

# Bluetooth Technology

Using Bluetooth to inform,  
analyze, and validate.



**Stephanie Peterson, AICP**

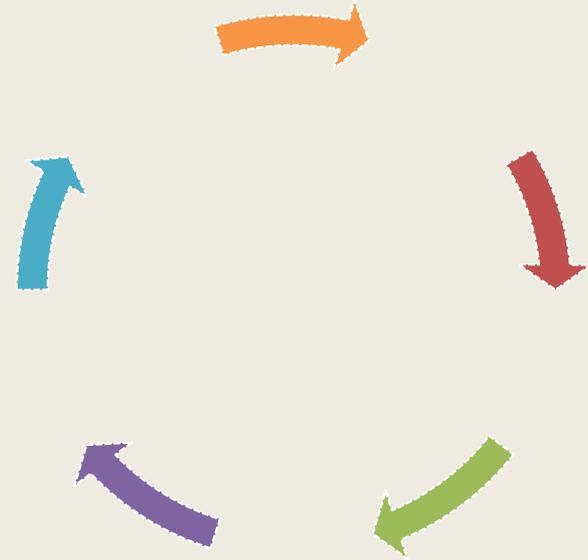
Director



# Overview



- What was the impetus?
- Why was Bluetooth used?
- What did the data show?
- Where do we go now?



## *Mission:*

Providing a **regional forum** to coordinate, encourage, and promote a **safe, efficient, affordable, and integrated** transportation system for all users in support of **livable communities** and **economic competitiveness**.

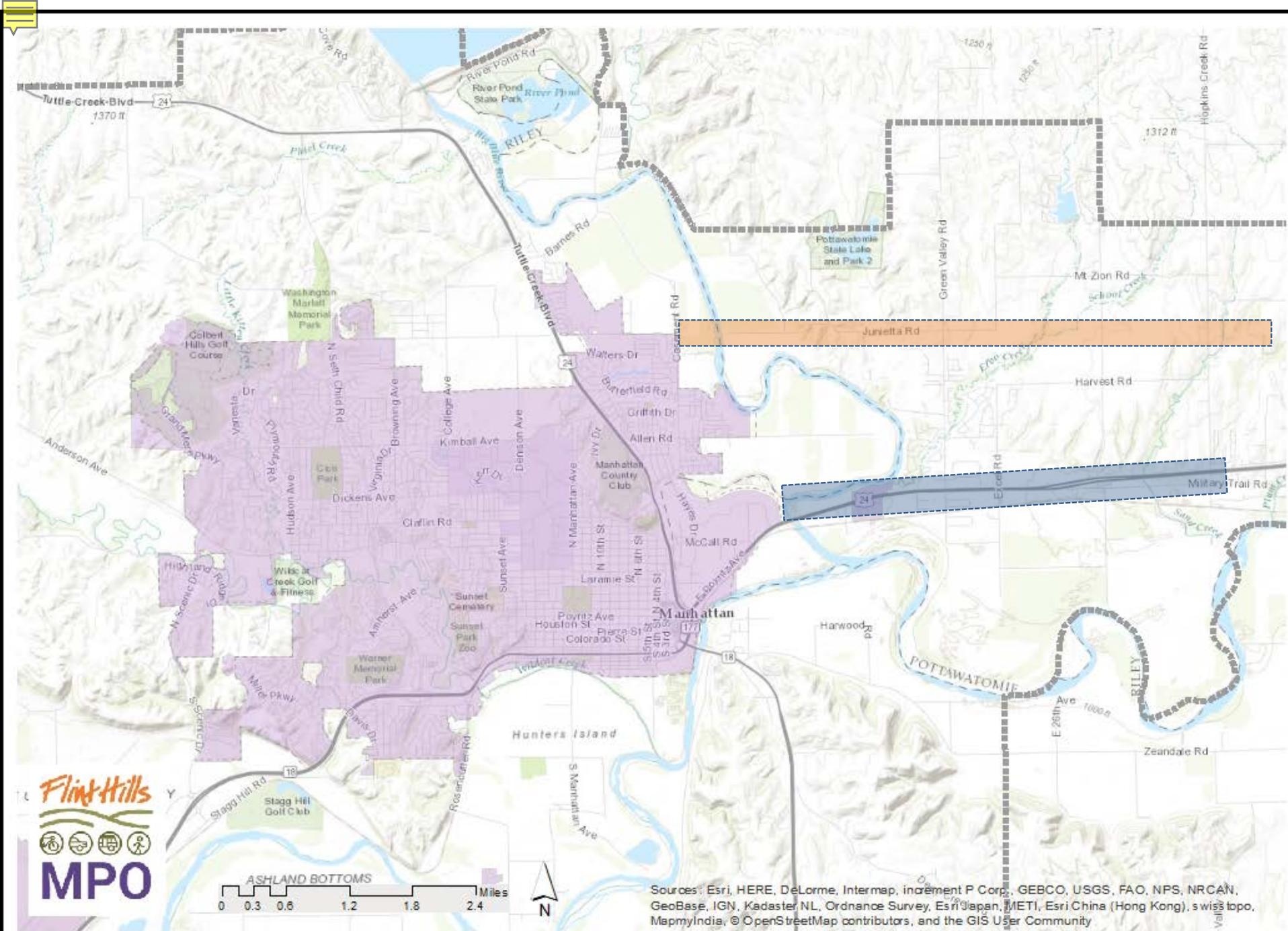


**Safe**

**Efficient**

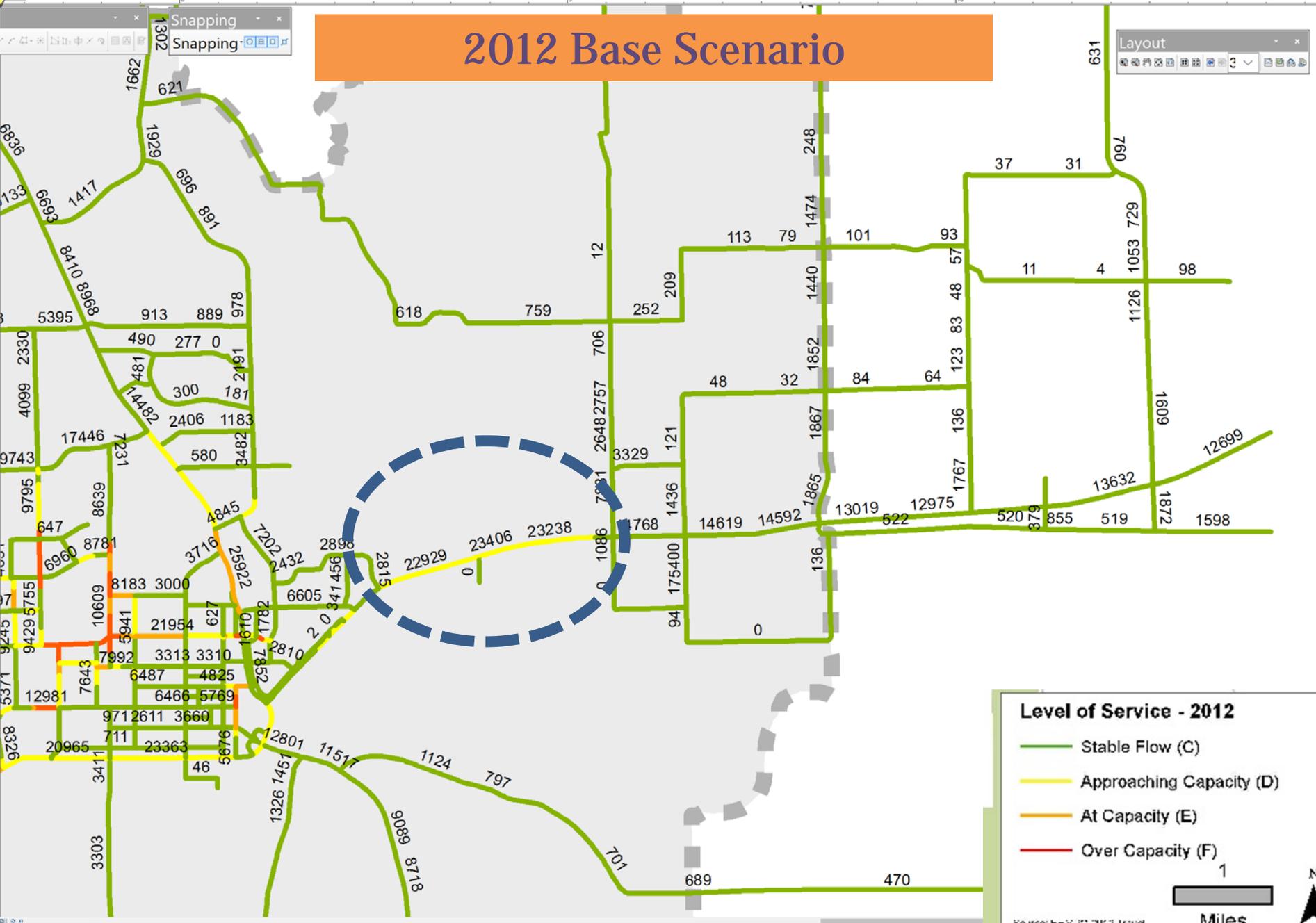
**Affordable**

**Integrated**



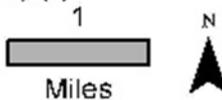
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# 2012 Base Scenario



