

Pueblo Colorado MPO Travel Model

CHICAGO AREA
MODEL USERS GROUP

DECEMBER 6, 2017

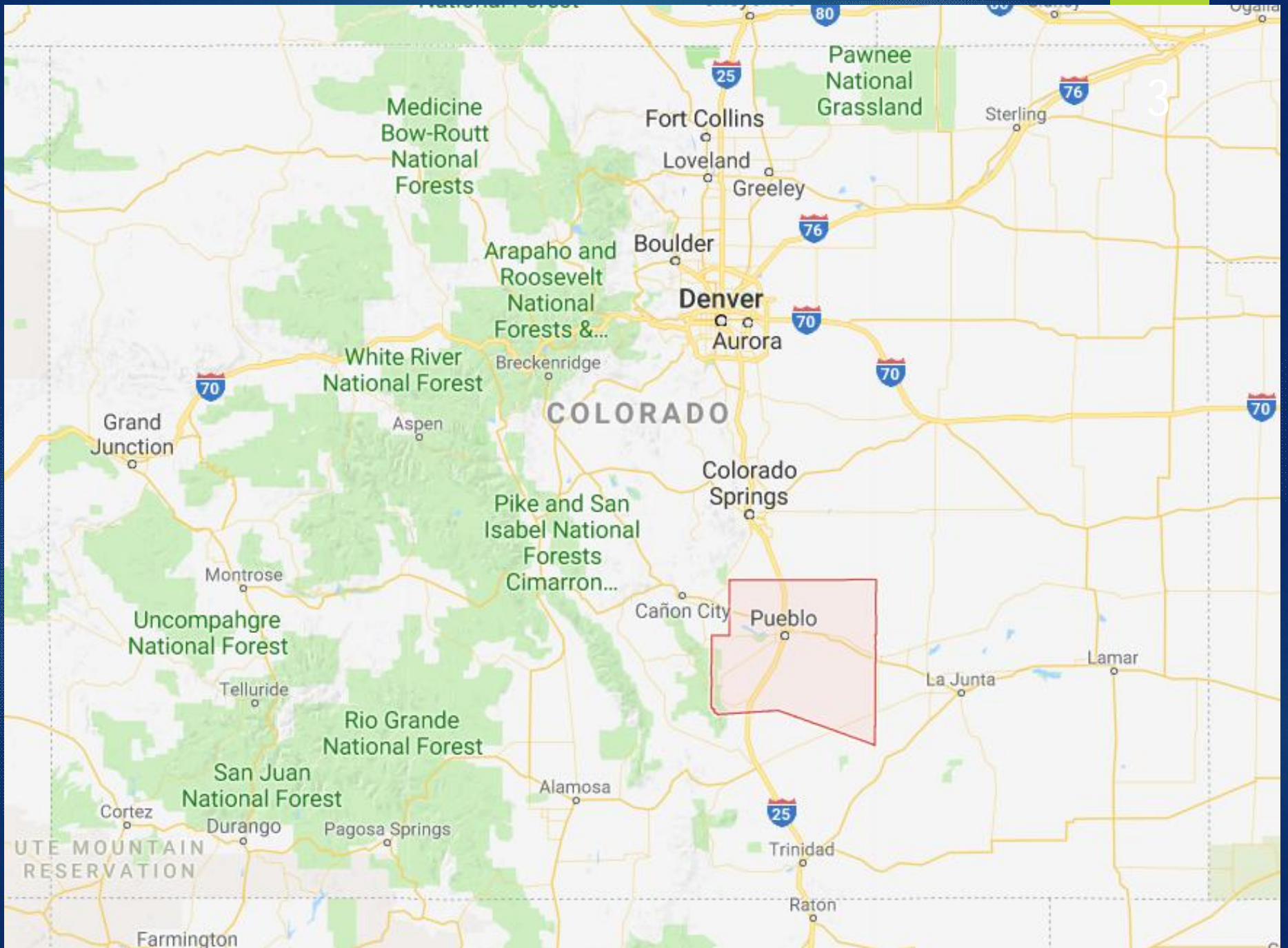
Mary Lupa, WSP
Matt Stratton, WSP
Carlee Clymer, WSP
Maureen Paz de Araujo, Wilson & Co.



Outline of the Presentation

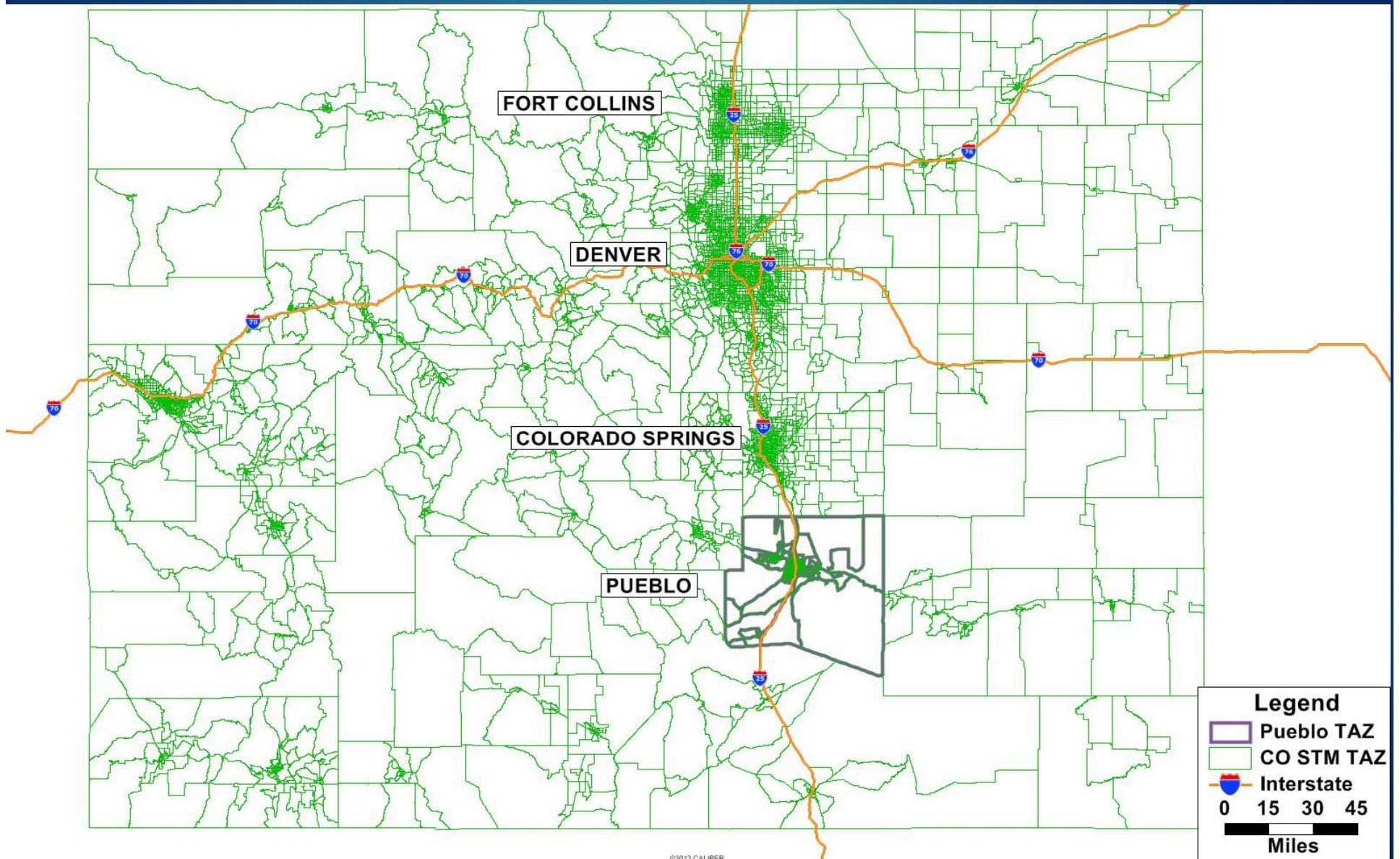
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- u A look at Pueblo
- u Four-step model framework.
- u TAZ and highway network
- u Forecasting the socioeconomic data.
- u Straightforward “dashboard” type model with quick learning curve.
- u Model work completed in one year including model development, future year scenario, methodology and user guide.
- u Framework for the integration of emerging Colorado statewide model components to the PACOG model.



Front Range of Colorado

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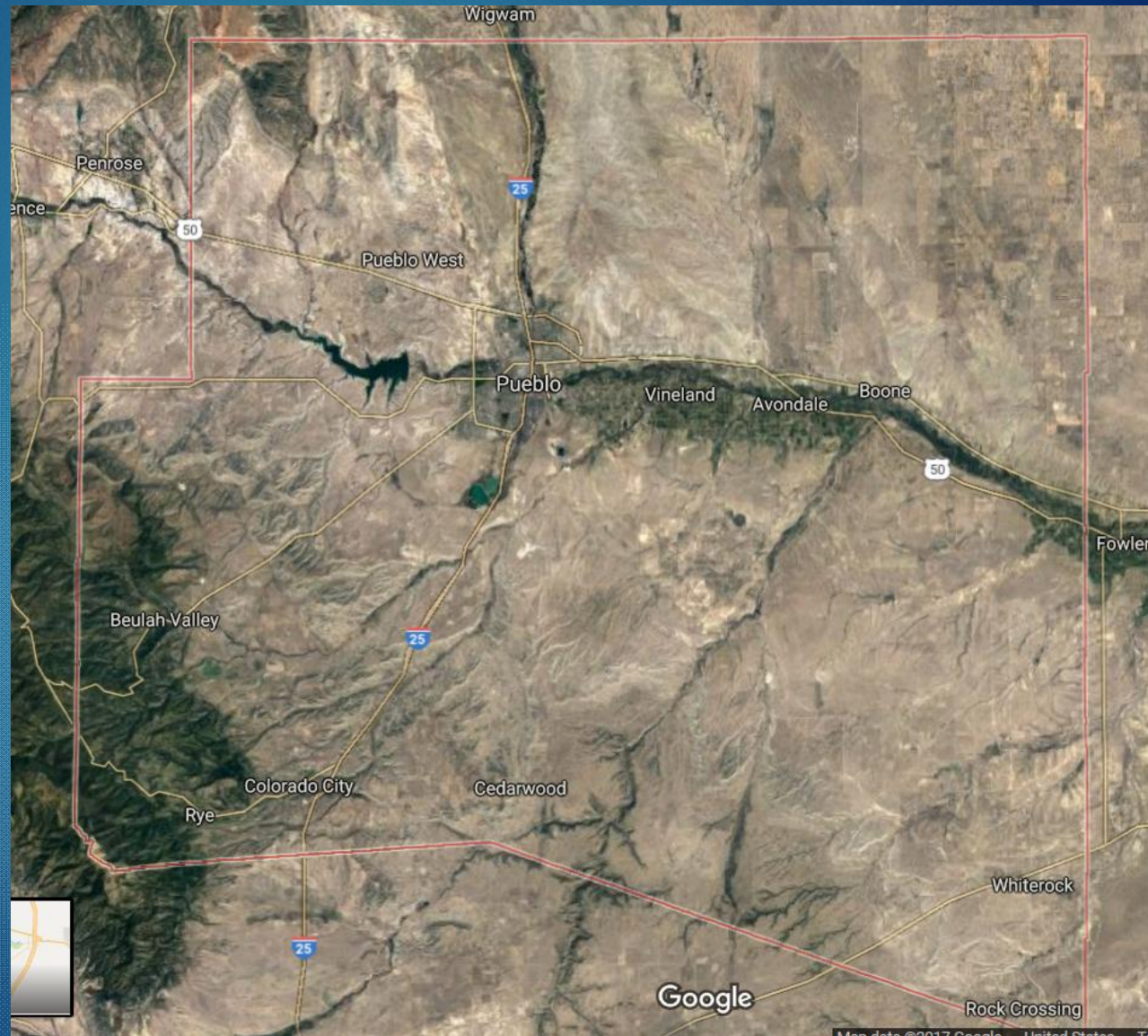


