Fehr & Peers

Reflections from a Practioner

Dynamic Traffic Assignment

Jeff Pierson | September 15, 2025

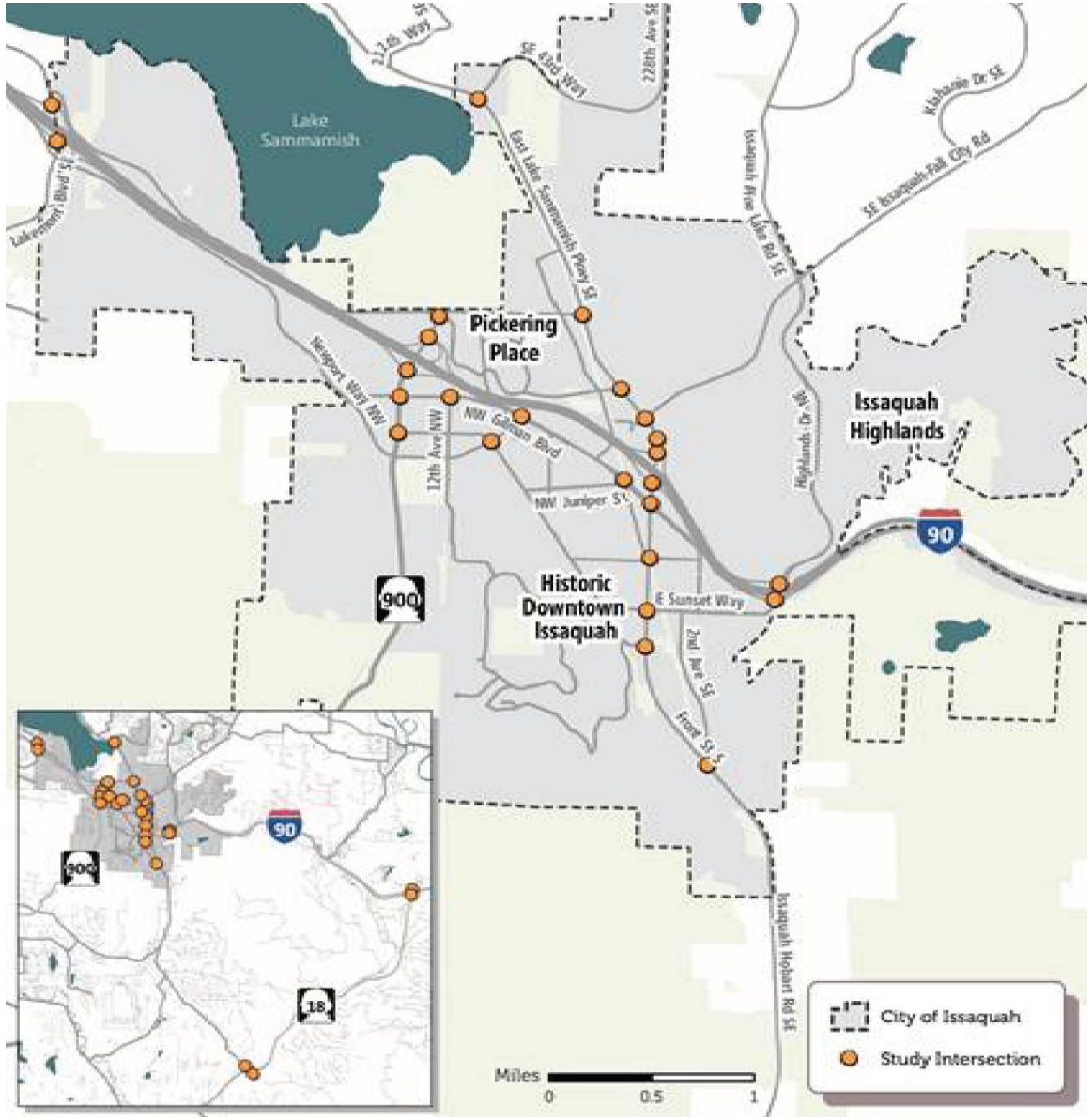
SECTION 01

Some Context

I-90 Front St IJR

INRO Dynameq

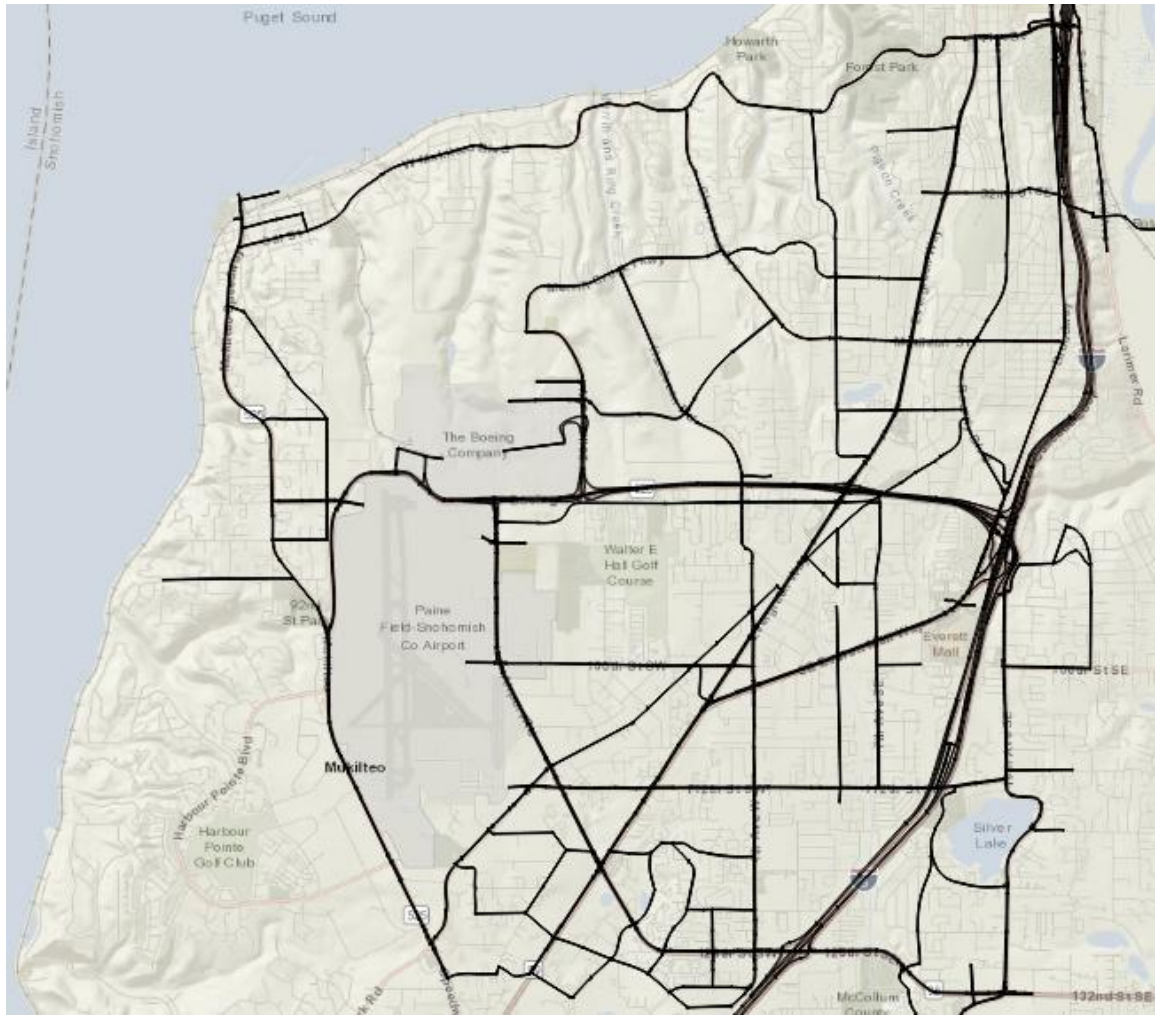
- Mesoscopic DTA
- Issaquah, WA
- 4 freeway interchanges
- Citywide network detail
- 3-hour AM and PM assignments
- Evaluate interchange design alternatives to reduce congestion
- Detailed analysis in Vissim/Synchro



