

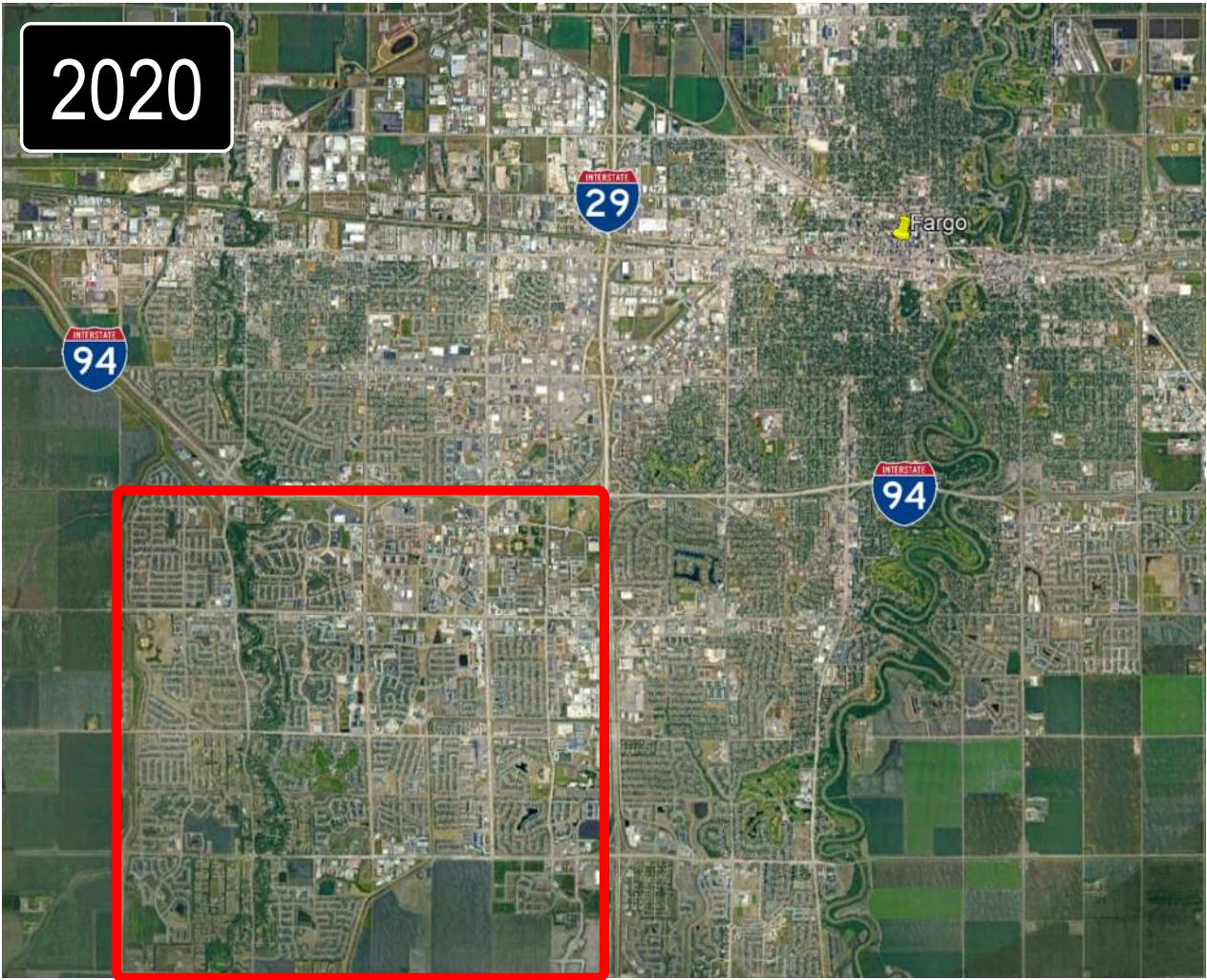
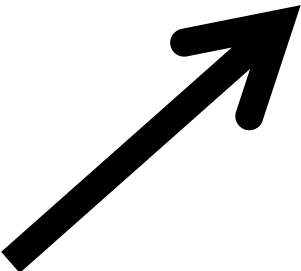
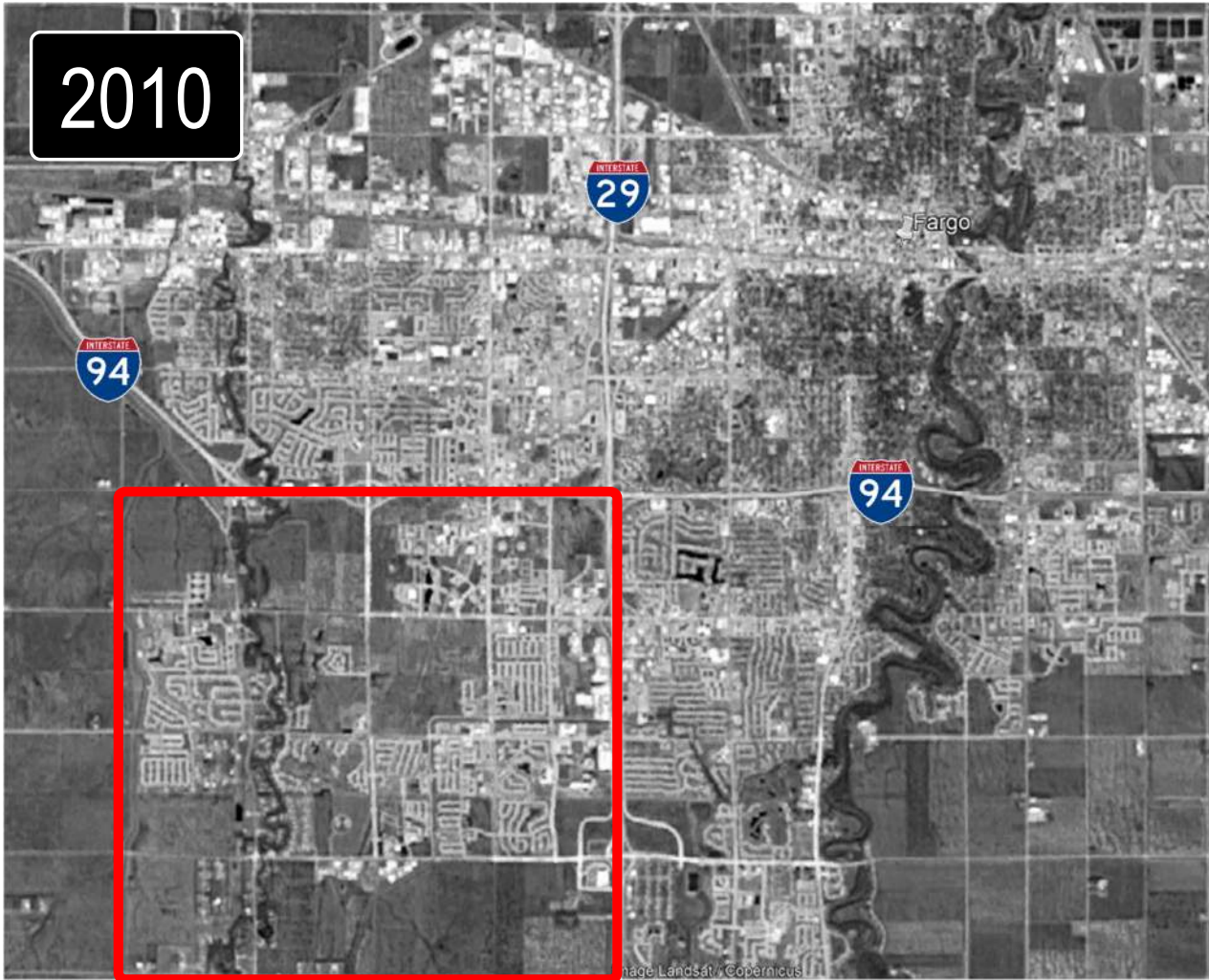