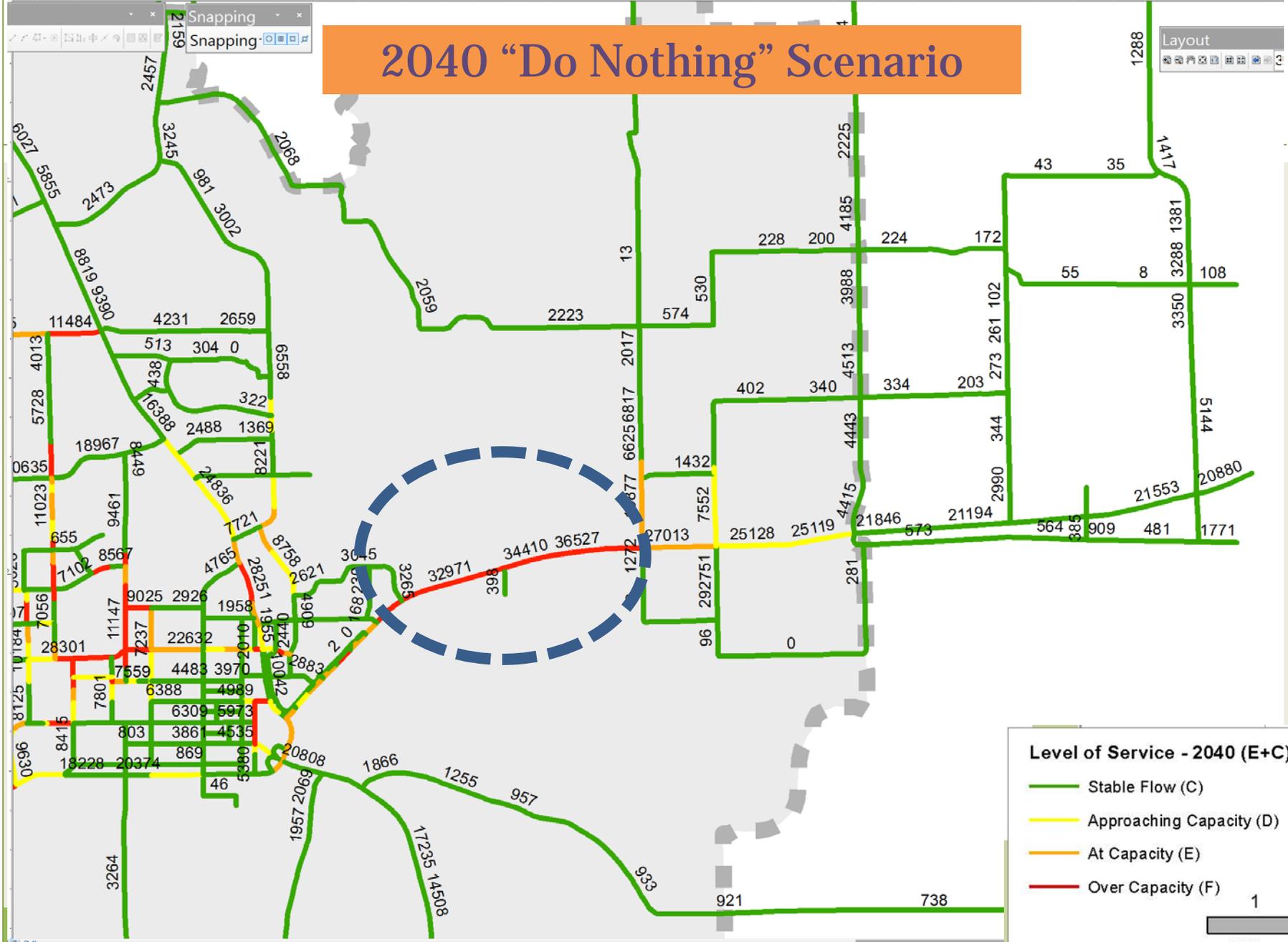
## Level of Service - 2012

- Stable Flow (C)
- Approaching Capacity (D)
- At Capacity (E)
- Over Capacity (F)



Source: FHWA 2002 Travel Demand Model

# 2040 "Do Nothing" Scenario



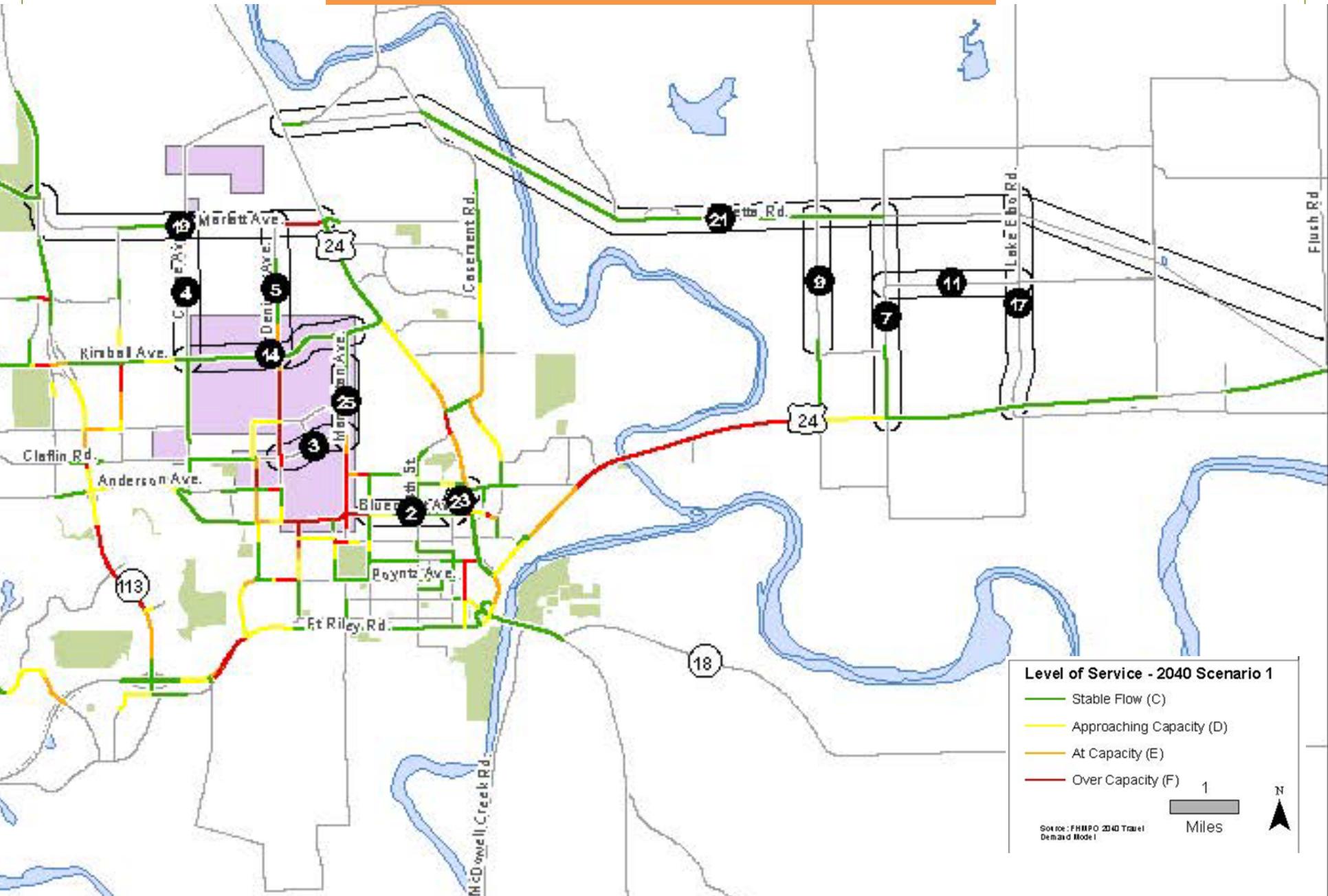
## Level of Service - 2040 (E+C)

- Stable Flow (C)
- Approaching Capacity (D)
- At Capacity (E)
- Over Capacity (F)

