EL Dorado County
Travel Demand Model Overview

Michael Schmitt, AICP CTP, PTP

March 25, 2013

Agenda

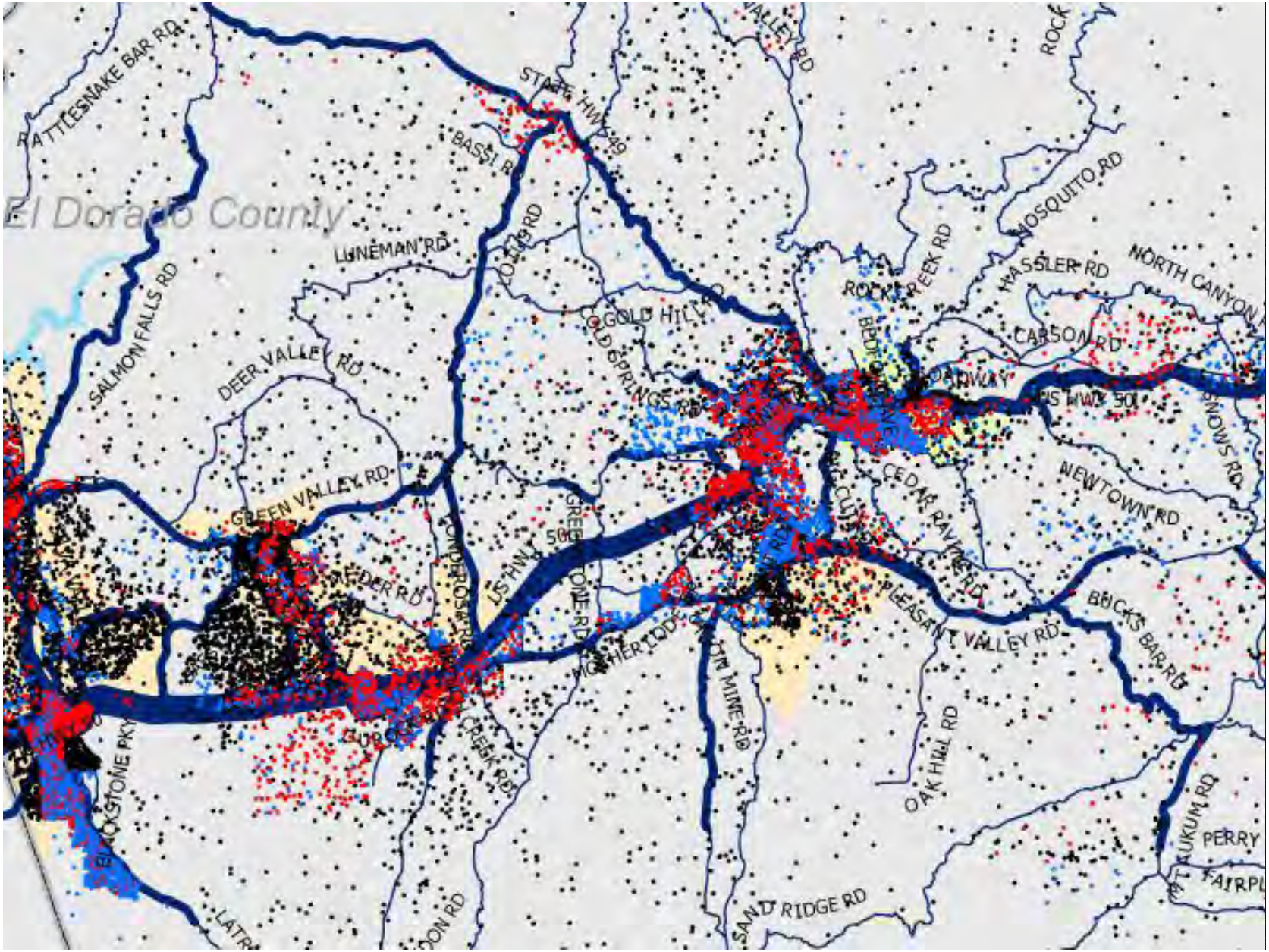
- Why, what, how?
- EDC model overview
- Land use forecast
- 5Ds
- Model calibration/validation

Why update the EDC model?

- Latest model version developed in 1998
- New software packages are available
- Planning horizon has changed
- Development patterns have changed
- Doesn’t maximize the use of GIS
- Concern about output

What is a travel demand model?

- Tool for understanding human behavior
- Forecasts trips onto transportation facilities
- Part of the planning process


El Dorado County
RATTLESNAKE BAR RD
STATE HWY 49
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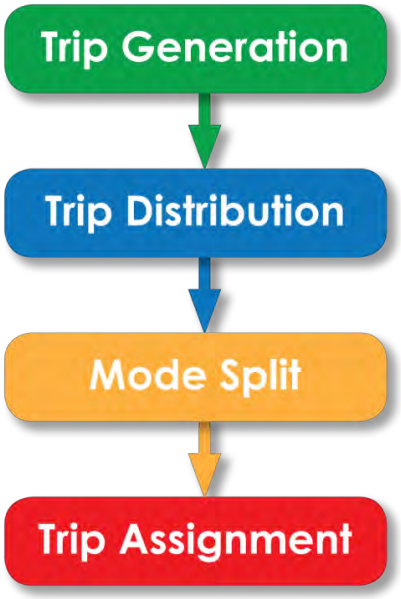
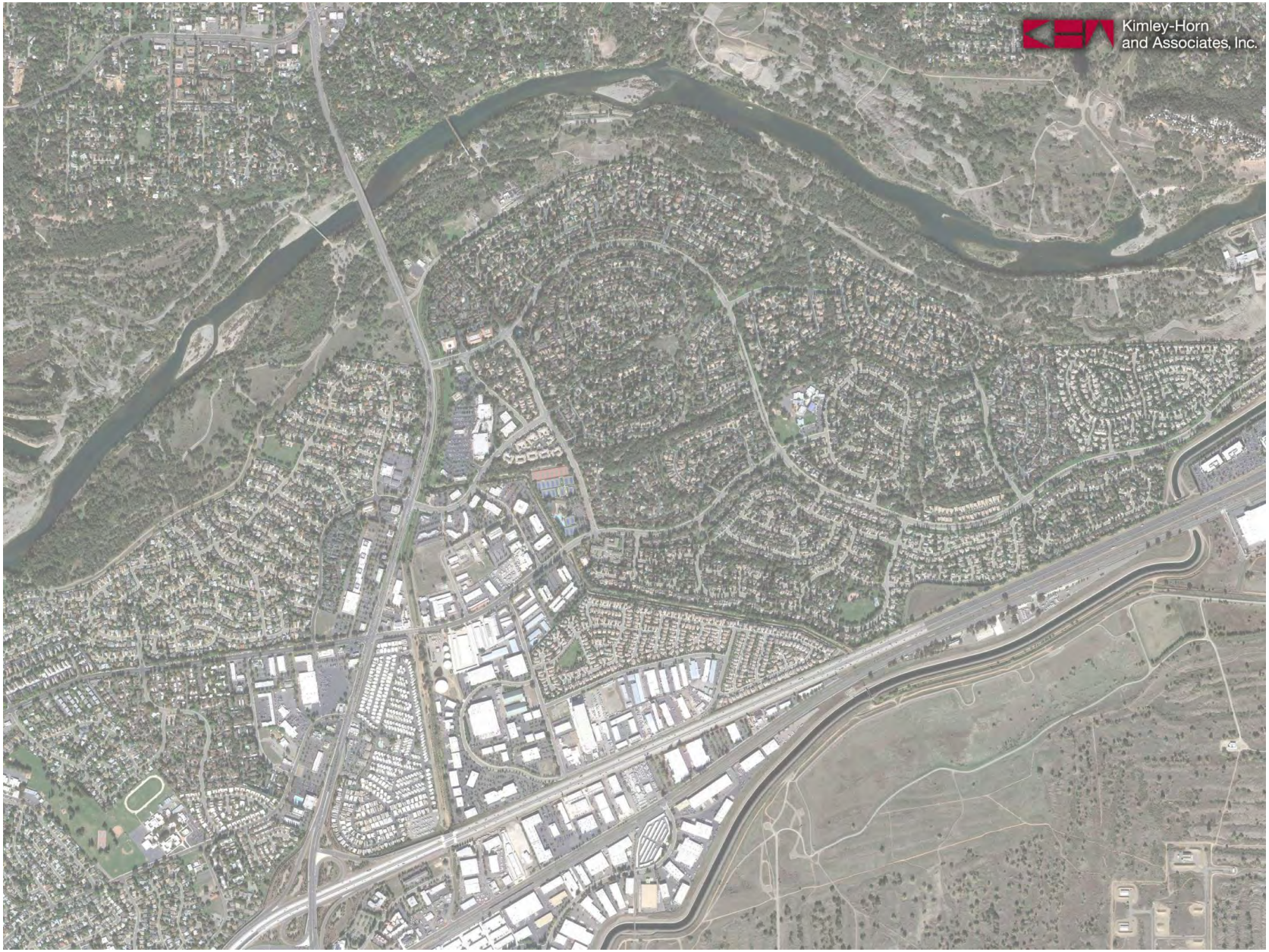
LUNEMAN RD
SALMON FALLS RD
DEER VALLEY RD
GOLD HILL RD
OLD SPRINGS RD
ROCK CREEK RD
MOSQUITO RD
HASSLER RD
NORTH CANYON
CARSON RD
US HWY 50
GREEN VALLEY RD
CEDAR RAVINE RD
NEWTOWN RD
PLEASANT VALLEY RD
BRICKS BAR RD
OAK HILL RD
SAND RIDGE RD
PERRY

