

REQUEST FOR COUNCIL ACTION

Date: 7/18/11
Item No.: 10.e

Department Approval



City Manager Approval



Item Description: Receive County Road C-2 Traffic Study

BACKGROUND

At the March 21, 2011 City Council meeting, a number of property owners from County Road C-2 and Josephine Road spoke regarding County Road C-2. The main point of discussion was the connection of County Road C-2 and potential impacts to Josephine Road and County Road C-2.

At the April 25, 2011 meeting, the City Council authorized the completion of a traffic study. The purpose of the study is to quantify the local and regional traffic impacts of connecting County Road C-2 between Hamline Avenue and Lexington Avenue under current traffic volume conditions and future year 2030 conditions.

The findings of the study will be presented to the public at an information meeting on Wednesday, July 13, 2011 at 6:00 pm. Notices for this meeting were sent to over 300 property owners and advertised in the City's News Fax.

The traffic study is attached.

POLICY OBJECTIVE

County Road C-2 from Snelling Avenue to Victoria Street is a collector street. There is continuous right-of-way for the segment of County Road C-2 between Hamline Avenue and Lexington Avenue, however, there is a 175 foot long segment east of Griggs Street and west of the cul-de-sac off Lexington Avenue that has never been constructed.

FINANCIAL IMPACTS

The cost to have SRF complete the Origin Destination Study and subsequent public meetings is \$15,000. The study was funded by the street construction fund.

STAFF RECOMMENDATION

Receive County Road C-2 traffic study.

REQUESTED COUNCIL ACTION

Recieve County Road C-2 traffic study.

Prepared by: Debra Bloom, City Engineer
Attachments A: Traffic Study



SRF No. 0117477

MEMORANDUM

TO: Debra Bloom, P.E., Assistant Public Works Director/City Engineer
City of Roseville

FROM: Craig Vaughn, P.E., PTOE, Senior Associate
Matthew Pacyna, P.E., Senior Engineer

DATE: July 13, 2011

SUBJECT: COUNTY ROAD C2 SUBAREA ORIGIN-DESTINATION STUDY

INTRODUCTION

As requested, SRF Consulting Group has completed a review of the subarea surrounding County Road C2 between Hamline Avenue and Lexington Avenue in the City of Roseville (see Figure 1: Study Area). The main objective of this study is to evaluate the travel pattern shifts associated with a potential connection of County Road C2 between Hamline Avenue North and Lexington Avenue North. Currently, County Road C2 is disconnected between Griggs Street North and Lexington Avenue North. Current traffic patterns, volumes, and intersection operations were reviewed to determine the effect a potential connection would have on the adjacent roadway network. Furthermore, the roadway design feasibility was reviewed to evaluate the impacts associated with constructing the County Road C2 connection. The following sections summarize the results of this study.

DATA COLLECTION

To determine the potential travel pattern shifts due to a County Road C2 connection, a tiered approach was developed to help identify the potential changes from a local and regional perspective. Based on this approach p.m. peak hour turning movement counts, average daily traffic volumes, and local and regional travel pattern data was collected. Each of the data collection components is summarized below. Figure 2 provides an overview of the various types and locations of data collected.

Turning Movement Counts

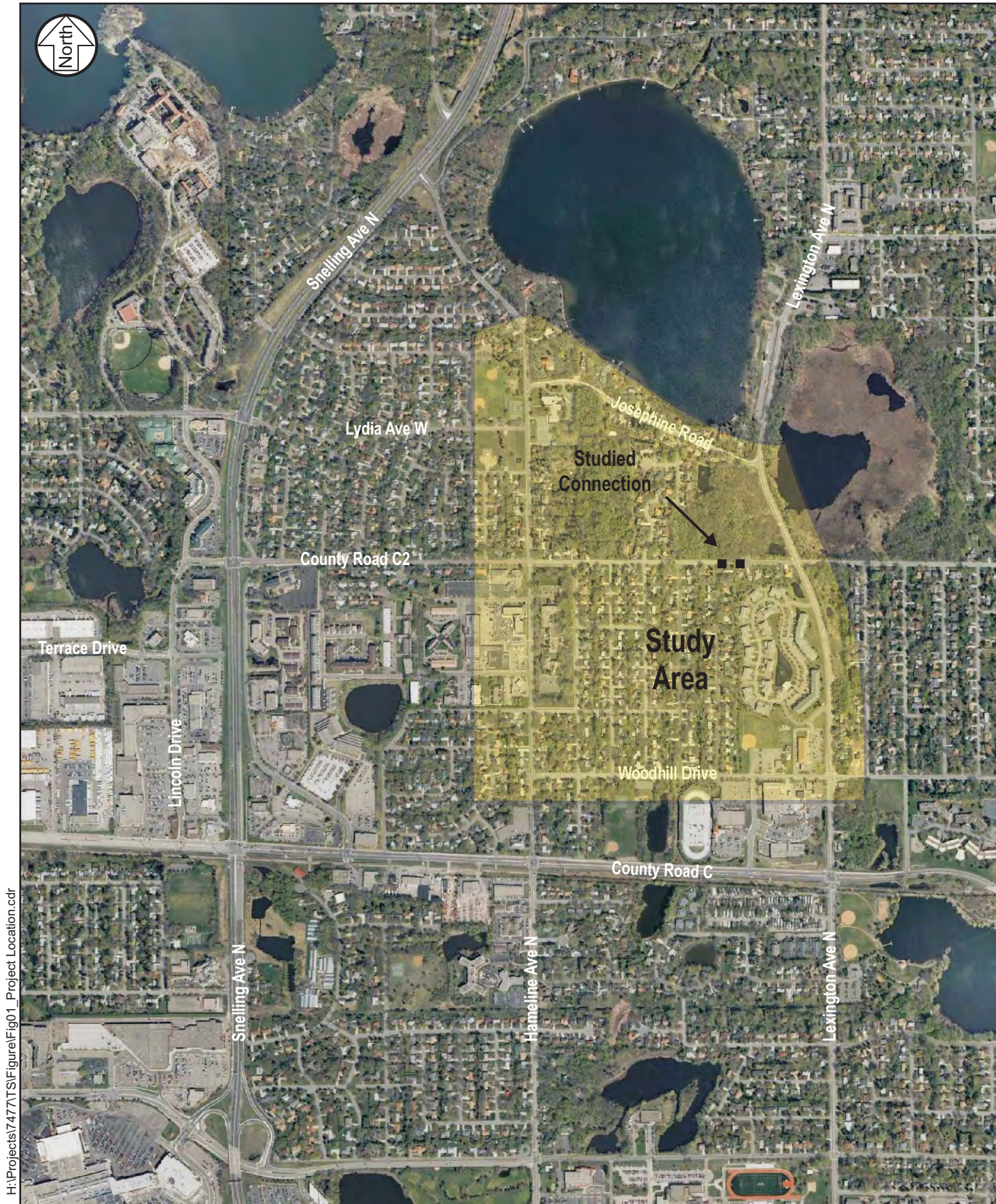
Year 2011 p.m. peak hour turning movements were collected at the following key intersections:

- Lexington Avenue North and County Road C2
- Lexington Avenue North and Josephine Road
- Josephine Road and Fernwood Street

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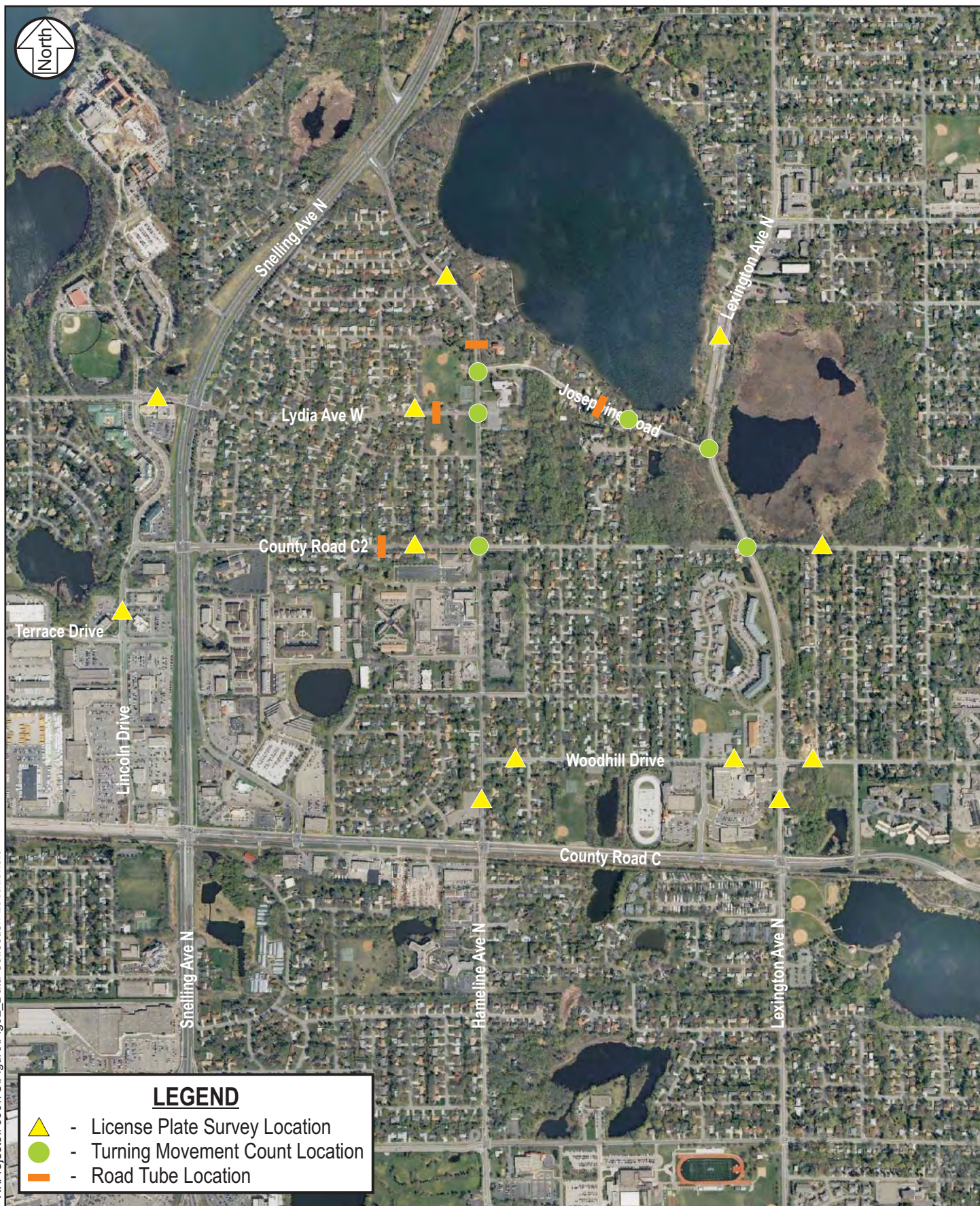
One Carlson Parkway North, Suite 150 | Minneapolis, MN 55447-4443 | 763.475.0010 Fax: 763.475.2429

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Data Collection Overview

County Road C2 Subarea Origin-Destination Traffic Study
City of Roseville

Figure 2

- Josephine Road and Hamline Avenue North
- Hamline Avenue North and County Road C2
- Hamline Avenue North and Lydia Avenue

It should be noted that the p.m. peak hour turning movement counts at all key intersections, except the Hamline Avenue North and Lydia Avenue intersection, were collected for the *Pulte Homes Traffic Study*, dated February 22, 2011. The p.m. peak hour turning movement count at the Hamline Avenue North and Lydia Avenue intersection was completed on May 18, 2011.

