I-35 & Route 152:
A New Application of Displaced Left-Turns at an Interchange

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Southeast Florida FSUTMS Users Group

TRANSYSTEMS

Speaker Info

Mike Wahlstedt, PE, PTOE, TranSystems

    Mike is the leader of the Traffic Engineering and Planning Group at TranSystems. He has an extensive background as project manager and project engineer with a wide range of transportation related projects, including both operations and planning. He has worked extensively on alternative intersections and interchanges, including nine DDIs that are either in design or open to traffic. Mike is a member of the TRB Access Management Committee and the TRB Alternative Intersections Working Group and served on the TRB review panel for NCHRP Project 20-05; Alternative Intersection Design and Selection.
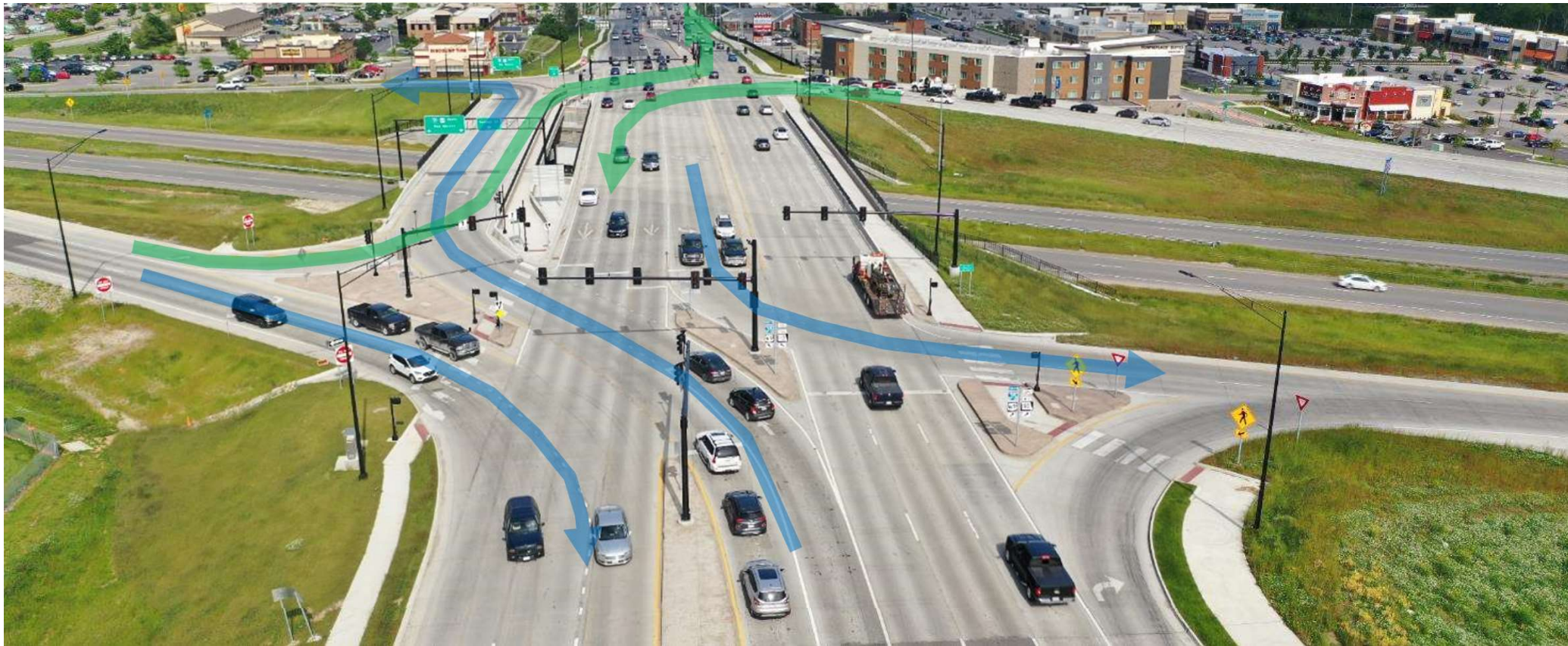
Acknowledgement:

Ryan Hale, PE, MoDOT

    Ryan has an extensive background in the development and analysis of alternative intersections and interchanges and worked jointly with TranSystems on the development of this project.

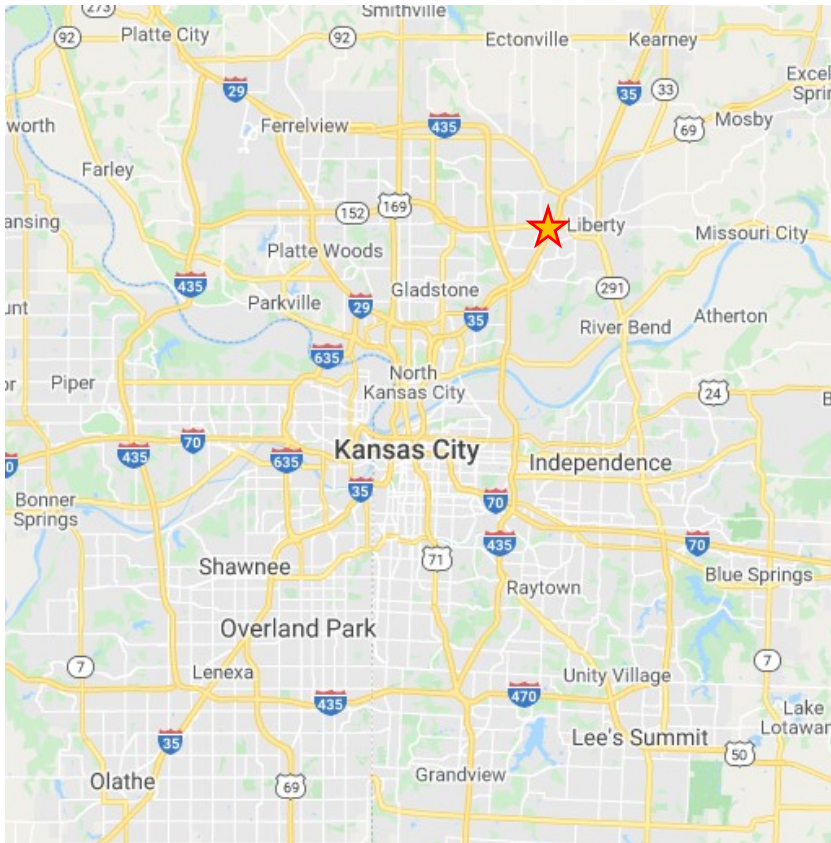# What is a Displaced Left-Turn Interchange?