Map of Pueblo Colorado (Terrain)

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Altitude:
4,692 feet

Arkansas River
(W to E) runs
through Pueblo



Overview of PACOG Region

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- u Population of 165,000 persons in 2016.
- u The MPO is Pueblo Area Council of Governments (PACOG)
- u The MPO extent is 2,400 square miles – all of Pueblo County

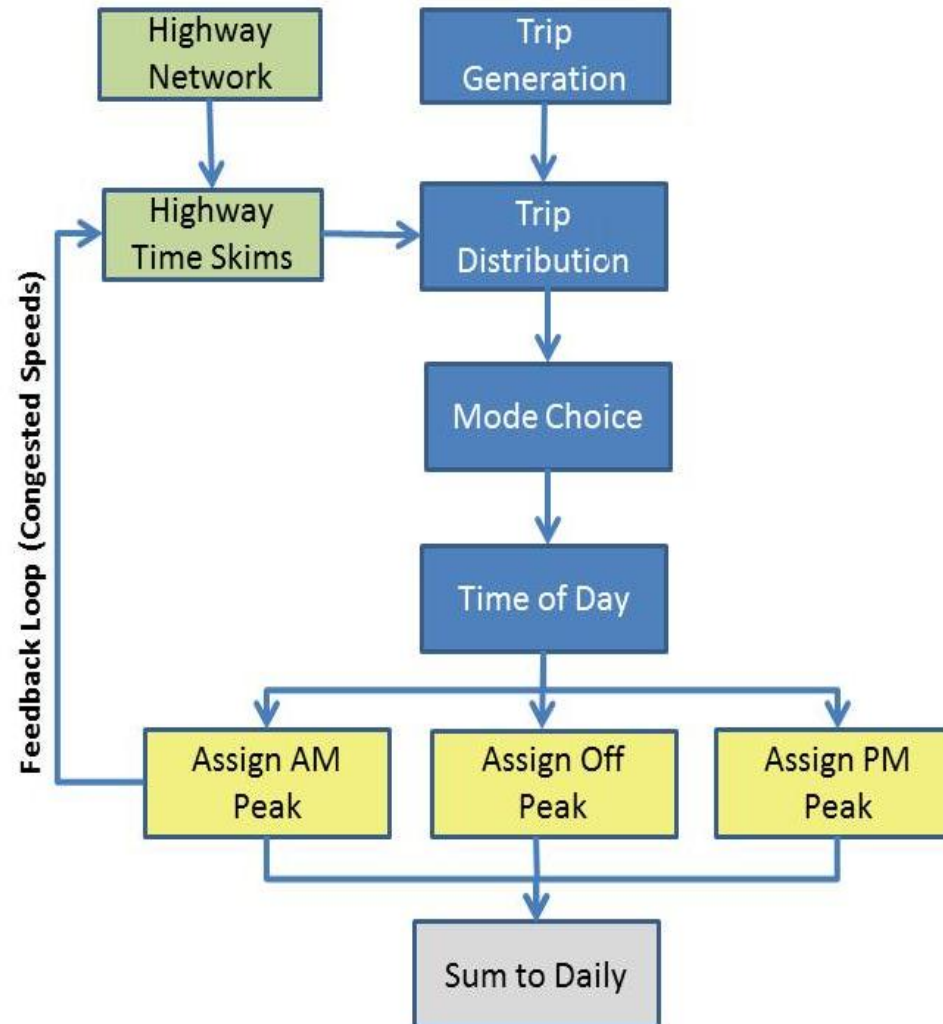
Pueblo Colorado PACOG Model

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- u 214 TAZ
- u Used the Front Range Household Survey 2010
- u Trip Generation – cross classified Household size (5 categories by income (4 categories).
- u Trip Distribution – gravity model using congested time for eight purposes: H-W, H-Shop, H-Other, NHB-O, NHB-W, H-Elementary /Middle School, H-High School, H-College University.
- u Mode Choice – auto-driven, no transit network or skims. Uses auto occupancy from the HHTS.
- u Assignment – standard equilibrium assignment with BPR function based on time - 100 global iteration maximum and a global convergence criteria of .001 on link segment time.

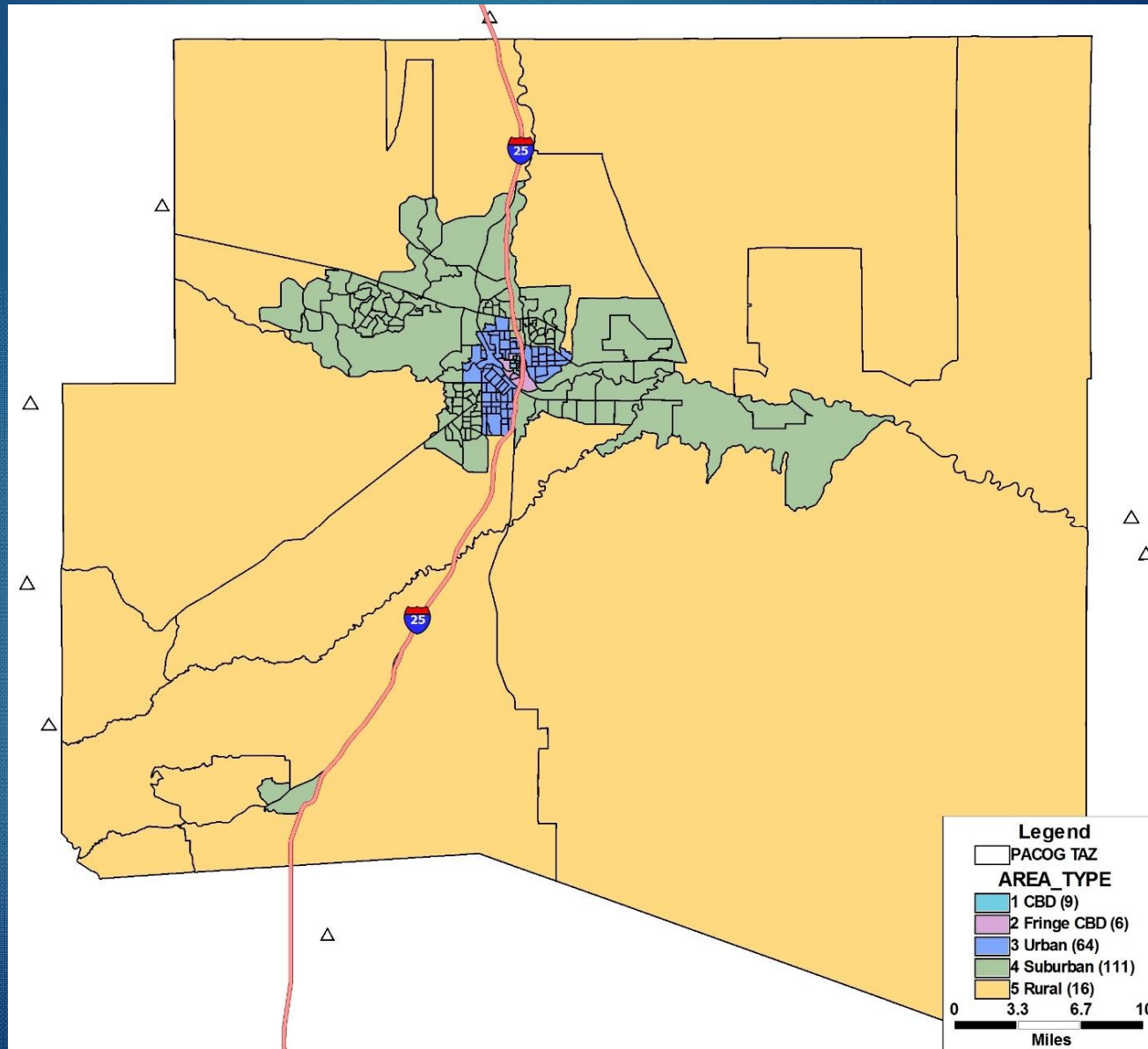
Four-step model framework.