“Four Step” Model

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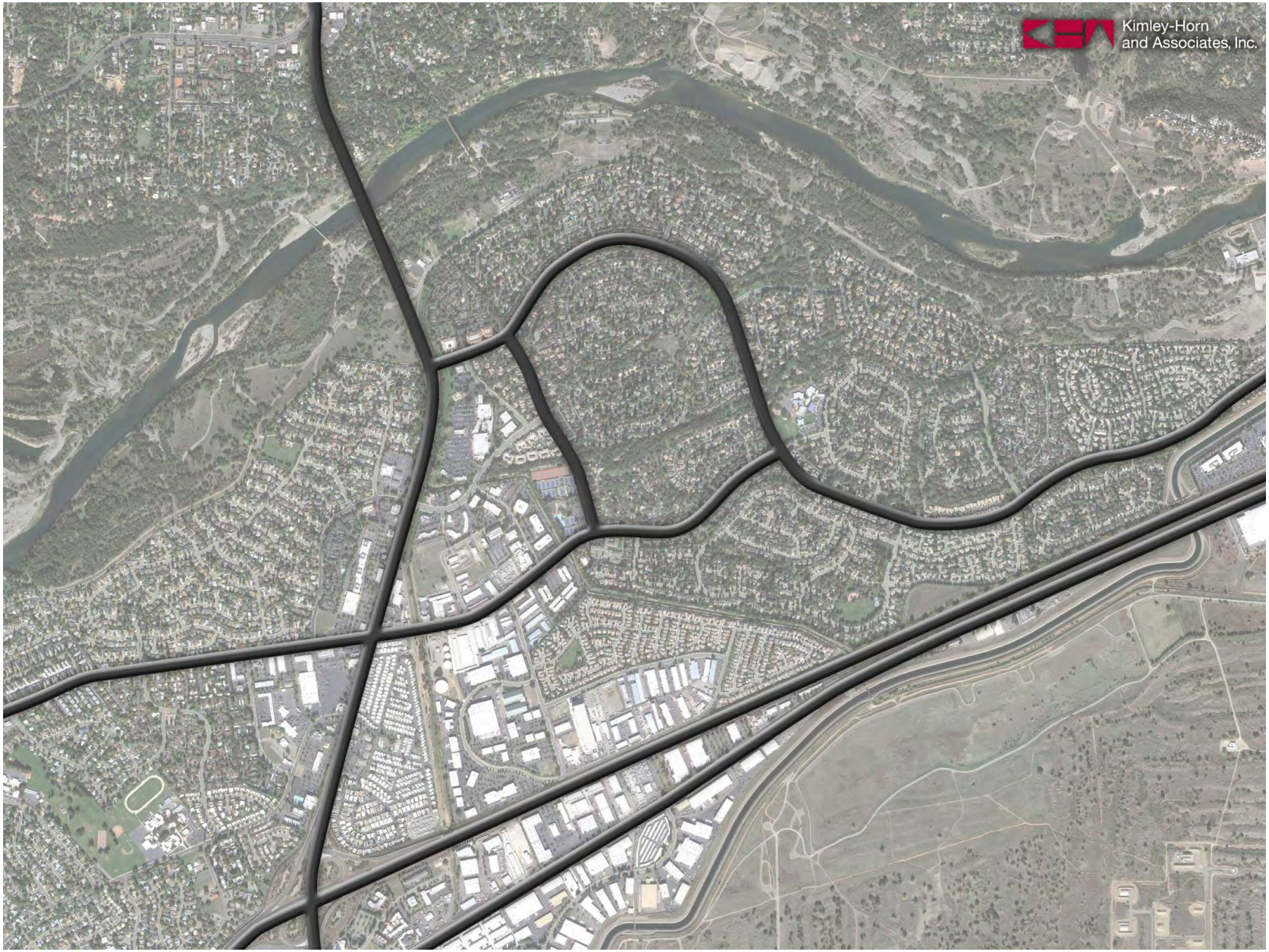
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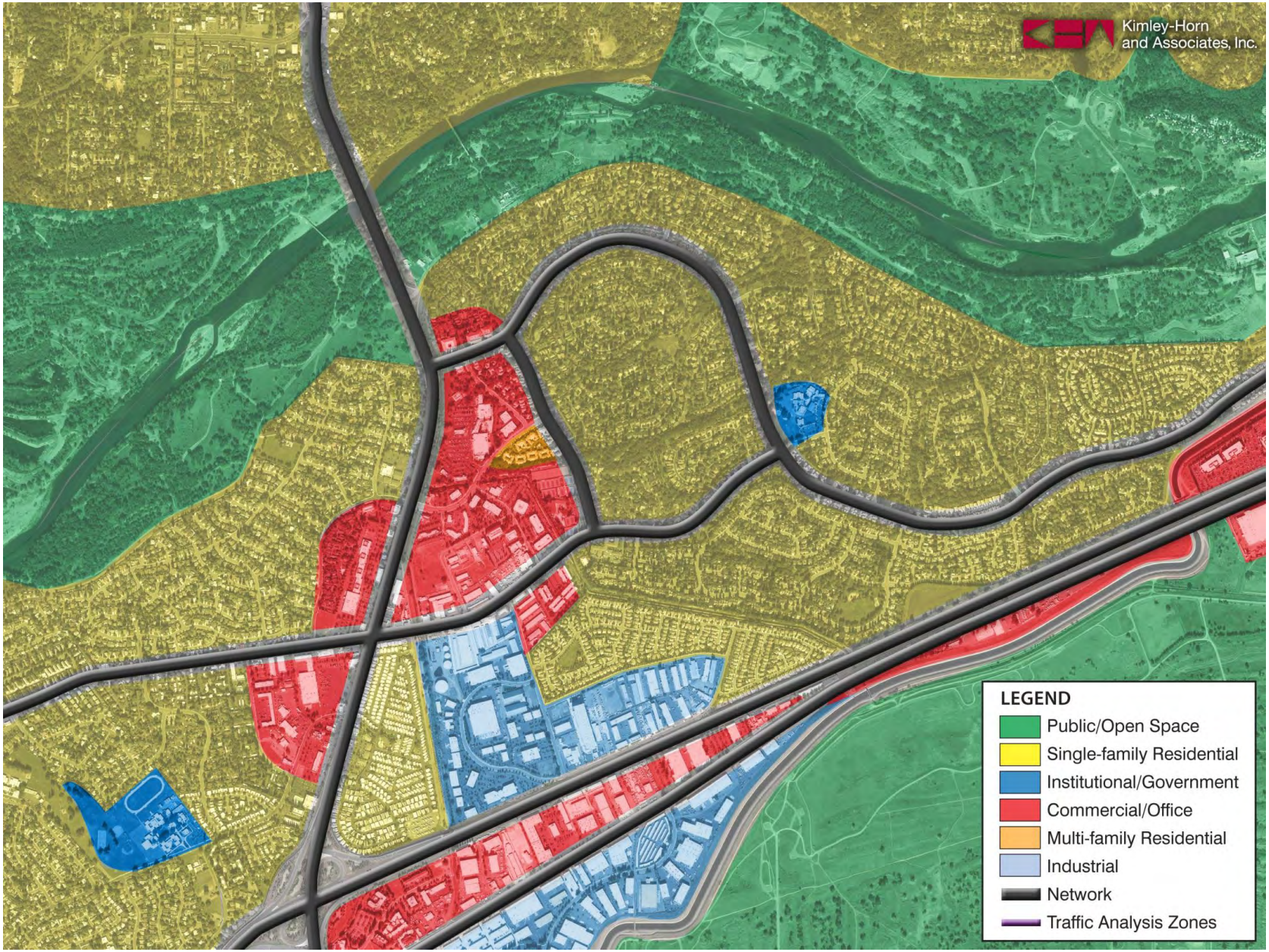
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Multi-family Residential
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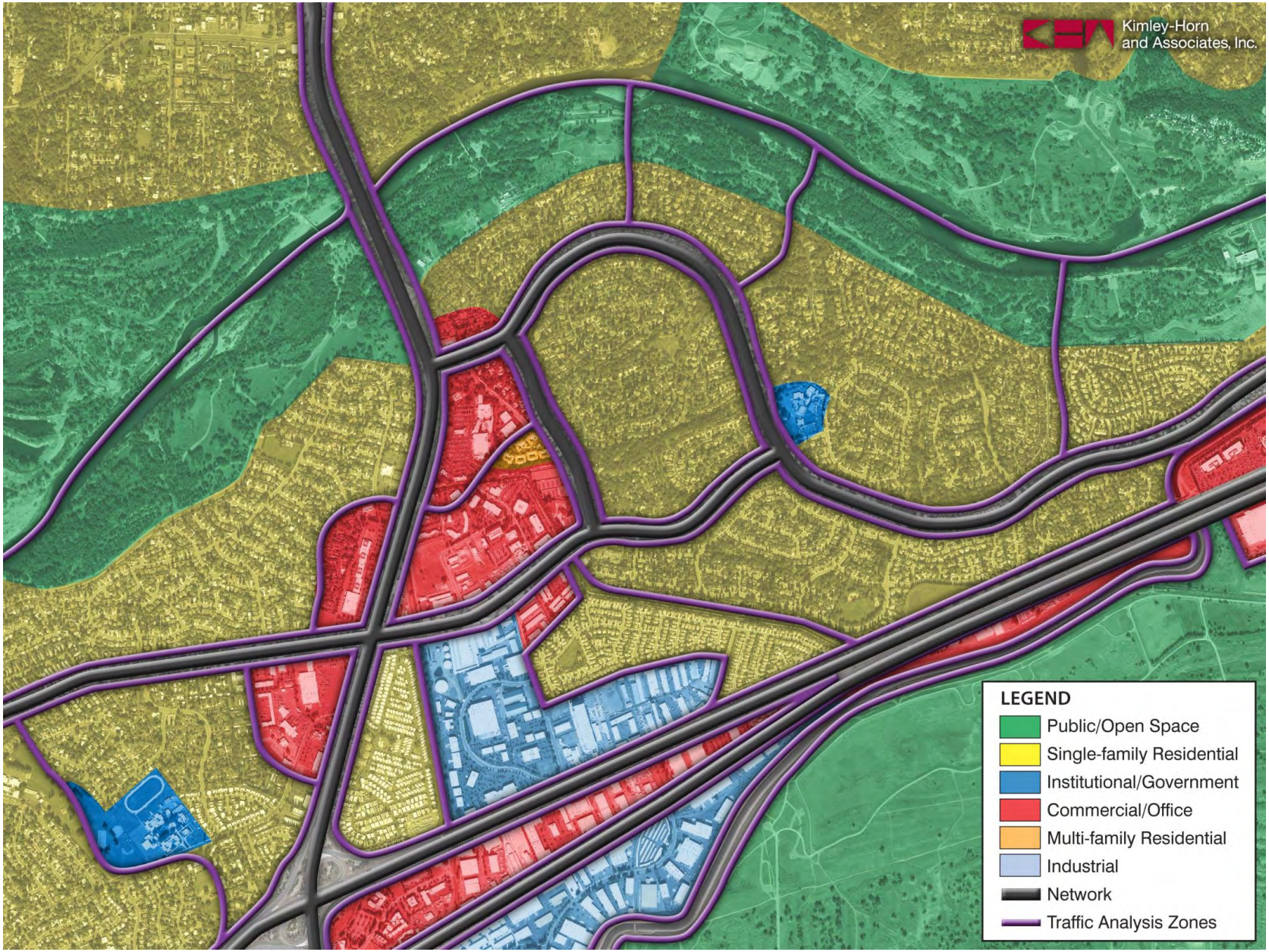
Traffic Analysis Zones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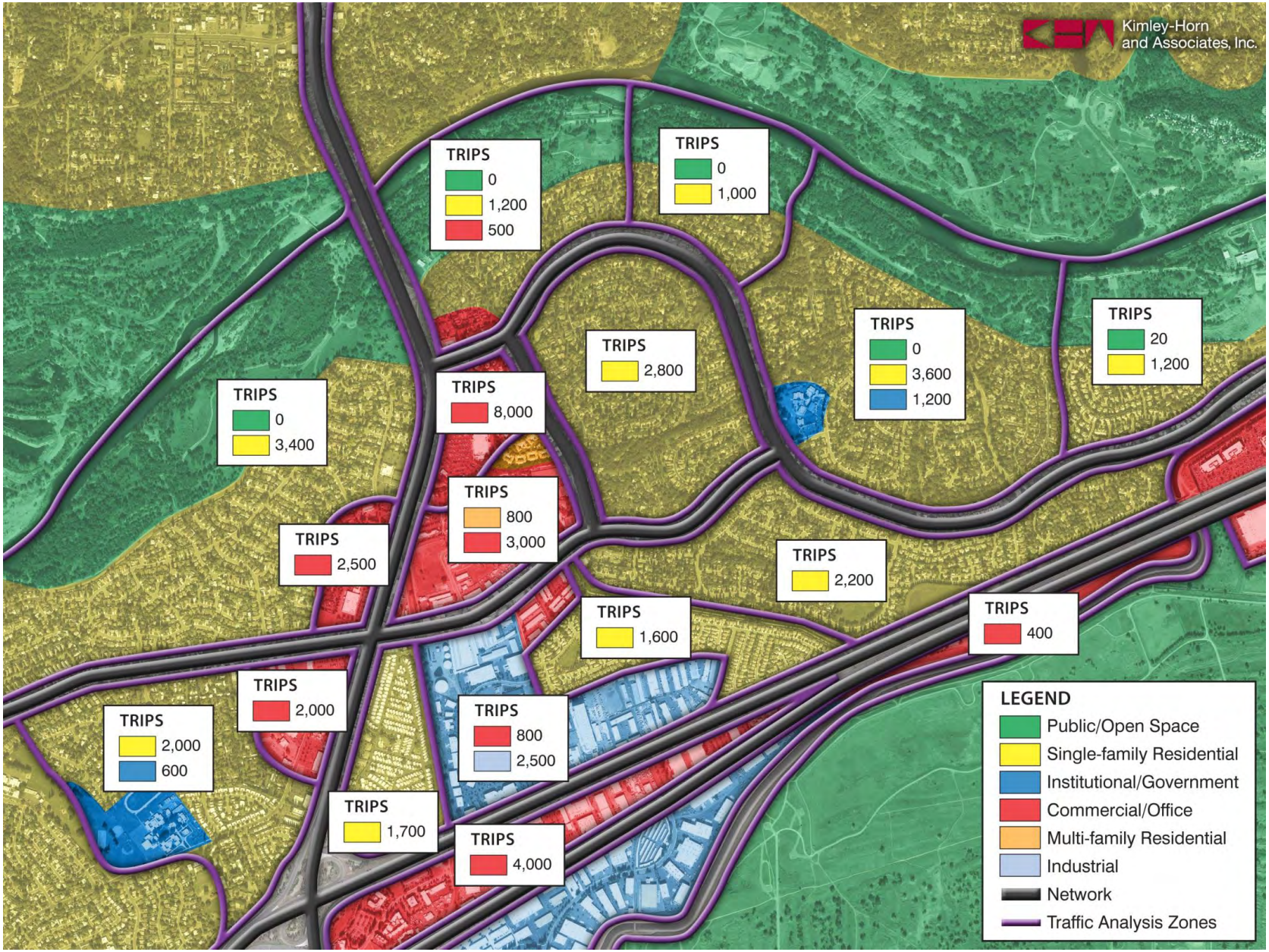
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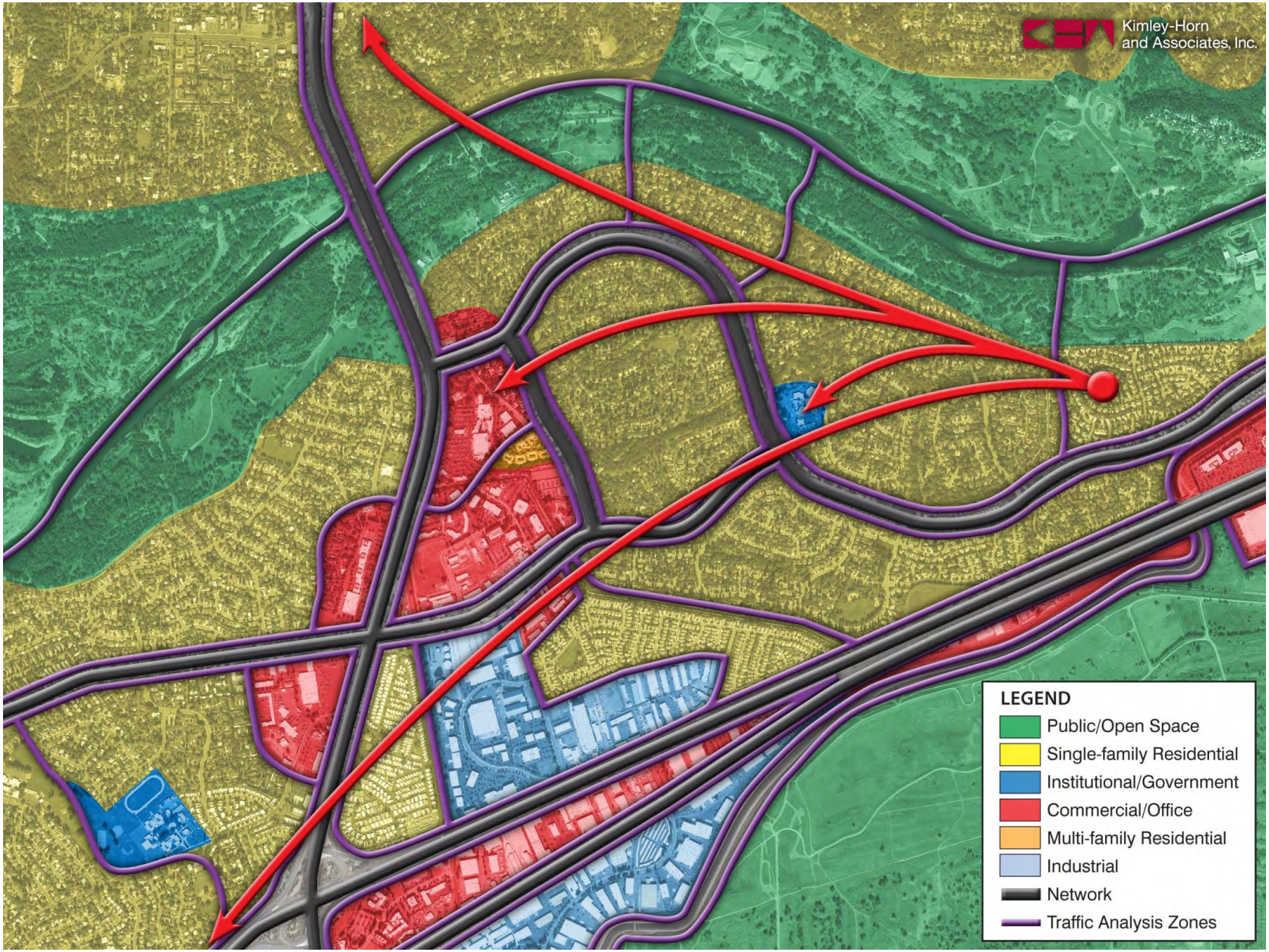