Interstate Operations Analysis & Plan for Future Improvements

North-Central ITE SimCap
Practice Group April 2023

METROCOG
FARGO-MOORHEAD METROPOLITAN COUNCIL OF GOVERNMENTS

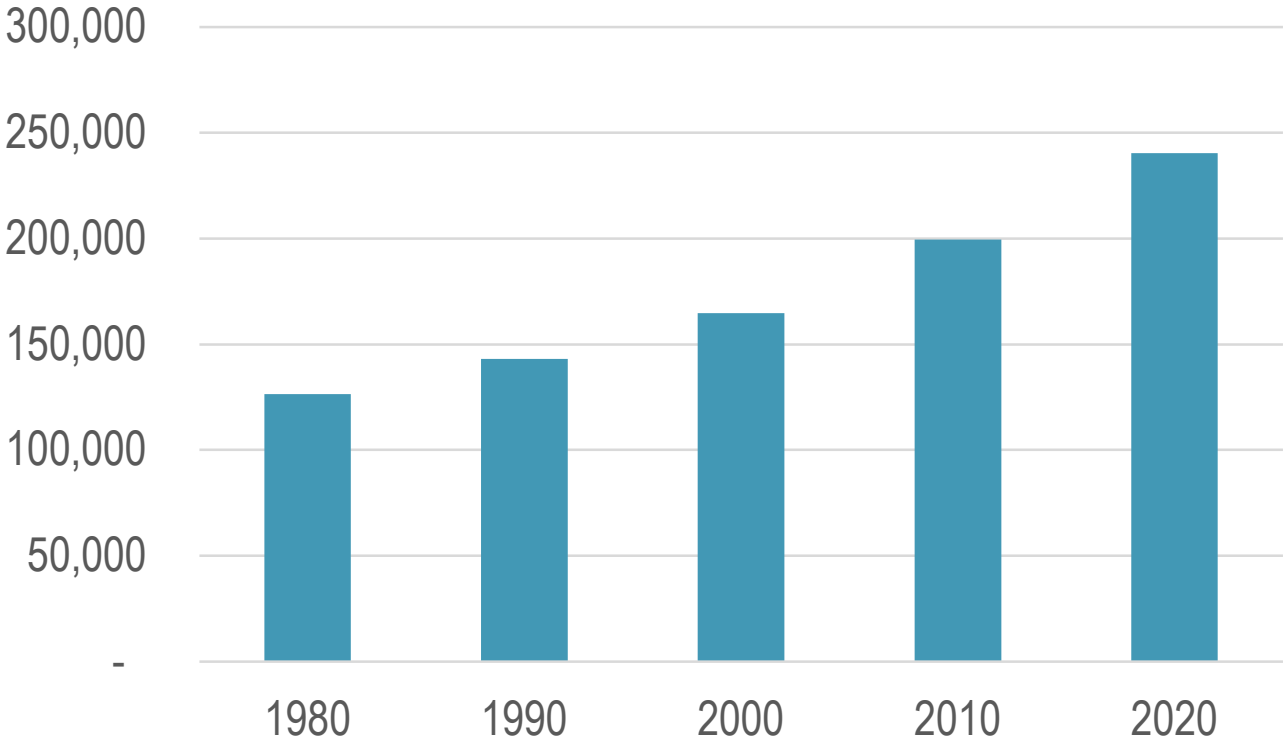
Metro Area Growth



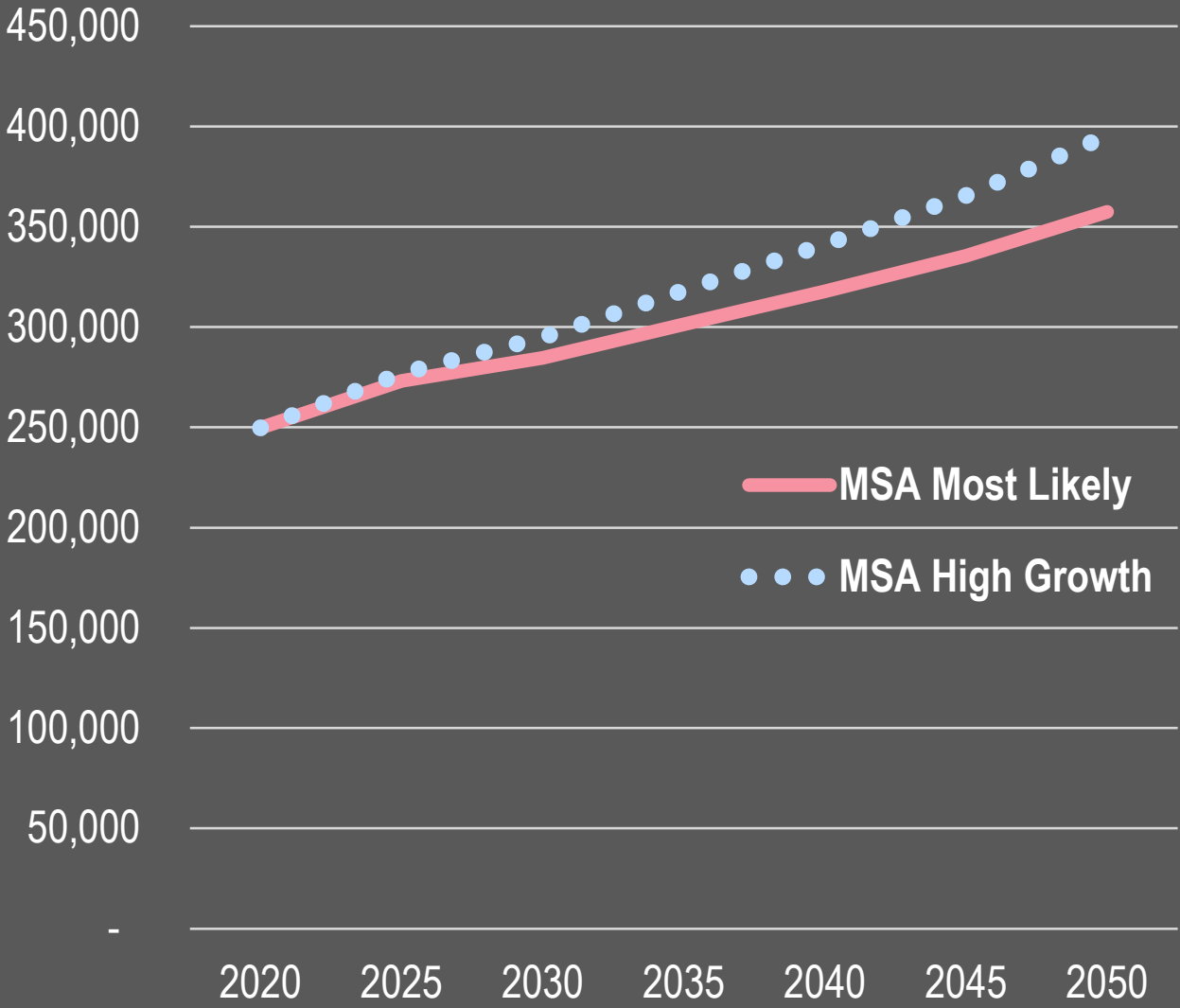
Metro Area Growth

Past & Future

Fargo-Moorhead MPA Population Growth



Fargo-Moorhead Projected Population Scenarios

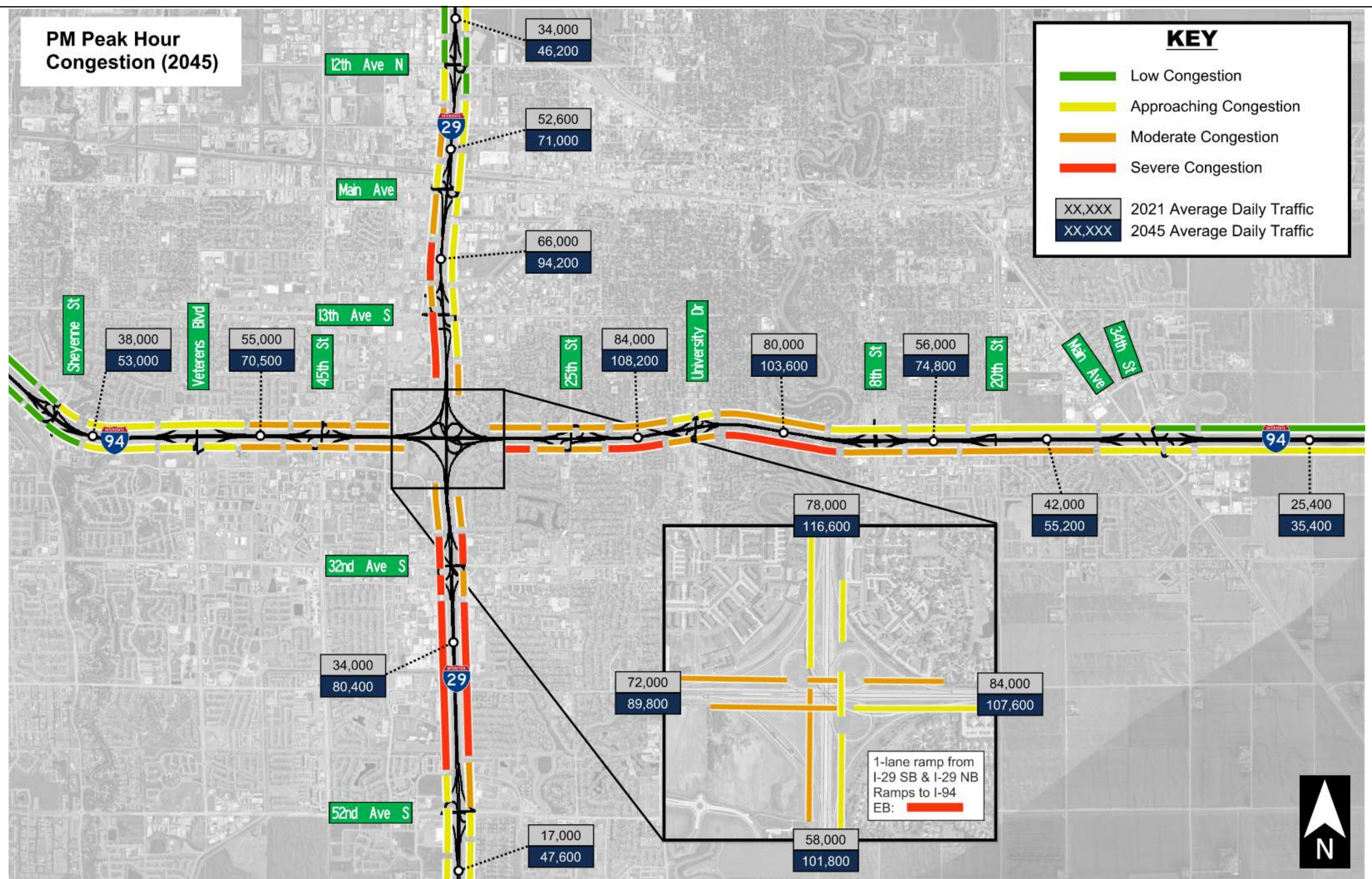


PM Peak Hour Congestion (2045)

KEY

- Low Congestion
- Approaching Congestion
- Moderate Congestion
- Severe Congestion