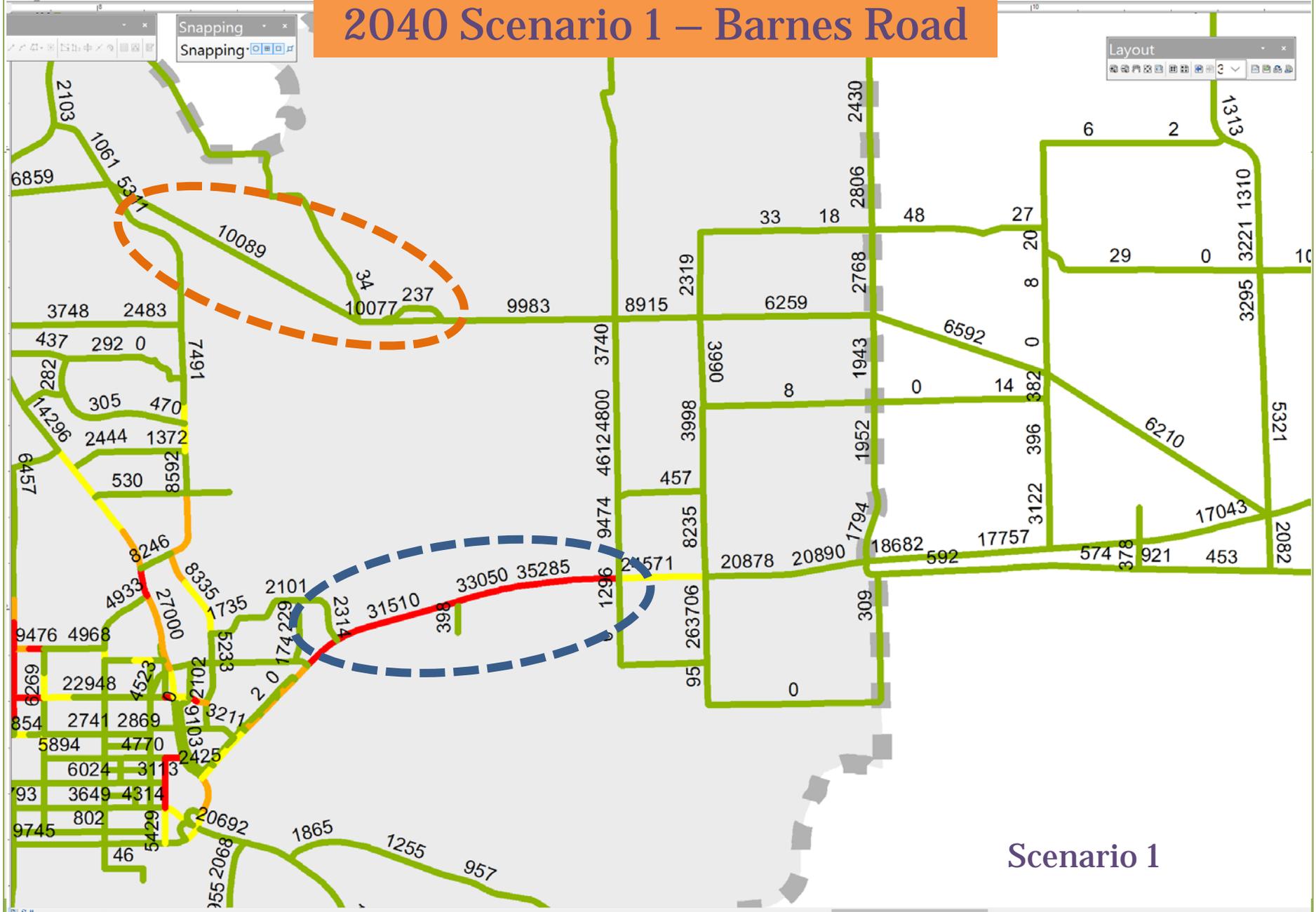


Source: FHMPO 2040 Travel Demand Model

# 2040 Scenario 1 – Barnes Road

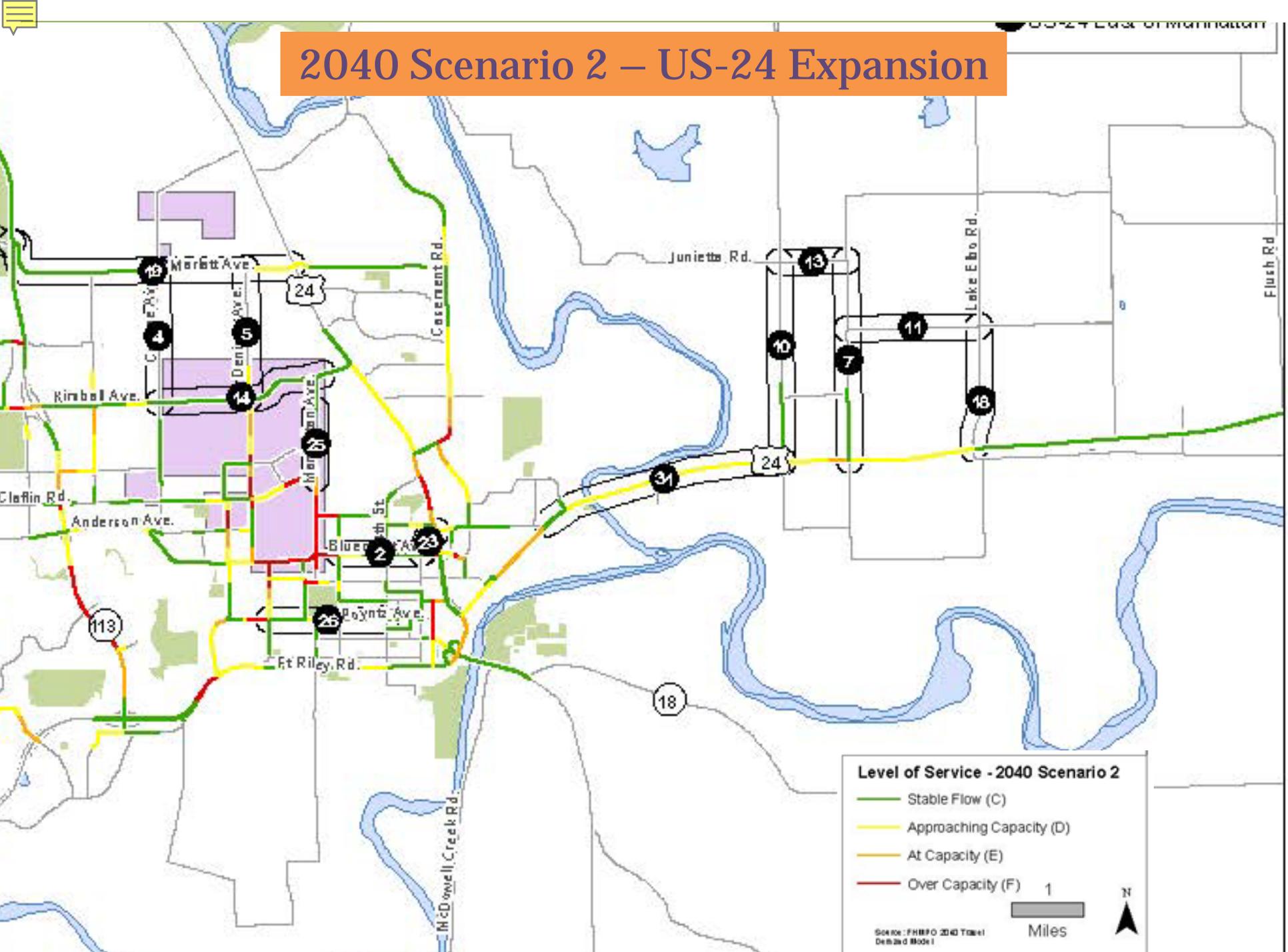


# 2040 Scenario 1 – Barnes Road

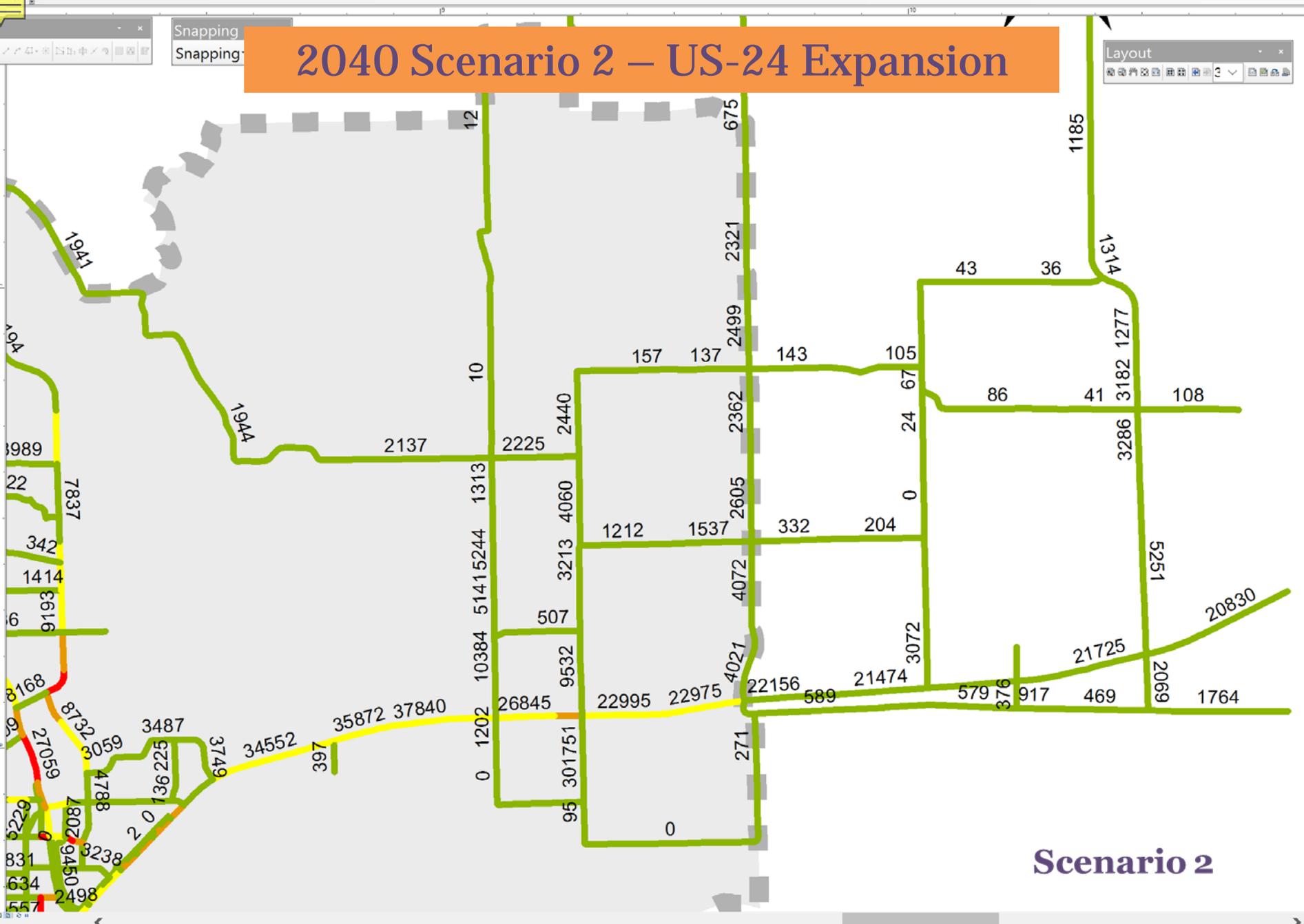


Scenario 1

# 2040 Scenario 2 – US-24 Expansion

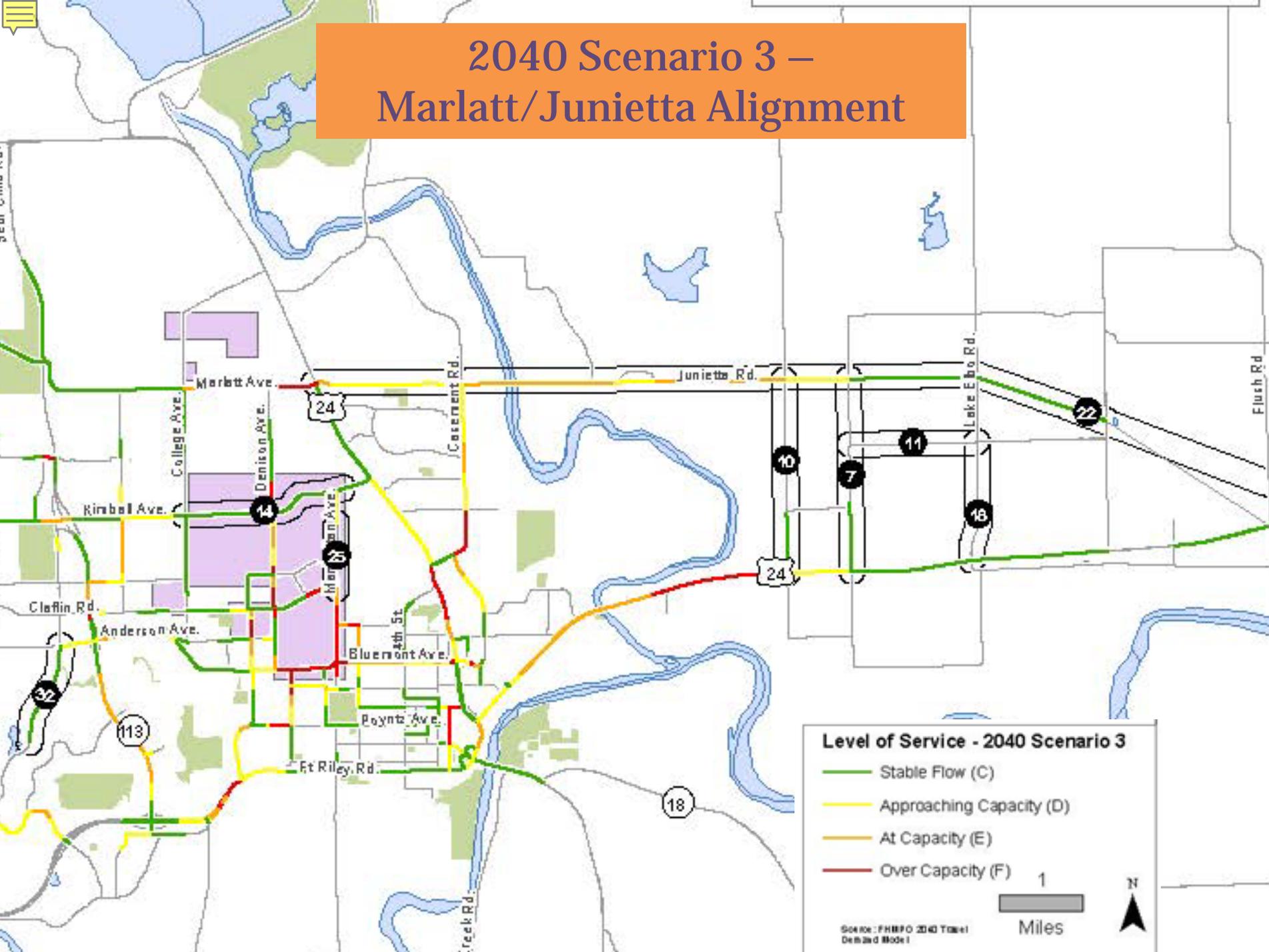


# 2040 Scenario 2 – US-24 Expansion

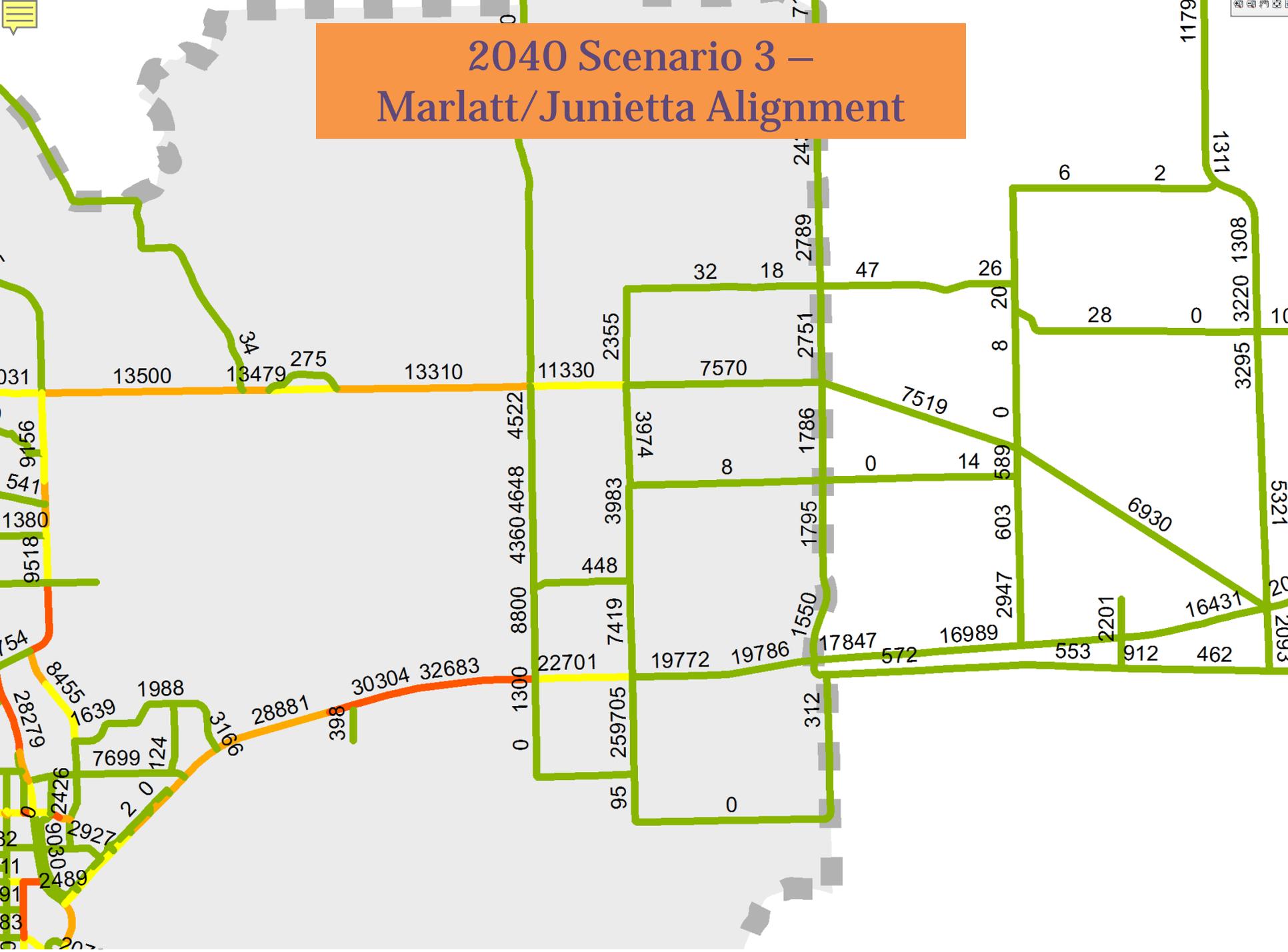


**Scenario 2**

# 2040 Scenario 3 – Marlatt/Junietta Alignment



# 2040 Scenario 3 – Marlatt/Junietta Alignment



# Notes:



- New alignments had tie-ins with Flush Rd – this will likely not occur (note the ADT on this portion)
- ADTs along new alignments...higher due to delay and capacity constraints on US-24?
- Need to model scenario with both US-24 expansion and second river crossing

