

StreetLight Data Usage at MnDOT

Summer MPO Directors Workshop

Michael Corbett | Metro District Planning

9/30/2020

StreetLight Data



“Without data you’re just another person with an opinion.”
-W. Edwards Deming, Data Scientist



Data Privacy

No personally identifiable information is collected!

StreetLight does **NOT** collect personally identifiable device information

MnDOT does **NOT** collect personally identifiable device information

- all device data is anonymized

- StreetLight and MnDOT do **NOT** have information on minors

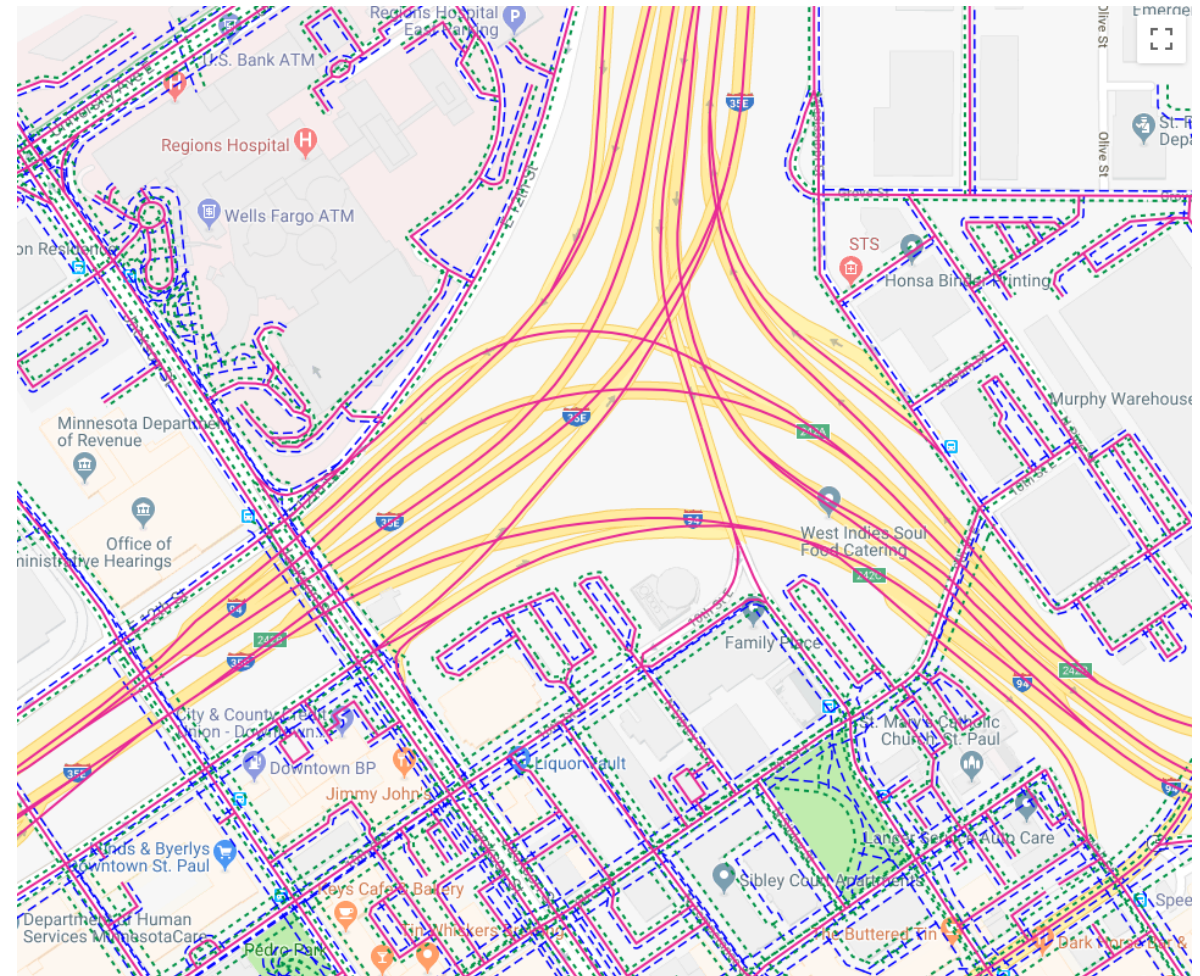
Home & work locations are inferred down to the Census Block Group and ZIP Code level

Interactive platform with full user control over queries & ability to iterate.

Users can create any type of "zones" or "gates" they would like - road segments, TAZs, shapefiles to use in their analysis.

Default map layer: the Open Street Map – can upload any shapefiles

Location "pings" will lock to routes

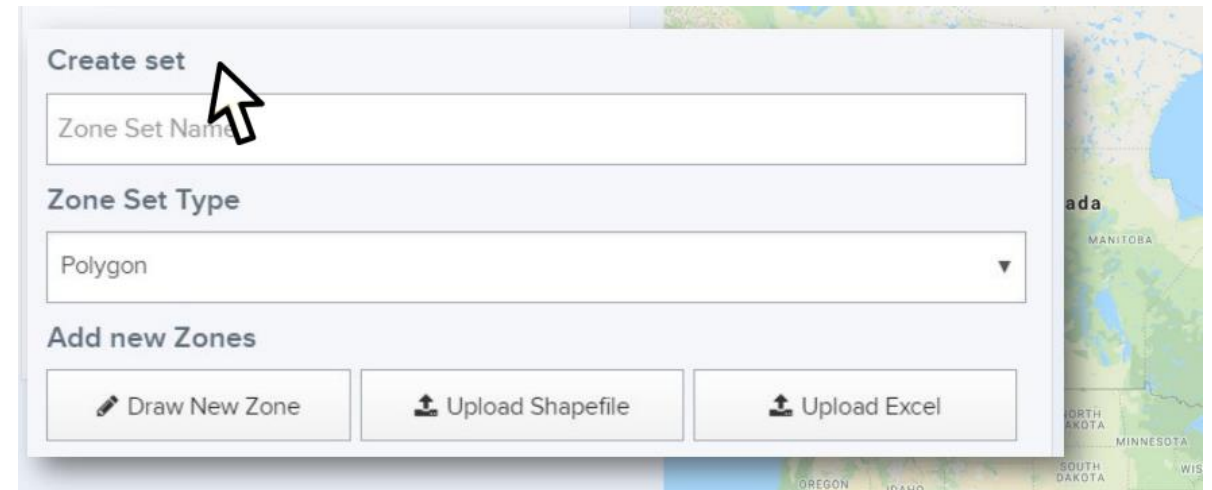


Queries can be set up quickly and users can run analytics on their own schedule without additional fees or delay in accessing results. Since Oct 2018:

- 87% of all the analyses run in the MnDOT account have finished processing in under 1 hour and;
- 71% in less than 10 minutes

Three easy steps:

- Create “zones”
- Set up Project type and parameters
- Analyze Outcome



Create set

Zone Set Name

Zone Set Type

Polygon

Add new Zones

Draw New Zone

Upload Shapefile

Upload Excel

Analysis Options

— Select Type of Travel —

Personal
Commercial

— Select Mode of Travel —

All Modes
Bicycles
Pedestrians

— Select a Data Source Type —

Location-Based Services with Pass-through
Navigation-GPS

Data Type - Different Day Types and Day Parts

Day Type Name	Start Day	End Day
Average Day	Monday	Sunday
<input type="text" value="Average Weekday"/>	<input type="text" value="Monday"/>	<input type="text" value="Thursday"/>
<input type="text" value="Average Weekend Day"/>	<input type="text" value="Saturday"/>	<input type="text" value="Sunday"/>
<input type="button" value="Add New Day Type"/>		
Day Part Name	Start Time	End Time
All Day	12am	12am
<input type="text" value="Early AM"/>	<input type="text" value="12am"/>	<input type="text" value="6am"/>
<input type="text" value="Peak AM"/>	<input type="text" value="6am"/>	<input type="text" value="10am"/>
<input type="text" value="Mid-Day"/>	<input type="text" value="10am"/>	<input type="text" value="3pm"/>
<input type="text" value="Peak PM"/>	<input type="text" value="3pm"/>	<input type="text" value="7pm"/>
<input type="text" value="Late PM"/>	<input type="text" value="7pm"/>	<input type="text" value="12am"/>
<input type="button" value="Add New Day Part"/>		

Summary of Use cases

Speed studies

Before and after conditions

Freight Movements

Turning Movement Counts

Detours

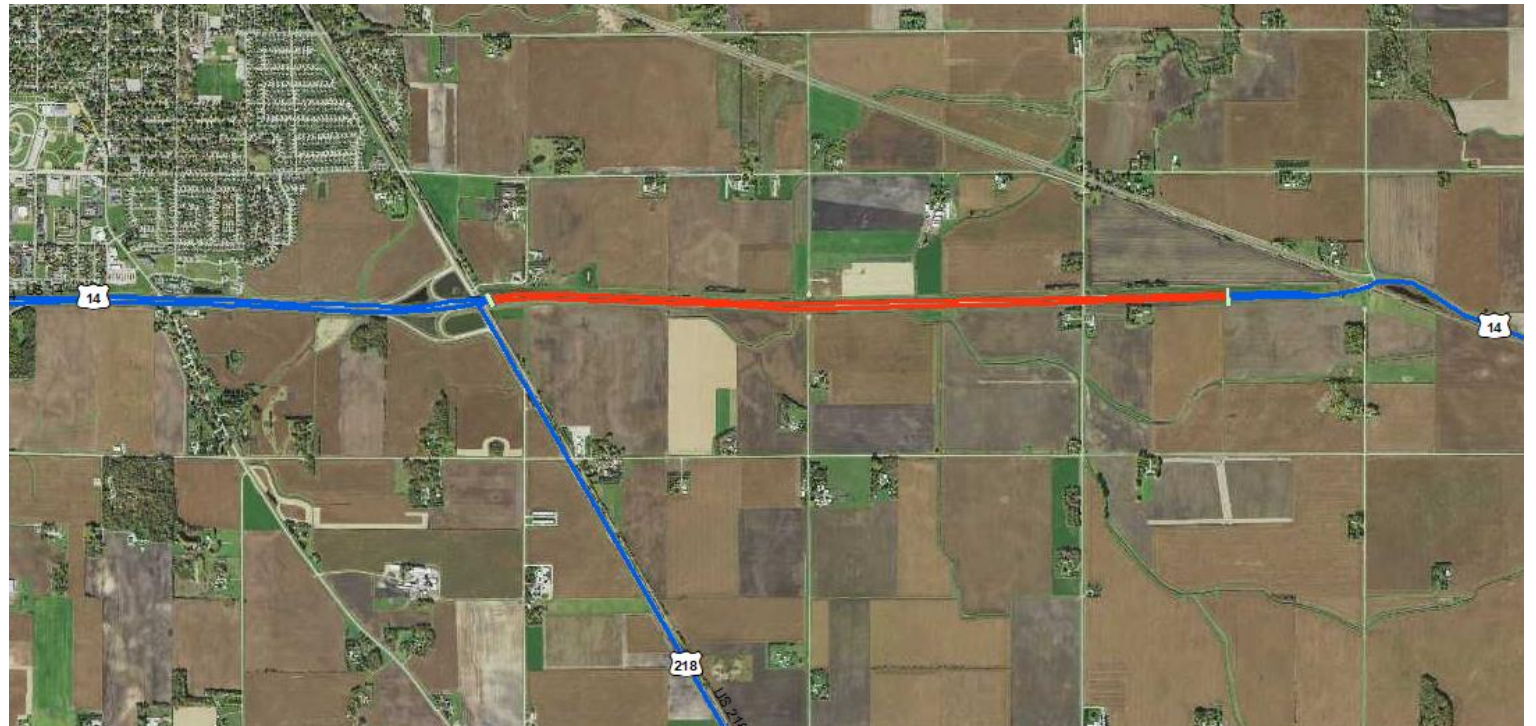
Origin-Destination analyses

Speed Changes on US 14

From July 2014 to September 2015, US 14 was upgraded to four lanes from US 218 to Steele County Rd 180

Compared May and June traffic in 2014 to May and June traffic in 2016

This analysis would not have been done if it wasn't for the historical data in StreetLight.



Speed Changes on US 14

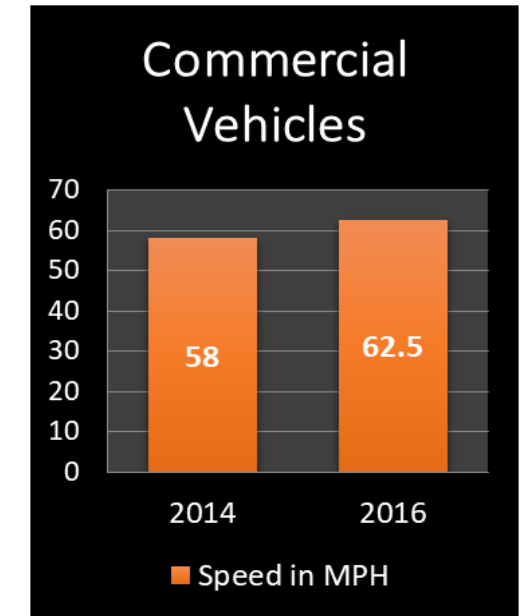
Personal Vehicle Results

- Speeds increased by 7.9 mph
- Insignificant difference for eastbound and westbound



Commercial Vehicle Results

- Speeds increased by 4.5 mph
- Insignificant difference for eastbound and westbound



Results

- Speeds increased along segment but stronger for personal than commercial vehicles
- Results only represent traffic behavior in warm months

West 7th Street (MN -5) speed analysis

Analysis: W7th-Davern to I-35E | Type: O-D Analysis

requested for public meeting

General Information

INFO

Name: W7th-Davern to I-35E
Country: US
Folder: StL Admin
Analysis Type: O-D Analysis
Mode of Travel: All Vehicles (GPS)
Output Type: StreetLight Index
Additional Project Configuration: Trip Attributes

Zones

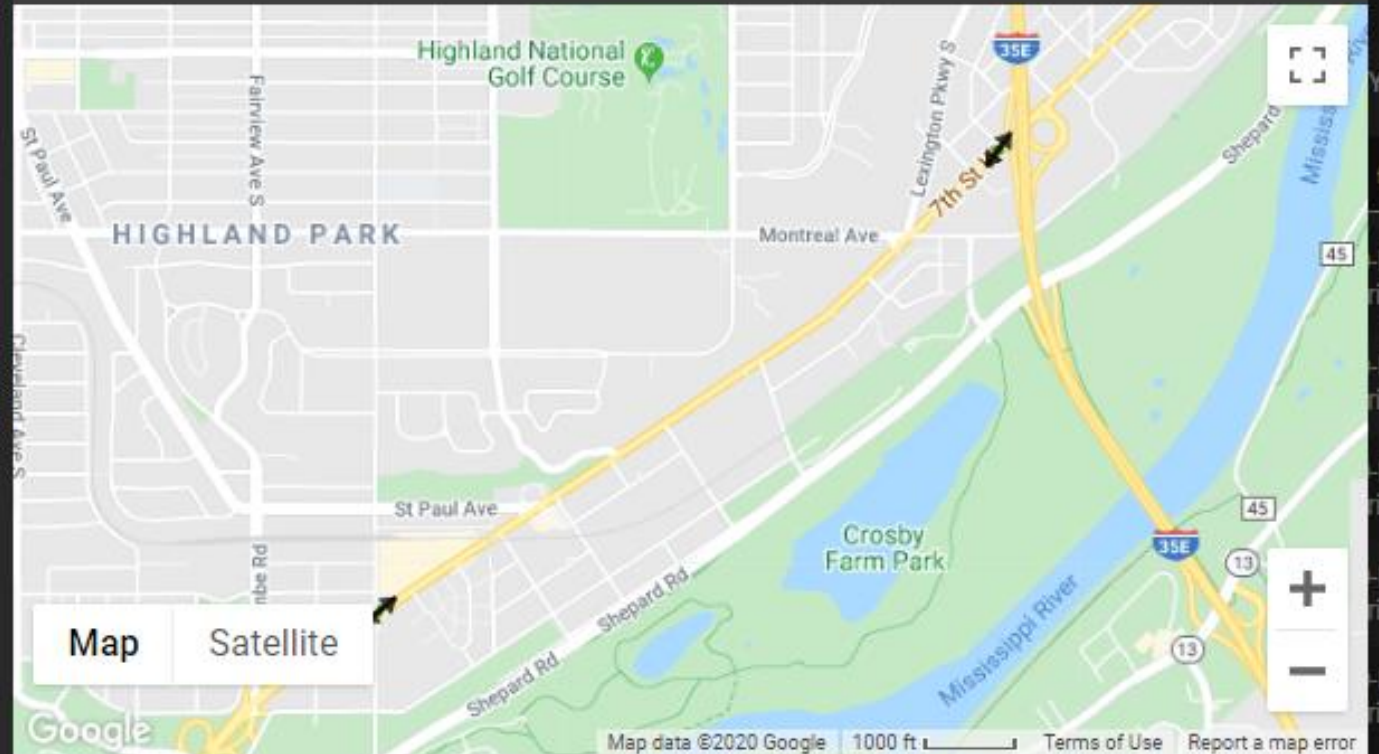
ORIGIN ZONES DESTINATION ZONES TRIP FILTERS

