NORTH CAROLINA
Department of Transportation

Introduction to Travel Demand Modeling

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Tools for Transportation Planning

Non-modeled:

- Trend Line Analysis

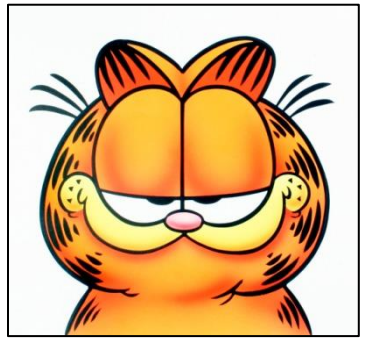
Modeled:

- Travel Demand Model

What is a model?

A representation of a real object or system that accounts for its relevant properties.

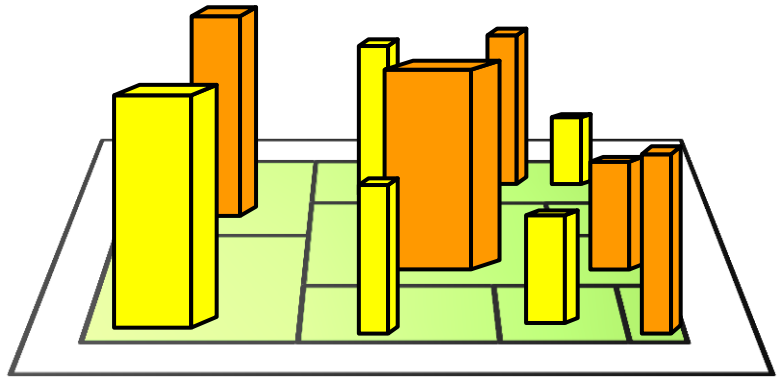
Real World "Object"



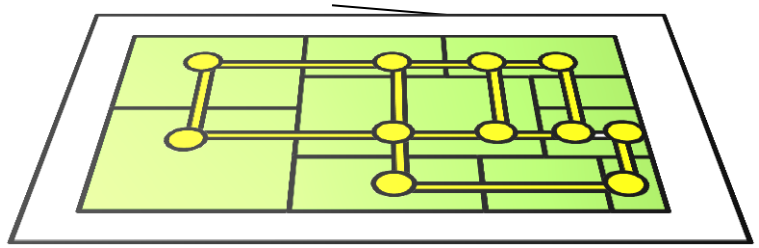
Model

What is a travel demand model?

A systematic process for translating land use and transportation supply into projections of travel demand

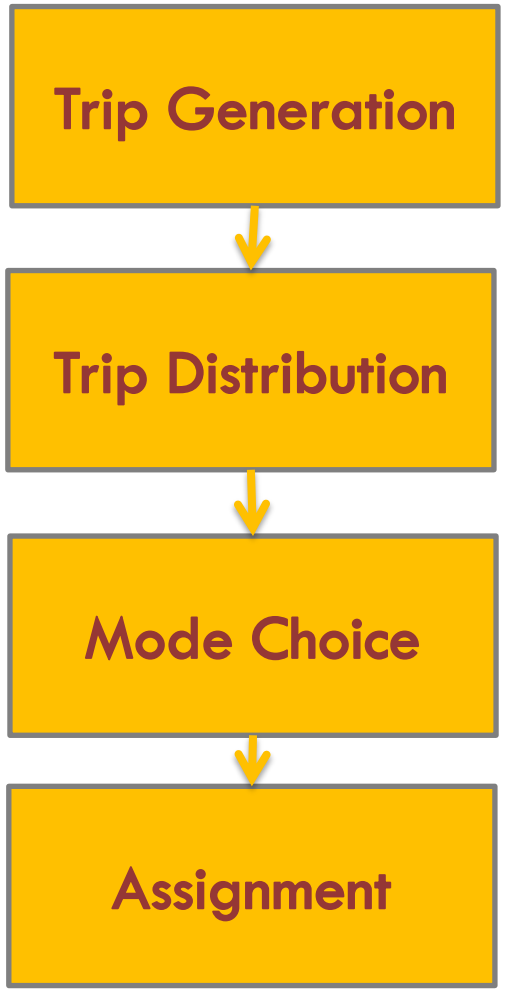


Land-Use



Transportation Network

What is a travel demand model?



How many trips will be made?

Where do trips go to?

How will they get there? Automobile, transit, bicycle, or walking

What routes are taken?

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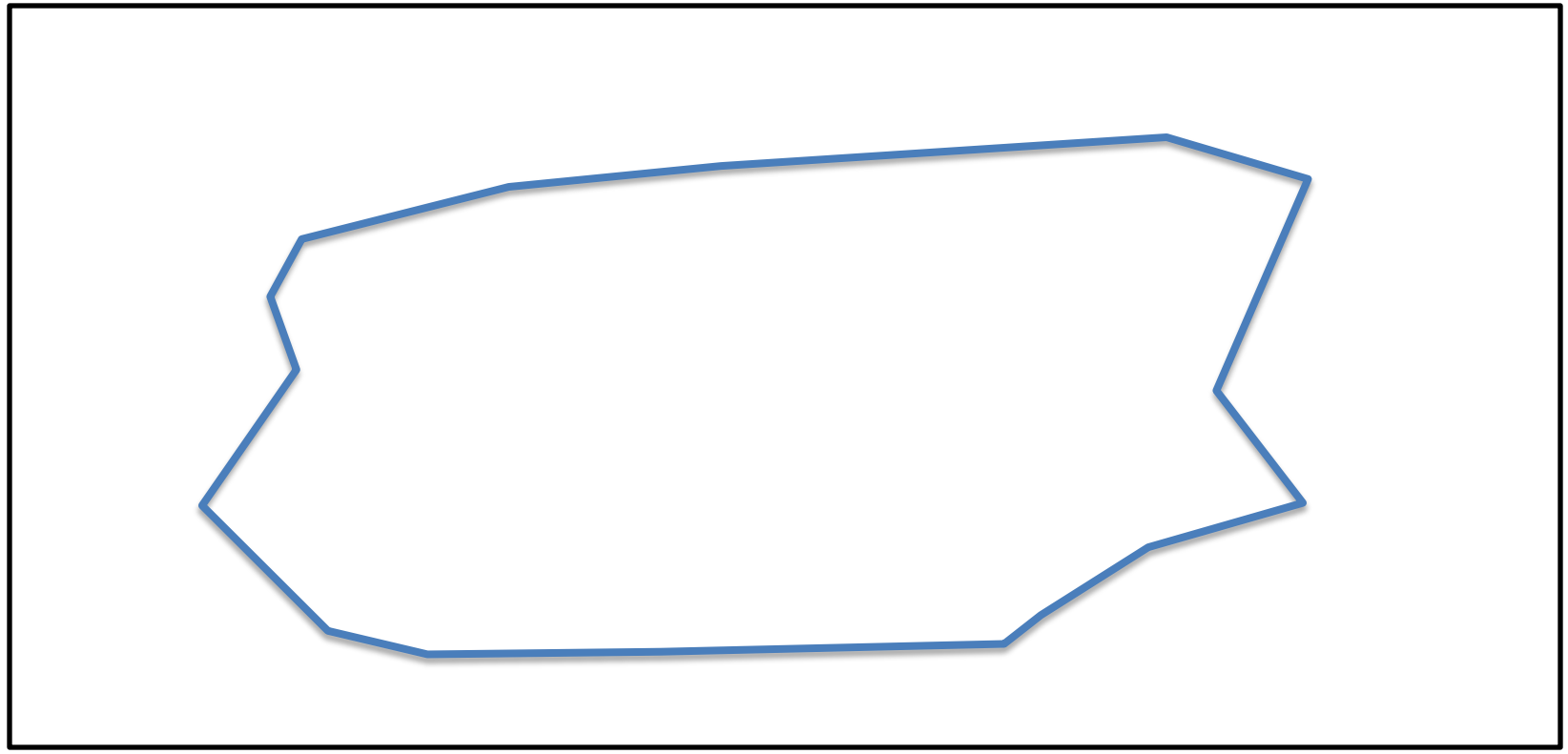
Few Key Concepts

What are these?