# Summary of TDM Results

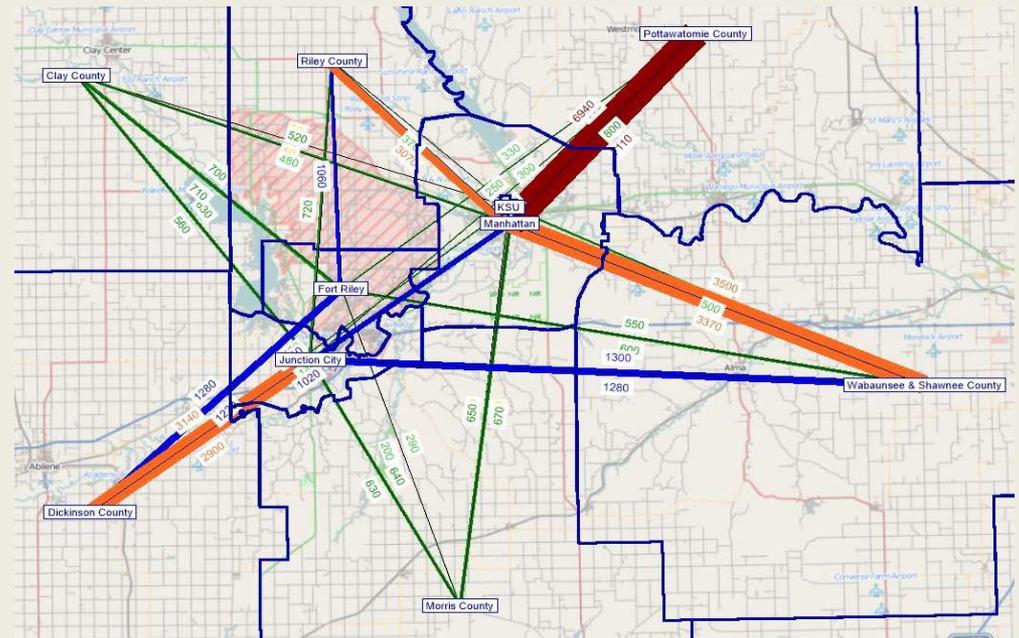


- Do nothing - Significant Capacity Issues along US-24
- Scenario 1 – Barnes Rd is not a viable solution
- Scenario 2 – Adding Capacity to US-24 is a solution
- Scenario 3 – Marlatt/Junietta alignment will not alleviate capacity issues along US-24
  
- Take Away Point – a second river crossing alone to address capacity is not the solution

# Not good enough....



- Model is only a tool
- Forecasting isn't a precise science
- Left with the question “Why did a second crossing not address the issue?”



### BLUETOOTH READER

**Joint Project Reader** ▲

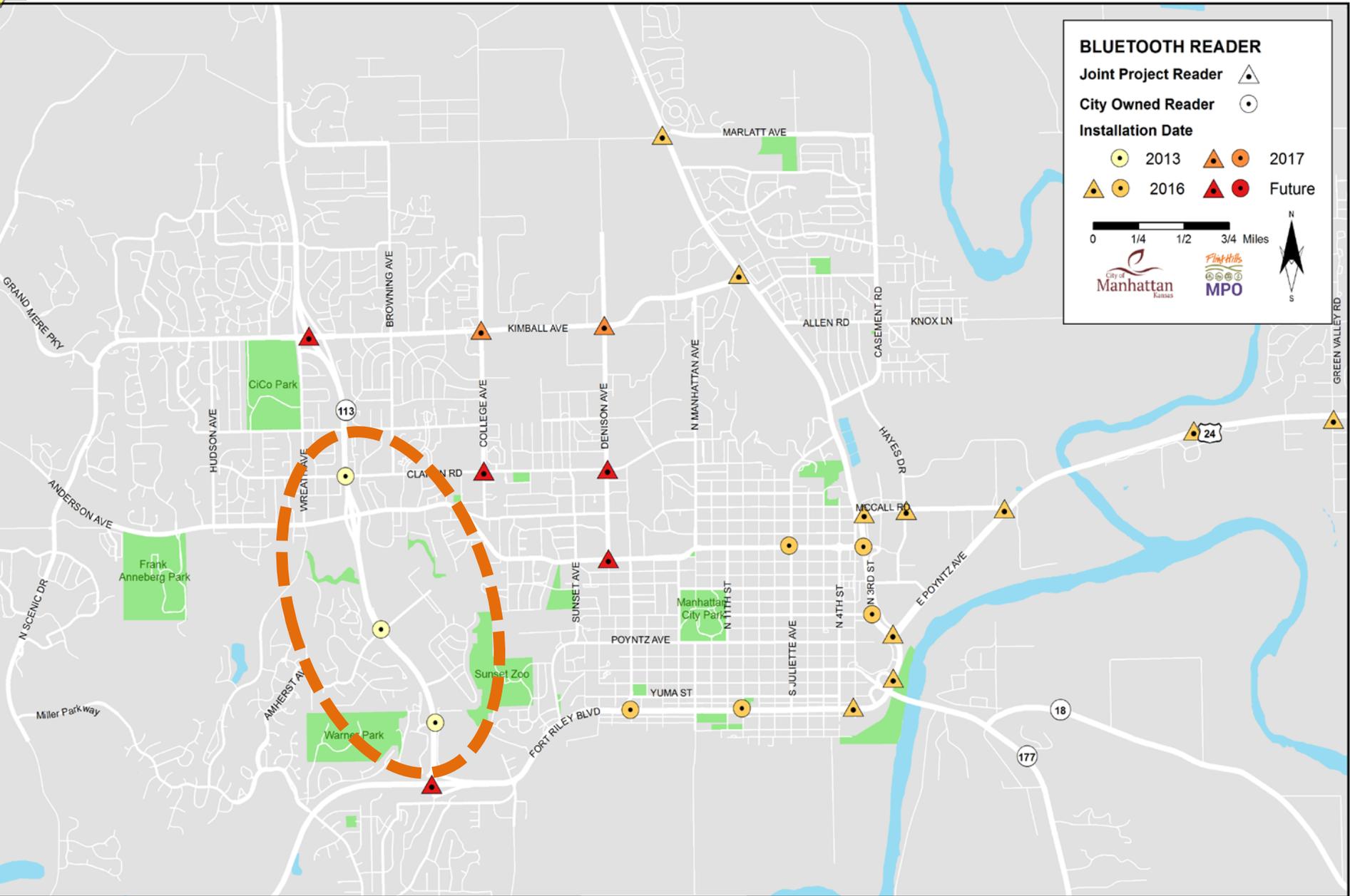
**City Owned Reader** ●

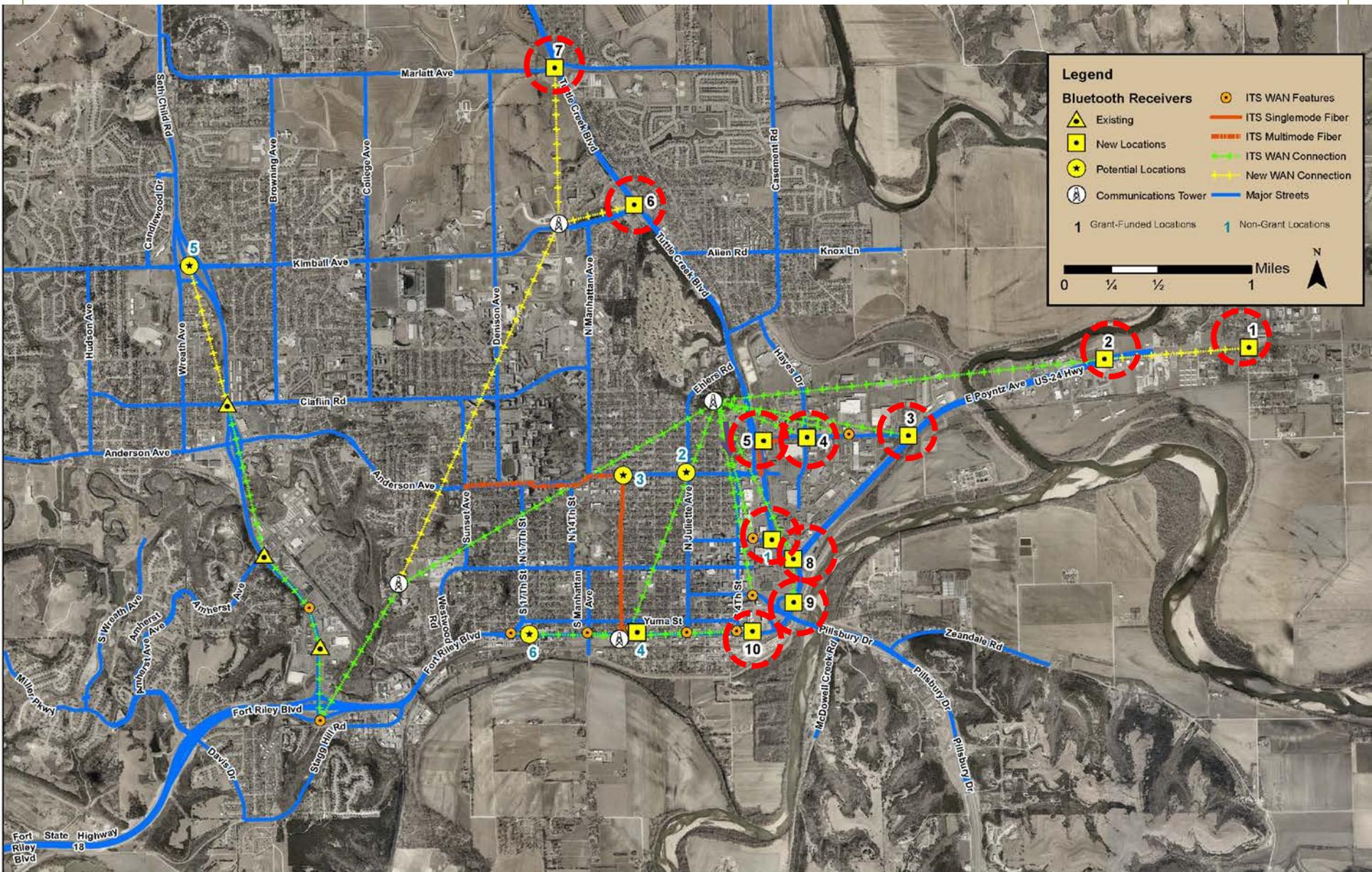
**Installation Date**

● (Yellow)	2013	▲ (Orange)	● (Orange)	2017
▲ (Yellow)	2016	▲ (Red)	● (Red)	Future