Zone Name	Pass-through	Direction	Bi-directional
W7th-Seg1 - Polygon Set with 2 Zones.			
W7th at Davern	Yes	51	Yes
W7th at I-35E	Yes	37	Yes

(ZOOM TO ENABLE) OSM LAYER

Vehicle X

© OpenStreetMap contributors



West 7th Street (MN -5) speed analysis

Speed analysis requested for public meeting with State Reps and Council members

	EB (mph)	WB (mph)	EB data pts	WB data pts	EB+WB data pts	EB&WB avg speed (mph)
Peak AM (6am-10am)	30	27	1832	315	2147	30
Peak PM (3pm-7pm)	29	25	1803	445	2248	28
Off Peak (9pm-6am)	34	32	708	252	960	33

Maryland 4 to 3 lane roadway conversion

- Staff was interested in answering three primary questions regarding the Maryland Avenue corridor
 - Is Maryland Avenue being used more by the surrounding residents for local trips, or as a gateway for commuters to access I-35E?
 - What were the effects of the 4-to-3 lane conversion on traffic patterns, trip length, and speed along Maryland Avenue?
 - How were adjacent roadways affected by the closure of Wheelock Parkway? Did traffic volumes substantially increase along other roadways due to the Wheelock closure?

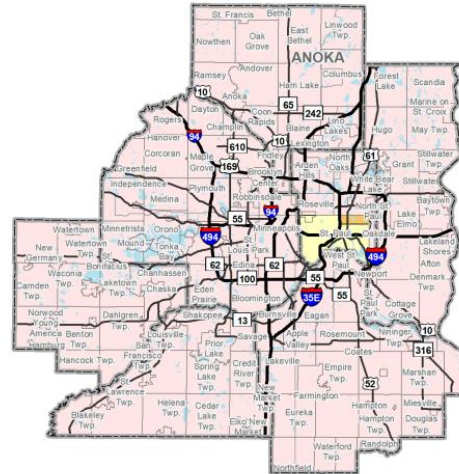
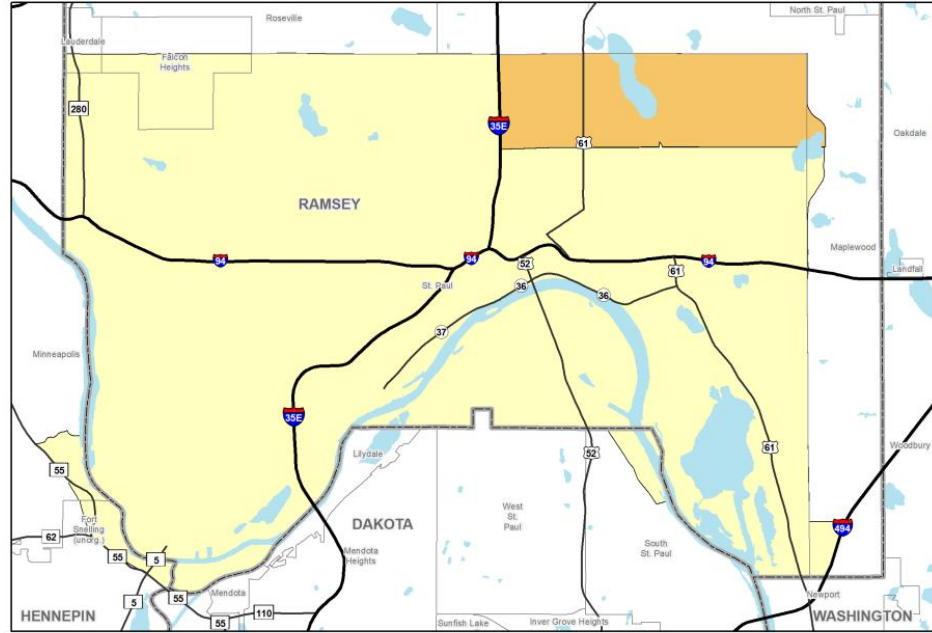


Wheelock Pkwy
Closed to Traffic Mid-June through August

Maryland Ave
4-3 "trial" Conversion (May 2017)

Phalen Blvd

Title: Maryland Avenue Neighborhoods



Highways

- Interstate Highways
- State, US Highways and County Roads
- County Boundaries
- City and Township Boundaries
- Lakes and Rivers
- Maryland Local TAZs
- All Other St. Paul TAZs
- Outside St. Paul

Maryland Avenue: Corridor Usage (O/D Analysis)

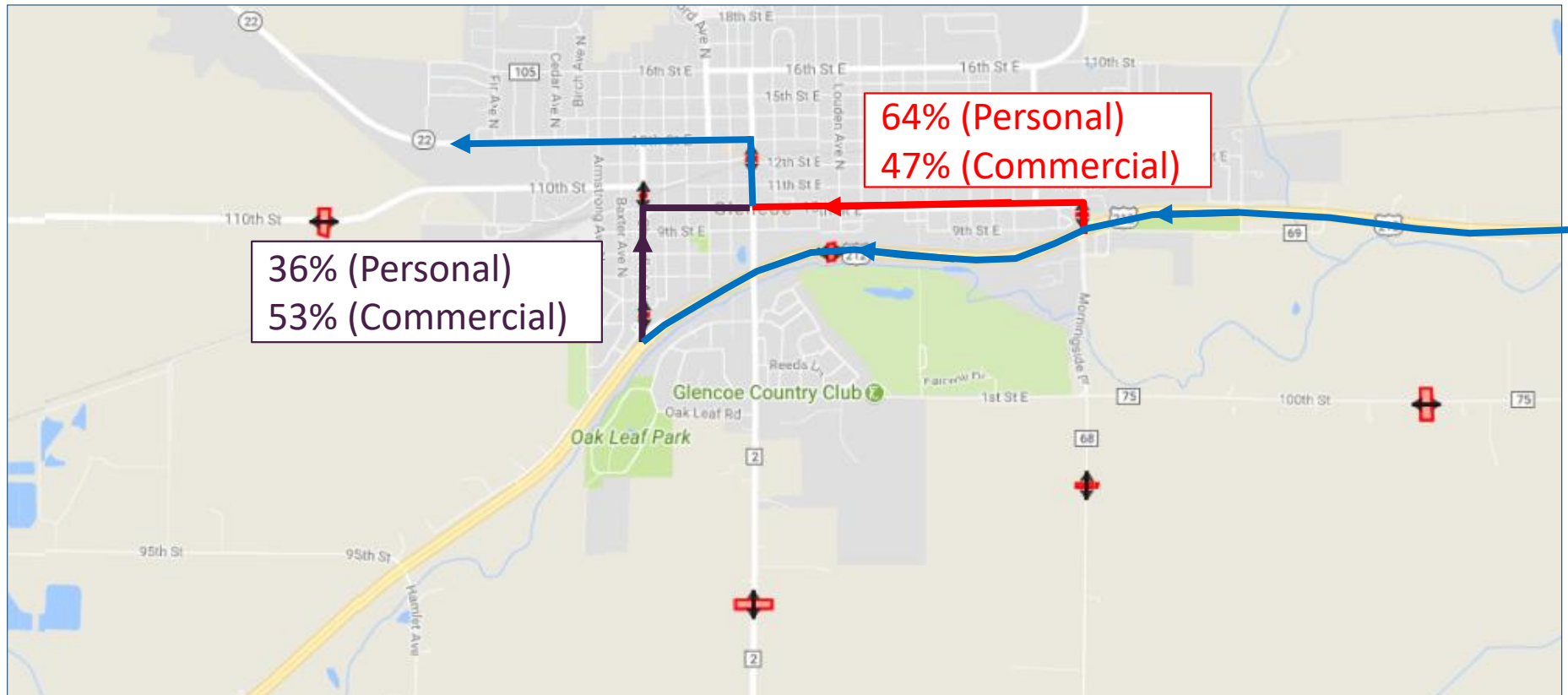
Origin	Destination		
	Local Maryland Area	St. Paul	Outside St. Paul
Local Maryland Area	14%	15%	15%
St. Paul	16%	9%	8%
Outside St. Paul	12%	7%	4%

What were the effects of the 4-to-3 lane conversion and Wheelock closure on traffic patterns, speed, and travel time?

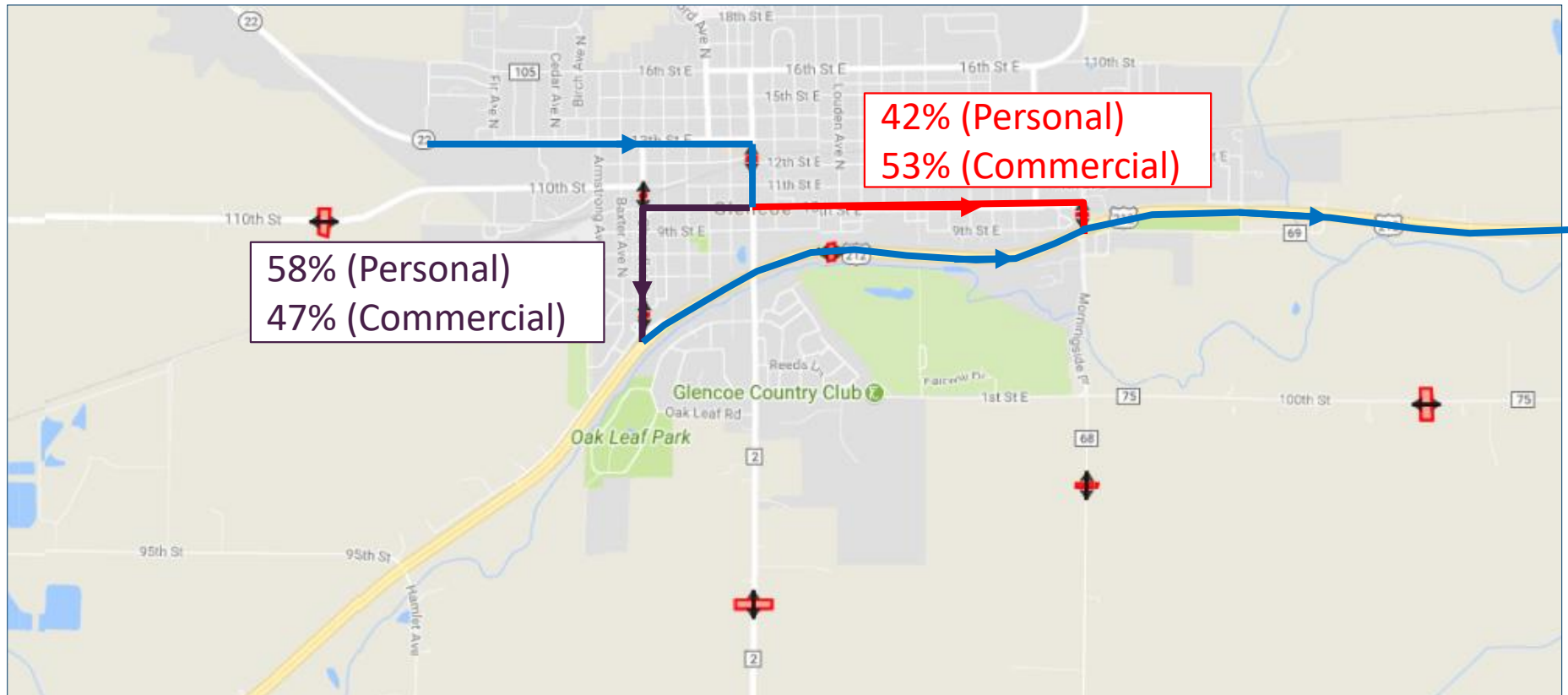
- Before and After Analysis: July 2016 and July 2017

Location	Average Speed - 2016	Average Speed - 2017
Maryland	22	24
Phalen	22	22
Wheelock	27	N/A