# What is a Displaced Left-Turn Interchange?

Project Location

Project Information

- Three Tied Projects
  - Interchange $15,263,000 (MoDOT)
  - Kansas Street $3,442,000 (City Funded)
  - Route 291 $7,518,000 (MoDOT)
  - Combined Total $26,223,000
- Schedule:
  - Design: September 2017 – November 2018
  - Construction: January 2018 – August 2020
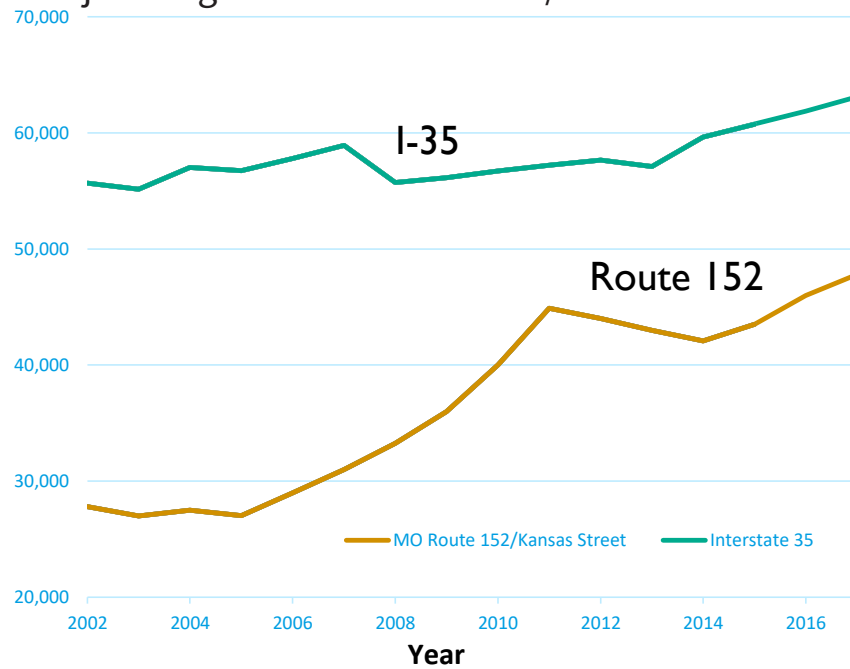   - Substantially complete since fall 2019

Project Challenges

FHWA report indicates 1,473 crashes in study area over the last five years. 840 (57%) were rear-end crashes.