0 1/4 1/2 3/4 Miles

City of **Manhattan** Kansas  
**Flint Hills**  
**MPO**



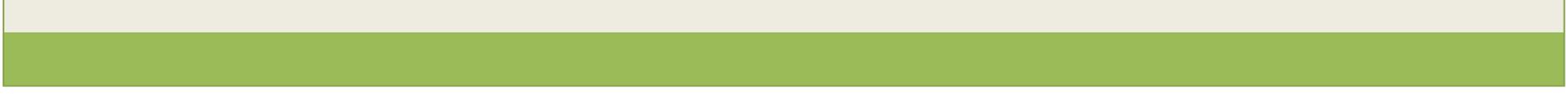


### Legend

Existing Bluetooth Receivers	ITS Singlemode Fiber	ITS WAN Features
New Locations	ITS Multimode Fiber	ITS WAN Connection
Potential Locations	New WAN Connection	Major Streets
Communications Tower		
Grant-Funded Locations	Non-Grant Locations	

0 1/4 1/2 1 Miles

N



# Bluetooth Reader Project



- Vantage Velocity System
- 15 New Bluetooth Readers Deployed in Manhattan on the east side of Manhattan
- Approximately \$50,000 for 10 readers and supporting communication equipment
- Provides speed, delay, travel time, O&D

# Bluetooth Reader Project



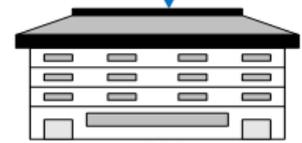
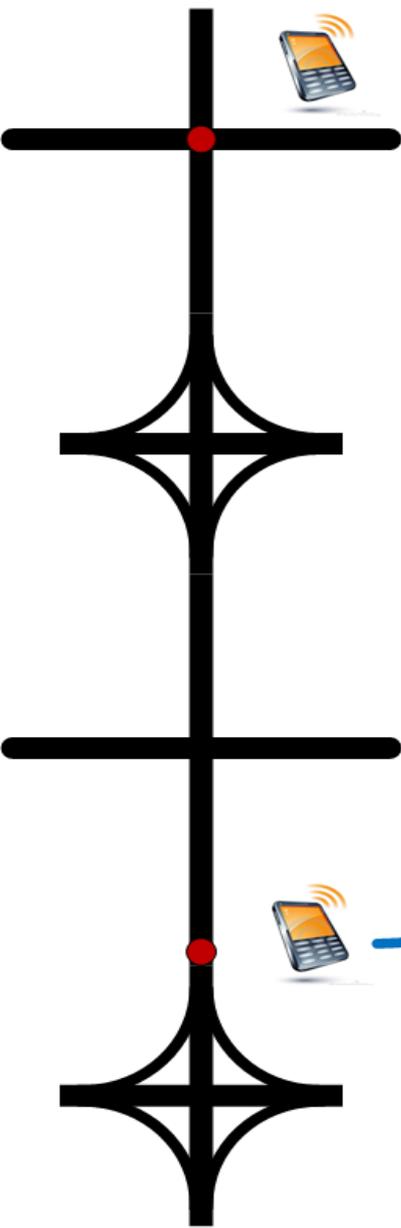
- **Traffic Cabinet Installation**
  - Rack or Shelf-Mount
- **Communication Options**
  - Ethernet
  - Cellular Modem
  - Low Bandwidth Radio
  - Others
- **Antenna is integrated into Existing Cabinets**
  - Omni-Directional
  - 300 feet Radius





Anderson Avenue ↗





Analysis of Data to Generate Charts, Graphs and Maps

MAC Address

Date/Time/Stamp

Data Set

Data Set

Data Set

MAC Address

Date/Time/Stamp

MTOF

# Bluetooth Reader Initial Data Collection



- **Data Collected**
  - 6 months of data
  - 5 days a week (M-F) = 130 Days of Data
  - 24 hours per day capture
  - 1 hour travel time limit
  - 2% to 5% capture rate
- **Summary of Data**
  - Table Format of O–D
  - Flow Charts
  - 5.189 Million matches over 6 month period

# Wichita MPO's Traditional O&D



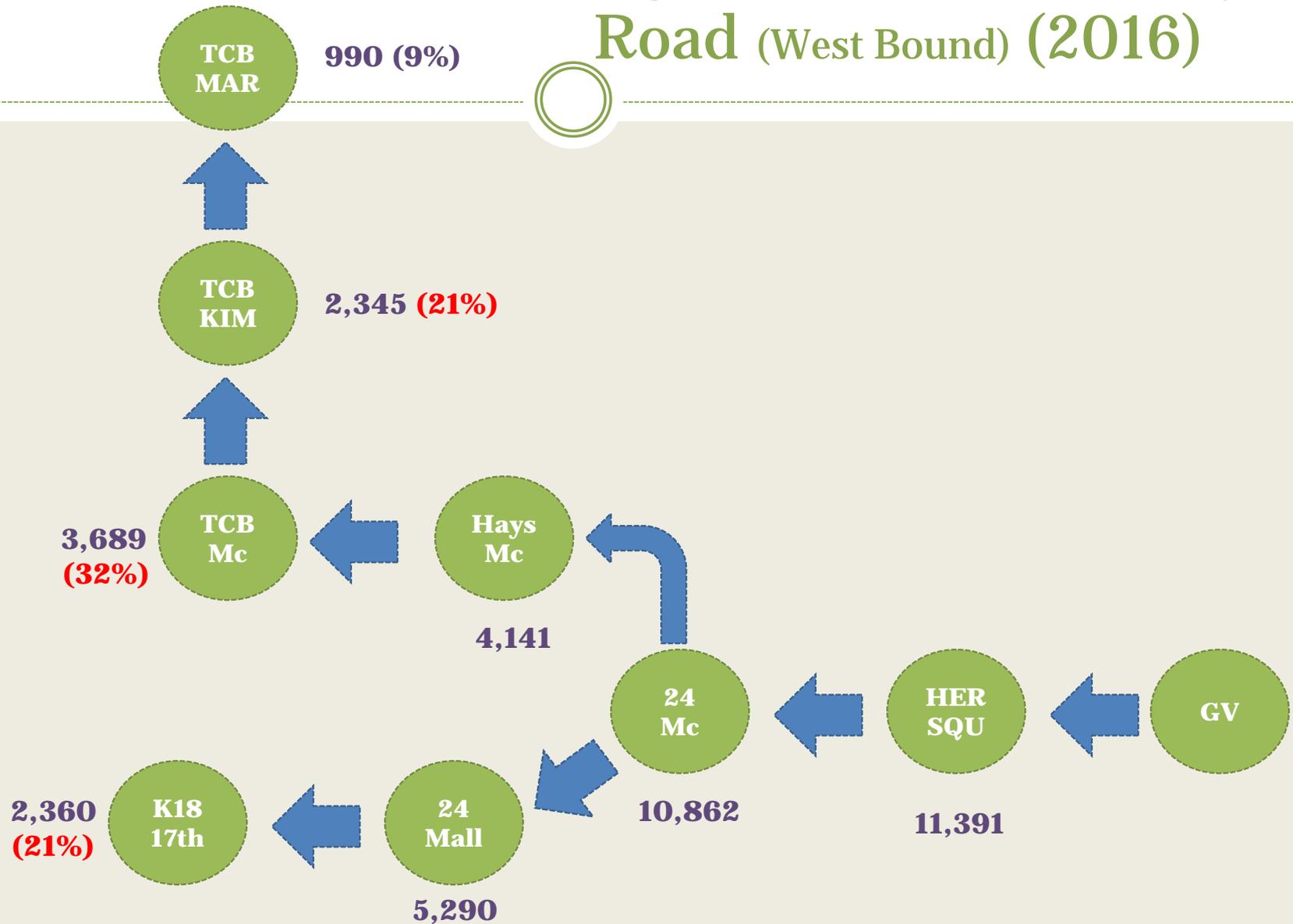
- Household Travel Survey conducted in 2012
  - \$492,000 (Approx. \$350,000-\$400,000 for O&D)
  - 15 to 20 external stations
  - Received 3,576 responses (less than 1% capture rate)
  - \$97.87/response
- Cost of a traditional O&D on US-24
  - 67,000 matches (Originating at GVR to 17<sup>th</sup> & FRB, TCB & McCall, and TCB & Kimball)
  - \$6.6 million to use traditional O&D to collect this amount of data