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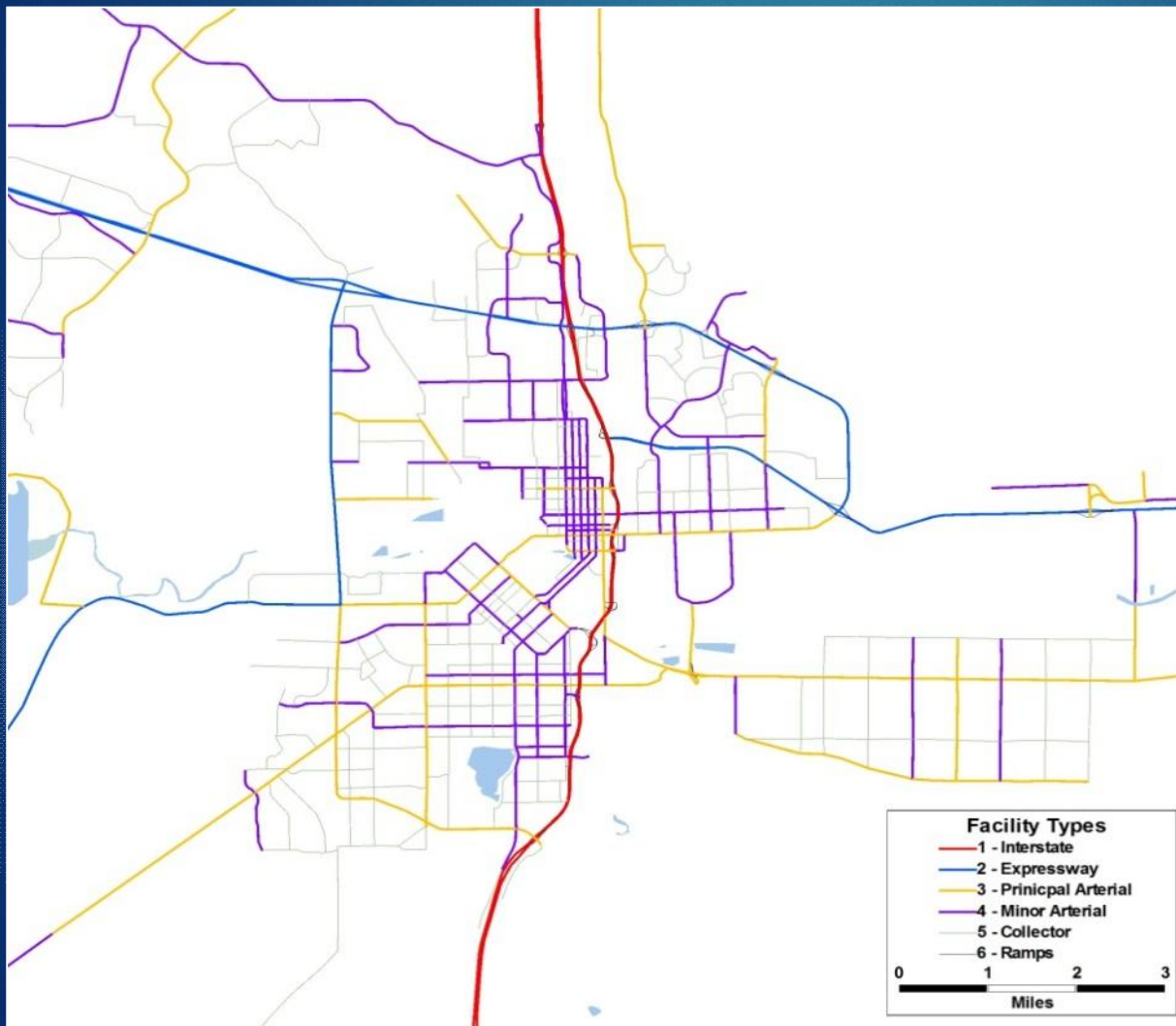
Map of Pueblo Colorado (TAZ)

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Highway Network

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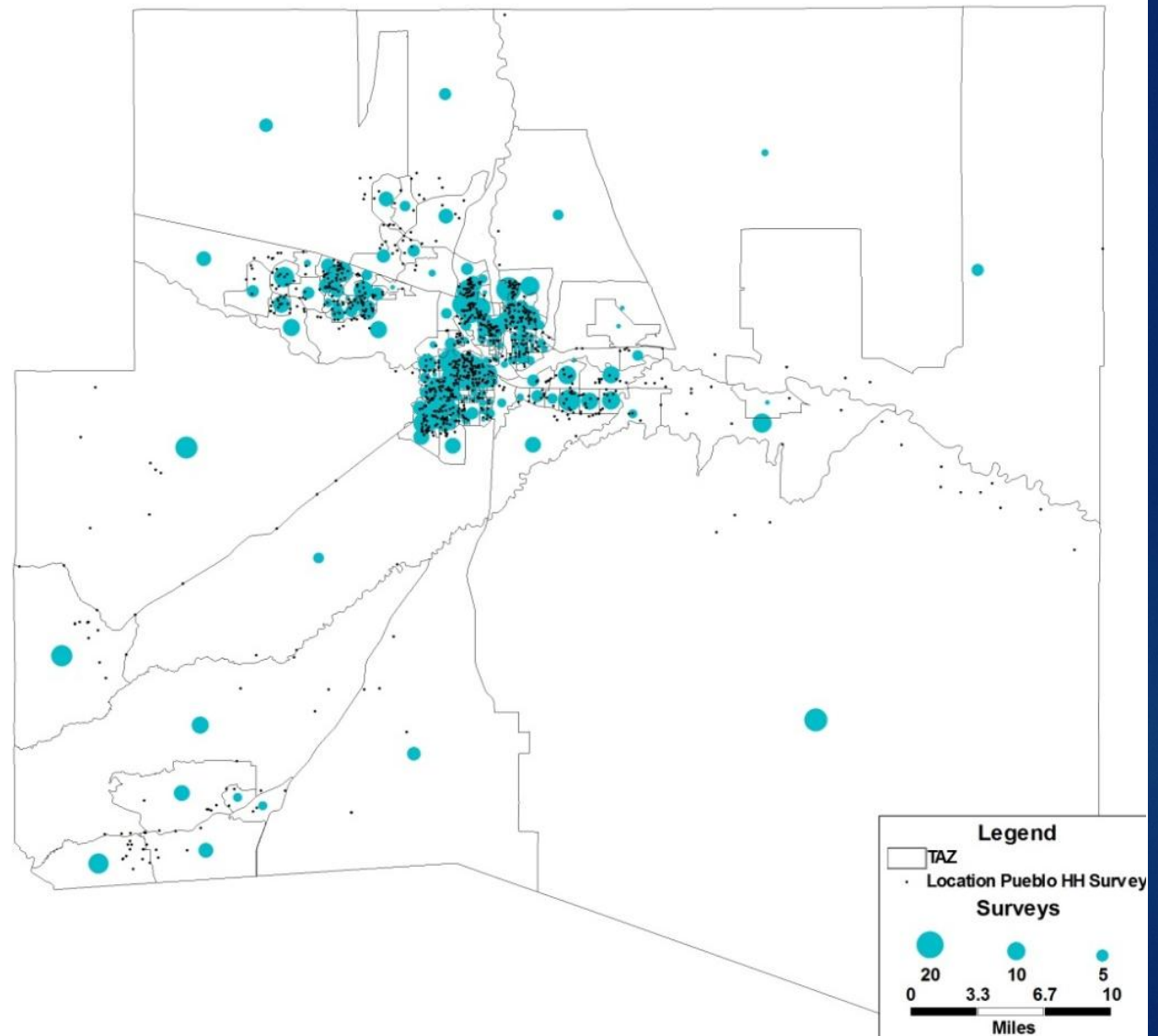


- u Six functional classifications + centroid connectors
- u Attributes include FC, area type, # of lanes, posted speed, congested speed, capacity, AADT

Front Range household survey

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- u Collected in 2010
- u 989 households collected
- u Used to prepare cross classification trip generation rates for by size and income
- u Used to calibrate trip distribution



Forecasting the SE data

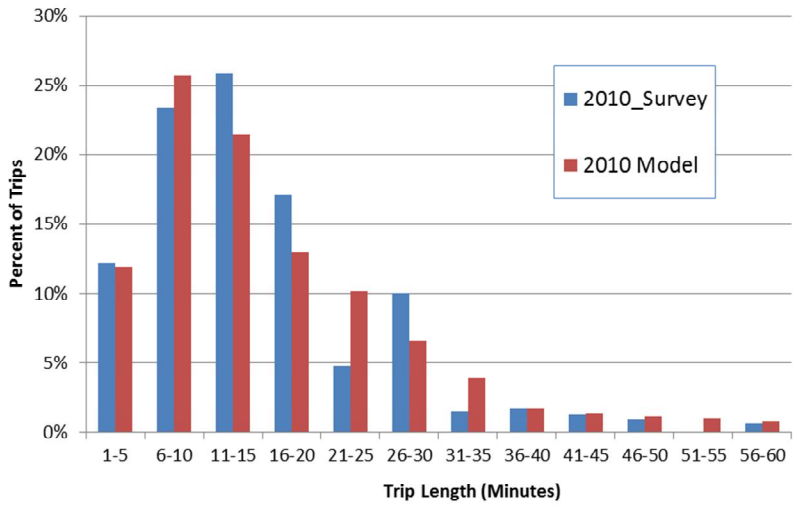
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PACOG provided significant assistance

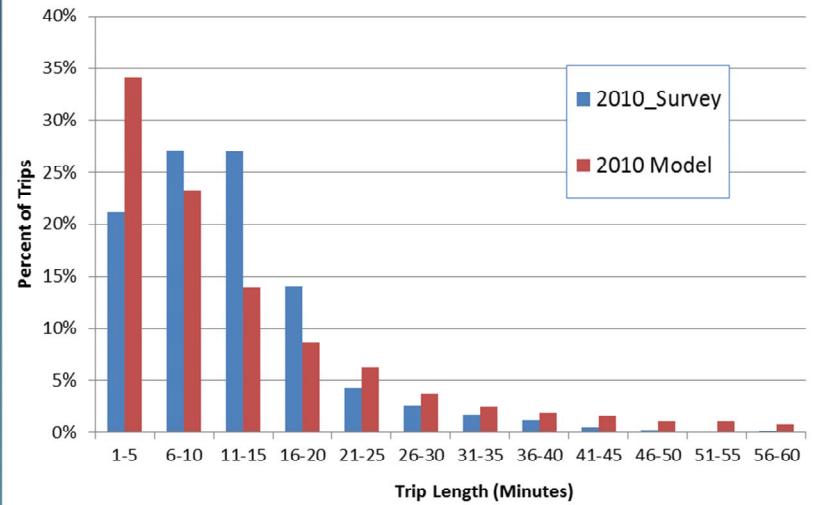
- u Prepared the ACS (U.S. Census) conversion to PACOG TAZ system for 2010
- u Obtained and cleaned the employment data - Colorado 2010 Quarterly Census of Employment & Wages (QCEW) and used this point data to establish 2010 employment at the zonal level in the study area.
- u Conducted all the forecast work including getting buy-in from regional leadership and citizen base.