Glencoe O&D – Freight and Personal

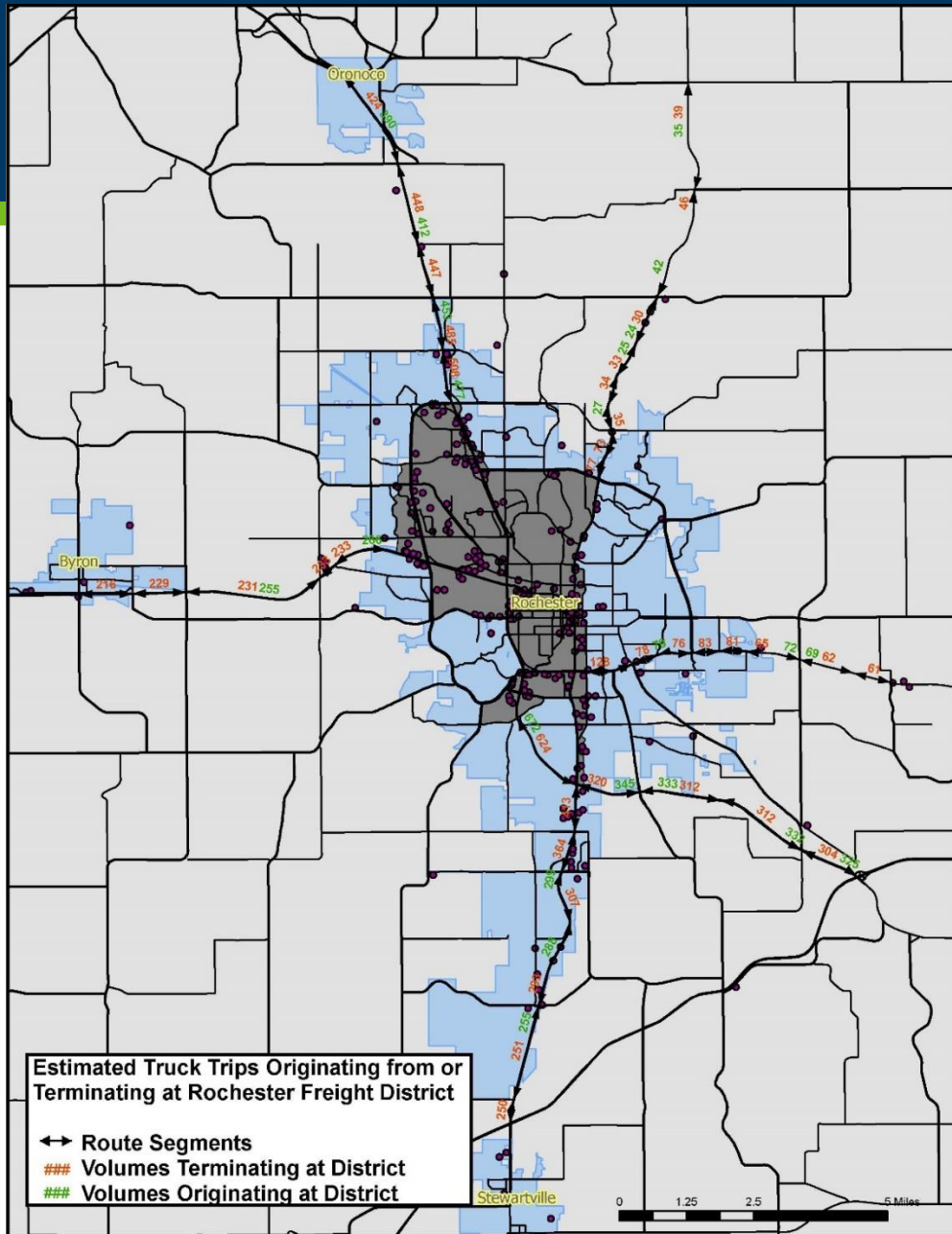


Glencoe O&D



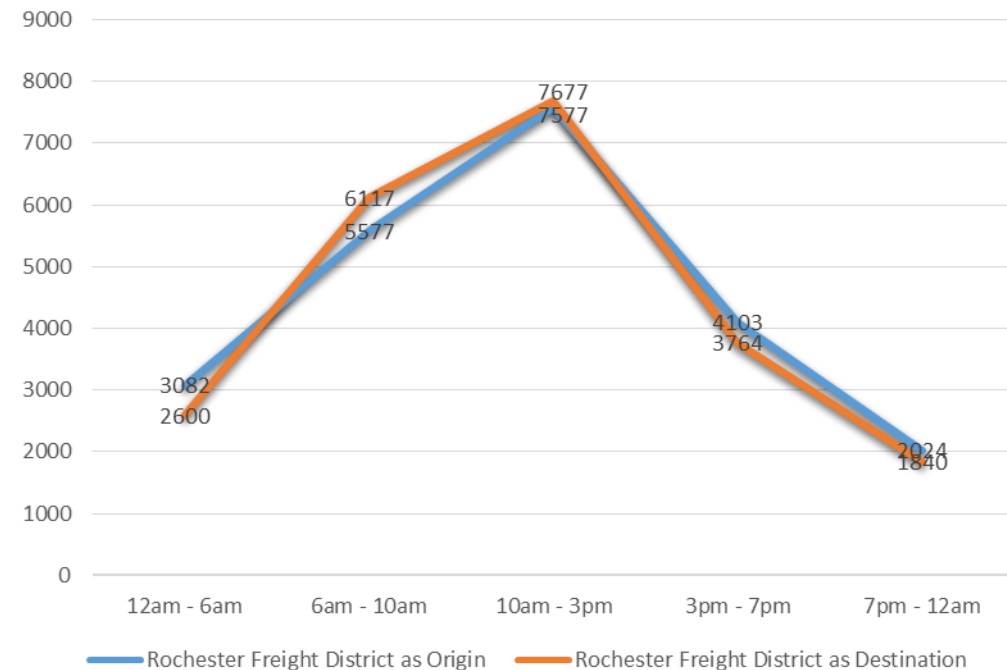
Freight Businesses in Rochester

Analyzed commercial traffic to and from Rochester and TH 52/TH 14/TH 63 on an average day.



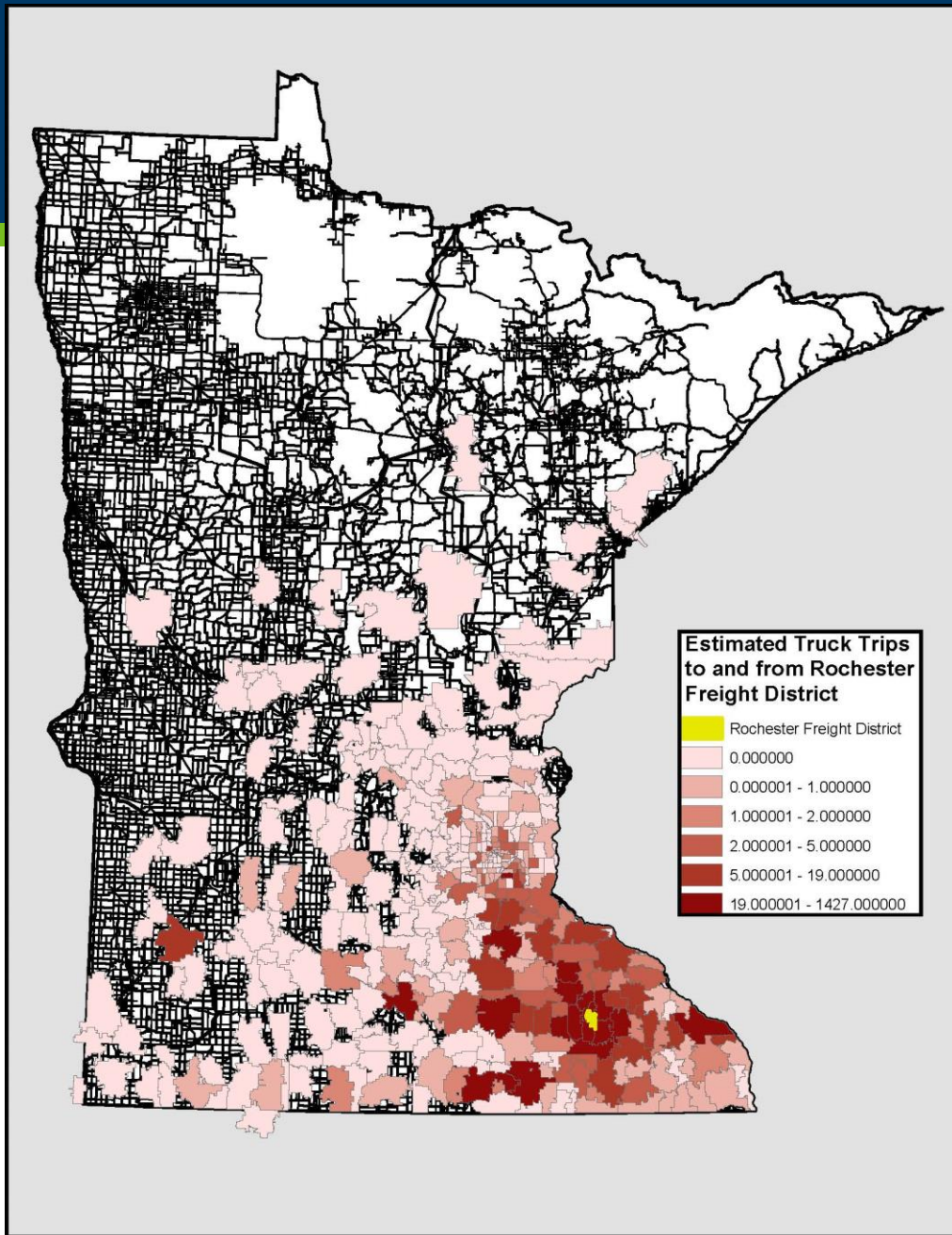
9/30/2020

Truck Trip Distribution by Time of Day



Freight Businesses in Rochester

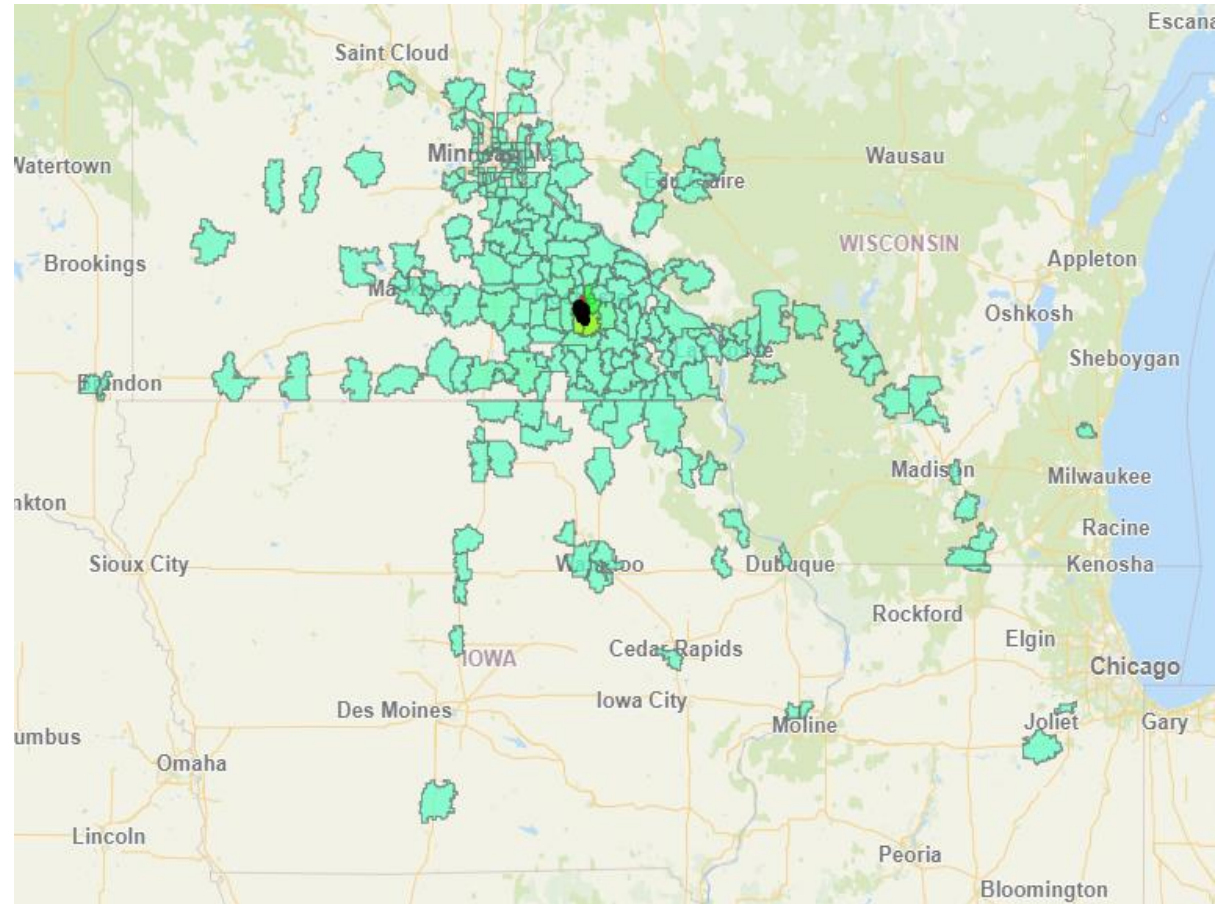
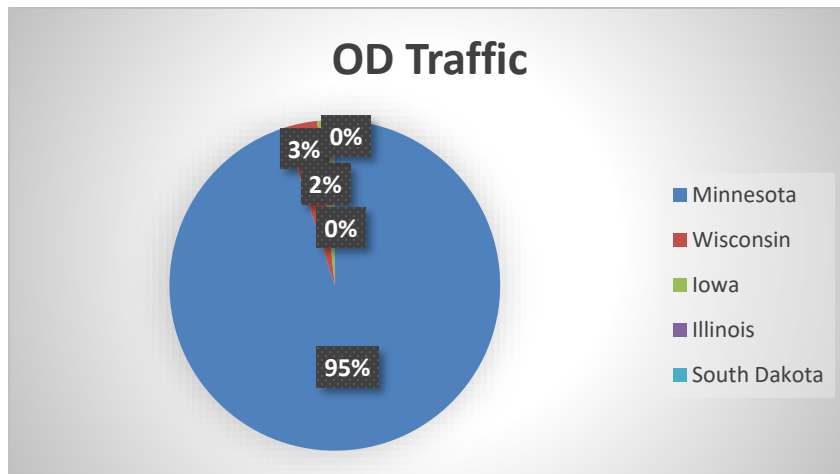
This map displays zip codes that trucks are traveling to and from Rochester on an average day.



Freight Businesses in Rochester

Of the trucks leaving Rochester, 95% stay in Minnesota and 5% leave the state on an average day.

State	OD Traffic
Minnesota	3752
Wisconsin	130
Iowa	61
Illinois	3
South Dakota	3



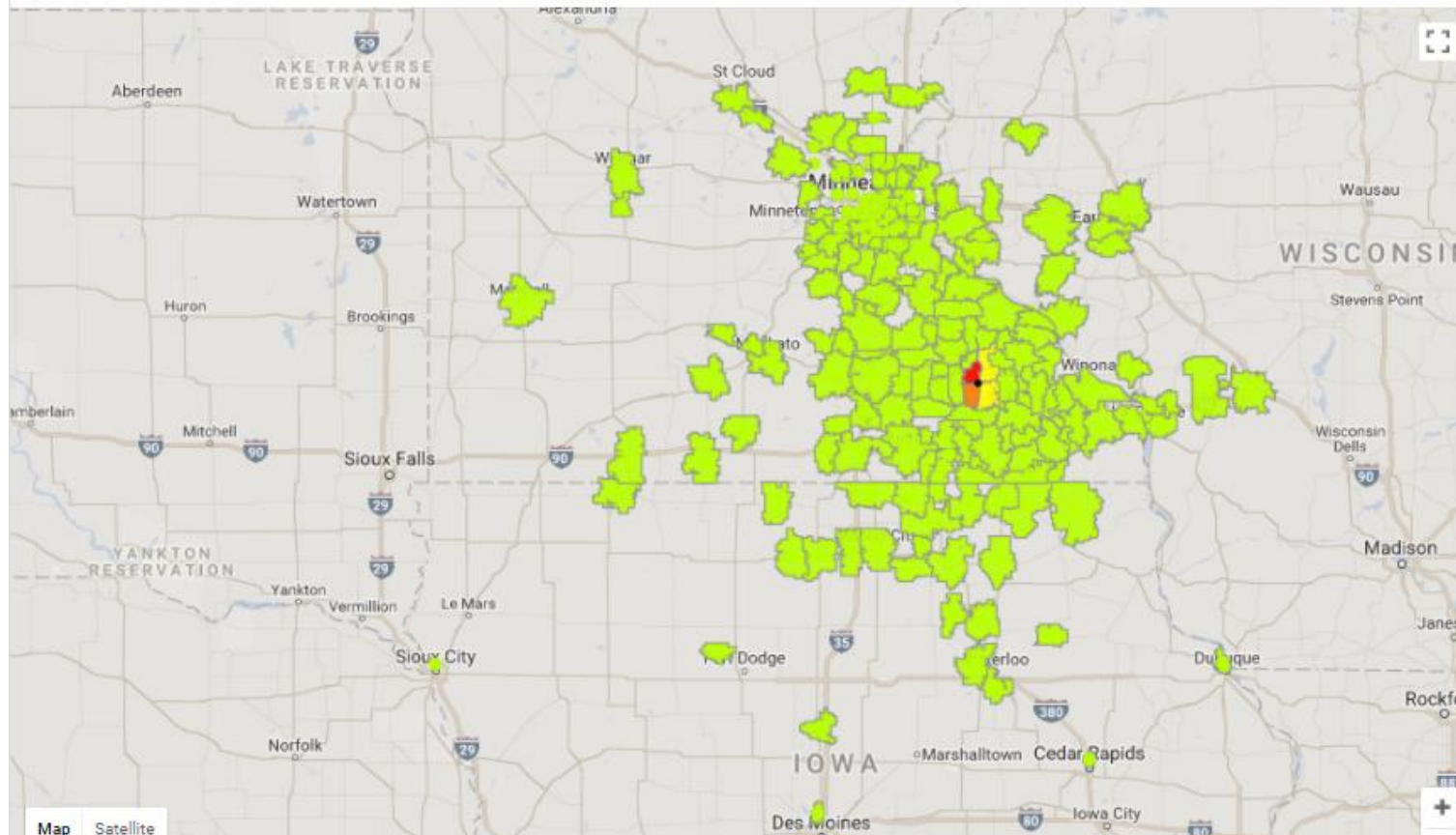
Mayo Hospital Campus O&D

D6, Mayo Sample | O-D to Pre-set Geography (LBS Data)

Origin | Average Day (M-Su) | All Day (12am-12am) | All Devices | StreetLight Trip Index and Percent

Colors indicate the StreetLight Trip Index to each Zip Code during the selected time period.