XX,XXX 2021 Average Daily Traffic
XX,XXX 2045 Average Daily Traffic



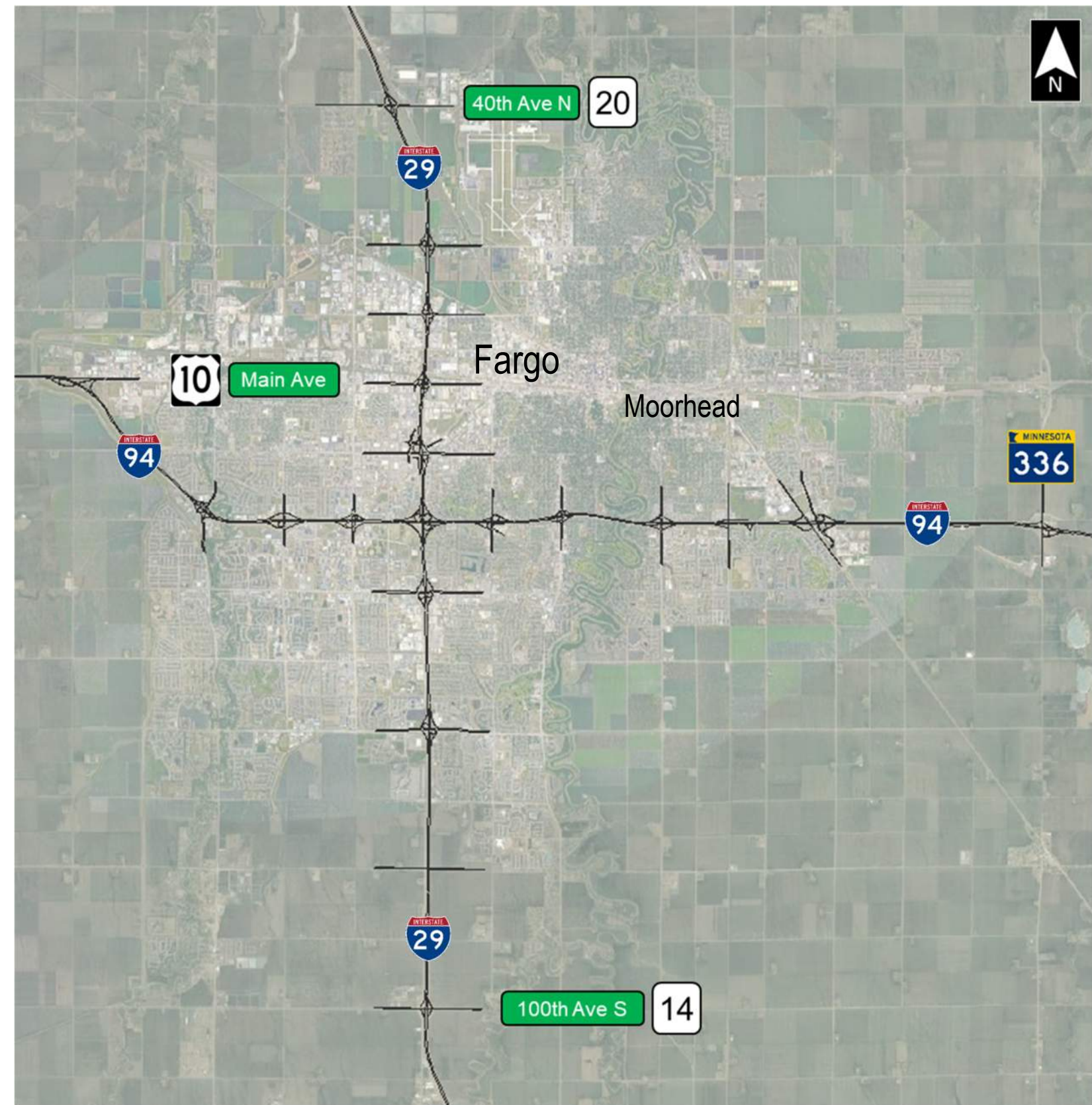
TransModeler Pros/Cons

Pros

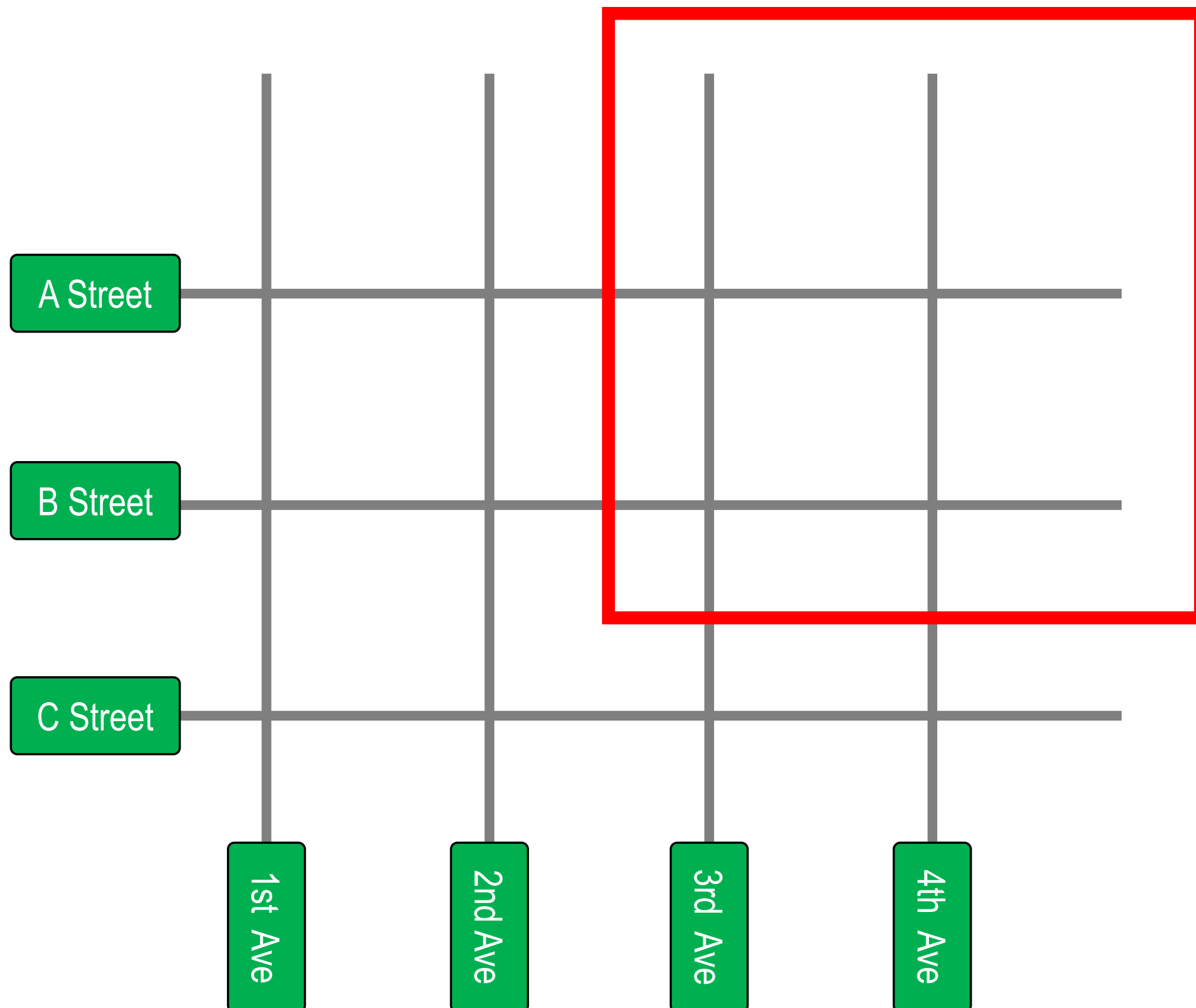
- Simulation Runtime ★
- Vehicle Routing
- Incorporation of DTA
- Demand Development (End-to-End) ★
- Intersection Coding
- Total Model Development Time ★

Cons

- Less Widespread
- Scenario Management ★
- Direct Competitor in some Markets
- “Lite Version” of Vissim for complex modelling (i.e. limited dials to turn)



Scenario Management (Con)



TransModeler allows user to “Stitch” networks together

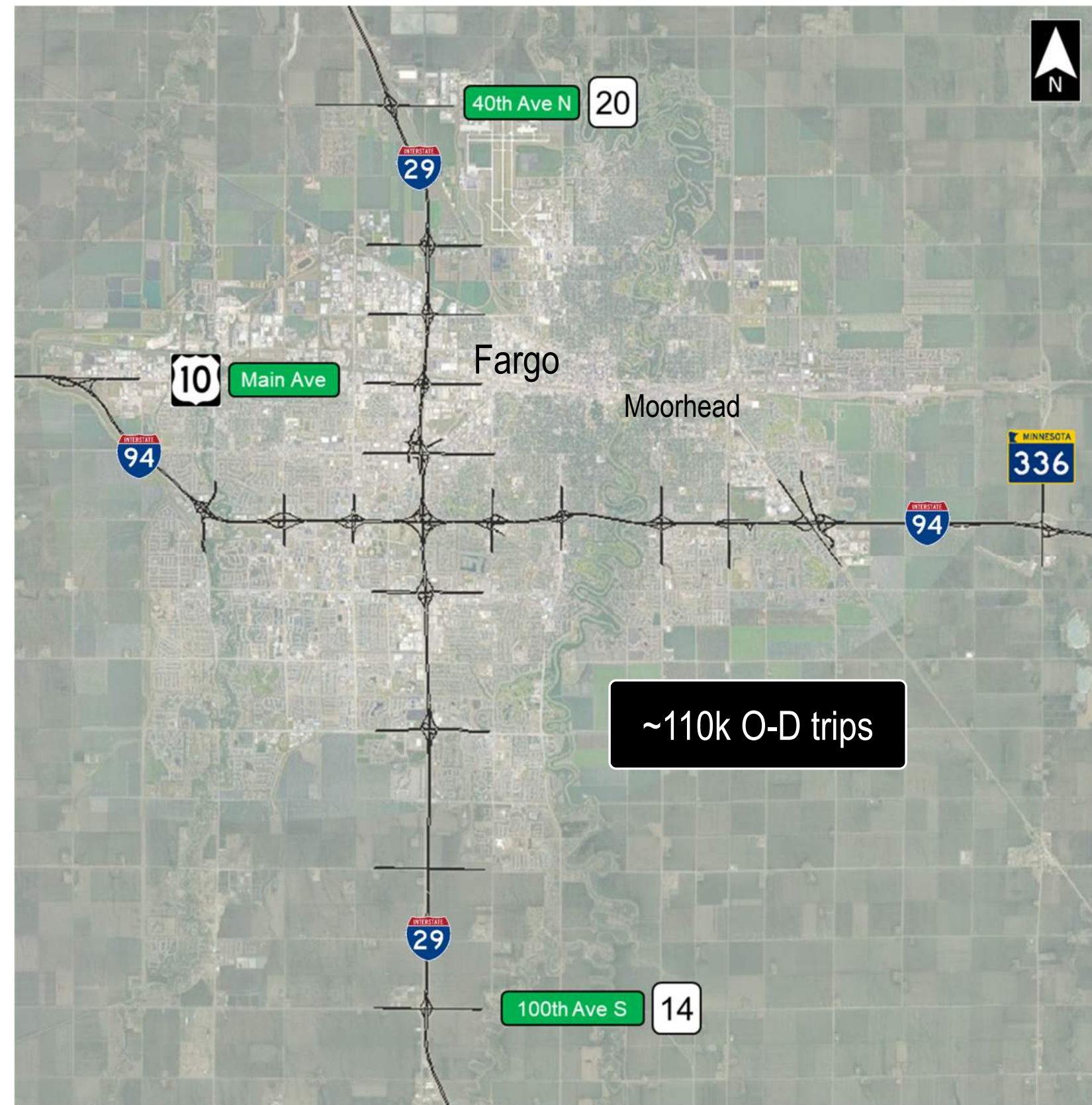
Does NOT allow user to modify individual intersections or corridors within a scenario manager like Aimsun

