope of a traffic study for an AUAR.

COMPARISON OF OTHER INTERSECTIONS

Several intersections beyond the five studied for this project have been identified as having potential concern related to the AUAR traffic. The scope of the impacts at those intersections are well beyond the scope of an AUAR. Therefore, the project related impacts are presented as a percentage comparison.

To address the relative site impacts to the related intersections, and interchanges, the overall peak hour volumes at these locations have been compared, and are presented in Tables 17-19. The tables below show the percentage of intersection volume that is generated by the Stones Throw development, and the entire AUAR development area (including the Stones Throw development).

Table 17. Intersection Contribution of Stones Throw Development Traffic, Scenarios 1 and 3 (percent of entire intersection volume)

Intersection	Scenario 3		Scenario 1	
	Zones A-G (development area)		Zones 1-7 (development area)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
NB I-94 at TH 101	7%	6%	10%	6%
SB I-94 at TH 101	6%	11%	7%	12%
CR 81/Industrial at Main Street	9%	14%	12%	15%
South Diamond Lake Road at Brockton Lane	2%	3%	3%	3%

Table 18. Intersection Contribution of Entire AUAR Area Traffic, Scenarios 1 and 3 (percent of entire intersection volume)

Intersection	Scenario 3		Scenario 1	
	Zones A-G and 8-13 (entire AUAR area)		Zones 1-13 (entire AUAR area)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
NB I-94 at TH 101	16%	13%	19%	13%
SB I-94 at TH 101	12%	23%	13%	24%
CR 81/Industrial at Main Street	26%	34%	28%	34%
South Diamond Lake Road at Brockton Lane	5%	6%	6%	6%

**Table 19. Intersection Contribution of Stones Throw and Entire AUAR Area Traffic, Scenario 2
(percent of entire intersection volume)**

Intersection	Scenario 2		Scenario 2	
	Zones A-G (development area)		Zones A-G and 8-13 (entire AUAR area)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
NB I-94 at TH 101	3%	3%	6%	7%
SB I-94 at TH 101	3%	5%	6%	11%
CR 81/Industrial at Main Street	4%	6%	15%	18%
South Diamond Lake Road at Brockton Lane	2%	3%	5%	6%

CONCLUSIONS

Development Characteristics

- The 2015 Comprehensive Plan Scenario 1 is expected to generate 3,330 trips during the a.m. peak hour and 3,965 trips during the p.m. peak hour.
- The 2015 Stones Throw Scenarios 2 and 3 are expected to generate 3,140 trips during the a.m. peak hour and 3,905 trips during the p.m. peak hour.
- The 2030 Comprehensive Plan Scenario 1 is expected to generate 8,140 trips during the a.m. peak hour and 9,420 trips during the p.m. peak hour.
- The 2030 Stones Throw Scenario 3 is expected to generate 6,735 trips during the a.m. peak hour and 9,020 trips during the p.m. peak hour.
- The 2030 Stones Throw Scenario 2 is expected to generate 6,835 trips during the a.m. peak hour and 9,795 trips during the p.m. peak hour.
- There is little difference in impact between Comprehensive Plan Scenarios and Stones Throw Scenarios. Trip generation varies by peak hour because of different types of land uses (residential with more a.m. peak traffic vs. retail with more daily traffic), but overall 2030 daily trip generation is within 8%. Traffic assignment varies by land use and exact location, but the overall intersection volumes and impacts are similar.

Intersection Operation Without Mitigation

- For the Years 2015 and 2030, under any scenario and time of day, all intersections will operate at undesirable LOS without mitigation.

Intersection Operation With Mitigation

Mitigation measures were identified with the intent to create intersection operations of LOS D or better.

2015 Scenarios 1 and 3 mitigation

- Mitigation measures result in acceptable operations at all intersections and movements in the project area all Scenarios in 2015.
- This document identifies the 2015 Scenarios 1 and 3 mitigation, and are summarized below:
 - Fletcher Lane and 109th Avenue North – Upgrade to semi-actuated traffic signal control, with a protected left turn phase for the northbound movement. The eastbound approach will have exclusive left turn and right turn lanes, the northbound approach is served by one through and one left turn lane, and the southbound movement has one through and one right turn lane.
 - Fletcher Lane and Territorial Road – This intersection requires the installation of an actuated traffic signal with protected left turns for each approach. All approaches will be served by one left turn, two through and one right turn lane with the exception of northbound which requires two left turn lanes.

- Brockton Lane and Territorial Road – Upgrade to semi-actuated traffic signal control, with a protected left turn phase for the northbound movement. The eastbound approach will have exclusive left turn and right turn lanes, the northbound approach is served by one through and two left turn lanes, and the southbound movement has one through and one right turn lane.
- Brockton Lane and 97th Avenue North – Presently under traffic signal control, this intersection requires expansion only. All approaches will be served by one left turn, two through and one right turn lane with the exception of southbound which requires two left turn lanes, and westbound which requires two right turn lanes.
- Brockton Lane and CSAH 81 – This traffic signal at this intersection will need to be upgraded to provide a protected left turn arrow for all movements. Geometry for CSAH 81 can remain unchanged, but Brockton Lane will need to provide two left turn lanes, two through lanes and one right turn lane in both directions.