Via TMS Crash Statistics Map
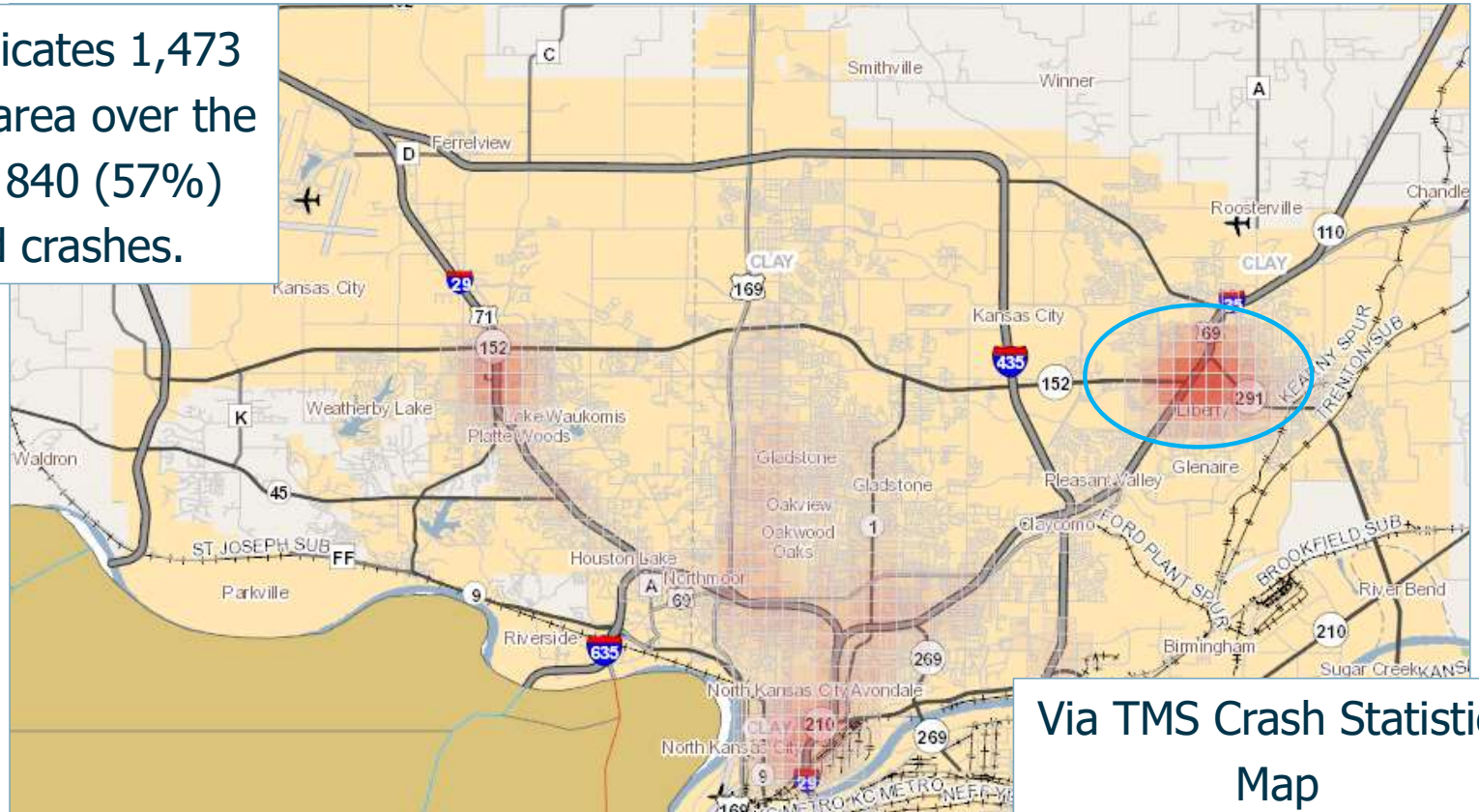
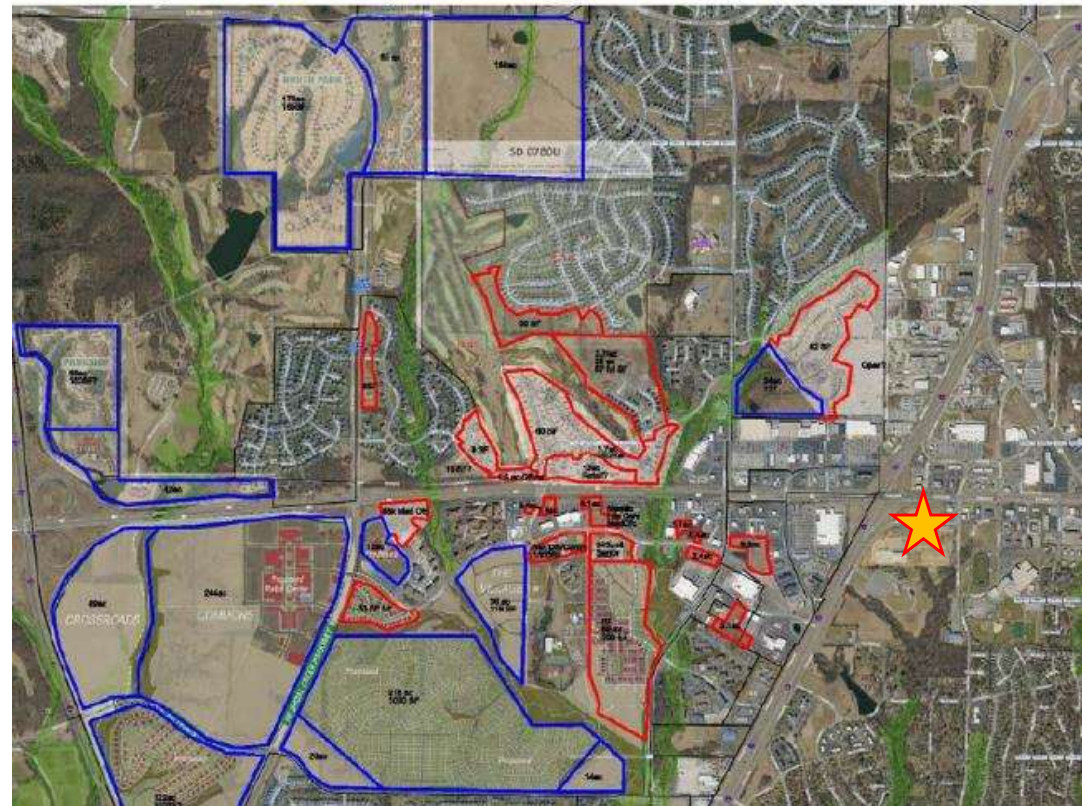# Project Challenges

Major congestion on Route 152/Kansas Aveune

Traffic Forecasts

- Major new development planned west of the interchange
  - Platted areas

Regional traffic forecasts
- Utilized MPO model
- Generated sub-area refinements
 - Subdivided zones
  - Refined network
  - Updated socec data

Figure 2-3: Undeveloped Areas along Route 152 Corridor West of I-35

Traffic Forecasts

Detailed Corridor Forecasts

- Generate intersection level turning movement forecasts using:
  - Counted traffic volume
  - Regional model growth
  - Corridor based O-D (StreetLight Data)
- Generates external volumes and vehicle routing for Vissim

