

# **Excelsior Road Area Transportation Study**

**For:**



**City of Baxter  
13190 Memorywood Drive  
Baxter, MN 56425**

**July 29, 2015**

**Approved Baxter City Council August 4, 2015**

**Prepared By:**

**WSB & Associates, Inc.  
15574 Edgewood Drive  
Suite #103  
Baxter, MN 56401  
Phone: (218) 824-3960**

## CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.



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Charles T. Rickart, P.E.

Date: July 29, 2015

Reg. No. 26082

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## **INTRODUCTION / BACKGROUND**

Several development proposals are being considered or discussed with the City adjacent to Excelsior Road west of TH 371. Previous transportation studies have been completed in the Excelsior Road area and have identified transportation needs including future roadway connections between Fairview Road and Excelsior Road to accommodate existing and future traffic conditions in the area.

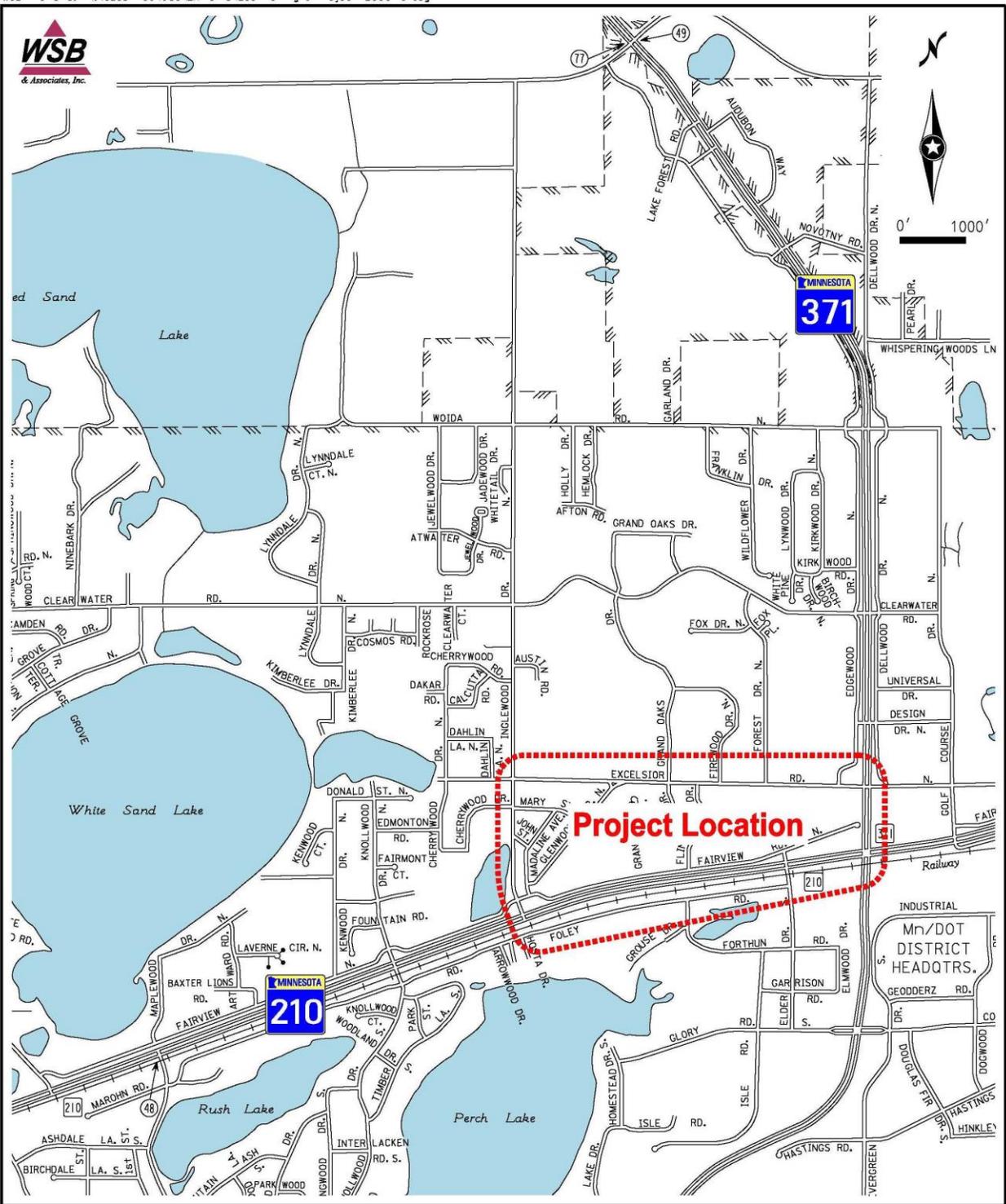
The purpose of this study is to determine the potential impacts and needs the anticipated area future development adjacent to Excelsior Road will have on; the area traffic operations, lane geometry/traffic control, access locations, right of way needs, future roadway connections and pedestrian/bicycle accommodations. The study area is located adjacent to Excelsior Road between TH 371 and Inglewood Drive north of TH 210. The project location is shown on **Figure 1**.

The transportation impacts of the existing and proposed traffic condition were evaluated at the following intersections.

- TH 210 at Inglewood Drive
- Inglewood Drive at Fairview Road
- Inglewood Drive at Excelsior Road
- Excelsior Road at Forest Drive
- Excelsior Road at Edgewood Drive
- TH 371 at Excelsior Road
- Elder Drive at Fairview Road
- TH 210 at Fairview Road

The following sections of this report outline the findings of this study including:

- Documentation of existing traffic conditions in the area;
- Projecting future traffic for the anticipated future area development;
- Analyzing both existing and future traffic conditions with and without alternative improvements;
- Determining lane configuration needs at the primary intersections along the corridor;
- Analyzing potential future roadway connection alternatives;
- Identifying access control, right-of-way and pedestrian/bike needs and alternatives, and;
- Developing conclusions and recommendations with respect to the existing and future roadway configurations in the corridor.



**Excelsior Road Area Transportation Study**  
**City of Baxter, Minnesota**

Figure 1  
**Project Location**

## EXISTING CONDITIONS

### A. *Land Use*

The existing land use in the study area consists primarily of commercial uses adjacent to TH 371, single family residential and multi-family residential along Excelsior Road, and a mix of residential and commercial along Fairview Road adjacent to TH 210.

### B. *Roadway Characteristics*

Excelsior Road: Excelsior Road is an east/west 2-lane major collector roadway, with a typical section ranging from 36 feet west of Edgewood Drive to 56 feet between Edgewood and TH 371. Currently a rural section is in place from Ironwood Drive to approximately 300 feet west of Edgewood Drive. An urban section is in place from the end of the rural section to TH 371. No parking signs are posted on the north side of Excelsior Road. The posted speed limit on this section of Excelsior Road is 30 mph.

Inglewood Drive: Inglewood Drive is a north/south 2-lane major collector roadway. It currently has a 24 foot wide rural section from Fairview Road to Excelsior Road and a 36 foot section from Fairview Road to TH 210. The posted speed limit on this section of Fairview Road is 30 mph.

Fairview Road: Fairview Road is an east/west 2-lane local street serving as a frontage road to TH 210. It currently has a rural 24 foot section. The posted speed limit on this section of Fairview Road is 30 mph.

Edgewood Drive: Edgewood Drive is a north/south 2-lane local street serving as a frontage road to TH 371. It currently has a 36 foot urban section. The posted speed limit on this section of Edgewood Drive is 30 mph.

The lane configurations at each of the study area intersection are as follows:

TH 210 at Inglewood Drive – Side Street Stop Control

EB TH 210 approaching Inglewood Dr – two thru, one left lane

WB TH 210 approaching Inglewood Dr – one right, two thru, one future left lane

SB Inglewood Dr approaching TH 210 – one right, one left lane

Inglewood Drive at Fairview Road – Side Street Stop Control

EB Fairview Rd approaching Inglewood Dr – one right/thru/left lane

WB Fairview Rd approaching Inglewood Dr – one right/thru/left lane

SB Inglewood Dr approaching Fairview Rd – one right/thru/left lane

NB Inglewood Dr approaching Fairview Rd – one right/thru/left lane

Inglewood Drive at Excelsior Road – Four-way Stop Control

EB Excelsior Rd approaching Inglewood Dr – one right/thru/left lane  
WB Excelsior Rd approaching Inglewood Dr – one right/thru/left lane  
SB Inglewood Dr approaching Excelsior Rd – one right/thru/left lane  
NB Inglewood Dr approaching Excelsior Rd – one right/thru/left lane

Excelsior Road at Forest Drive – Side Street Stop Control

EB Excelsior Rd approaching Edgewood Dr – one right/thru/left lane  
WB Excelsior Rd approaching Forest Dr – one right/thru/left lane  
SB Forest Dr approaching Excelsior Rd – one right/thru/left lane

Excelsior Road at Edgewood Drive – Side Street Stop Control

EB Excelsior Rd approaching Edgewood Dr – shoulder, one thru, one left lane  
WB Excelsior Rd approaching Edgewood Dr – one right, one thru, one left lane  
SB Edgewood Dr approaching Excelsior Rd – one right, one left lane  
NB driveway approaching Excelsior Rd – one right/through/left lane

TH 371 at Excelsior Road – Traffic Signal Stop Control

EB Excelsior Rd approaching TH 371 – one right, one thru, one left lane  
WB Excelsior Rd approaching TH 371 – one right, one thru, one left lane  
SB TH 371 approaching Excelsior Rd – one right, two thru, one left lane  
NB TH 371 approaching Excelsior Rd – one right, two thru, one left lane

Elder Drive at Fairview Road – Side Street Stop Control

EB Fairview Rd approaching Elder Dr – one right/thru/left lane  
WB Fairview Rd approaching Elder Dr – one right/thru/left lane  
SB driveway approaching Fairview Rd – one right/thru/left lane  
NB Elder Dr approaching Fairview Rd – one right/thru/left lane

TH 210 at Elder Drive – Side Street Stop Control

EB TH 210 approaching Elder Dr – one right, two thru, one left lane  
WB TH 210 approaching Elder Dr – one right, two thru, one left lane  
SB Elder Dr approaching TH 210 – one right lane  
NB Elder Dr approaching TH 210 – one right lane

The existing roadway geometrics including the intersection traffic control, is shown on **Figure 2**.