2030 Scenarios 1 and 3 mitigation

- Mitigation measures result in acceptable operations at most intersections and movements in the project area for Scenarios 1 and 3 in 2030. However, there are certain cases where the overall intersection LOS is E, and several movements that operate at LOS E and F. It is likely that these conditions will be of short duration, and the movements with less than desirable delay can be accommodated with sufficient storage areas.
- This document identifies the 2030 Scenarios 1 and 3 mitigation, and are summarized below:
 - Fletcher Lane and 109th Avenue North – Same traffic signal control and geometry as in the 2015, with the exception of providing an additional eastbound left turn lane.
 - Fletcher Lane and Territorial Road – From the recommended 2015 traffic control and geometry, additional left turn lanes should be provided for the eastbound, westbound and southbound approaches so that all four legs have two left turn lanes.
 - Brockton Lane and Territorial Road – Same traffic control as recommended in 2015. The eastbound approach requires two left turn lanes and two right turn lanes. Two left turn lanes and two through lanes are provided for the northbound approach, and two through lanes and one right turn lane are needed for the southbound approach.
 - Brockton Lane and 97th Avenue North – The eastbound and northbound approaches provide two left turn lanes, two through lanes and one right turn lane. The southbound approach provides two through lanes, one right turn lane and three left turn lanes, and the westbound approach requires two left turn lanes, two through lanes and three right turn lanes. The issue with providing three turn lanes

is that three receiving lanes will be required north and east of the intersection. If that were the case, a taper could be provided a certain distance down the road to return to two lanes.

- Brockton Lane and CSAH 81 – The only alteration to this intersection from 2015 is that an addition through lane is needed for eastbound and westbound CSAH 81. This likely would be needed in 2015 to accommodate the dual left turn lanes at the northbound and southbound approaches.

2030 Scenario 2 mitigation

- Mitigation measures result in acceptable operations at most intersections and movements in the project area for Scenario 2 in 2030. However, at the Brockton Lane/CSAH 81 intersection in the a.m. peak hour, overall LOS is E, and certain movements operate at LOS E and F. It is likely that these conditions will be of short duration, and the movements with less than desirable delay can be accommodated with sufficient storage areas.
- This document identifies the 2030 Scenario 2 mitigation, and are summarized below:
 - Fletcher Lane and 109th Avenue North – Same traffic signal control and geometry as in the 2030 Scenarios 1 and 3, with the exception of providing an additional northbound left turn lane.
 - Fletcher Lane and Territorial Road – Same traffic signal control and geometry as in the 2030 Scenarios 1 and 3.
 - Brockton Lane and Territorial Road – Same traffic control as recommended in 2030 Scenarios 1 and 3. The southbound approach requires an additional right turn lane.
 - Brockton Lane and 97th Avenue North – Compared to 2030 Scenarios 1 and 3, provide one fewer southbound left, and provide two fewer westbound right turn lanes.
 - Brockton Lane and CSAH 81 – Compared to 2030 Scenarios 1 and 3, one additional through lane is needed for the northbound and southbound through movements on Brockton Lane, one additional eastbound and westbound left turn lane is needed on CSAH 81, and one eastbound right turn lane is needed on CSAH 81.
- Further investigation of the 2030 conditions and development of mitigation measures should be performed as future roadway plans, updated background traffic counts, nearby development details and project related information becomes available.

Memorandum

TO: Jay Hill, Schoell & Madson, Inc.
FROM: URS Corporation
DATE: May 1, 2007
SUBJECT: *Addendum to South East Town of Hassan AUAR Traffic Analysis*

AMENDMENT TO PREVIOUS MEMORANDUM

This purpose of this document is to report further findings as requested during the AUAR comment process, and in meetings with the developer, township and other agencies. The primary focus of this addendum is to identify impacts from the AUAR site, as well as other contributors) on additional intersections and the connecting roadway segments.

The additional intersections studied were:

- Fletcher Lane (CSAH 116) and 97th Avenue (CSAH 30)
- Brockton Lane and South Diamond Lake Road
- Main Street and Territorial Road
- Main Street and CSAH 81
- Main Street and Ramps to/from Eastbound I-94
- Main Street and Ramps to/from Westbound I-94

Volume and level of service (LOS) and mitigation recommendations will be reported for these intersections for the different scenarios. Four of these intersections were identified in a January 25, 2007 memorandum. A volume comparison was performed, comparing the trips and turning movements produced by the Stone's Throw development and entire AUAR area to the total forecasted intersection volume.

Recommended mitigation will also be identified for the following roadway segments:

- Brockton Lane
 - South of 97th Avenue
 - North of 97th Avenue
 - North of Territorial Road
 - North of CSAH 81
 - North of South Diamond Lake Road
- Fletcher Lane
 - South of 97th Avenue

- North of 97th Avenue
- North of 109th Avenue
- North of Territorial Road
- North of CSAH 81
- CSAH 81
 - East of Brockton Lane
 - West of Brockton Lane
 - East of Main Street
- 109th Avenue
 - West of Fletcher Lane
- Territorial Road
 - West of Brockton Lane
 - West of Fletcher Lane
 - West of Main Street
- 97th Avenue North
 - East of Brockton Lane
 - West of Brockton Lane
 - West of Fletcher Road
- Main Street
 - North of Territorial Road

The area from the Main Street/CSAH 81 intersection north through the Main Street (TH 101)/I-94 interchange presents an interesting situation. This area is already highly congested at certain times of the day. Mitigation recommendations may be presented for intersections in this area, but more comprehensive and wider scale analysis will be performed as part of the Northwest Hennepin County Sub-Area Transportation Study.