The key intersections within the study area are currently unsignalized, with side-street stop control. Lexington Avenue North is a three-lane roadway (two-lane roadway with a center two-way left-turn lane (TWLTL)) with a posted speed limit of 40 miles per hour (mph). Hamline Avenue North is a two-lane roadway with a posted speed limit of 35 mph; the other roadways within the study area are two-lane roadways with posted speed limits of 30 mph. Full-access is provided at each key intersection. Year 2011 geometrics, traffic controls, and p.m. peak hour volumes for the key intersections are shown in Figure 3.

Average Daily Traffic Volumes

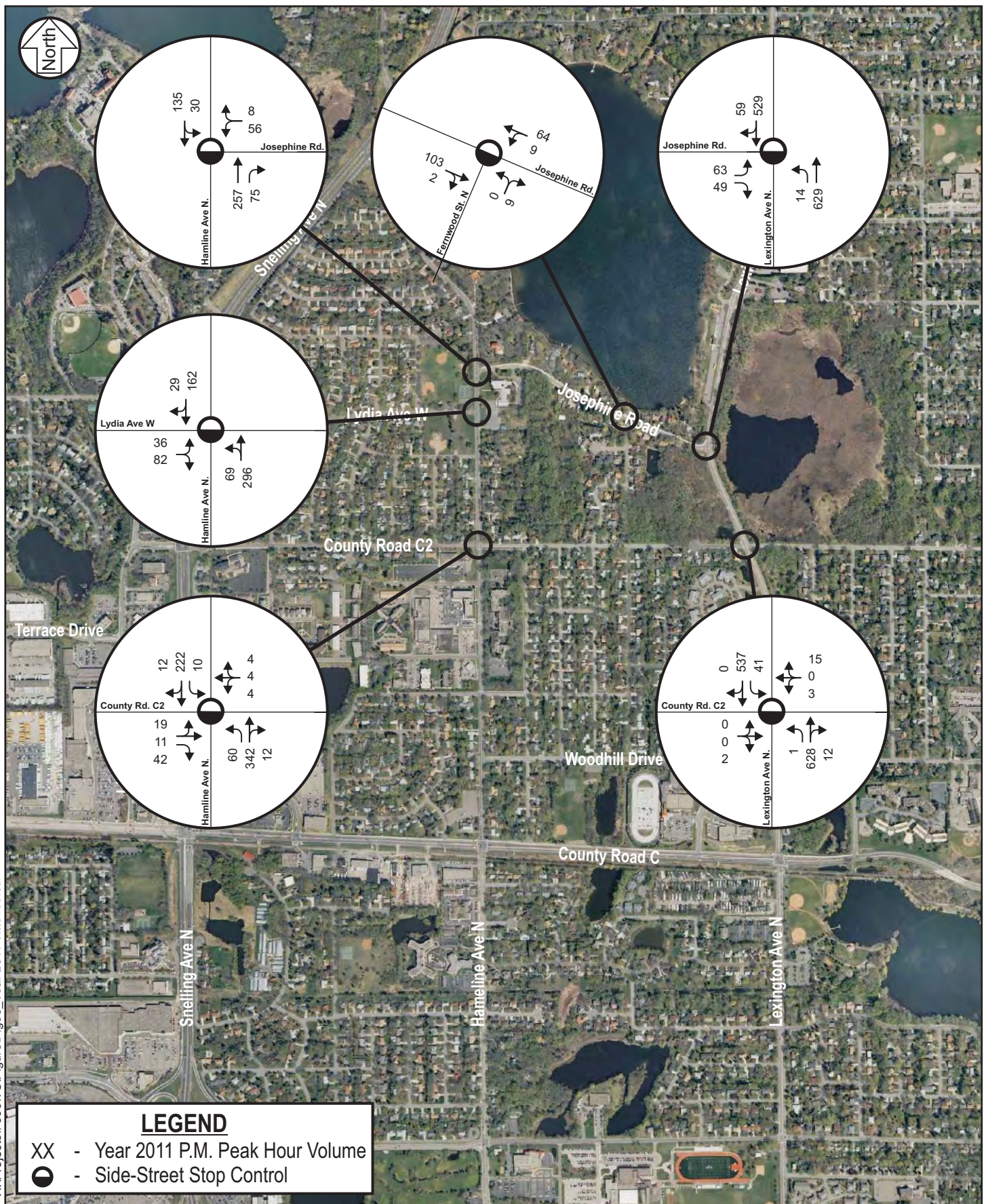
To determine the travel pattern shifts a potential County Road C2 connection will have on area roadways, existing average daily traffic volumes were collected. The volumes included a combination of historical and newly collected average daily traffic volumes. Updated average daily traffic volumes were collected the week of May 16, 2011 at the following locations:

- Hamline Avenue North (North of Josephine Road)
- Lydia Avenue (between Snelling Avenue and Hamline Avenue North)
- County Road C2 (between Snelling Avenue and Hamline Avenue North)
- Josephine Road (between Hamline Avenue North and Lexington Avenue North)

The updated average daily traffic volumes were used to determine the percent capture for the license plate origin-destination study discussed later in this memorandum. It should be noted that the average daily traffic volumes from the 2009 Minnesota Department of Transportation flow maps were used as the base average daily traffic volumes.

Current Travel Patterns

To determine the current travel patterns, an origin-destination (O-D) study was conducted. The goal of the O-D study was to identify the potential travel pattern changes if the County Road C2 connection were constructed. To perform the O-D study, a cordon area was developed around the potential County Road C2 connection area. The O-D study was conducted by recording the location, time, direction, and license plate information for all vehicles that passed each survey location. The license plate O-D surveys were conducted during the p.m. peak hour (4:30 p.m. to 5:30 p.m.) on Tuesday May 24, 2011.



As previously mentioned, average daily traffic volumes were collected to help determine the percent capture of license plates. The percent capture is used to gauge the statistical reliability of the data collected. Based on the comparison between the p.m. peak hour data collected from the average daily traffic counts and the license plate O-D study, the average percent capture was approximately 90 percent, which represents a reliable data set.

The license plate data was reviewed and matches identified to develop an understanding of the current travel patterns within the study area. Based on the current travel pattern information, the amount of traffic that may potentially shift to County Road C2 can be determined if the connection were constructed. It should be noted that the peak hour data collected as part of the O-D data collection effort was extrapolated to daily values using the tube count data to identify the percent peak hour proportion. A summary of the current travel patterns and daily traffic volumes using the specific traveled routes are shown in Figures 5 through 8. Please note that this set of figures also presents the amount of traffic that can be expected to shift to County Road C2 if it were connected through. How this was determined is discussed in the following section.

TRAVEL PATTERN SHIFTS

Local Travel Pattern Shifts

The license plate O-D data and subsequent travel time comparisons were reviewed in order to estimate how much traffic can be expected to shift to County Road C2 if it were connected. Please note, never will 100 percent of drivers change their travel pattern if the connection were constructed; the current routes may have some travel time benefit or operational benefit that make them attractive. The new route must be significantly quicker in order to get a large amount of people to change their current pattern. Travel times for the routes that could have drivers shift to County Road C2 were developed.

The travel times were calculated using a combination of the length of the route, the average speed, and specific intersection delays. The travel times were categorized into groups based on the general travel pattern (i.e. southwest to/from northeast) and include an estimated travel time for the potential route using a County Road C2 connection. A route diversion curve was used to determine the amount of vehicles that can be expected to change their travel pattern.

