CA-MPO CITIZENS TRANSPORTATION ADVISORY COMMITTEE (CTAC)

Charlottesville Albemarle Regional Travel Demand Model Development

TJPDC

September 24, 2025

Agenda

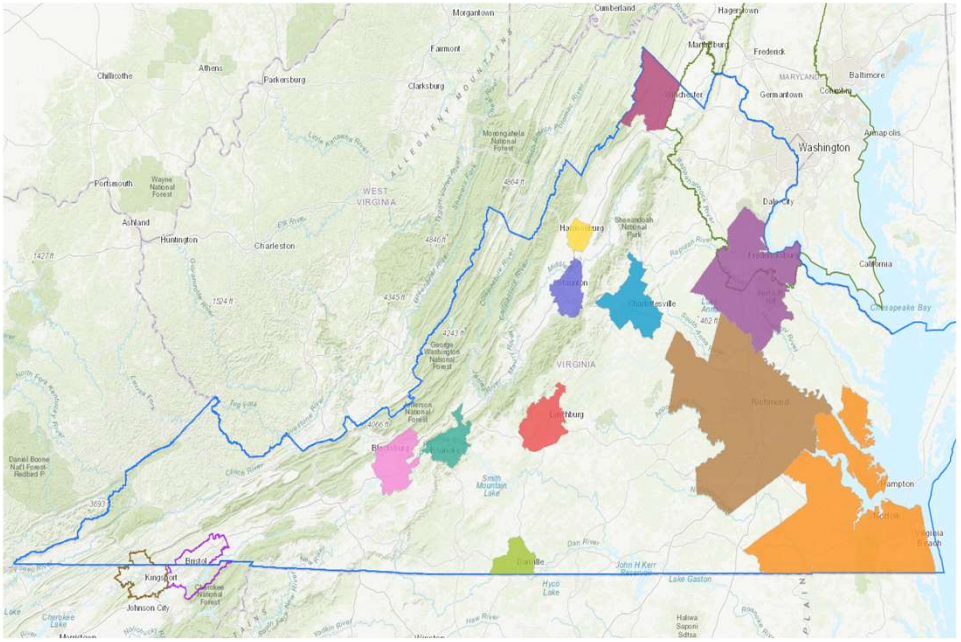
- What is Travel Demand Modeling?
- Travel Demand Modeling in Virgina
- How does the CAMPO model work?
- What can the CAMPO model tell us?
- What does the CAMPO model need?
- Why update the model?
- Current status and next steps

What is Travel Demand Modeling?

- **Travel Demand Model**
  - A computer model used to estimate travel behavior and travel demand for a specific future time frame, based on a number of assumptions

- **Purpose**
  - Answer critical “what if” questions about proposed plans and policies
  - Using “Forecasts” assist decision makers in making informed transportation planning decisions