STUDY APPROACH

The study was performed in exactly the same manner as reported in the January 25, 2007 memorandum. The same trip generation and distribution percentages were used, the only difference was the use of the SimTraffic simulation model in place of the Synchro model. Because of the proximity of some of the new intersections studied for this addendum, SimTraffic is a better tool, as it better accounts for how delayed vehicles can affect upstream and downstream intersection operation with extended queues, different types of platooning and coordinated traffic signal systems.

Traffic counts for the six study intersections were collected in March and September of 2006, and April of 2007.

EXISTING ROADWAY CONDITIONS

The geometry and traffic control for the six additional intersections are detailed in the following:

- Fletcher Lane and 97th Avenue – This is a traffic signal controlled intersection served by one right turn, one through and one left turn lane in all directions. The westbound right turn lane is channelized.
- Brockton Lane and South Diamond Lake Road – This intersection is stop controlled for the eastbound and westbound approaches. The north and south approaches are served by an exclusive left turn lane and a shared through/right turn lane. The westbound approach provides one shared lane for all movements, and the eastbound approach provides a shared left turn/through lane and an exclusive right turn lane.
- Main Street and Territorial Road – This is a three legged intersection where the southbound approach is stop controlled. The westbound approach provides right turn and through lanes. The eastbound approach has a shared left turn/through lane and provides a left turn bypass lane as well. The southbound approach is served by one lane which is shared by the left turn and right turn movements.
- Main Street and CSAH 81 – This is a traffic signal controlled intersection. The westbound approach provides one lane each for the left turn, through and right turn lanes. The eastbound approach is served by a left turn lane and a shared through/right turn lane. The northbound approach provides a shared left turn through lane, an exclusive through lane and a channelized right turn lane, while the southbound approach provides exclusive left turn, through and channelized right turn lanes.
- Main Street and Ramps to/from Eastbound I-94 – This is a three legged traffic signal controlled intersection. The eastbound off ramp from I-94 has exclusive left turn and right turn lanes. The northbound approach provides two through lanes and a channelized right turn lane to eastbound I-94. The southbound approach provides only two through lanes, as vehicles get to eastbound I-94 via a loop ramp prior to the intersection.
- Main Street and Ramps to/from Westbound I-94 – This is a three legged traffic signal controlled intersection. The westbound off ramp from I-94 provides a left turn lane, a shared left turn/through lane and a channelized right turn lane. The northbound approach provides an exclusive left turn lane and two through lanes, and the southbound approach has two through lanes and a channelized right turn lane to westbound I-94.

Analysis for the entire study area was performed for both the a.m. and p.m. peak hours with the existing conditions and volumes using the SimTraffic simulation program. Results of the analysis indicate that some of the intersections are presently underperforming during peak hour periods. Ideal geometry and traffic control was then identified for the existing traffic conditions. The simulation was then rerun for the two peak hour periods with improved geometry and traffic control. Recommended mitigation is presented below, followed by the capacity analyses results, which are shown in Table A1.

- Fletcher Lane (CSAH 116) and 97th Avenue (CSAH 30) – Current geometry and traffic control are adequate.

- Brockton Lane and South Diamond Lake Road - Current geometry and traffic control are adequate.
- Main Street and Territorial Road – This intersection operated at an unacceptable manner until a traffic signal was introduced. Southbound left turns volumes during the a.m. peak hour were high enough to create poor level of service. In addition to a traffic signal, there should be exclusive left and right turn lanes for the southbound approach, and the eastbound approach would need to be changed to an exclusive left turn lane and through lane.
- Main Street and CSAH 81 – Along with high volumes, the existing signal operation and lane configuration contributes to the poor operation of this intersection. Recommended improvements include providing an exclusive right turn lane to the eastbound movement, changing northbound geometry to provide an exclusive left turn lane, two through lanes and a right turn lane, and adding a second exclusive left turn lane to the southbound approach.
- Main Street and Ramps to/from Eastbound I-94 – Current geometry and traffic control are adequate.
- Main Street and Ramps to/from Westbound I-94 – This intersection has a very high number of vehicles heading northbound from I-94. Recommended improvements include, providing an additional right turn lane to the westbound approach, and adding a second left turn lane to the northbound approach.

With the improvements identified above, most of the movements operate in an acceptable manner.

Table A1. Peak Hour LOS for Existing Volumes with Mitigations

2006 Existing		Movement													
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT	
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
EXISTING CONDITIONS WITH CAPACITY MITIGATION - AM	CSAH 30 and Fletcher Lane														
	Level of Service (LOS)	B	B	B	C	B	A	C	A	A	C	C	B	B	
	S. Diamond Lake Rd and Brockton Ln														
	Level of Service (LOS)	C	C	B	D	D	C	A	A	A	A	A	A	B	
	Territorial Road and Main Street														
	Level of Service (LOS)	D	B			B	A				B		A	B	
	CSAH 81 and Main Street														
	Level of Service (LOS)	E	C	B	D	E	A	F	E	B	C	B	A	D	
	EB I-94 Ramps and Main Street														
	Level of Service (LOS)	D		B					A	A		B		B	
EXISTING CONDITIONS WITH CAPACITY MITIGATION - PM	WB I-94 Ramps and Main Street														
	Level of Service (LOS)				D	D	A	E	A			B	A	B	
	CSAH 30 and Fletcher Lane														
	Level of Service (LOS)	C	A	A	C	C	B	C	C	B	C	A	A	C	
	S. Diamond Lake Rd and Brockton Ln														
	Level of Service (LOS)	B	C	A	C	B	C	A	B	A	A	A	A	B	
	Territorial Road and Main Street														
	Level of Service (LOS)	C	B			B	A				A		A	B	
	CSAH 81 and Main Street														
	Level of Service (LOS)	E	E	C	E	E	C	F	D	A	E	C	B	D	
EB I-94 Ramps and Main Street															
Level of Service (LOS)	C		B					A	A		B		B		
WB I-94 Ramps and Main Street															
Level of Service (LOS)				D	E	B	E	B			C	A	C		