**C. Traffic Volumes**

AM and PM peak hour turning movement and daily counts were conducted during the week of May 18, 2015. These counts were used as the existing baseline conditions for the area. **Figure 2** shows the existing intersections that were analyzed as part of this, with the existing 2015 AM and PM peak hour and traffic volumes.

#### D. *Crash Data*

The crash data included with this study was obtained using the Minnesota Crash Mapping Analysis Tool (MnCMAT) developed by MnDOT. The database includes crashes reported to MnDOT by local law enforcement agencies.

The crash data presented is for the years of 2012-2014. The MnCMAT database does not provide access to the original handwritten crash reports, which contain some details that are not represented in the MnCMAT database. Crashes that resulted in damages under \$1000 may not be included in the database results as well.

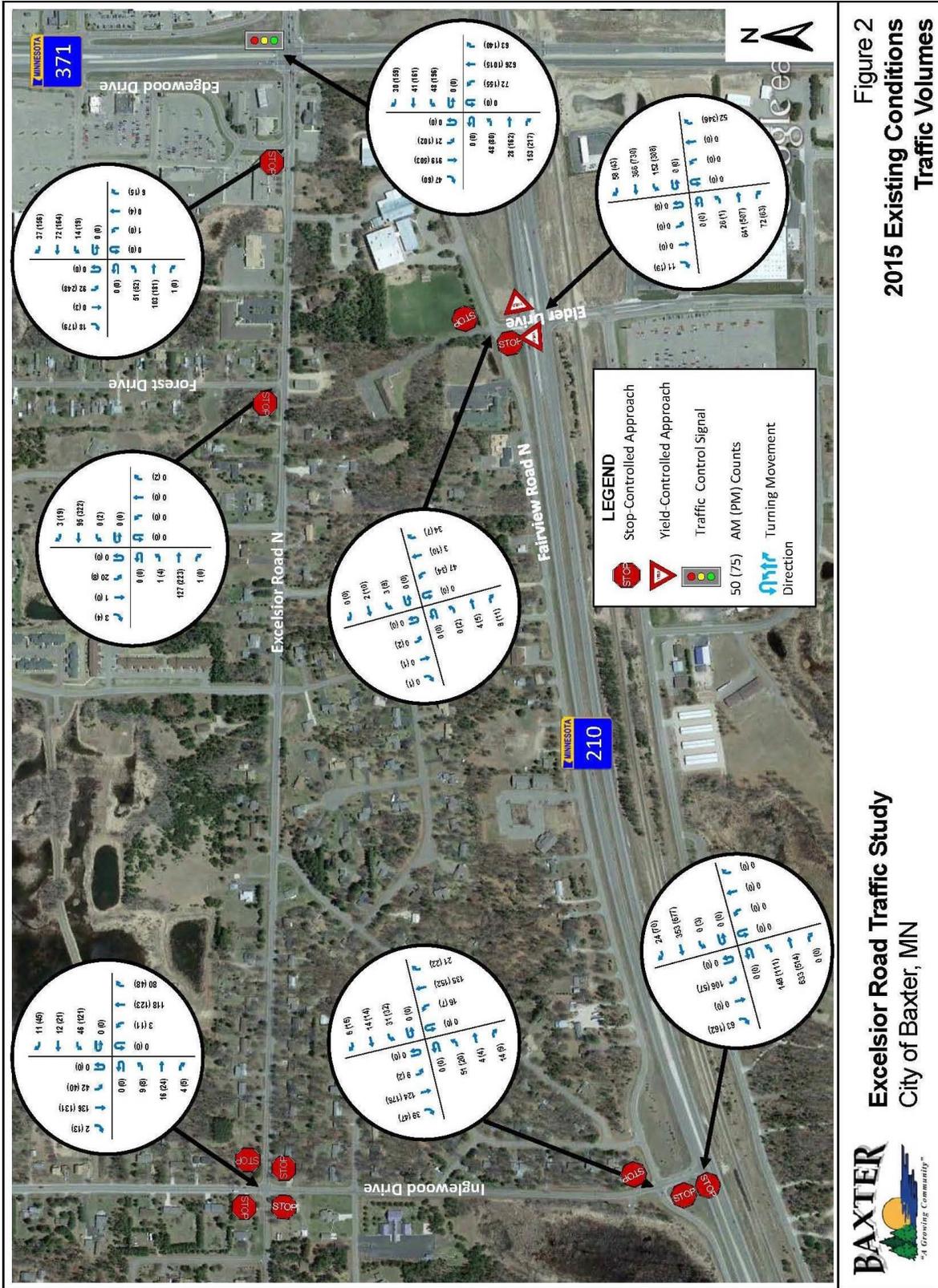
The results indicate that the primary intersections in the area are at or above the MnDOT Metro and Statewide average crash rates and severity rates. In general the types of crashes include:

- Rear end crashes of vehicles stopped or slowing down to make left or right turns.
- Right angle crashes of vehicles pulling out from a side street or driveway.
- Left turn crashes of vehicles turning in front of another vehicle.

A summary of the existing crash data is shown in **Table 1**.

**Table 1 – Crash Summary**

Location	Crashes							
	2012			2013		2014		Total Crashes
	K	PD	PI	PD	PI	PD	PI	
TH 210 at Inglewood Dr	0	0	0	0	1	3	0	4
Inglewood Dr at Fairview Rd	0	0	0	0	0	0	0	0
Inglewood Dr at Excelsior Rd	0	0	0	0	0	1	0	1
Excelsior Rd at Forest Dr	0	1	0	0	1	1	0	5
Excelsior Rd at Edgewood Dr	0	0	0	0	0	1	1	2
TH 371 at Excelsior Rd	1	8	2	6	1	8	5	31
Elder Dr at Fairview Rd	0	0	0	0	0	0	0	0
Elder Dr at TH 210	0	1	0	9	2	3	0	15



## ROADWAY NETWORK IMPROVEMENT ALTERNATIVES

In conjunction with previous studies and the Cities Transportation Plan the City has identified Transportation Concept plans for several possible improvements for the area roadway network. Two specific roadway connections were considered with the Excelsior Road Area Study.

- A. Signalize and add the south (northbound) approach creating a full movement intersection at TH 210 and Inglewood Drive. This concept was assumed with all analyzed build alternatives. The signalized intersection on TH 210 at Knollwood Drive and the south approach connection across the railroad tracks will be removed with the installation of the new signal at Inglewood Drive. This project is scheduled to be completed in 2019.
- B. Provide a connection from Fairview Road to Excelsior Road. Three alternative alignments were included with the analysis for this connection. The intersection control (i.e. signal or roundabout) required at the major intersections will be determined at a later date with an Intersection Control Evaluation (ICE). For this analysis signalized intersections were assumed.

**Alternative 1** – Fairview Road connection to Excelsior Road without realignment of the existing Edgewood Drive. This would create two “T” intersections. The location of the new intersection would be located as far west as feasible to improve the spacing between the two roadways.

**Alternative 2** – Fairview Road connection to Excelsior Road with the realignment of existing Edgewood Drive. The intersection would be located west of the existing Edgewood Drive intersection. This will provide improved intersection spacing between Edgewood Drive and TH 371. The existing Edgewood Drive intersection would be removed.

**Alternative 3** – Fairview Road connection to Excelsior Road at existing Edgewood Drive. Although this alternative would create one intersection the spacing between Edgewood Drive and TH 371 limit the length of the left turn lanes.

*Figure 3* shows the alternatives included with the analysis of future build conditions.



**Excelsior Road Area  
Transportation Study**  
City of Baxter, Minnesota

Figure 3  
**Fairview Road / Excelsior Road  
Connection Alternatives**

## TRAFFIC PROJECTIONS

In order to analyze the lane configuration and traffic control needs projected traffic volumes were determined for the area. Projected 2017 and 2035 traffic volumes were determined based on proposed anticipated future development land use in the area and the City's current Transportation Plan. The following sections outline the traffic generation from the study area, as well as the traffic distribution and projected traffic volumes.

### **A. Traffic Generation**

Traffic growth in the vicinity of a proposed site will occur between existing conditions and any given future year due to other development within the region. This background growth must be accounted for and included in future year traffic forecasts. Reviewing the historical traffic counts in the area, traffic has stayed somewhat constant or dropped in the past few years. However, in order to account for some background growth in traffic the Crow Wing County State Aid traffic growth projection factor of 1.7 over a 20 year period was used to project traffic from the 2015 counts to the 2017 and 2035 analysis years.

In addition to the regional background traffic, future area development related traffic was determined and included with the overall future traffic projections. The land use estimates were based on potential "worst case" conditions for the area. Based on assumptions from the City's land use and zoning plans and current and anticipated development proposals the future land use in the area adjacent to Excelsior Road was determine. The estimated trip generation from the future area development is:

ADT = 3000 vpd (1500 in and 1500 out)  
AM Peak = 295 (158 in, 137 out)  
PM Peak = 445 (229 in, 216 out)

### **B. Traffic Distribution**

Area generated trips were distributed to the adjacent roadway system based on several factors including:

- Previous traffic and transportation studies in the area.
- Anticipated origins and destinations for specific land use (i.e. location of commercial uses in relationship to residential).
- Existing travel patterns and future roadway connections.