Model Runtime (Pro)

Benchmark

- 2 Hour Model w/ 20-minute warm-up
- Model Network
 - ~33 miles of Interstate
 - ~40 Signalized Intersections
- Output
 - Trip Statistics
 - VMT, VHT, Delay
 - Model Speeds for All Segments
- Threading Model
 - Fixed Seed w/ Single Threading
Model **~8 Minutes Runtime**
 - Random Seed w/ Wide Area Threading
Model **~3 ½ Minutes Runtime**

*Results are likely out-of-date since
TM 7 was released in April 2023*



End-to-End Routing (Pro)

EXAMPLE



STREETLIGHT
Big Data for Mobility

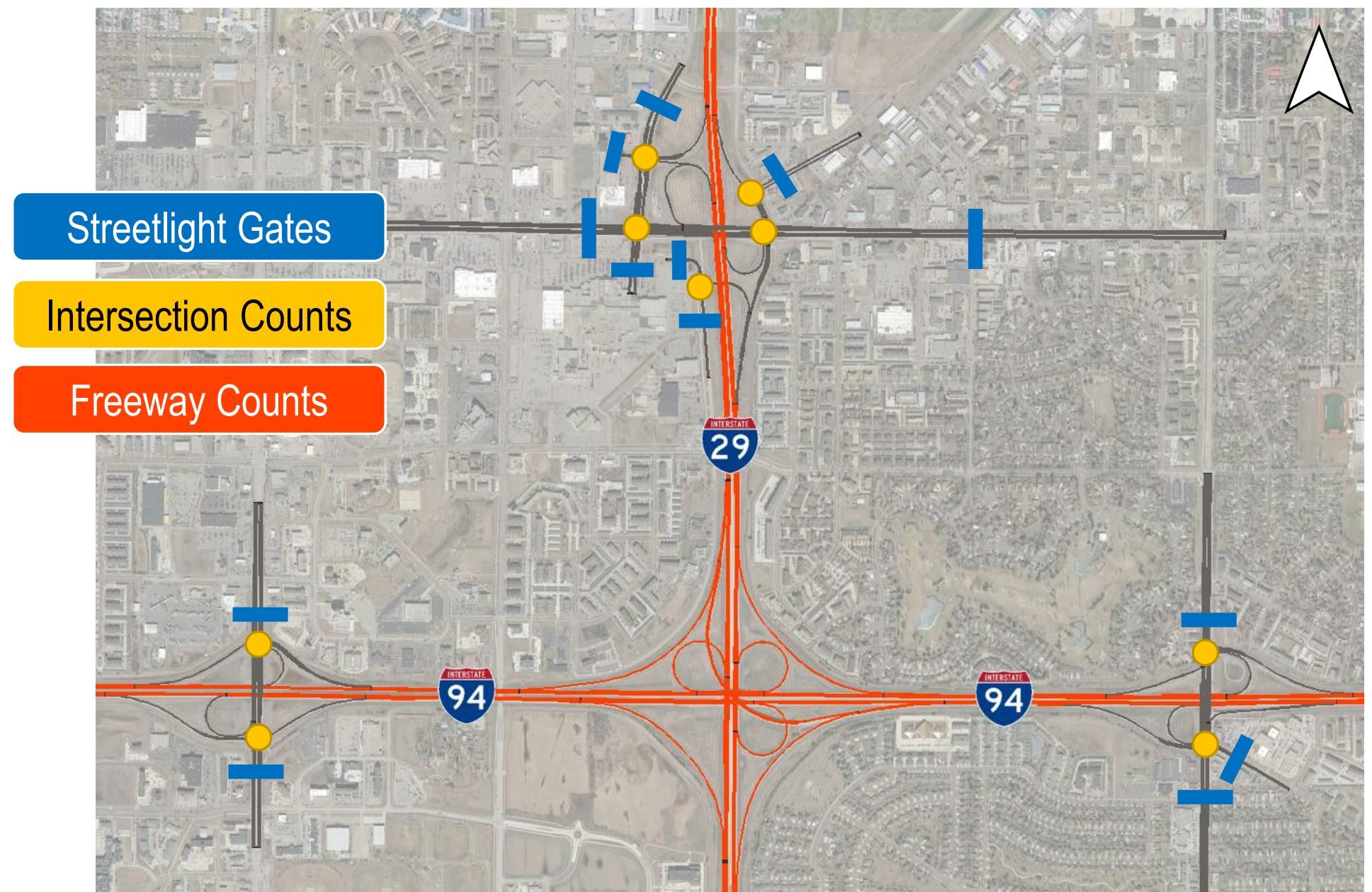


miOVISION



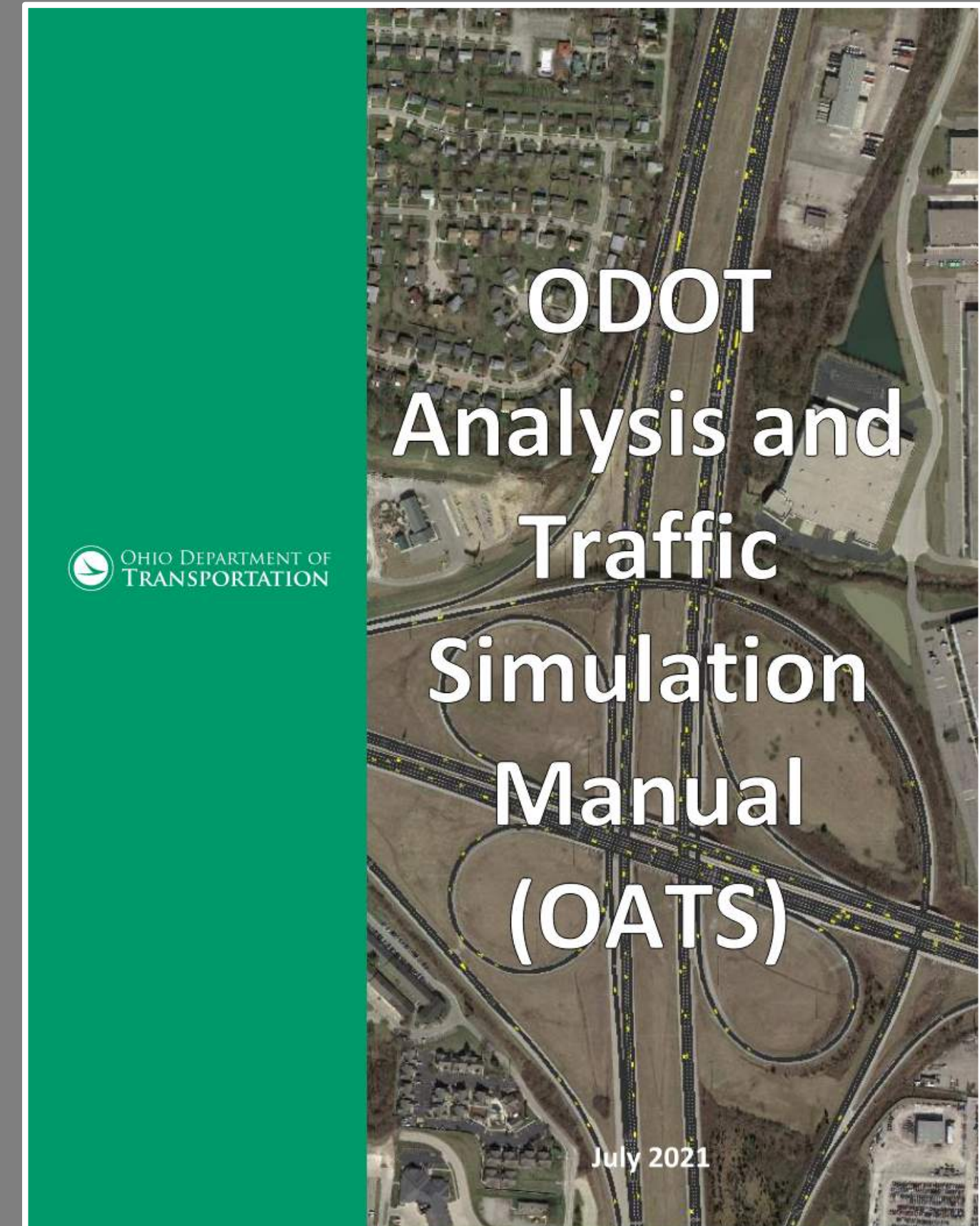
***Origin-Destination
Matrix Estimation***

Can use Fratar Balancing to
match Row / Column sums
since trip end counts are known



Model Development (Pro) Guidance

- OATS Manual
- KYTC Microsimulation Guidance
- Caliper's Help Menu
- Other FHWA or State DOT Guidance