Insufficient Trips 1 - 229 (0 - 2.6%) 230 - 1,166 (2.6 - 13.5%) 1,167 - 2,077 (13.5 - 24%) 2,078 - 2,599 (24 - 30%) Origin Zone



Turning Movement Count Comparison

Turning Movement Count: StreetLight vs. Video count

- One-day turning movement counts (6/12/2017) compared to StreetLight Data (annual average from August 2016 to July 2017)

Figure 1: Origin & Destination Gates—*Streetlight Insight* Analysis

Star indicates location of 06/12/2017 Turn Movement Count.



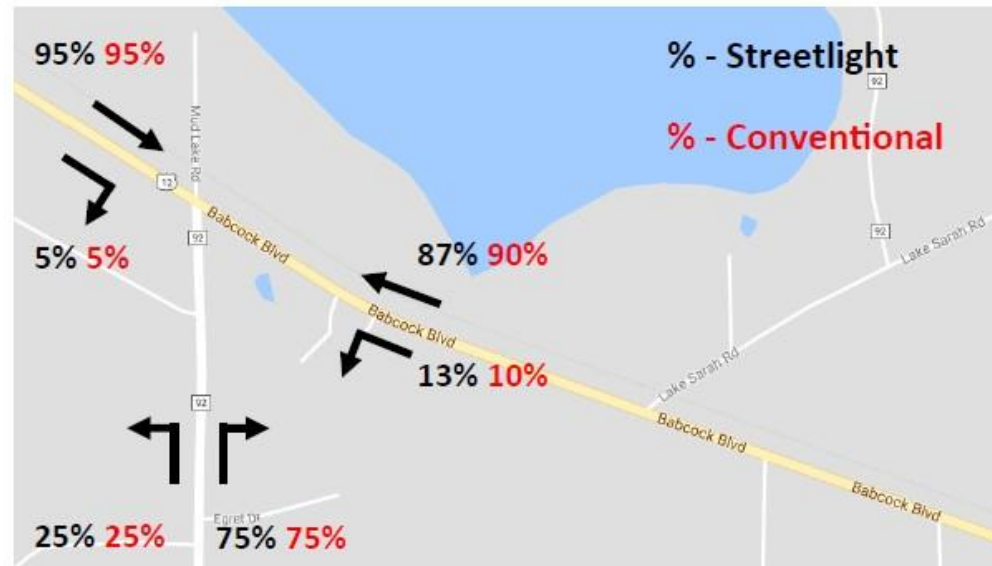
1a. NB CSAH 92 (West Intersection)



1b. SB CSAH 92 (East Intersection)

Turning Movement Count Comparison

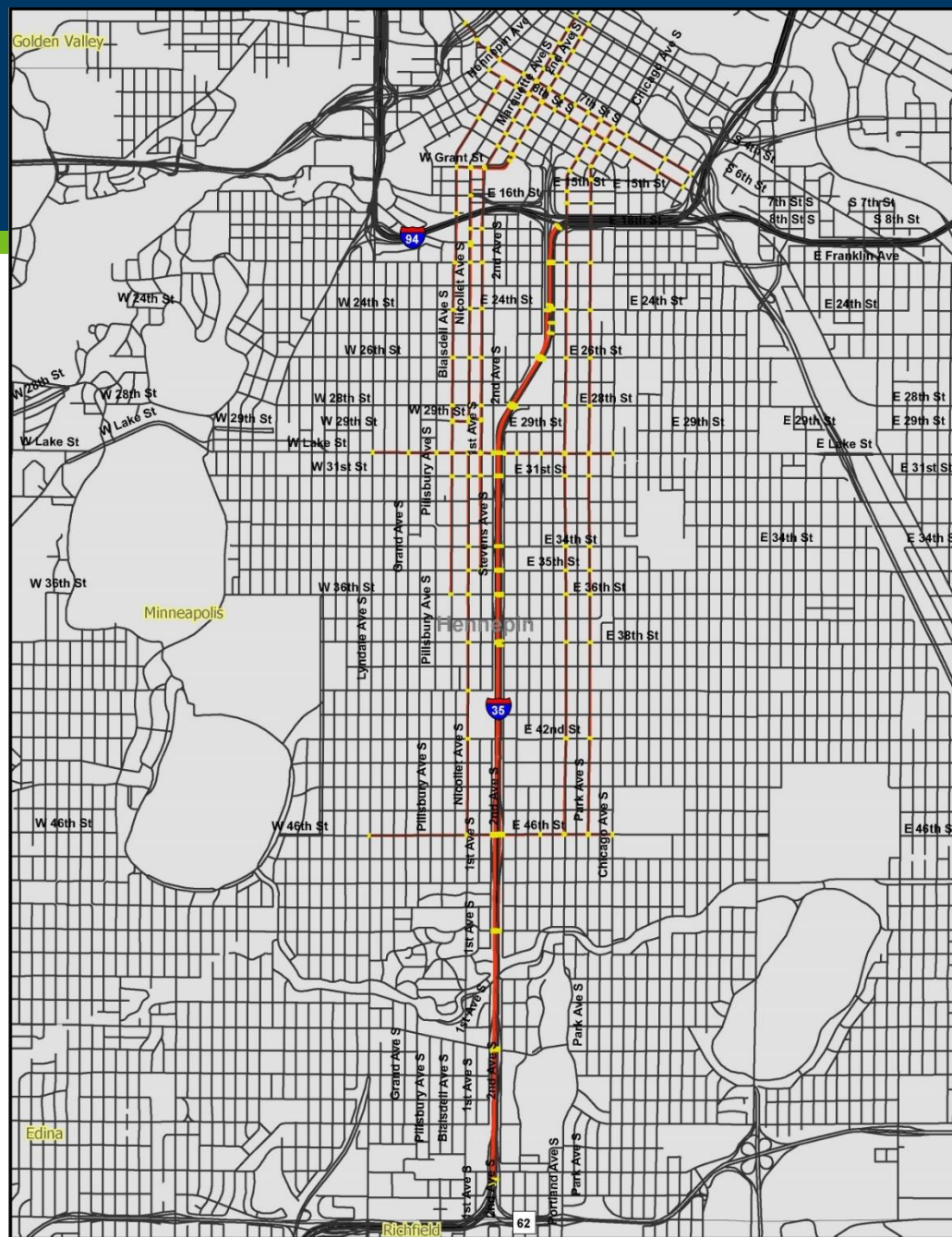
Figure 2: Streetlight vs. Conventional Turn Movement Counts (All-Day)



West Intersection (USTH 12 and CSAH 92)

Turn Movement Count (06/12/2017). Streetlight Insight (Aug 2016 -Jul 2017).

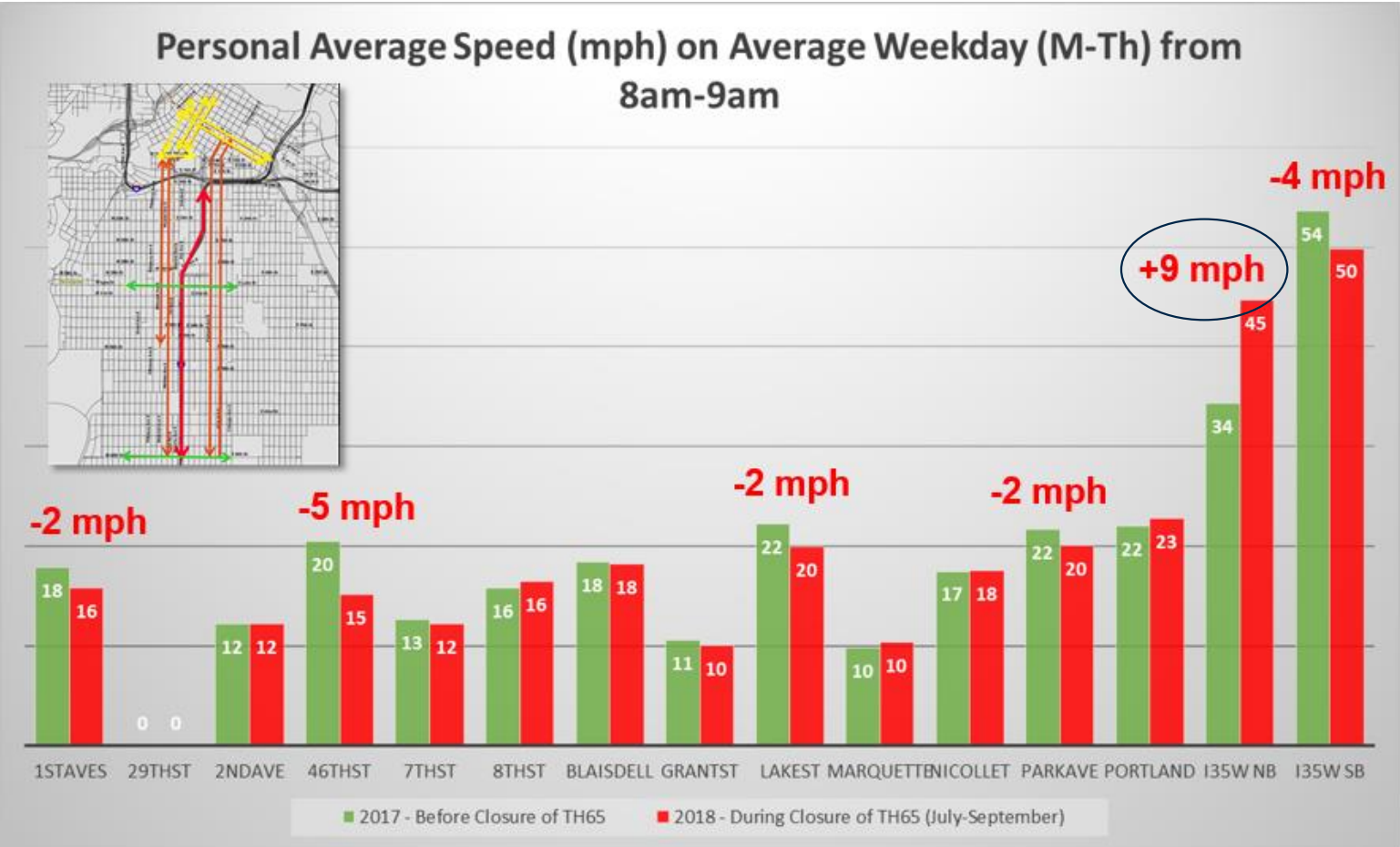
I-35W and I-94



Analyzed multiple parallel corridors and some cross streets within the immediate impact area.

	Spring 2018	Summer 2018
Bridge closures		
Franklin Ave bridge closed		
26 th St bridge closed		
38 th St bridge closed		
Ramp closures		
11 th St ramp from I-94 closed		
12 th St ramp to I-35W lane restrictions		
35 th St ramp closures		
36 th St to SB I-35W ramp closure		
Highway 65 downtown access closed		

I-35W and I-94

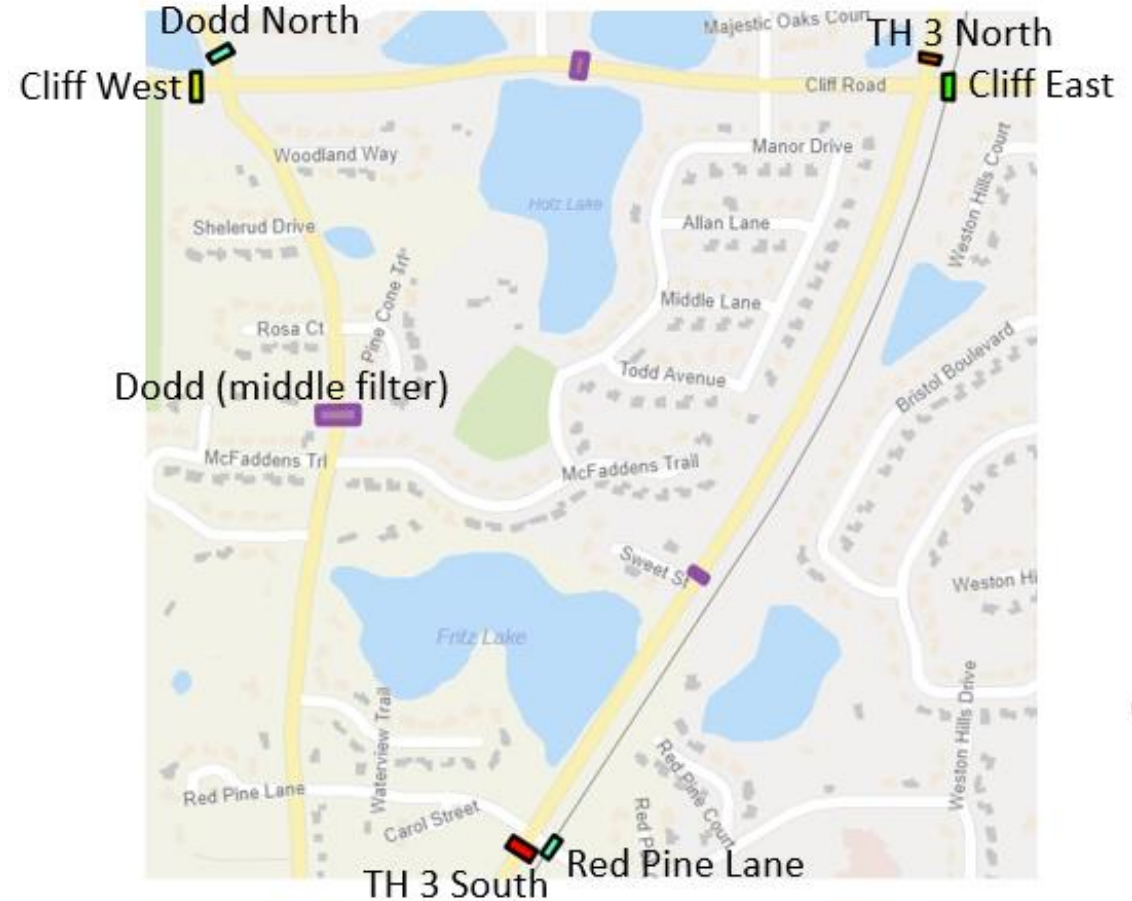


Speeds increase by an average of 9mph on NB I-35W between TH 62 and I-94 because of less access to I-35W.

