



Integrating DTA with a Traditional Mode Choice Model

TRB Planning Applications

May 2013

The DTA Team

A Collaborative Effort

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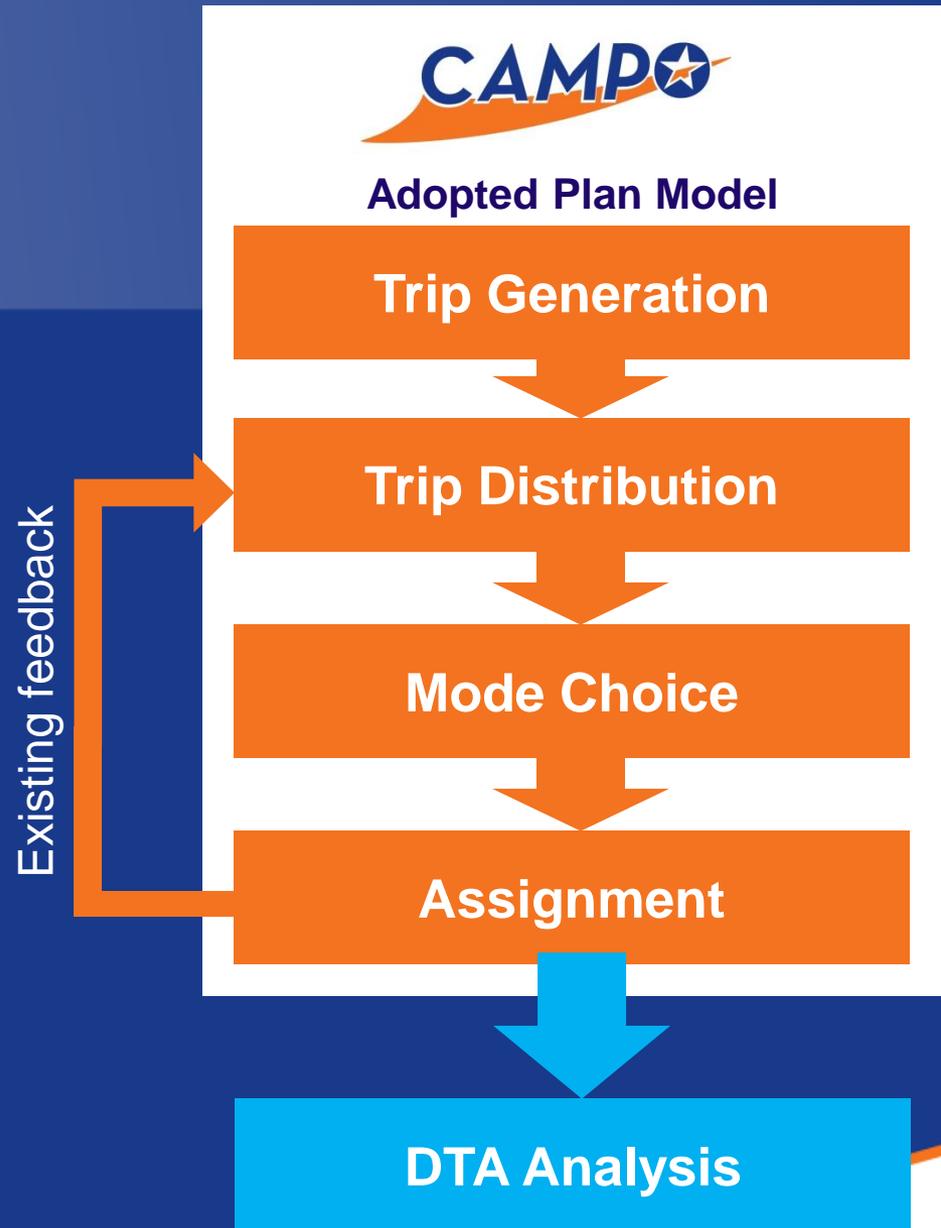
Why DTA?

Need + Resources = Opportunity

- Local agency interest in a more precise traffic analysis tool
 - Downtown and other sub-areas
 - Corridor-level analysis
- UT's Center for Network Modeling based in Austin
- Multi-agency collaboration to fund effort

CAMPO DTA to Date

A “Fifth” Step after
the 4-step Model



Why Integrate DTA?

Desire for consistency between DTA times and times being used for trip distribution and mode choice

- Traveler delay

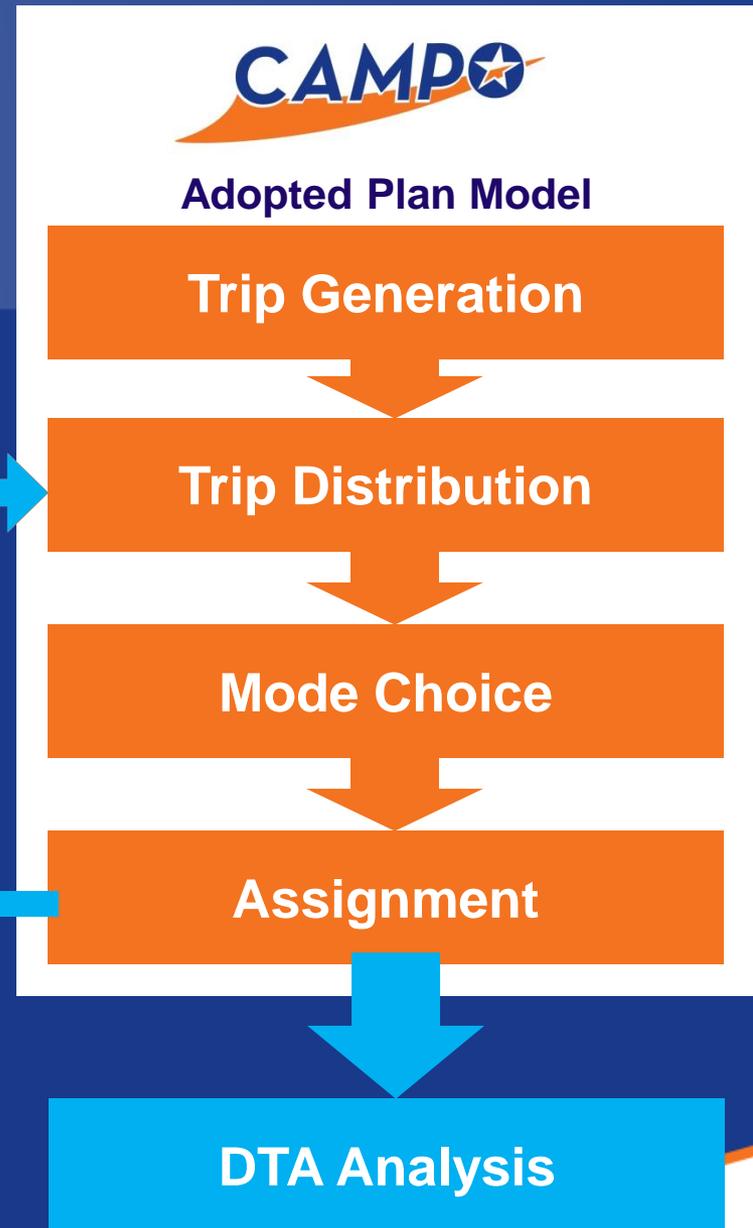
- Potential mode shifts

Incremental step to advance model that is applicable for trip-based and later ABM (if/when)