Travel Demand Modeling in the Commonwealth of Virginia

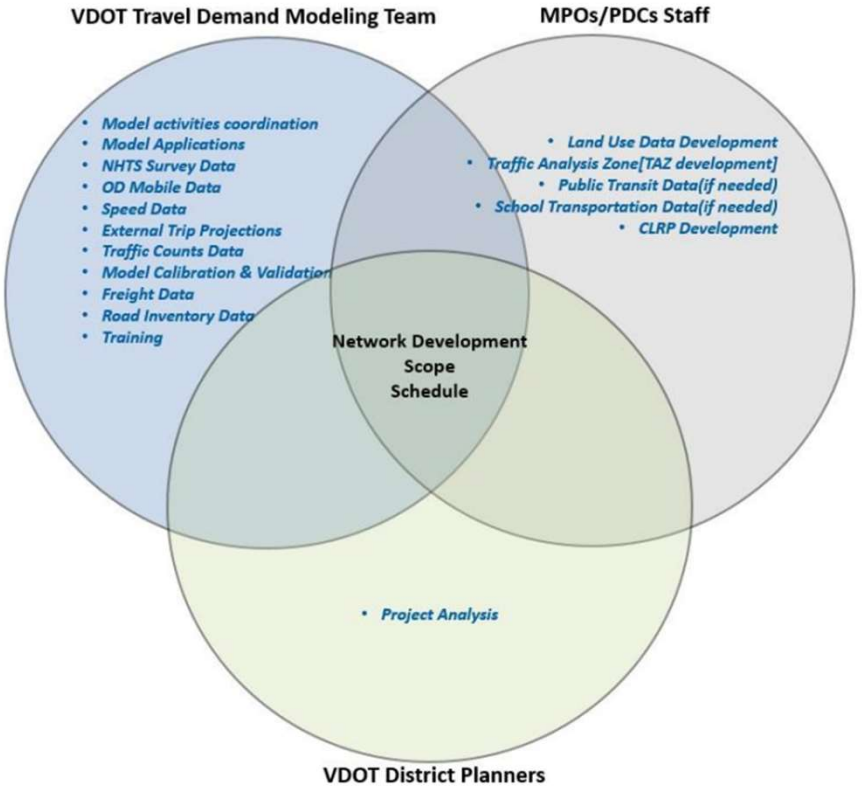


- **Total 12 travel demand models maintained in Virginia**

- Virginia Statewide Model
- Hampton-Roads TPO Model
- Fredericksburg Area MPO Model
- Roanoke-Valley-Alleghany Regional Model
- Danville-Pittsylvania MPO Model
- Central Virginia MPO (Lynchburg) Model
- Harrisonburg-Rockingham MPO Model
- Winchester-Frederick County MPO Model
- Staunton-Augusta-Waynesboro MPO Regional Model
- Richmond-Tri-Cities Regional Model
- New River Valley MPO Model
- Charlottesville-Albemarle Regional Model

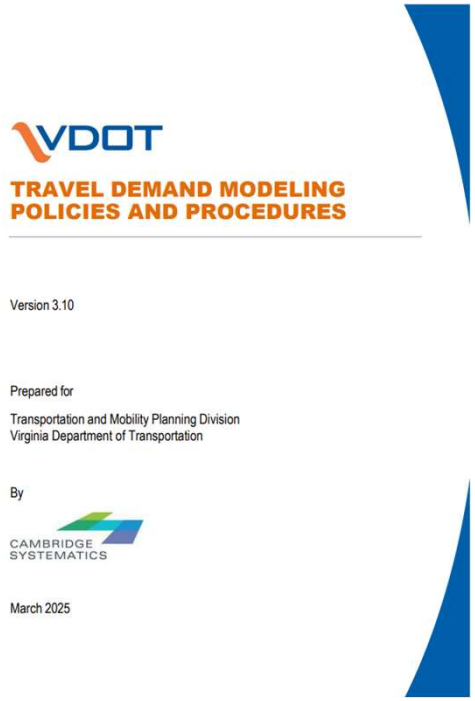
Travel Demand Modeling in the Commonwealth of Virginia

- **VDOT Transportation Mobility and Planning Division (TMPD) staff, VDOT District Planners, and MPO/Planning District Commission (PDC) staff all play varying roles in the development, maintenance, and application of travel demand modeling in the Commonwealth of Virginia.**



Travel Demand Modeling in the Commonwealth of Virginia

- The *'Travel Demand Modeling Policies and Procedures*' manual has been developed and continuously updated over the past decade. This manual serves as a comprehensive guide for public agencies responsible for developing, validating, and applying travel demand models, ensuring consistency, accuracy, and alignment with best practices in transportation planning in state Virginia.



Link

How does the CAMPO model work?

- **CAMPO model**
  - "Four step" process based on trip making and trips
  - Analyze and forecast the critical aspects of travel

Questions to be answered	Aspects of Travel	Four-step process
How many trips will people make?	Frequency/Magnitude	**Generation**
Where do people travel from/to?	Locations	**Distribution**
How will people travel?	Transportation modes	**Mode Choice**
When will people travel?	Departure/arrival times	**(Time of Day)**
How is transportation system used?	Routes	**Assignment**

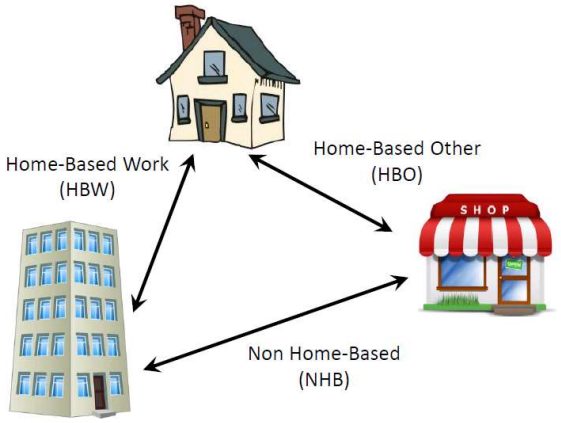
"Time of Day" is considered part of Assignment step

How does the CAMPO model work?