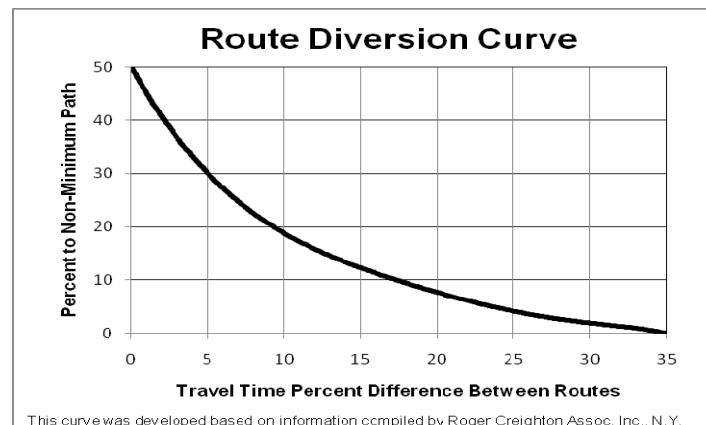
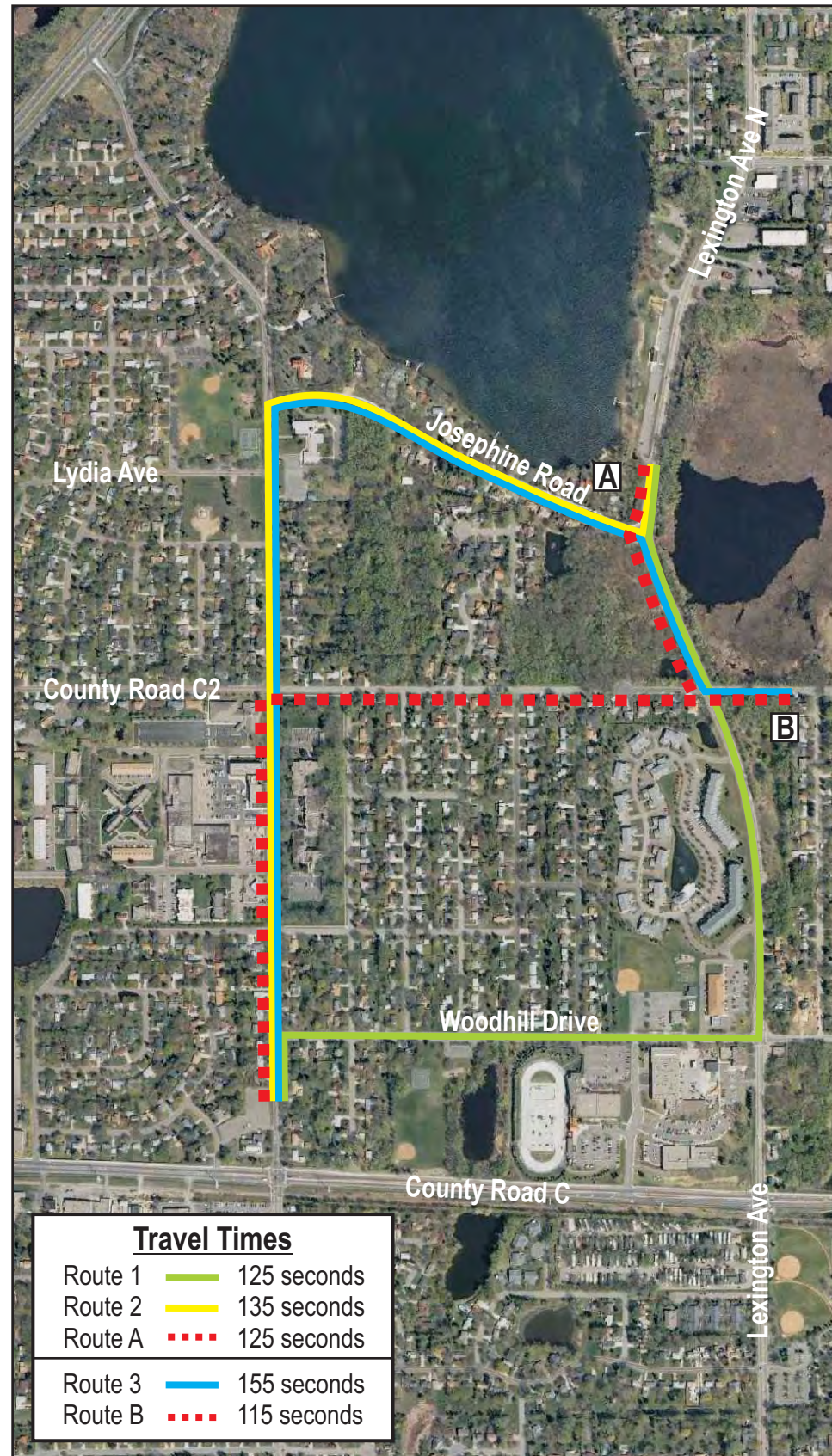
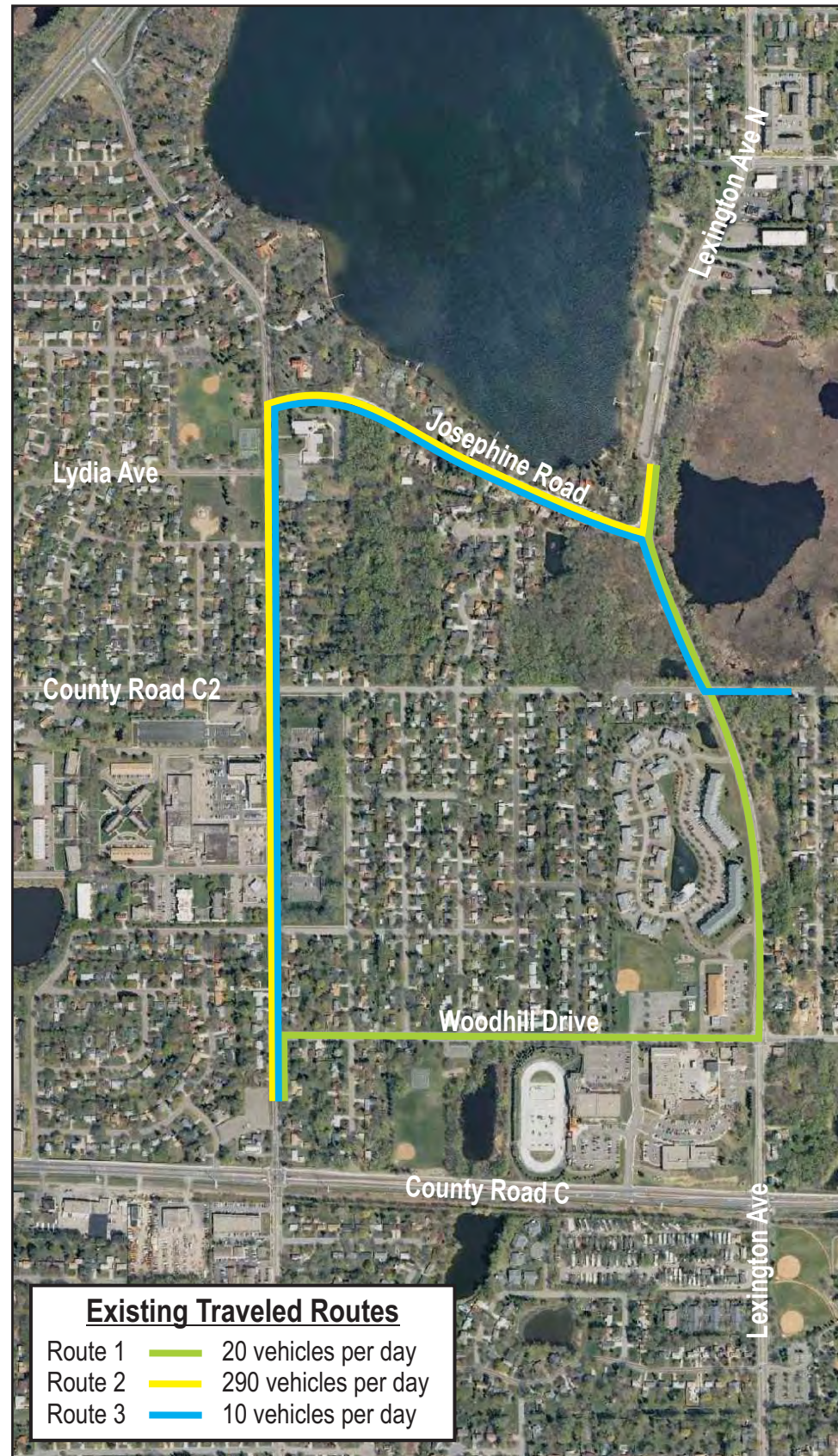
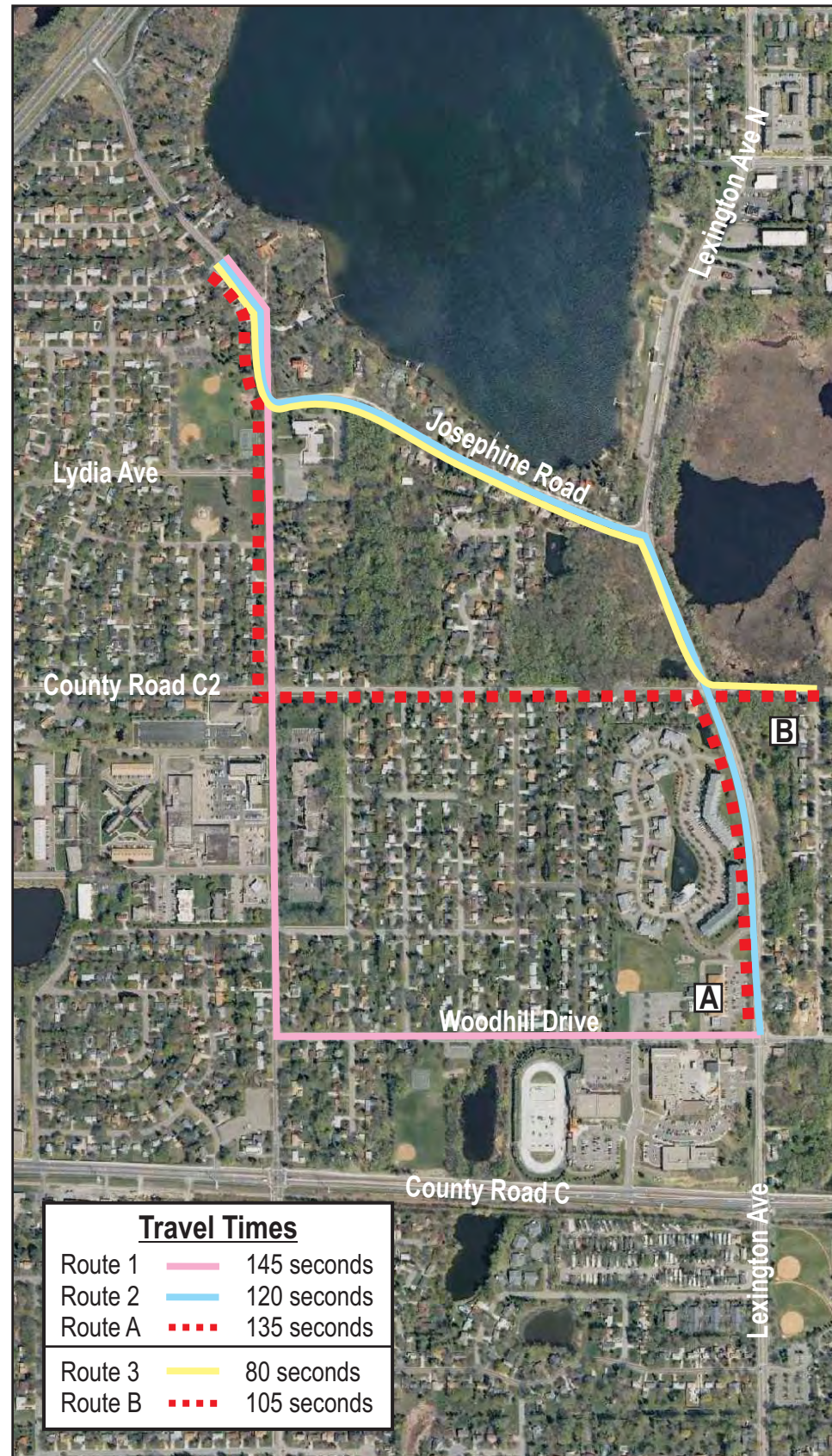
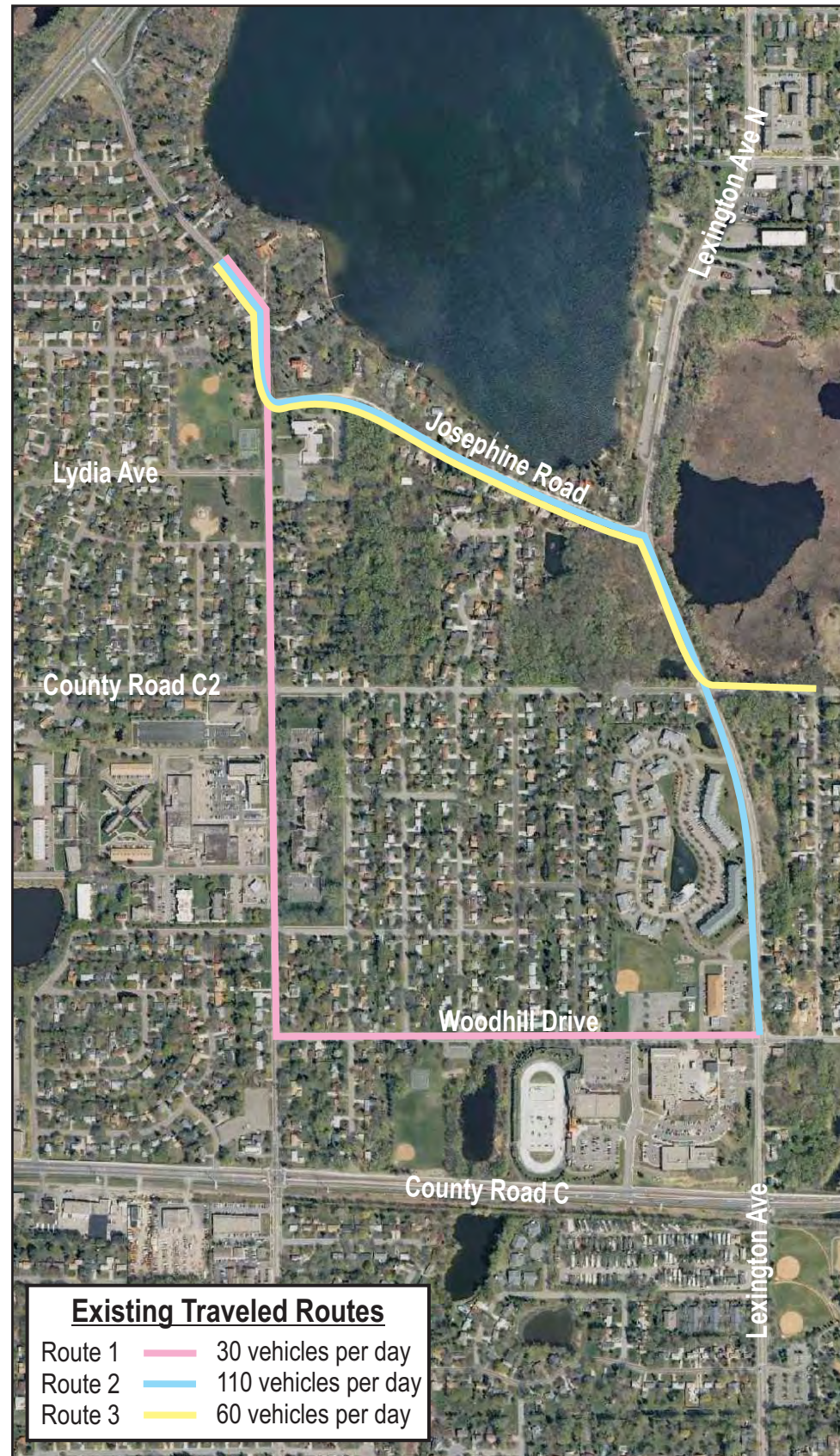