“In Theory”

DTA Could be Incorporated the Same Way UE Assignment Results Are

Existing feedback





CAMPO Adopted Plan Model

Trip Generation
24 hour by purpose

Trip Distribution

HBW Trip Purposes	Other Trip Purposes
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Mode Choice

HBW Trip Purposes	Other Trip Purposes
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Create Trip Tables

AM Peak	24-Hour
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Assignment

AM 2-Hr Peak	24-Hour
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CAMPO Feedback

Existing Feedback Structure

NO

Compare current to previous loop 24-hour highway skims Converged?

YES (Done)

Compare current to previous loop peak highway skims (information only)

Feedback Convergence Method:

Caliper MSA

Criteria: % RMSE of skim tables ≤ 0.015 or iterations > 12

Static Assignment: UE with Relative Gap $< .001$ or iterations = 150

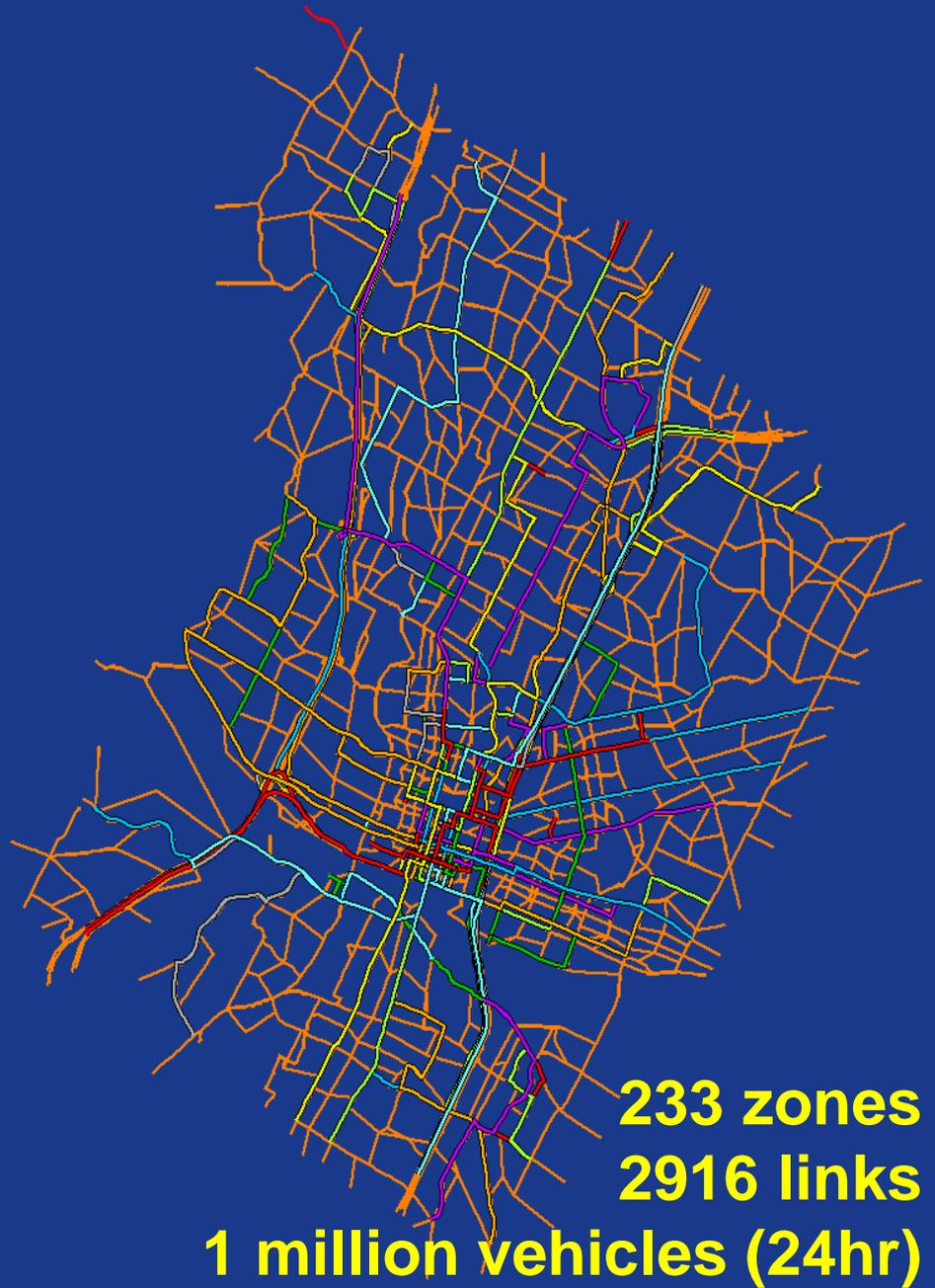
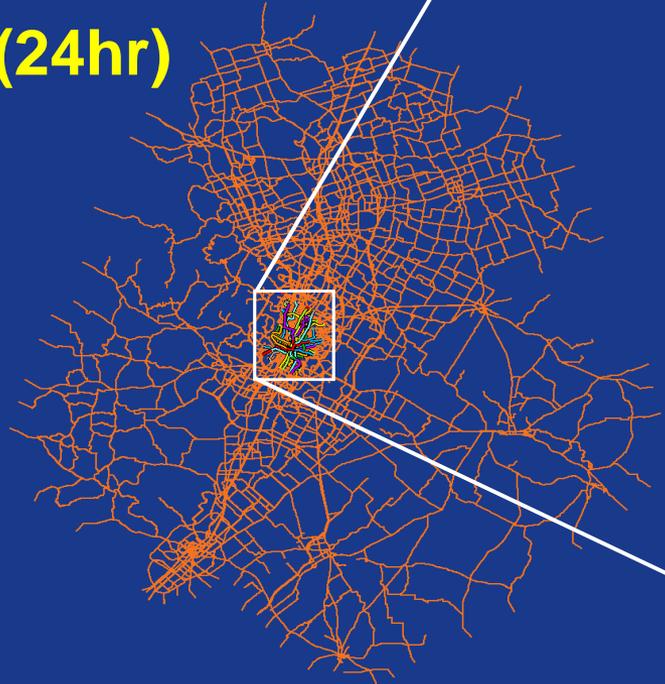
Slice n' Dice

Considerations to Simplify Our Task for Testing

- Skip existing CAMPO model steps
- Loosen convergence criteria
- Run CAMPO model for 5-county region, but DTA for sub-area only
- “Shrink” (scale) the region for test
- Only integrate peak times for DTA (keeping UE 24-hour times)
- No calibration, just mechanics

Study Area

1462 zones
17551 links
13 million vehicles
(24hr)



233 zones
2916 links
1 million vehicles (24hr)



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Other Trip Purposes

Create Trip Tables

AM Peak VISTA

24-Hour

Assignment

AM 2-Hr Peak VISTA

24-Hour

Compare current to previous loop peak highway skims (information only)

Compare current to previous loop 24-hour highway skims Converged?