# AirSage Data



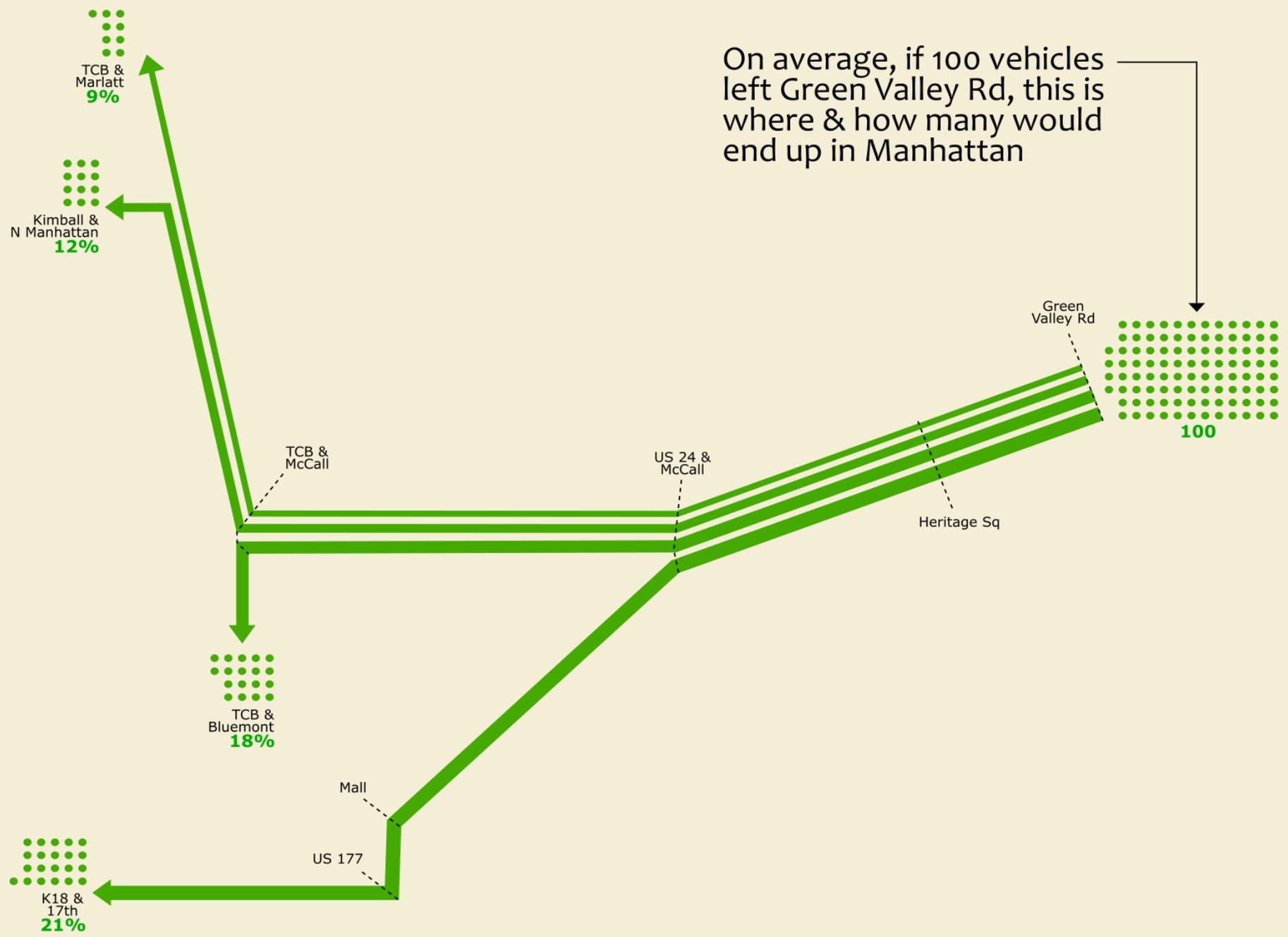
- Costs about \$10,000/day
- Uses cell towers to ping cell phone signals
  - Data broken down by zip code
- US-24 Costs to use AirSage
  - For 130 days worth of data, \$1.3 million

# Originate at Green Valley Road (West Bound) (2016)

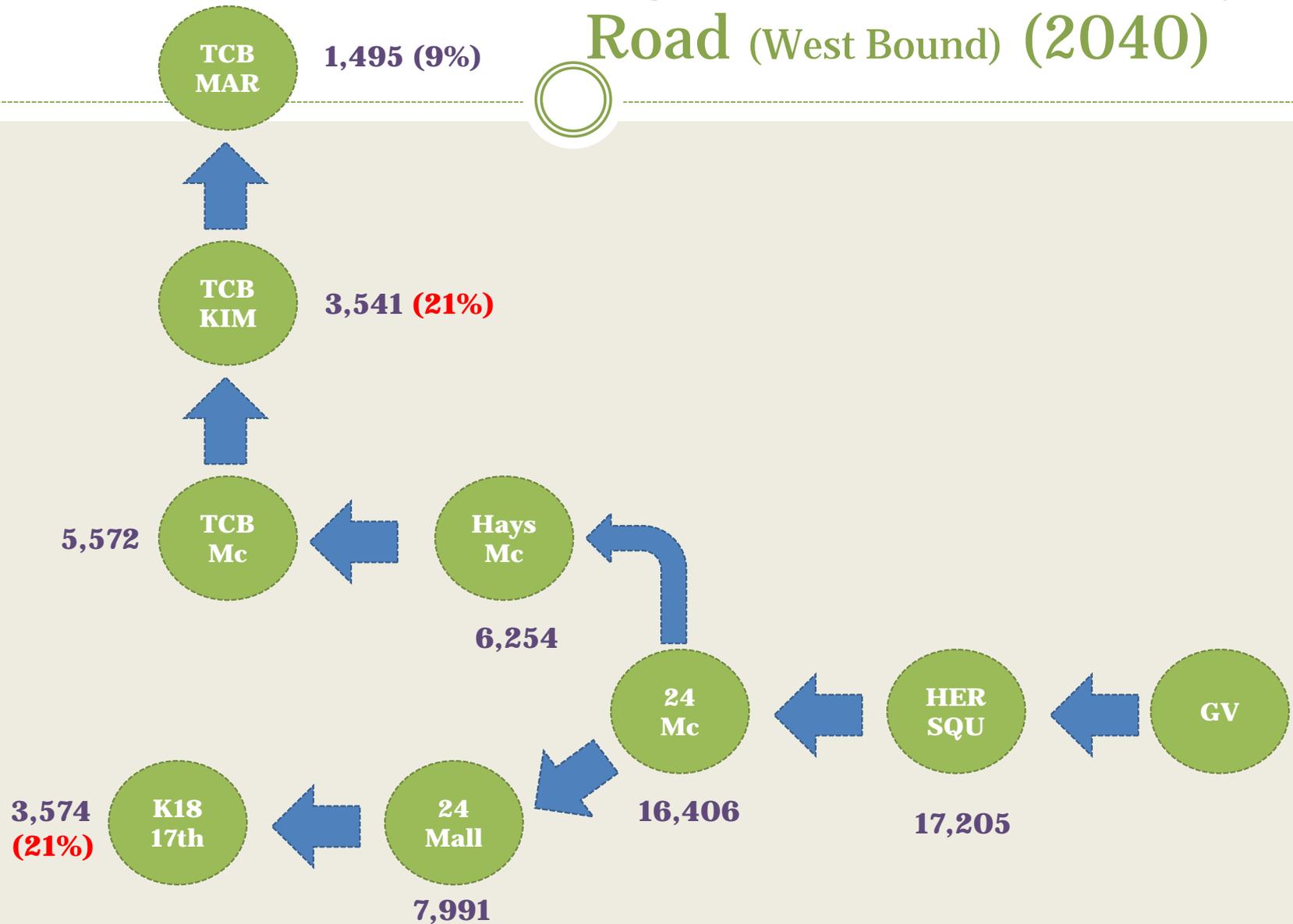




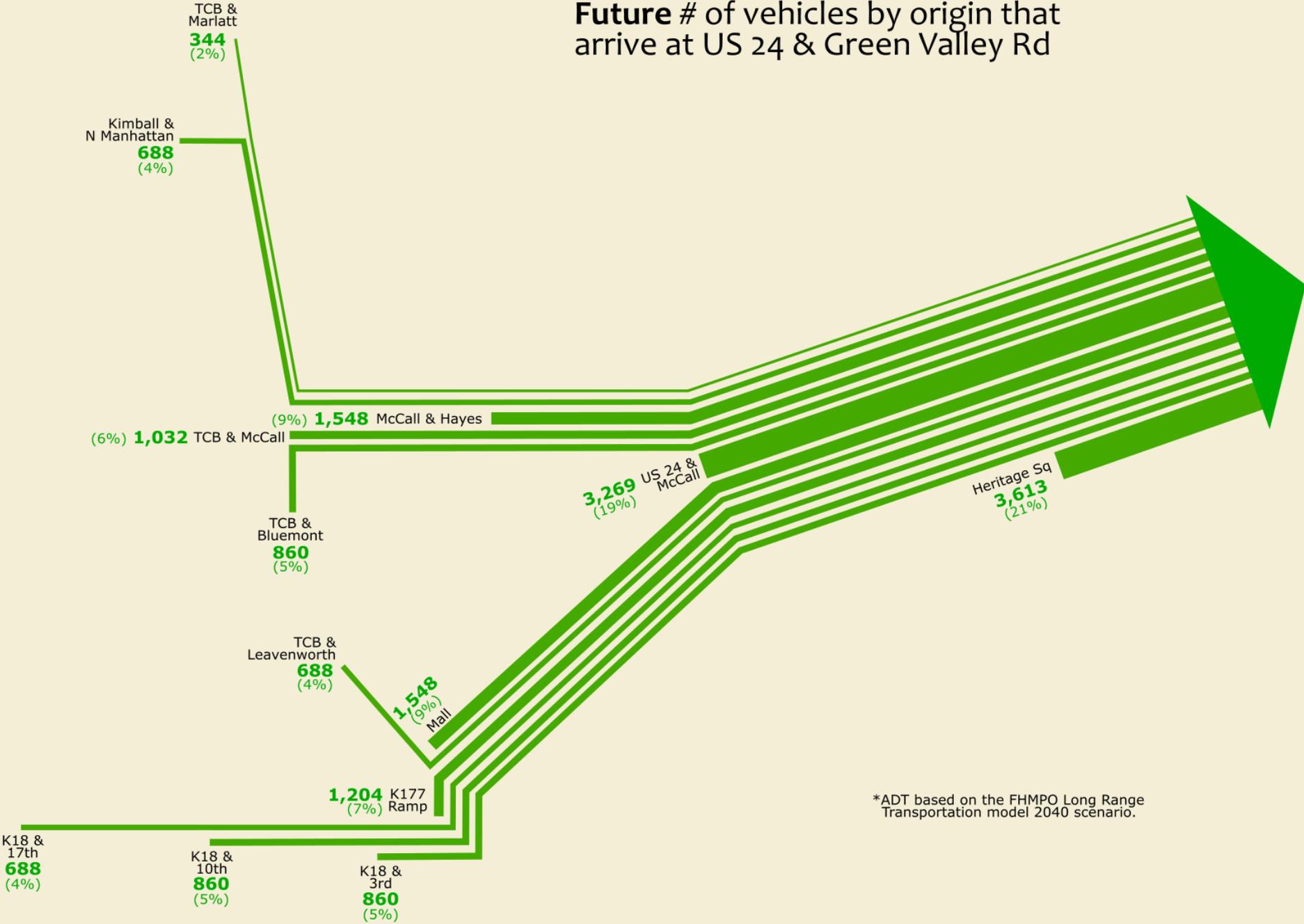
On average, if 100 vehicles left Green Valley Rd, this is where & how many would end up in Manhattan