Employment Category	NAICS Range
BASIC	<= 425120
RETAIL	441110 - 454390
SERVICE	481111 - 814110
GOVERNMENT	> 814110

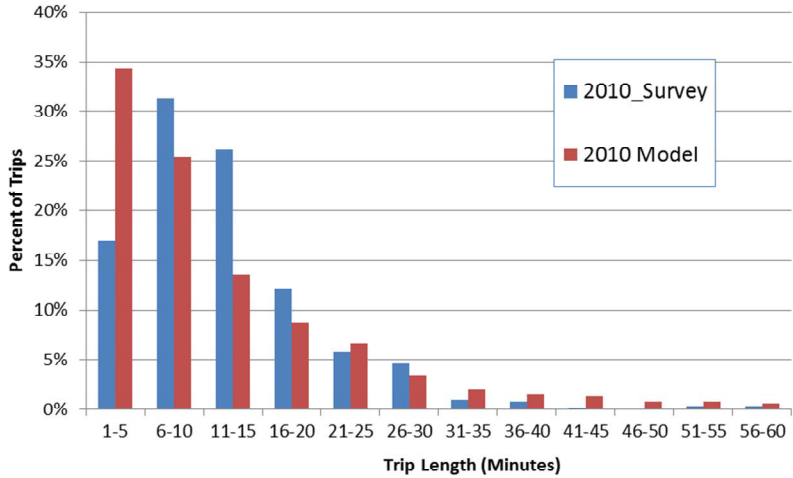
Home-Based Work



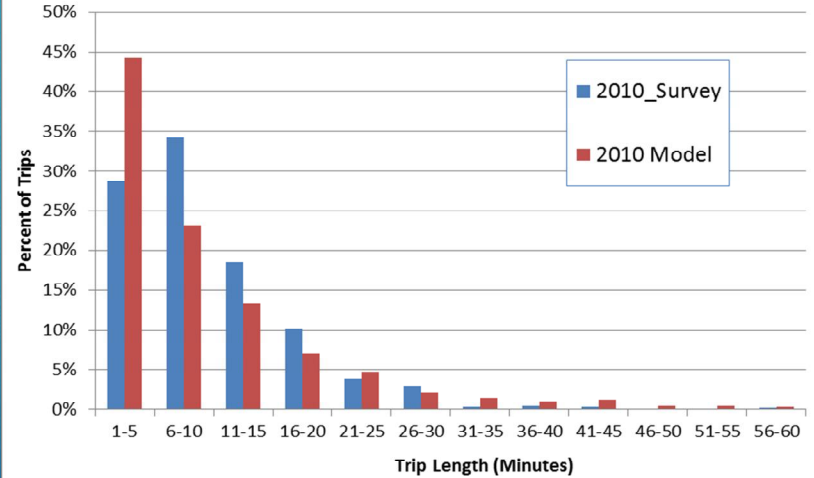
Home-Based Other



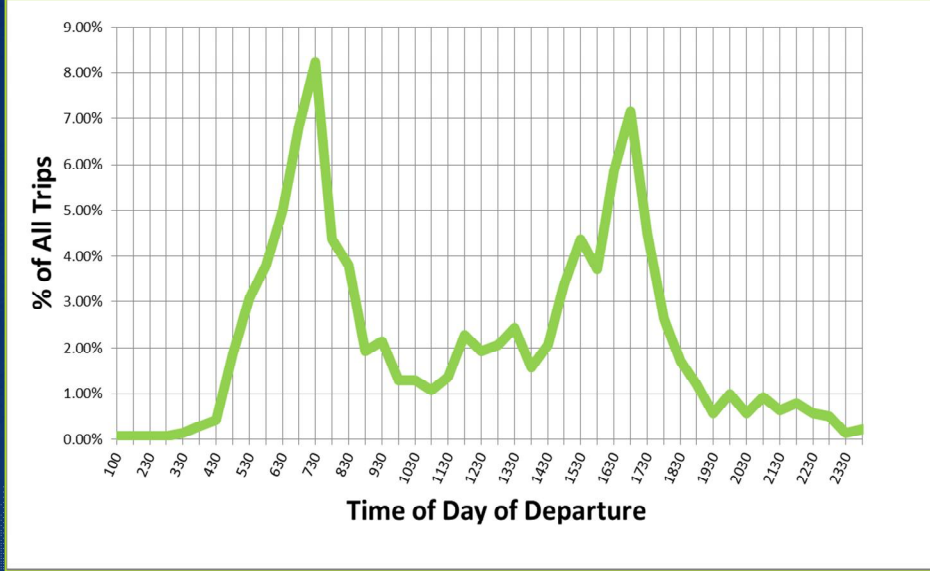
Home-Based Shop



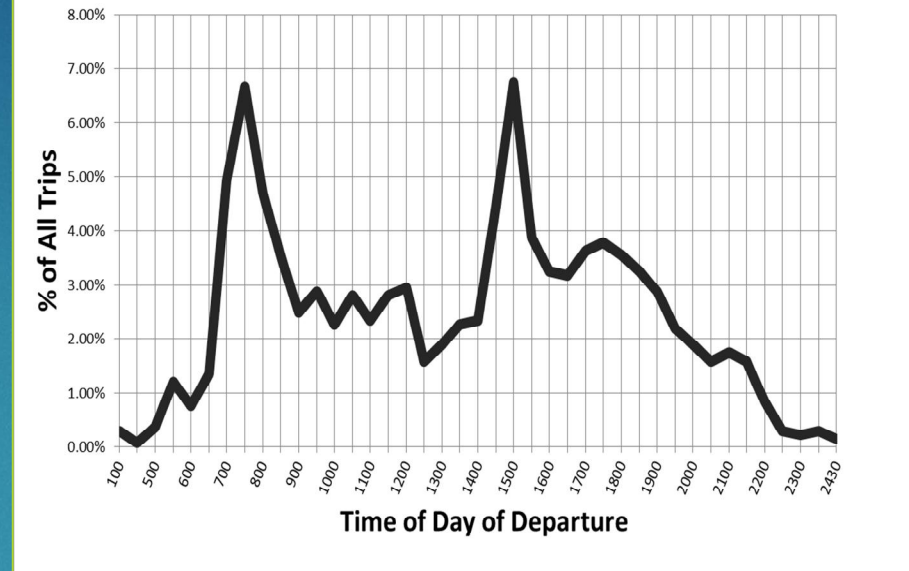
NHB-Other



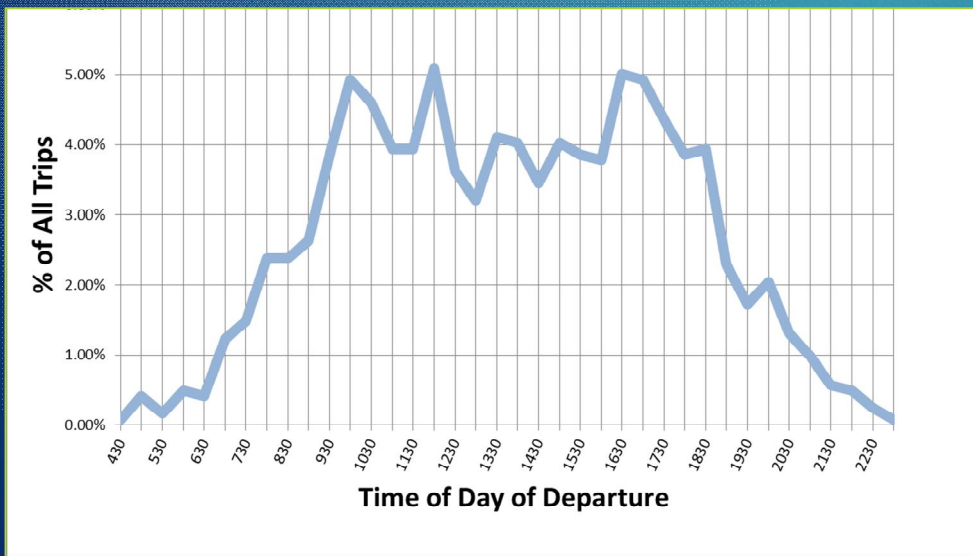
H-W



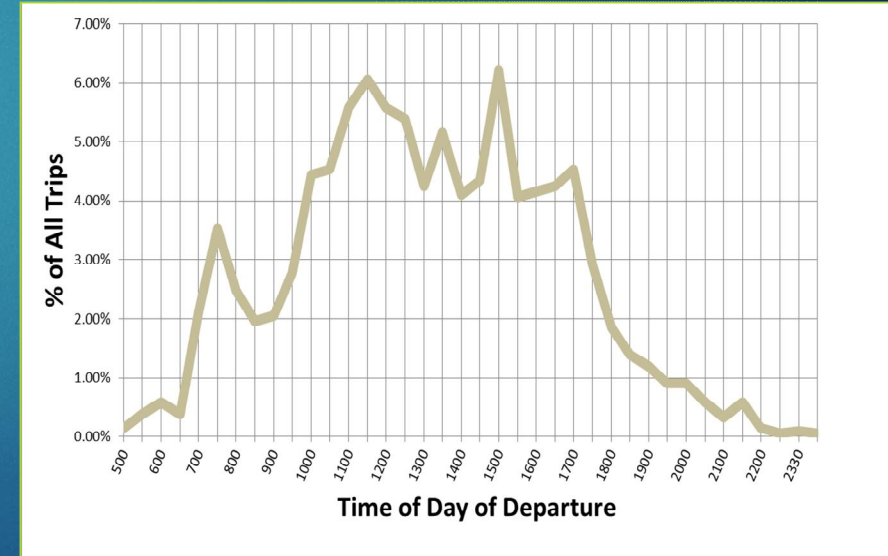
H-O



H-Shop



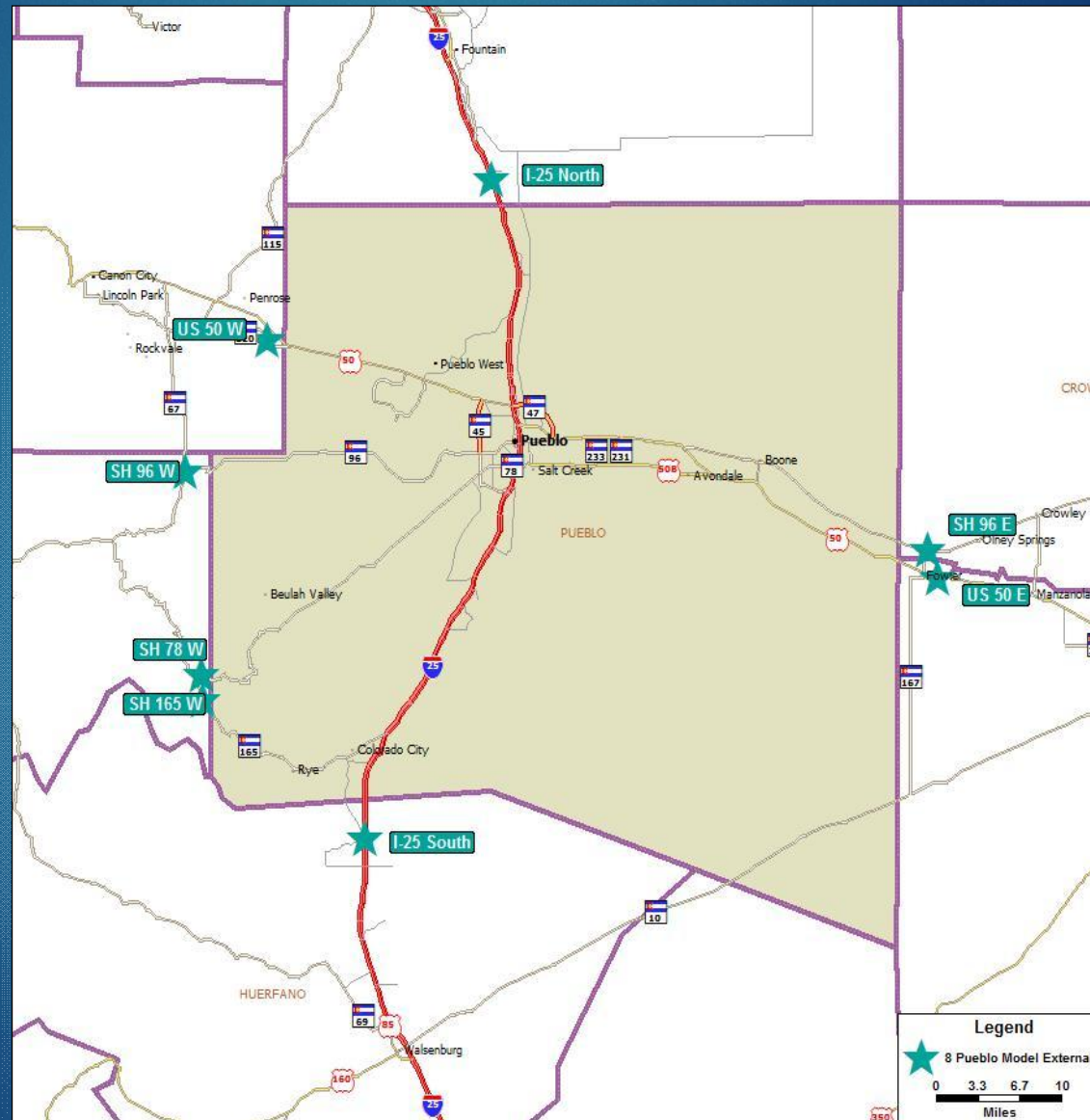
NHB



Approach to transit, trucks and time of day periods

- u Transit – used bus stops per TAZ as a surrogate for transit use; applied a .997 to .999 factor to person trips for TAZs with at least one bus stop.