Cliff and Dodd Cut Through

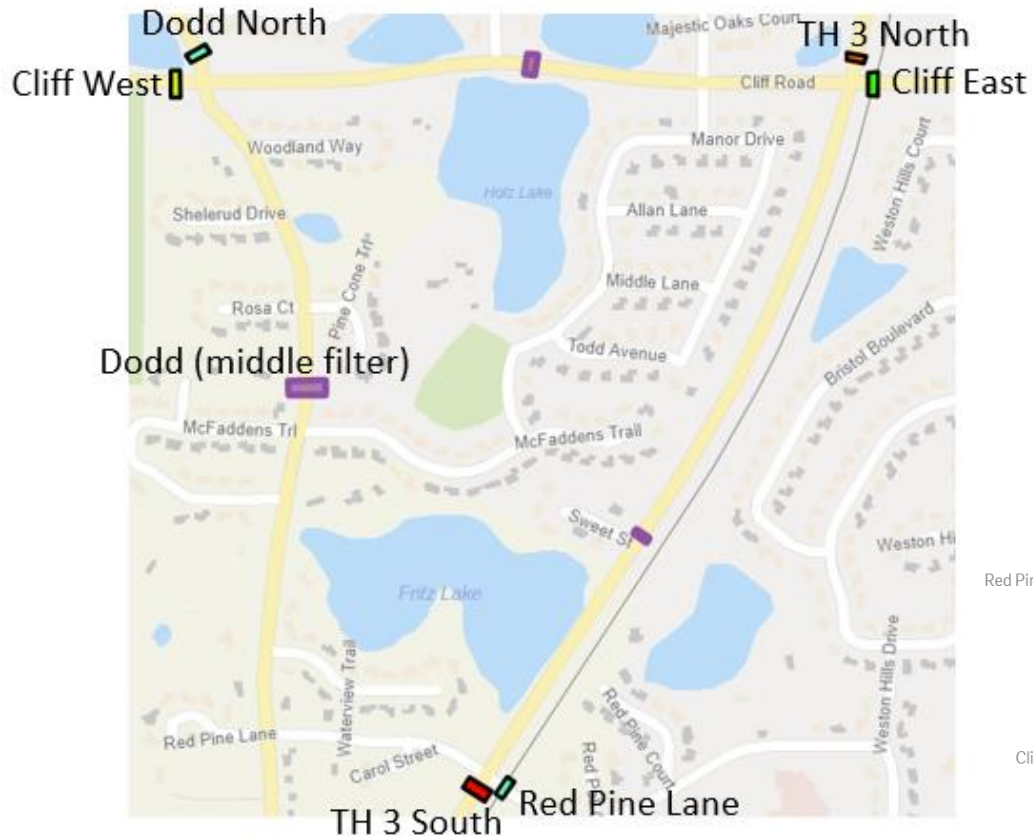
There were local neighborhood complaints about traffic using Dodd Road to avoid Cliff Road signalized intersection at TH 3.

A quick origin-destination with middle filters was done to find the route vehicles were taking.



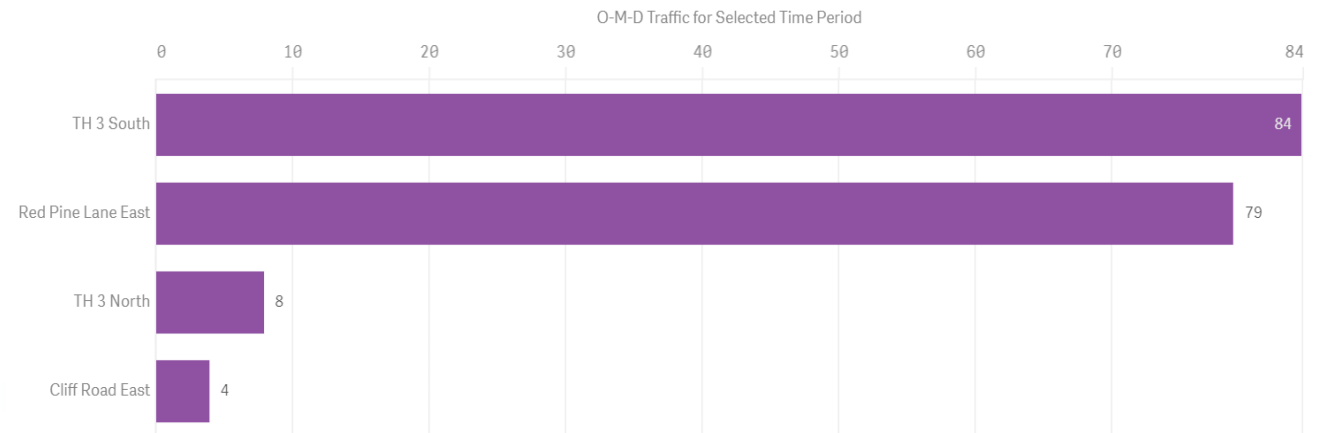
Cliff and Dodd Cut Through

Origin (all day):
Cliff West and Dodd North = 2385



Middle Filter:
Dodd = 175

7.3% of traffic cuts through using Dodd
48% to TH 3 South
45.1% to red Pine Lane East
4.6% to TH 3 North
2.3% to Cliff Road East



Dodd Road Neighborhood Traffic

CLIFF ROAD STUDY

INPUTID SUMMARY (CONTINUED)

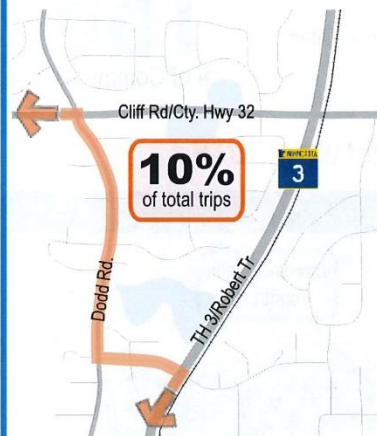
32

Dodd Road Travel Patterns

Where are vehicles coming from?

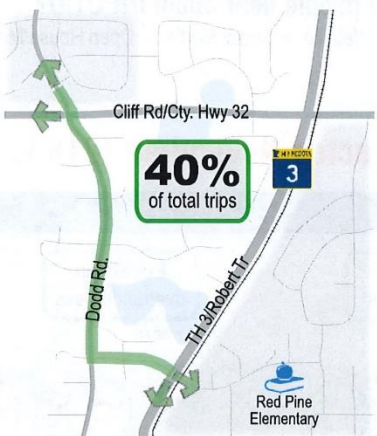
Neighborhood cut-through traffic and traffic volumes using Dodd Rd. to avoid the Cliff Rd/TH 3 intersection were common concerns on INPUTID and at public meetings. The following data was collected using *Streetlight Insights* to better understand the breakdown of who is driving through the area and their origin/destination.

Regional Trip "Cut-Through" Traffic



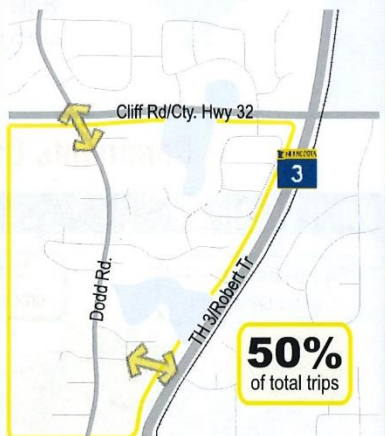
10-percent of the total vehicular trips through the area are due to regional cut-through traffic. These are drivers with origin/destinations outside of the local area and are using Dodd Rd as a cut-through to avoid the Cliff Rd/TH 3 intersection.

Local Trip "Cut-Through" Traffic



40-percent of the total vehicular trips are to or from nearby destinations in the city of Eagan. These are drivers with origins/destinations outside of the neighborhood, but within the area.

Local Trips - Neighborhood Traffic



50-percent of the total vehicular trips through the area are local. These are drivers with origins/destinations within the neighborhood.

Dodd Road is a Minor Collector roadway.

Collectors provide connection between neighborhoods and to minor business concentrations. Assigning roadway classifications is part of county-wide transportation planning and ensures that there are roadways to serve all functions and trip types. 41-percent of Dakota County's roadway system is designated as collector roadways.

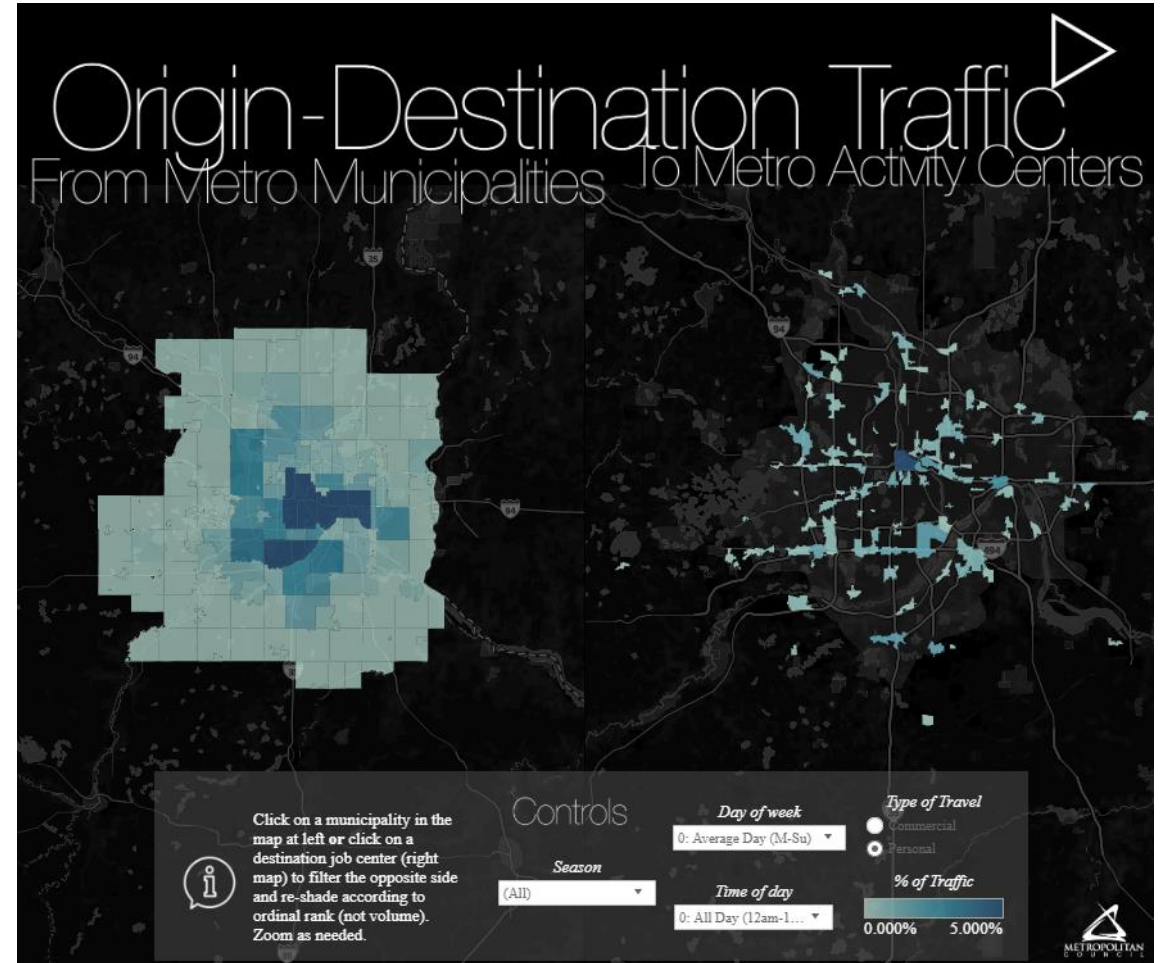
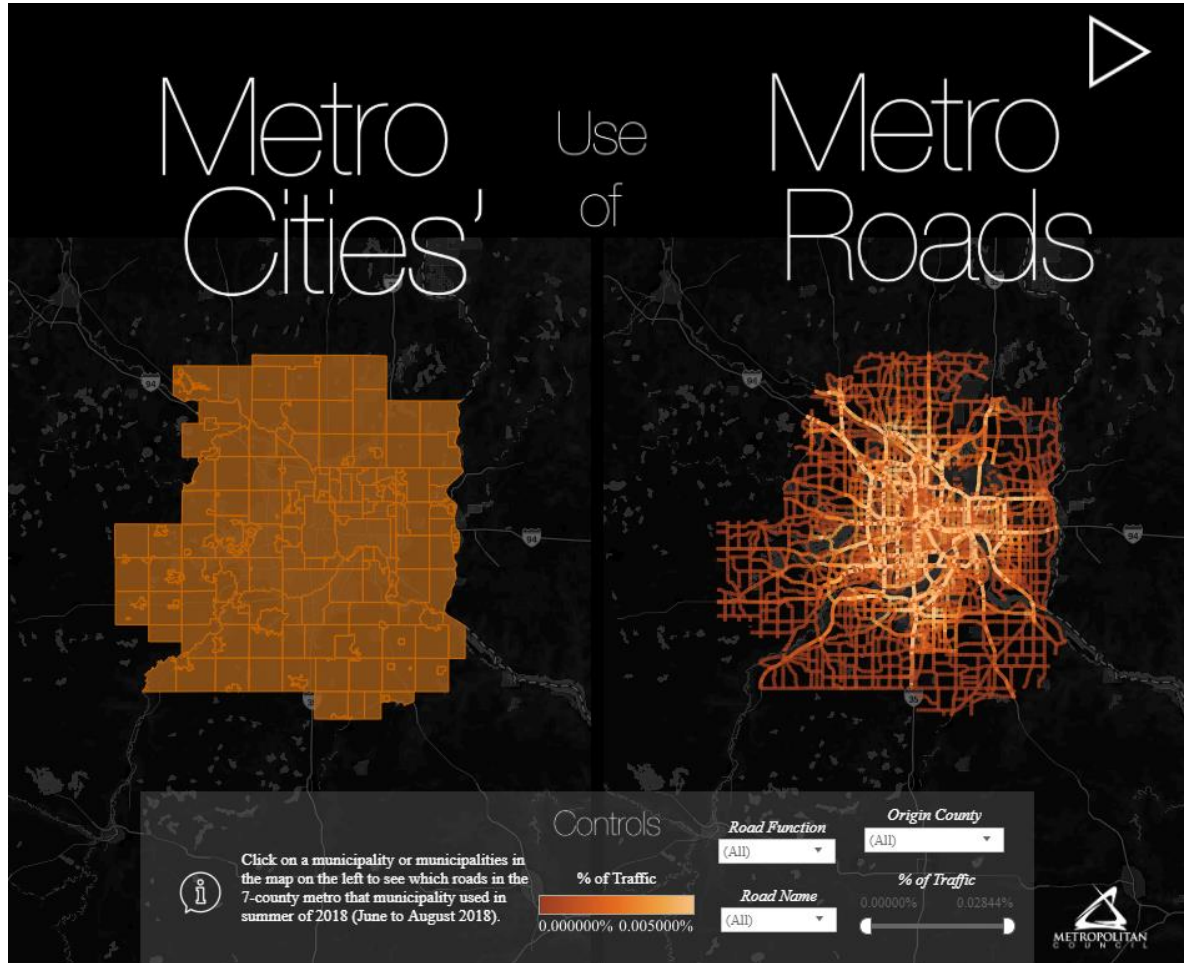
Dodd Road is functioning properly as a collector roadway, and 90% of traffic using Dodd Road is local traffic and not regional traffic.

Dodd Road Neighborhood Traffic

- Able to easily and quickly answer a standard local traffic complaint/concern
- A standard OD analysis would take much more time, cost much more money, and would only be based on a moment in time rather than a year's worth of data
- Without StreetLight, MnDOT would most likely not be able to answer this question because spending that much money is not cost-effective.
- MnDOT can show that we take local concerns seriously and respond to them quickly
- Future similar complaints/concerns regarding cut-through traffic can use the same type of analysis.

Transportation flows dashboard project

Data from StreetLight was used to demonstrate travel patterns in the Twin Cities region.



Transportation flows dashboard project

The data covered beyond commute/employment flows and can be looked at by season.