- Traffic Analysis Z one (TAZ)
- Centroid
- Centroid Connector

Few Key Concepts-TAZ

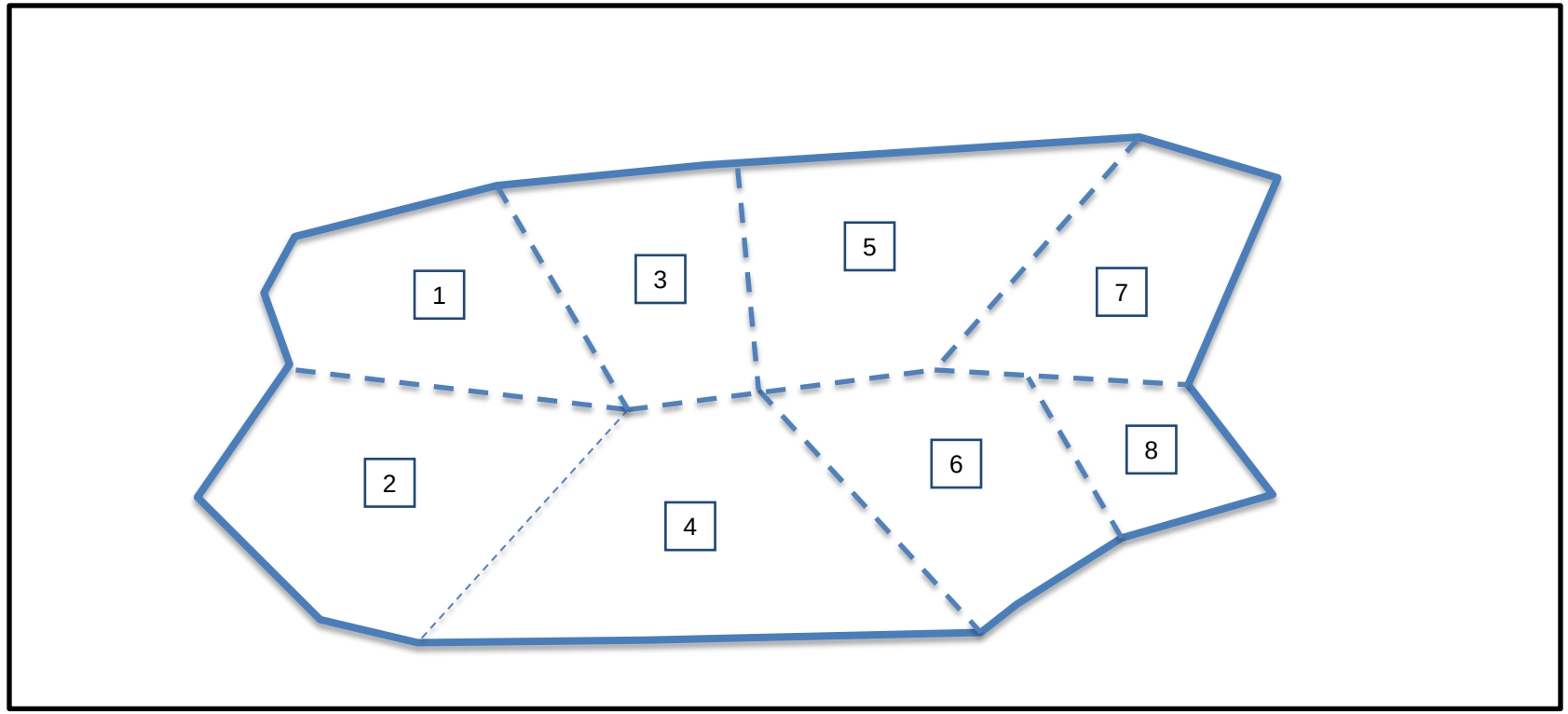
Schematic Representation of TAZ



Model Boundary

Few Key Concepts-TAZ

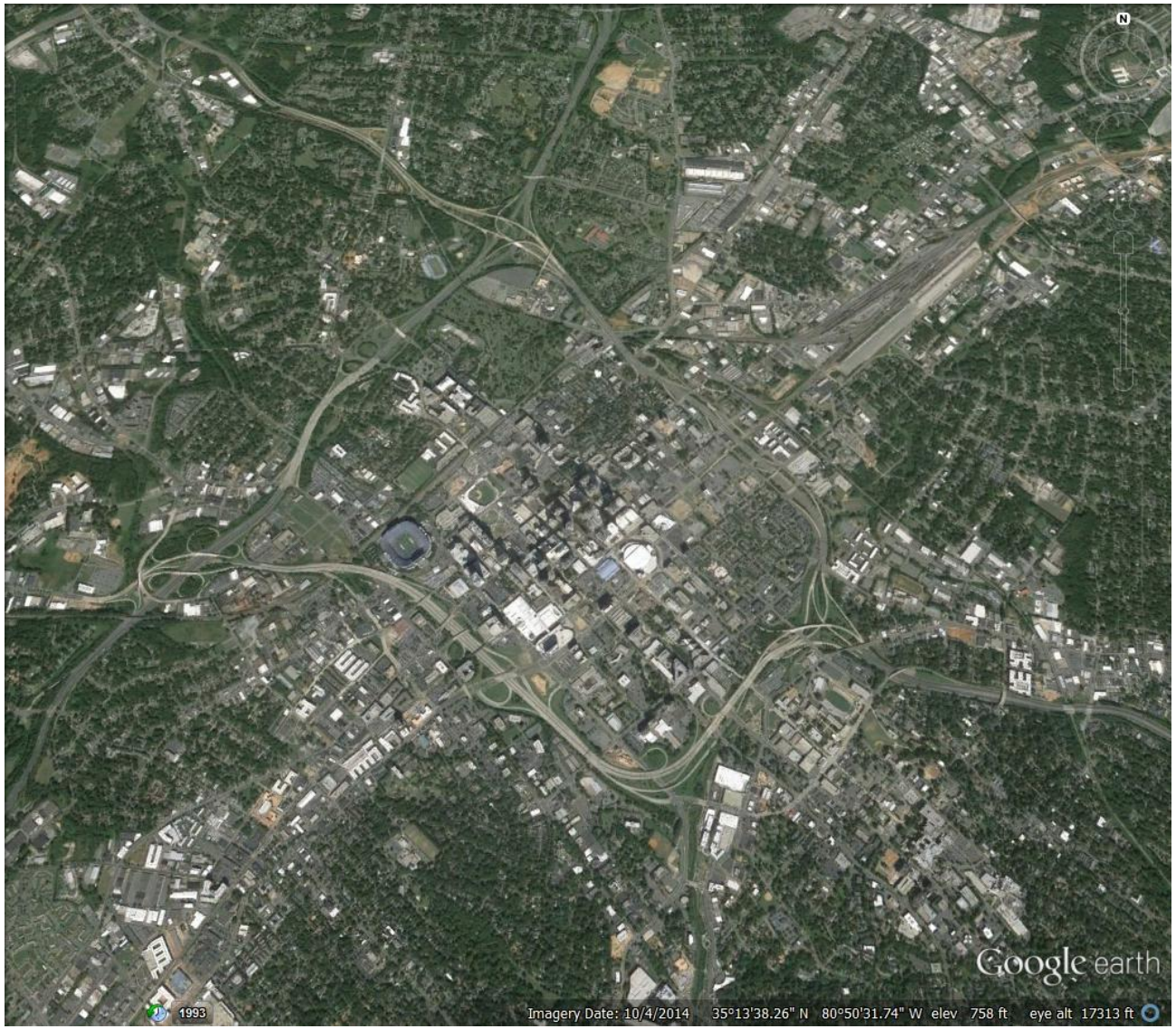
Schematic Representation of TAZ



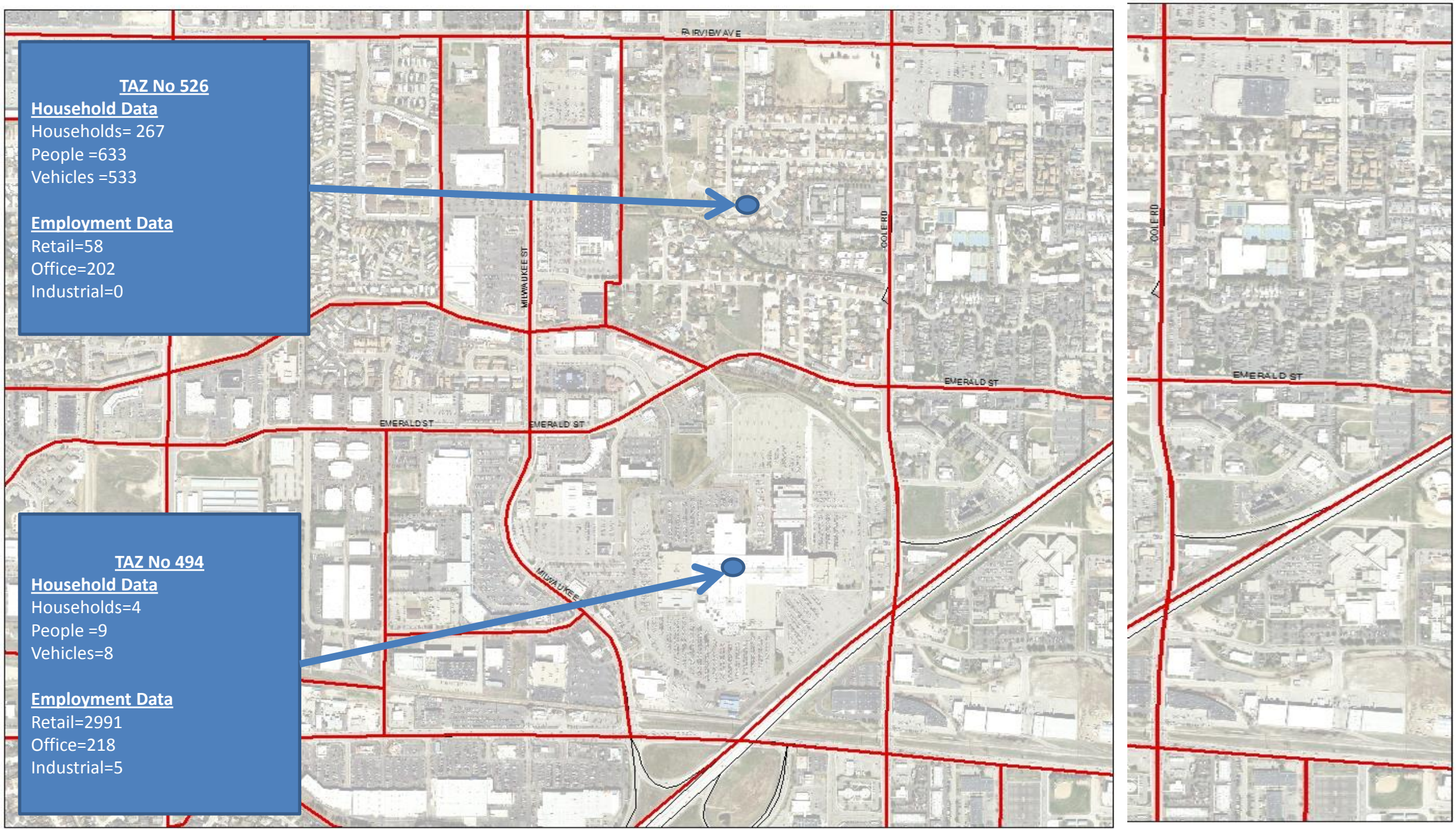
Few Key Concepts-TAZ

- TAZ -A common sense subdivision of the study area
- Typically created along census boundaries (census block, group & tract)