- u Trucks – included in the trip generation and distribution step, unvalidated.
- u Three time periods: 1 hour AM, one hour PM, 22 hour off peak

Approach to externals



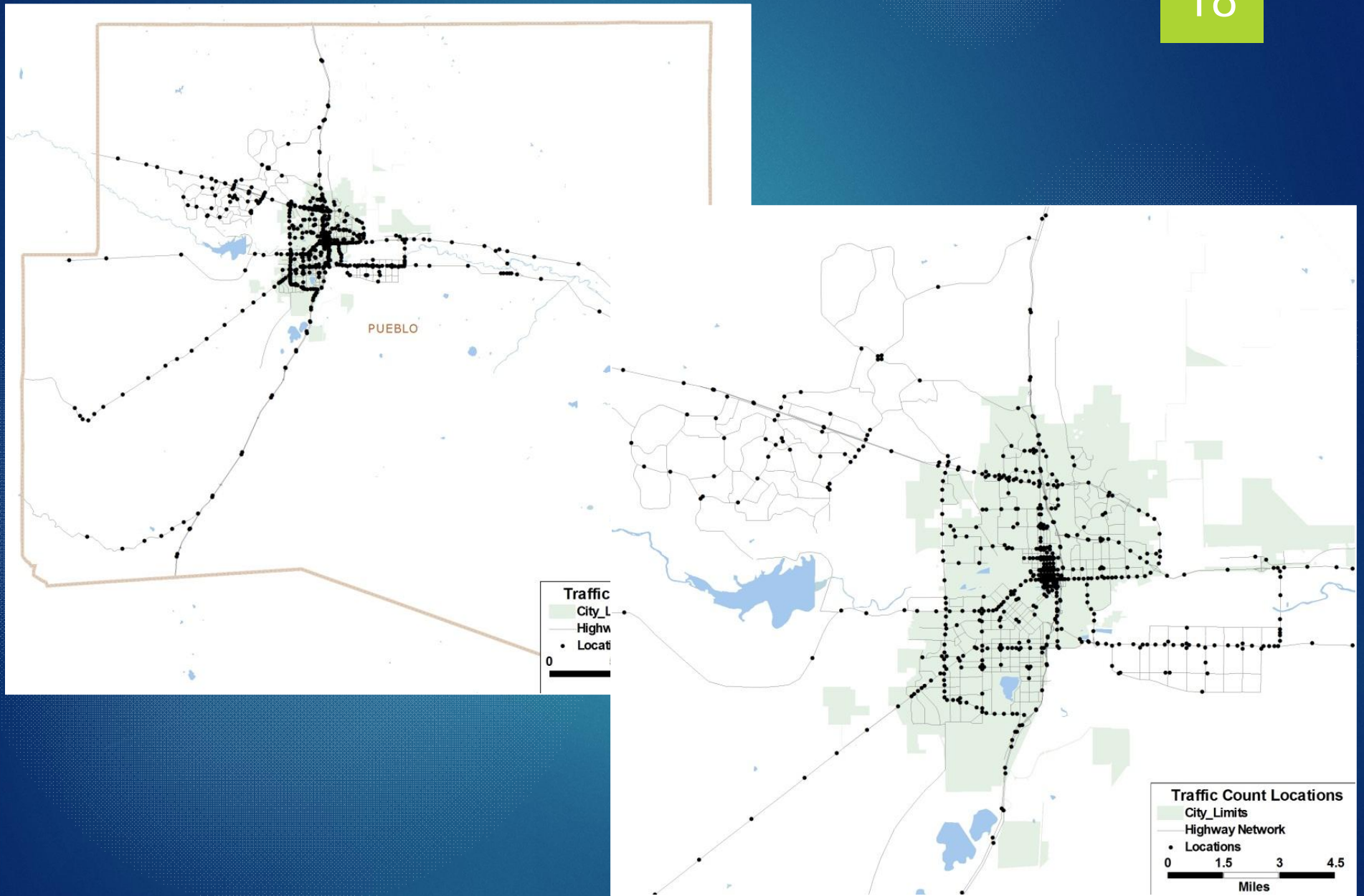
Software

- u Historically (1970s) the PACOG model was UTPS
- u By the 1980s it migrated to MinUTP
- u Converted to TransCAD by 2002 – with Fortran call for trip generation
- u Latest update inserted TransCAD module for trip generation.

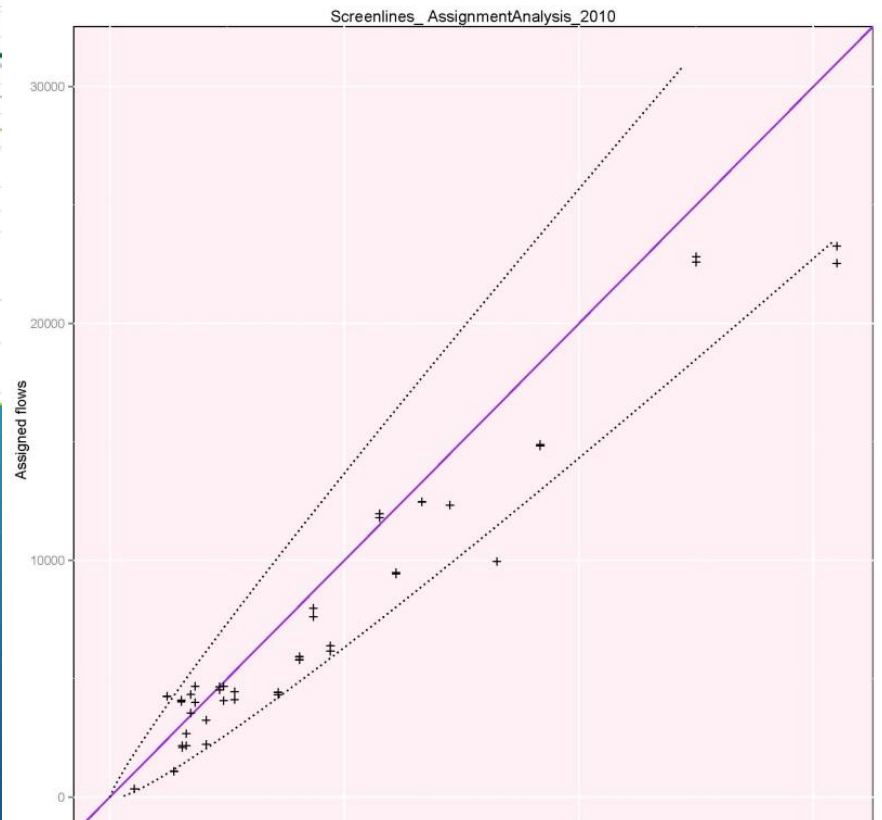
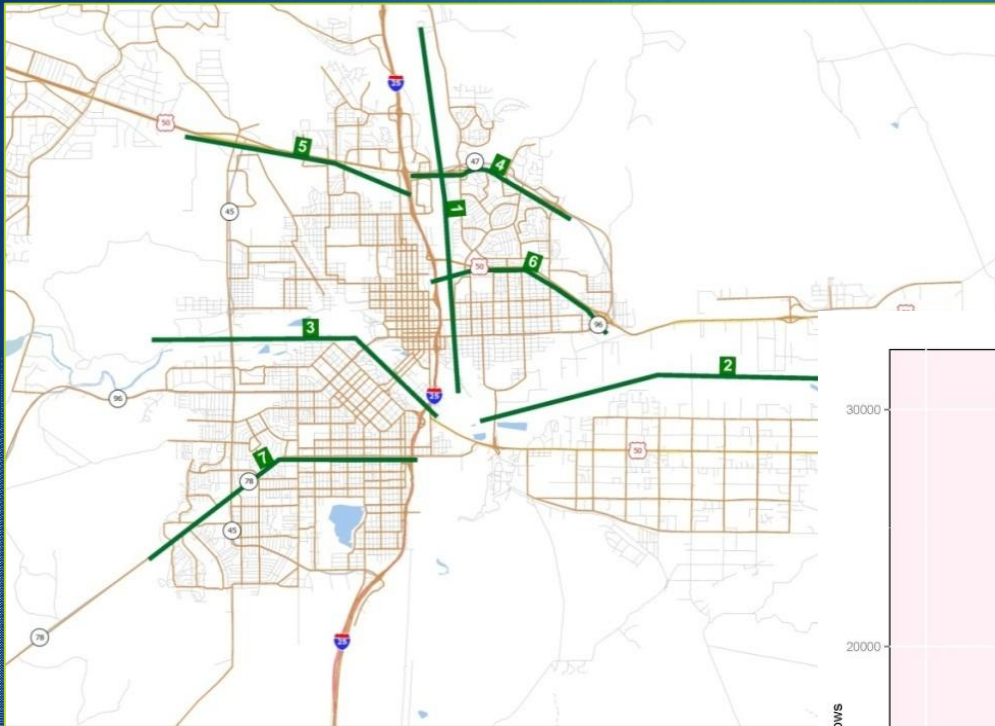
TransCAD Version 6.0 used