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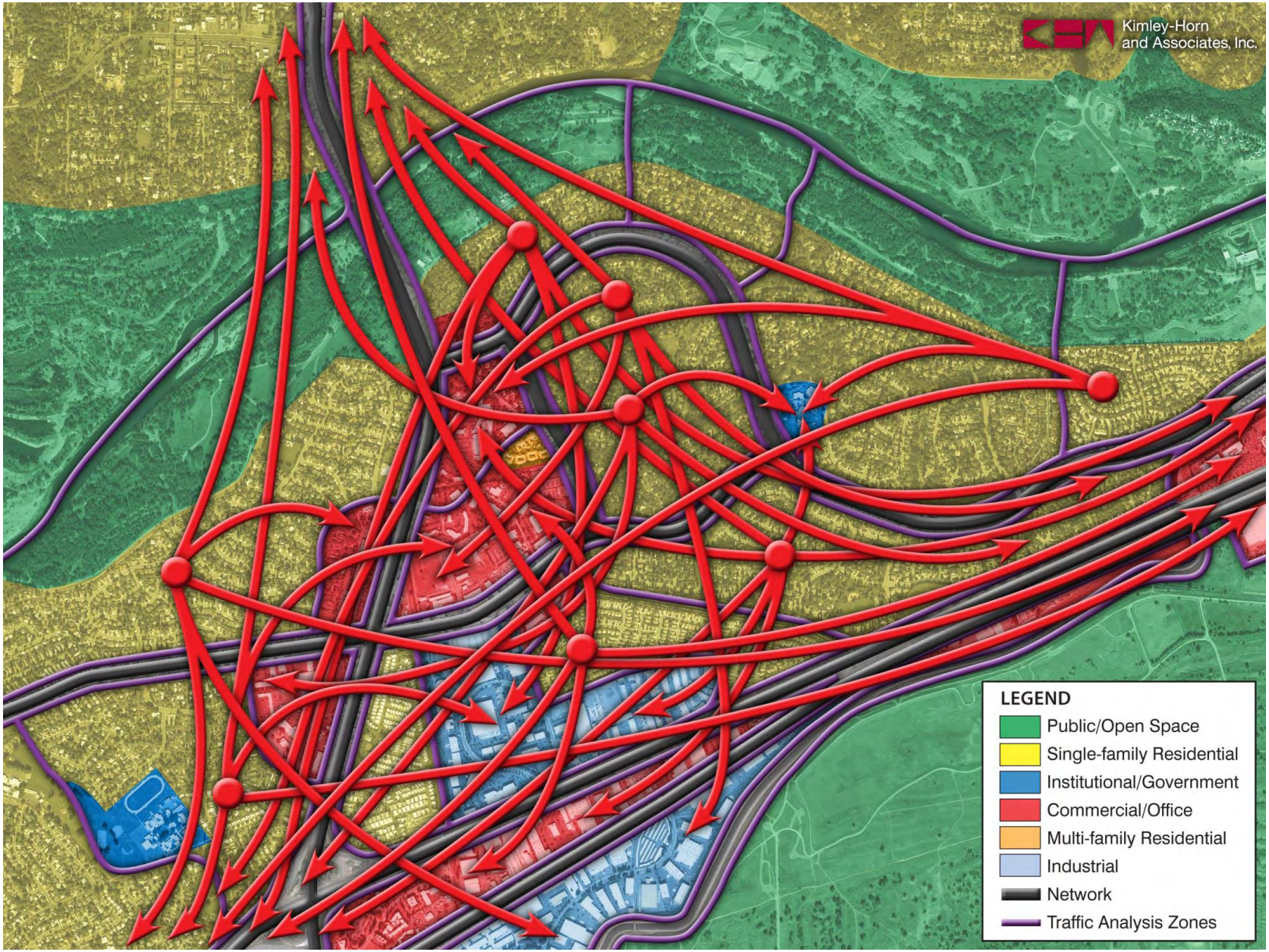
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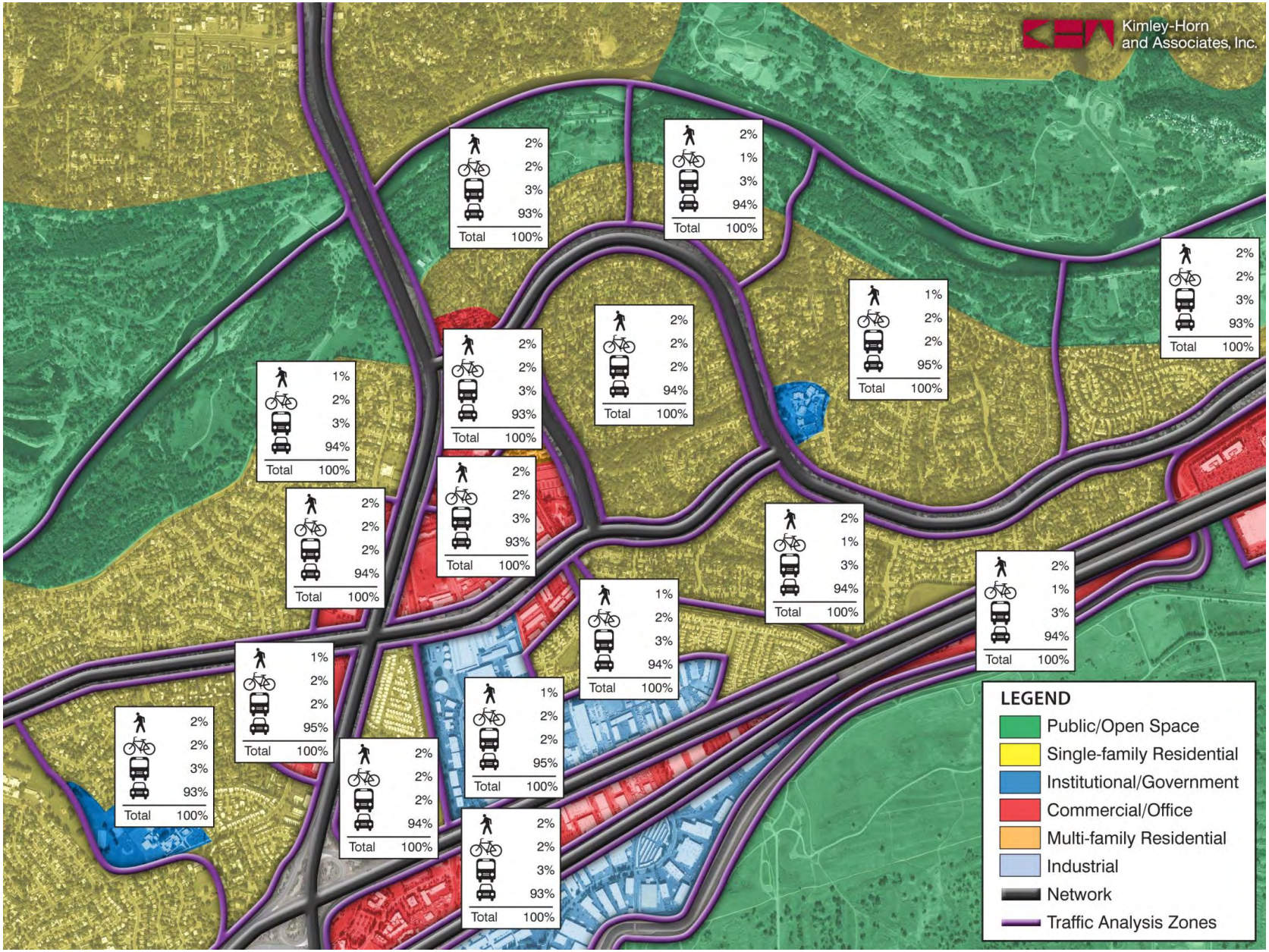
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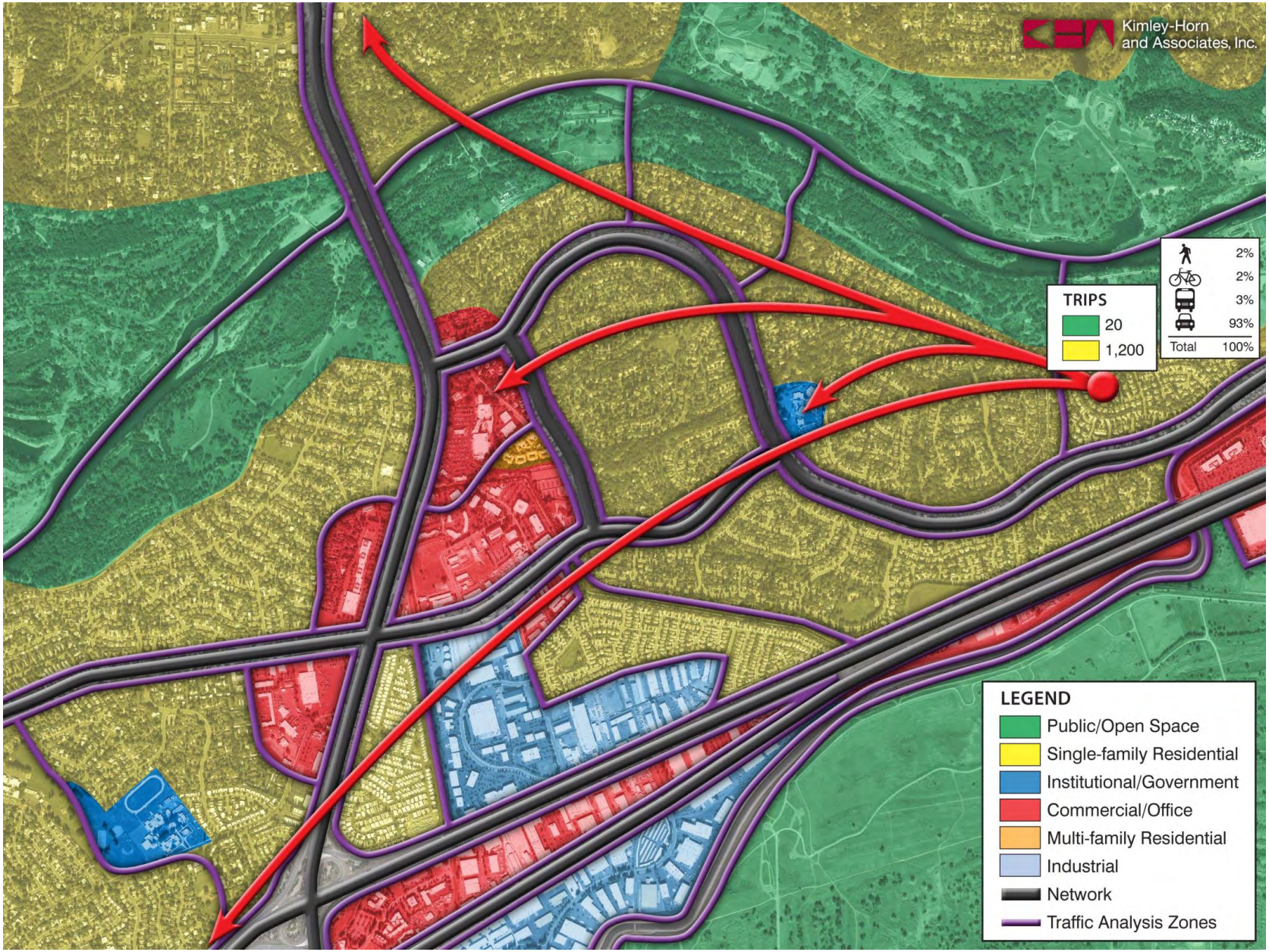
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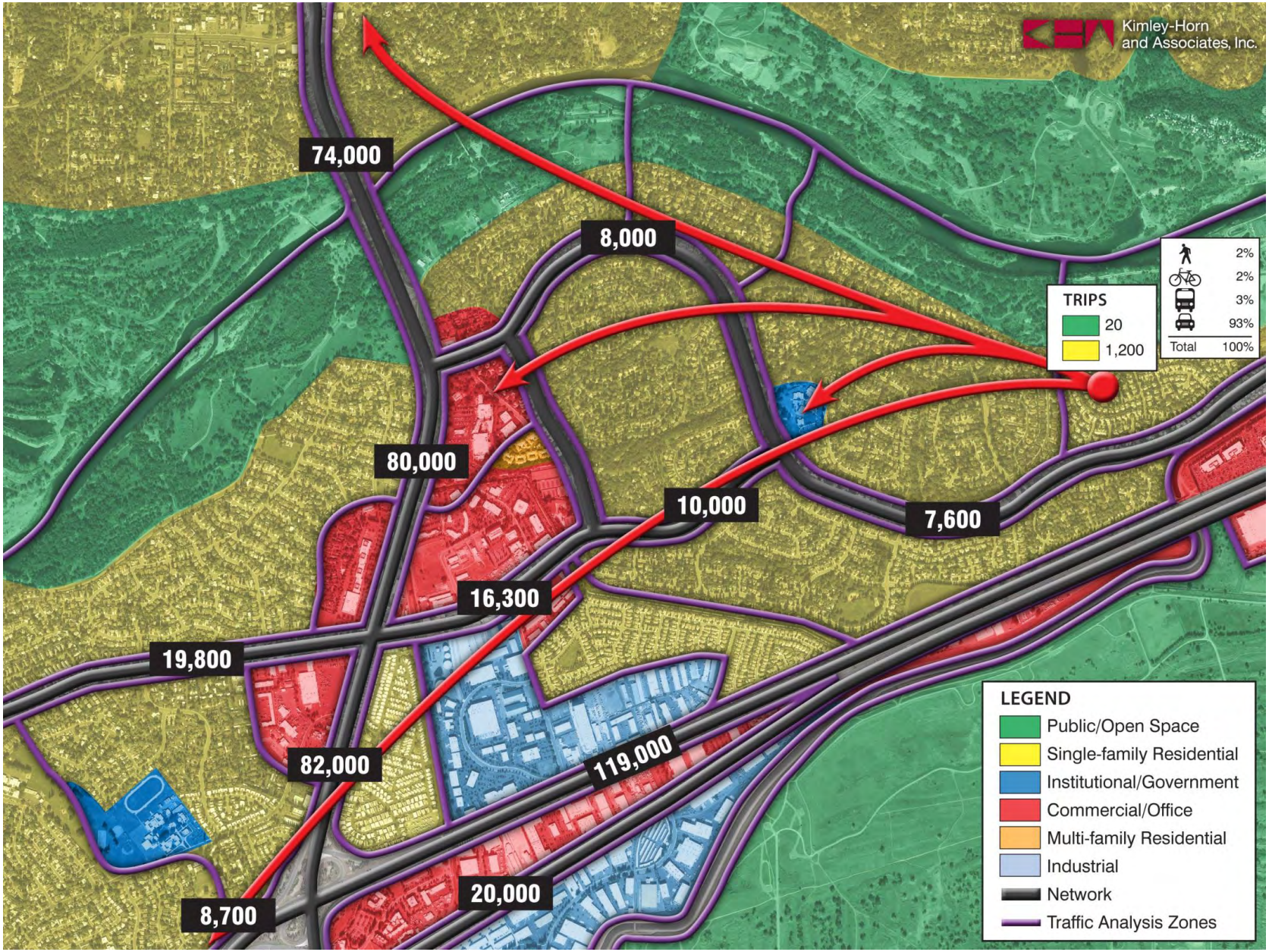
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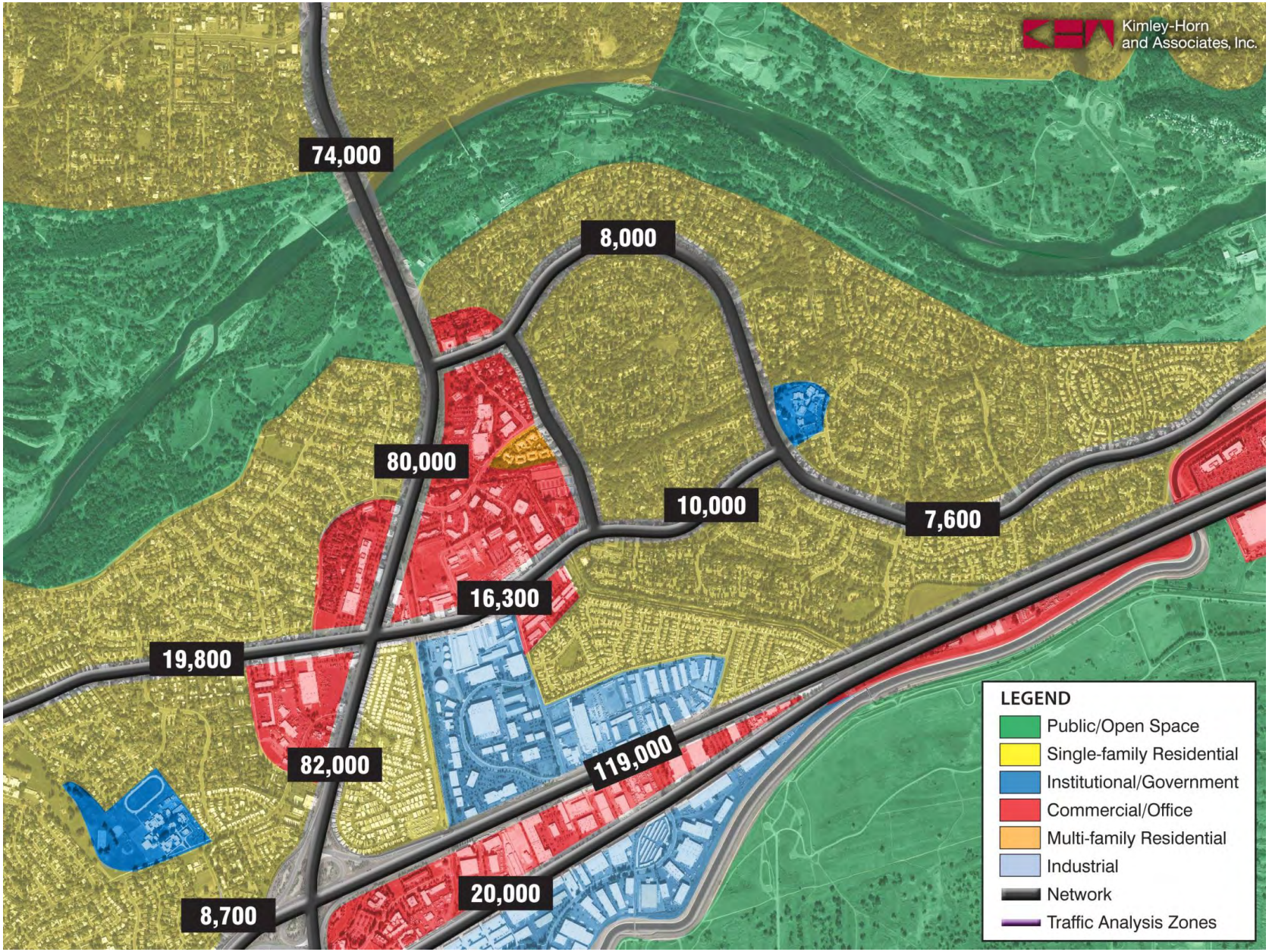
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How the macro model can help