2030 COMPREHENSIVE PLAN (Scenario 1) AND STONES THROW (Scenario 3) LAND USE SCENARIOS

Analysis for the entire study area was performed for both the a.m. and p.m. peak hours with the 2030 comprehensive plan and Stone’s Throw volumes (see Figure A1 for a.m. and Figure A2 for p.m.) using the SimTraffic simulation program.

Figure A1. Additional a.m. peak hour Intersection Volumes for Existing Conditions and Scenarios 1 and 3

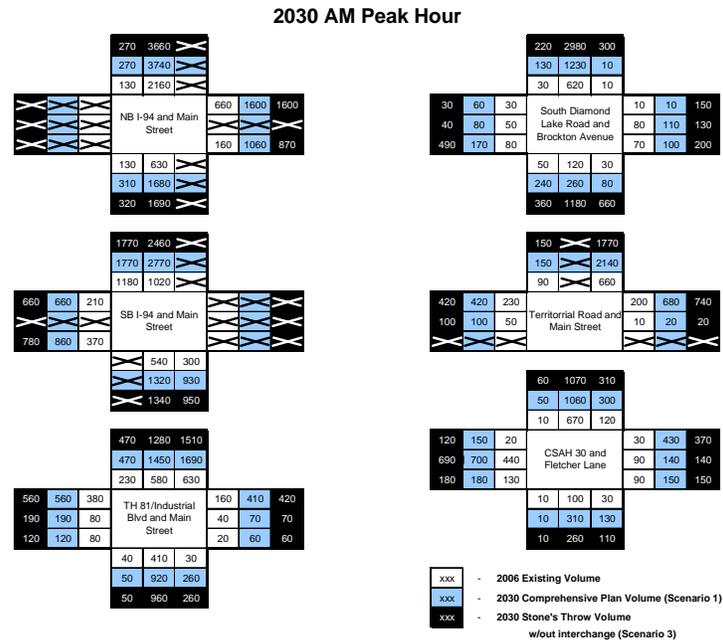
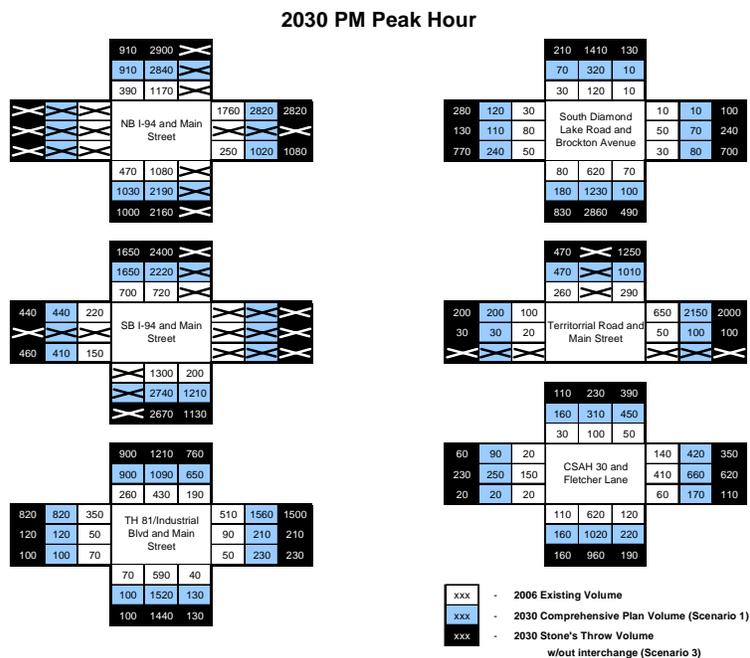


Figure A2. Additional p.m. peak hour Intersection Volumes for Existing Conditions and Scenarios 1 and 3



After getting the initial results, capacity increases and traffic control improvements were introduced into the network. The following mitigation, shown in Figure A3, was applied to the intersections prior to running the analyses a second time:

- Fletcher Lane and 97th Avenue – This traffic signal controlled intersection provides one left turn lane, two through lanes and one right turn lane for each approach with the exception of the westbound right turn lane being channelized, and the south approach providing a second left turn lane.
- Brockton Lane and South Diamond Lake Road – The east and west approaches to this traffic signal controlled intersection provide exclusive left turn, through and right turn lanes. The north and south approaches provide one left turn, two through and one right turn lanes.
- Main Street and Territorial Road – This three legged, traffic signal controlled intersection is served by two left turn lanes and one through lane for the eastbound approach, and one through and two channelized right turn lanes for the west approach. The southbound approach provides two left turn lanes and one right turn lane.