Validation used AADT

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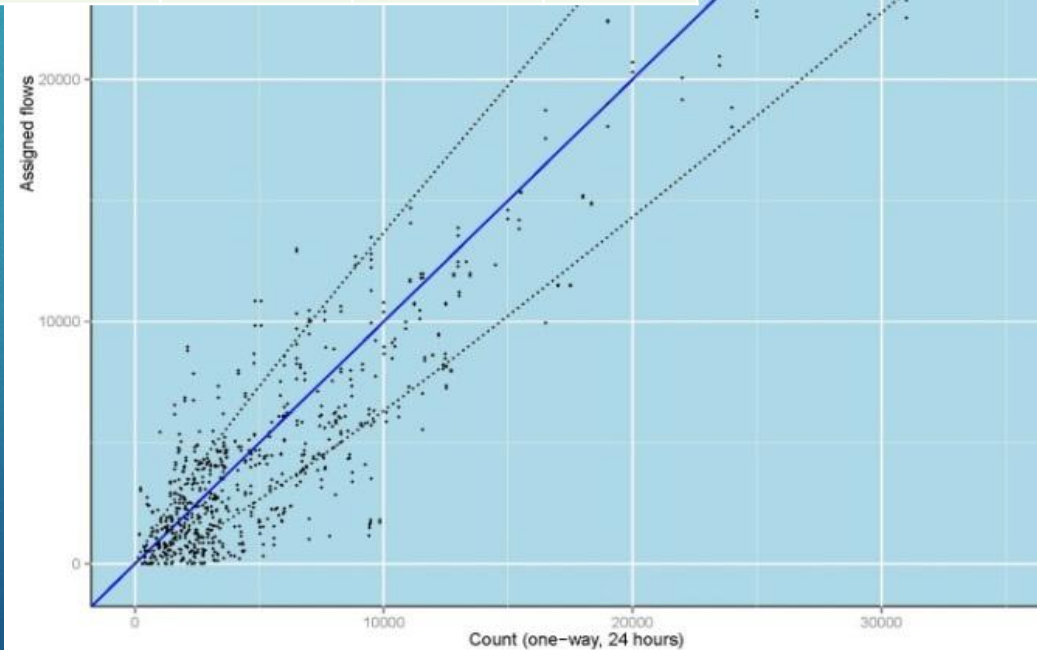
Screenline with validation



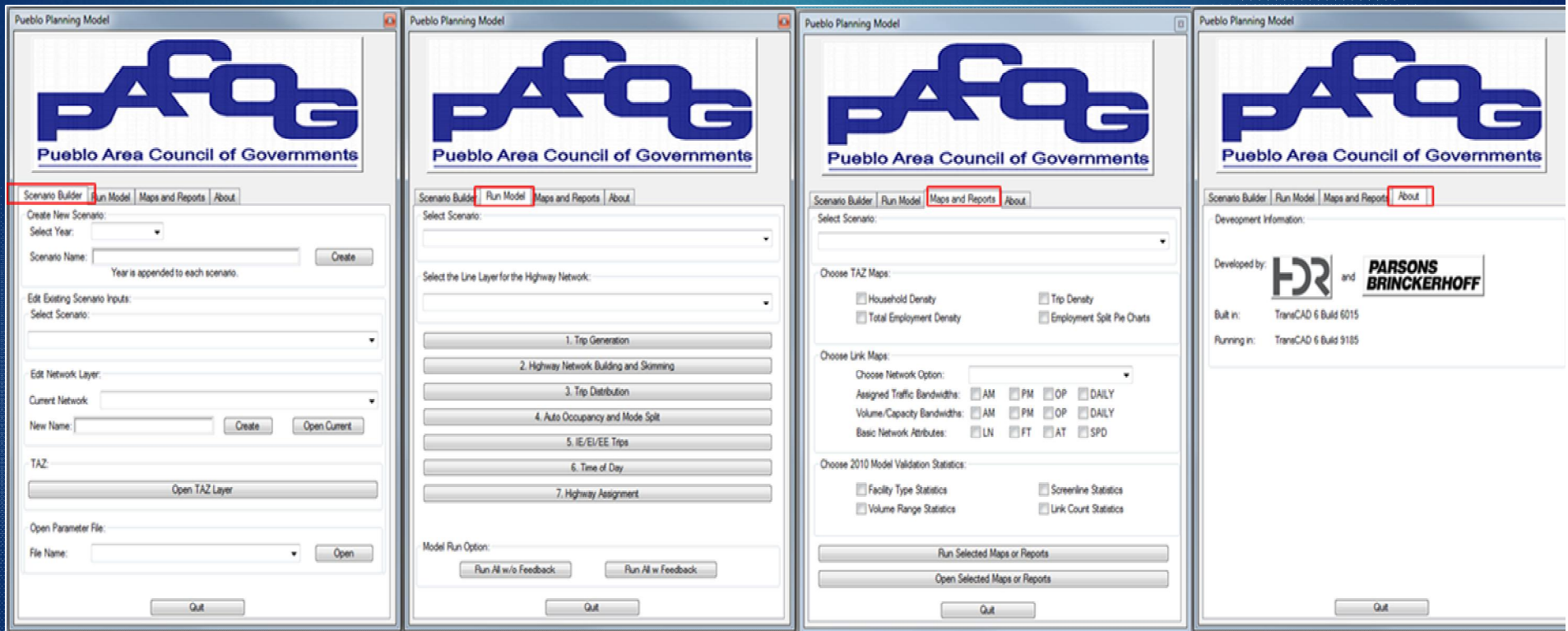
All highway links with validation

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Volume Range (Two-Way)	Volume Range ID	Number of Observations	VMT Comparison				% Root Mean Square Error
			Observed VMT	Model VMT	Difference	% Difference	
Less than 5,000	1	173	195,486	220,050	24,564	12.6%	127
5,000-10,000	2	118	262,499	266,895	4,396	1.7%	125
10,000-20,000	3	94	508,338	490,152	(18,186)	-3.6%	29
20,000-30,000	4	35	202,893	180,735	(22,158)	-10.9%	16
30,000-40,000	5	11	76,959	58,453	(18,506)	-24.0%	27
40,000-50,000	6	4	32,015	28,774	(3,241)	-10.1%	13
Total	Total	435	1,278,190	1,245,059	(33,131)	-2.6%	64