- Evaluate road widening and road additions
- Evaluate new interchanges
- Analyze the impacts of transportation plans
- It can show impacts of large developments
- It can forecast corridor volumes
- It can be used as a basis for micro
- It can test alternative land use plans

Why are travel demand models not perfect?

- Merely a statistical replication of human behavior that assumes…
  - everyone acts rationally
  - demographic forecasts are reasonable
  - existing conditions are accurately reflected
  - external factors are known and under our control

EDC Model Overview

- 2010 base year
- 2035 no-project (current GP)
- 2035 project (TGPA & ZOU)
- 2025 no-project (current GP)
- Underlying submodels based on
  - census data
  - SACOG household travel survey
- Cube software

EDC model data sources

- 2008 El Dorado County Housing Element
- 2010 Living Units database
- 2010 EDC parcel shapefile
- 2010 US Census data and shapefiles
- 2000 Sacramento Area Household Travel Survey: Final Report
- 2008 SACOG Small Area Data Set
- 2008 SACOG Traffic Analysis Zones
- 2008 Model Update Report: SACMET 07
- Capital Improvement Program

EDC model inputs

Residential

- Persons per household
- Workers per household
- Auto ownership

Non-residential

- Manufacturing employees
- Office employees
- Medical employees
- Education employees
- Other employees
- K-12 enrollment
- College enrollment

EDC model transportation modes

- Drive alone
- HOV – 2 occupants
- HOV – 3 or more occupants
- Transit, walk access
- Transit, drive access (using park and rides)
- Walk
- Bicycle

EDC model outputs

- Link volumes
- Information on transportation modes
- Volume/capacity (v/c)
- Vehicles miles traveled (VMT)
- Vehicle hours traveled (VHT)
- Intersection turn movements*

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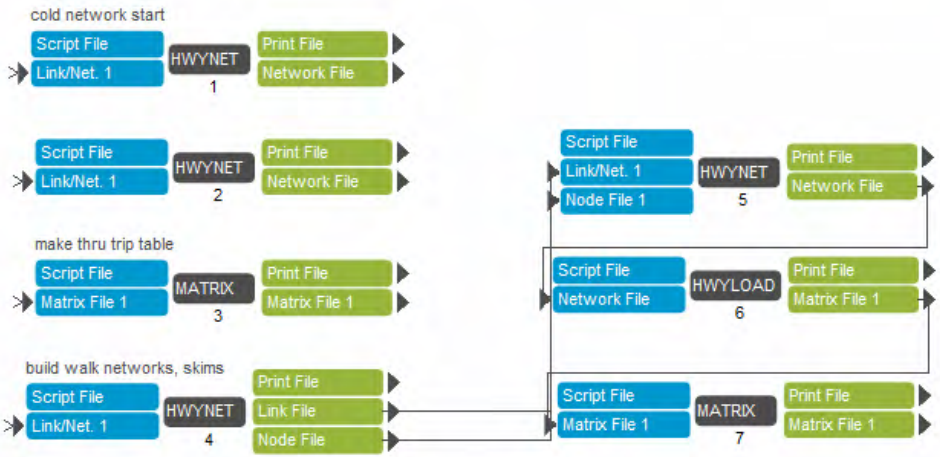
EL DORADO COUNTY TRAVEL DEMAND MODEL