SR 526 Corridor Study

INRO Dynameq

- Mesoscopic DTA
- Everett, WA
- SR 526 and I-5 Corridors
- 250+ intersections
- 3-hour AM and PM assignments
- Evaluate corridor design alternatives to reduce congestion and cut-through traffic on local streets
- Detailed analysis in Vissim/Synchro



Colfax BRT Implementation

Caliper TransModeler

- Microscopic DTA
- Denver, CO
- 9-mile study corridor

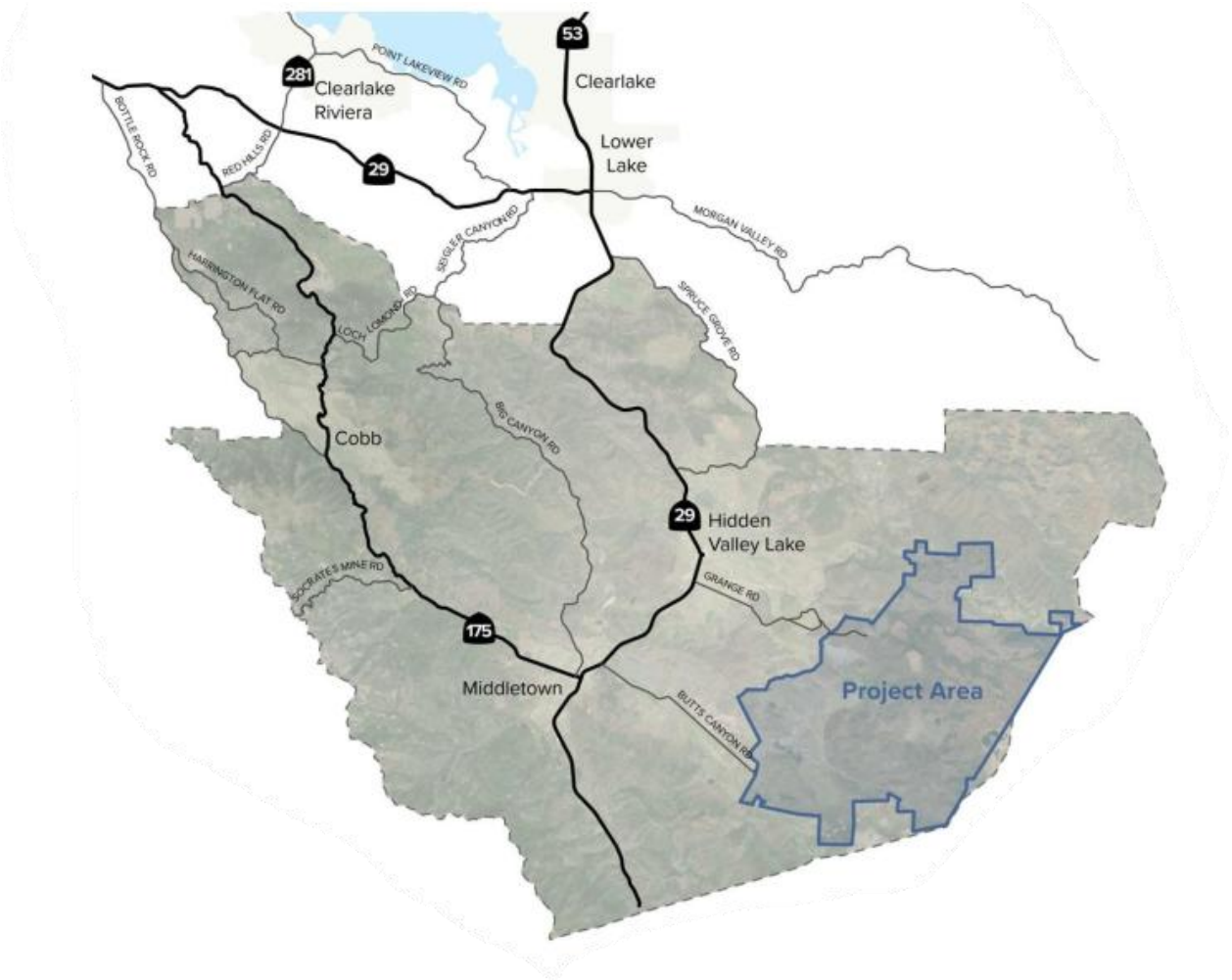
- 6 parallel arterials
- 150+ traffic signals
- 3-hour assignments