Figure 4: Route Diversion Curve

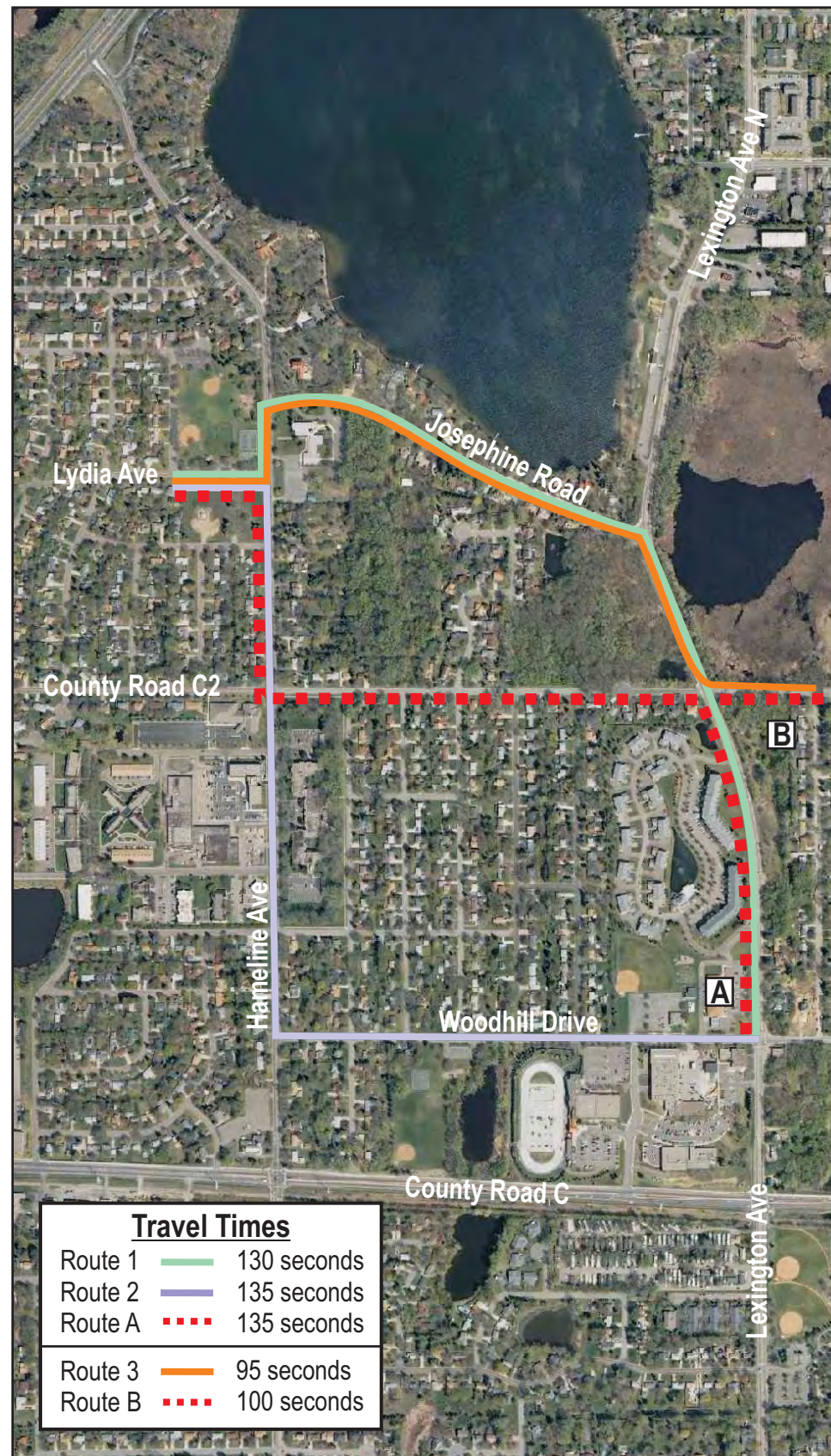
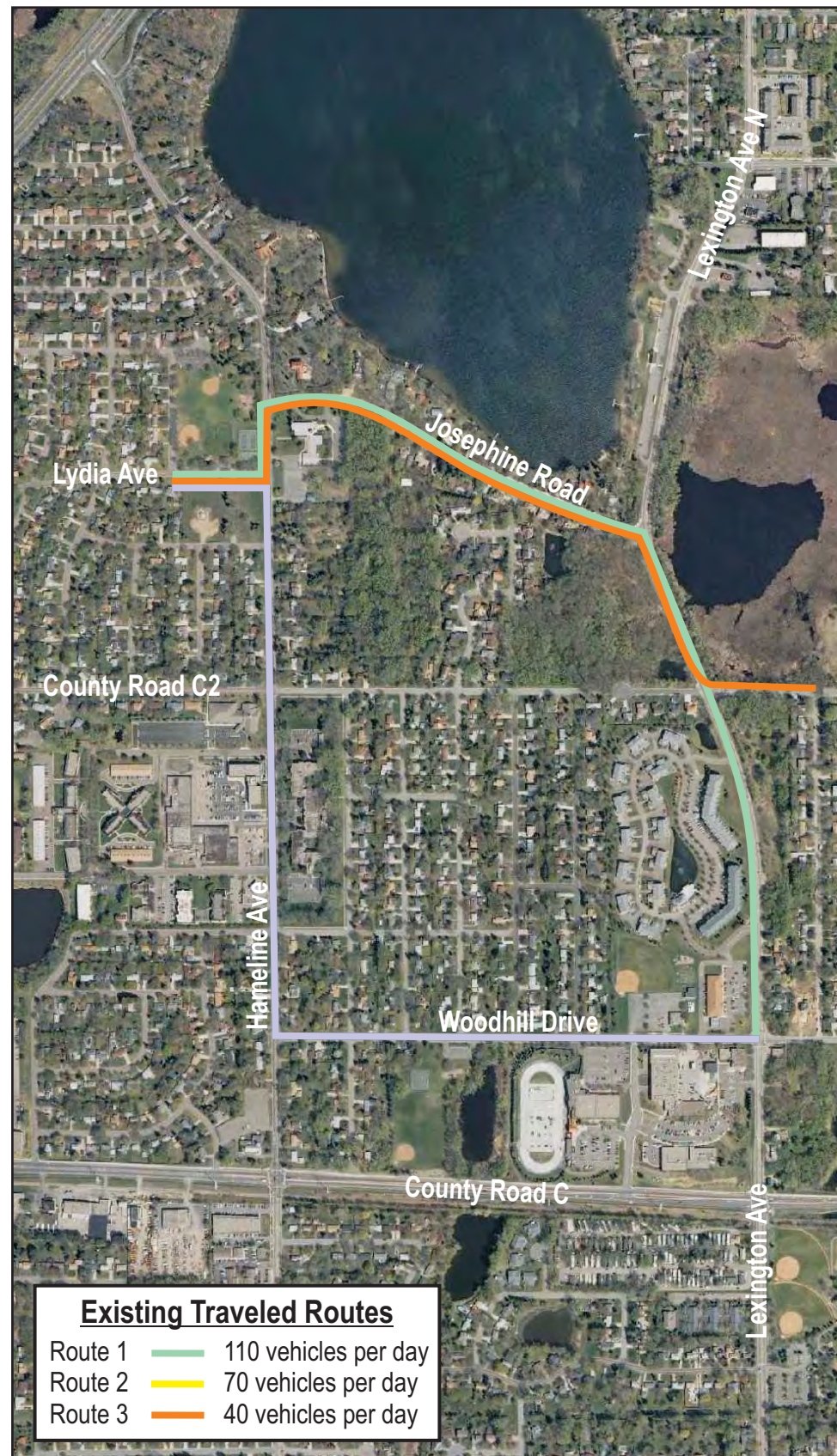
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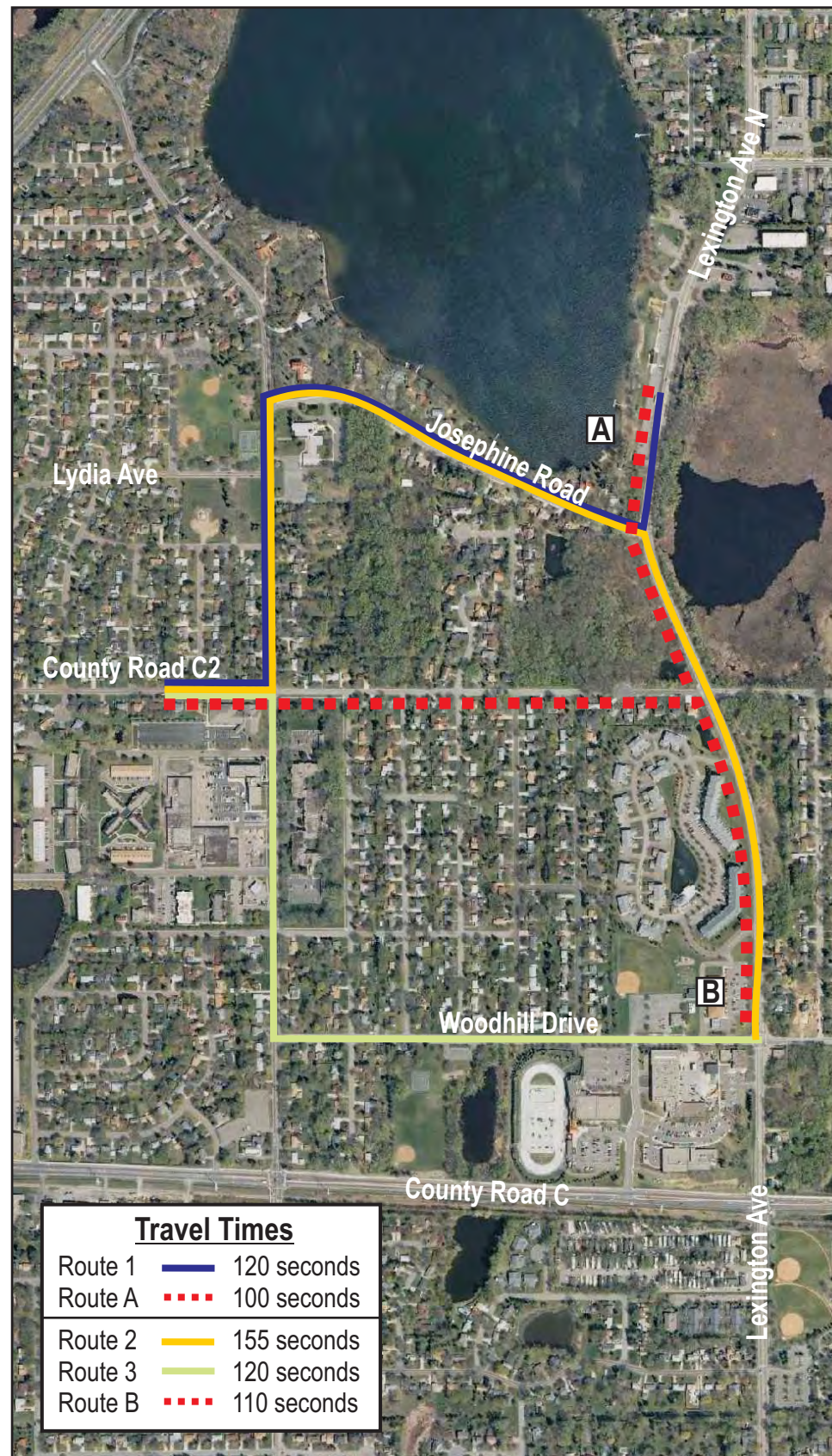
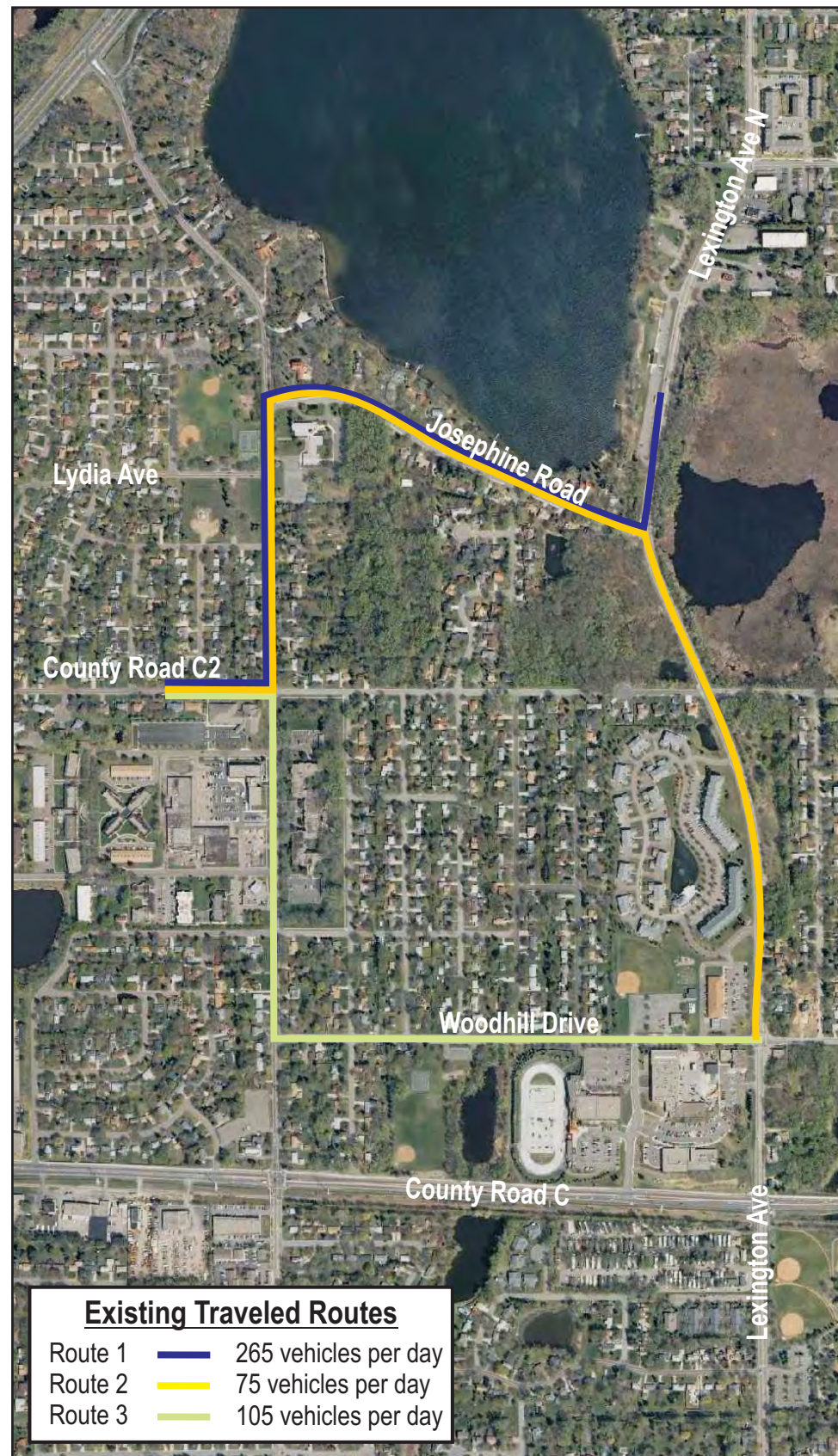
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Results of the travel time route comparison and the resultant percent diversion to County Road C2 is summarized in Table 1. The most affected routes from a volume perspective will be Josephine Road and Woodhill Drive between Hamline Avenue and Lexington Avenue. Josephine Road and Woodhill Drive are expected to see a reduction of approximately 650 and 450 vehicles per day, respectively. It is estimated that approximately 300 vehicles per day of the 450 vpd along Woodhill Drive originate or are destined for the neighborhood between Hamline Avenue and Lexington Avenue, and will utilize the potential County Road C2 connection if constructed. This summarizes the potential County Road C2 connection local changes (approximately 1,100 vehicles per day). Again, Figures 5 through 8 present the current and potential (with the County Road C2 connection) travel time routes for those affected.

Table 1
Travel Time Comparison

General Travel Pattern	Average Travel Time (Seconds) *	Percent Diversion to County Road C2
Southwest to/from Northeast (Figure 5)		
Route 1	125 seconds	50 percent
Route 2	135 seconds	80 percent
- Route A - via CR C2	125 seconds	---
Route 3	155 seconds	100 percent
- Route B - via CR C2	125 seconds	---
Northwest to/from Southeast (Figure 6)		
Route 1	145 seconds	70 percent
Route 2	120 seconds	15 percent
- Route A - via CR C2	135 seconds	---
Route 3	80 seconds	No Diversion
- Route B - via CR C2	105 seconds	---
West to/from East (via Lydia) (Figure 7)		
Route 1	130 seconds	70 percent
Route 2	135 seconds	50 percent
- Route A - via CR C2	135 seconds	---
Route 3	95 seconds	30 percent
- Route B - via CR C2	100 seconds	---
West to/From East (via CR C2) (Figure 8)		
Route 1	120 seconds	90 percent
Route 2	155 seconds	100 percent
- Route A - via CR C2	100 seconds	---
Route 3	120 seconds	80 percent
- Route B - via CR C2	110 seconds	---

* Travel times for each route include intersections delays.