Based on these parameters the following general traffic distribution was used to distribute the projected traffic volumes along in the Excelsior Road area:

- 20% to/from the north on TH 371
- 5% to / from north on Inglewood Drive
- 20% to / from south on TH 371
- 30% to / from east on TH 210
- 5% to/from the east on Excelsior Road
- 5% to/from the west on Excelsior Road
- 15% to / from west on TH 210

### **C. *Projected Traffic Volumes***

Traffic forecasts were prepared for the year 2017 which is the year after the initial phase of area development is anticipated to be completed and for the 2035 conditions the twenty year design year which represents the full development of the area.

The traffic forecasts were prepared by adding the projected annual background traffic growth and the projected non-development traffic growth to the existing 2015 traffic counts to determine the “No-Build” traffic conditions. The anticipated area development traffic was then added to the no-build traffic conditions to determine the 2017 and 2035 Build traffic conditions. **Figures 4 - 7** shows the projected 2017 and 2035 No-Build and Build AM and PM peak hour traffic volumes for each roadway alignment alternative.

The total future full build of the area (2035) traffic volumes were determined by adding the development site traffic with the existing traffic on the area roadways. Based on these assumptions the following Average Daily Traffic volumes on area roadways were determined for build conditions:

#### Excelsior Road

TH 371 to Edgewood Drive:

Existing 2015 = 6,700 vpd

Projected 2017 = 7,000 vpd

Projected 2035 = 9,500 vpd

Edgewood Drive to Inglewood Drive:

Existing 2015 = 4,000 vpd

Projected 2017 = 4,200 vpd

Projected 2035 = 5,600 vpd

Inglewood Drive

TH 210 to Fairview Drive:

Existing 2015 = 4,000 vpd

Projected 2017 = 4,500 vpd

Projected 2035 = 6,000 vpd

Fairview Drive to Excelsior Road:

Existing 2015 = 2,700 vpd

Projected 2017 = 2,900 vpd

Projected 2035 = 3,800 vpd

Fairview Road

Inglewood Drive to Elder Drive:

Existing 2015 = 1,200 vpd

Projected 2017 = 2,300 vpd

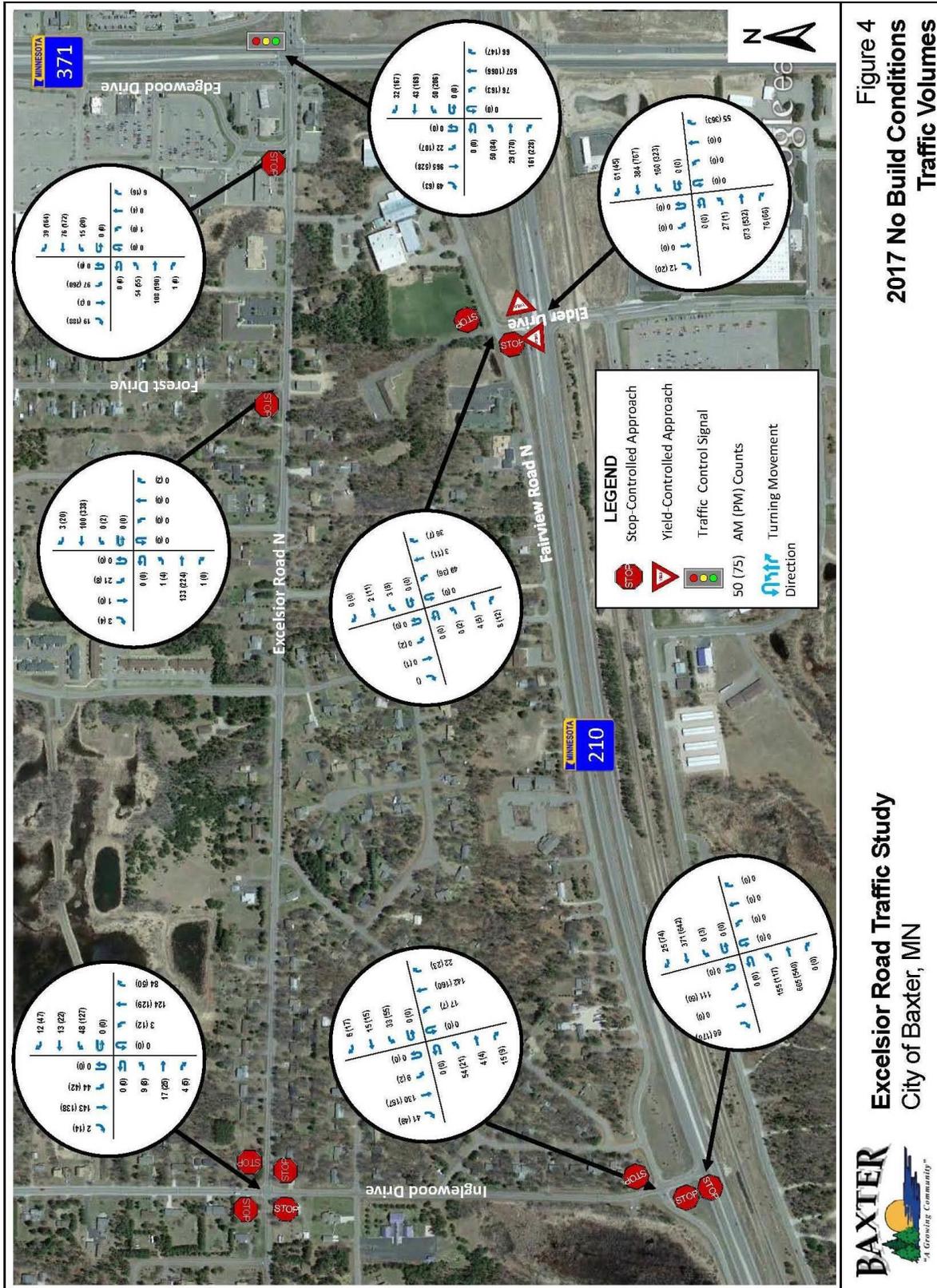
Projected 2035 = 3,100 vpd

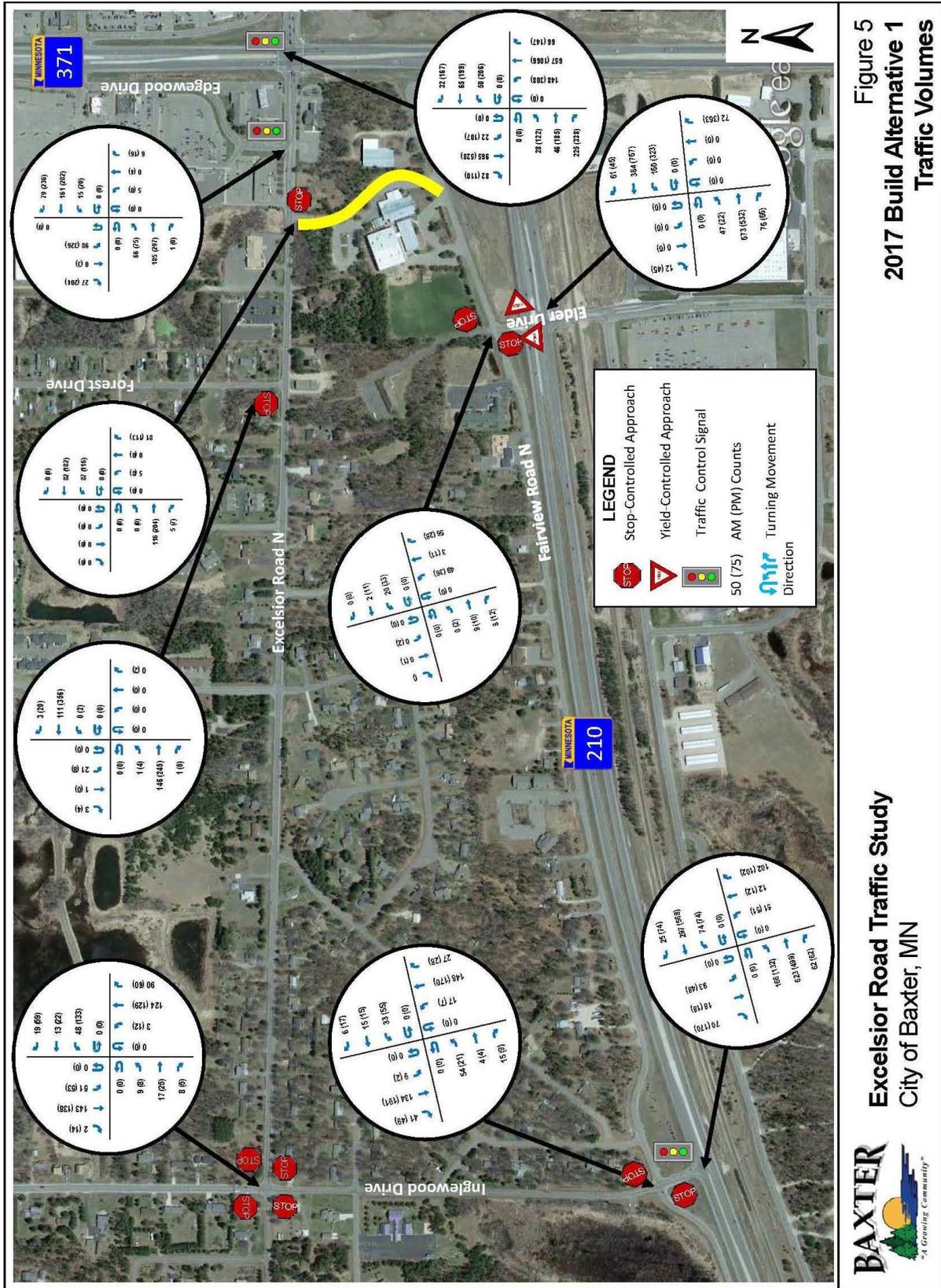
East of Elder Drive:

Existing 2015 = 820 vpd

Projected 2017 = 2,000 vpd

Projected 2035 = 2,900 vpd





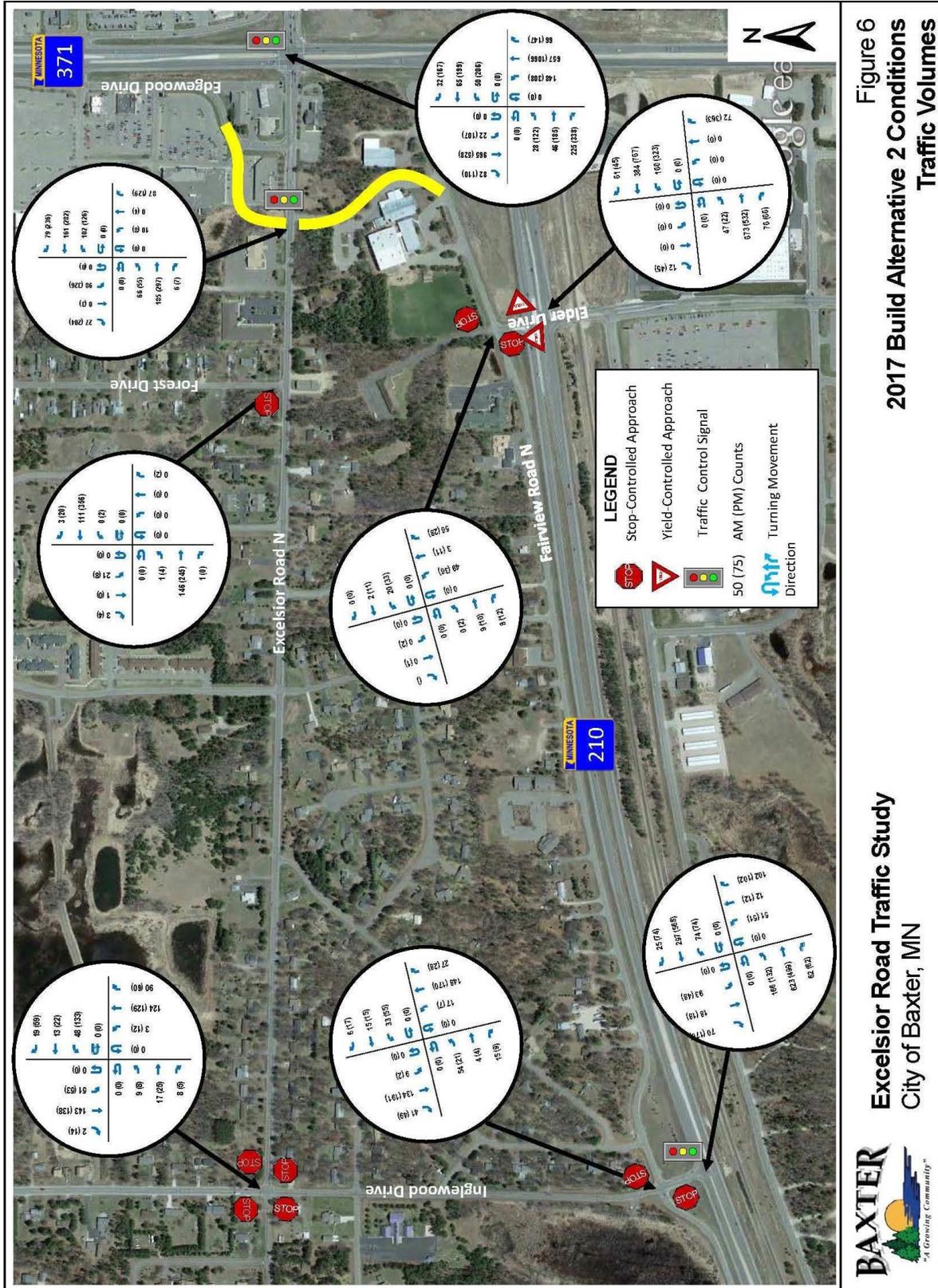


Figure 6  
2017 Build Alternative 2 Conditions  
Traffic Volumes

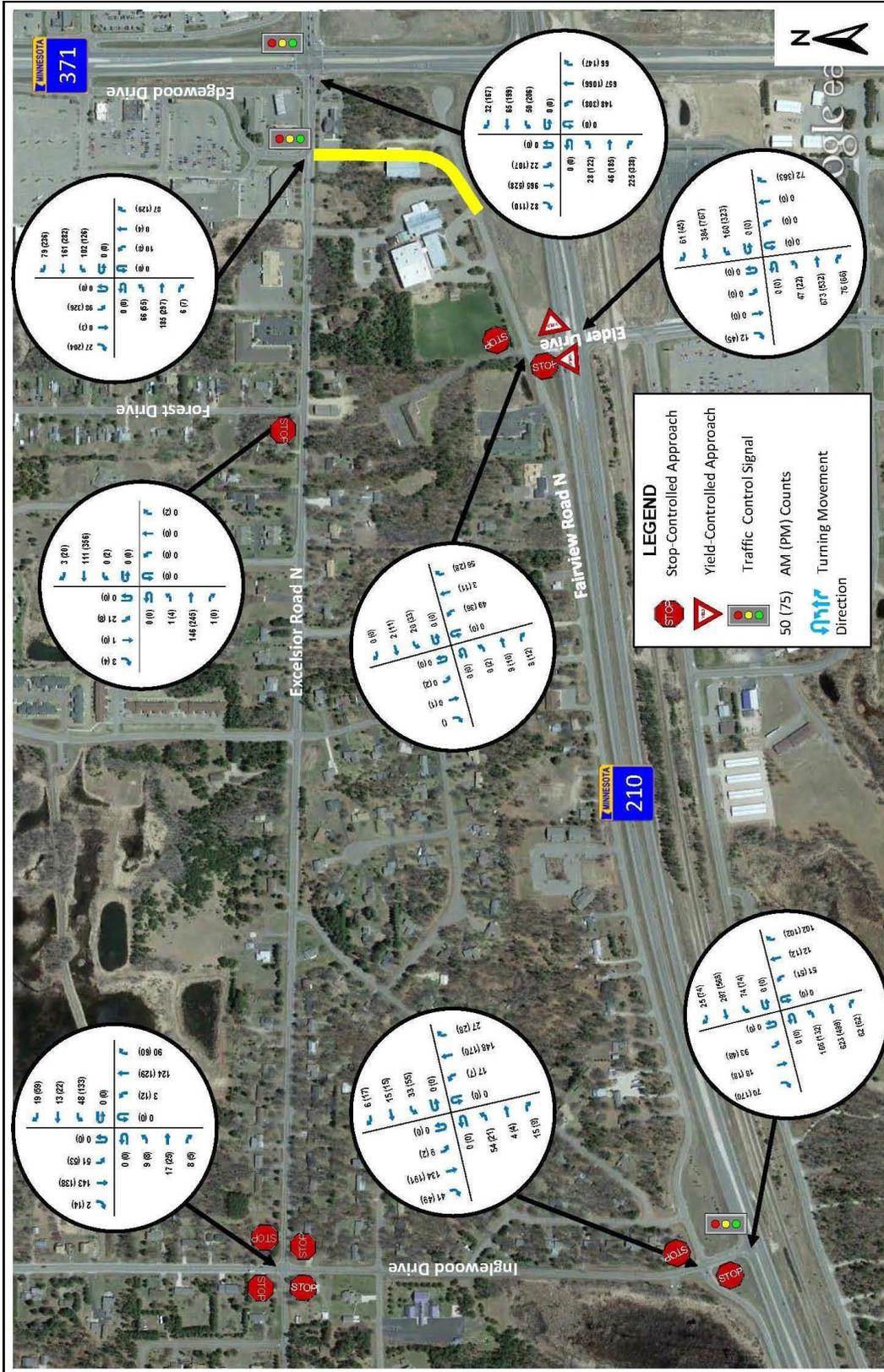


Figure 7  
2017 Build Alternative 3 Conditions  
Traffic Volumes

Excelsior Road Traffic Study  
City of Baxter, MN







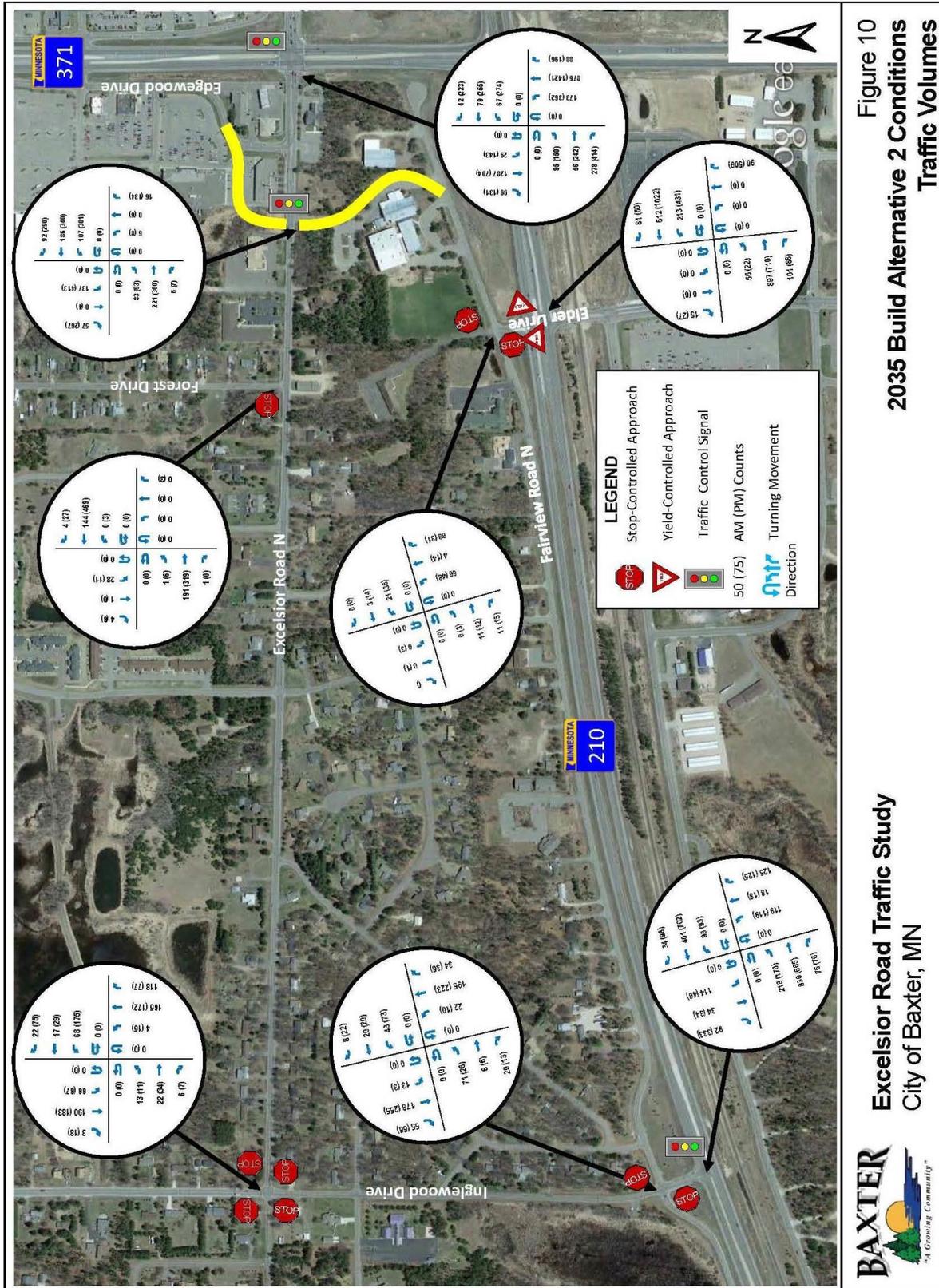
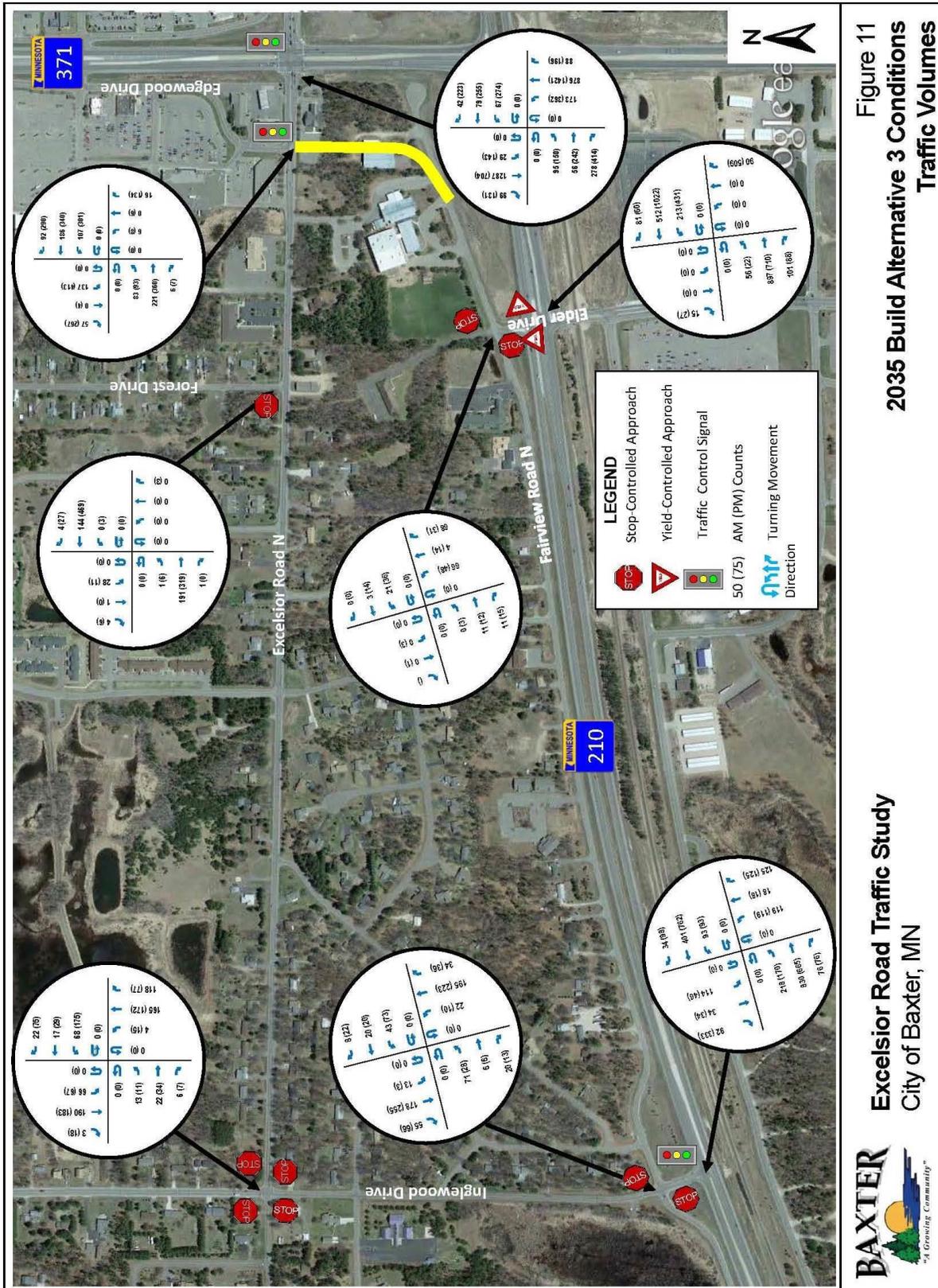


Figure 10  
2035 Build Alternative 2 Conditions  
Traffic Volumes

Excelsior Road Traffic Study  
City of Baxter, MN





## TRAFFIC IMPACT ANALYSIS

Existing and/or forecasted traffic operations were evaluated for the intersections and access in the Excelsior Road study area. The analysis was conducted for the following scenarios.

1. Existing 2015
2. Projected 2017 No-Build
3. Projected 2017 Build Alternative 1, Alternative 2 and Alternative 3
4. Projected 2035 No-Build
5. Projected 2035 Build Alternative 1, Build Alternative 2 and Alternative 3

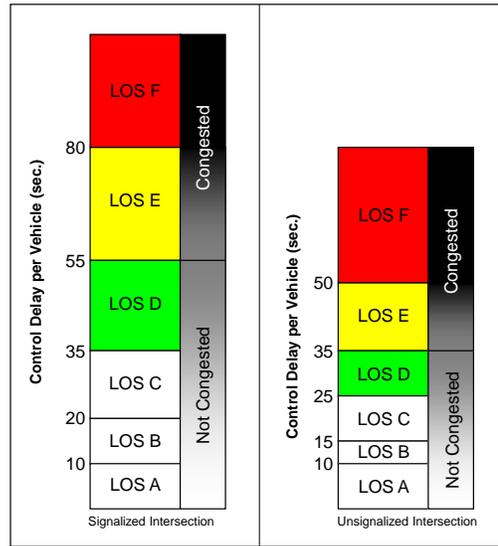
This section describes the methodology used to assess the operations and provides a summary of traffic operations for each scenario.

### **A. Methodology**

The intersections in the corridor were evaluated during the AM and PM peak hours using Synchro/SimTraffic micro simulation software. The results are derived from established methodologies documented in the Highway Capacity Manual (HCM) 2010. The software was used to evaluate the characteristics of the roadway network including lane geometrics, turning movement volumes, traffic control, and signal timing. In addition, the signal timing parameters for future year conditions were optimized using Synchro. This information was then transferred to SimTraffic, the traffic simulation model, to estimate average peak hour vehicle delays and queues.

One of the primary measures of effectiveness used to evaluate intersection traffic operations, as defined in the HCM, is Level of Service (LOS) – a qualitative letter grade, A – F, based on seconds of vehicle delay due to a traffic control device at an intersection. By definition, LOS A conditions represent high quality operations (i.e., motorists experience very little delay or interference) and LOS F conditions represent very poor operations (i.e., extreme delay or severe congestion). **Figure 12** depicts a graphical interpretation of delay times that define level of service. The delay thresholds are lower for un-signalized intersections than signalized intersections due to the public’s perception of acceptable delays for different traffic controls as indicated in the HCM. In accordance with the Minnesota Department of Transportation (MnDOT) guidelines, this analysis used the LOS D/E boundary as an indicator of acceptable traffic operations.

**Figure 12: Level of Service Ranges for Signalized and Un-signalized Intersections**



SOURCE: Level of Service thresholds from the Highway Capacity Manual, 2000.

Existing Level of Service Summary

**Table 2 - 2015 Existing Conditions** shown below, summarizes the existing LOS at the primary intersections in the study area based on the current lane geometry, traffic control and 2015 traffic volumes. The analysis results show that all intersection are operating at an overall LOS C or better during both the weekday AM and PM peak hours with all movements operating at LOS D or better.