- Contains homogenous land-use
- Why TAZ s? To simplify the modeling process

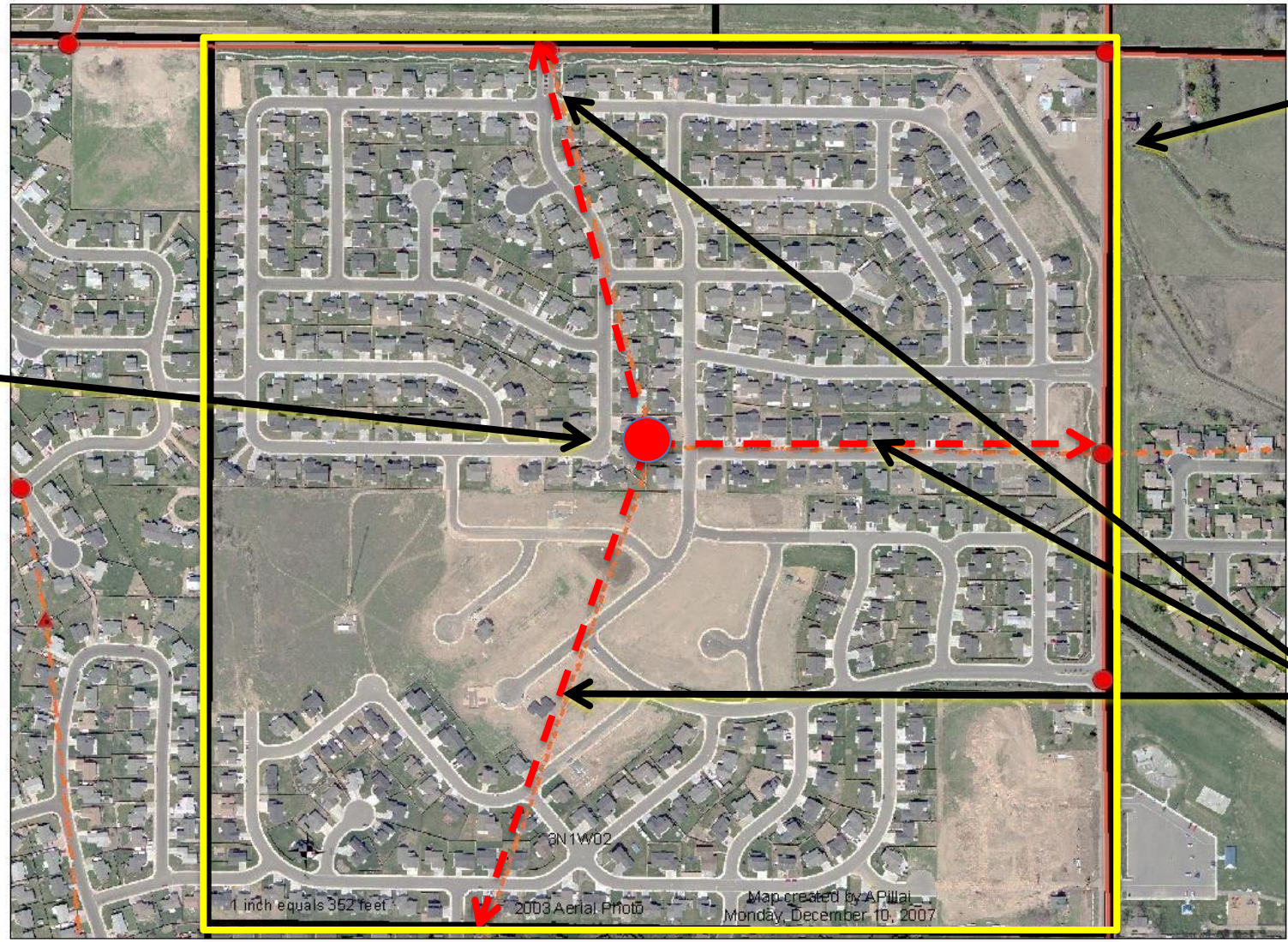
Few Key Concepts-TAZ



Few Key Concepts-TAZ


TAZ No 526
Household Data
Households= 267
People =633
Vehicles =533
Employment Data
Retail=58
Office=202
Industrial=0
TAZ No 494
Household Data
Households=4
People =9
Vehicles=8
Employment Data
Retail=2991
Office=218
Industrial=5
FAIRVIEW AVE
MILWAUKEE ST
OOLE RD
EMERALD ST
EMERALD ST
EMERALD ST
MILWAUKEE
OOLE RD
EMERALD ST