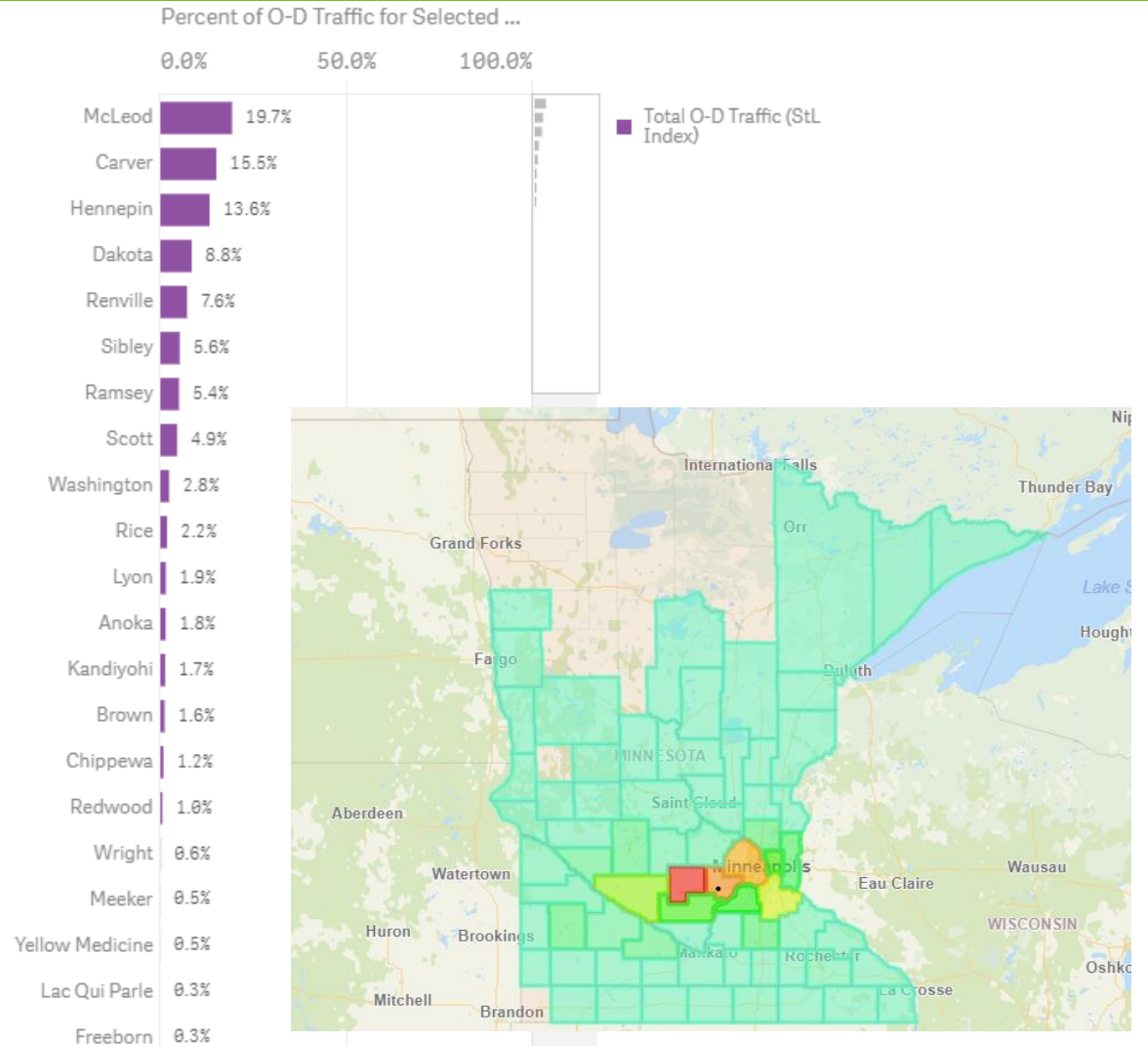
StreetLight returned clean data, so not much time was spent aggregating/tidying the data.

Currently, TBI and LODES are alternatives. TBI provides more granular data about trip purpose/trip mode, but is only representative at the regional level and wouldn't be useful to show cross-county or cross-municipality sheds/flows.

www.metrocouncil.org/transportationflows

TH 212, 2 to 4 Lane Expansion from Cologne to Norwood Young America

- MnDOT and Met Council's efforts to improve the Highway 212 corridor where there have been four fatalities within the last year benefits travelers from all over the state.
- Greater Minnesota contributes greater than 47% of all traffic along this corridor, with over 5,600 daily trips and origins in 70 different MN counties on an average weekday, which stresses the statewide impact of the corridor.
- McLeod County produces the highest rates of traffic along this corridor, comprising nearly 20% of all traffic.
- More than 83% of trips were greater than 10 miles, indicating that this corridor is used for longer, regional or statewide trips.



I-494 Zip Code Analysis

The communications department wanted to use targeted Facebook ads to reach the commuters using a section of I-494 for an upcoming project

An Origin-Destination analysis of roadway users by zip codes was performed

The origin zip codes were ranked and identified for the communications team to target potential commuters

Targeted Facebook ad

- Reached 54,063 people
- 150 shares
- 28 comments
- 30 reactions

Based on the outcomes, the communications department would like to replicate this approach again for other larger projects.

Minnesota Department of Transportation Like Page

South metro travelers, delays may be coming to your drive in August as crews begin work on I-494 between Hardman Ave and Blaine Ave in Inver Grove Heights and South St. Paul.

Work will include widening and resurfacing the Concord St/Hwy 156 bridge deck, replacing bridge joints, constructing an auxiliary lane between Hardman Ave to the west of 7th Ave, improving drainage, and replacing or repairing I-494 pavement between Hardman Ave and 5th Ave.

All work is scheduled to be complete by the fall of 2019. For more info about this project or to sign up for email updates visit the project website:

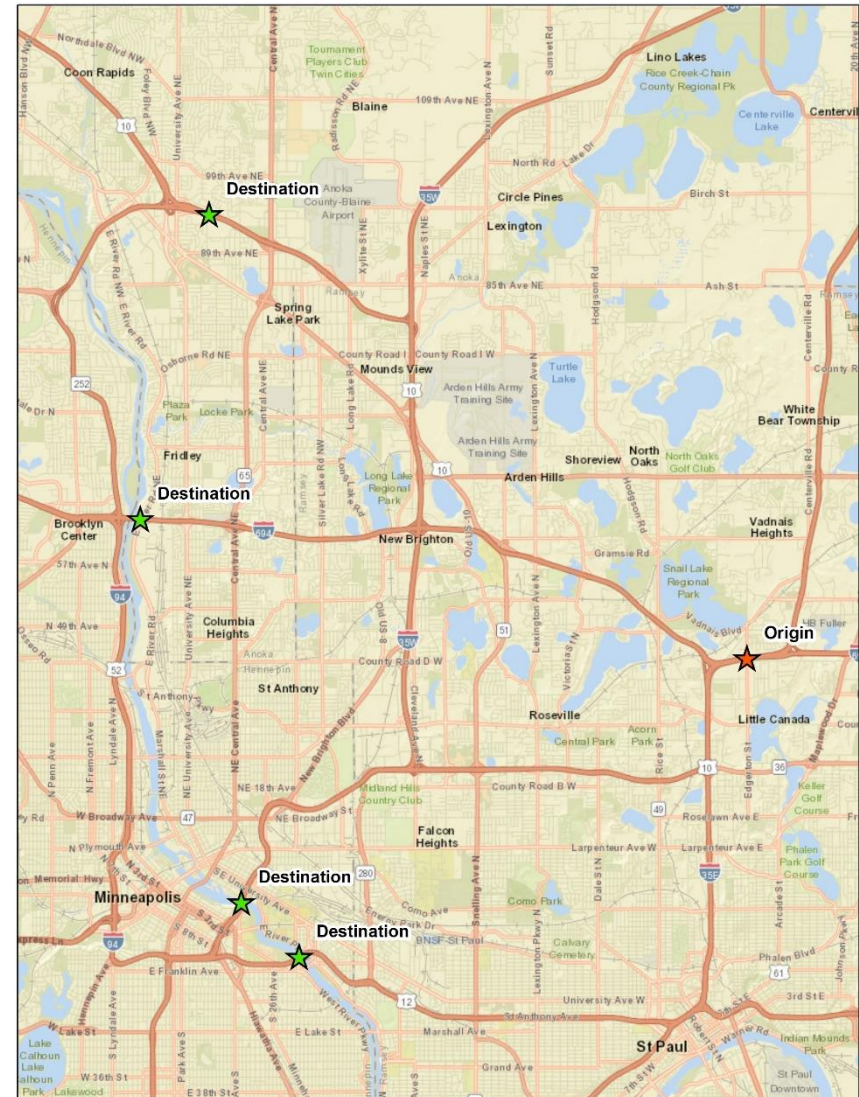
DOT.STATE.MN.US
MnDOT | I-494 Inver Grove Heights Learn More

Sign up for email updates to have the latest info sent...

54,063 people reached

I-35/694 Commons Travel Time Sign

Our Regional Transportation Management Center was working with a consultant on where to place message signs during I-35W construction. These message signs would provide estimated travel time to specific crossings/roadways. They wanted to put a message sign at the 35/694 commons (shown as a red star on the map). They were hoping we could use Streetlight to determine which crossings/locations were most used from that location and they would display time to those locations from the message signs.



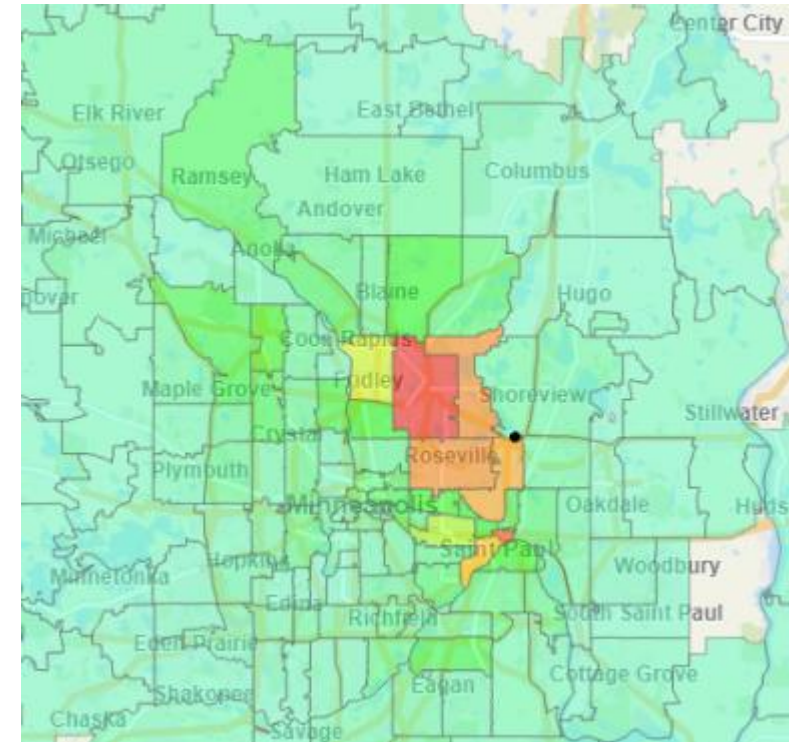
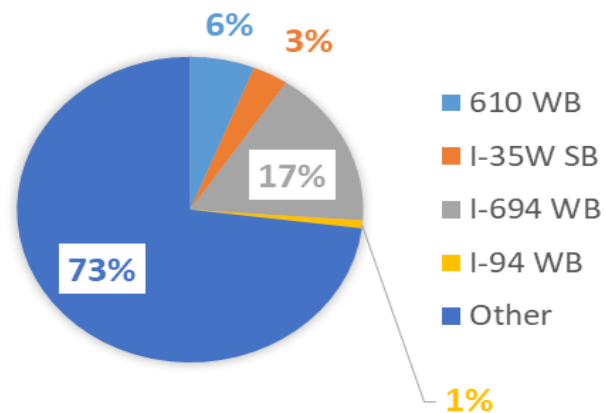
I-35/694 Commons Travel Time Sign

An OD analysis was done to determine which locations were the top destination for those traveling westbound on 694 and southbound on I-35.

The results show that I-694 westbound was the largest destination for travelers in that section of roadway. A large majority of travelers completed their trips on other roadways, most likely local routes.

After speaking with RTMC representatives, they decided **NOT** to deploy a travel time sign at that location since neither destination option they were considering would have benefitted very many motorists. Without the Streetlight tool, this type of analysis would likely not have been completed.

AVERAGE DAY (MON-SUN), ALL-DAY (12AM-12PM)



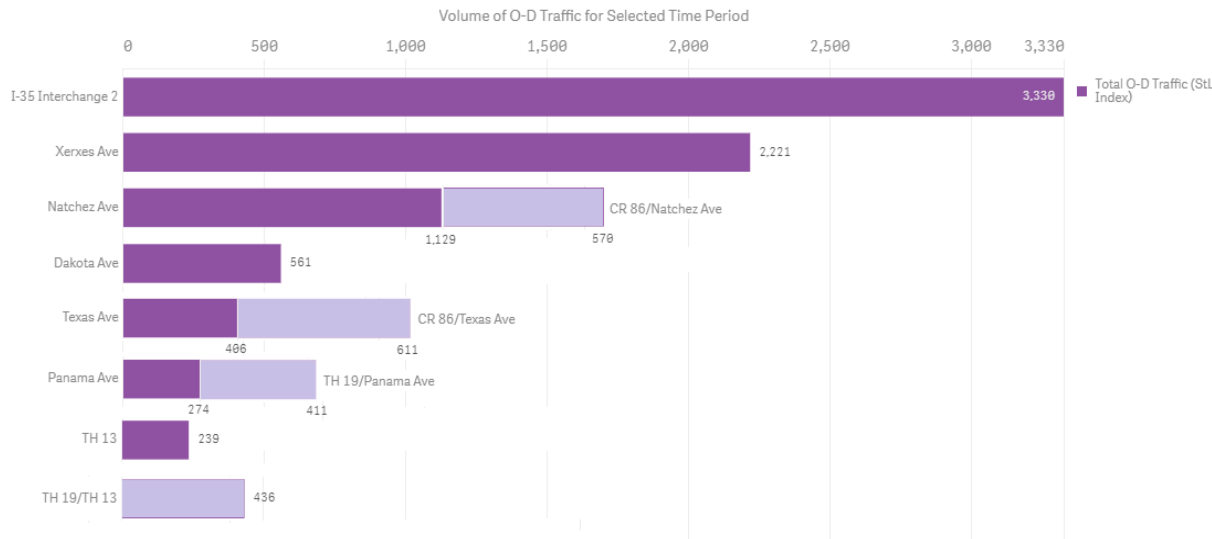
I-35 and CR 2 Interchange

Where is traffic coming from or going to I-35 and CR 2 Interchange?

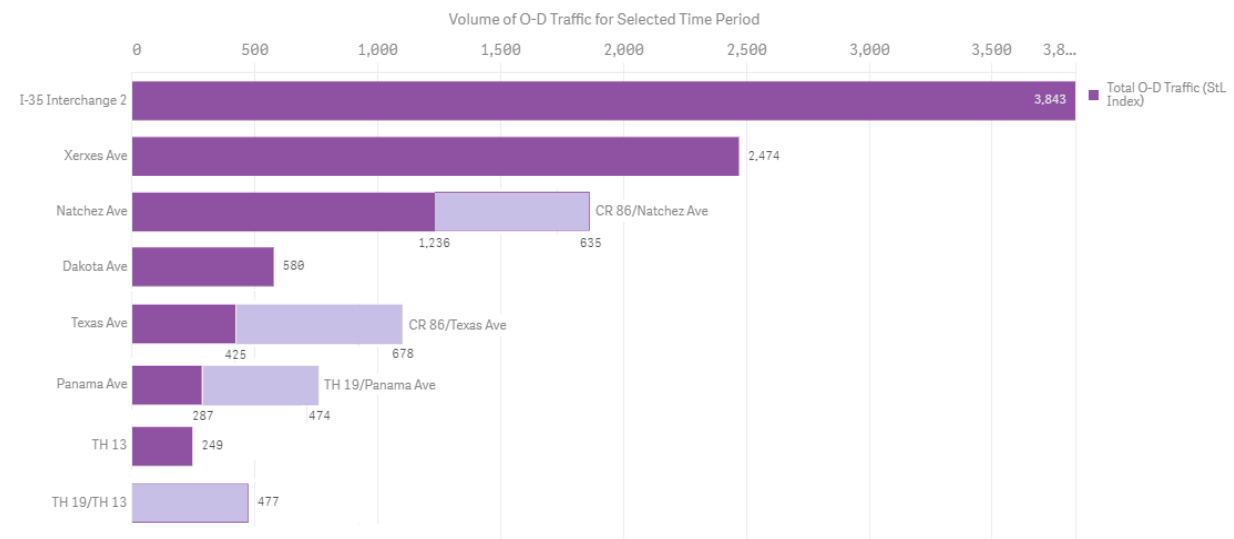


I-35 and CR 2 Interchange

Average Weekday (Monday through Thursday) in 2018 – Traffic coming from I-35/County Road 2 interchange east of Elko New Market.