As was previously mentioned, the area from the Main Street/CSAH 81 intersection north through the Main Street (TH 101)/I-94 interchange is highly congested at certain times of the day in 2007. A more comprehensive and wider scale analysis will be performed as part of the Northwest Hennepin County Sub-Area Transportation Study. For this analysis The Main Street/CSAH 81 intersection was greatly affected by the operation and queues of the I-94 interchange intersections. So saying, the following geometries were used for this analysis:

- Main Street and CSAH 81 – This traffic signal controlled intersection is served by two left turn, two through and one right turn lane in each direction. All of the right turn lanes are channelized with the exception of the eastbound approach.
- Main Street and Ramps to/from Eastbound I-94 and Main Street and Ramps to/from Westbound I-94 – Figure A4 shows the configuration used for all analyses of the 2030 scenarios.

The results from the capacity analyses for the comprehensive plan scenario (Scenario 1) are shown in Table A2, and results for the Stone's Throw scenario (Scenario 3) are shown in Table A3.

Figure A3. 2030 Scenarios 1 and 3 Intersection Geometry

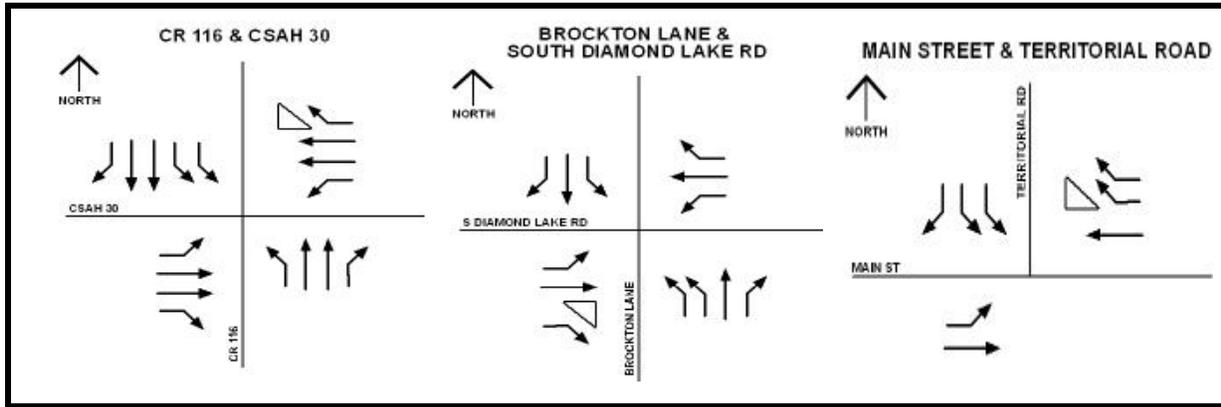


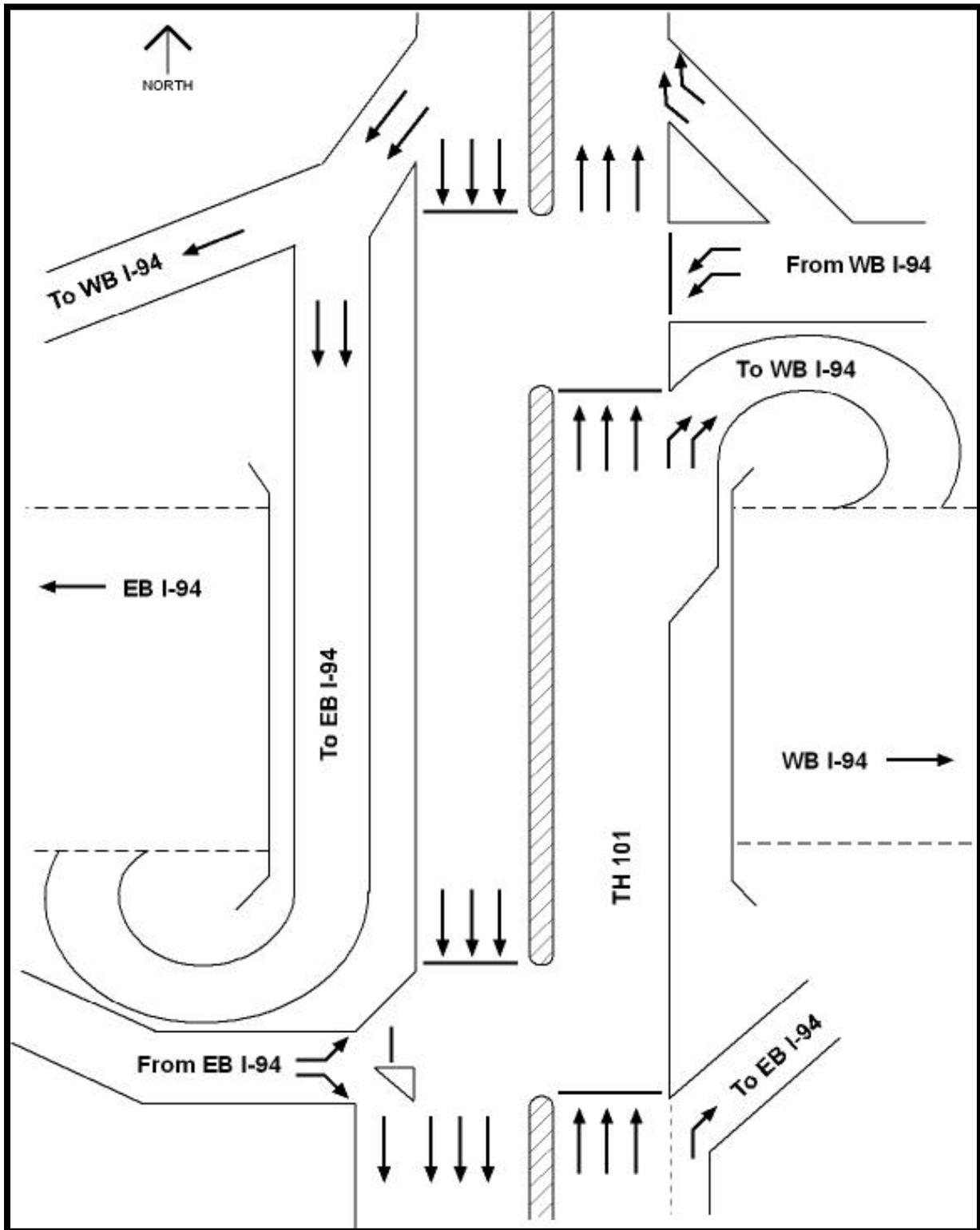
Table A2. Peak Hour LOS for Scenario 1 – 2030 Comprehensive Plan