Few Key Concepts-Centroid & Connector

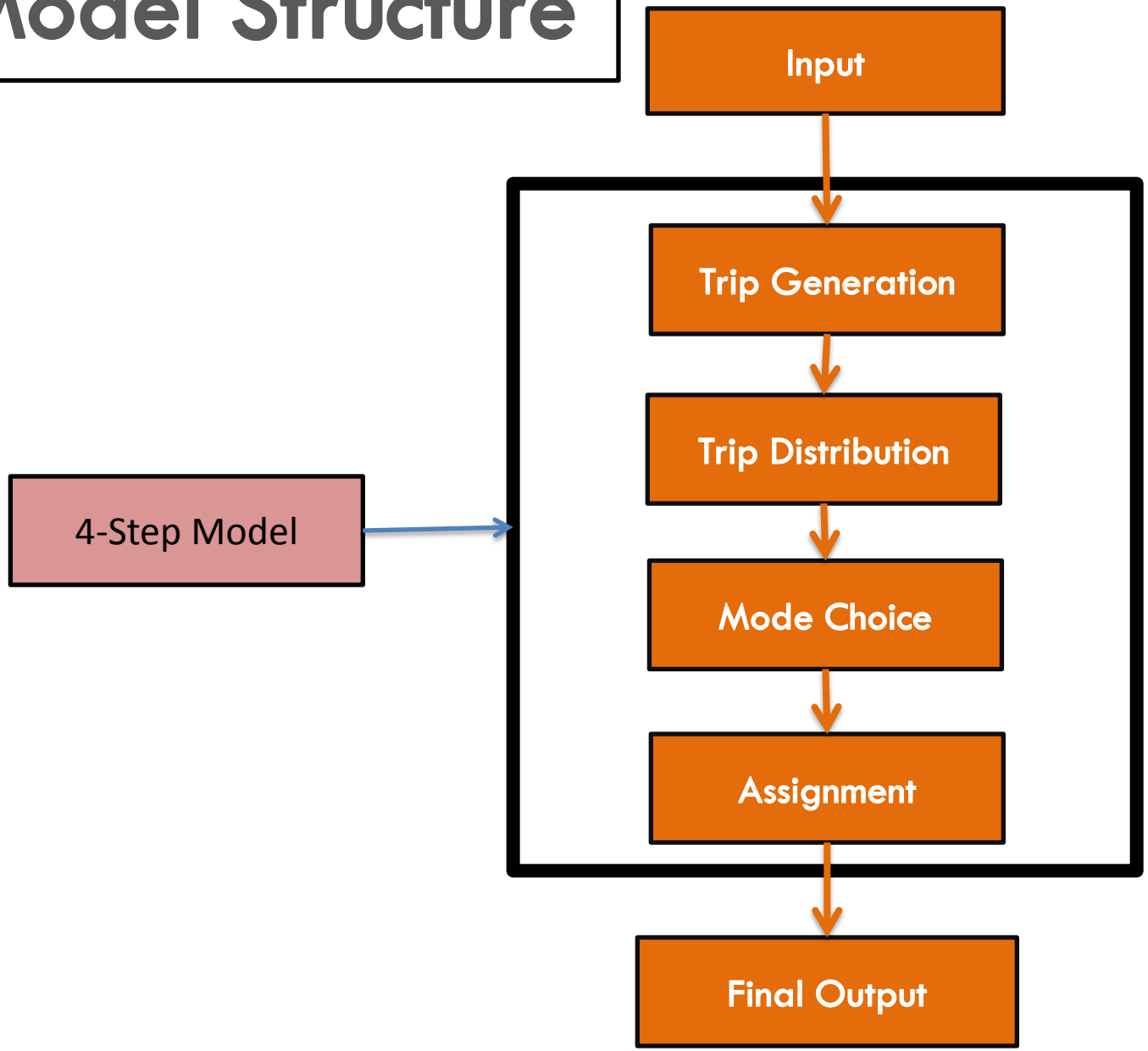


TAZ

Centroid

Connectors

Model Structure



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Input Data-Model Foundation

Input Data is critical!!!

Why?

Garbage in, garbage out!

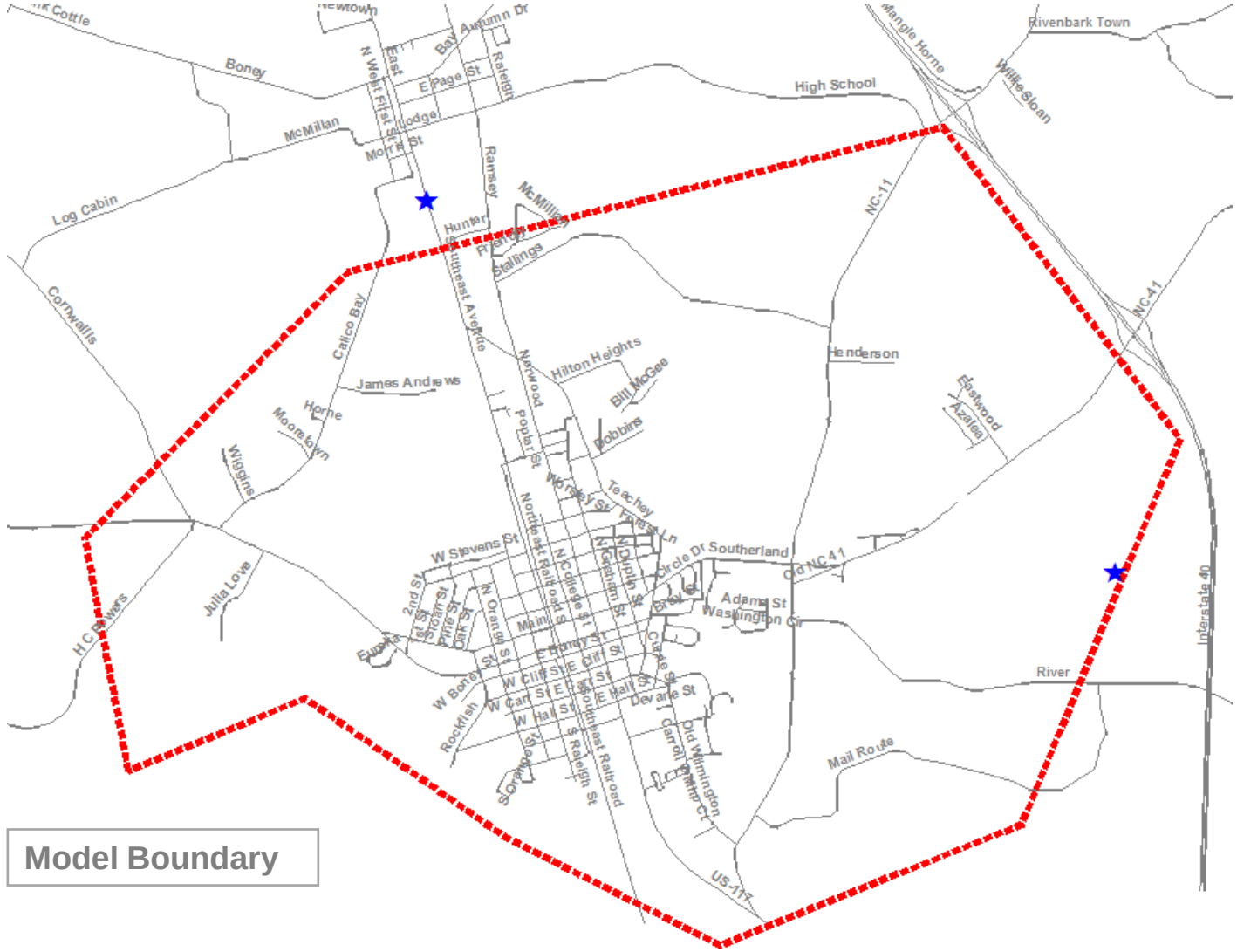
Input Data

- Socio-Economic data/Demographics
  - Population
  - Households
  - Jobs (Office, Retail, Highway Retail, Service, Industrial)
  - School (K-12, Western Carolina University)
- Transportation Network