NO

YES (Done)

CAMPO Feedback

DTA Integration Concept

Feedback Convergence Method:
Caliper MSA

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Proof of Concept

Taking Incremental Steps Toward Region-wide DTA

- Scale study area to expedite testing
- Use existing CAMPO model structure and utilities to maximum extent
- Focus on mechanics

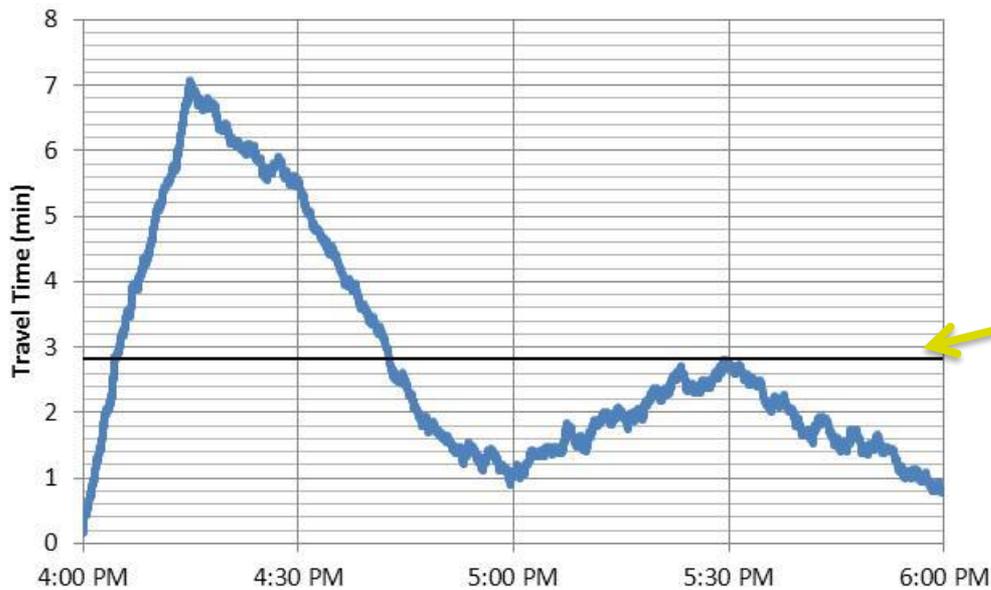
Biggest lesson learned:
the value of collaboration.

VISTA

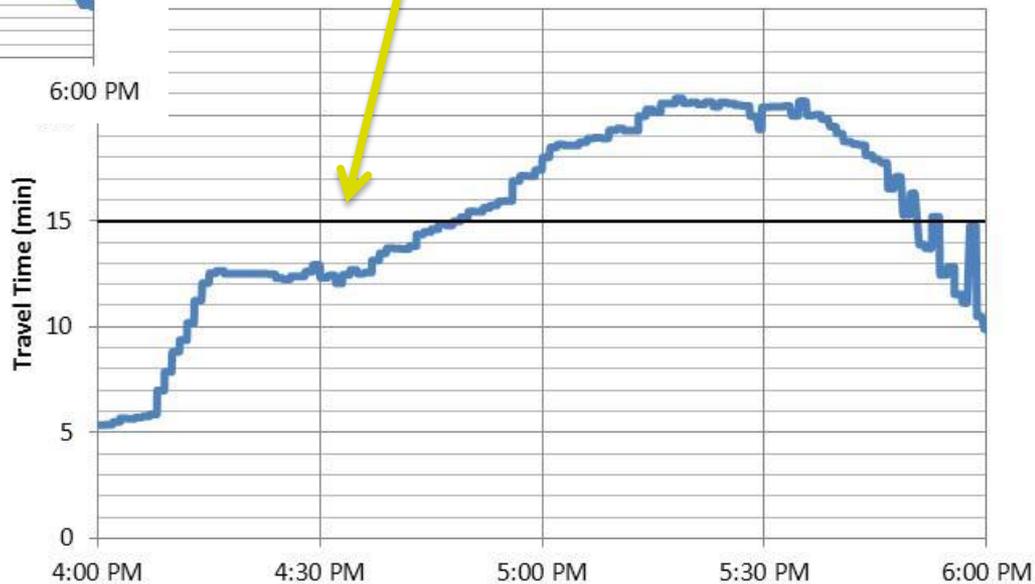
University of Texas Network Modeling Center

- Assigns traffic according to dynamic user equilibrium
 - Typically use 15-minute departure time intervals
- Cell-transmission model for simulation
 - Typically run in six-second increments

More Motivation



Auto travel times
for two O-D pairs

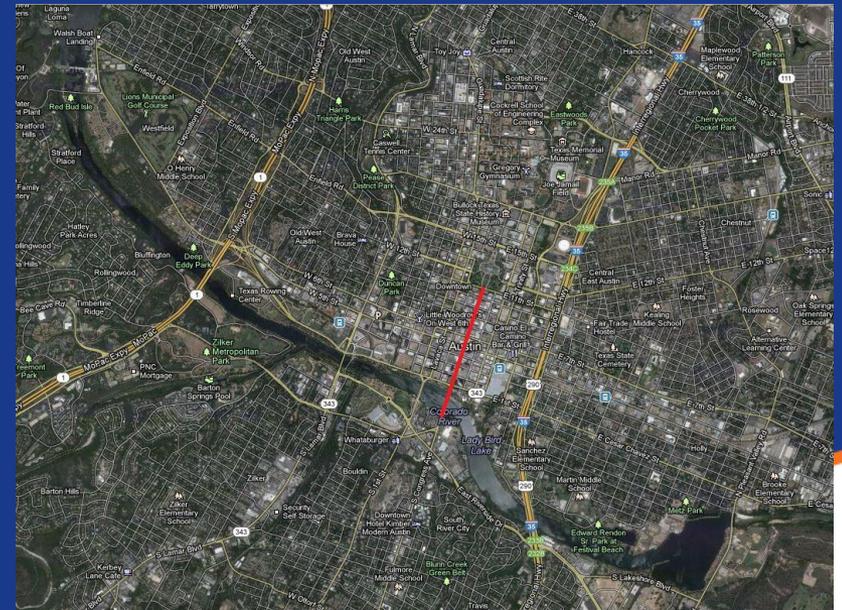
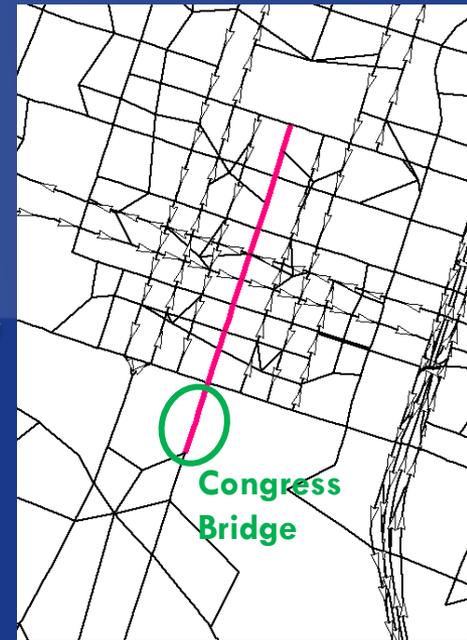