Trip Generation

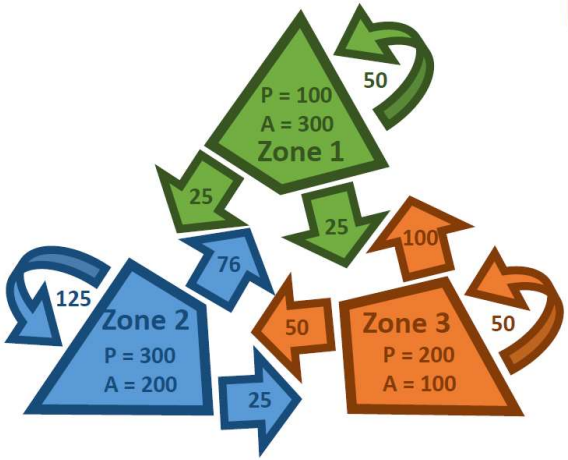
How Many Trips?

- Determines the number of trips generated by each zone
- Trips are stratified by purpose



How does the CAMPO model work?

Trip Distribution



Where Do Trips Go?

Trip Generation

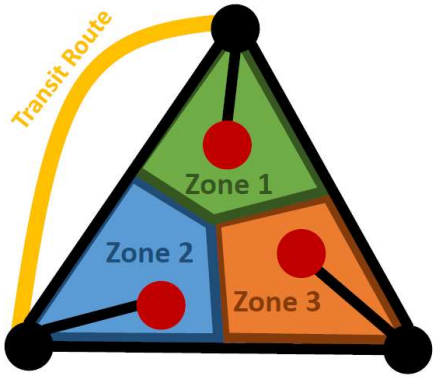
- Determines the quantity of productions and attractions in each zone

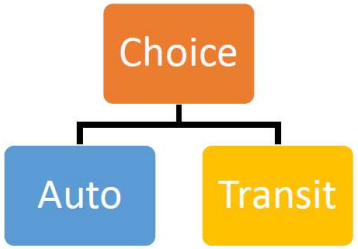
Trip Distribution

- Links the productions and attractions between zones

How does the CAMPO model work?

Mode Choice





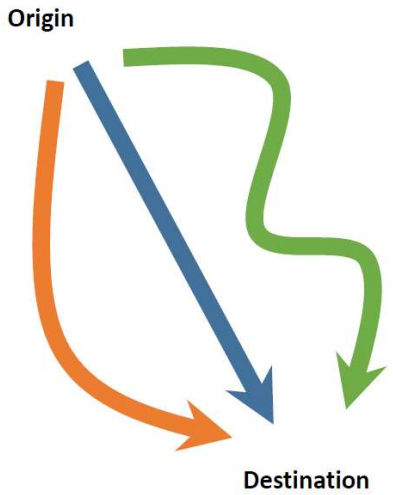
Compares the relative desirability of each mode

How does the CAMPO model work?

Traffic Assignment

Which Route?

- Determines the paths travelers will use between each origin and destination pair



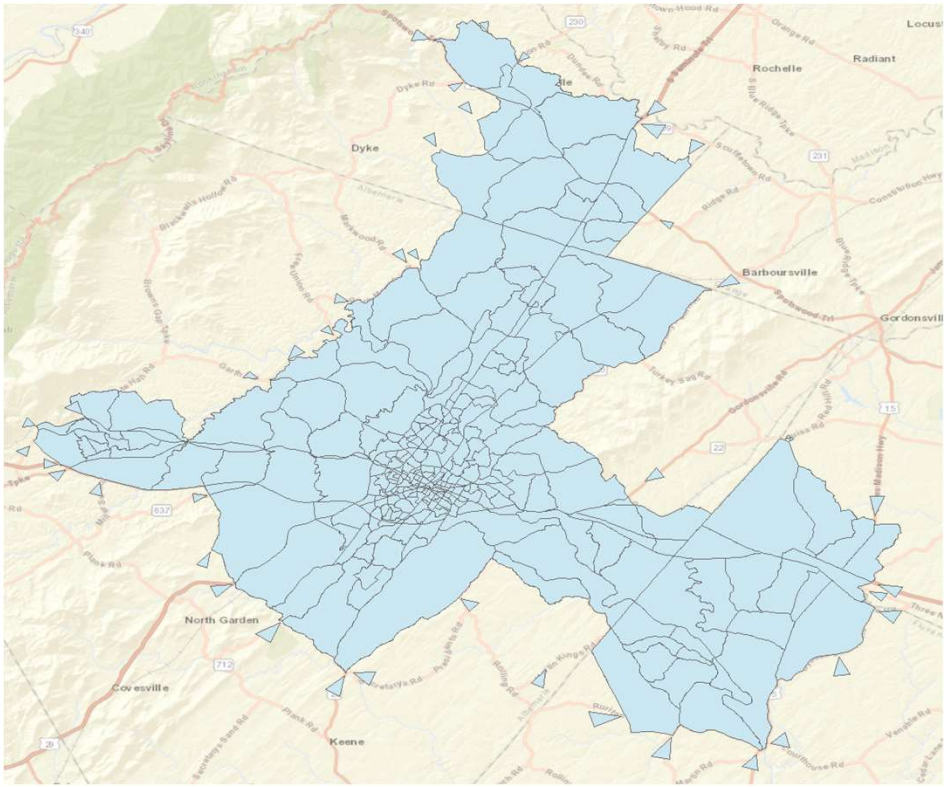
What can the CAMPO model tell us?