Regional Travel Pattern Shifts

The license plate O-D study provides an understanding of travel patterns at the local level under current conditions. In order to understand the expanded attraction this connection may have on the transportation system, if any, the Metropolitan Council Regional Travel Demand Model was used to identify potential pattern shifts from outside of the immediate study area. The regional model takes into account current and planned households, employment figures, and transportation network changes (under future conditions) to project traffic volumes and travel patterns. The future construction of Twin Lakes Parkway was considered under future conditions to understand if this connection would provide an efficient route for trips to this area. It was determined that fewer than five percent of the proposed Twin Lakes Redevelopment Area travel shed will use either Josephine Road or County Road C2. Therefore, the County Road C2 connection does not serve a significant amount of traffic destined for the Twin Lakes redevelopment area.

Based on the Regional Travel Demand Model, approximately 450 vehicles per day will divert from County Road C to use County Road C2. Other regional system travel pattern shifts include a reduction of approximately 350 vehicles per day from other regional routes in the area (i.e., Snelling Avenue, County Road B2, TH 36, County Road E, etc.). Therefore, the potential County Road C2 connection regional travel pattern shift would be approximately 800 vehicles per day under year 2011 conditions.

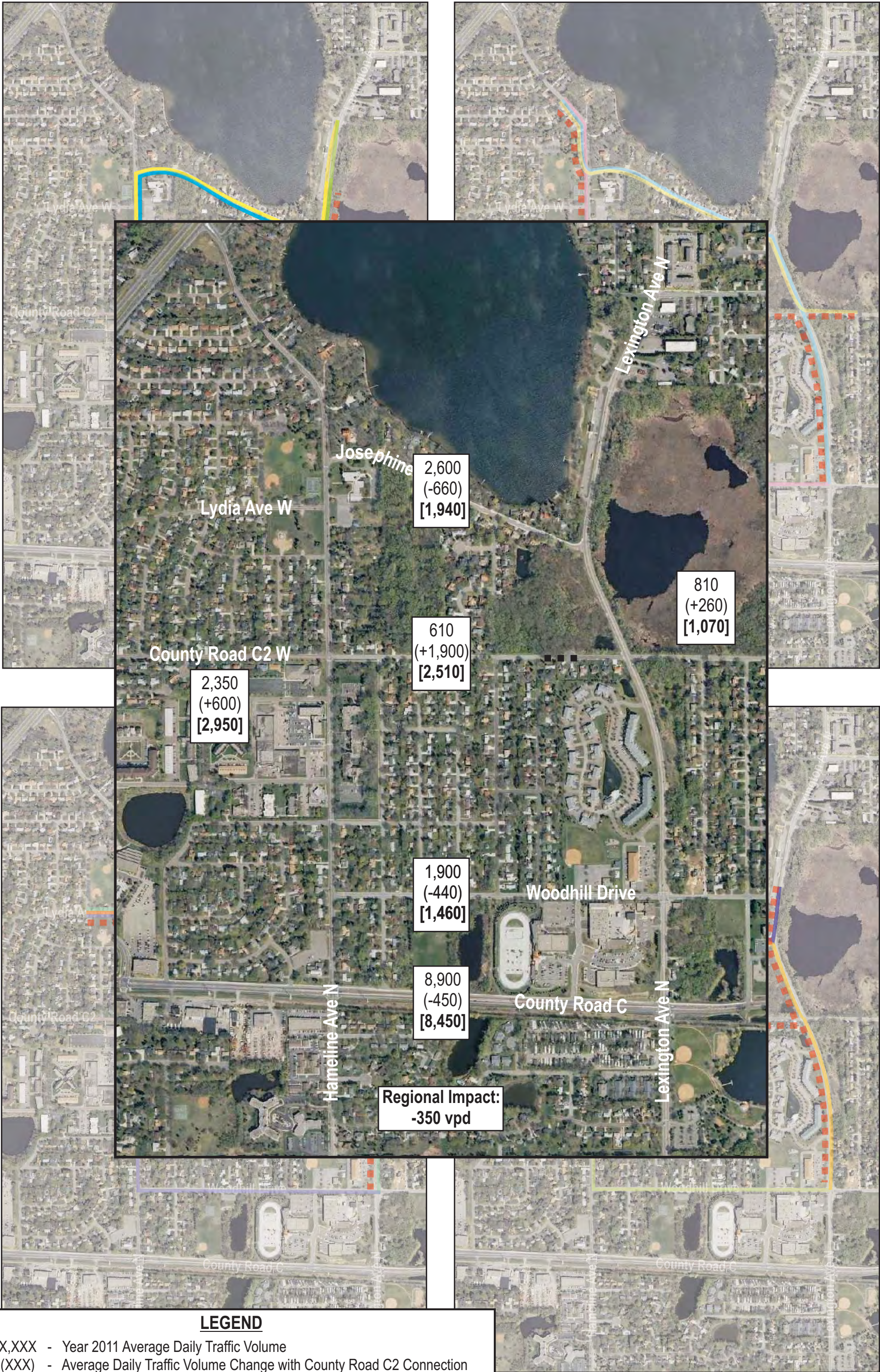
Overall Travel Pattern Shifts

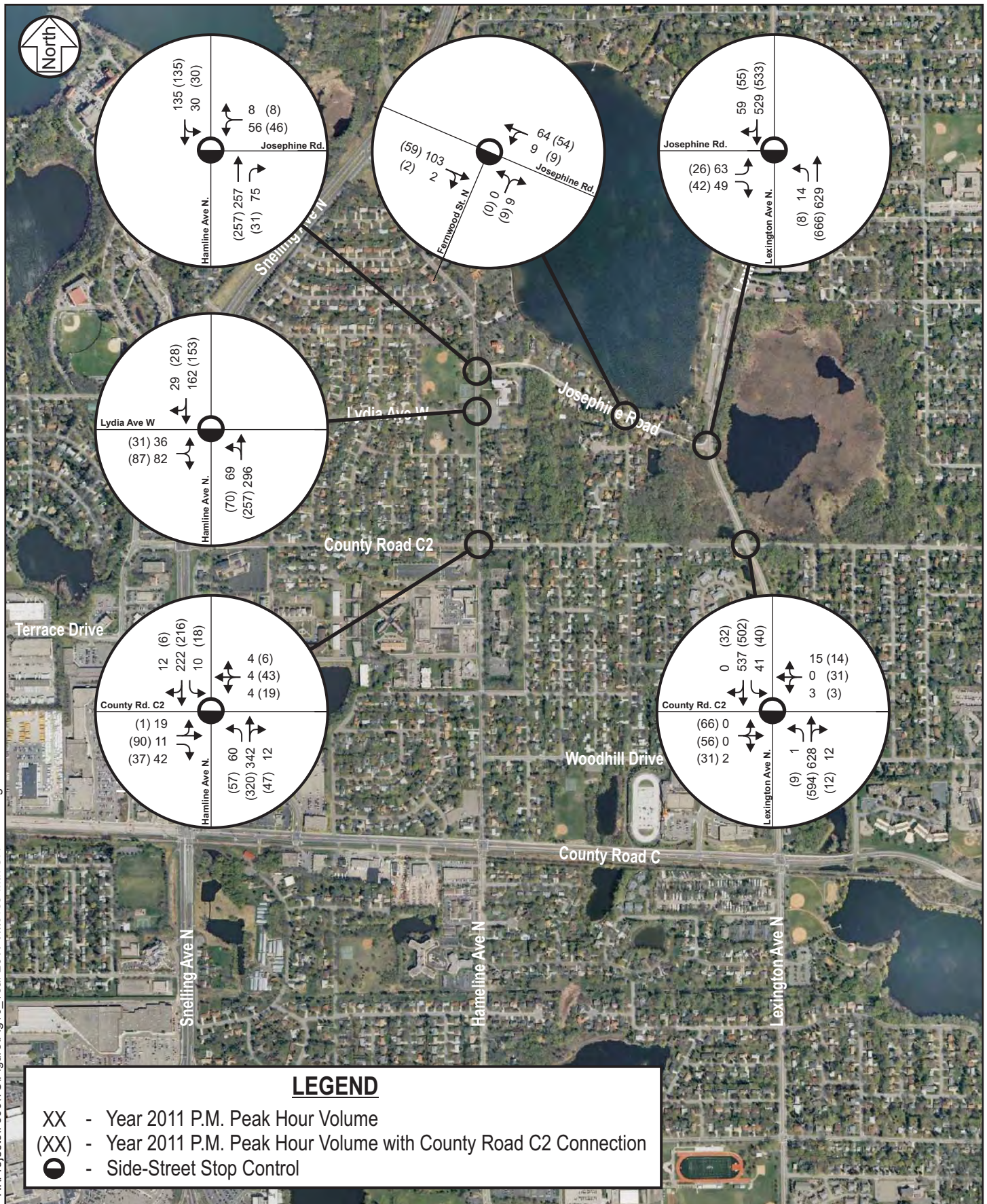
The local and regional travel pattern shifts combined together result in a year 2011 diversion of approximately 1,900 vehicles per day using County Road C2 if the connection were constructed. This results in a year 2011 County Road C2 average daily traffic volume of approximately 2,510 between Hamline Avenue and Lexington Avenue. Figure 9 shows the net change for the key east/west roadways within the study area and the expected year 2011 average daily traffic volumes if the County Road C2 connection were constructed.

TRAFFIC OPERATION ANALYSIS

Year 2011 Peak Hour Intersection Operations

To establish a baseline for the area intersection operations, a p.m. peak hour intersection capacity analysis was completed. This analysis was used to compare the operational impacts with and without the potential County Road C2 connection. The operations analysis was conducted using a combination of the Highway Capacity Manual (HCM) and Synchro/SimTraffic software (version 7). The current p.m. peak hour volumes collected and the modified p.m. peak hour volumes based on the potential County Road C2 connection that were used for the operations analysis are shown in Figure 10. It should be noted that only the p.m. peak hour was reviewed due to it representing a worst-case scenario for the adjacent roadway network. This has been validated with the daily data that has been collected.





Capacity analysis results identify a Level of Service (LOS), which indicates how well an intersection is operating. The LOS results are based on average delay per vehicle. Intersections are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. In the Twin Cities metropolitan area, LOS A through D is generally considered acceptable by drivers. For side-street stop controlled intersections, special emphasis is given to providing an estimate for the level of service of the minor approach. Traffic operations at unsignalized intersections with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support those volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches in most cases. Table 2 presents the level of service criteria for signalized and unsignalized intersections.