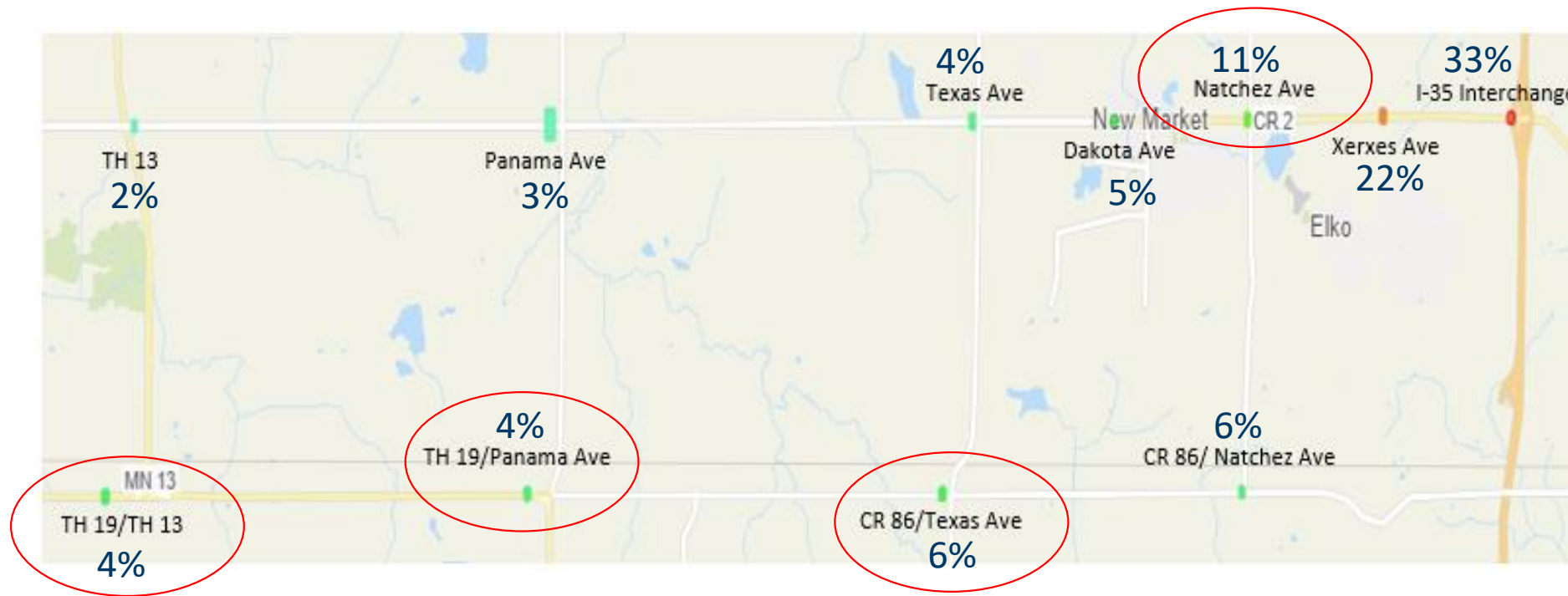


Average Weekday (Monday through Thursday) in 2018 – Traffic going to I-35/County Road 2 interchange east of Elko New Market.



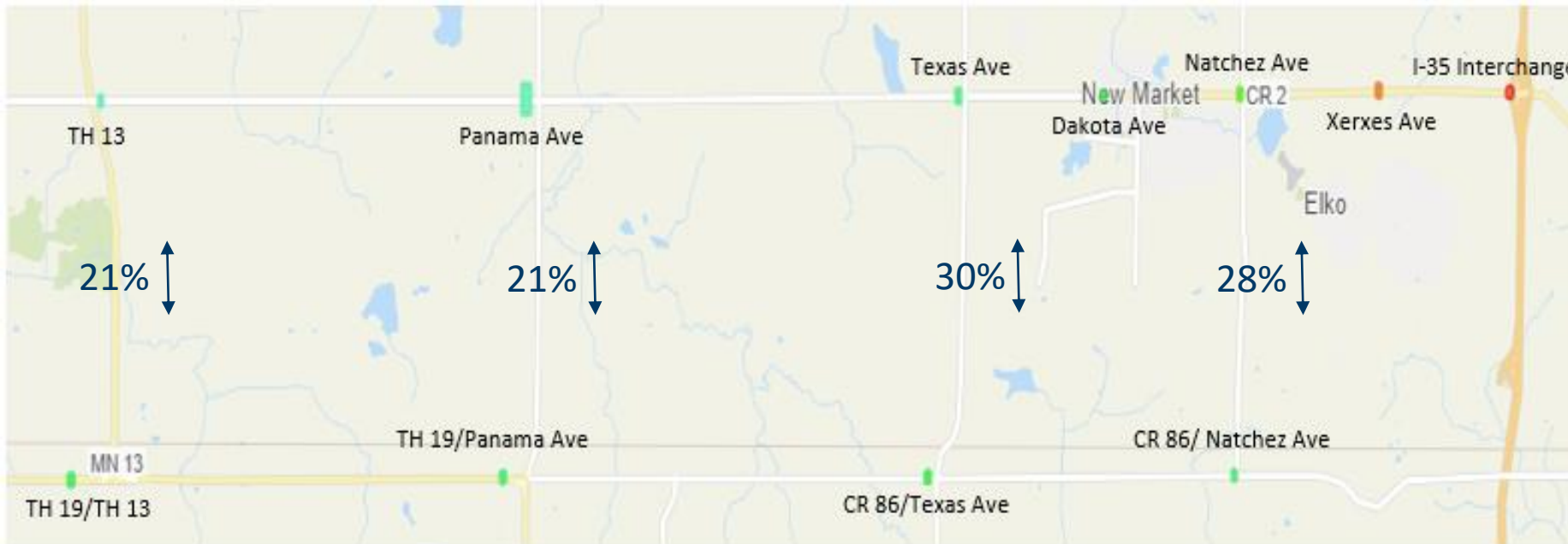
I-35 and CR 2 Interchange

Traffic coming from I-35 and CR 2 Interchange



I-35 and CR 2 Interchange

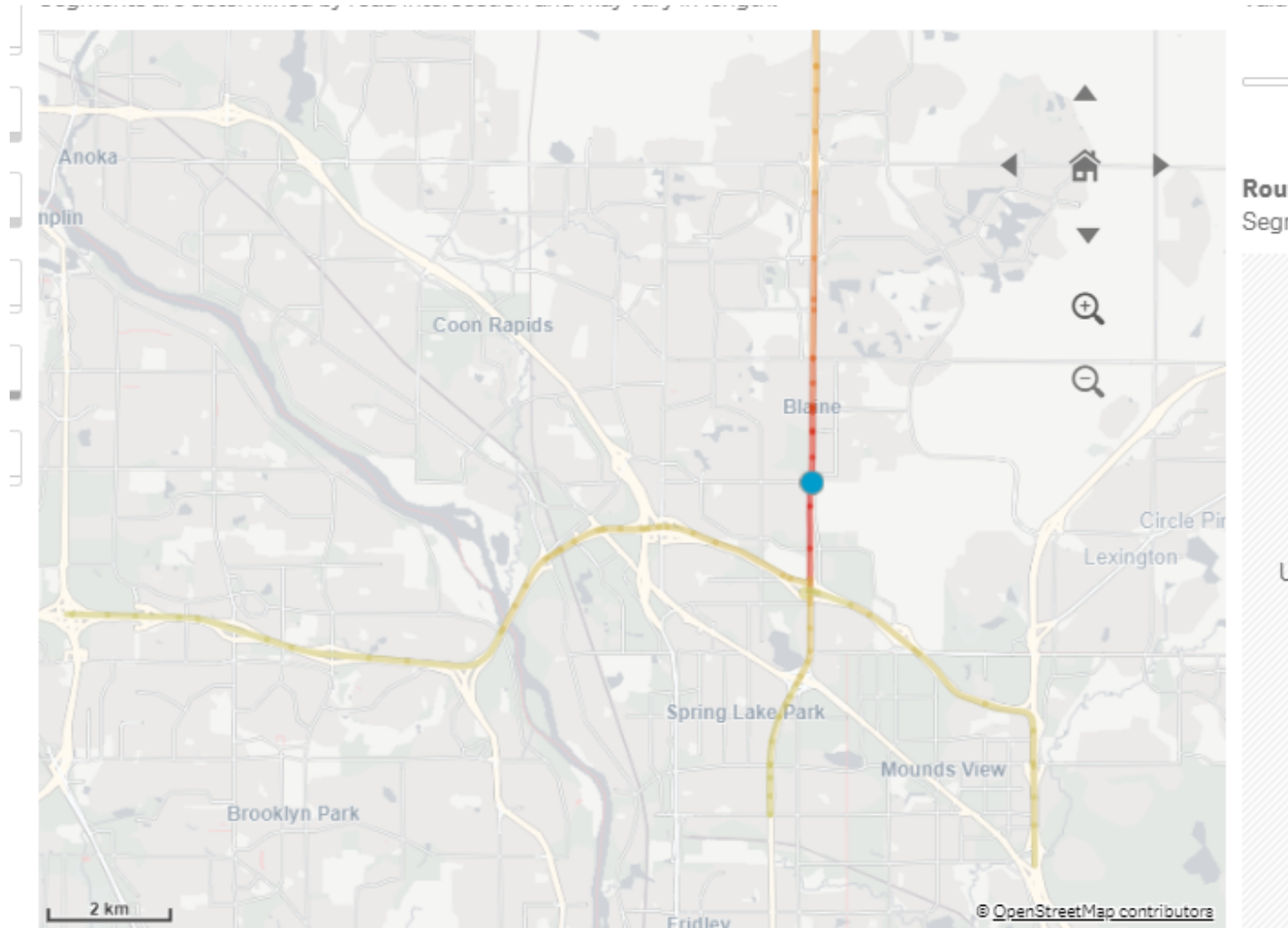
What routes are being used between CR 2 and MN 13/CR 86?



I-35 and CR 2 Interchange

- Able to easily and quickly answer a standard local traffic complaint/concern.
- It would have been extremely labor intensive or logically not feasible to conduct this type of study in the field.
- Streetlight allows the flexibility to refine the analysis based on initial results to capture all the data needed to summarize the traffic situation.
- StreetLight allowed MnDOT to answer a question from a State Representative.
- Future similar complaints/concerns regarding outside traffic can use the same type of analysis quickly and easily.

Top Routes Analysis TH 65 at 99th Ave



This intersection has a nearly 50-50 split for truck traffic.

Less than 3% of freight traffic comes from 99th.

At TH 65 and US, roughly 1/3 (33.3%) of the SB traffic on TH 65 goes to each of the following legs –

WB US 10, EB US 10 and SB TH 65.

Visualizations - StreetLight InSigl x +

insight.streetlightdata.com/#/visualizations/151566

SEE WHAT'S NEW! STREETLIGHT HELP

michael.j.corbett@state.mn.us in Minnesota DOT (MNDOT) - Regional Subscription

SWITCH ANALYSIS ANALYSIS: EB 494 2019 TYPE: Zone Activity ADD-ON: Trip Attributes, Home and Work Locations EXPAND

Zones Analyses Visualizations Viz3D Account JUMP TO PAGE

EB-494-2019 Analysis Story Basic Analysis Metrics - ZA a...

Device Type Personal Presentation View as StreetLight V... Day Type Weekday (M-Th) Day Part Mid-Day (10am-3pm) Attribute Zone Traffic Premium Attribute Trip Attributes Selections Insights

Basic Analysis Metrics - ZA and Home/Work

Personal Travel Home and Work Filter Weekday (M-Th) Mid-Day (10am-3pm) Intersection: Trip Pass-Through Select Zone(s) Zone Traffic Select Home or Work Grid View as StreetLight Volume

Zone Traffic

Heatmap of Zone Traffic Colors indicate the Zone Traffic to and from each Zone during the selected time period.

Zone Traffic Volume

Zone Name, Zone Traffic Volume	Zone Traffic (StL Volume)
#7 I-35W	22,615
#9 Nicollet	22,069
#4 TH 100	21,770
#8 Lyndale	21,043
#6 Penn	20,993
#2 W Bush Lake	20,463
#3 E Bush Lake	20,200
#5 France	19,701
#11 12th Ave	19,473
#10 Portland	19,341
#12 TH 77	18,073
#14 34th Ave	17,599

>22.62k <6.66k

To get more information on how to interpret your analysis traffic Output Type: <https://support.streetlightdata.com/hc/en-us/articles/360029642992>

Zones
 Analyses
 Visualizations
 Viz3D
 Account

JUMP TO PAGE

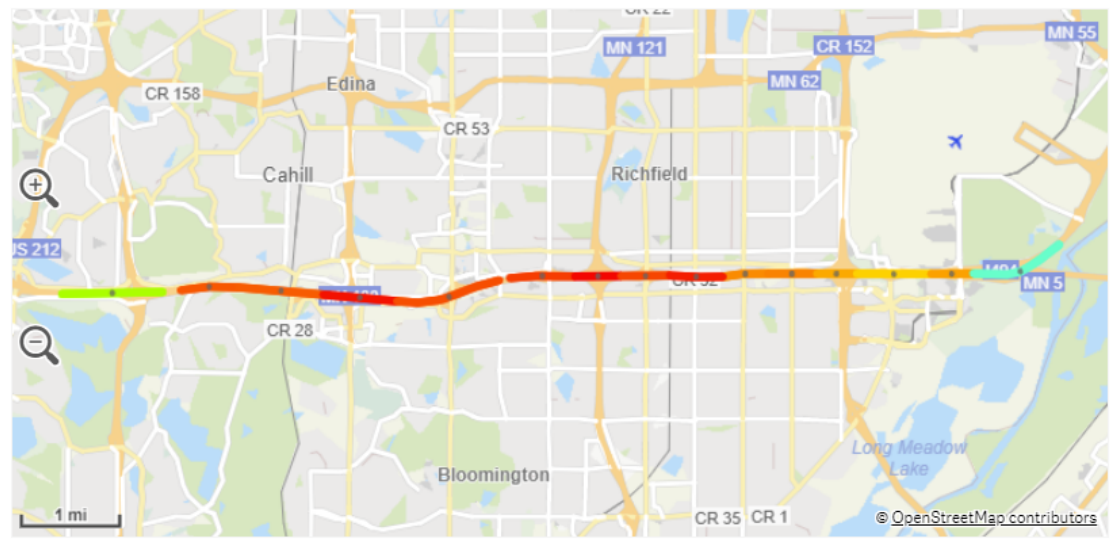
EB-494-2020 Analysis Story
 Duplicate Basic Analysis Metrics - ZA a...
 Device Type Personal Presentation View as StreetLight V... Day Type Weekday (M-Th) Day Part Mid-Day (10am-3pm) Attribute Zone Traffic Premium Attribute Trip Attributes
 Selections Insights

Basic Analysis Metrics - ZA and Home/Work

- Personal Travel
- Home and Work Filter
- Weekday (M-Th)
- Mid-Day (10am-3pm)
- Intersection: Trip Pass-Through
- Select Zone(s)
- Zone Traffic
- Select Home or Work Grid
- View as StreetLight Volume

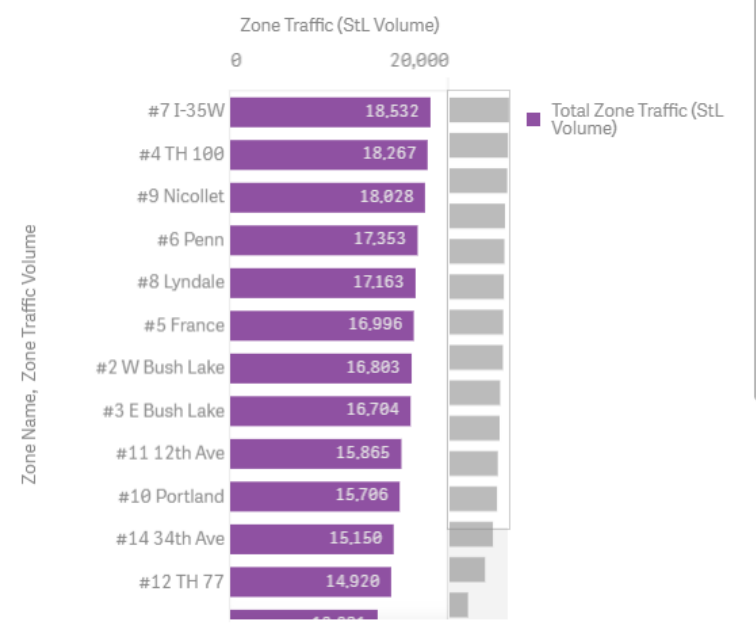
Heatmap of Zone Traffic

Colors indicate the Zone Traffic to and from each Zone during the selected time period.