**Table 2: 2015 Existing Conditions Level of Service Summary**

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Overall Delay (sec/veh)	LOS	Overall Delay (sec/veh)
TH 210 at Inglewood Dr	A (C)	6	A (C)	10
Inglewood Dr at Fairview Rd	A (A)	3	A (A)	3
Inglewood Dr at Excelsior Rd	A (A)	6	A (A)	7
Excelsior Rd at Forest Dr	A (A)	1	A (A)	2
Excelsior Rd at Edgewood Dr	A (A)	2	B (C)	12
TH 371 at Excelsior Rd	B (D)	16	C (D)	23
Elder Dr at Fairview Rd	A (A)	1	A (A)	2
TH 210 at Elder Dr	A(A)	2	A (A)	2

A (A) – Overall LOS (Worst Movement LOS)

### Forecasted Traffic Operations

A capacity and LOS analysis was completed for the study area intersections for 2017 which is the year after the proposed initial development would be completed and for the 2035 conditions which represents the 20 year design timeframe assumed to be full development of the area. The results of the analysis are discussed below and shown in **Table 3 – Table 6**.

**Table 3 – No Build Level of Service Summary**, shows that all intersection will be operating at an overall LOS D or better in 2017 and 2035 during both the weekday AM and PM peak hours with the existing traffic control. However, with the increase in traffic, some movements by 2035 will be operating at LOS E and F, specifically at the intersections of TH 210 at Inglewood Drive, Excelsior Road at Edgewood Drive and TH 371 at Excelsior Road.

**Table 3: No Build Condition Level of Service Summary**

Intersection	2017				2035			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)						
TH 210 at Inglewood Dr	A (C)	8	A (D)	12	B (E)	20	B (F)	32
Inglewood Dr at Fairview Rd	A (A)	3	A (A)	3	A (C)	10	B (C)	20
Inglewood Dr at Excelsior Rd	A (A)	7	A (A)	7	B (C)	22	C (D)	28
Excelsior Rd at Forest Dr	A (A)	1	A (A)	2	A (A)	3	A (A)	4
Excelsior Rd at Edgewood Dr	A (C)	12	B (D)	20	B (D)	28	D (E)	38
TH 371 at Excelsior Rd	B (D)	20	C (D)	28	D (E)	35	D (F)	39
Elder Dr at Fairview Rd	A (A)	1	A (A)	2	A (A)	3	A (A)	5
TH 210 at Elder Dr	A (A)	2	A (A)	3	A (B)	8	A (C)	10

A (A) – Overall LOS (Worst Movement LOS)

All build alternatives assume that the intersection of TH 210 and Inglewood Drive would be improved to provide a full movement signalized intersection. This will improve the overall and movement LOS from the No-Build condition. Where intersection control is required, a traffic signal system was assumed. The type of traffic control would be determined with the development of an Intersection Control Evaluation (ICE) report, which is one of the next steps in the implementation of any improvement in the corridor.

**Tables 4, 5 and 6 – Projected Build Level of Service Summary**, shows that all intersection would operate at overall LOS D or better in 2017 and 2035 during both the weekday AM and PM peak hours. The only exceptions are with Alternative 1 at the new intersection on Excelsior Road at Fairview in 2035 during the PM peak hour would operate at an overall LOS E and, with Alternative 3 at the intersection of TH 371 and Excelsior Road in 2035 during the PM peak hour which would operate at an overall LOS E.

**Table 4: Build- Alternative 1 Condition**

Intersection	2017				2035			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)						
TH 210 at Inglewood Dr	A (C)	12	A (C)	14	B (D)	23	C (D)	30
Inglewood Dr at Fairview Rd	A (A)	3	A (A)	4	A (C)	12	B (C)	21
Inglewood Dr at Excelsior Rd	A (B)	7	A (B)	9	B (D)	24	C (D)	32
Excelsior Rd at Forest Dr	A (A)	1	A (A)	2	A (A)	4	A (B)	6
Excelsior Rd at Fairview Rd	B (C)	12	B (C)	16	C (D)	24	E (E)	38
Excelsior Rd at Edgewood Dr	A (C)	18	B (D)	28	B (D)	32	D (F)	40
TH 371 at Excelsior Rd	B (D)	20	C (D)	32	D (E)	38	D (F)	42
Elder Dr at Fairview Rd	A (A)	2	A (A)	3	A (A)	5	A (A)	7
TH 210 at Elder Dr	A (A)	3	A (B)	5	A (B)	10	A (C)	15

A (A) – Overall LOS (Worst Movement LOS)

The specific movements at LOS E or F for Alternative 1 in 2035 include: Excelsior Road at Fairview Road PM peak hour = LOS E; Excelsior Road at Edgewood Drive PM peak hour = LOS F; TH 371 at Excelsior Road, AM Peak hour = LOS E and PM peak hour = LOS F. These deficient levels are a result of the creation of two “Tee” intersections on Excelsior Road and the interaction between them and TH 371.

**Table 5: Build- Alternative 2 Conditions**

Intersection	2017				2035			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)						
TH 210 at Inglewood Dr	A (C)	12	A (C)	14	B (D)	23	C (D)	30
Inglewood Dr at Fairview Rd	A (A)	3	A (A)	4	A (C)	12	B (C)	21
Inglewood Dr at Excelsior Rd	A (B)	7	A (B)	9	B (D)	24	C (D)	32
Excelsior Rd at Forest Dr	A (A)	1	A (A)	2	A (A)	4	A (B)	6
Excelsior Rd at Edgewood Dr	B (C)	20	B (D)	30	B (D)	34	D (E)	38
TH 371 at Excelsior Rd	B (D)	20	C (D)	32	D (E)	38	D (F)	42
Elder Dr at Fairview Rd	A (A)	2	A (A)	3	A (A)	5	A (A)	7
TH 210 at Elder Dr	A (A)	3	A (B)	5	A (B)	10	A (C)	15

A (A) – Overall LOS (Worst Movement LOS)

The specific movements at LOS E or F for Alternative 2 in 2035 include: Excelsior Road at Edgewood Drive PM peak hour = LOS E; TH 371 at Excelsior Road, AM Peak hour = LOS E and PM peak hour = LOS F. These deficient levels are a result of the additional projected traffic on Excelsior Road.

**Table 6: Build- Alternative 3 Conditions**

Intersection	2017				2035			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)						
TH 210 at Inglewood Dr	A (C)	12	A (C)	14	B (D)	23	C (D)	30
Inglewood Dr at Fairview Rd	A (A)	3	A (A)	4	A (C)	12	B (C)	21
Inglewood Dr at Excelsior Rd	A (B)	7	A (B)	9	B (D)	24	C (D)	32
Excelsior Rd at Forest Dr	A (A)	1	A (A)	2	A (A)	4	A (B)	6
Excelsior Rd at Edgewood Dr	B (D)	26	C (E)	38	C (E)	38	D (F)	48
TH 371 at Excelsior Rd	B (D)	24	C (D)	36	D (E)	40	E (F)	50
Elder Dr at Fairview Rd	A (A)	2	A (A)	3	A (A)	5	A (A)	7
TH 210 at Elder Dr	A (A)	3	A (B)	5	A (B)	10	A (C)	15

A (A) – Overall LOS (Worst Movement LOS)

The specific movements at LOS E or F for Alternative 3 in 2017 include: Excelsior Road at Edgewood Drive PM peak hour = LOS E, and; in 2035 include: Excelsior Road at Edgewood Drive AM peak hour = LOS E and PM peak hour = LOS F; TH 371 at Excelsior Road, AM Peak hour = LOS E and PM peak hour = LOS F. These deficient levels are a result of the location of the new connection of Fairview Avenue to line up with the existing Edgewood Drive and it's interaction with TH 371.

Vehicle Queuing Analysis

A queuing analysis for the existing and future conditions was conducted, evaluating the anticipated vehicle queues with the proposed traffic conditions. The analysis was conducted using the SimTraffic simulation software. The results found that during both the weekday AM and PM peak hours in 2017 and 2035 conditions, the maximum queues will exceed the available or proposed turn lane or block driveways at the following locations:

No Build:

- TH 210 at Inglewood Drive southbound traffic would block the Fairview Road intersection without Traffic signal control.
- Excelsior Road at Edgewood Drive southbound left turn traffic would block the driveway into Holiday / Cash Wise Liquor without traffic signal control.

#### Alternative 1 (Offset intersections):

- Excelsior Road at Fairview Road (new intersection) westbound to southbound left turn traffic would back up into the through lane back to the existing Edgewood Drive intersection.
- Excelsior Road at Edgewood Drive eastbound to northbound left turn traffic would back up into the through lane past the new Fairview Road intersection.
- Excelsior Road at Edgewood Drive southbound left turn traffic would block the driveway into Holiday / Cash Wise Liquor without traffic signal control.
- TH 371 at Excelsior Road eastbound traffic would back up past the Edgewood Drive intersection.

#### Alternative 2 (relocated intersection west):

- Edgewood Drive southbound and northbound approaching Excelsior Road would require a minimum of 500 feet to the first driveway access to accommodate turning traffic into the developments. A three lane section with a center left turn lane is recommended both north and south of Excelsior Road on Edgewood Drive and Fairview Road.

#### Alternative 3:

- Excelsior Road at Edgewood Drive eastbound to northbound left turn traffic would back up into the through lane past the new Fairview Road intersection.
- Excelsior Road at Edgewood Drive westbound left turn traffic would back up into TH 371 with or without traffic signal control.
- TH 371 at Excelsior Road eastbound traffic would back up past the Edgewood Drive intersection.