Table 2
Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Average Delay per Vehicle [seconds]	
	Signalized Intersections	Unsignalized Intersections
A	< 10	< 10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	> 80	> 50

⁽¹⁾ Stop-controlled intersection LOS criteria are the same for side-street and all-way stop controlled intersections.

Results of the year 2011 operations analysis shown in Table 3 indicate that all key intersections currently operate at an acceptable overall LOS A during the p.m. peak hour with existing traffic control and geometric layout. All side-street delays are considered acceptable and do not require mitigation. With year 2011 traffic volume levels and the County Road C2 connection, all key intersections will continue to operate at an acceptable overall LOS A during the p.m. peak hour with existing traffic control and geometric layout. Side-street delays will increase at the County Road C2 intersections with Lexington Avenue North and Hamline Avenue North. However, the increase in side-street delays is considered acceptable and does not require mitigation. Therefore, from an operations perspective, the potential County Road C2 connection does not significantly impact area intersection operations.

Table 3
Year 2011 Peak Hour Capacity Analysis Comparison
Level of Service Results

Intersection	P.M. Peak Hour Level of Service	
	Without C2 Connection	With C2 Connection
Lexington Avenue North and County Road C2 *	A/B	A/D
Lexington Avenue North and Josephine Road *	A/C	A/B
Josephine Road and Fernwood Street *	A/A	A/A
Josephine Road and Hamline Avenue North *	A/B	A/B
Hamline Avenue North and County Road C2 *	A/B	A/C
Hamline Avenue North and Lydia Avenue *	A/B	A/B

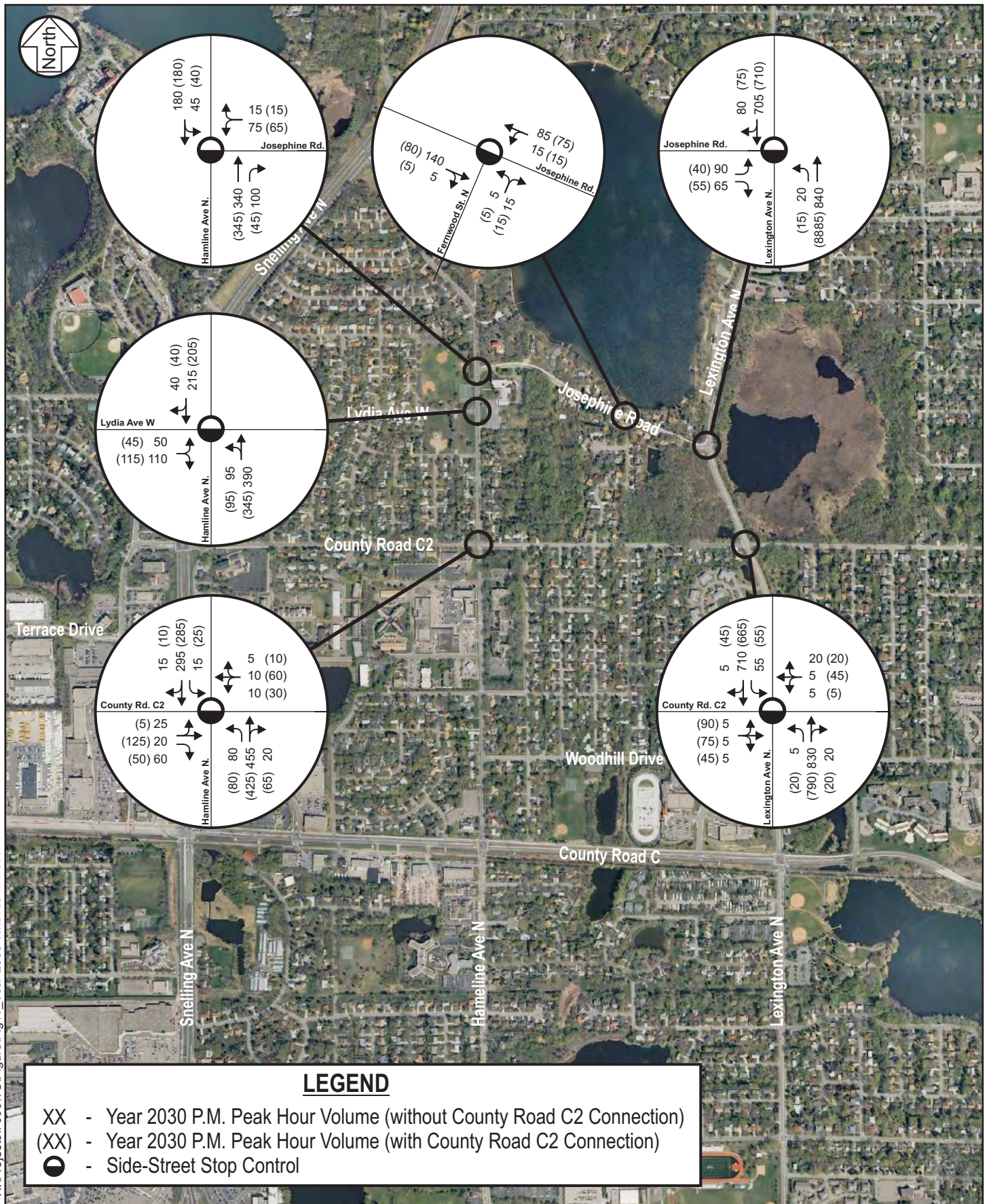
* Indicates an unsignalized intersection with side-street stop control. The overall LOS is shown followed by the worst approach LOS.

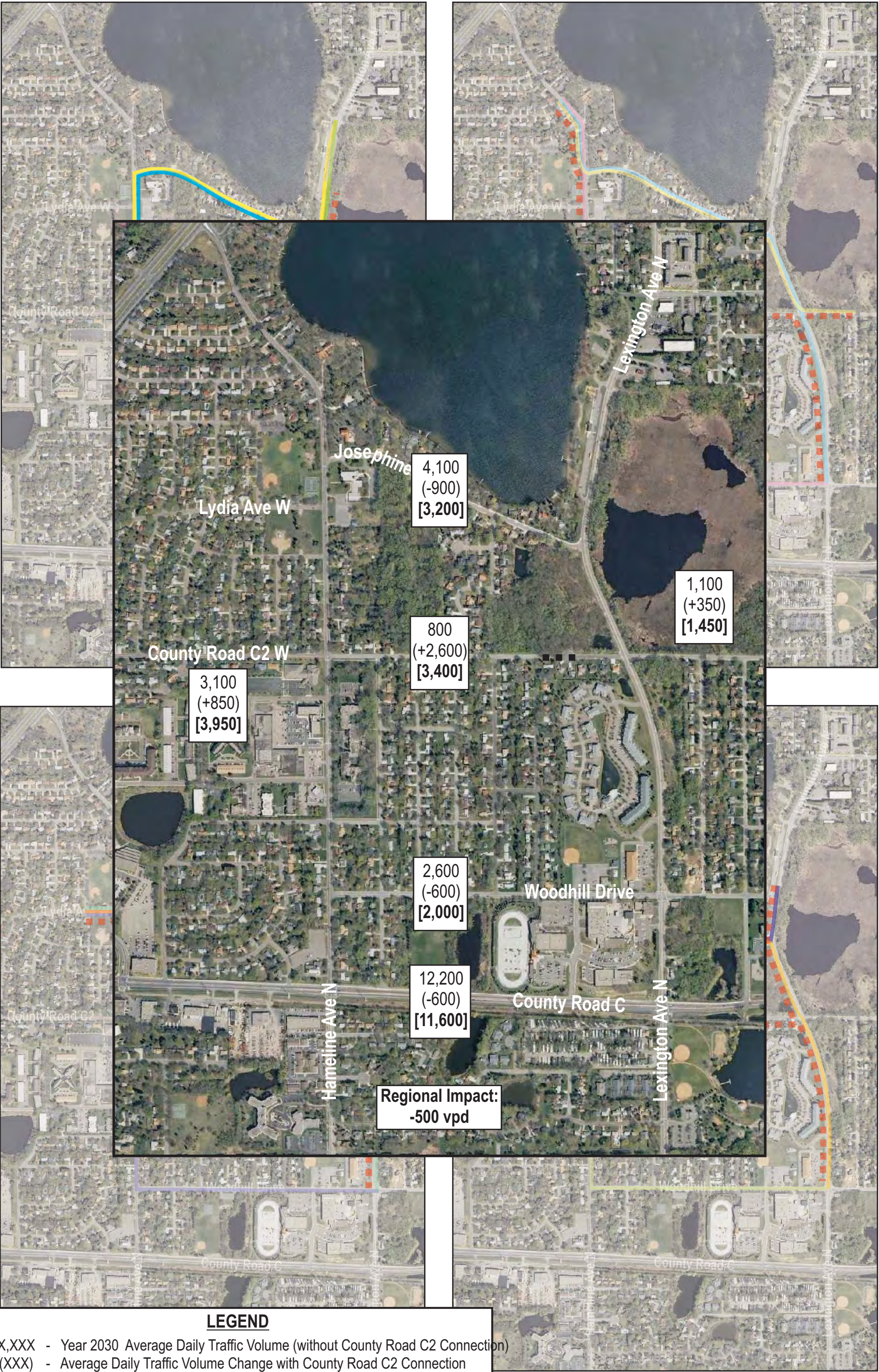
Year 2030 Traffic Forecasts

To determine how the existing and potential (with the County Road C2 connection) roadway network will operate under year 2030 conditions, p.m. peak hour and daily traffic forecasts were developed. The traffic forecasts were developed using a combination of historical area growth, the Regional Travel Demand Model and traffic volumes from the City of Roseville Transportation Plan. Based on this information, an annual growth rate of one and one-half percent was applied to the year 2011 peak hour volumes (with and without the County Road C2 connection) to develop year 2030 traffic forecasts. It should be noted that the Josephine Woods residential development is accounted for as part of this year 2030 forecast.

During the year 2030 forecast development and comparison with historical information a relatively significant difference was identified with respect to the traffic forecast on Josephine Road. The Regional Travel Demand Model evaluated as part of this current study forecast the average daily traffic on Josephine Road to be approximately 4,100 vehicles per day. This is different than the value of 6,500 presented in the Year 2030 Comprehensive Plan. The difference was reconciled understanding that the Year 2030 Comprehensive Plan values were developed using an earlier data set for the base assumptions. The Regional Travel Demand Model evaluated as part of this current study used a base network of year 2010, whereas the previous Year 2030 Comprehensive Plan Regional Travel Demand Model evaluation would have used a base network of year 2005.