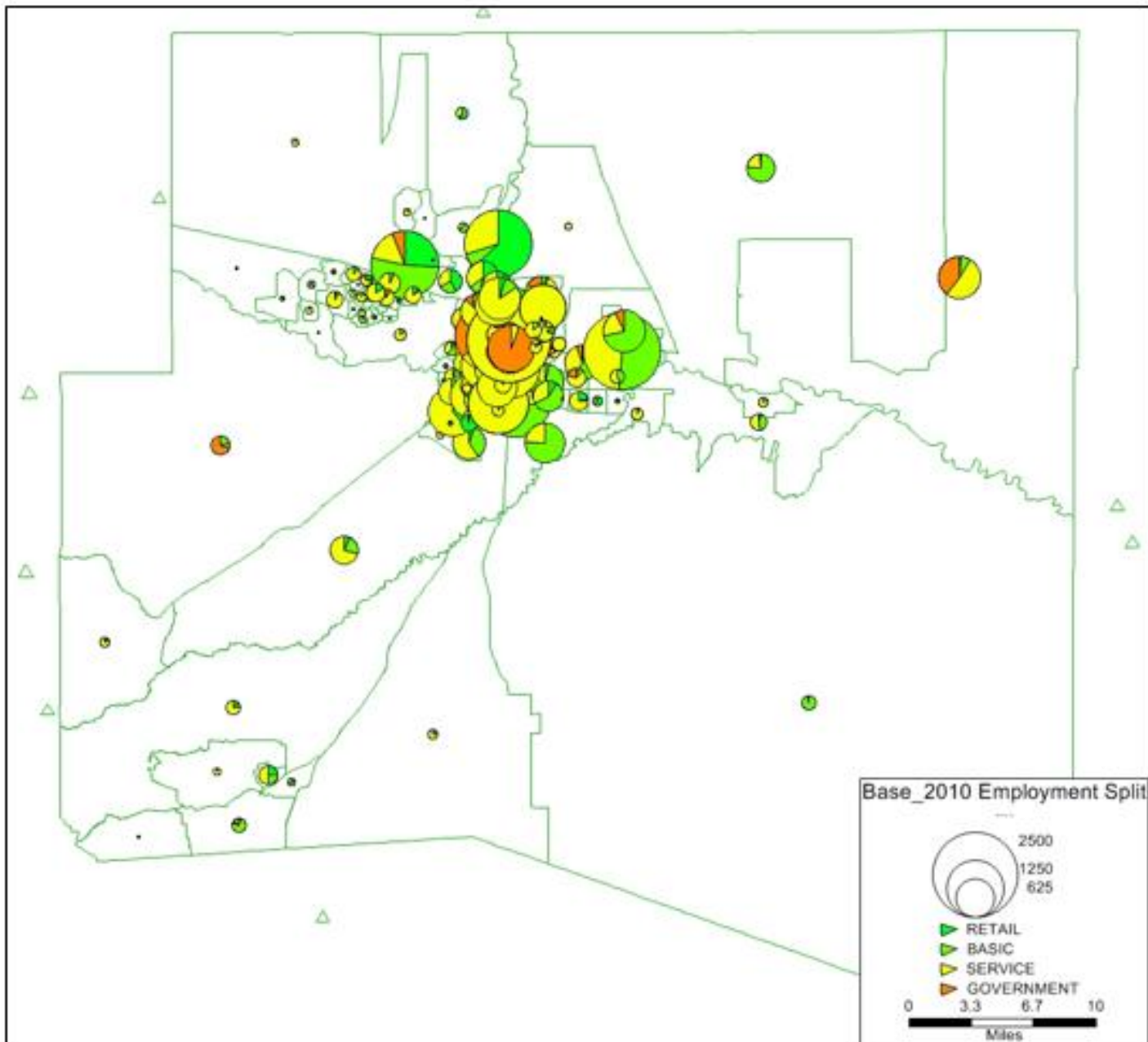
Straightforward “dashboard” type model with quick learning curve



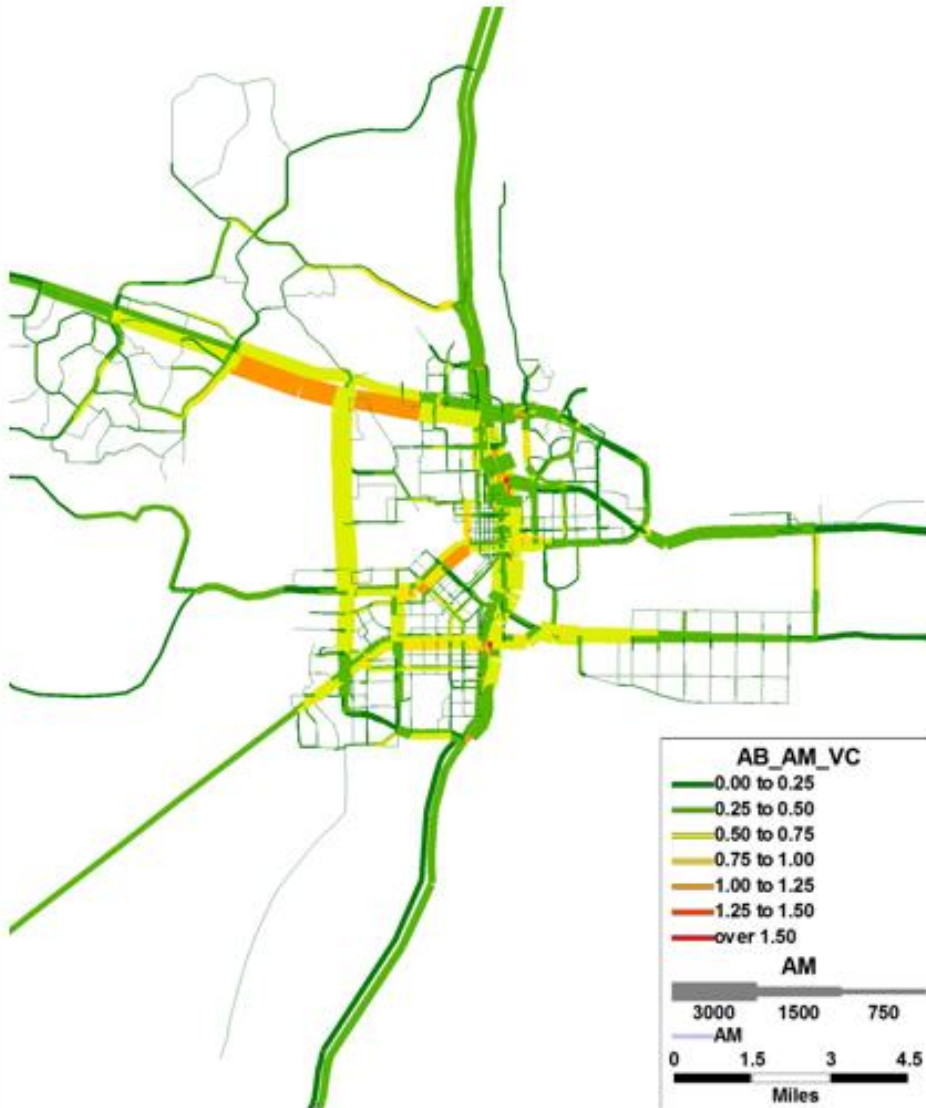
GUI with 4 tabs, scenario builder, model step breakout, ability to look at SE data, & parameter settings

Maps and reports feature – generate and save

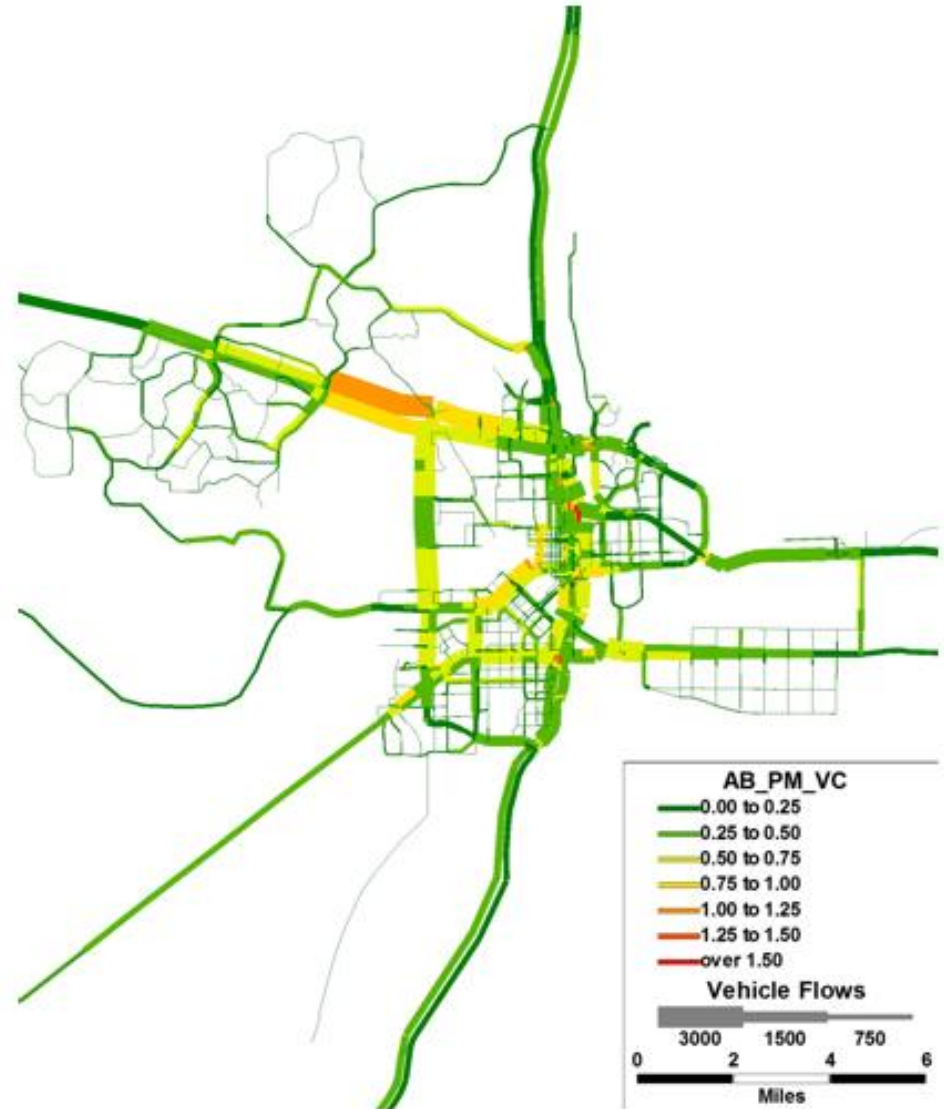
Figure 43: Employment Split Pie Charts



AM (City View)



PM (City View)