Congress Avenue “Road Diet” Scenario

Impacts to Congress Avenue
and Bridge



Congress Avenue



Test Scenarios

Does the Effort Make a Difference?

Model Components	Traditional CAMPO Model	Traditional CAMPO Model + DTA	DTA Integration (Direct Feedback of DTA Times)
CAMPO 4-Steps	✓	✓	✓
Feedback of UE Times	✓	✓	✓
AM DTA Analysis using OD Table		✓	✓
Feedback of DTA Times			✓

DRAFT DRAFT

Results Assessment

DRAFT DRAFT

- Link-Level
 - Flow

DRAFT DRAFT

- Corridor-Level
 - Travel Time (NB and SB)

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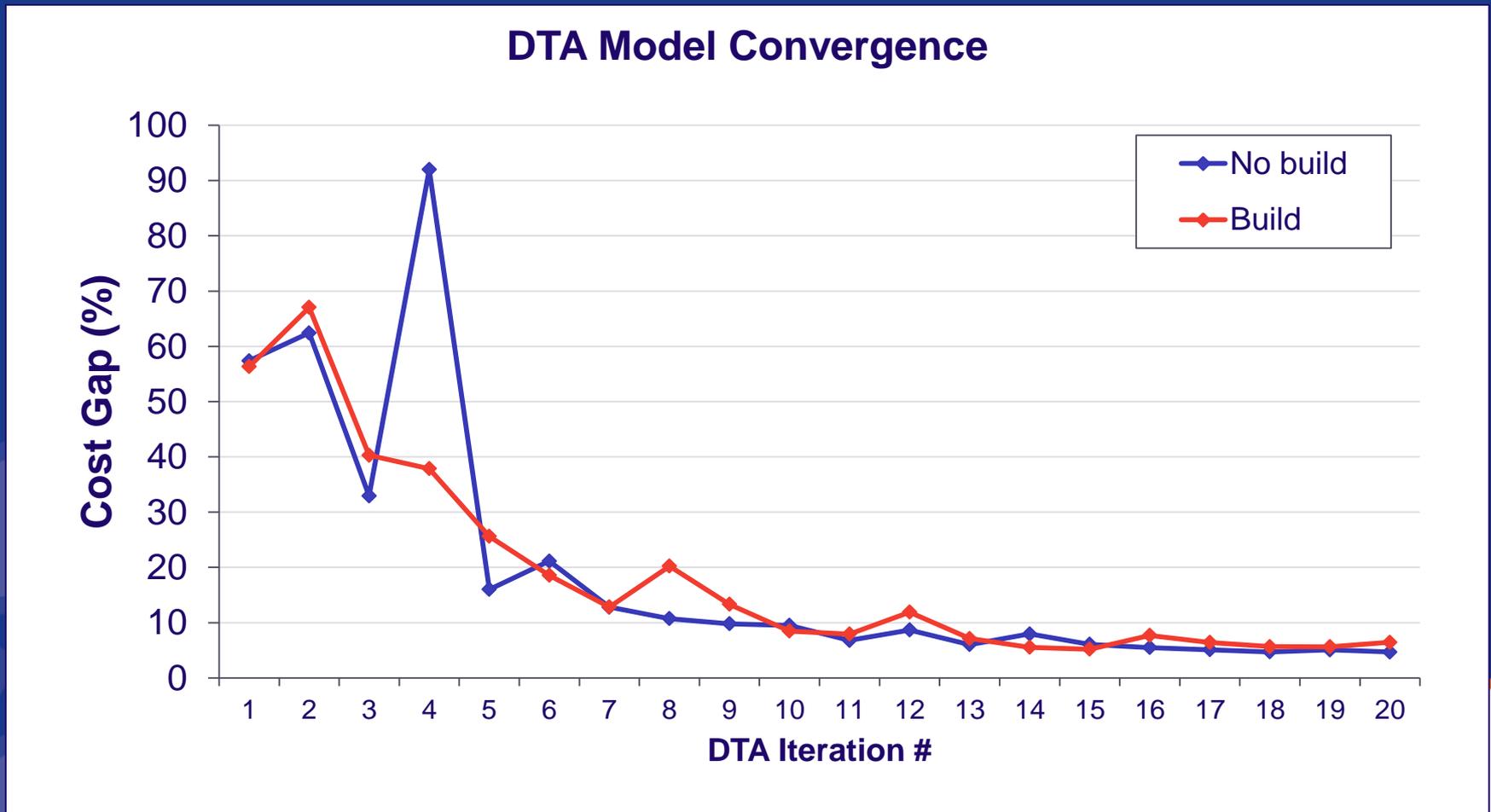
- System-Level
 - Mode Split