Initialize model networks from the Base Year Network file



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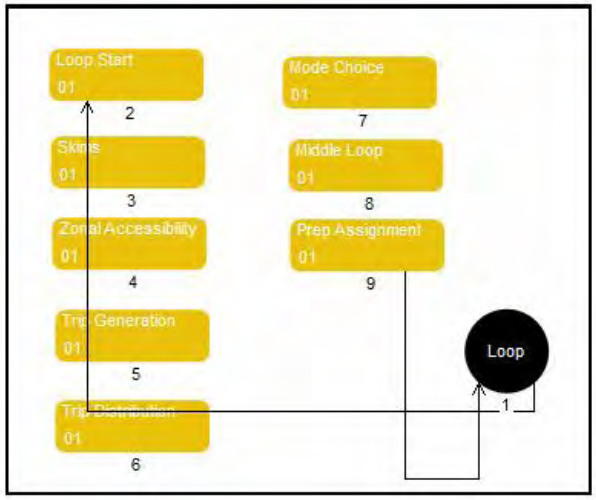
EL DORADO COUNTY TRAVEL DEMAND MODEL

Trip Generation, Trip Distribution and Mode Choice Feedback Loop



Volume/Capacity

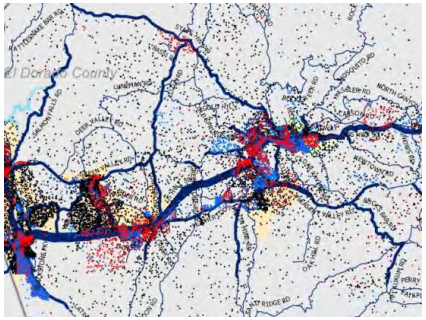
Functional Classification

AM Peak Hour Speed

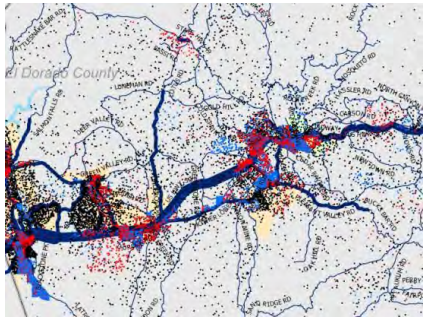
PM Peak Hour Speed

Output Options

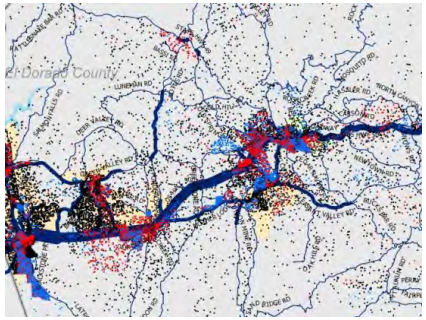
- Capacity
- Vehicle Miles Traveled
- Vehicle Hours Traveled
- AM Peak Hour V/C
- PM Peak Hour V/C
- AM Turn Movements
- PM Turn Movements
- Change in volume
- Select Link
- Select Zone
- Dot-Density
- Thematic Mapping
- Other



Daily Volume and LU



PM Peak Hour and LU

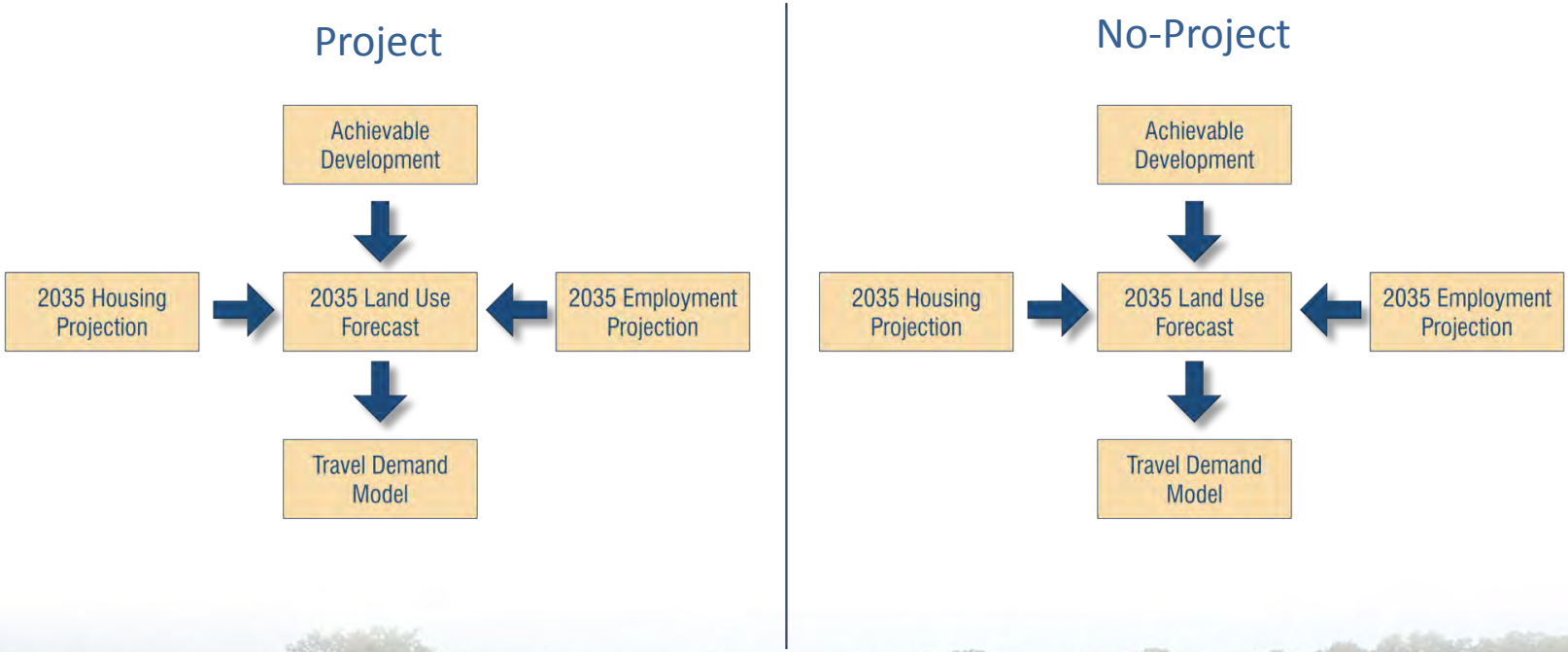


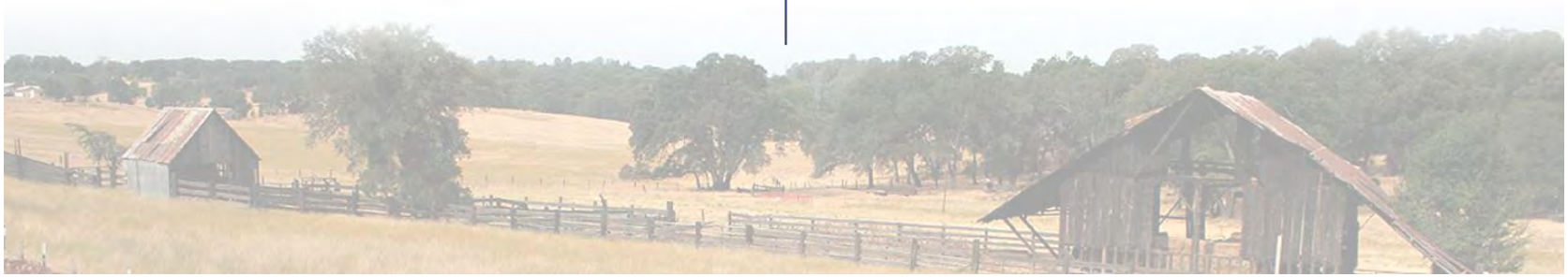
AM Peak Hour and LU

Achievable Development

Achievable Development is an estimate of the reasonably expected intensity of development that is anticipated for a particular land use or parcel given known opportunities, constraints, and assumptions.