2030 Scenario 1		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 COMPREHENSIVE PLAN (SCENARIO 1) - AM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	D	C	B	D	C	A	D	B	B	D	C	B	C
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	C	C	A	D	C	A	C	A	A	C	C	B	C
	Territorial Road and Main Street													
	Level of Service (LOS)	D	D			A	A				B		B	C
	CSAH 81 and Main Street													
	Level of Service (LOS)	F	E	D	D	D	A	E	E	F	E	B	B	E
EB I-94 Ramps and Main Street														
Level of Service (LOS)	D		D					B	B		E		D	
WB I-94 Ramps and Main Street														
Level of Service (LOS)				E		A		C			E		D	
2030 COMPREHENSIVE PLAN (SCENARIO 1) - PM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	D	C	B	D	D	B	D	C	B	D	C	B	C
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	D	D	A	D	D	B	E	B	A	E	B	A	C
	Territorial Road and Main Street													
	Level of Service (LOS)	D	C			D	C				B		A	C
	CSAH 81 and Main Street													
	Level of Service (LOS)	F	D	B	C	D	F	E	F	A	F	C	C	F
EB I-94 Ramps and Main Street														
Level of Service (LOS)	E		A					B	B		B		B	
WB I-94 Ramps and Main Street														
Level of Service (LOS)				E		F		C			C		E	

Table A3. Peak Hour LOS for Scenario 3 – 2030 Stone's Throw

2030 Scenario 3		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
Intersection		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 STONES THROW (SCENARIO 3) - AM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	D	C	B	D	C	B	D	B	B	D	C	B	C
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	D	C	A	C	C	A	D	B	A	D	B	B	B
	Territorial Road and Main Street													
	Level of Service (LOS)	D	C			A	A				B		A	B
	CSAH 81 and Main Street													
	Level of Service (LOS)	F	E	C	E	D	A	E	F	F	F	C	B	E
EB I-94 Ramps and Main Street														
Level of Service (LOS)	D		B					A	B		E		D	
WB I-94 Ramps and Main Street														
Level of Service (LOS)				E		A		C			E		D	
2030 STONES THROW (SCENARIO 3) - PM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	D	C	A	D	C	B	D	C	B	C	B	B	C
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	C	C	A	C	C	B	C	B	A	C	B	A	B
	Territorial Road and Main Street													
	Level of Service (LOS)	C	B			D	B				B		A	B
	CSAH 81 and Main Street													
	Level of Service (LOS)	F	E	E	F	E	E	F	F	F	F	E	D	F
EB I-94 Ramps and Main Street														
Level of Service (LOS)	E		B					B	A		D		C	
WB I-94 Ramps and Main Street														
Level of Service (LOS)				F		E		D			E		E	

Figure A4. Main Street (TH 101) and I-94 Interchange Configuration Used for Analyses



2030 STONE'S THROW SCENARIO 2, WITH NEW I-94 INTERCHANGE AT BROCKTON LANE

Much like the previous step, analysis for the entire study area was performed for both the a.m. and p.m. peak hours using the 2030 Stone's Throw, with additional Interstate Access volumes (see Figures A5 for a.m. and A6 for p.m.) using the SimTraffic simulation program.

Figure A5. Additional a.m. peak hour Intersection Volumes for Existing Conditions and Scenarios 1 and 2
2030 AM Peak Hour