- Evaluate arterial operational performance and travel shifts due to lane conversion

Guenoc Resort Evacuation Study

Caliper TransModeler

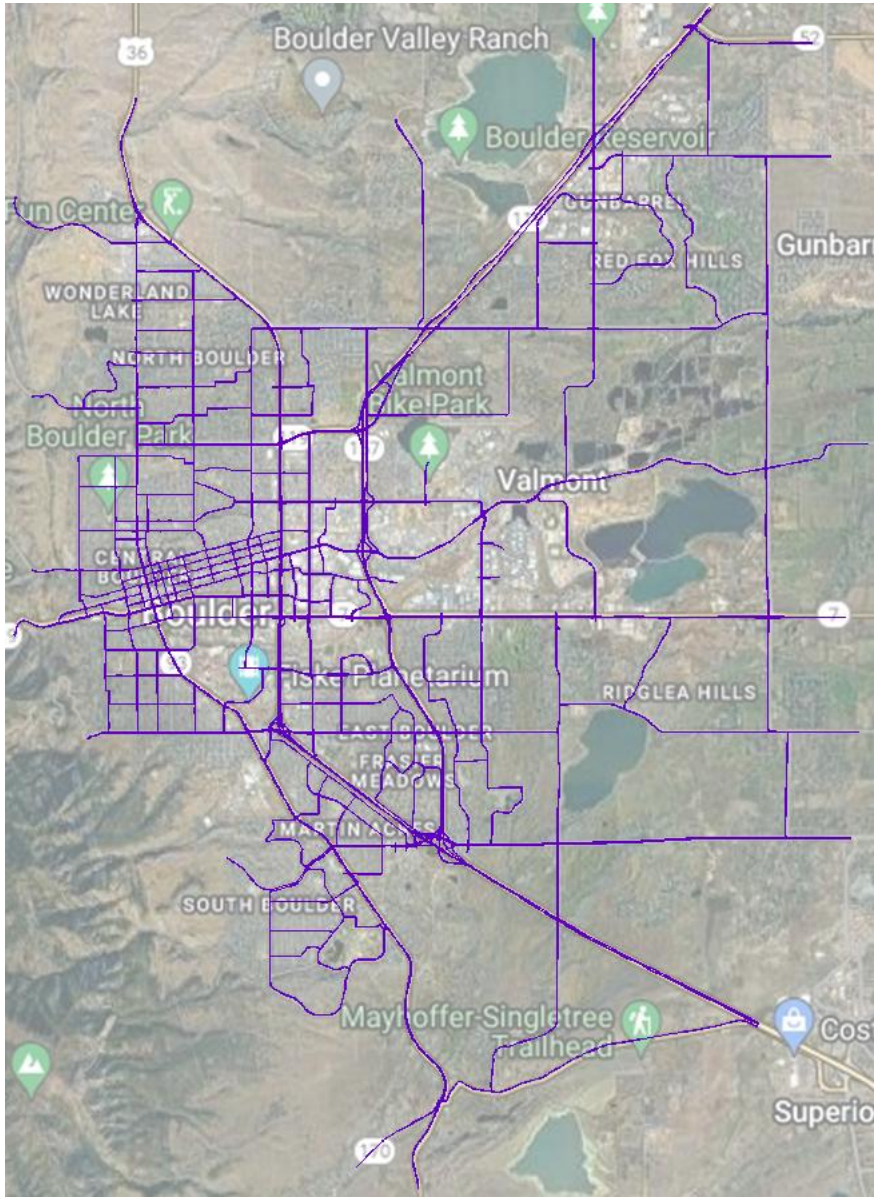
- Microscopic DTA
- Lake County, CA
- ~350 lane-miles
- 175+ intersections
- 9-hour assignment
- Evaluate time required for residents, employees, and visitors to evacuate
- Test fire scenarios, route closures, and management strategies