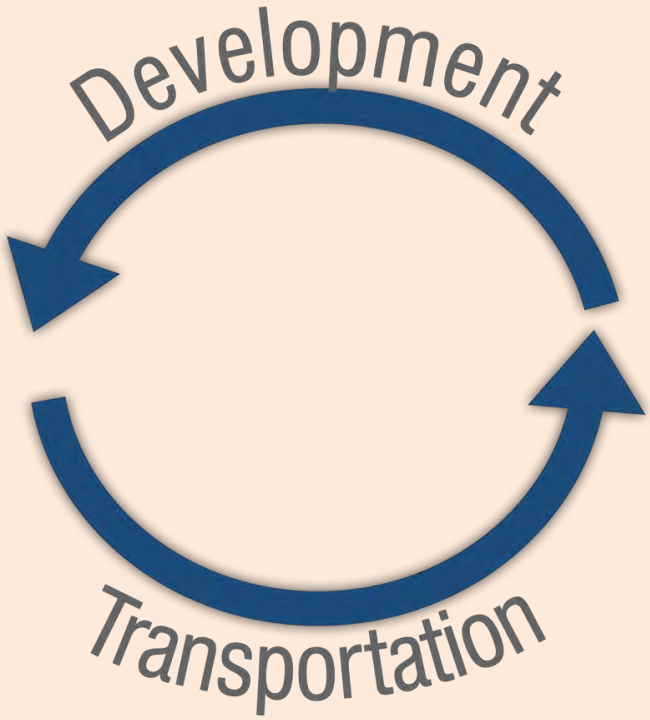
Model data development



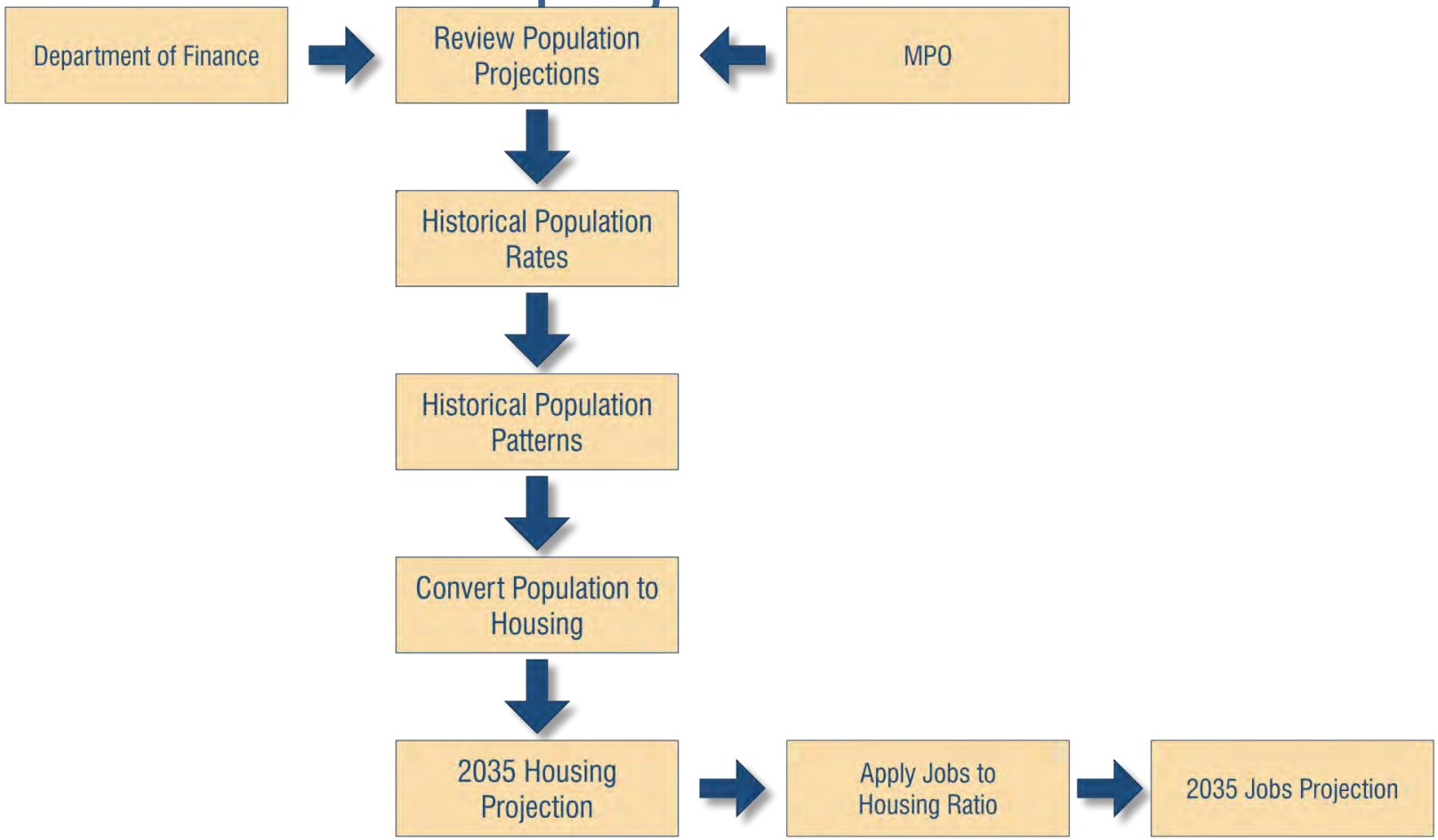


Evolution of 2035 DRAFT housing and employment projections

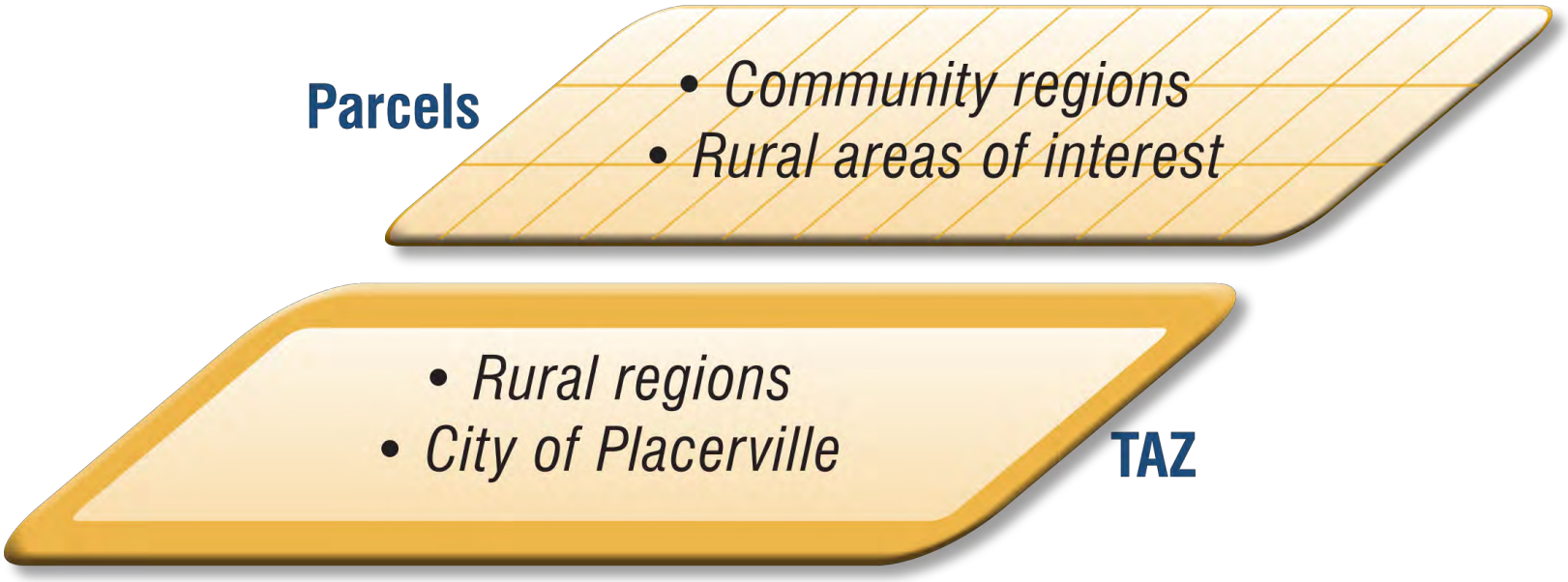
1. Revise horizon year for 2001 EPS forecasts
2. Use SACOG forecasts
3. BAE forecast
4. Revise (#3) based on initial model output

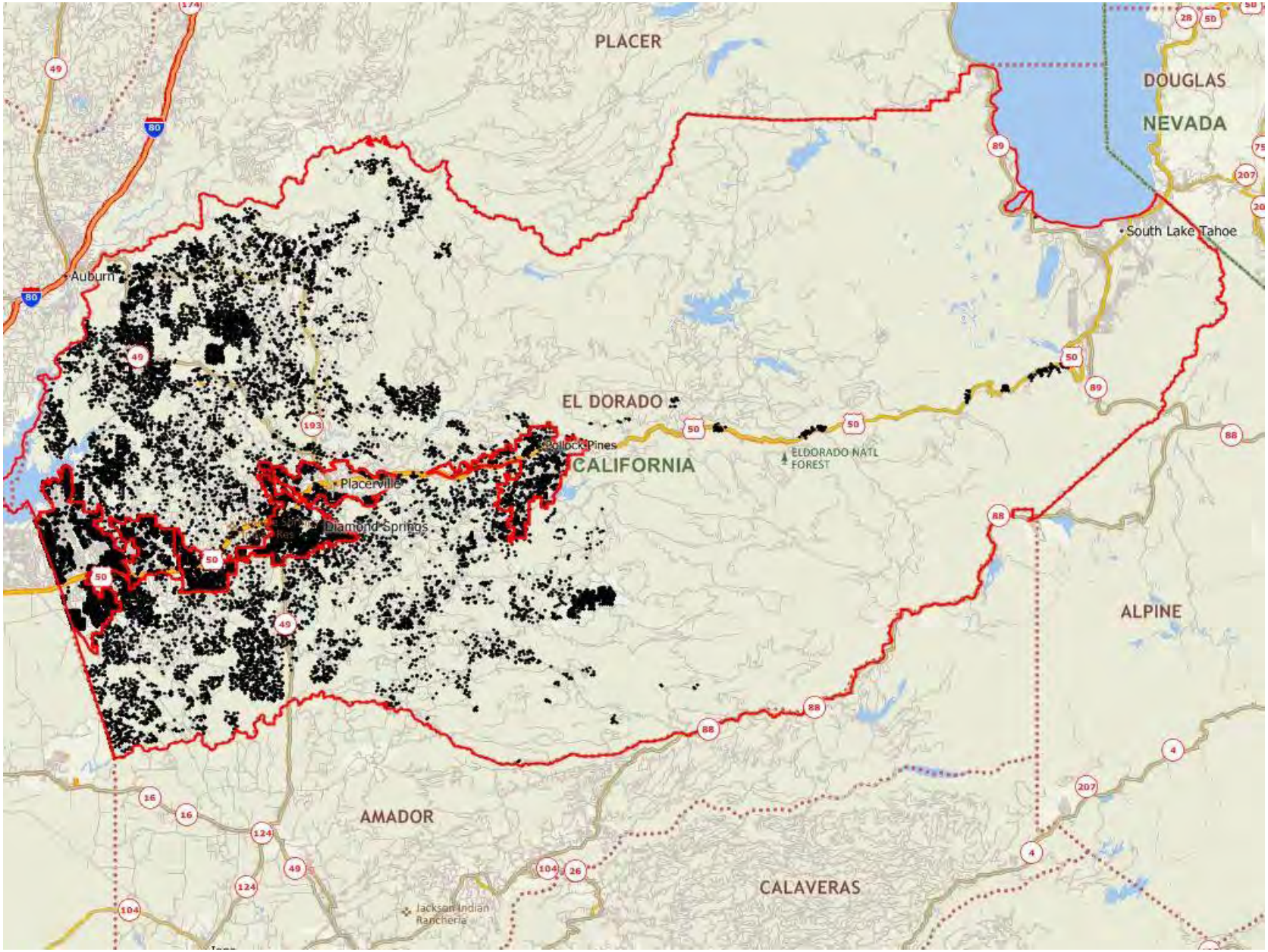


DRAFT housing and employment projections



Land Use Analysis




PLACER
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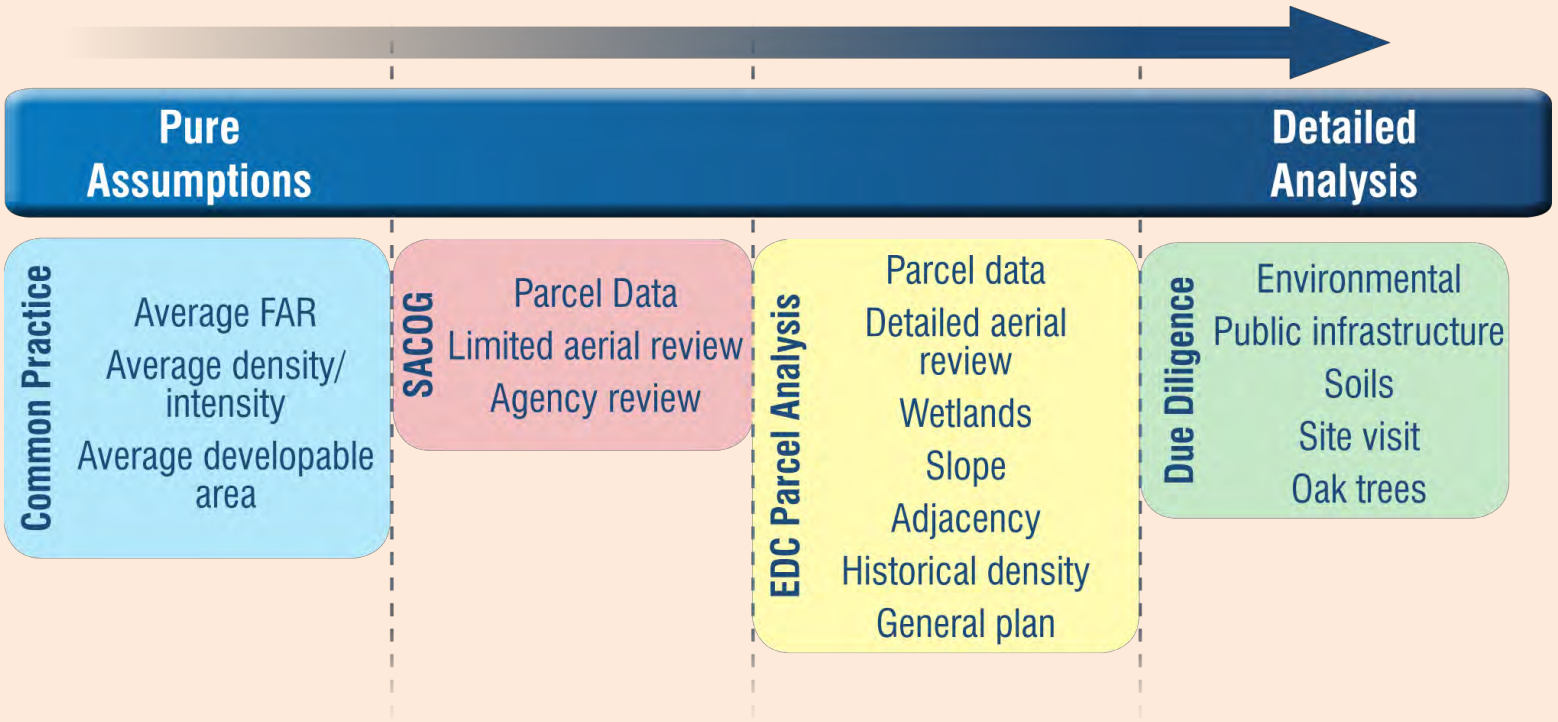
Placerville
Diamond Springs
ALPINE
AMADOR
CALAVERAS
Jackson Indian Rancheria