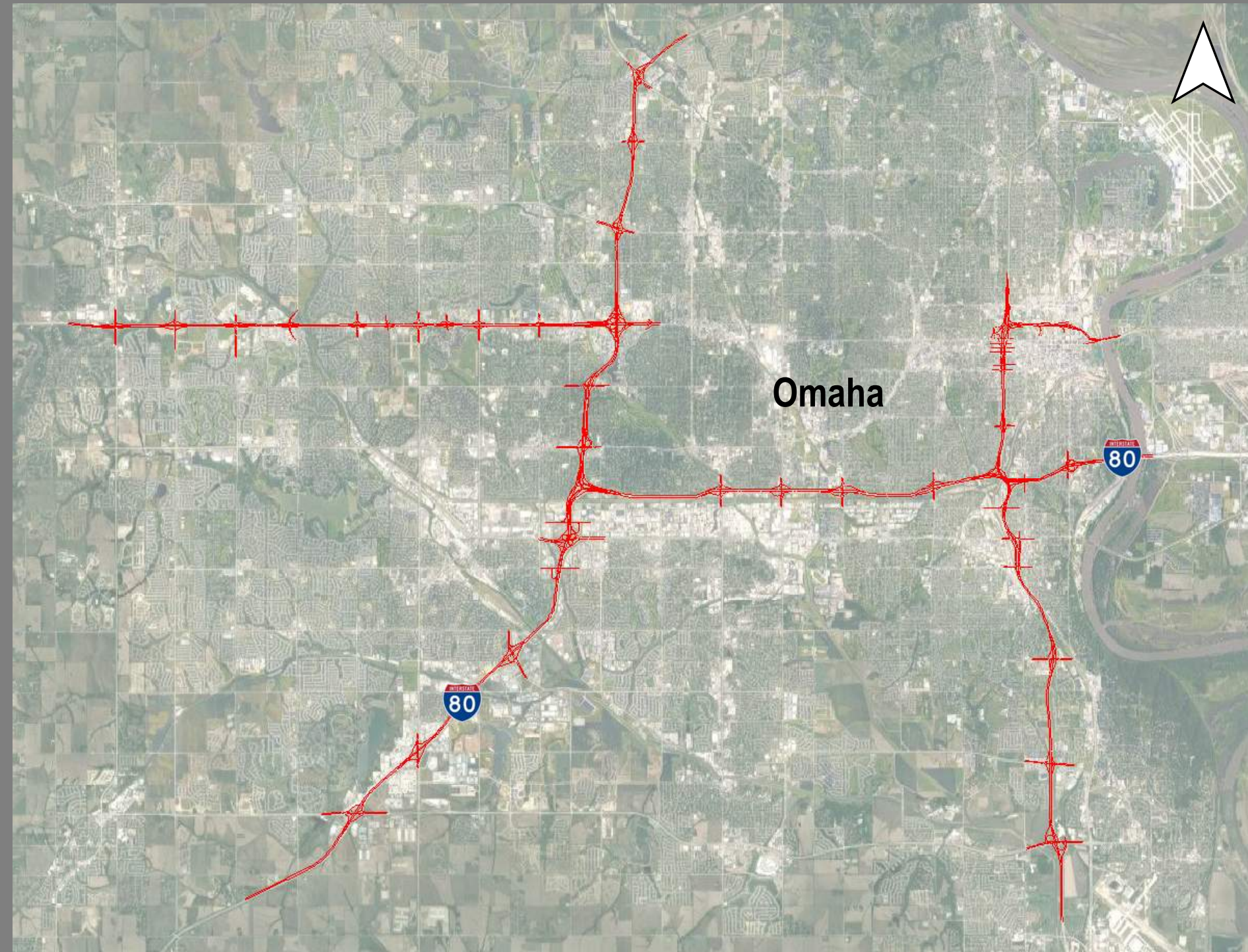


Model Development

Previous Experience

Metro Area Travel Improvement Study

- TSMO
- Geometric Improvements

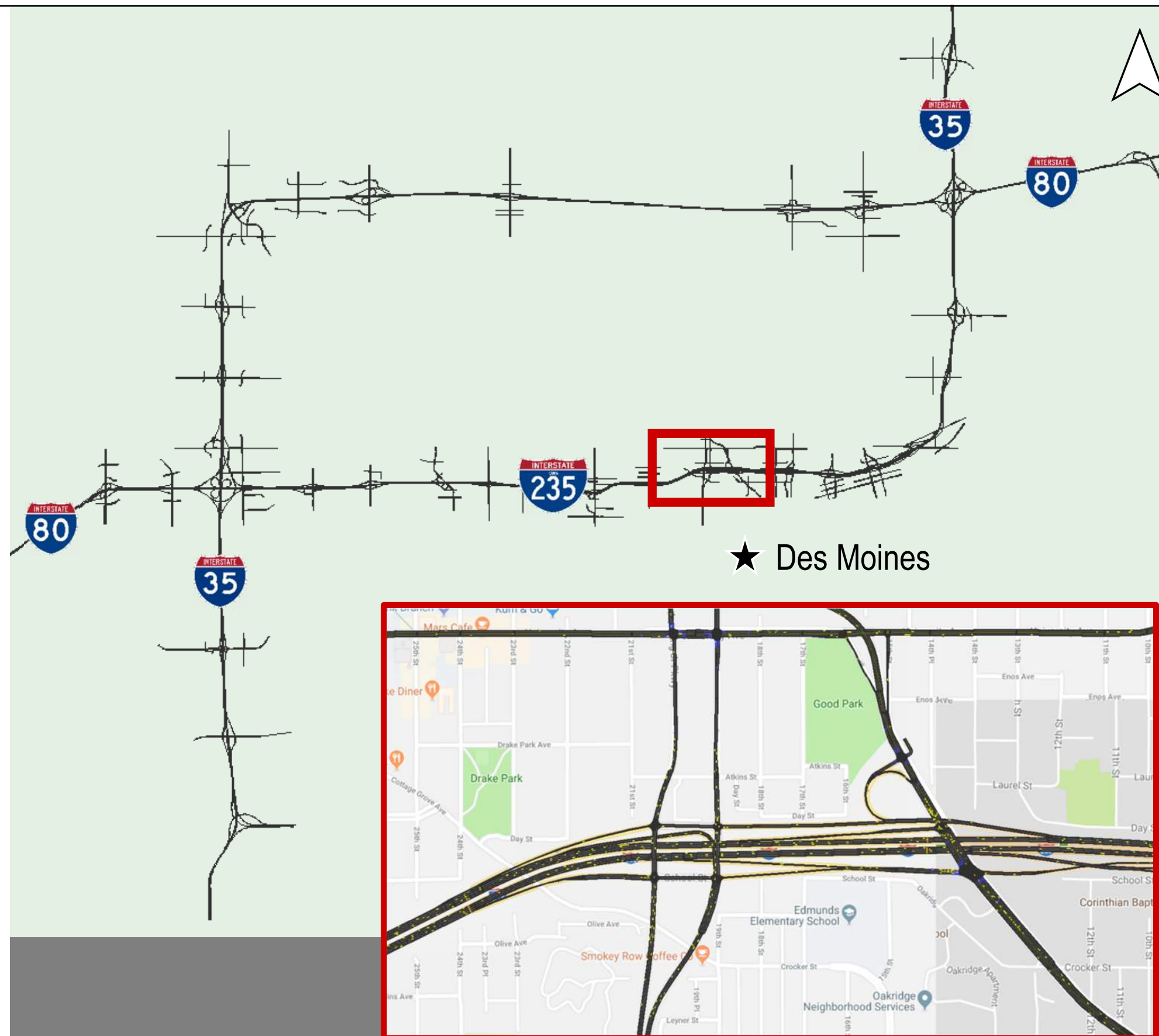


Model Development

Previous Experience

Des Moines Integrated Corridor Management

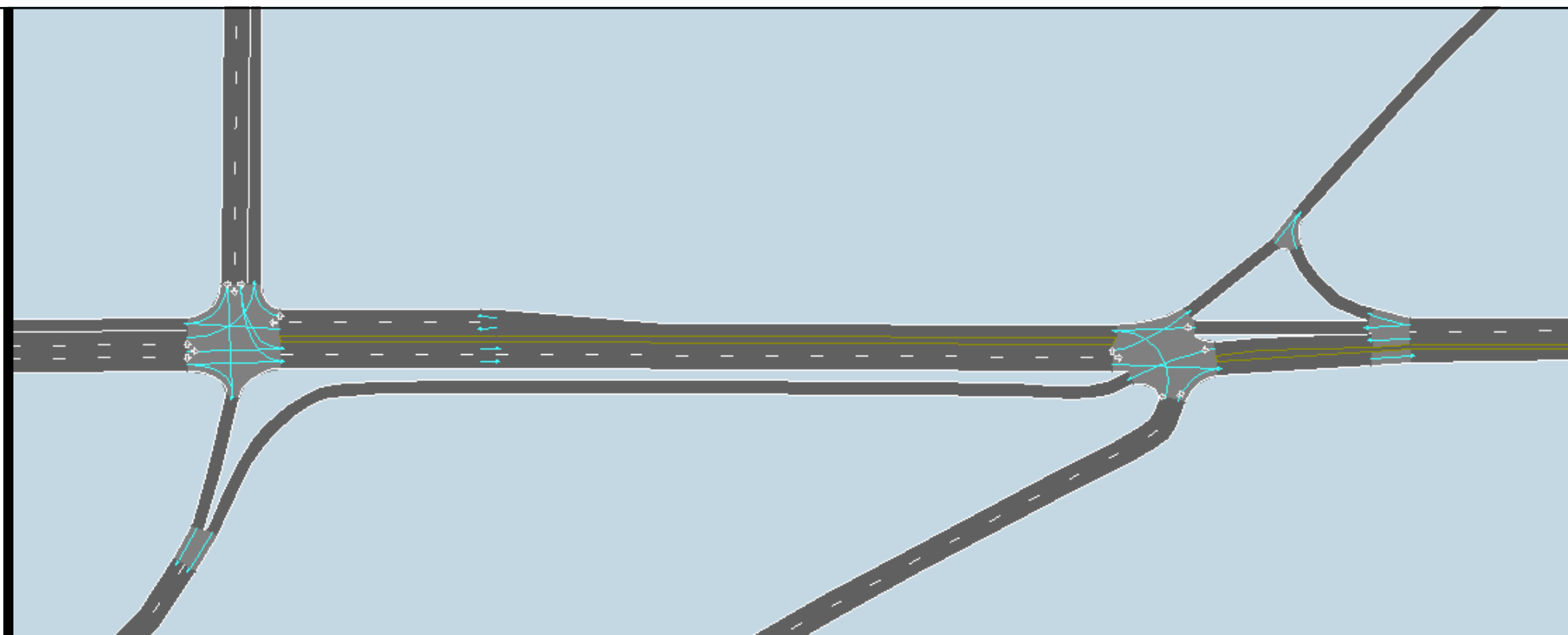
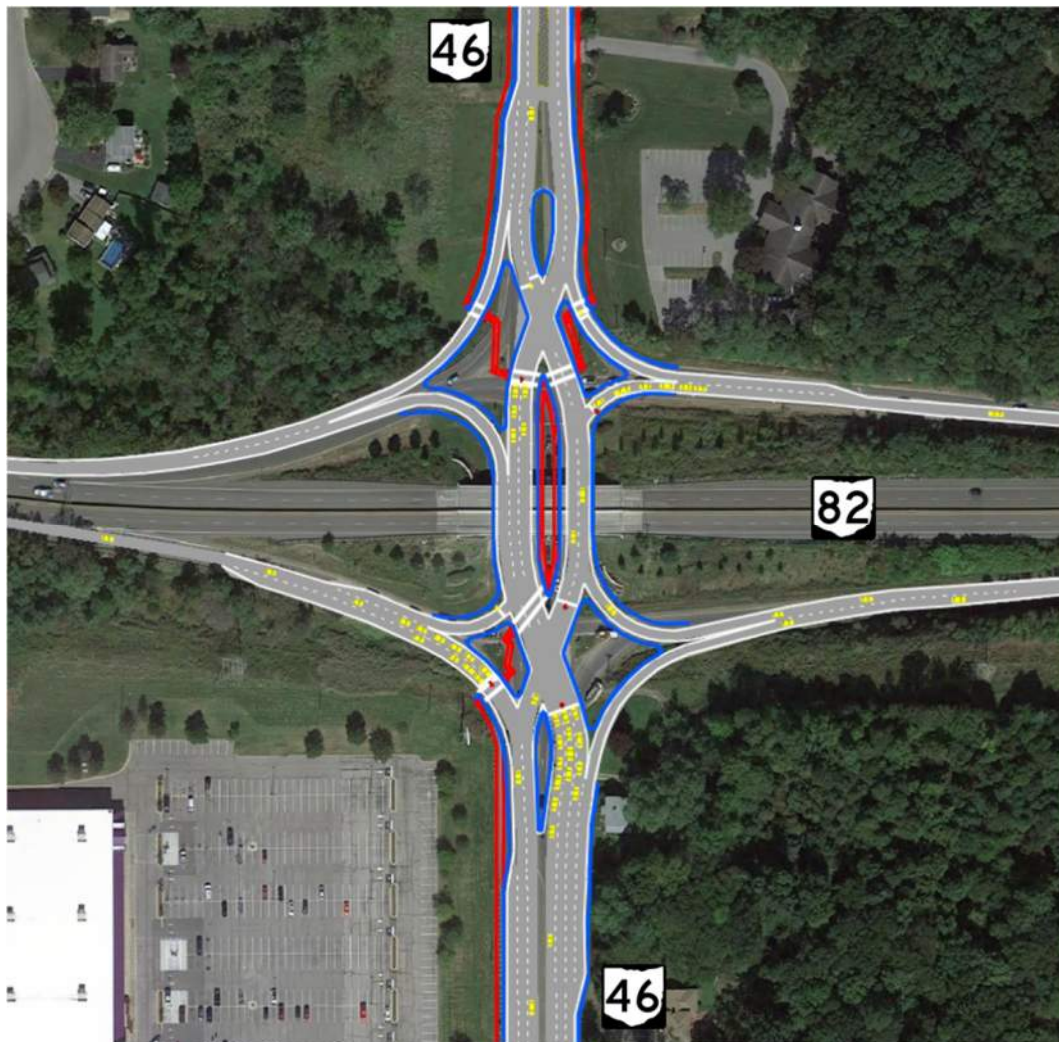
- TSMO Improvements (Ramp-Metering Focus)
- Bottleneck Removal