DRAFT DRAFT

- Trip Distribution

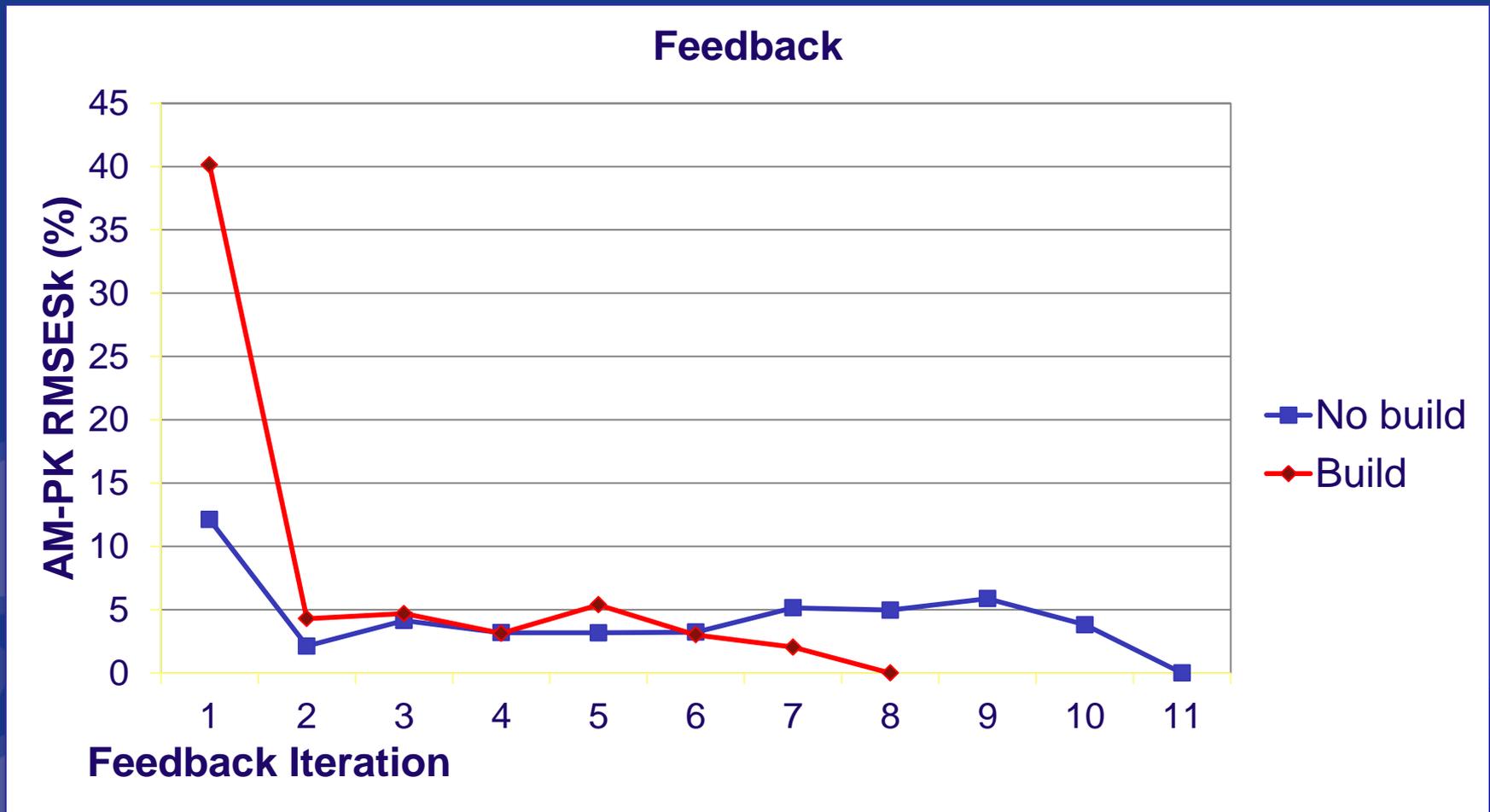
Convergence

DTA Model

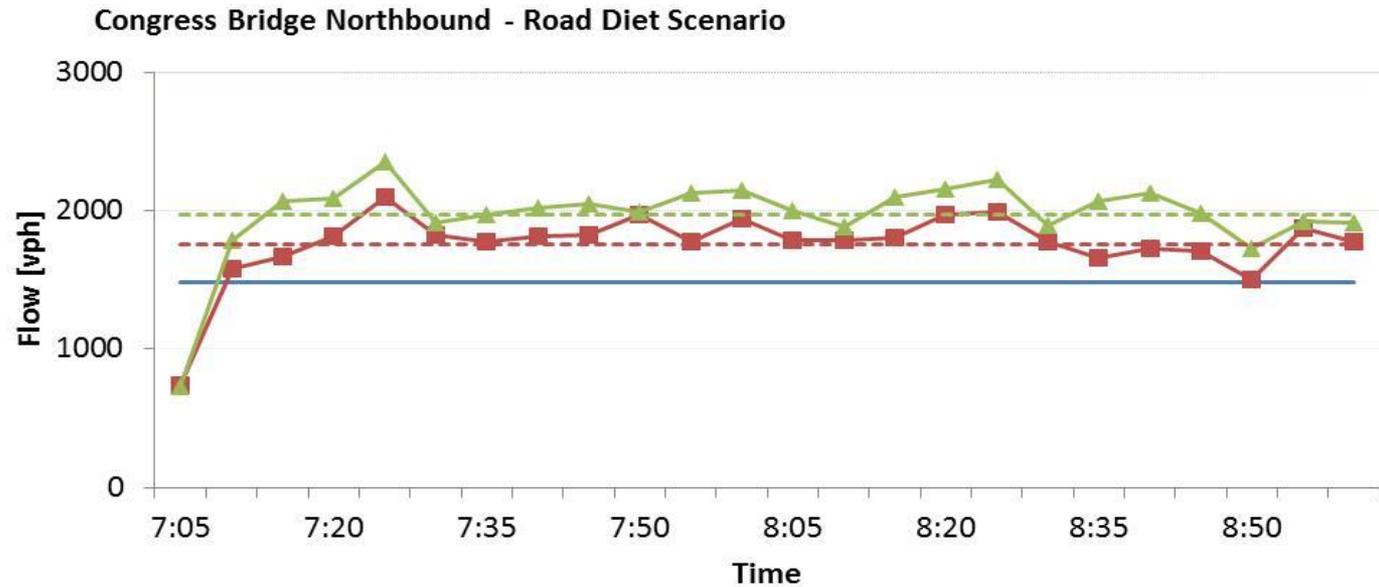
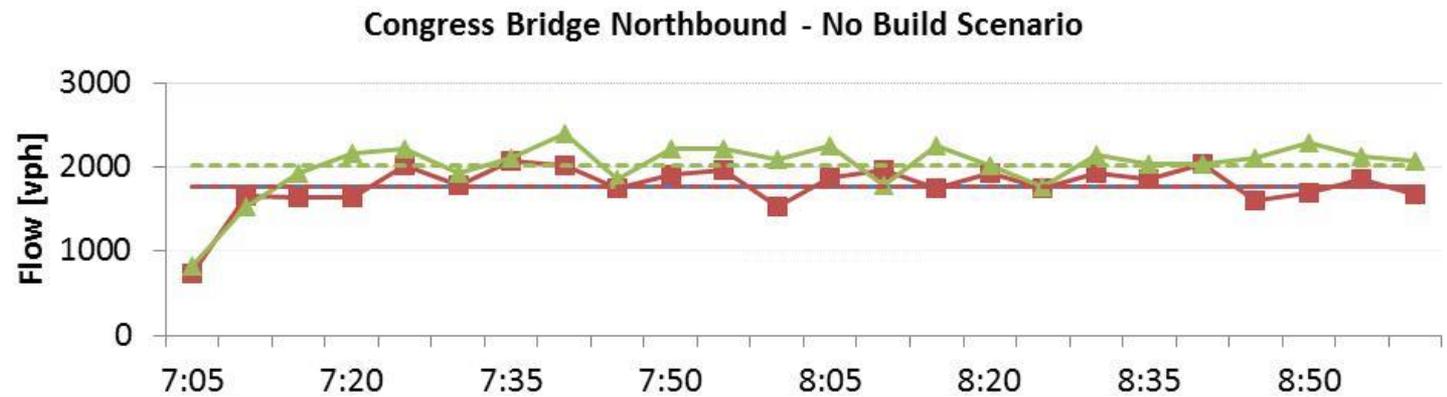