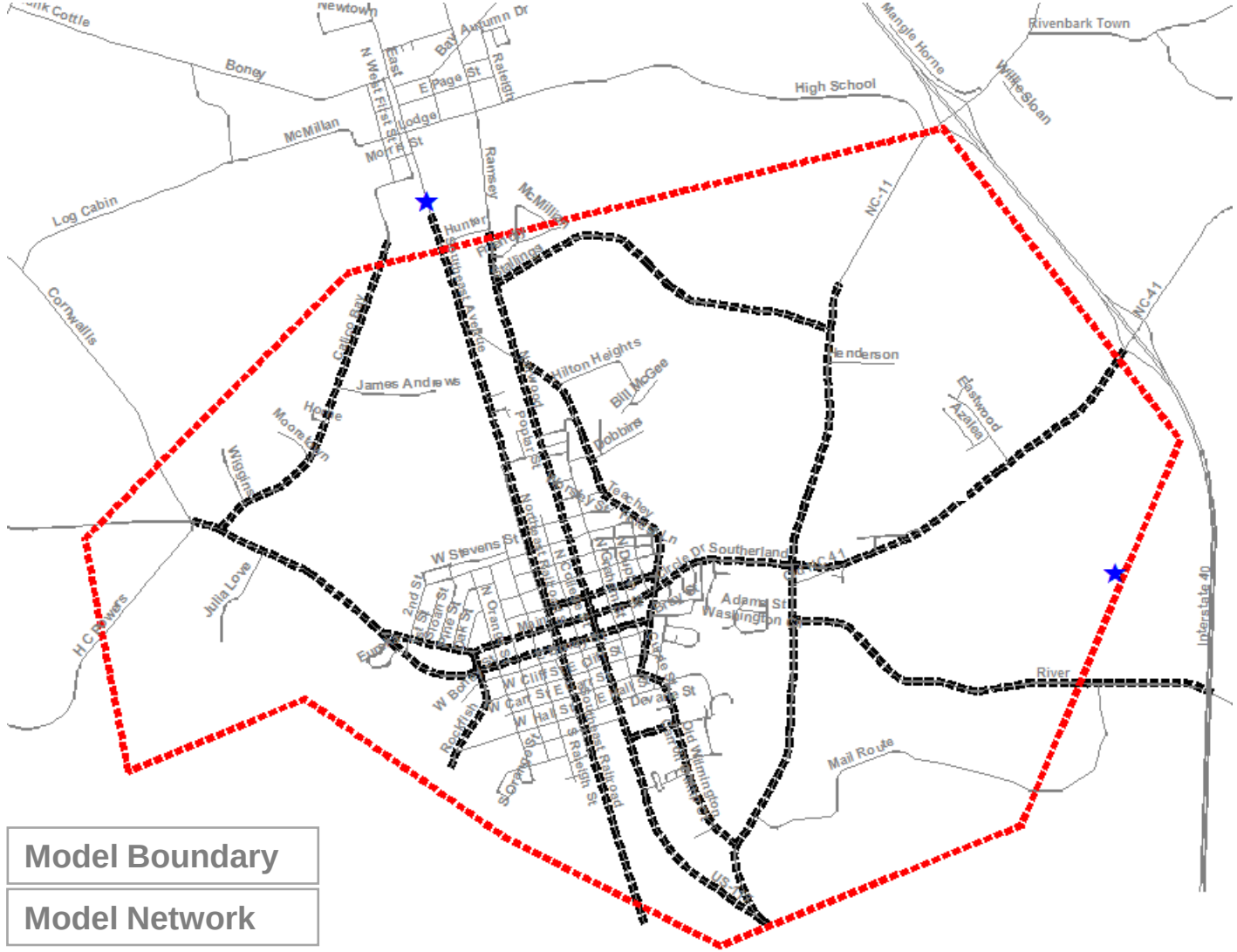
Input Data-Demographics

- Socio-Economic data/Demographics
  - Population
  - Households
  - Employment
  - School enrollment
  - V ehicle ownership
- Compiled using
  - Census data
  - Local comprehensive plans
  - Employment data from private vendors (infoUSA) and reviewed by local staff and CTP Committee
  - School data
- Aggregated at the TAZ level

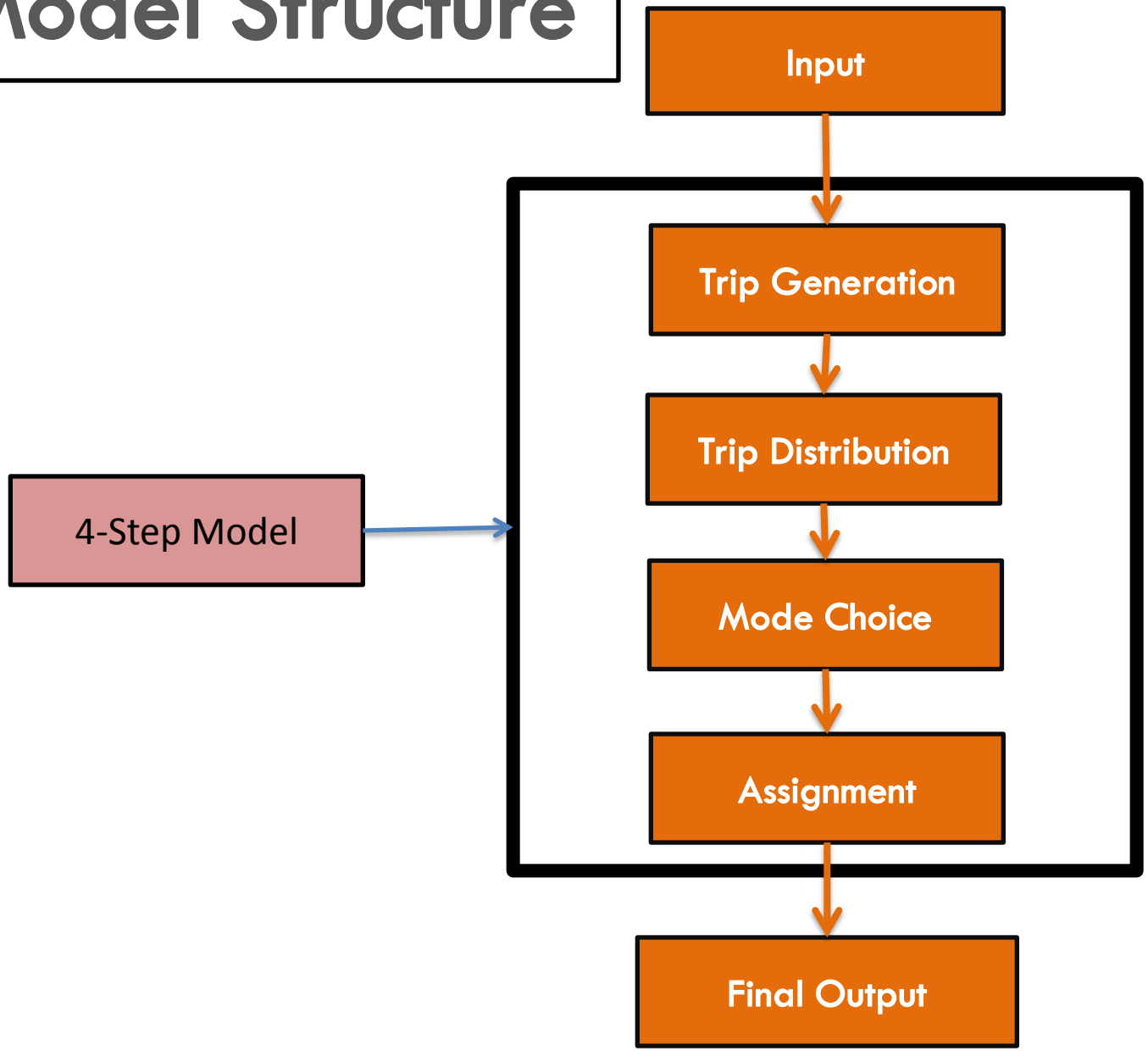
Input Data- Transportation Network



Input Data- Transportation Network



Model Structure



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Trip Generation

How many trips are generated?

Work Trips

Shopping trips

School Trips

Other Trips & More….

Trip Generation

How many trips are generated?

- Determines how many **Productions** or **Attractions** are in each TAZ in a typical day

- Characterized by trip purpose. E.g. Home-based-work, Home-based-school, Home-based-other etc.

Trip Distribution

Where do the trips go to (or come from)?

- Determines how many trips begin or end in each TAZ in a typical day

- Trip distribution is done through:
  - ✓ Gravity Model

Trip Distribution

Gravity Model

(Based on Newton's Law of Gravity)

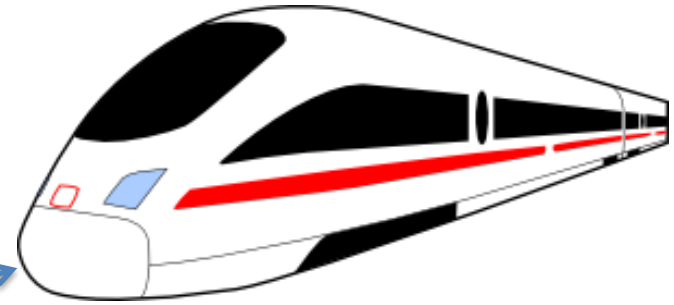
- Distributes trips based on "size" and "distance" to other zones

Size: Land use

Distance: Any "cost factor". e.g. distance, travel time, cost ($)

Mode Choice

How will they get there?