# Originate at Green Valley Road (West Bound) (2040)



# Future # of vehicles by origin that arrive at US 24 & Green Valley Rd



\*ADT based on the FHMPO Long Range Transportation model 2040 scenario.

# Next Steps



- Procure more Bluetooth devices
- Update the TDM
- Implement US-24 Corridor Plan
- Update Flint Hills Transportation Plan

**BLUETOOTH READER**

Joint Project Reader

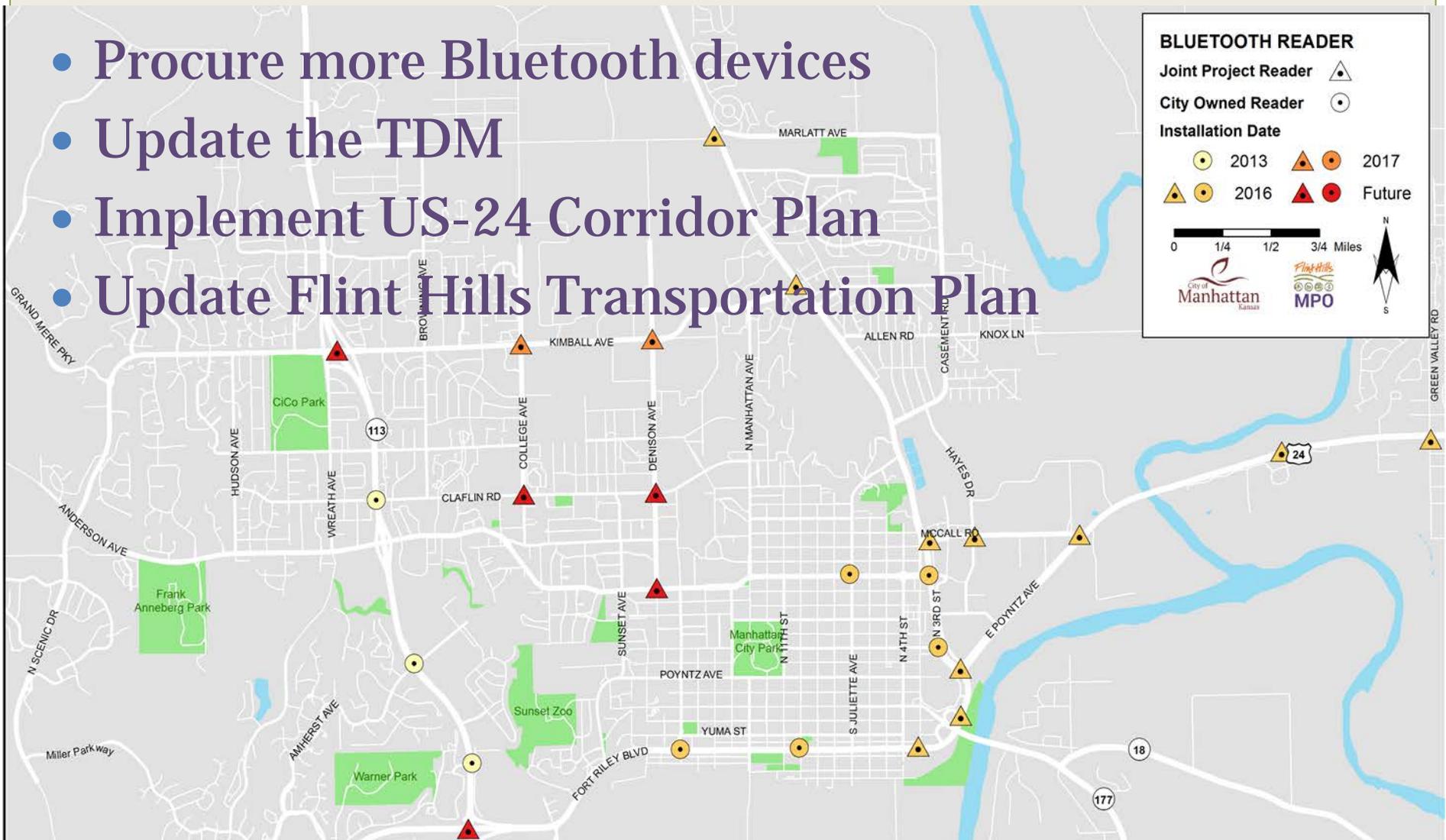
City Owned Reader

**Installation Date**

	2013		2017
	2016		Future

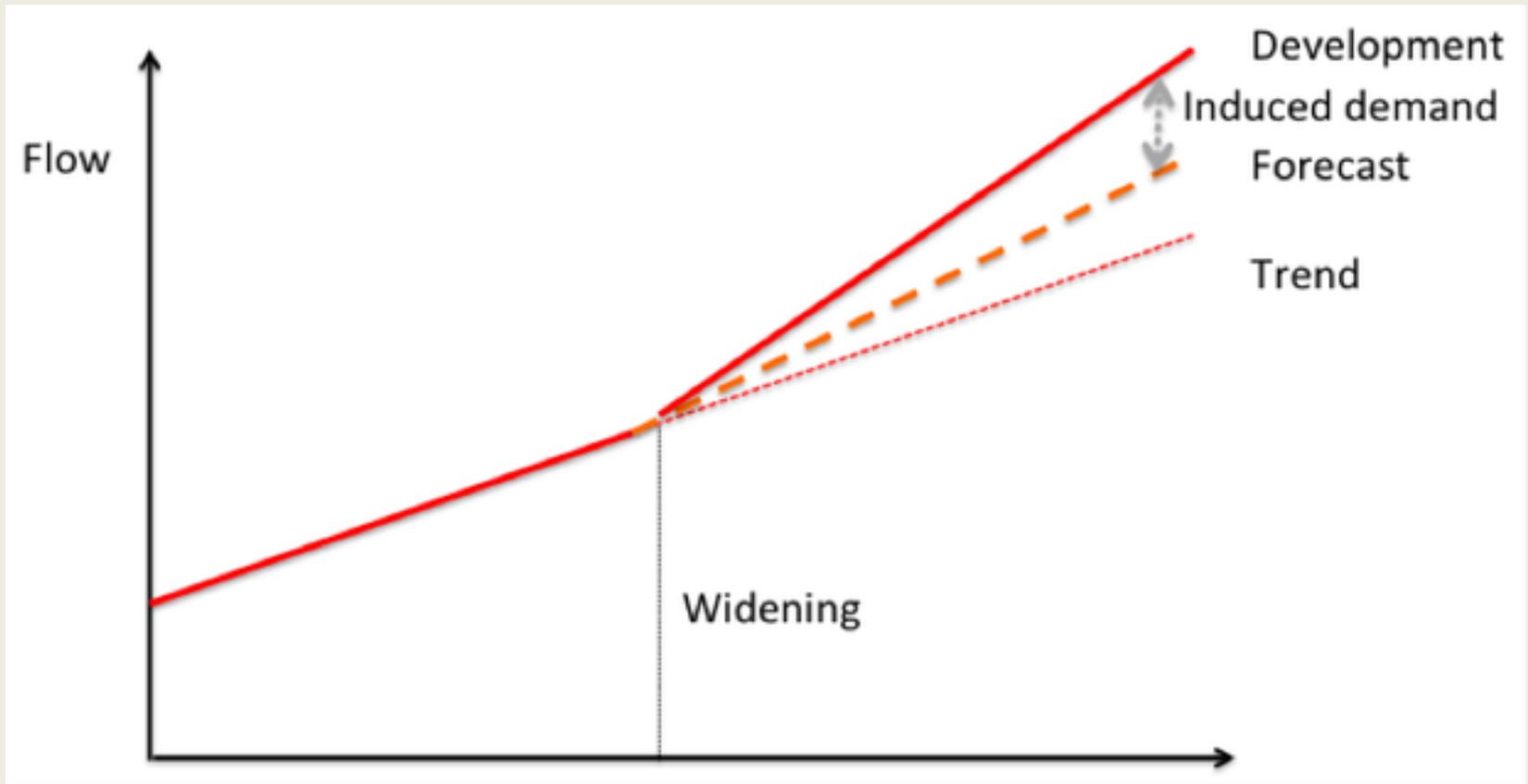
0 1/4 1/2 3/4 Miles

City of Manhattan Kansas  
Flint Hills MPO





# Induced Demand



Or, think about it in reverse- - Reduced Demand