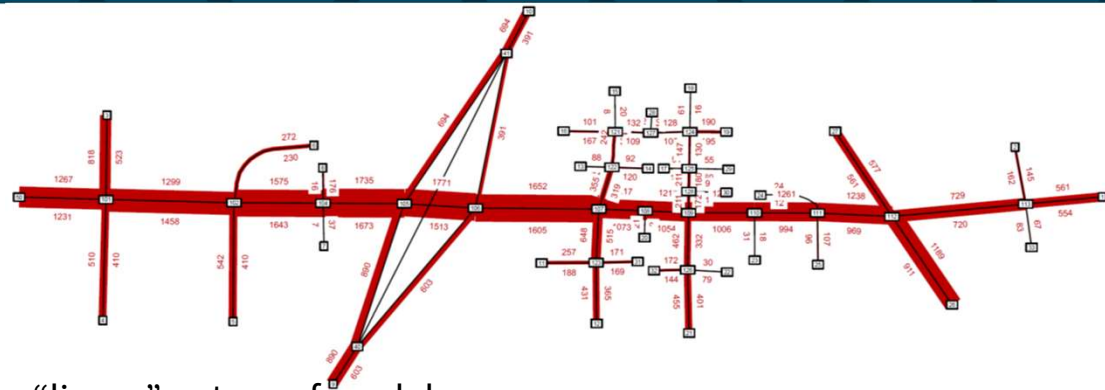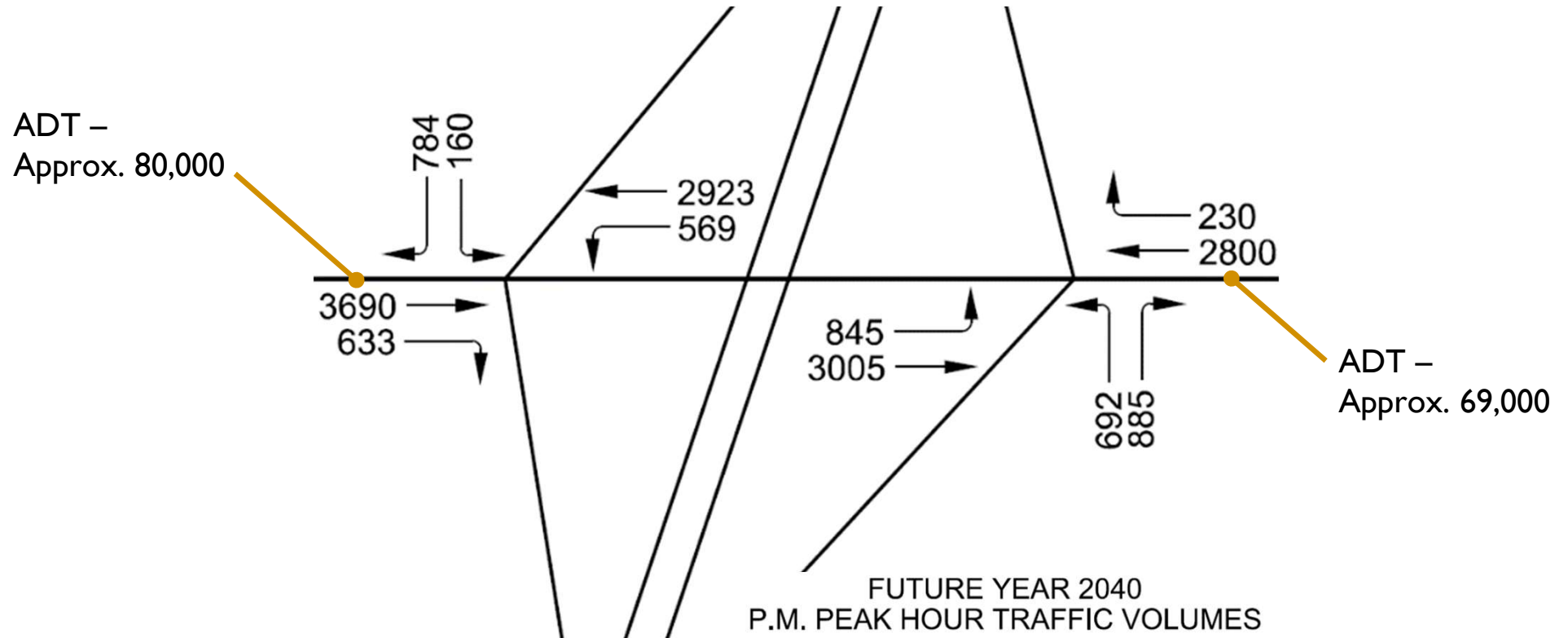- Visum "sketch" model – container for managing data, assignment only
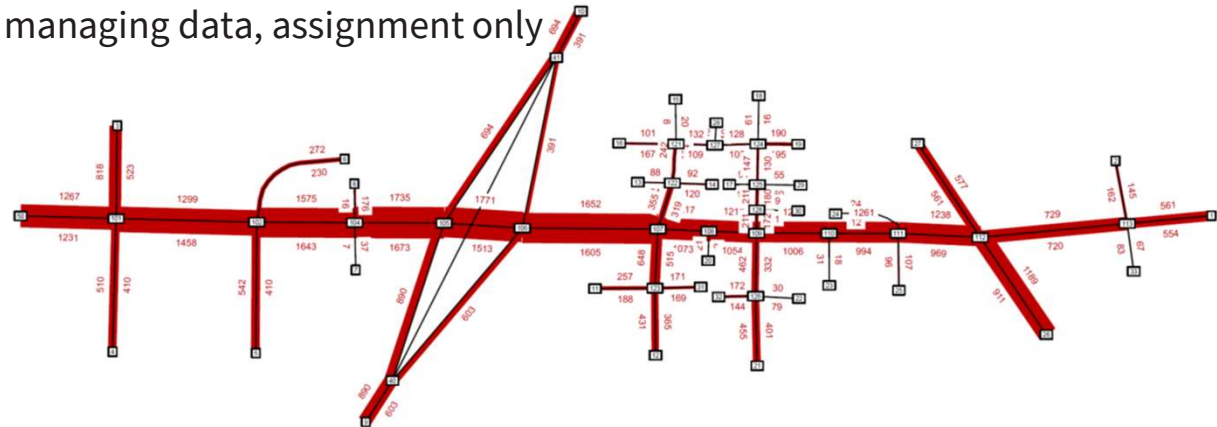
Traffic Forecasts