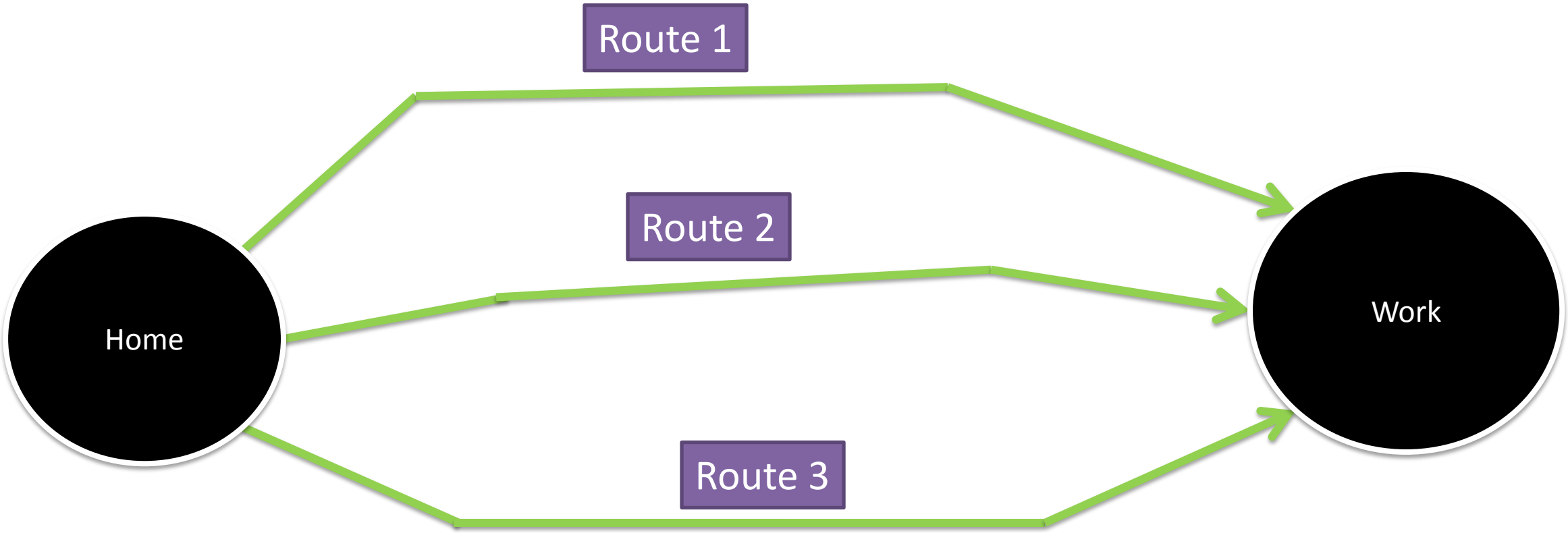
Mode

Mode Choice

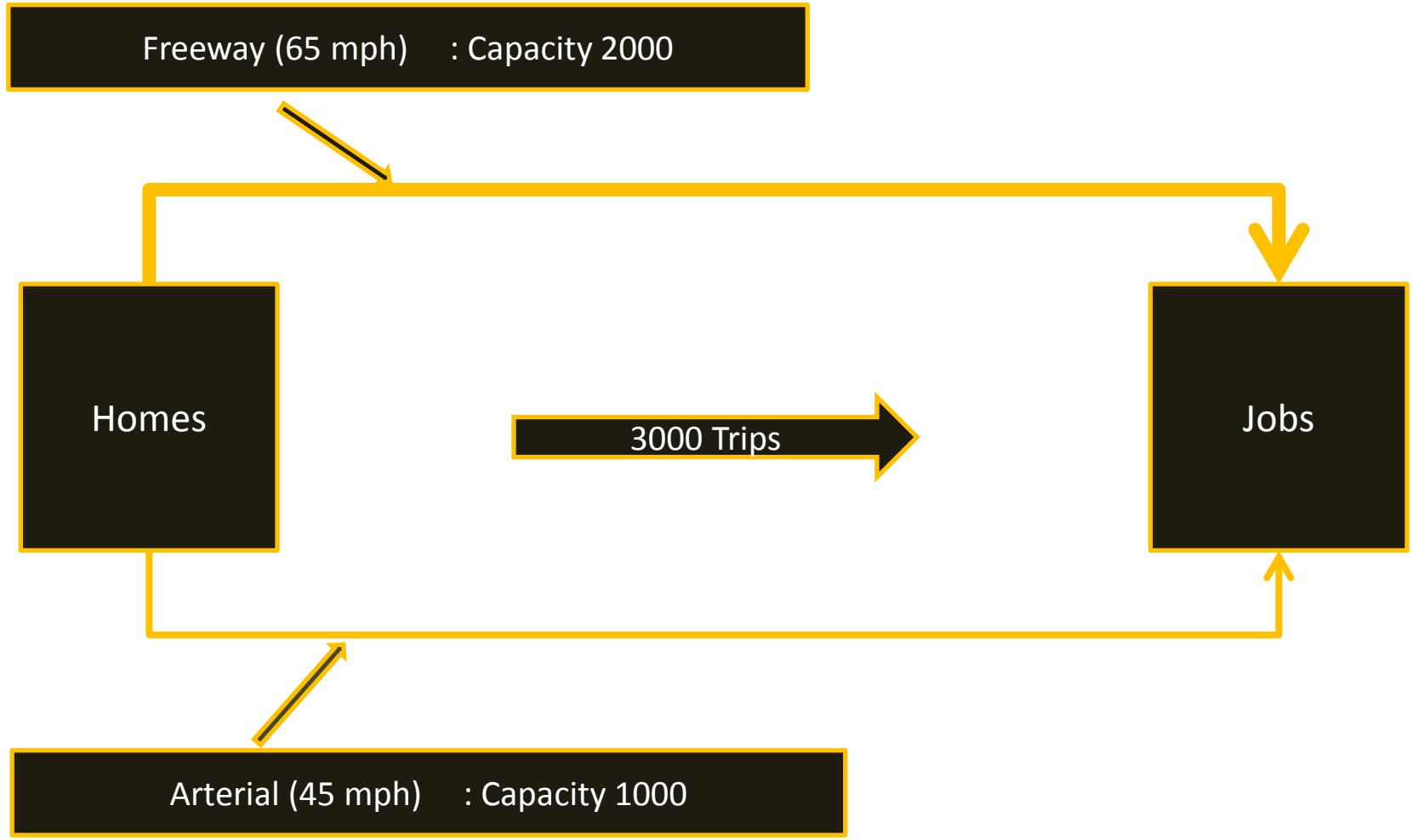
How will they get there?

- Small Area Models do not have an explicit mode choice model
  - ✓ Non-vehicular trips are removed before trip assignment
- Non-vehicular modes typically comprise about 5% of the total trips

Trip Assignment



Trip Assignment: "The Circle of Traffic"



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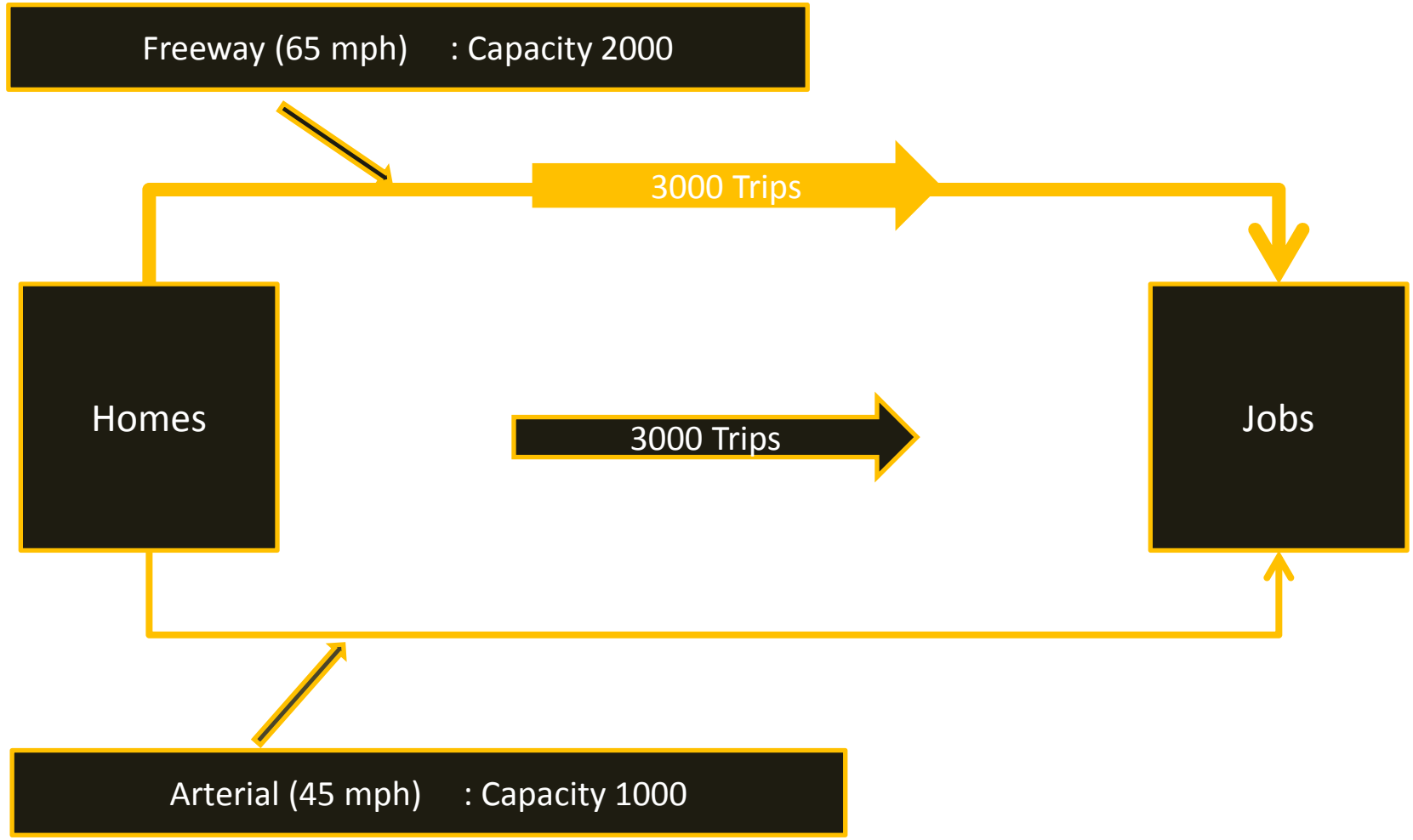