Model needed for Long Range Planning

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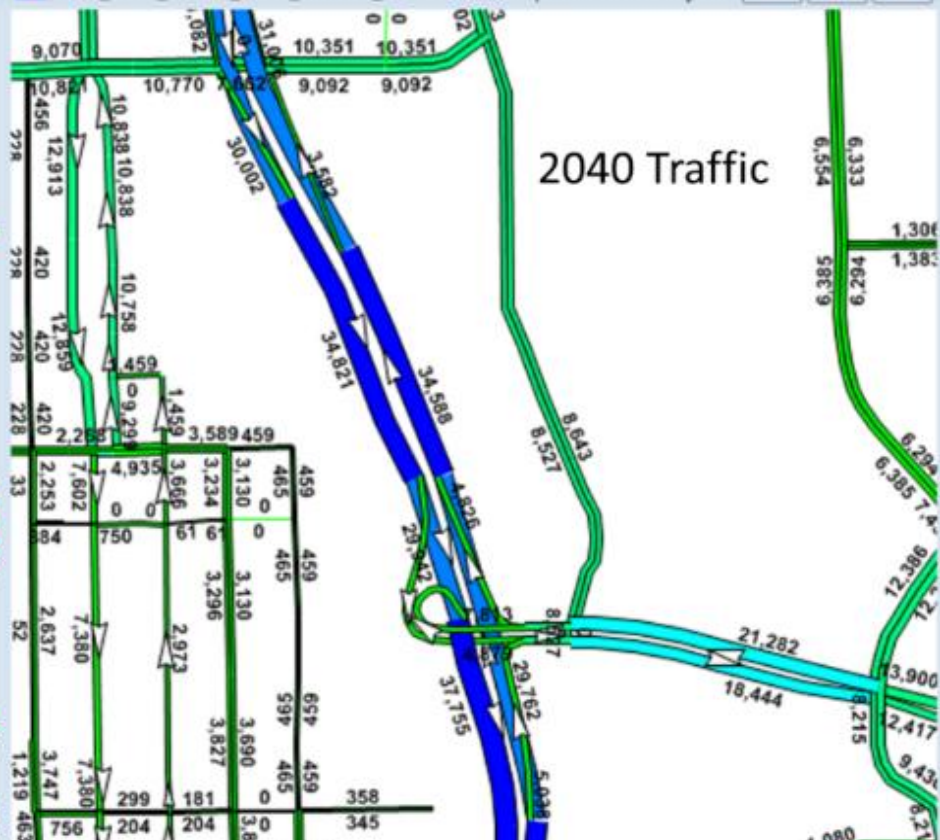
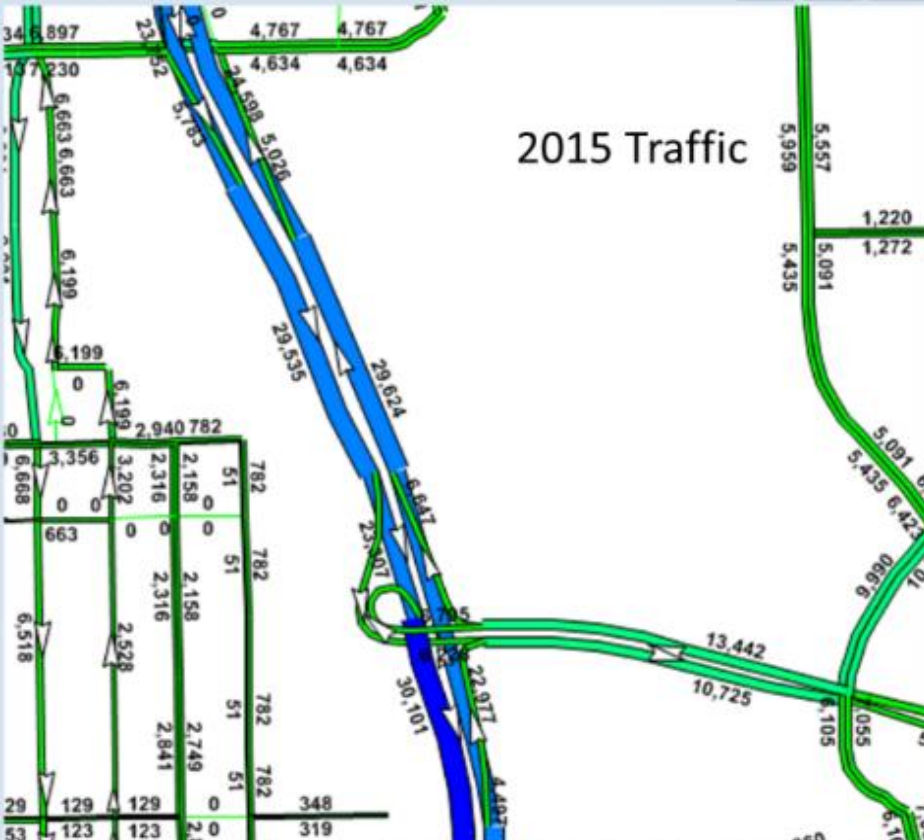


2015_map_daily.map - LoadedDailyNetwork_2015_NoCCs

Plan_2040_DAILY_Flow_NoCCs_Bandwidth.map - LoadedDailyN...

2015 Traffic

2040 Traffic



Plan_2015_DAILY_Flow_NoCCs

Plan_2040_DAILY_Flow_NoCCs

- █ 7500.00 and below
- █ 7500.00 to 15000.00
- █ 15000.00 to 22500.00
- █ 22500.00 to 30000.00
- █ 30000.00 and above

- █ 8000.00 and below
- █ 8000.00 to 16000.00
- █ 16000.00 to 24000.00
- █ 24000.00 to 32000.00
- █ 32000.00 and above



Miles

Miles

Timeline of model development 26

Kickoff

April 2014

- *HH survey ready*
- *previous model at hand*
- *work plan in place for team*

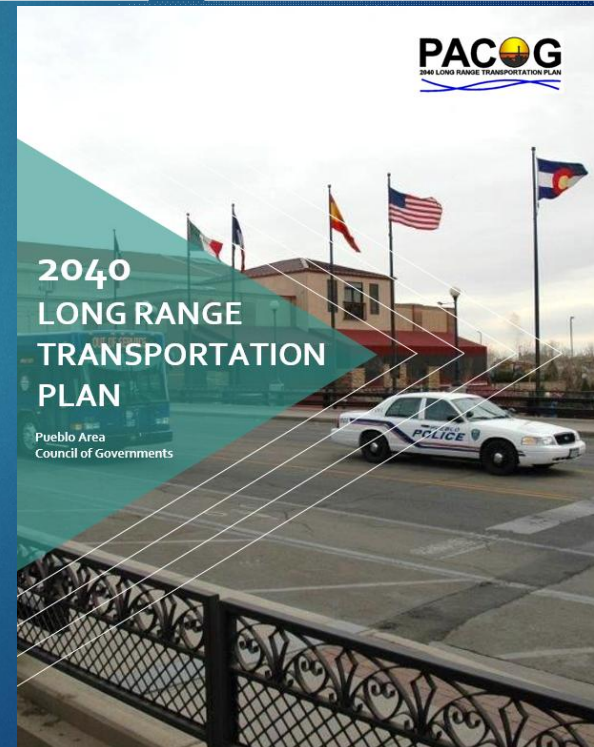
Problem Solving

August 2014

- *network capacity calculation*
- *employment data cleaning*
- *traffic count collection & prep*

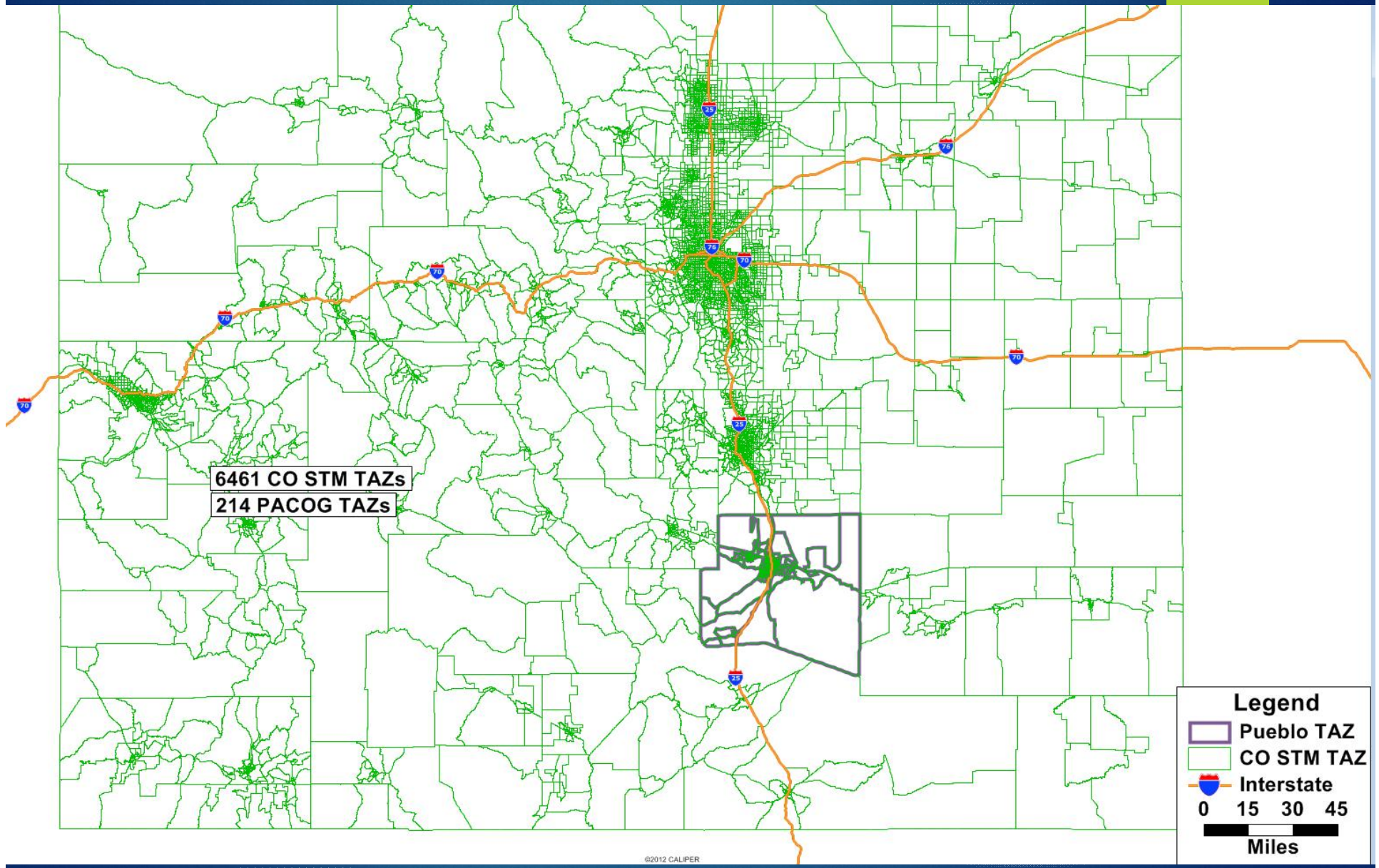
2010 validation and 2040 NB complete April 2015

LRP drafted Summer 2015, completed December 2015



Pueblo < --- > Colorado STM

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Summary

- u “Right-sized” models are of high value to small and medium sized MPOs.
- u Add detail where the MPO needs it: TAZ resolution, excellent SAF and employment data cleaning, good network assignment visuals.
- u Budget and schedule are manageable.
- u Staying with a standard four-step model structure provides ease in set-up and completion
 - Well-studied components.
 - National targets for guidance