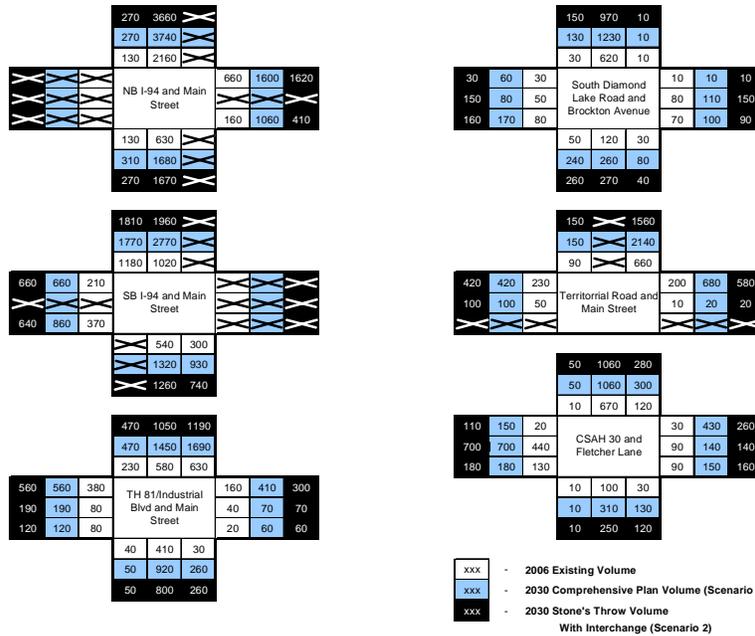
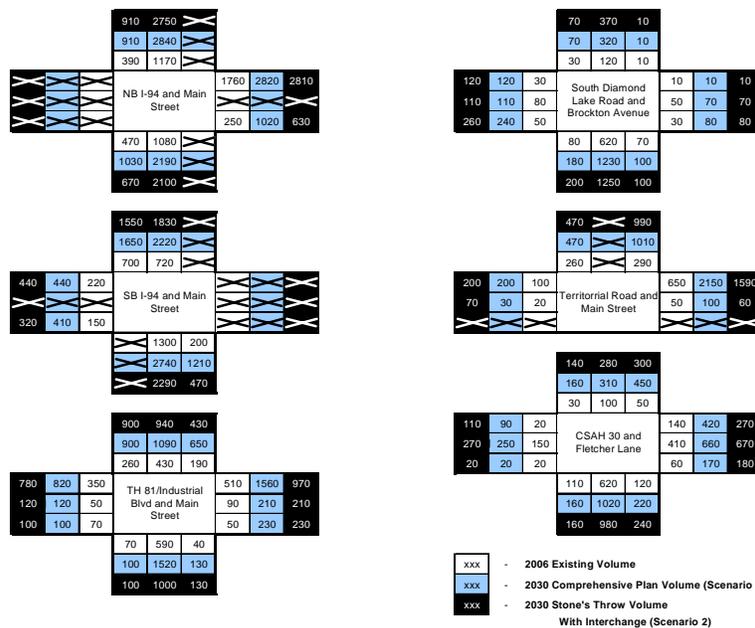


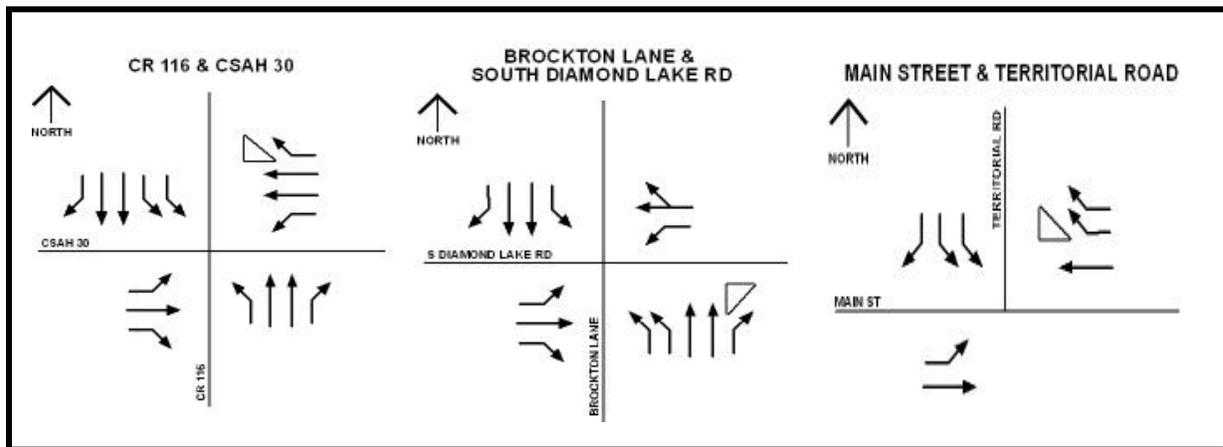
Figure A6. Additional p.m. peak hour Intersection Volumes for Existing Conditions and Scenarios 1 and 2
2030 PM Peak Hour



After getting the initial results, capacity increases and traffic control improvements were introduced into the network. The following mitigation, shown in Figure A7, was applied to the intersections prior to running the analyses a second time:

- Fletcher Lane and 97th Avenue – This traffic signal controlled intersection provides one left turn lane, two through lanes and one right turn lane for each approach with the exception of the westbound right turn lane being channelized, and the south approach providing a second left turn lane.
- Brockton Lane and South Diamond Lake Road – The east and west approaches to this traffic signal controlled intersection provide exclusive left turn, through and right turn lanes. The north and south approaches provide one left turn, two through and one right turn lanes.
- Main Street and Territorial Road – This three legged, traffic signal controlled intersection is served by two left turn lanes and one through lane for the eastbound approach, and one through and two channelized right turn lanes for the west approach. The southbound approach provides two left turn lanes and one right turn lane.

Figure A7. 2030 Scenario 2 Intersection Geometry



For the area from the Main Street/CSAH 81 intersection north through the Main Street (TH 101)/I-94 interchange, the geometries and traffic control used was the same as for Scenarios 1 and 3 (see Figure A2).