Model Development

Previous Experience

Ohio DOT
Interchange Project(s)



Critical Link Tool:
*Similar to Select Link
Analysis in TransCAD*

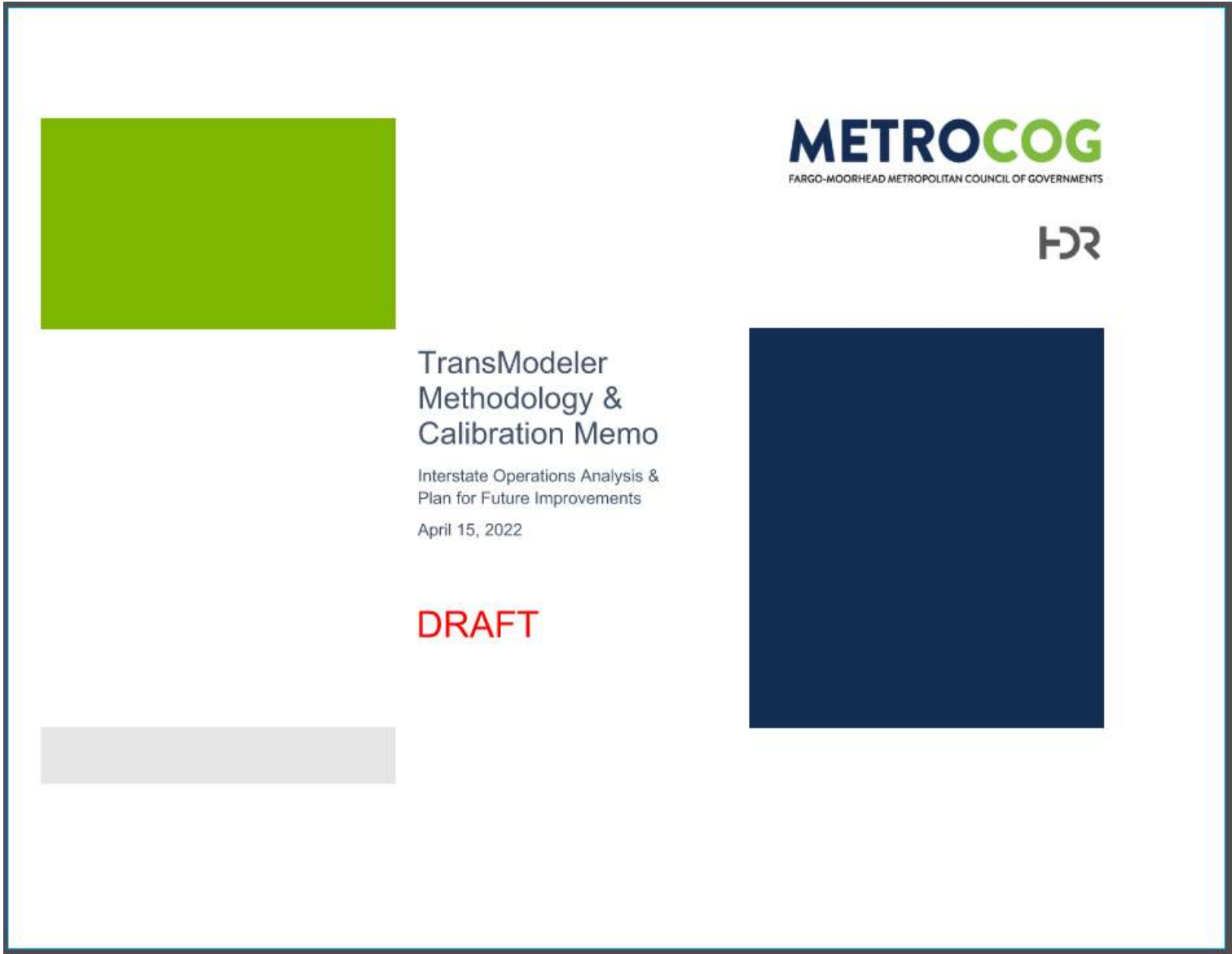
Critical Link Tools

RAMP (EB), ID: 8

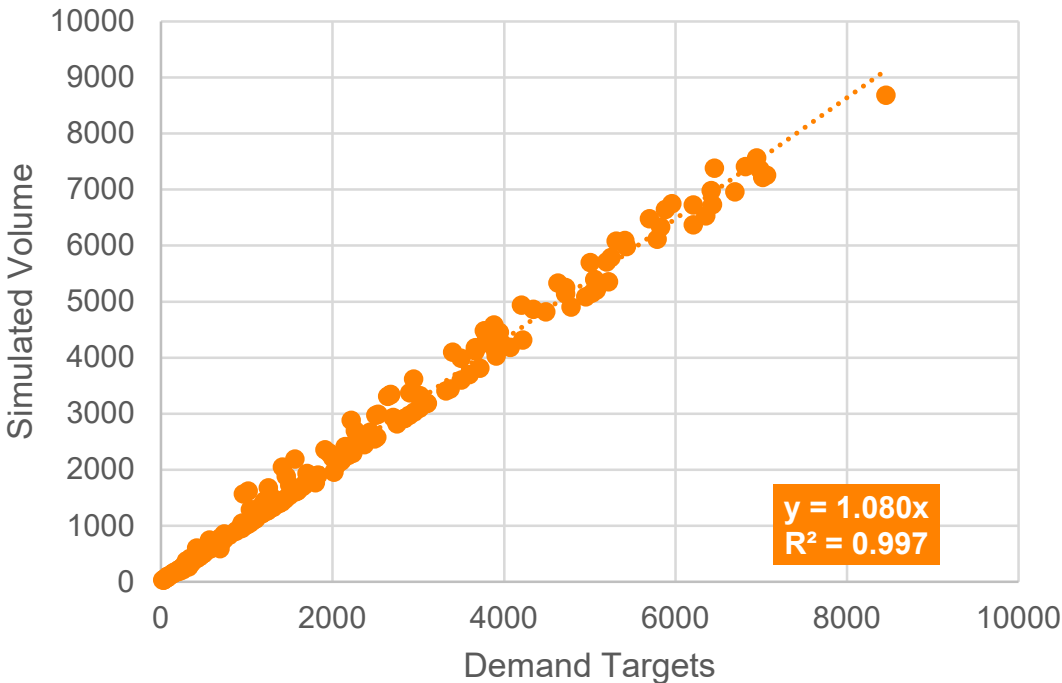
Origin	Destination	Trips
3	9	337
3	7	231
3	10	200
1	9	125
1	7	87