Convergence

CAMPO Feedback – % RMSE (peak skims)



Bridge Flow



What? CAMPO hourly flow decreased, but DTA flows did not change much; DTA Feedback highest flow

Why? More Diversion in CAMPO model; Most auto trips with DTA Feedback

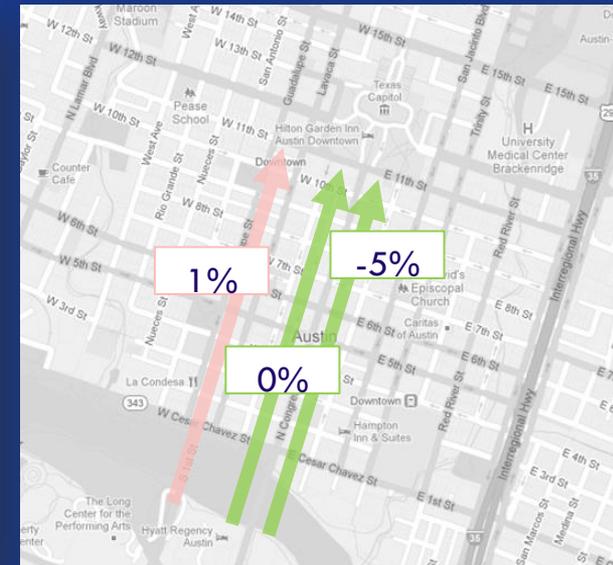
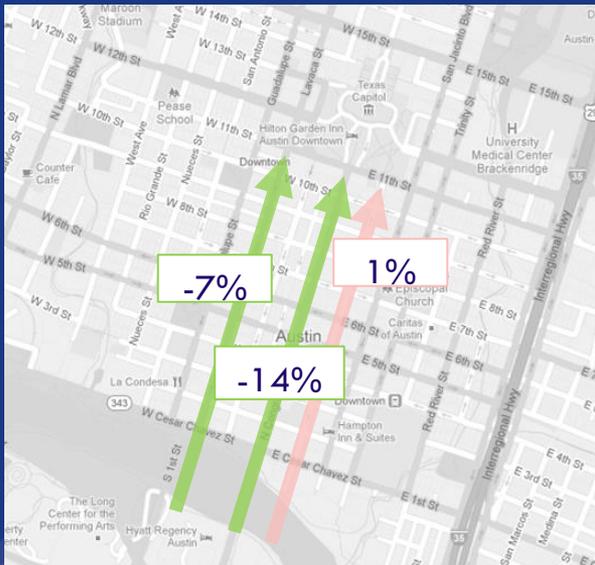
Change In VMT on Northbound Facilities:

No build Vs. Congress Capacity Reduction

CAMPO

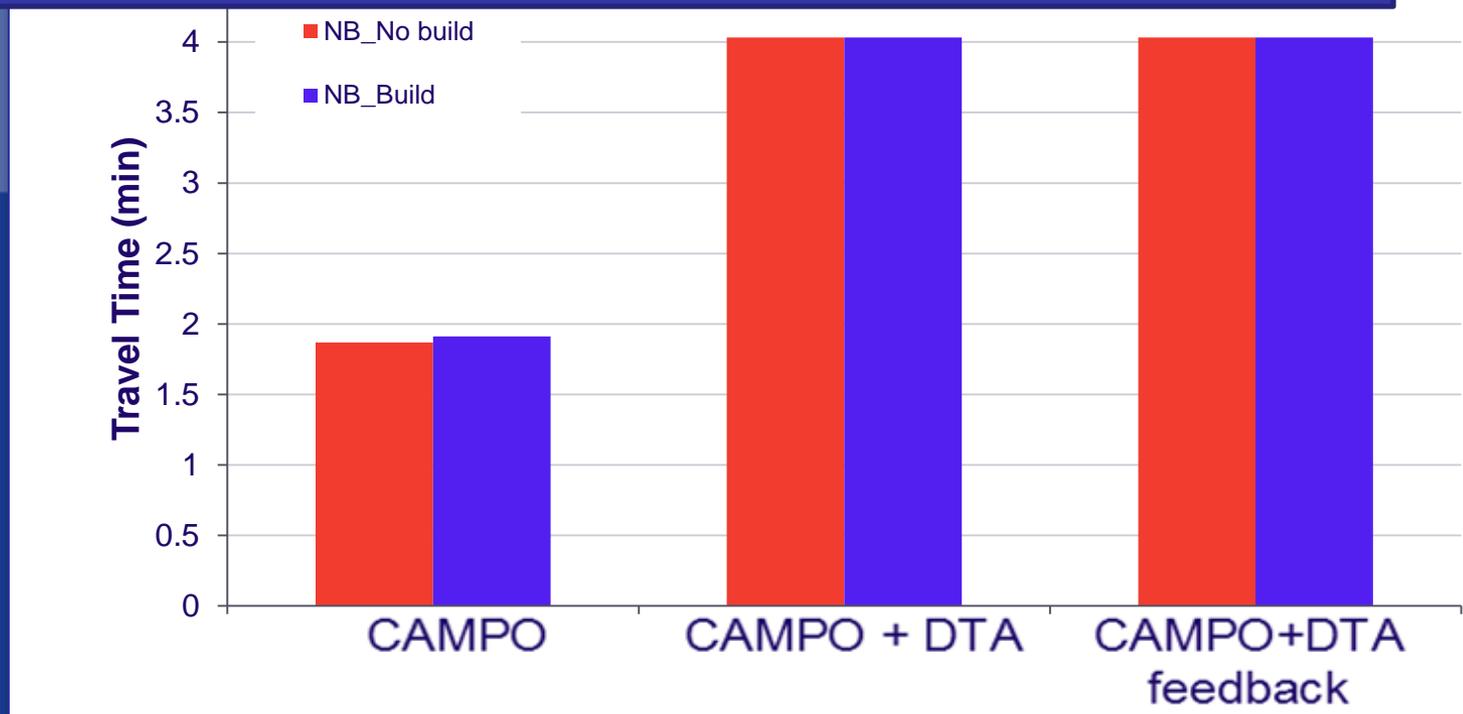
CAMPO + DTA

CAMPO + DTA
Feedback



- **What?** Less change with DTA
- **Why?** Alternate routes more attractive in static assignment?