Boulder Network Evaluation

Caliper TransModeler

- Macroscopic then Microscopic DTA
- Boulder, CO
- Citywide network model
- 250+ intersections
- 3-hour AM and PM assignments
- Evaluate cumulative impacts of multiple corridor design alternatives to improve transit and biking infrastructure
- Understand changes in vehicular delay and potential diversion through residential neighborhoods



SECTION 02

Some Reflections

DTA Models are Useful!!!

- Can be used on a wide range of projects to **quickly evaluate** numerous design alternatives, understand travel behavior changes, and estimate evacuation times
- The results are **generally logical** and don't require substantial post-processing before presenting
- **Better operational metrics** than a demand model

DTA Models are Challenging!!!

- DTA models are effectively **multi-hour microsimulation models** that cover a large study area (otherwise their usefulness is limited)
- **Existing data requirements** include OD travel patterns, multi-hour freeway and arterial volumes, intersection geometry, signal timing, corridor travel times, congested speeds, and queuing observations at bottlenecks (if you want to do it right)

There are No (Strict) Rules

- DTA models should be calibrated and validated using a **combination of forecasting and microsimulation guidelines**
- The methodology for each study **will vary** and depends on how exactly the model will be used and what performance metrics will be reported from the model

Are Mesoscopic Models Helpful?!?*

- **More complicated** than link-based macroscopic models
- **Less sophisticated** than vehicle-based microscopic models
- Cannot generate HCM delay-based performance metrics
- Requires other software tools for detailed operations analysis
- Introduces another model to calibrate and validate

**The opinions expressed on these slides are those of the misguided presenter and do not official policy of Fehr & Peers or the MoMo conference.*

Mesoscopic Model Limitations*

- Driver behavior limited to a handful of parameters
- Pre-timed traffic signals only
- No feedback on model performance during simulation
- Bottleneck calibration is time consuming
- Results visualization is similar to forecasting models

**Workarounds are available, but they are still workarounds.*

SECTION 03

Some Suggestions

Current Workflow

Regional Travel Demand Model

Subarea Calibration and Validation

Subarea DTA Model

Development, Calibration, Validation, and Evaluation

Corridor Microsimulation Model (Freeways)

Development, Calibration, Validation, and Evaluation

Individual Deterministic Models (Intersections)

Evaluation

An Alternative*

Regional Travel Demand Model with Macroscopic DTA

Subarea Calibration and Validation

~~**Subarea DTA Model**~~

~~Development, Calibration, Validation, and Evaluation~~

Corridor Microsimulation Model (Freeways)

Development, Calibration, Validation, and Evaluation

Individual Deterministic Models (Intersections)

Evaluation

**Yes, this likely does shift the model development responsibility to already thinly-stretched MPOs.*

Another Alternative*

Regional Travel Demand Model

Subarea Calibration and Validation

~~**Subarea DTA Model**~~

~~Development, Calibration, Validation, and Evaluation~~

Microsimulation DTA Model (Freeways and Intersections)

Development, Calibration, Validation, and Evaluation

**Stochastic models might not have immediate acceptance for use in environmental regulatory studies (i.e. NEPA).*

Final Thoughts

- Microscopic DTA models provide the best opportunity to **simplify the analysis** for planning and alternatives analysis studies
- Regional travel demand models should implement macroscopic DTA models to **replace static assignment models**
- All DTA frameworks have **pros and cons** that should be well considered before jumping head-first into model development

Let’s Discuss