- Main Street and CSAH 81 – This traffic signal controlled intersection is served by two left turn, two through and one right turn lane in each direction. All of the right turn lanes are channelized with the exception of the eastbound approach.
- Main Street and Ramps to/from Eastbound I-94 and Main Street and Ramps to/from Westbound I-94 – Figure A2 shows the configuration used for all analyses of the 2030 scenarios.

The results from the capacity analyses for the Stone’s Throw with New Interstate Access scenario (Scenario 2) are shown in Table A3.

Table A4. Peak Hour LOS for Scenario 2 – 2030 Stone’s Throw with New Interstate Access

2030 Scenario 2		Movement												
		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			INT
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2030 STONE'S THROW WITH INTERCHANGE (SCENARIO 2) - AM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	C	E	C	E	B	B	B	B	A	C	D	B	D
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	B	C	B	C	B	A	D	A	A	D	C	B	C
	Territorial Road and Main Street													
	Level of Service (LOS)	D	B			A	A				B		B	B
	CSAH 81 and Main Street													
	Level of Service (LOS)	F	E	C	E	D	A	E	D	B	F	C	B	E
	EB I-94 Ramps and Main Street													
	Level of Service (LOS)	D		D					B	B		E		D
WB I-94 Ramps and Main Street														
Level of Service (LOS)				D		A		A	A		B		B	
2030 STONE'S THROW WITH INTERCHANGE (SCENARIO 2) - PM	CSAH 30 and Fletcher Lane													
	Level of Service (LOS)	C	B	A	D	C	B	C	C	B	D	B	B	C
	S. Diamond Lake Rd and Brockton Ln													
	Level of Service (LOS)	C	C	B	C	C	B	C	B	B	C	B	A	B
	Territorial Road and Main Street													
	Level of Service (LOS)	C	B			C	C				B		A	B
	CSAH 81 and Main Street													
	Level of Service (LOS)	E	E	C	D	E	A	F	D	B	E	D	C	D
	EB I-94 Ramps and Main Street													
	Level of Service (LOS)	D		C					C	B		C		C
WB I-94 Ramps and Main Street														
Level of Service (LOS)				F		F		C	A		B		F	

Roadway Segment Analysis

Intersections are most often the critical location for providing sufficient capacity. SimTraffic was used to evaluate operations in the project area. The roadway segment mitigation has been identified through the intersection operations analysis in order to receive at least as many lanes come from any one approach at any time. In addition, a summary of project AADT is provided as a verification of the analysis.

Existing Annual Average Daily Traffic (AADT) was compared to existing peak hour traffic volume on segments in the project area. This comparison provides a peak hour percentage of daily traffic, which was then used to calculate the future AADT based on the forecast peak hour volumes developed for the traffic impact study, and is shown in Table A5.

Table A5. AADT and Recommended Cross Sections

Location	Existing AADT	2030 Scenario 1 Daily	2030 Scenario 2 Daily	2030 Scenario 3 Daily	Recommended Cross Section
Brockton Lane					
o South of 97 th Avenue	3,875	7,400	9,200	7,500	2 Lanes
o North of 97 th Avenue	5,600	22,800	15,800	23,200	4 Lanes
o North of Territorial Road		19,700	26,500	19,500	4 Lanes
o North of CSAH 81	8,250	17,600	19,700	17,700	4 Lanes
o North of South Diamond Lake Road	5,850	12,600	12,600	12,600	4 Lanes
Fletcher Lane					
o South of 97 th Avenue	6,100	11,300	11,300	9,900	4 Lanes
o North of 97 th Avenue	6,500	16,600	16,600	14,200	4 Lanes
o North of 109 th Avenue	5,200	17,200	16,000	18,500	4 Lanes
o North of Territorial Road		18,600	14,800	18,900	4 Lanes
CSAH 81					
o East of Brockton Lane	11,400	15,400	18,700	15,700	4 Lanes
o West of Brockton Lane	8,300	21,000	23,900	20,300	4 Lanes
o East of Main Street	10,000	29,000	29,000	29,500	4 Lanes
109th Avenue					
o West of Fletcher Lane	2,300	5,300	6,300	6,000	2 Lanes
Territorial Road					
o West of Brockton Lane	2,900	14,300	19,200	15,900	4 Lanes
o West of Fletcher Lane	6,400	15,000	15,700	17,800	4 Lanes
o West of Main Street	3,625	8,500	8,500	8,600	2 Lanes
97th Avenue North					
o East of Brockton Lane	12,000	39,600	27,000	40,500	4 Lanes *
o West of Brockton Lane	8,600	16,700	18,600	16,000	2 Lanes
o West of Fletcher Road	7,300	13,200	13,200	11,800	2 Lanes
Main Street					
o North of Territorial Road	5,750	25,400	25,700	26,400	4 Lanes
o North of CSAH 81	26,600	54,500	54,500	55,300	(See diagram of interchange area)

*The roadway cross section east of the intersection of 97th Avenue North at Brockton Lane will require three receiving lanes, of which one will be dropped. The appropriate distance required to allow the lane drop to work would be analyzed at the time of the detailed intersection design.

With the proposed cross sections, the SimTraffic analysis shows that the proposed roadway segments are providing sufficient capacity to serve forecast volumes.