Figure 11 shows the p.m. peak hour turning movement volumes under year 2030 conditions with and without the potential County Road C2 connection. Figure 12 shows the year 2030 average daily traffic volumes with and without the potential County Road C2 connection.





Year 2030 Peak Hour Intersection Operations

To determine how the existing and potential (with the County Road C2 connection) roadway network will operate under year 2030 conditions, a p.m. peak hour intersection capacity analysis was completed. This analysis was used to compare the operational impacts with or without the potential County Road C2 connection.

The year 2030 operations analysis results shown in Table 4 indicate that all key intersections will operate at an acceptable overall LOS A during the p.m. peak hour with existing traffic control and geometric layout. All side-street delays are considered acceptable and do not require mitigation. Under year 2030 conditions with the County Road C2 connection, all key intersections will operate at an acceptable overall LOS C or better during the p.m. peak hour with existing traffic control and geometric layout. The side-street at the Lexington Avenue North and County Road C2 intersection will operate at LOS F with an eastbound side-street delay of approximately two minutes. Side-street delays of this magnitude are generally considered unacceptable to motorists and warrant mitigation.

Table 4
Year 2030 Peak Hour Capacity Analysis Comparison
Level of Service Results

Intersection	P.M. Peak Hour Level of Service	
	No C2 Connection	With C2 Connection
Lexington Avenue North and County Road C2 *	A/C	C/F (B/F)
Lexington Avenue North and Josephine Road *	A/C	A/C
Josephine Road and Fernwood Street *	A/A	A/A
Josephine Road and Hamline Avenue North *	A/C	A/C
Hamline Avenue North and County Road C2 *	A/C	A/B
Hamline Avenue North and Lydia Avenue *	A/B	A/B

* Indicates an unsignalized intersection with side-street stop control. The overall LOS is shown followed by the worst approach LOS.

() Parentheses indicate the intersection operations with the recommended improvements.

To improve the side-street delays at the Lexington Avenue North and County Road C2 intersection under year 2030 conditions (with the County Road C2 connection), an eastbound right-turn lane should be constructed. With the recommended right-turn lane, the Lexington Avenue North and County Road C2 intersection will operate at LOS B/F (shown in parentheses in Table 4). Side-street delays along County Road C2 will be approximately 90 seconds. While this may be perceived unacceptable, it will only occur during the peak hour, which represents a small proportion of the overall daily operation. However, if the side-street delays are considered unacceptable by the City, installation of a traffic signal would mitigate this condition. Based on a preliminary review of the p.m. peak hour traffic volumes, the Lexington Avenue North and County Road C2 intersection will likely meet the peak hour traffic signal warrant.

ROADWAY DESIGN REVIEW

The following section presents a conceptual roadway design for the potential County Road C2 connection. This layout is presented for conceptual purposes only and is not intended to represent a detailed construction drawing. Furthermore, other alternatives are possible to complete this connection and the one shown in Figure 13 would require further review, comment, data collection and development.

Existing Conditions – Alignment

The existing alignment of County Road C2 between Merrill Street and Griggs Street as well as the segment from the cul-de-sac to Lexington Avenue are straight and in line, and as such present no significant impacts to adjacent properties due to alignment connections. Design speed on a roadway without horizontal curves is not a factor in this case. The posted speed limit is 30 mph.

Existing Conditions – Profile

The existing roadway profiles of both segments referenced above were evaluated to determine adequacy of the grades and vertical curves with the 30 mph posted / design speed. In accordance with MnDOT Road Design Manual Table 2-5.06A, the design speed for a low speed collector should be 30 – 40 mph. The existing maximum grade in this segment is eight percent (8%), which by itself does not pose an issue with design compliance as the length is less than 500 feet and is less than the 11.0% maximum grade suggested by MnDOT Road Design Manual Table 3-4.02A. However, the combination of the rolling terrain and short vertical curves, cause deficiency in the design such that the existing configuration does not meet the design standards for 30 mph in several areas. The existing vertical curves and existing design speed standards that are met are shown in Figure 13. Within both segments there are areas with very short vertical curves (50 feet or less) or in some cases no curves at all. These areas typically have very small algebraic differences of grades and as such should not present issues with traffic at the design speed. However, the MnDOT State Aid Manual would recommend that the minimum vertical curve length be 3-times the design speed, which in this case is 90 feet. If the roadway is improved, it is recommended that the vertical curve lengths be constructed to meet current standards.

Potential Roadway Conditions – Profile

In an effort to determine the approximate impacts of a proposed connection, a conceptual profile was developed that meets a 30 mph design speed (see Figure 13). The following issues and impacts that should be resolved as part of further study or design, if the County Road C2 roadway connection is to proceed, are listed as follows:

- In an effort to balance impacts across the different properties adjacent to County Road C2, the high point of the proposed vertical curve near Merrill Street is represented further west of its current location; this was done in order to limit the amount of fill in the low area of CR C2 near Fernwood Street. As a result, there are impacts to Merrill Street and driveways in the area.



- The proposed profile in the vicinity of the existing retaining wall may drop by approximately 1.6 feet. The slope between the curb and retaining wall will need to be steepened to keep proper cover over the bottom of the retaining wall. The wall should be studied further to determine if the wall bottom would be disturbed during construction, which may require complete wall replacement.
- The correction of the vertical curvature to meet 30 mph design speed causes as much as 3.2 feet of additional fill to be placed in the low area near Fernwood Street. This causes the need to reconstruct approximately 175' of Fernwood Street to accommodate the additional fill and create an acceptable profile on the cross street.
- Driveways in the area should be carefully studied to ensure that acceptable grades and drainage patterns can be met.
- Existing storm sewer systems will require reconstruction to accommodate the revised drainage patterns.
- The existing sanitary sewer manholes will require reconstruction to meet the proposed grade of the new roadway.
- The existing watermain will need to be evaluated as well to determine potential impacts due to change in roadway profile.

SUMMARY AND CONCLUSIONS

Based on the analysis, the following conclusions and recommendations are offered for your consideration:

- To determine the current travel patterns, an origin-destination (O-D) study was conducted. The license plate O-D surveys were conducted during the p.m. peak hour (4:30 p.m. to 5:30 p.m.) on Tuesday May 24, 2011.
- Based on the O-D survey data the most affected routes from a volume perspective will be Josephine Road and Woodhill Drive between Hamline Avenue and Lexington Avenue. Josephine Road and Woodhill Drive are expected to see a reduction of approximately 650 and 450 vehicles per day, respectively. This summarizes the potential County Road C2 connection local changes (approximately 1,100 vehicles per day).
- In order to understand the expanded attraction this connection may have on the transportation system, if any, the Metropolitan Council Regional Travel Demand Model was used to identify potential pattern shifts from outside of the immediate study area. Based on the Regional Travel Demand Model, approximately 450 vehicles per day will divert from County Road C to use County Road C2. Other regional system travel pattern shifts include a reduction of approximately 350 vehicles per day from other regional routes in the area (i.e., Snelling Avenue, County Road B2, TH 36, County Road E, etc.). Therefore, the potential County Road C2 connection regional travel pattern shift would be approximately 800 vehicles per day under year 2011 conditions.

- The local and regional travel pattern shifts combined together result in a potential diversion of approximately 1,900 vehicles per day under year 2011 conditions if County Road C2 were connected. This results in an existing County Road C2 average daily traffic volume of approximately 2,510 between Hamline Avenue and Lexington Avenue.
 - o Josephine Road would have an ADT of approximately 1,940
 - o Woodhill Drive would have an ADT of approximately 1,460
 - o County Road C would have an ADT of approximately 8,450
- Year 2030 traffic forecasts were developed using a combination of historical area growth, the Regional Travel Demand Model and traffic volumes from the City of Roseville Transportation Plan. Based on this information, an annual growth rate of one and one-half percent was applied to the year 2011 peak hour volumes (with and without the County Road C2 connection) to develop year 2030 traffic forecasts.
- The local and regional travel pattern shifts combined under year 2030 conditions result in a diversion of approximately 2,600 vehicles per day to County Road C2 for a total projected average daily traffic volume of 3,400.
 - o Josephine Road would have an ADT of approximately 3,200
 - o Woodhill Drive would have an ADT of approximately 2,000
 - o County Road C would have an ADT of approximately 11,600
- All key intersections currently operate at an acceptable overall LOS A during the p.m. peak hour without the County Road C2 connection, and with existing traffic control and geometric layout. All side-street delays are considered acceptable and do not require mitigation. Under year 2011 conditions with the County Road C2 connection, all key intersections will continue to operate at an acceptable overall LOS A during the p.m. peak hour with existing traffic control and geometric layout. Side-street delays will increase at the County Road C2 intersections with Lexington Avenue North and Hamline Avenue North. However, the increase in side-street delays is considered acceptable and does not require mitigation considering year 2011 traffic volumes.
- Under year 2030 conditions all key intersections will operate at an acceptable overall LOS A during the p.m. peak hour without the County Road C2 connection, and with existing traffic control and geometric layout. All side-street delays are considered acceptable and do not require mitigation. Under year 2030 conditions with the County Road C2 connection, all key intersections will operate at an acceptable overall LOS C or better during the p.m. peak hour with existing traffic control and geometric layout. The side-street at the Lexington Avenue North and County Road C2 intersection will operate at LOS F with an eastbound side-street delay of approximately two minutes. Side-street delays of this magnitude are generally considered unacceptable to motorists and warrant mitigation.

- o To improve the side-street delays at the Lexington Avenue North and County Road C2 intersection under year 2030 conditions with the County Road C2 connection, an eastbound right-turn lane should be constructed. With the recommended right-turn lane, the Lexington Avenue North and County Road C2 intersection will operate at LOS B/F. Side-street delays along County Road C2 will be approximately 90 seconds.
- o If the side-street delays are considered unacceptable by the City, installation of a traffic signal would mitigate this condition. Based on a preliminary review of the p.m. peak hour traffic volumes, the Lexington Avenue North and County Road C2 intersection will likely meet the peak hour traffic signal warrant under year 2030 conditions with the County Road C2 connection.
- The current alignment of the truncated section of County Road C2 is straight and in line, and as such presents no significant impacts to adjacent properties due to potential horizontal alignment connections.
- The combination of the rolling terrain and short vertical curves along County Road C2 in this area cause deficiency in the roadway design such that the current configuration does not meet the design standards for 30 mph in several areas. If the roadway is improved or connected, it is recommended that the vertical curve lengths be constructed to meet current standards.