Detailed Corridor Forecasts

- Load Visum model
  - Network
  - Turn-restrictions
  - Counted turn volumes
  - Zones – external points of network
  - Note capacities, etc., not necessary due to "linear" nature of model
- Generate base O-D matrices (AM, PM)
  - Generate O-D from StreetLight Data – same zone structure as model
    - Why StreetLight Data as a source vs. regional model?
  - Use matrix projection to adjust model externals to match external count volumes
  - Apply matrix estimation (tFlow) to adjust matrix to match internal turn volumes
- Generate future volumes/O-D
  - Apply growth at externals based on regional model link growth using matrix projection
  - Apply matrix estimation using link growth at selected internal links, if needed
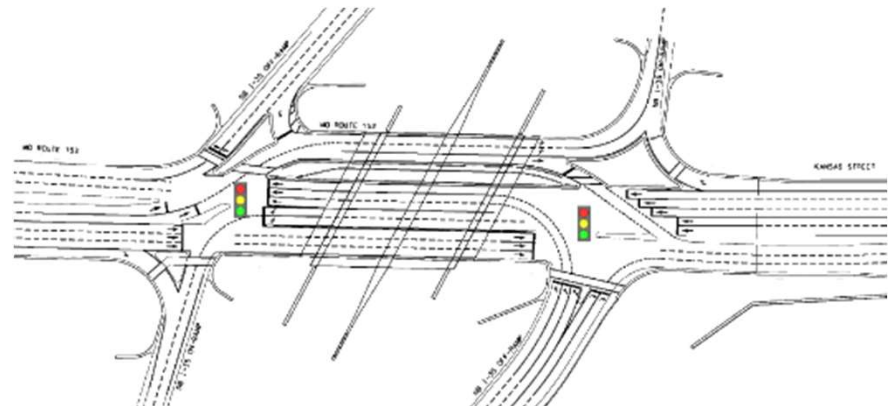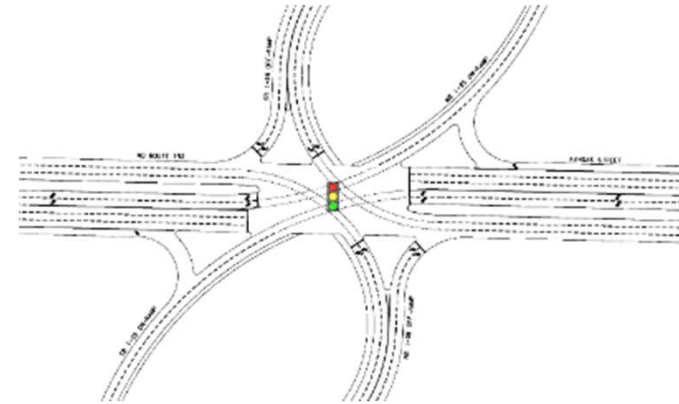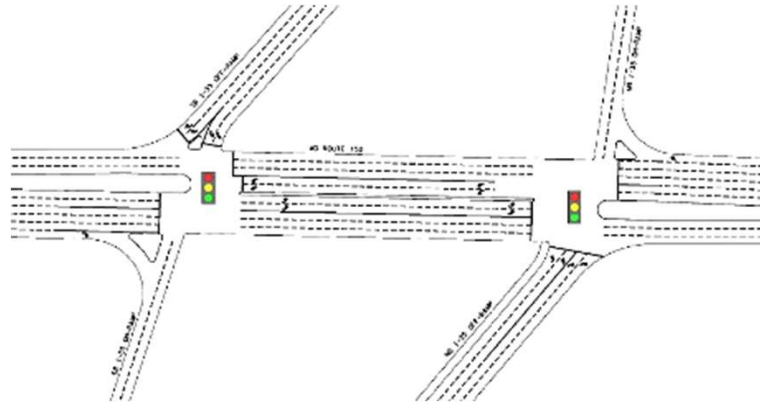
Capacity Challenges