O-D Pairs: 6 Trips: 1056 Count: N/A

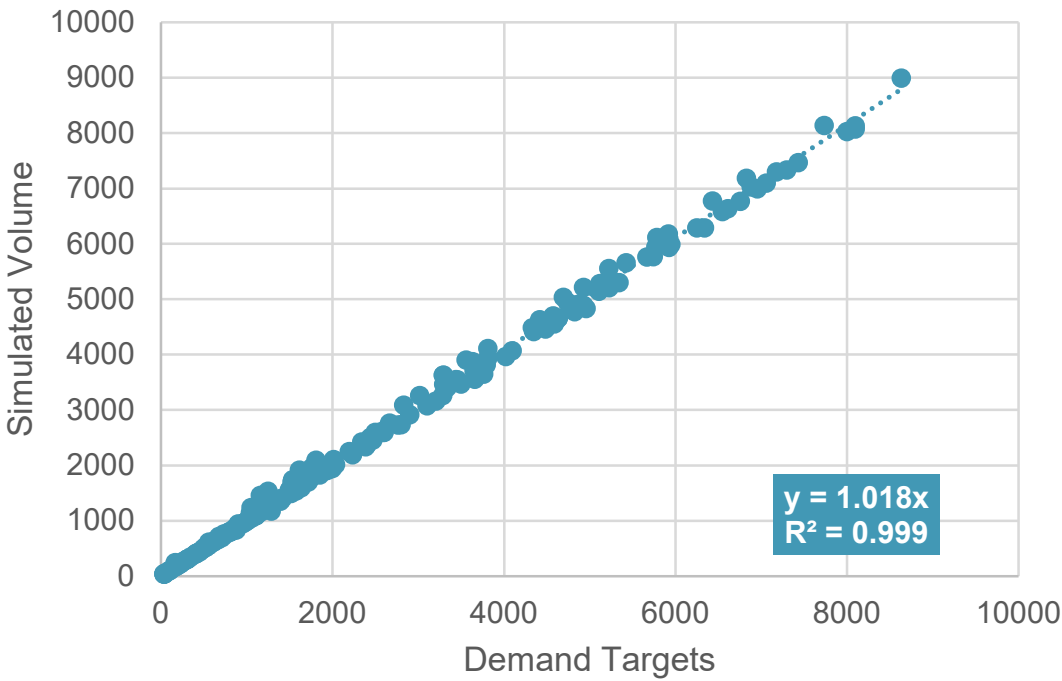
Microsimulation Model Development & Calibration



AM Simulated Volume vs Demand Targets



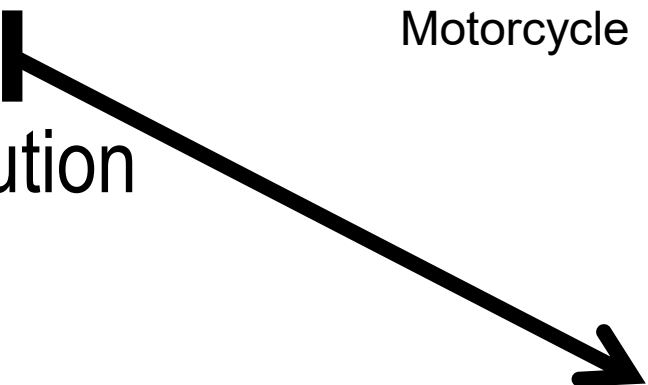
PM Simulated Volume vs Demand Targets



Parameter Adjustments

- **Vehicle Fleet**
- **Lane Changing**
 - Mandatory
 - Discretionary
- **Car Following Model:**
Modified General Motors
 - Headway Buffer Distribution Modification
- **Speed Distribution**
 - Reduced Excessive Speeding Parameters
- **Demand Curves**
- **Lane Connectivity**

Vehicle Type	Default	Modified
Low Performance Passenger Cars	12%	12%
Medium Performance Passenger Cars	48%	25%
High Performance Passenger Cars	12%	6%
Pickup Trucks, Vans, SUVs	20.2%	50%
Single-Unit Trucks	3.2%	3%
Tractor-Trailer Trucks (Semis)	1%	4%
Bus	0.3%	-
Motorcycle	3.3%	-



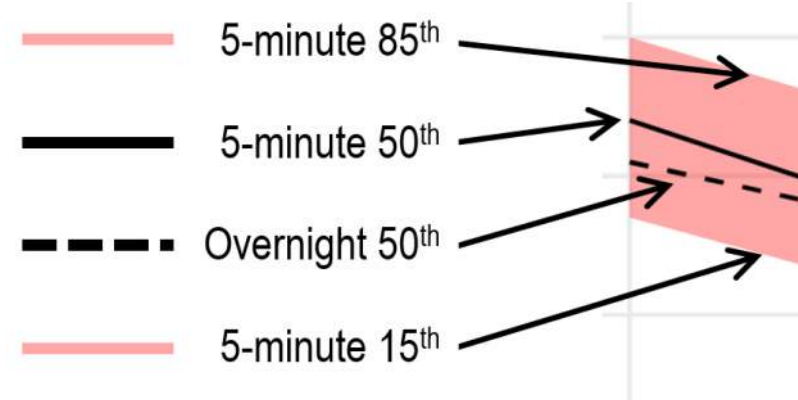
Caliper's recommended
Car Following Model

(Refined at MIT)

Planning-Level Calibration

Areas of Emphasis

- **Percentile Speeds**

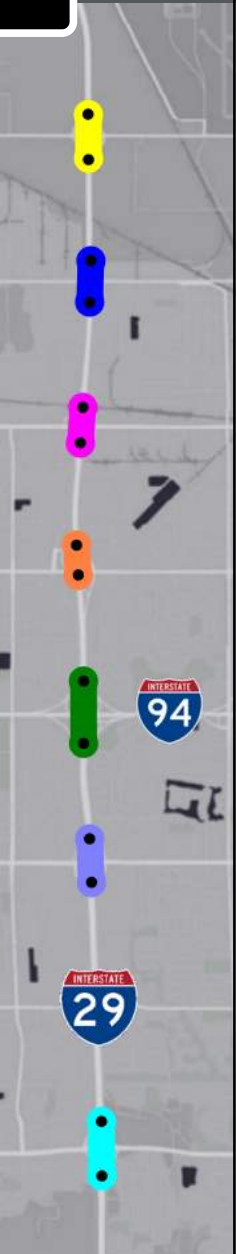
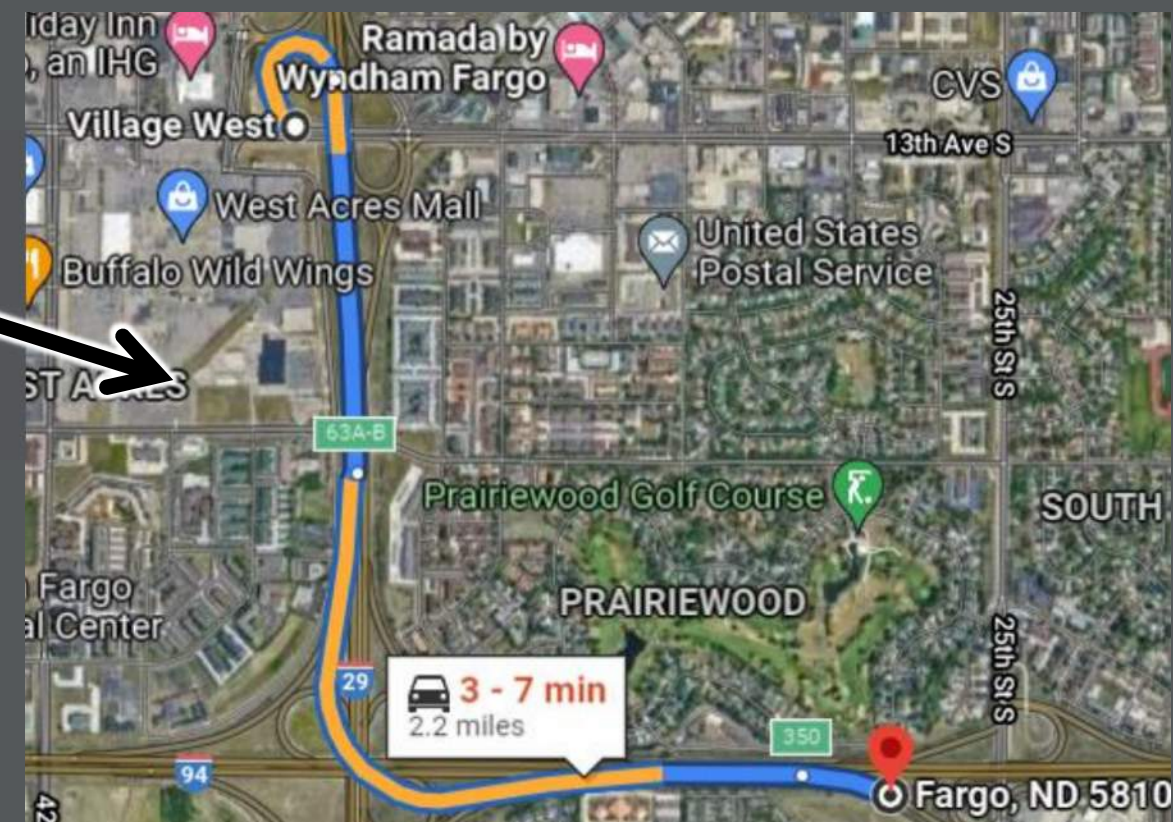
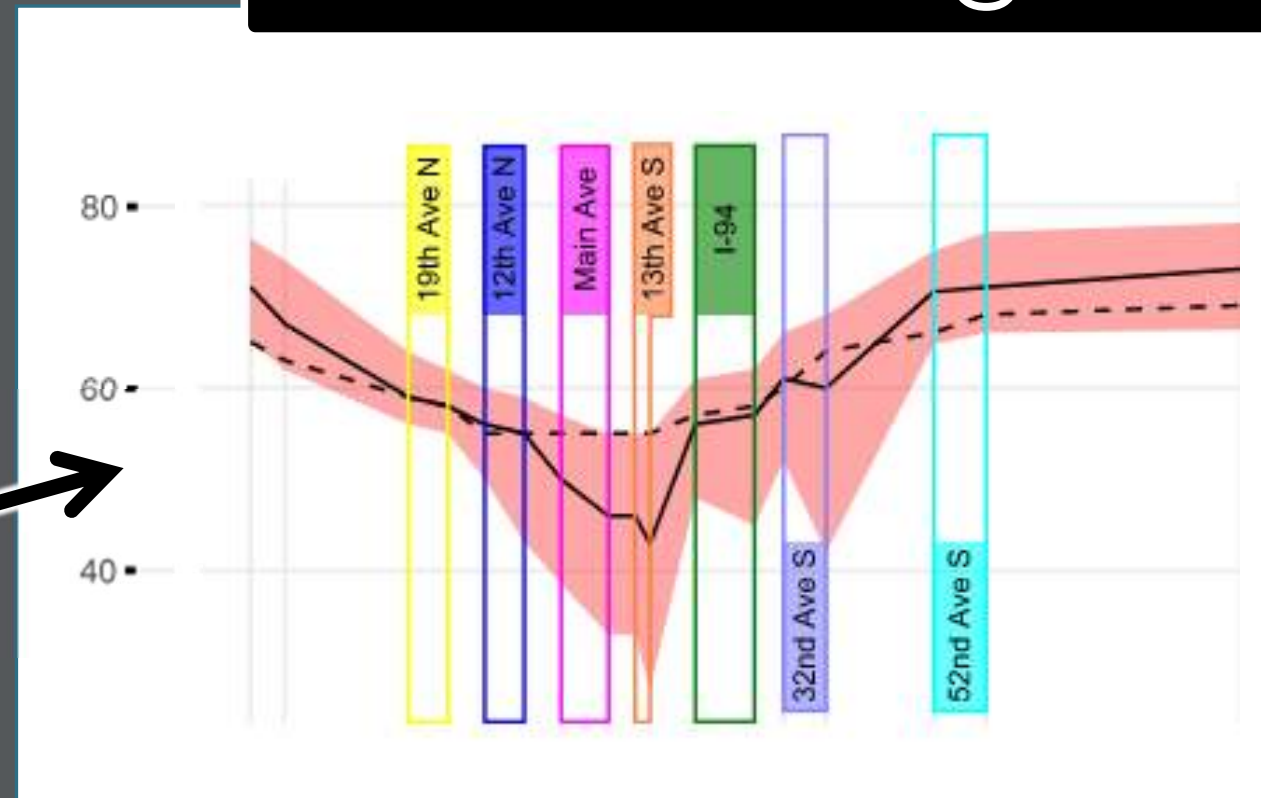