Based on the traffic and queue analysis discussed above **Alternative 2 provides the safest and most efficient vehicle operation now and in the future** and is recommend as the preferred alternative. Alternative 1 and Alternative 3 both have significant operations and vehicle queuing issues that will result in safety concerns in the future.

## RIGHT-OF-WAY

Based on the traffic analysis and required lane geometry, the right-of-way needs were reviewed. For the Fairview Road extension and/or Edgewood Drive realignment alternatives a typical 80 feet of right-of-way should be provided. Along Excelsior Road at the intersection of Fairview Road / Edgewood Drive additional right of way would be required. The exact amount would depend on the location of the intersection and the type of traffic control selected (i.e. Traffic Signal or Roundabout). Along Excelsior Road west of the Edgewood Drive/Fairview Road intersection any right-of-way needs would be based on what type of pedestrian accommodations is provided. This could range from no right-of-way to 14 feet (7 on each side). As the area develops the City should work with adjacent developers to acquire any needed right-of-way.

## ACCESS CONTROL

A basic traffic engineering approach to improving operational and safety characteristics of a roadway is managing access to it. The spacing of intersections and driveways should be controlled as defined by roadway functional class, traffic operations and traffic volumes. The level of control is determined by the type of access being considered and the functional classification of the roadway itself.

Arterials need the most access control to provide their primary function of mobility (longer-distance trips at relatively high speeds). Local streets, on the other hand, carry short trips and primarily serve an access function. Collector roadways serve both a mobility and access function in roughly equal measures and access should be managed accordingly.

This approach limits the impact of intersections and driveways on average speeds and levels of service on roadways appropriate to the function of those facilities. Some linkage to land uses may become somewhat less direct, but this needs to be balanced against the overall gains in terms of operational and safety conditions.

For the Excelsior Road Area Study the following access spacing guidelines should be considered:

- Excelsior Road at Edgewood Drive:
  - North approach - The first driveway should be located a minimum of 500 feet from the intersection.
  - South approach – The first driveway should be located a minimum of 500 feet from the intersection.
  - West approach – Add a raised concrete median, remove first two driveways on the north side of Excelsior Road.
  - East approach remove driveway across from the existing Edgewood Drive.
- With development proposals provide internal traffic design to limit the number of driveways to the roadway system and/or to provide that access on appropriate roadways.
- In general were possible driveways should be located across from each other.
- In general were appropriate one access should be provided per property per street frontage.
- Shared driveways should be provided where abutting properties have similar land uses.
- When properties adjoin two streets, the access should be to the lower volume street.

## PEDESTRIAN NETWORK ANALYSIS

The City of Baxter is committed to providing a comprehensive and coordinated series of trails that provides transportation as well as recreational value. In general the trails network should follow the following guidelines:

- City Trails should be connected with State and Regional trails where possible.
- City trails should be continuous with other trail systems and/or sidewalks in the City.
- Trails should connect recreation and amenity areas with areas of potentially higher pedestrian and bicycle traffic volumes.
- Trails should provide access in the City where sidewalks are deficient.

In determining the appropriate facilities for the City, several “Best Practices” can be considered.

**Traditional Bike Lanes** - On-road bike lanes provide designated space exclusively for cyclists and are distinctly separate from auto-traffic lanes. On-road bike lanes go in one direction, consistent with vehicle traffic and are striped and clearly visible for drivers. Striped bicycle lanes have been shown to have a channeling effect for both drivers and cyclists, and makes cyclists feel more confident that drivers will not drift into their path travel.

**Off-Road Trails** - Off-road trails can be a much more comfortable option than an on-street bike lane as users are separated from traffic. They provide a great opportunity for children and less experienced cyclists to use non-motorized transportation and feel safe. In many cases, off-road trails are used by multiple types of users such as cyclists, joggers, people on rollerblades, and people walking their dog. For routes that receive significant use, separate trails for different users may be necessary. When separate paths are provided, proper signage should indicate which paths are to be used by pedestrians and which should be used by cyclists. Using different paving materials or providing a median between the separate facilities can further reinforce designation for different users.

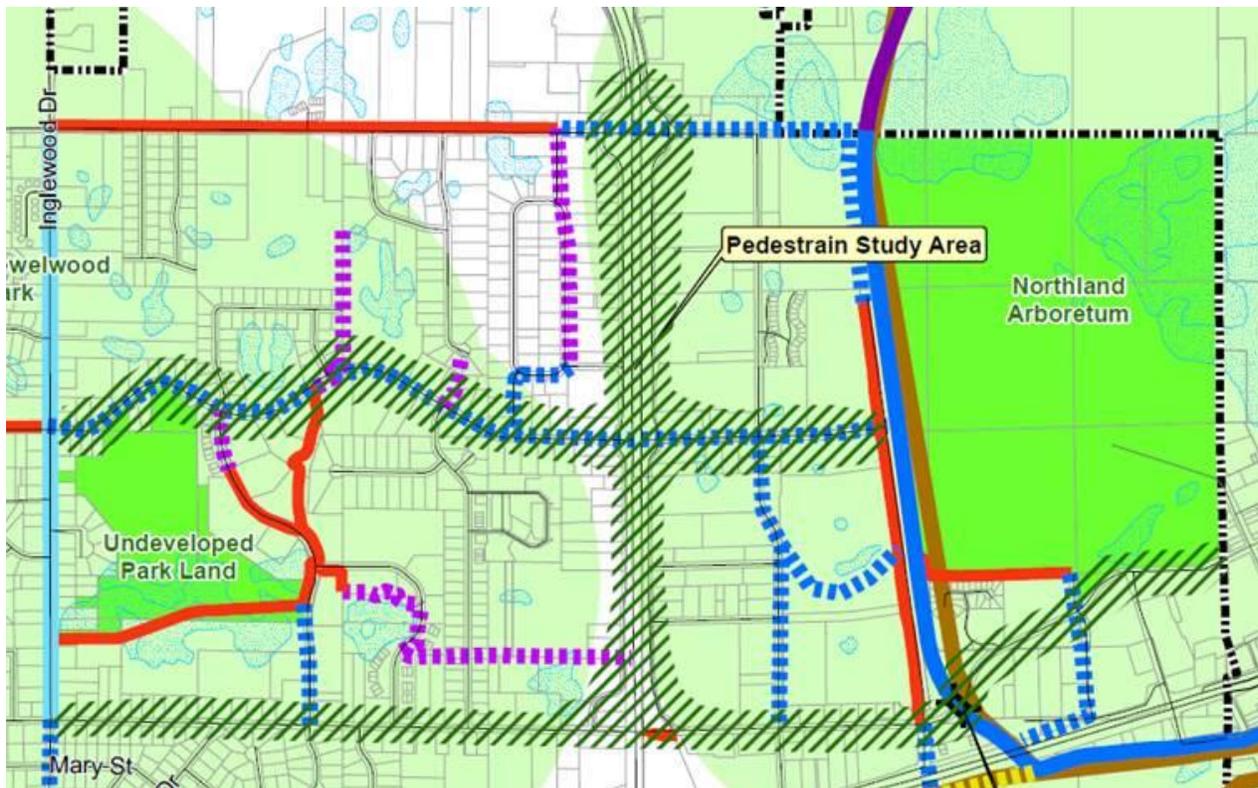
Currently within the City of Baxter, there are existing bituminous paths, gravel paths and on-road designated (and undesignated) bike lanes that provide localized pedestrian networks through neighborhoods and within some existing City and regional parks. In addition the City has been securing easements adjacent to some corridors based on the previous Comprehensive Trails Plan.

The City recently completed the Comprehensive Plan update outlining implementation goals for the Parks and Trail System. For the Excelsior Road area there are three primary implementation strategies that apply. They include:

1. Preparing pedestrian studies for some of the primary corridors within the City including: TH 371 Trail Crossing, Edgewood Drive, Dellwood Drive, Excelsior Road and Clearwater Road;
2. Identifying and implementing on-road bike corridors on major roadway within the City, and;
3. Developing Multi-modal Planning and Design policies.

**Figure 13** shows a portion of the recently adopted “Future and Existing Parks and Trails System” map for the area north of TH 210. This map shows Excelsior Road and Edgewood Drive are two of possible future pedestrian corridors in this area.

**Figure 13: City Future and Existing Parks and Trails System Map**



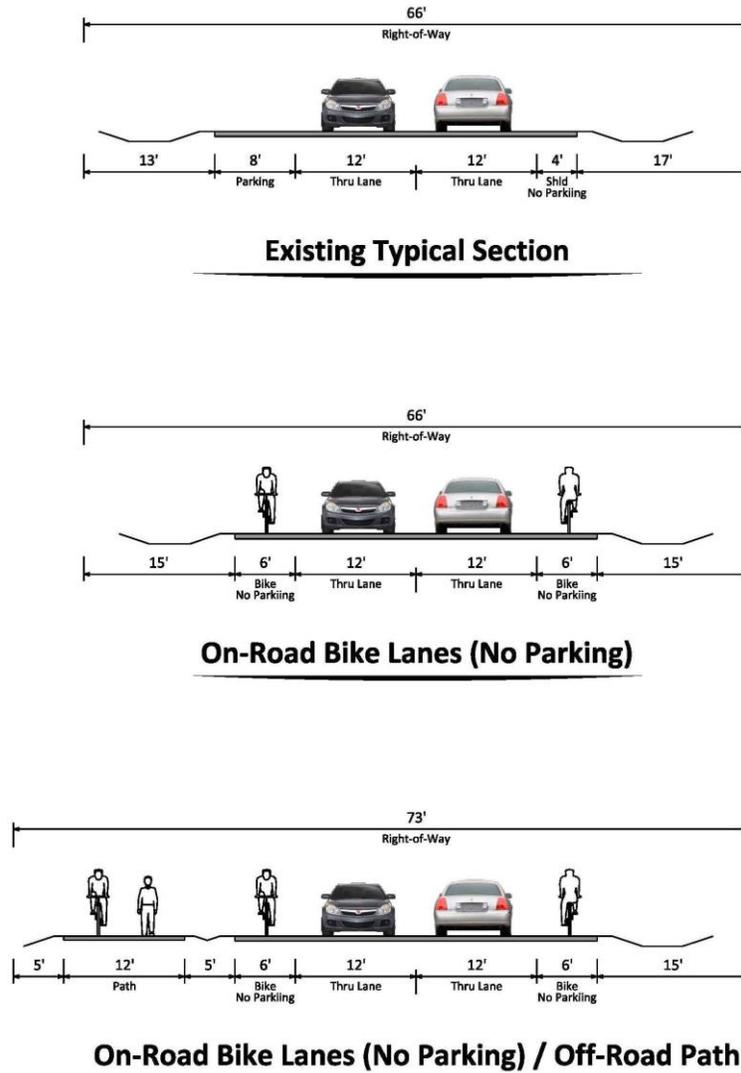
To ensure that any improvement proposed on or adjacent to Excelsior Road, future pedestrian facilities need to be considered. A pedestrian facility in this location provides access from the residential areas west of TH 371, the commercial areas adjacent to TH 371, and; connects to the existing path east of TH 371 by use of the controlled signaled intersection as a safe crossing.