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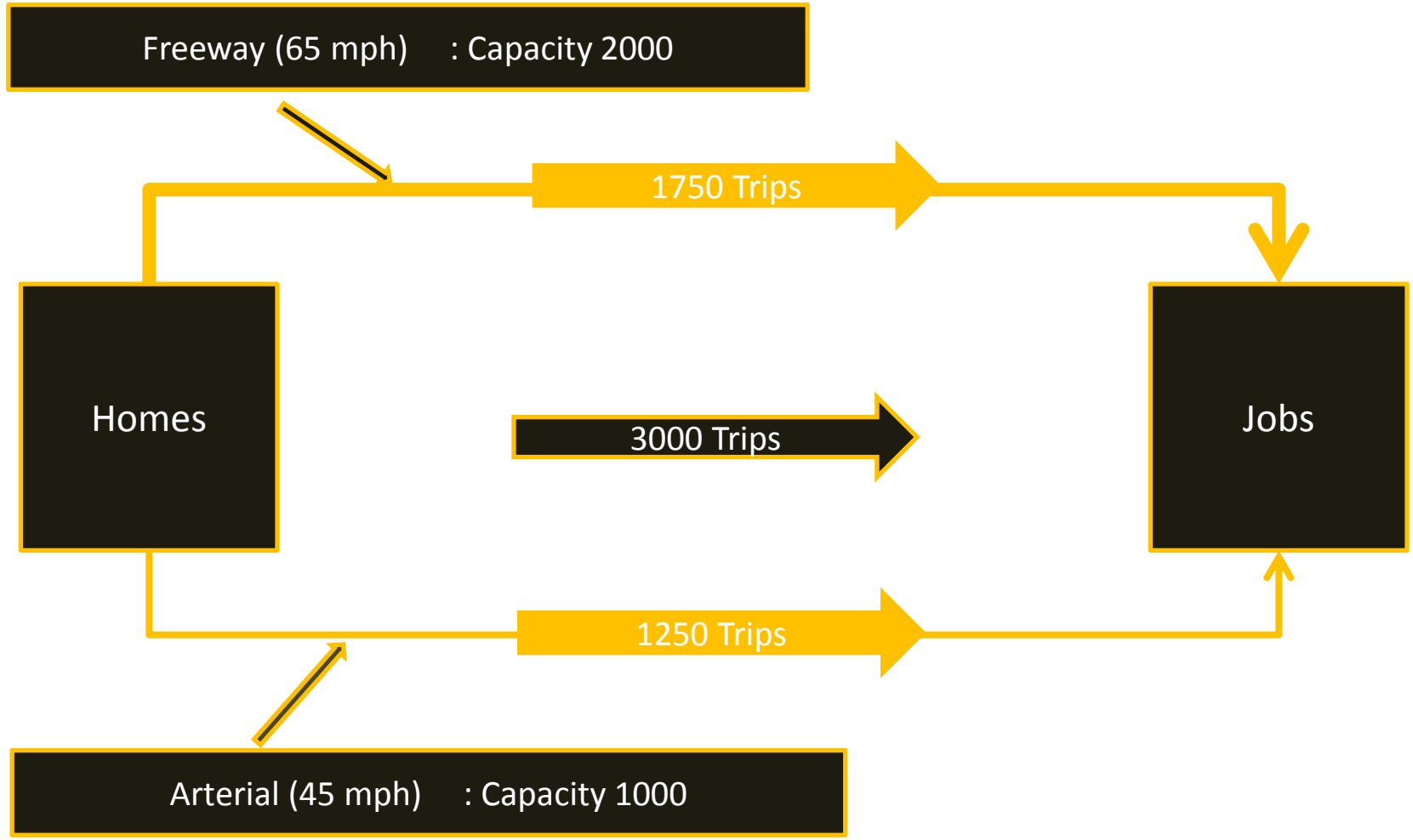