- **Travel Time Comparison**

- **Volume Development**

- Daily Volumes w/ K Factors
- Miovision Turning Movements
- Streetlight Volumes

I-29 Southbound @ 5:15 PM



Microsimulation Model Development: I-29 Calibration

Probe Data Speeds

Figure 2. I-29 AM Probe Data Speeds



Figure 4. I-29 PM Probe Data Speeds

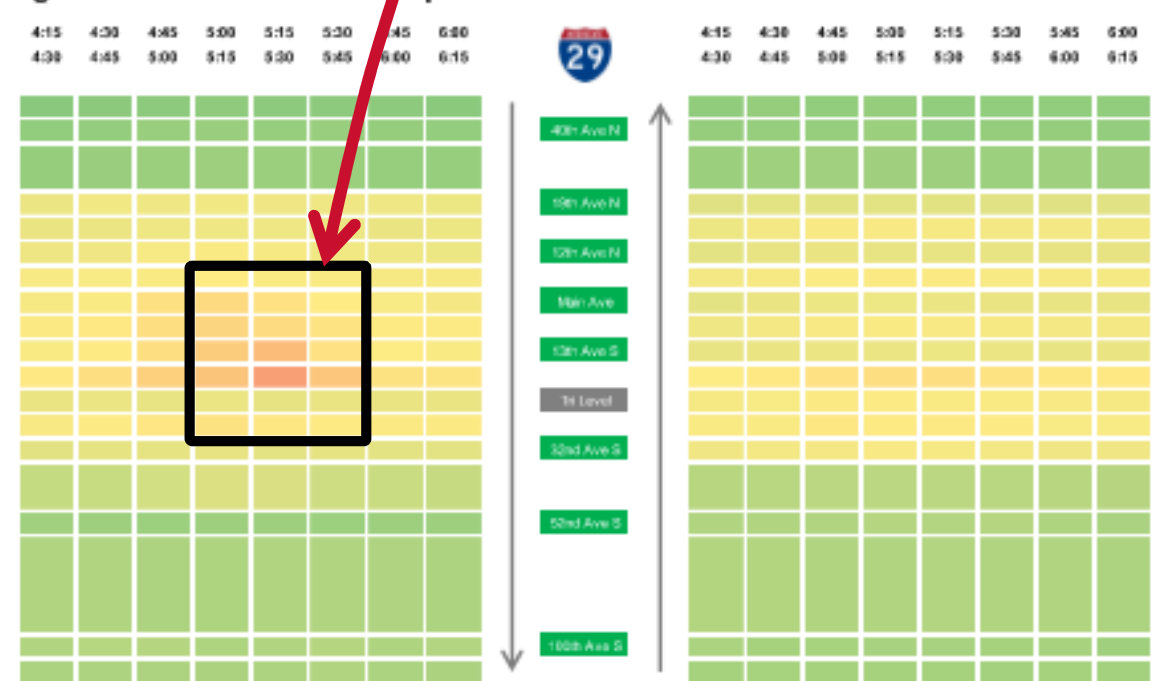


Simulation Speeds

Figure 3. I-29 AM Simulated Speeds



Figure 5. I-29 PM Simulated Speeds



Microsimulation Model Development: I-94 Calibration

Figure 6. I-94 AM Probe Data Speeds



Figure 8. I-94 PM Probe Data Speeds

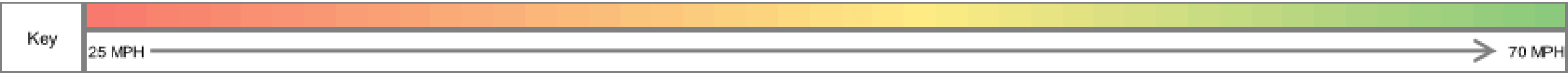


Figure 7. I-94 AM Simulated Speeds



Figure 9. I-94 PM Simulated Speeds



Wrap-Up

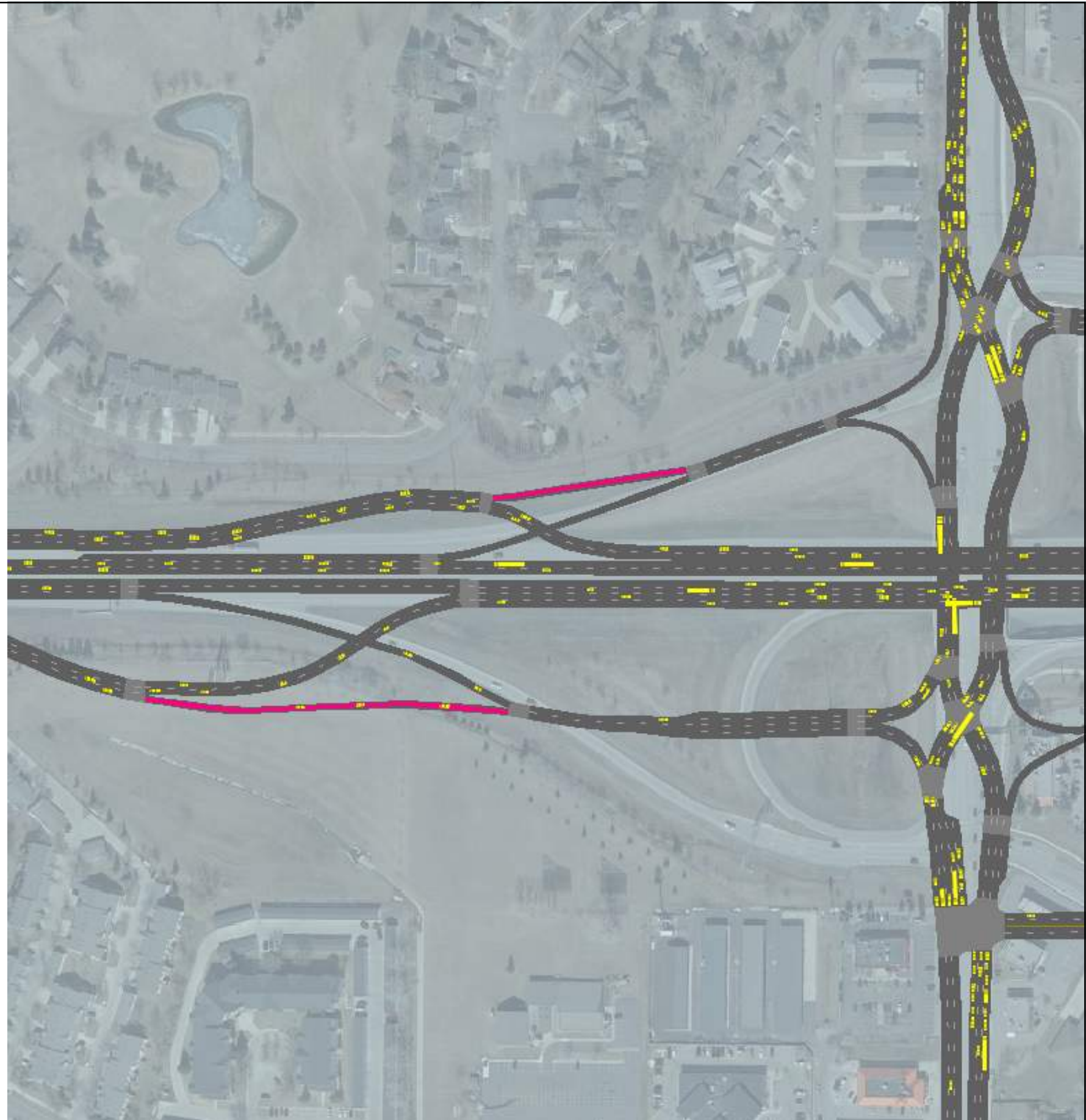
Current Project Status

- Recently Presented to NDDOT and MnDOT Management
- Addressing Draft Report Comments
- Developing Final Deliverable (data, analysis, models, etc.)

Contact Information

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[linkedin.com/in/jacobaweiss/](https://www.linkedin.com/in/jacobaweiss/)



References

- OATS Manual
<https://www.transportation.ohio.gov/working/engineering/roadway/studies-access-management/oats>
- KYTC Guidance
<https://transportation.ky.gov/Planning/Pages/Microsimulation-Modeling.aspx>
(2-Hour Virtual Training:
<https://youtu.be/khJRaE7YNSE>)
- TransModeler Guidance
Help Menu (F1) in TM

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