ADT – Approx. 80,000

784 160

2923
569

230
2800

3690
633

845
3005

692 885

ADT – Approx. 69,000

FUTURE YEAR 2040
P.M. PEAK HOUR TRAFFIC VOLUMES

Options Considered

Capacity Challenges

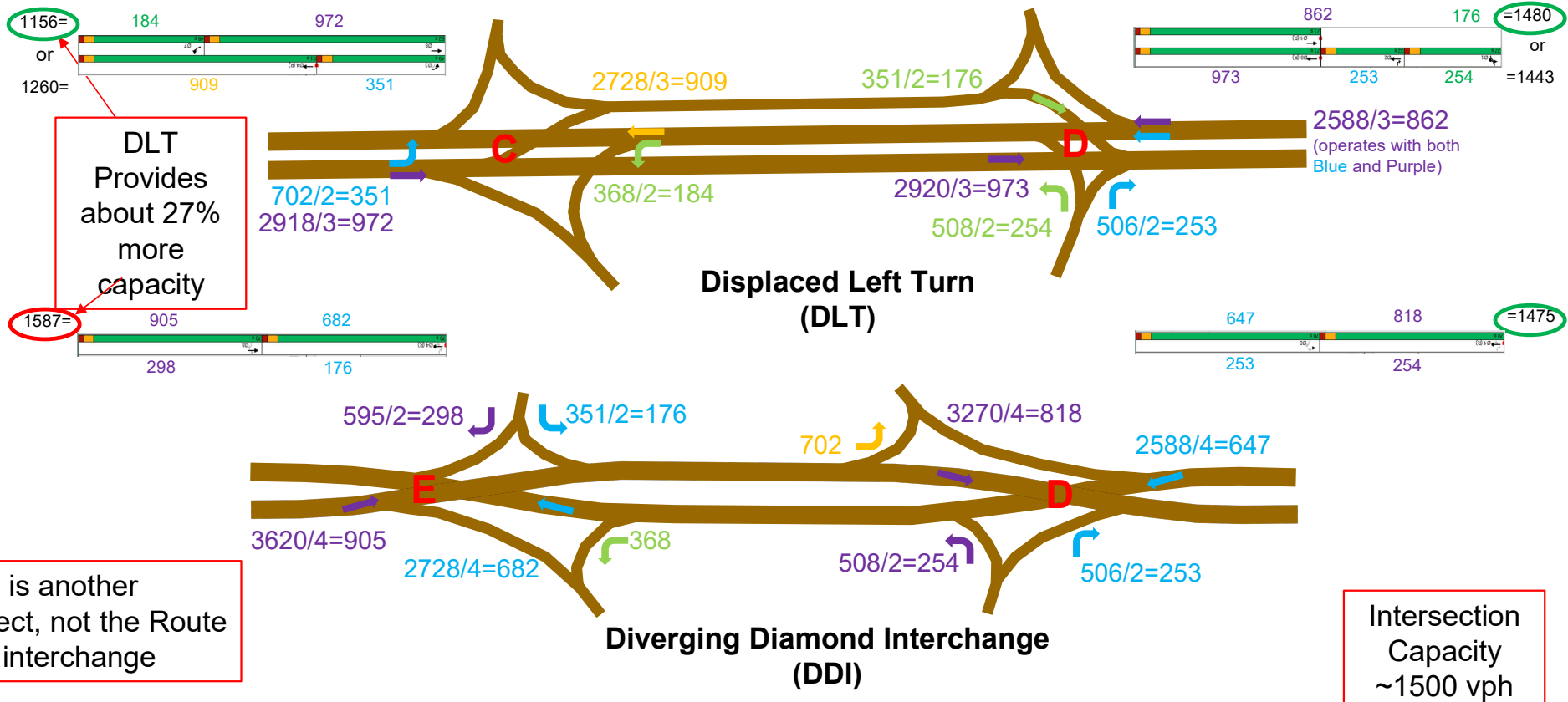| Traditional diamond interchange struggles: high through volumes (EBT, WBT) combined with high left-turn volumes lead to queues at signals	SPUI struggles: left-turn volumes aren't balanced so signal isn't efficient	DDI struggles: through volumes (EBT, WBT) are so high that the signals cannot provide enough green time for each direction

Displaced Left-Turn Concept

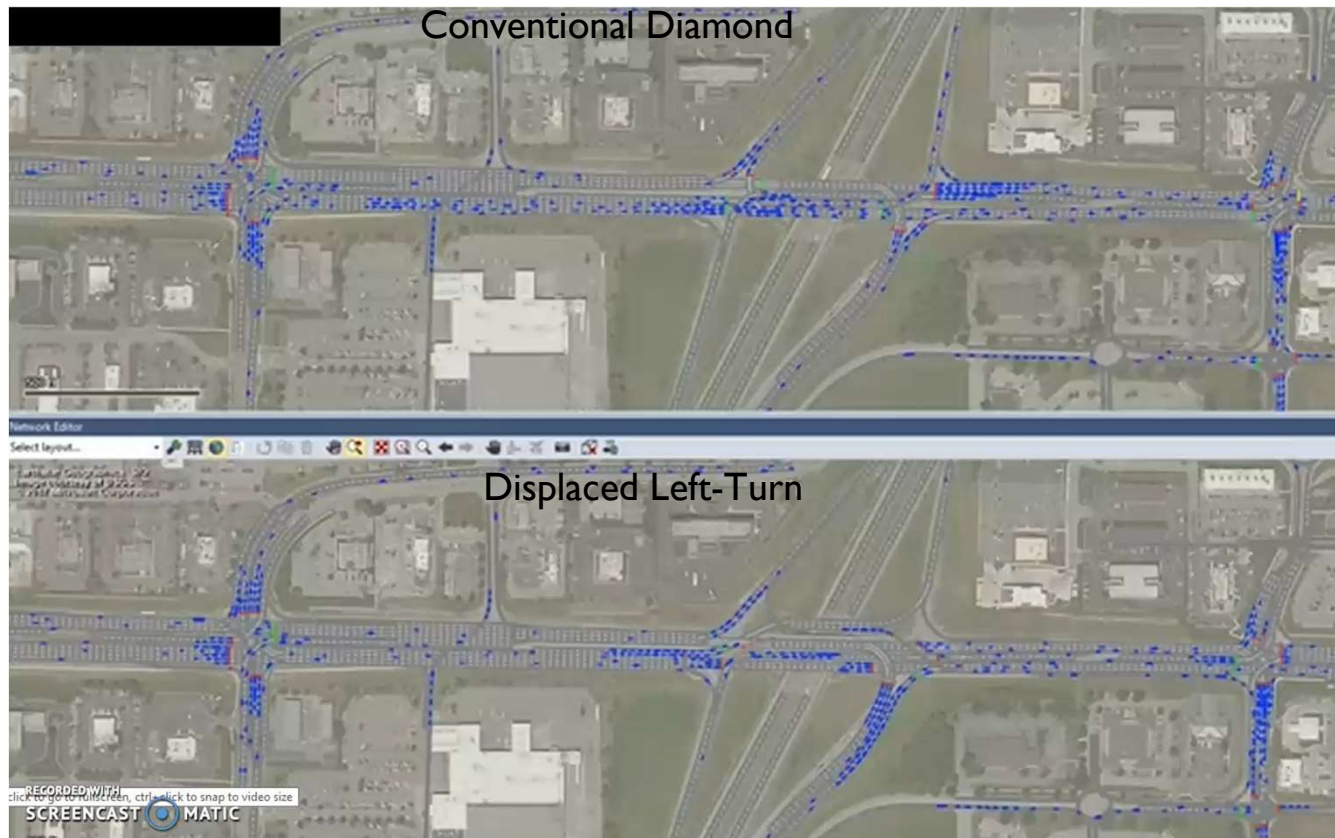Compared to the traditional diamond in the peak hour, this geometry results in about:

- 1,500 more vehicles served
- 30% less travel time
- 45% less delay

Critical Movement Comparison

1156= or 1260=

184   972

909   351

DLT Provides about 27% more capacity

2728/3=909   351/2=176

702/2=351   368/2=184   2920/3=973   508/2=254   506/2=253
2918/3=972

Displaced Left Turn (DLT)

862   176   =1480 or =1443

973   253   254

2588/3=862
(operates with both Blue and Purple)

1587=   905   682   647   818   =1475

298   176   253   254

595/2=298   351/2=176   702   3270/4=818   2588/4=647

3620/4=905   2728/4=682   368   508/2=254   506/2=253

Diverging Diamond Interchange (DDI)

This is another project, not the Route 152 interchange

Intersection Capacity ~1500 vph

Operational Comparison


Conventional Diamond

Displaced Left-Turn

Construction Challenges

- Major Retail Area – heavy Christmas traffic
- High School on corridor
- Consultation with stakeholders
- Get work done before shoppers find new destinations
- Learning curve for detour routes
- Close bridge and replace in 3 months (108 days)
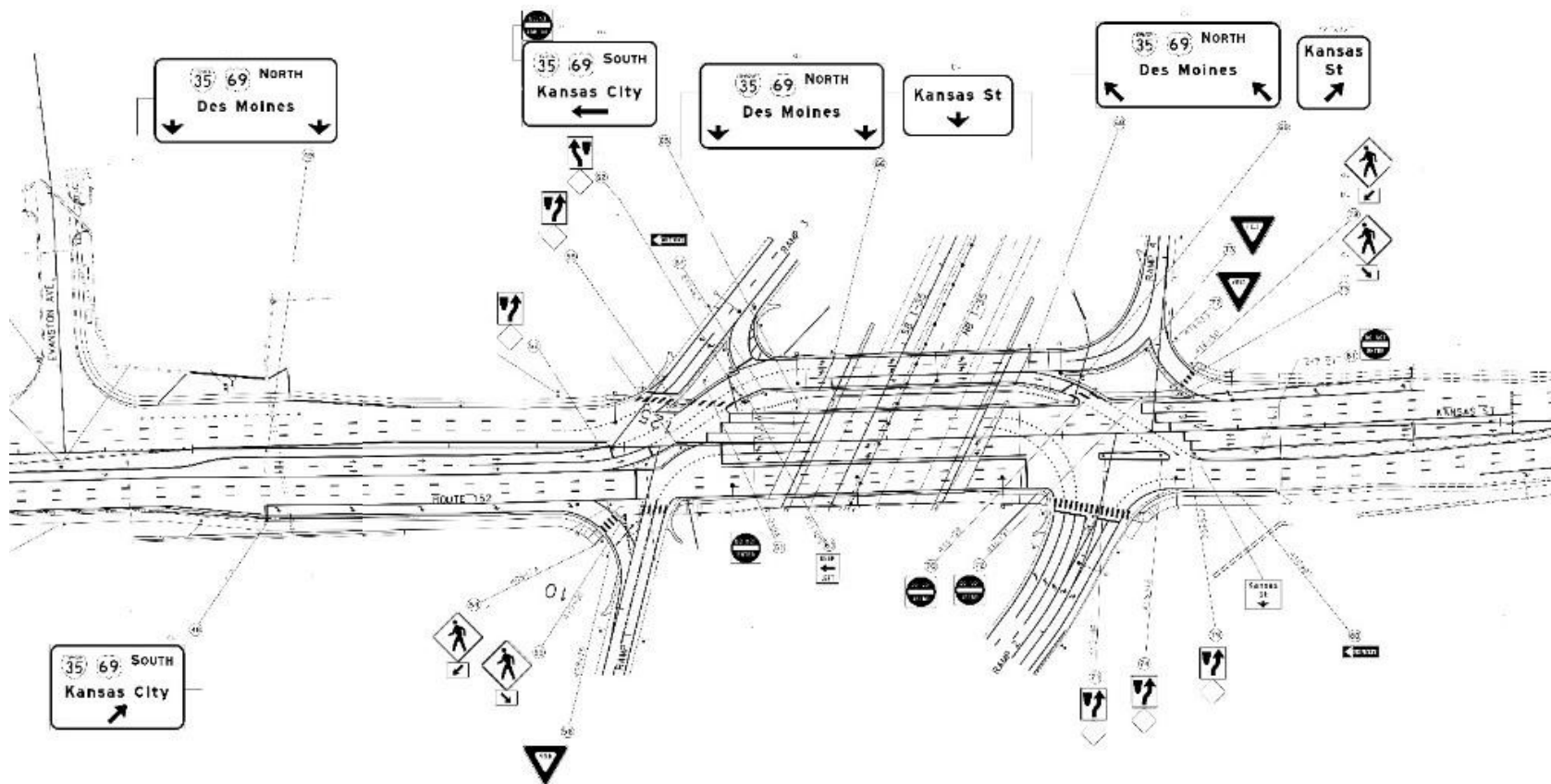- Incentive/Disincentive $25,000 per day
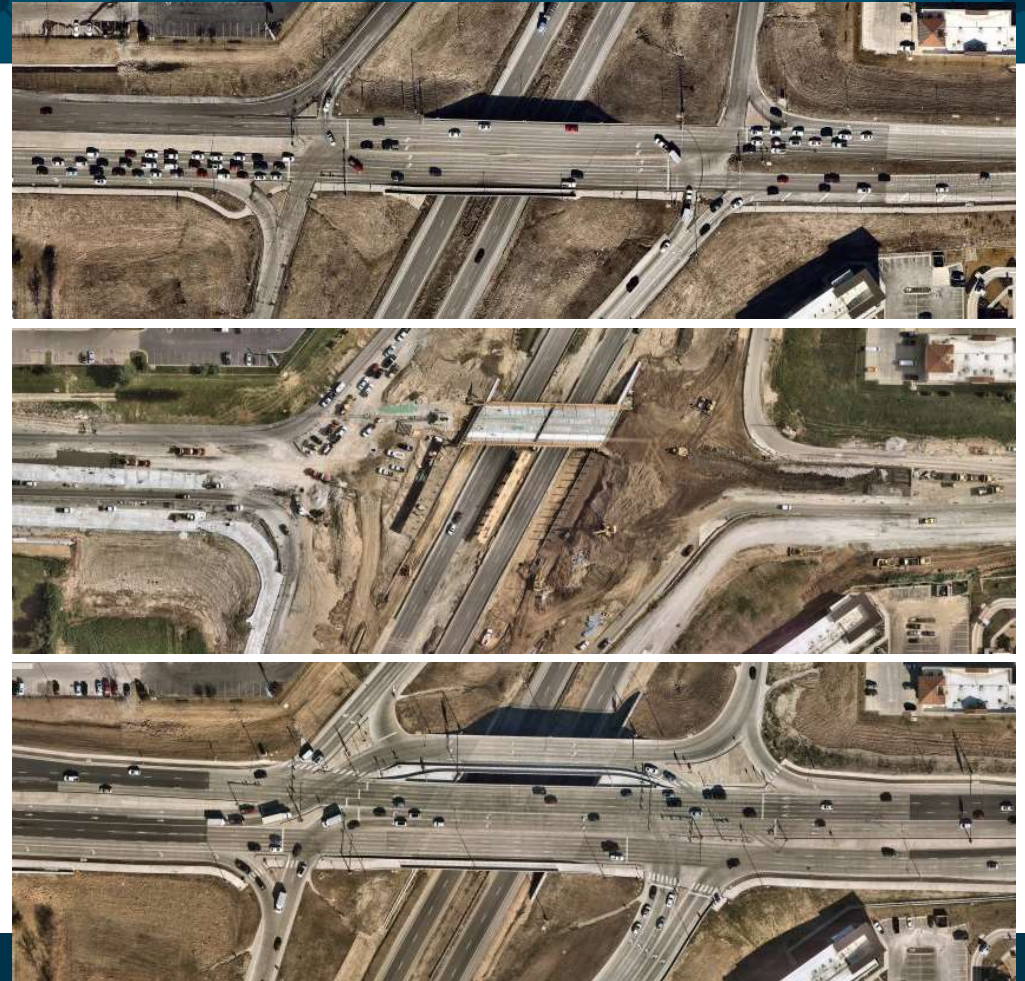
Traffic Signal Operation
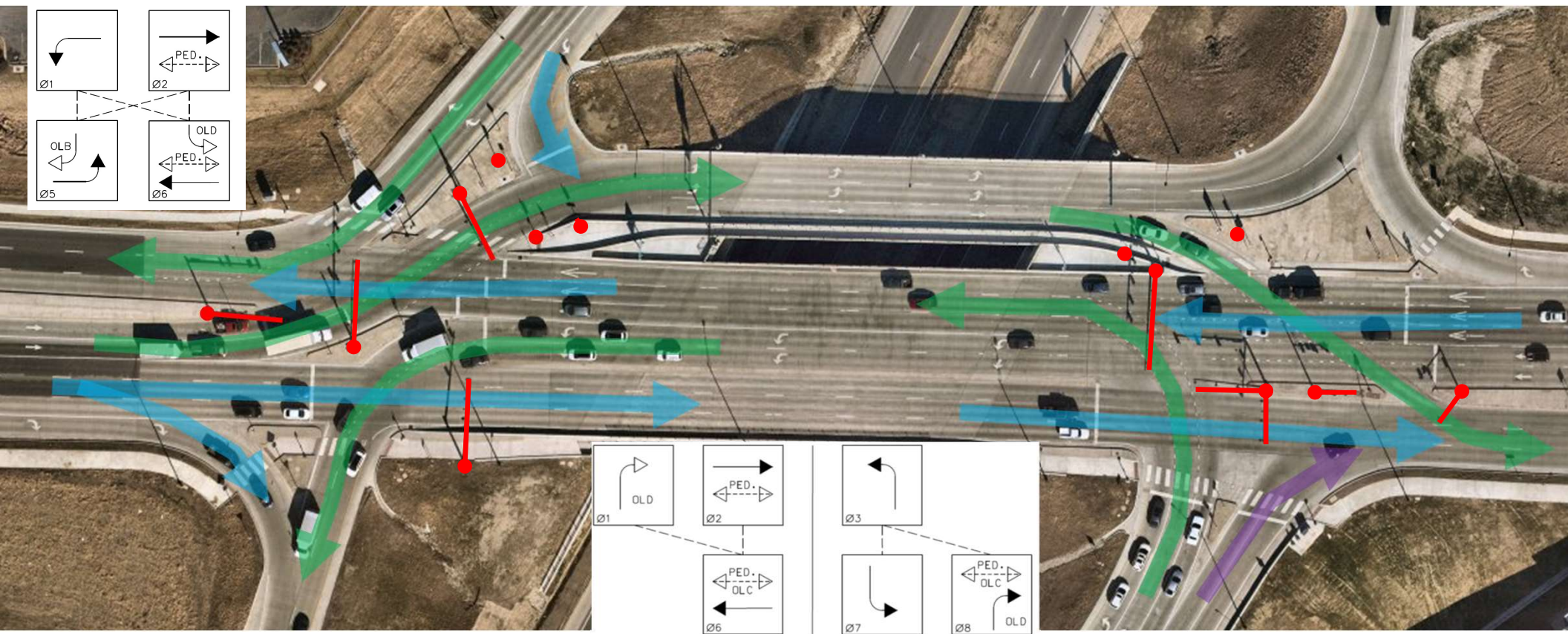
Traffic Signal Operation

Signing Plan

Questions?

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