The options to accommodate pedestrians and bikes on Excelsior Road are to either provide an off-road pedestrian trail adjacent to the roadway or, provide on-road accommodations. An off-road pedestrian path could be provided on the south side of Excelsior Road from Inglewood Drive to TH 371. This would require acquisition of approximately 7 to 14 feet of right-of-way for the length of the corridor.

If an on-road bike lane would be considered it would need to follow State Aid rules. The bike lanes could be accommodated on Excelsior Road west of Edgewood Drive by designating the existing shoulders as dedicated bike lanes. This would require signing no parking on the south side similar to the north side. From Edgewood Drive through the intersection with TH 371 on-road bike lanes would require restriping and widening the roadway 3 to 5 feet.

**Figure 14** shows the existing typical roadway section on Excelsior Road together with typical sections for both on-road and off-road facilities.

**Figure 14: Excelsior Road Typical Sections**



## CONCLUSIONS / RECOMMENDATIONS

Based on the analysis documented in this memorandum, WSB has concluded the following:

- The Excelsior Road area is anticipated to generate an additional 3,000 daily trips at full development (2035) resulting in ADT on Excelsior Road ranging from 4,000vpd to 7,000vpd in 2017 and 5,600vpd to 9,500vpd by 2035.
- The results of the existing (2015) traffic operations analysis indicates that all existing intersections are operating at an overall LOS C or better during both the weekday AM and PM peak hours with all movements operating at LOS D or better.
- The traffic operation analysis for the No-Build conditions shows that all intersection will be operating at an overall LOS D or better in 2017 and 2035 during both the weekday AM and PM peak hours with the existing traffic control. However, with the increase in traffic, some movements by 2035 will be operating at LOS E and F.
- Three primary alternatives were included with the analysis to provide a connection from Fairview Road to Excelsior Road.
  - **Alternative 1** – Fairview Road connection to Excelsior Road without realignment of the existing Edgewood Drive creating two “T” intersections.
  - **Alternative 2** – Fairview Road connection to Excelsior Road with the realignment existing Edgewood Drive.
  - **Alternative 3** – Fairview Road connection to Excelsior Road at existing Edgewood Drive.
- Intersection traffic operations for the 2017 and 2035 build alternatives shows that all intersection would operate at overall LOS D or better in 2017 and 2035 during both the weekday AM and PM peak hours. The only exceptions are with Alternative 1 at the new intersection on Excelsior Road at Fairview in 2035 during the PM peak hour would operate at an overall LOS E and, with Alternative 3 at the intersection of TH 371 and Excelsior Road in 2035 during the PM peak hour which would operate at an overall LOS E.
- The queuing analysis indicates that during both the weekday AM and PM peak hours for 2017 and 2035 conditions, the maximum queues are exceeded at several locations where the available turn lane storage is exceeded or driveways are blocked including:
  - No-build - TH 210 at Inglewood Drive southbound traffic would block the Fairview Road intersection without Traffic signal control. Excelsior Road at Edgewood Drive southbound traffic would block the first development driveway without traffic signal control.

- Alternative 1 - Excelsior Road at Fairview Road (new intersection) westbound to southbound left turn traffic would back up into the through lane back to the existing Edgewood Drive intersection. Excelsior Road at Edgewood Drive eastbound to northbound left turn traffic would back up into the through lane past the new Fairview Road intersection. Excelsior Road at Edgewood Drive southbound left turn traffic would block the driveway into Holiday / Cash Wise Liquor without traffic signal control. TH 371 at Excelsior Road eastbound traffic would back up past the Edgewood Drive intersection.
  - Alternative 2 - Edgewood Drive southbound and northbound approaching Excelsior Road would require a minimum of 500 feet to the first driveway access to accommodate turning traffic into the developments. A three lane section with a center left turn lane is recommended both north and south of Excelsior Road on Edgewood Drive and Fairview Road.
  - Alternative 3 - Excelsior Road at Edgewood Drive eastbound to northbound left turn traffic would back up into the through lane past the new Fairview Road intersection. Excelsior Road at Edgewood Drive westbound left turn traffic would back up into TH 371 with or without traffic signal control. TH 371 at Excelsior Road eastbound traffic would back up past the Edgewood Drive intersection.
- Based on the analysis **Alternative 2 is the recommended preferred alternative**, providing the safest and most efficient vehicle operation now and in the future. Alternative 1 and Alternative 3 both have significant operations and vehicle queuing issues that will result in safety concerns in the future. *Figure 15* shows the recommended Alternative 2 improvements.
  - Based on the analysis the following right-of-way needs are anticipated:
    - For the Fairview Road extension/Edgewood Drive realignment a typical 80 feet should be provided.
    - At the intersection of Excelsior Road and Fairview Road/Edgewood Drive right-of-way will be required. The exact amount would depend on the location of the intersection and the type of traffic control selected (i.e. Traffic Signal or Roundabout).
    - The right-of-way needs on Excelsior Road would be based on what type of pedestrian accommodations is provided. This could range from no right-of-way to 14 feet (7 on each side).
  - Any improvement proposed on or adjacent to Excelsior Road should be designed to accommodate future pedestrian facilities. Pedestrian facilities in this location provides access from the residential areas west of TH 371, the commercial areas adjacent to TH 371, and; connects to the existing path east of TH 371 by use of the controlled signalized intersection as a safe crossing.

- An off-road pedestrian path could be provided on the south side of Excelsior Road from Inglewood Drive to TH 371. This would require acquisition of approximately 7 to 14 feet of right-of-way for the length of the corridor. The bike lanes could also be accommodated on Excelsior Road west of Edgewood Drive by designating the existing shoulders as dedicated bike lanes. From Edgewood Drive through the intersection with TH 371 on-road bike lanes would require restriping and widening the roadway 3 to 5 feet.

Based on these conclusions the following is recommended.

1. Adopt the Fairview Road to Excelsior Road Alternative 2 recommended plan (**Figure 15**). This plan provides the safest and most efficient vehicle operations verses Alternative 1 or Alternative 3. This plan will provide direction to property owners and developers adjacent to the Excelsior Road corridor to include the following components:
  - a. Reconstruct the intersection of Excelsior Road and Fairview Road/Edgewood Drive as a traffic signal or roundabout based on the determination of the Intersection Control Evaluation (ICE) report.
  - b. Realign Edgewood Drive to 1000 feet north of Excelsior Road as a three lane section with a center left turn lane.
  - c. Construct the connection from Fairview Road to Excelsior Road as a three lane section with a center left turn lane.
  - d. Provide access control 500 feet north, 450 feet south, 370 feet east (past the existing Edgewood Drive) and 350 feet west of the new Excelsior Road and Fairview Road/Edgewood Drive intersection.
  - e. Allow access to the proposed development south of Excelsior Road at the locations shown on the proposed site plan (approximately 450 feet and 750 feet south of Excelsior Road) with the south access modified as shown in **Figure 15**. Access to the Church should be modified to line up with the proposed development access.
  - f. Provide accommodations for an off road pedestrian path on the south side of Excelsior Road from approximately 600 feet east of the new Excelsior Road and Fairview Road/Edgewood Drive intersection to TH 371.
  - g. Provide accommodations for an off road pedestrian path on the west side of Edgewood Drive/Fairview Road from 1000 feet north of Excelsior Road to 800 feet south.
2. Designate/restripe Excelsior Road to provide one lane in each direction and an on-road bike lane from the new Fairview Road/Edgewood Drive intersection to Inglewood Drive.
3. Secure additional right-of-way from properties as they develop to provide an 80 foot right-of-way corridor (40 feet on each side from centerline) along Excelsior Road to accommodate a future off-road pedestrian path.

The next steps in the process of implementing an improvement are as follows:

1. Intersection Control Evaluation (ICE) – This document will identify the type and details of intersection traffic control (i.e. Traffic Signal or Roundabout). This report will need to be reviewed and approved by MnDOT.
2. Feasibility Study – This document will outline the details of the improvement as well as discuss costs and funding.
3. Detail Design – This will include preparation of the final design plans and specification for public bidding for the improvements identified in the previous documents.
4. Construction – Implementation of the improvements.

If you have any question or comments please feel free to contact Chuck Rickart (612.360.1283)



**Excelsior Road Area  
Transportation Study**  
City of Baxter, Minnesota

Figure 15  
**Fairview Road / Excelsior Road  
Recommended Alternative #2**