Congress Corridor Travel Time



- **What?** DTA times are higher; no change across scenarios
- **Why?** DTA accounts for signals unlike CAMPO model; near free flow conditions

Auto Trips

Scenario	No Build		Reduced Capacity	
	CAMPO+DTA	CAMPO+DTA Feedback	CAMPO+DTA	CAMPO+DTA Feedback
Auto Trips	130,399	140,761	130,861	140,556

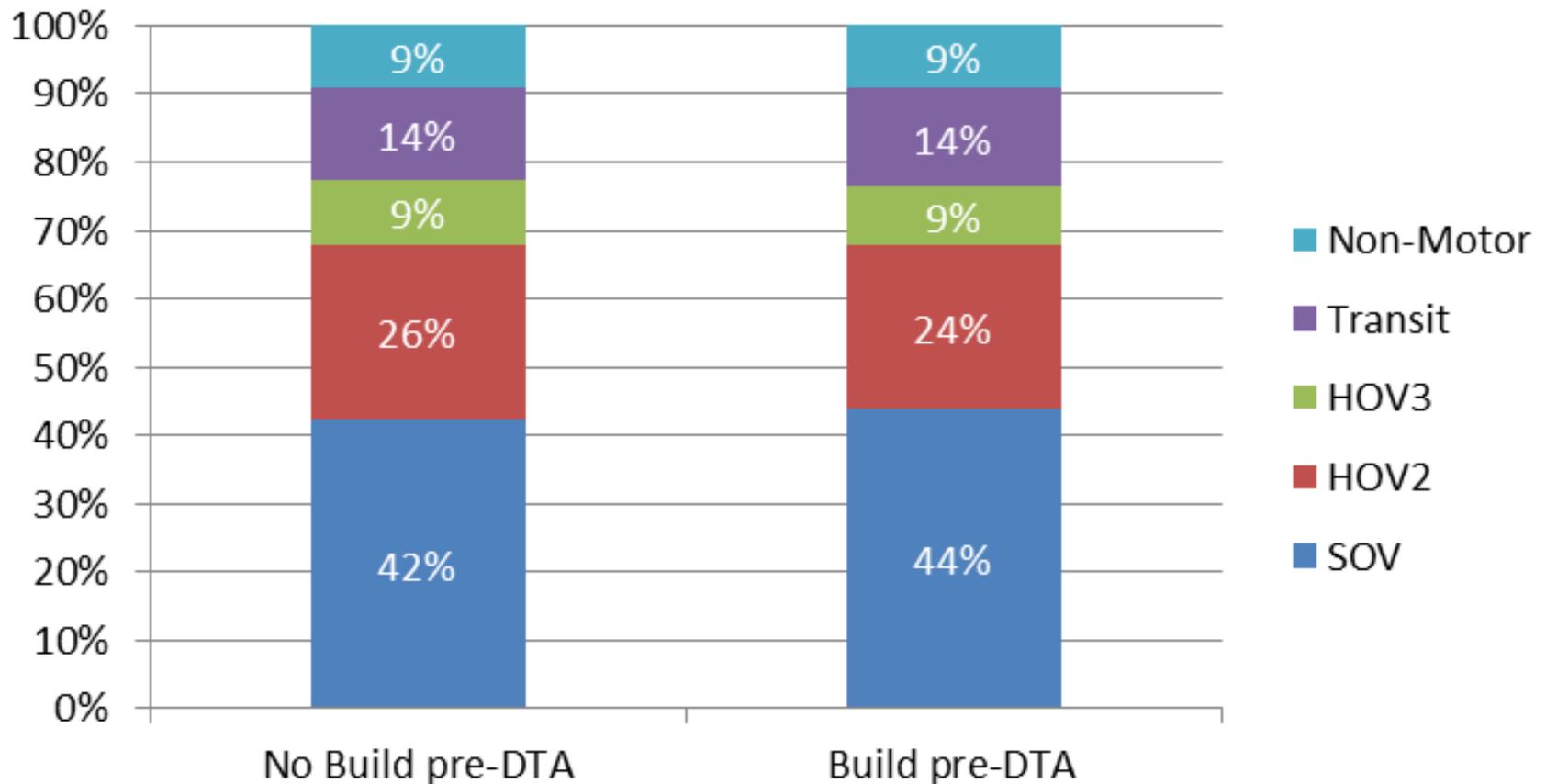
What? More auto trips with feedback

Why? Travel times higher in DTA → Factor applied to find transit travel time impacts transit mode more than auto