Community region analysis



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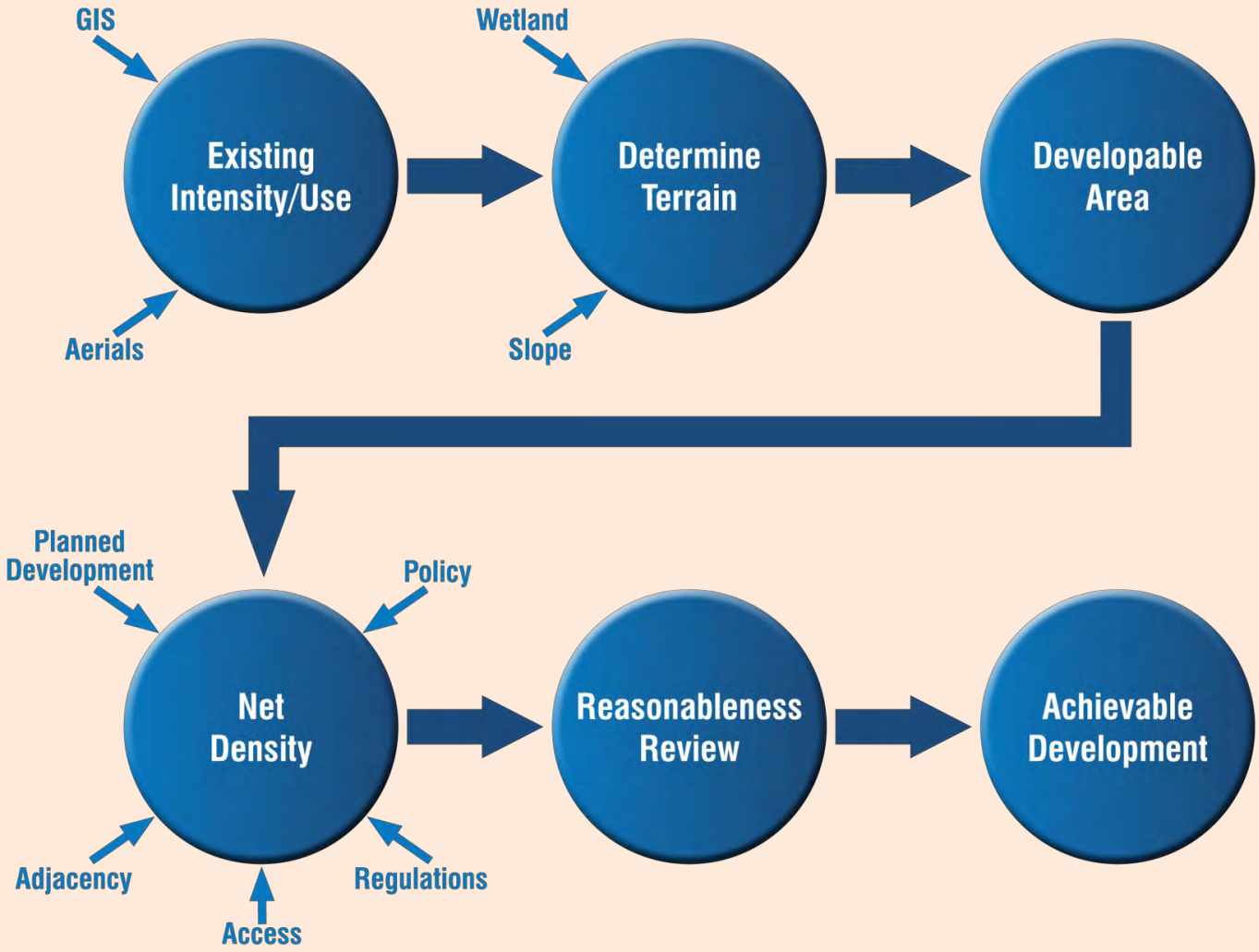

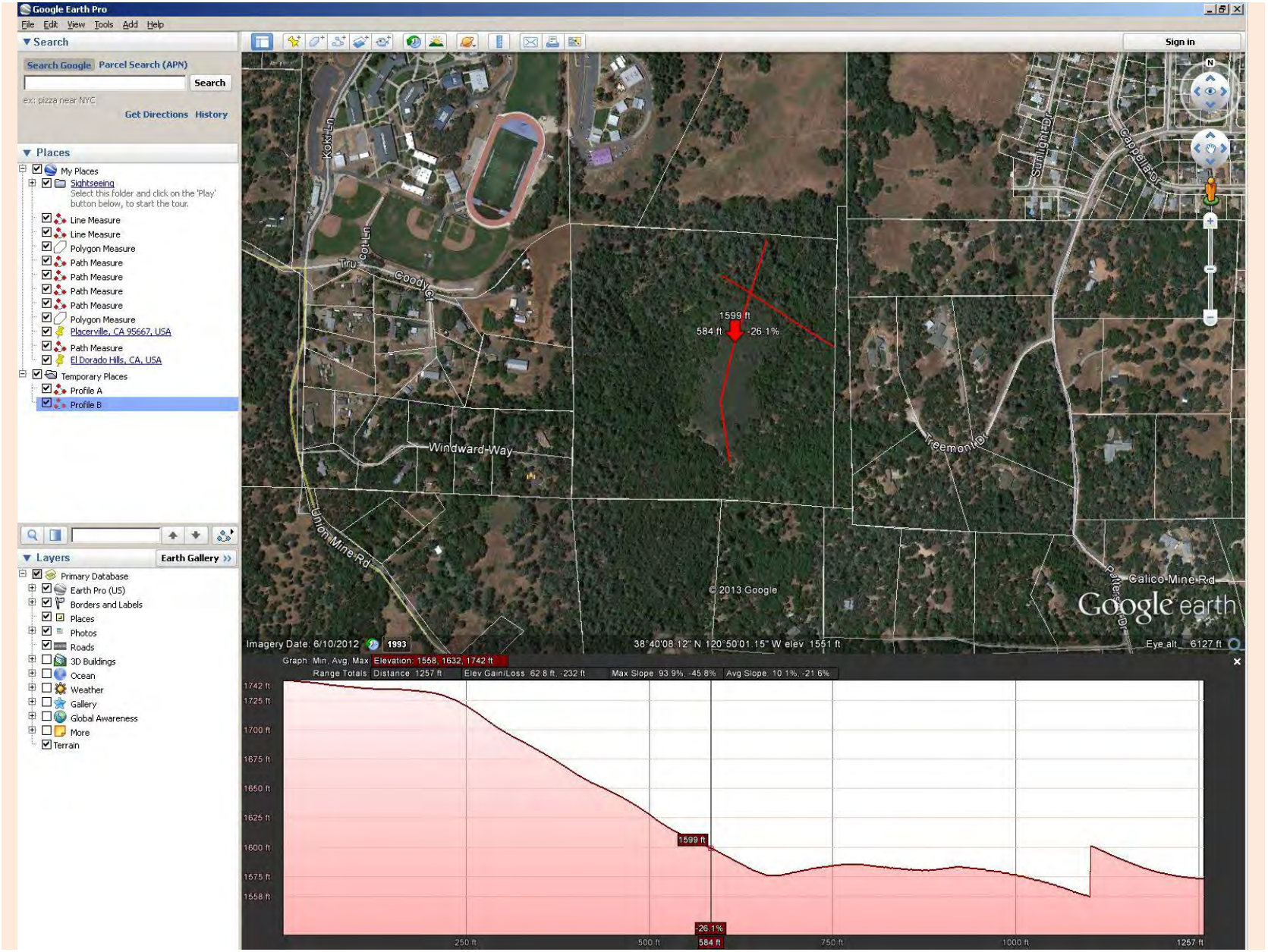
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El Dorado Hills, CA, USA
Temporary Places
Profile A
Profile B
Layers
Earth Gallery
Primary Database
Earth Pro (US)
Borders and Labels
Places
Photos
Roads
3D Buildings
Ocean
Weather
Gallery
Global Awareness
More
Terrain
Sign in
Koki Ln
Tru Loop
Coody Ct
Windward Way
Union Mine Rd
Sunlight Dr
Cappella Dr
Treemont Dr
Calico Mine Rd
Patterson Dr
1599 ft
584 ft
-26.1%
© 2013 Google
Google earth
Imagery Date: 6/10/2012 1993
38°40'08.12" N 120°50'01.15" W elev 1551 ft
Eye alt 6127 ft
Graph: Min, Avg, Max Elevation: 1558, 1632, 1742 ft
Range Totals Distance: 1257 ft Elev Gain/Loss: 62.8 ft, -232 ft Max Slope: 93.9%, -45.8% Avg Slope: 10.1%, -21.6%
1742 ft
1725 ft
1700 ft
1675 ft
1650 ft
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1600 ft
1575 ft
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1599 ft
-26.1%
250 ft
500 ft
584 ft
750 ft
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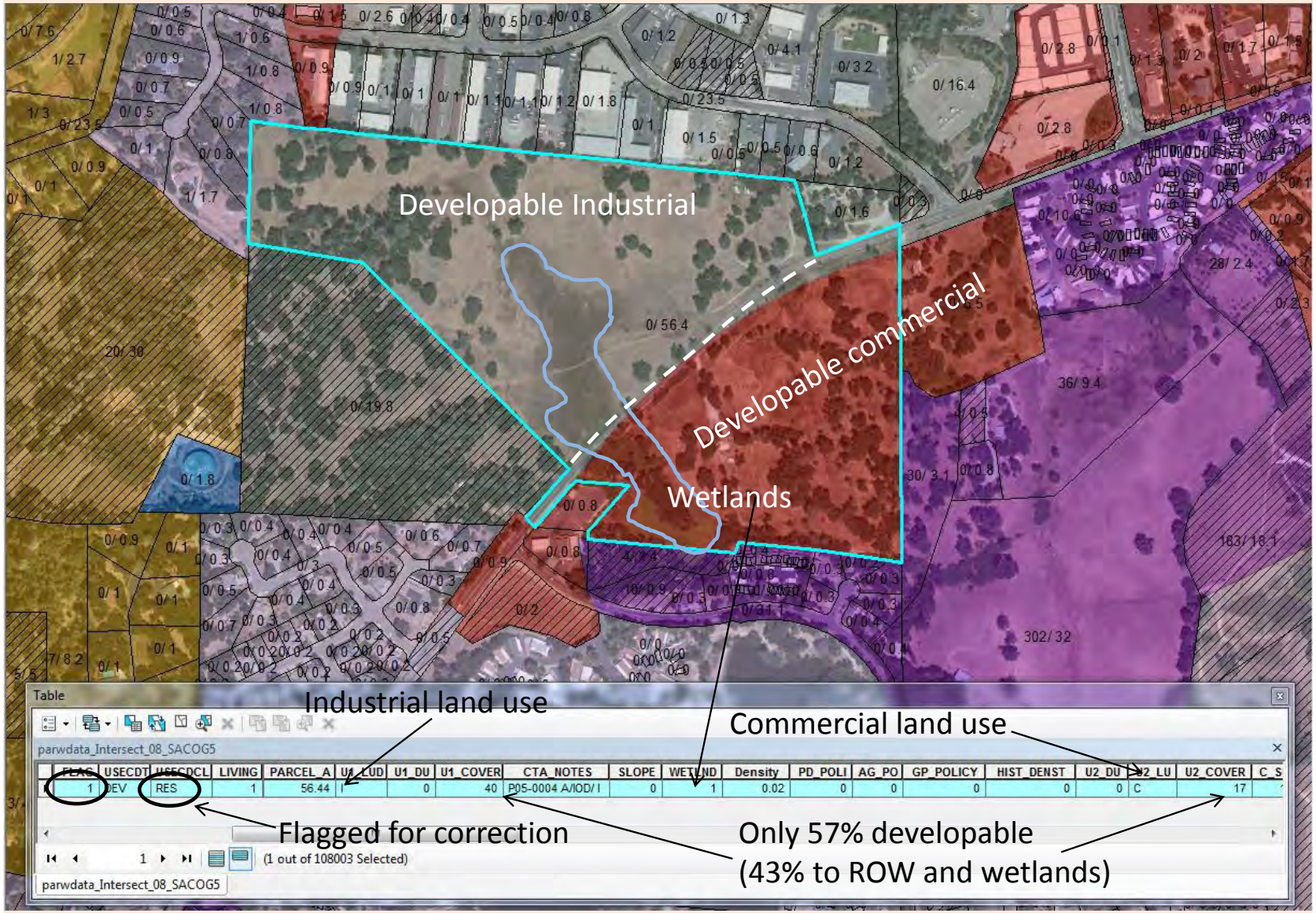

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2035 DRAFT Land Use Forecast

- General Plan and State legislation
- Historical trends
- Proximity to infrastructure and site access
- Project status
- Growth patterns
- Proximity to major corridors
- Proximity to other uses and services

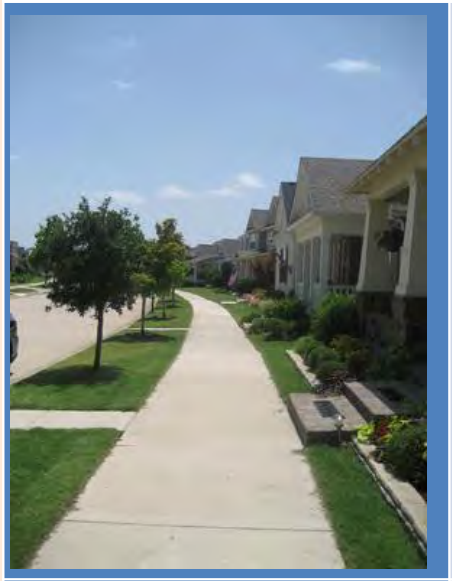
5Ds

- Traditional four steps model limited
- 5D submodel increases sensitivity to:
  - Mixed use development
  - Transit proximity
  - Walkable communities
- Results in increase transit, biking, walking trips