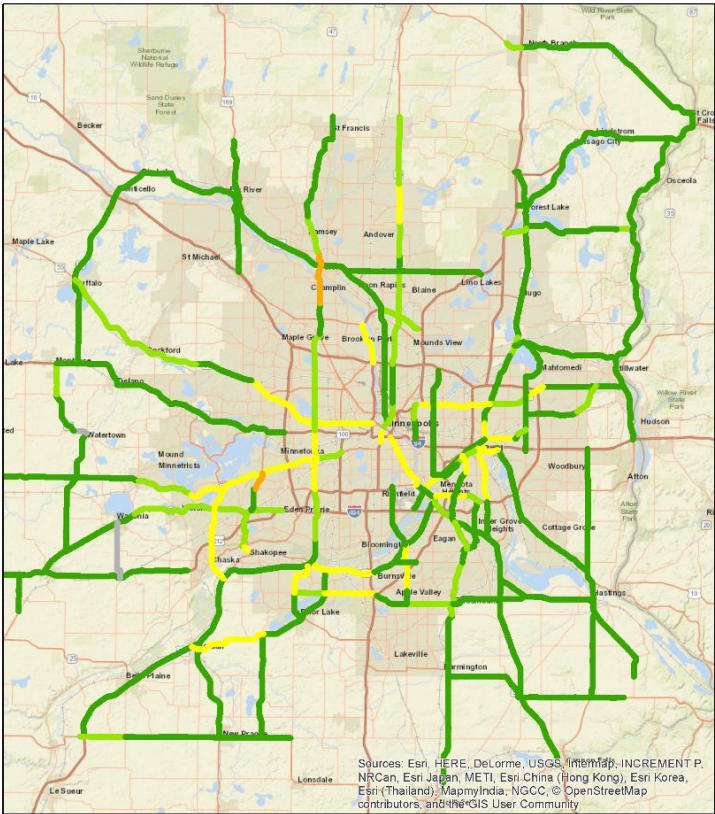
To get more information on how to interpret your analysis traffic Output Type: <https://support.streetlightdata.com/hc/en-us/articles/360029642992>

Zone Traffic Volume

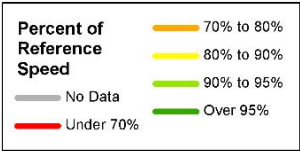


Arterial Performance

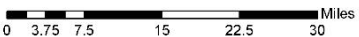
Twin Cities Personal Vehicles Morning Congestion Index



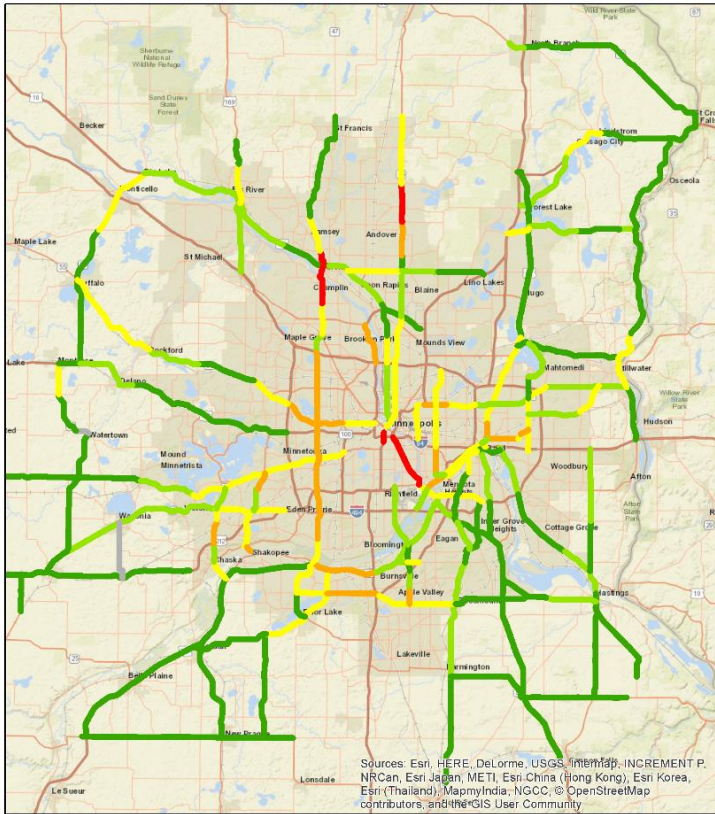
Sources: Esri, HERE, DeLorme, USGS, Imagery, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community



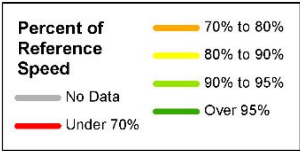
John Zehnder
MnDOT Metro District
Roseville, Minnesota
Source: Streetlight Data



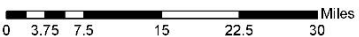
Twin Cities Personal Vehicle Afternoon Congestion Index



Sources: Esri, HERE, DeLorme, USGS, Imagery, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

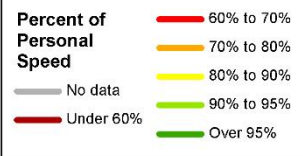
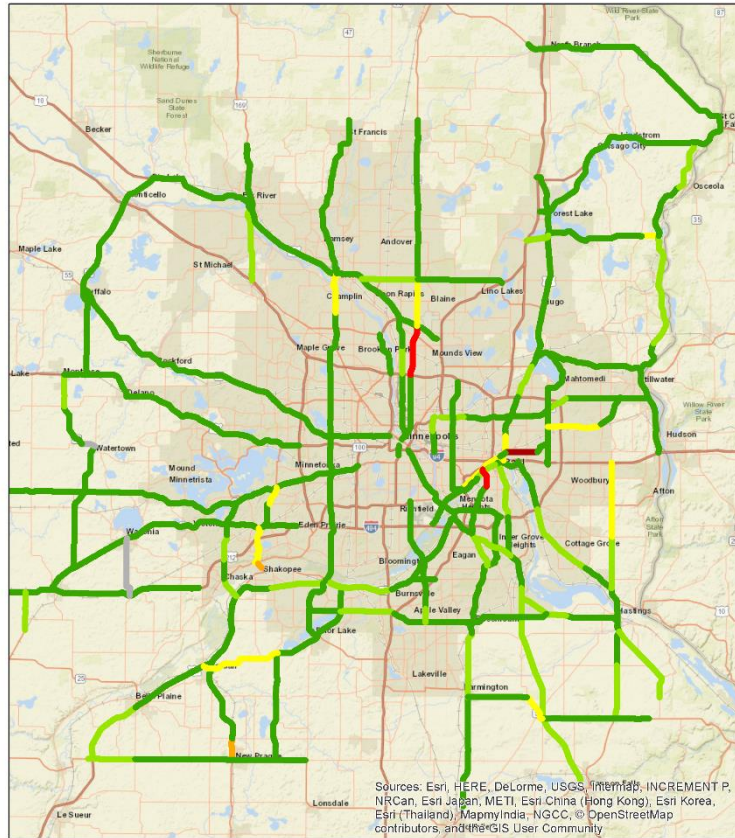


John Zehnder
MnDOT Metro District
Roseville, Minnesota
Source: Streetlight Data

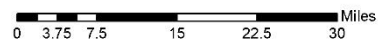


Freight vs personal vehicles-Arterial performance

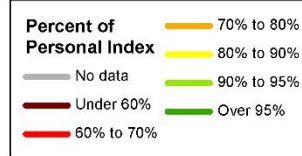
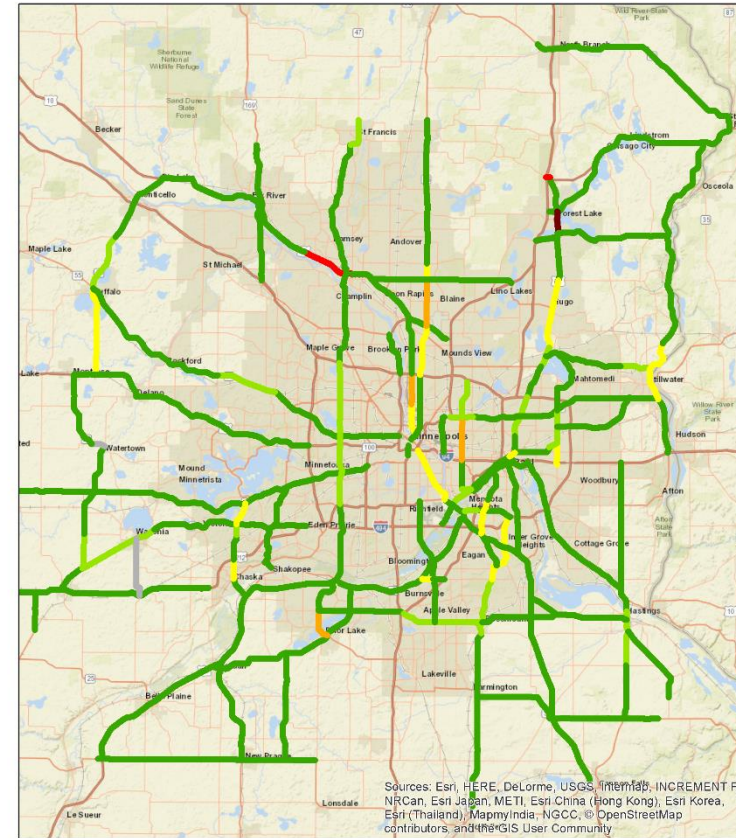
Twin Cities Commercial Reference Speed Relative to Personal Reference Speed



John Zehnder
MnDOT Metro District
Roseville, Minnesota
Source: Streetlight Data



Twin Cities Afternoon Commercial Congestion Relative to Personal Congestion



John Zehnder
MnDOT Metro District
Roseville, Minnesota
Source: Streetlight Data

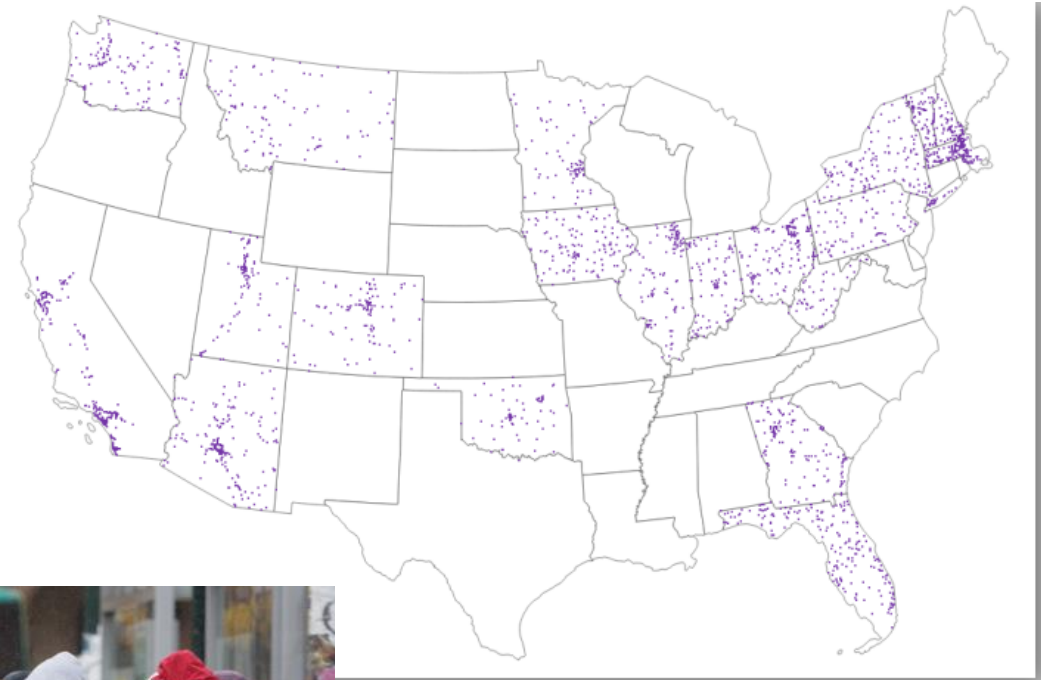


MnDOT Initiatives

AADT analytics tested using MnDOT data from continuous counters

Bike and Pedestrian analytic development using MnDOT data

Transit analytics using regional transit data including trips on MnDOT bus-only shoulders



Why are we doing this?

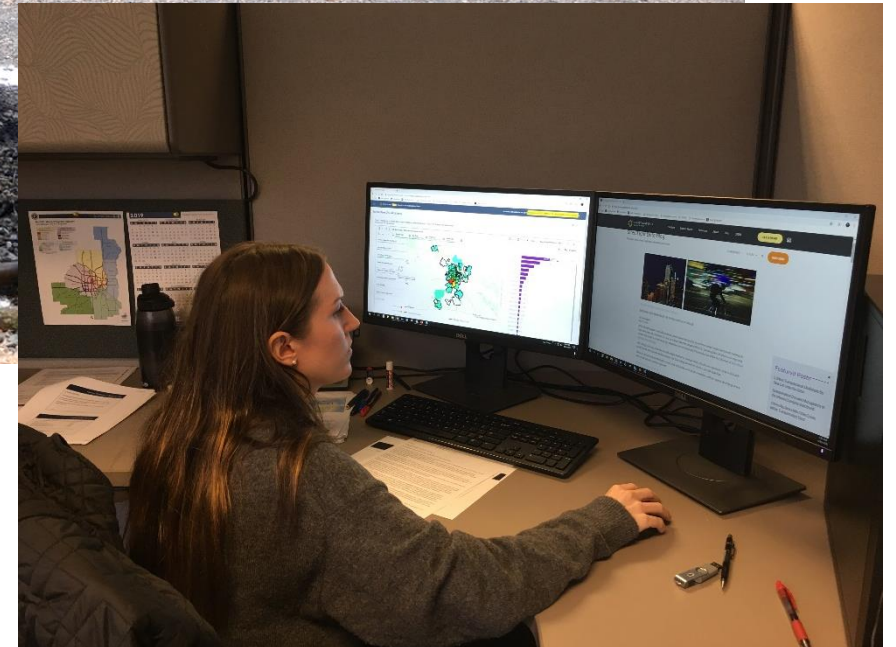
We can make more informed decisions

We can run various analyses much faster and for less cost versus other methods

We can run new types of analyses and more detailed ones that weren't feasible before (value added)

Return on investment is very high, at least 10X what we spent on it

Keeping our invaluable MnDOT workers out of harms way!



MnDOT will be able to enhance current data collection efforts

Possibility of replacing some data collection methods with StreetLight

Current subscription runs through the end of September 2020

All state employees have access for unlimited analyses

All cities and counties within Minnesota can piggyback off of MnDOT's current subscription for \$5,000 per seat license until September

Thank you!

Michael Corbett, PE

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