Mode Choice Sensitivity

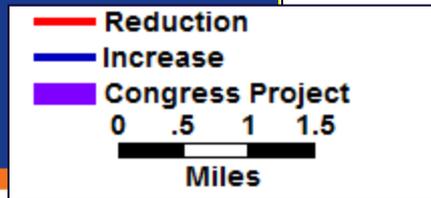
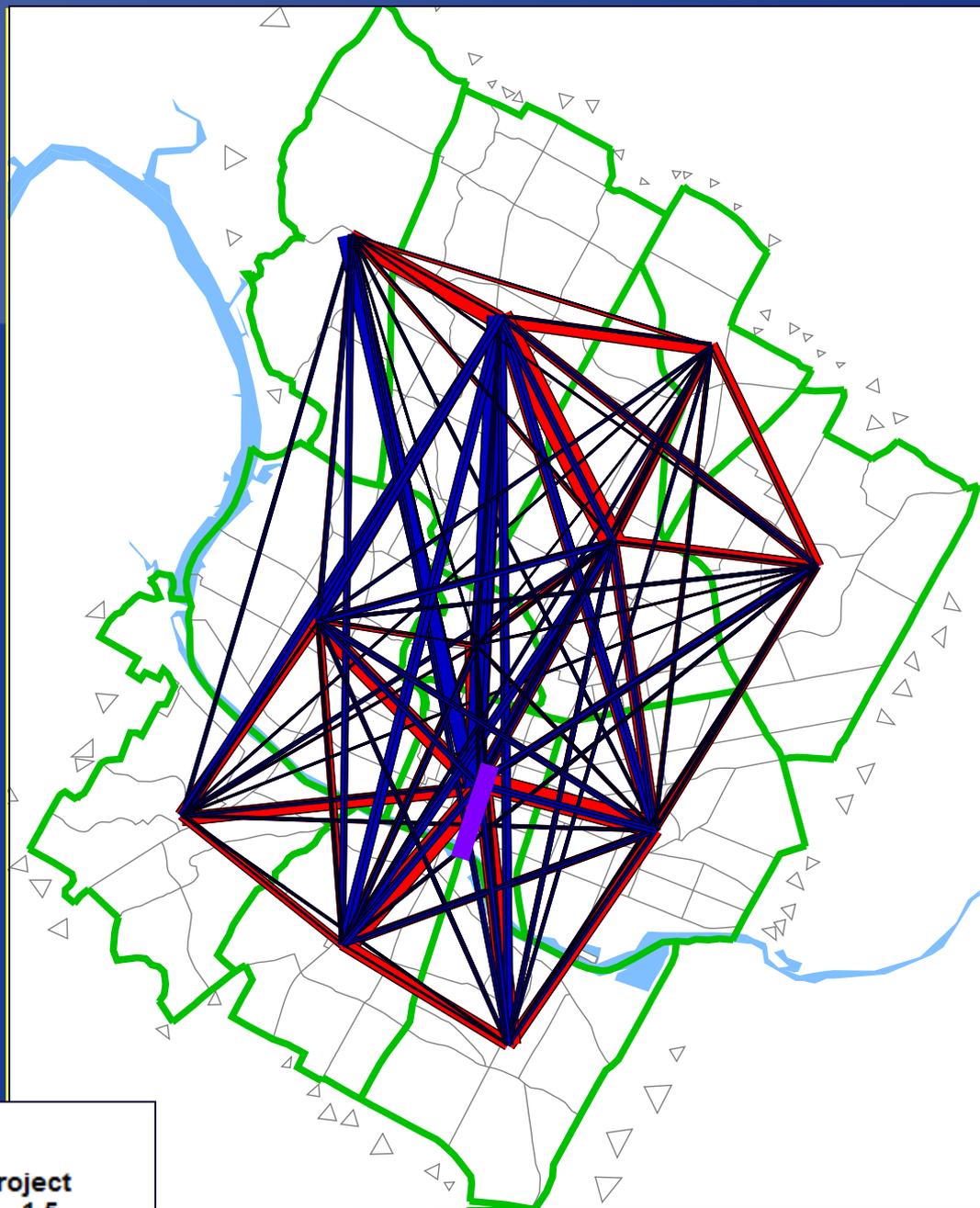
Comparing **Build v. No Build**, CAMPO Model only

CAMPO-Only Model Mode Choice: All Internal Trips



Trip Distribution Sensitivity

Comparing
Build v. No Build
under
CAMPO model only
Approach
(still under study)



Run Times

Estimates Based on Current Effort

Model Stage	Small-area Test	Estimate for Regionwide
Phase I Warm Start: Full CAMPO Feedback (UE)	1 hour	12 hours
DTA Convergence	2 hours	2 days
Potential Total Time	1 day	24 days

Next Steps

Plenty to Do...

- Examine changes in more detail
- Feedback of times using MSA
- Use regional and 24-hour DTA
- Feed auto and transit skims from DTA
- Incorporate into 2010 base year time-of-day model
- Departure time choice

Thank you

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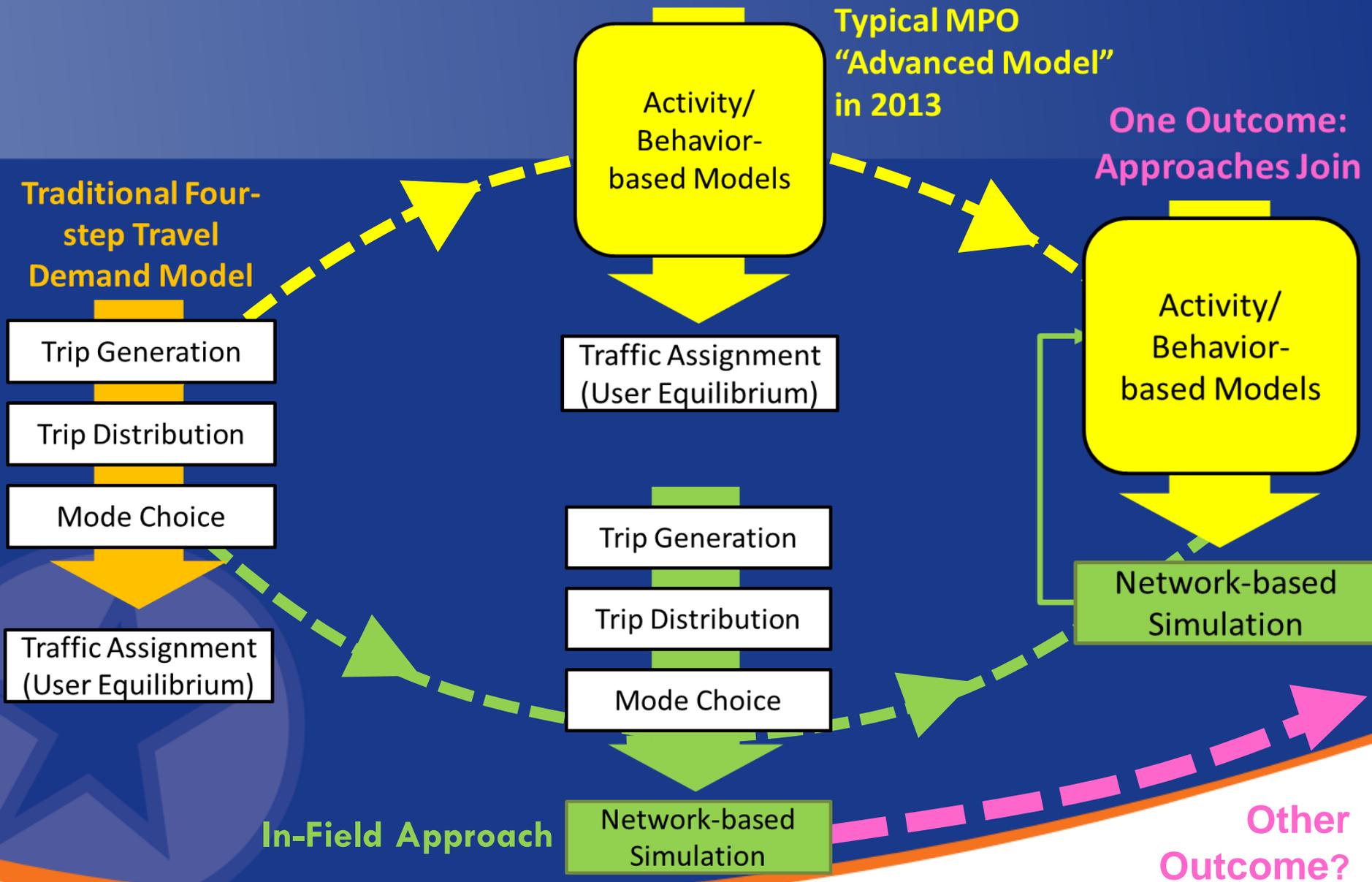
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Has the Horse Left the Barn?





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