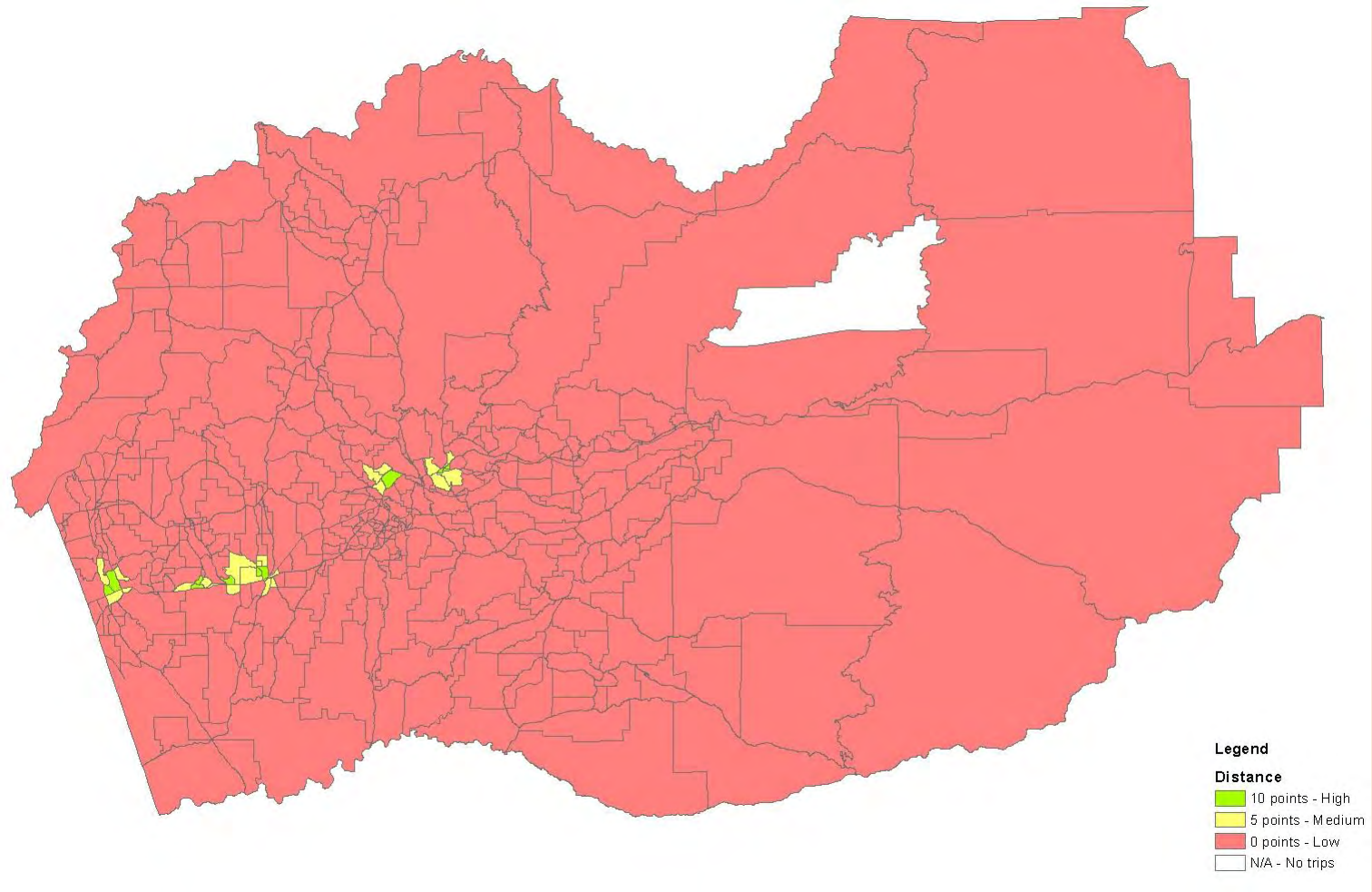
5D point system

5D Factors	LOW (0 POINTS)	MEDIUM (5 POINTS)	HIGH (10 POINTS)	UNITS
DENSITY 1 (RESIDENTIAL)	<4.00	>=4.00 AND <=12.00	>12.00	Households/Ac
DENSITY2 (EMPLOYMENT)	<15.00		>50.00	Employees/Ac
DESIGN	Low Walkability	Fair Walkability	Good Walkability	Pedestrian Environmental Factors (PEF)
	PEF = 7.00 OR PEF = 8.00	PEF = 9.00	PEF = 10.00	
DISTANCE	> 1/2 MILE	<= 1/2 AND >= 1/4 MILES	< 1/4 MILE	Miles to Transit Stop
DIVERSITY	<=10,000	<50,000 and >10,000	>=50,000	Median HH Income Classes
	Class 5	Class 2, 3, 4	Class 1	
DESTINATION	<= 100	>100 AND < 500	>= 500	Congested VHT per HH

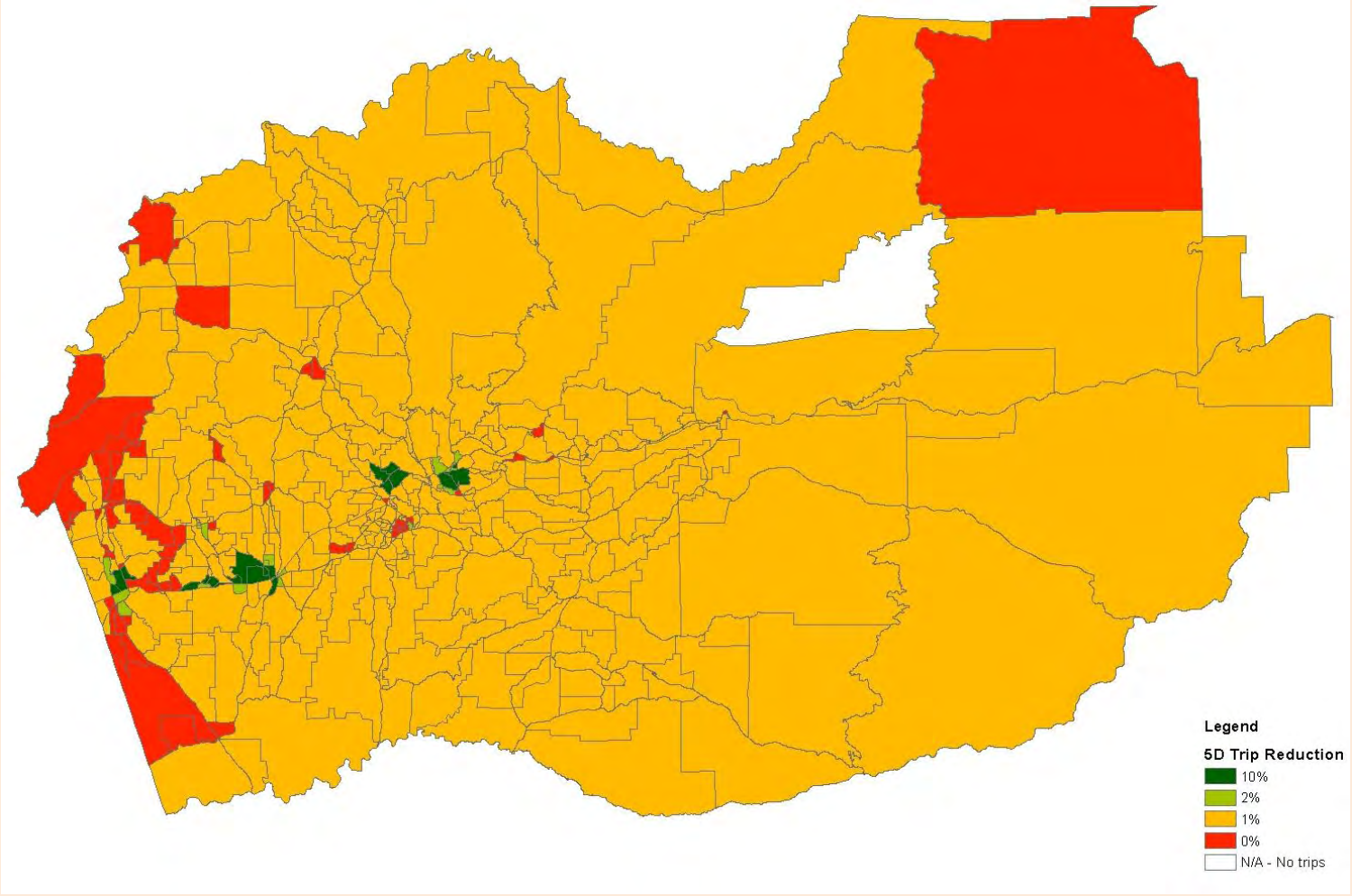
Density-residential

0 points	5 points	10 points
		
Less than 4 households per acre	Between 4 and 12 housholds units per acre	Greater than 12 households per acre

5D Distance scoring



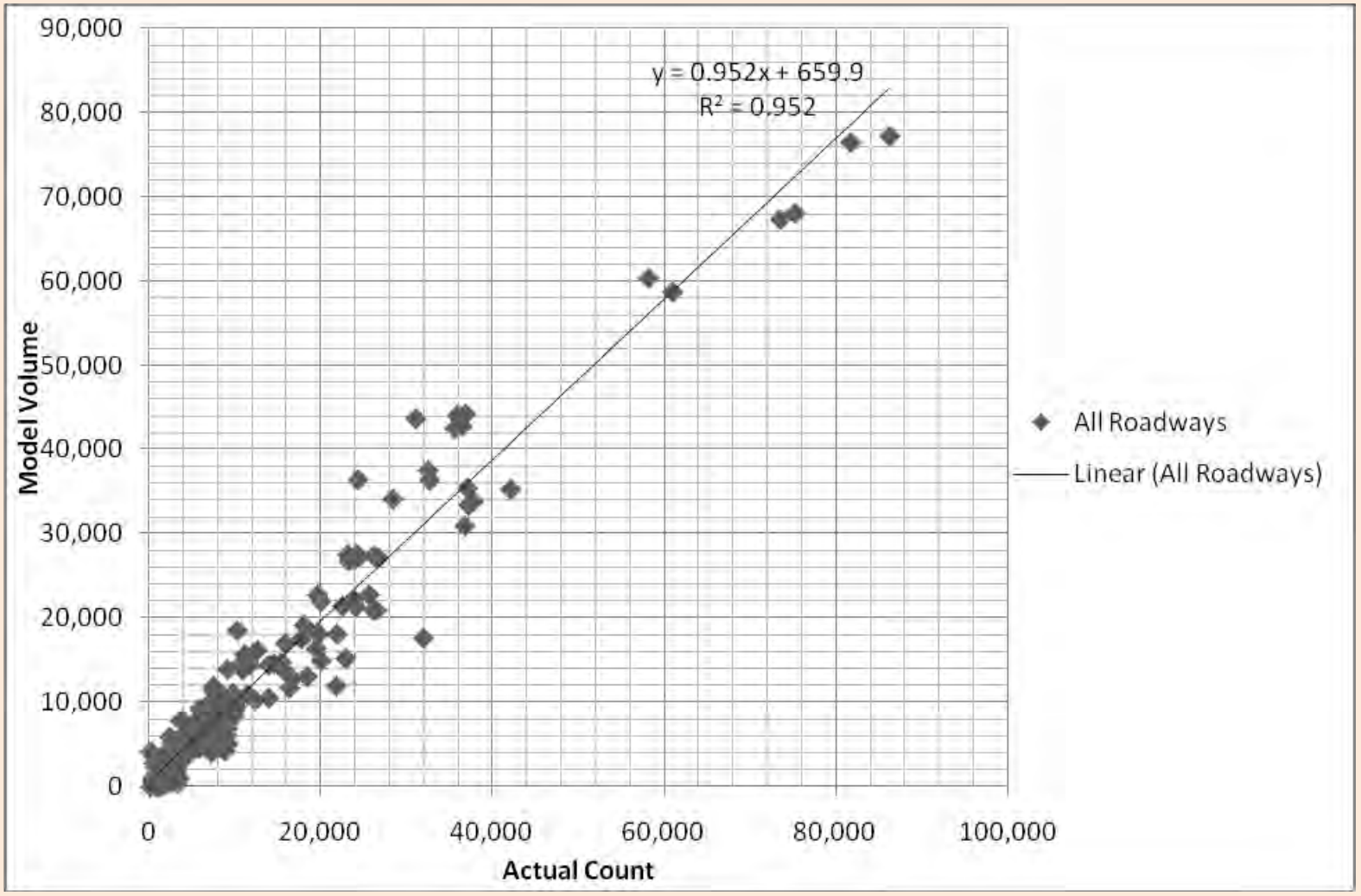
5D vehicle trip reduction



Model validation criteria

- Correlation coefficient
- Percent root mean square error (RMSE)
- Percent error
- Screenline
- Roadway link validation
- Peak period validation
- Peak hour validation

Model correlation coefficient



Questions?