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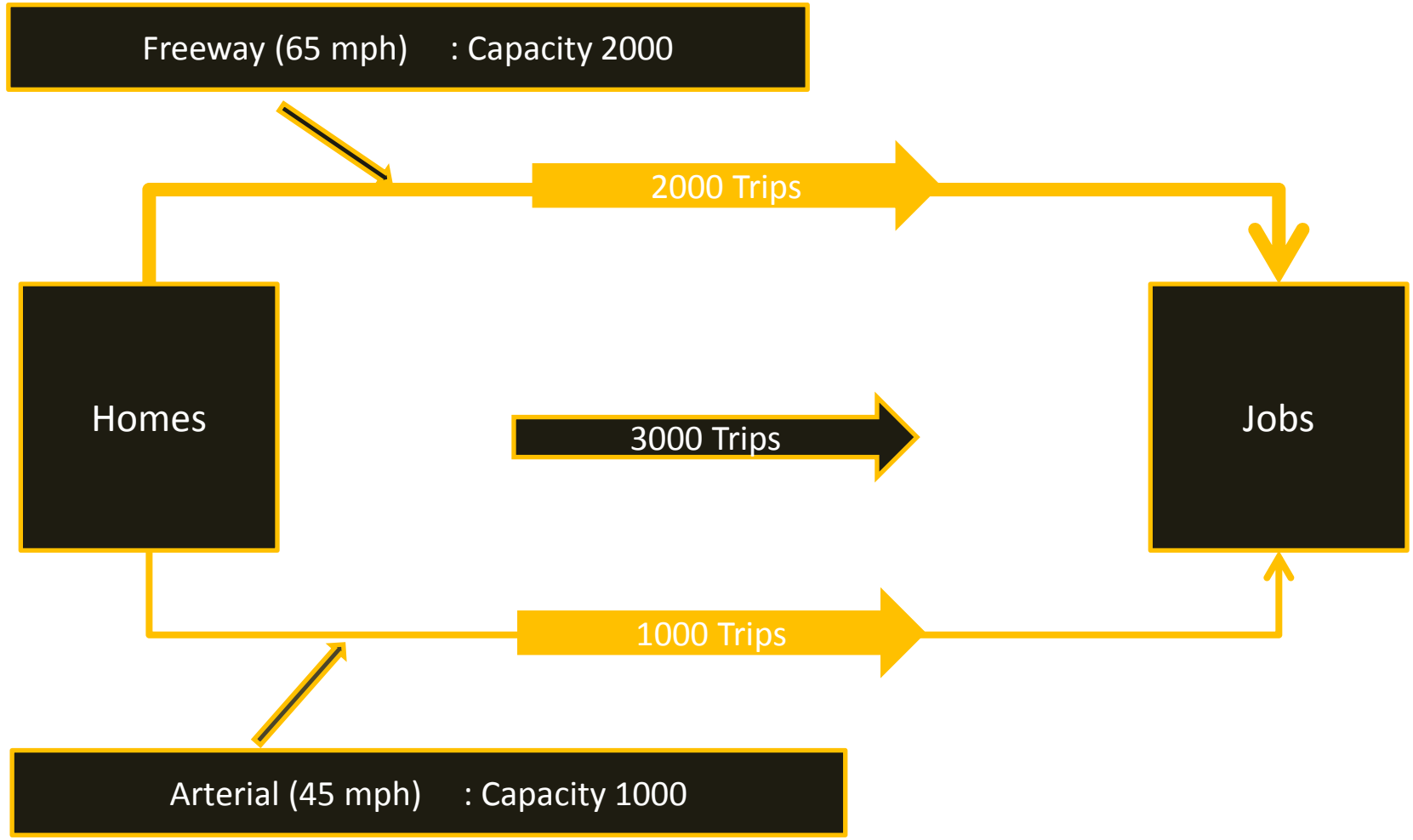
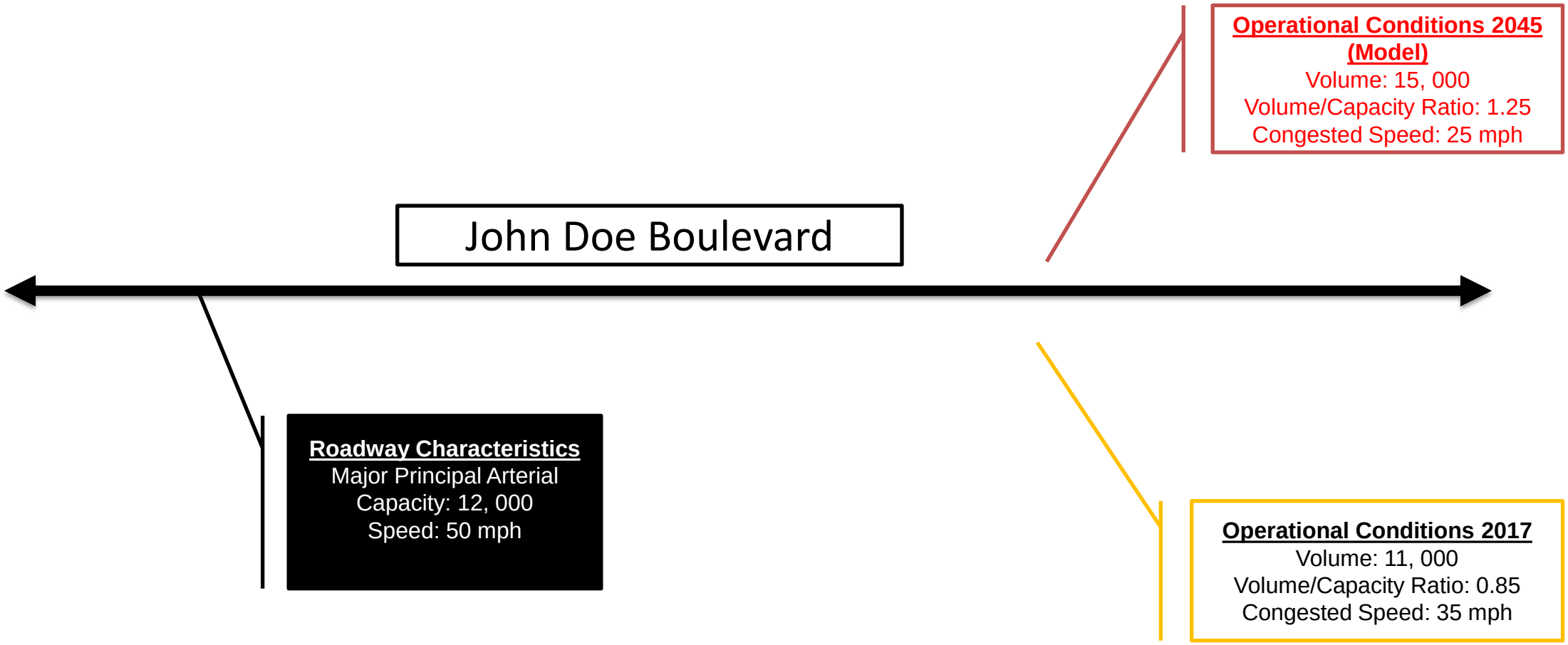
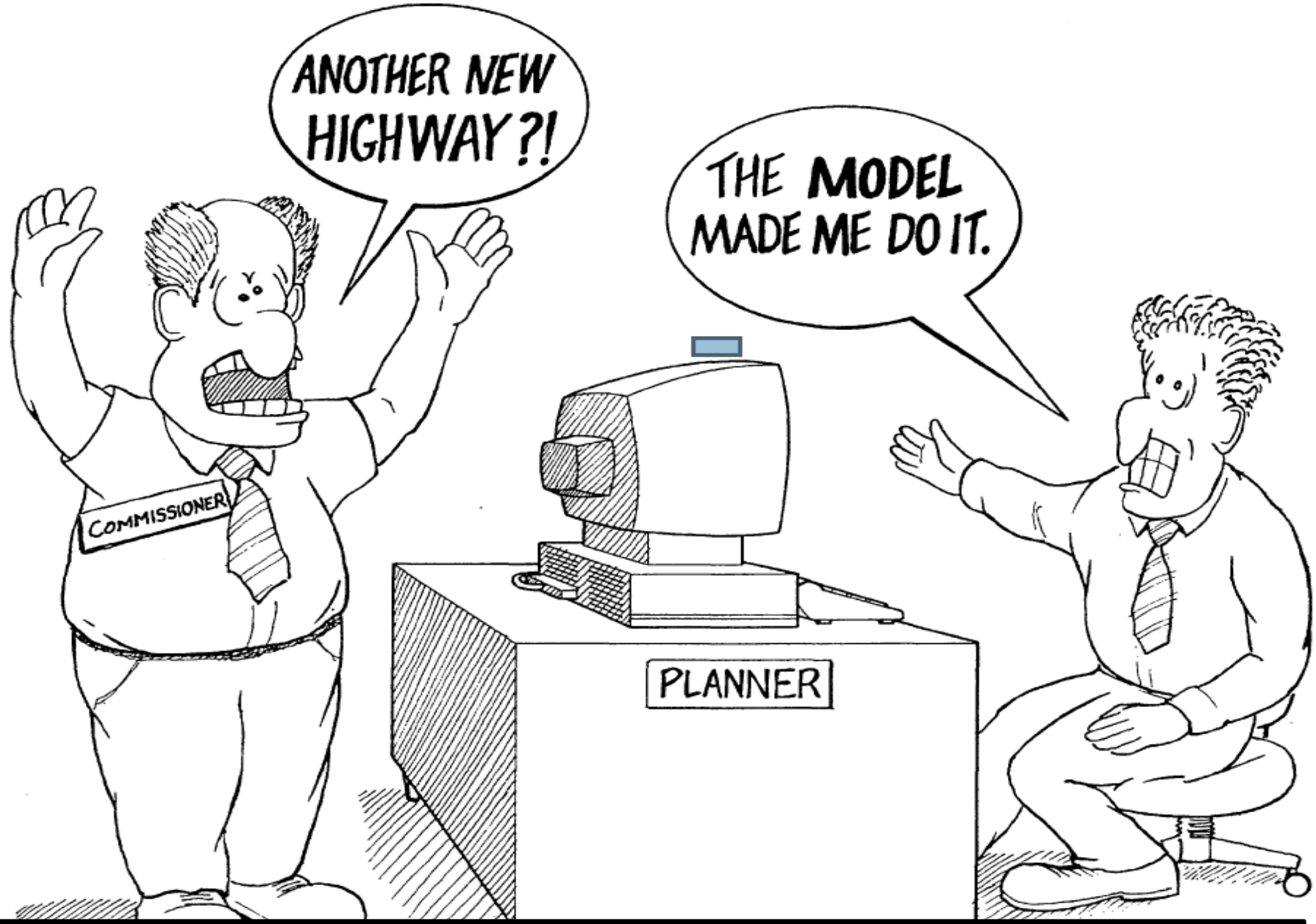


Outputs

- Volumes
- Congested Speed
- Volume-capacity ratio
- Travel times

Evaluating Outputs





Disclaimer: Resemblance of any events in this caricature to actual incidents is obvious!

How can local planners assist with the development of a Travel Demand Model (TDM)?

- ✓ Input on establishing the model boundary
- ✓ Input on roads to study (staff and CTP Steering Committee)
- ✓ V erifying employment data (overall and by TAZ – Employers may trust a local call versus a call from "Raleigh")
- ✓ Growing and verifying population (overall and by TAZ – building permits are helpful)
- ✓ An extra set of eyes to check the base year data (road attributes, population etc.)
- ✓ Assistance with future year population and employment projections (staff and CTP Steering Committee)

Contact Us

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