- Traffic volumes by:
  - Vehicle classes - auto, single-unit-truck, multi-unit-truck
  - Time periods - AM, MD, PM, NT and daily
  - Speed, travel time, congestion index (e.g. V/C), VMT and VHT*
- Transit ridership by:
  - Stops/stations
  - Routes
  - Modes/operators – local bus, express bus and UVA shuttle
  - Time periods – peak and off-peak
- Other regional metrics
  - Total trips
  - Average trip length
  - Mode share

*V/C – Volume / Capacity ratio
VMT – Vehicle Miles Travelled
VHT – Vehicle Hours Travelled

What does the CAMPO model need?

- **Traffic analysis zone (TAZ)**
  - **Smaller geographic units for analysis**
  - **Rich land use data (population, employment, schools, etc.)**
  - **Homogenous land use (residential, industrial, commercial, etc.)**
  - **Size – transportation network detail**
  - **307 TAZs**
  - **Externals**
    - Capture important roadways carrying volume to/through model area
    - 43 externals

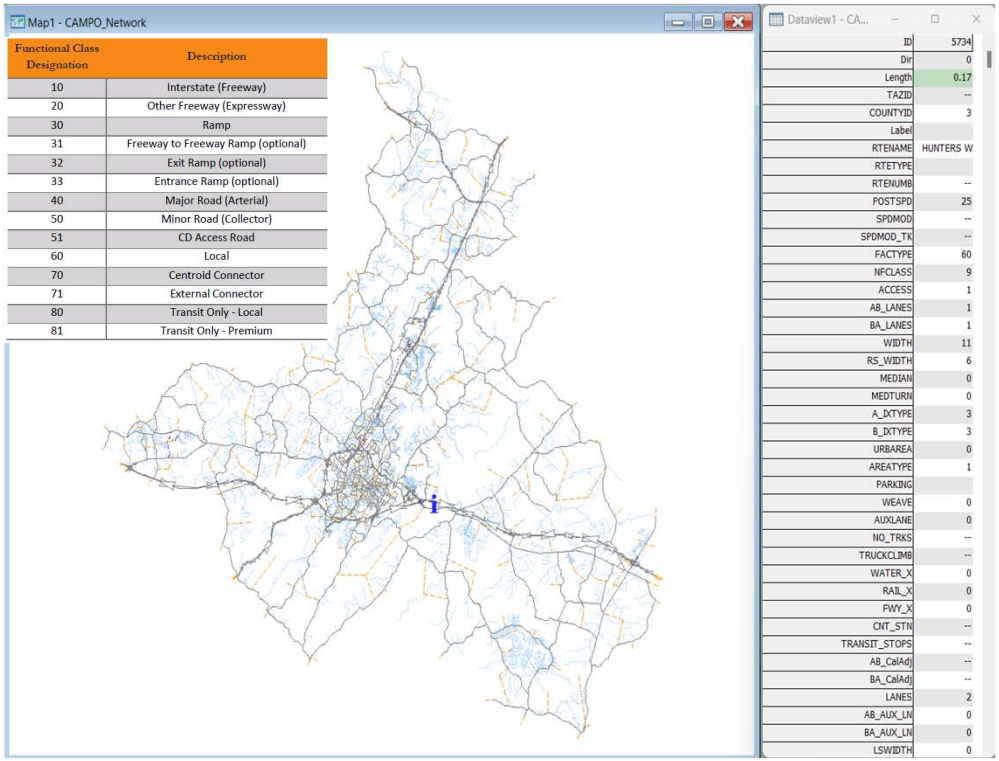


What does the CAMPO model need?

- Demographic Data
  - Population
  - Households
  - Employment
  - School, College enrollment, Income levels, etc.
- Demographic Data developed needs to be approved at local and regional level as it is tied to Local Comprehensive Plan assumptions
- Other Data sources for model update
  - American Census Survey (ACS), National Household Survey (NHTS)
  - VDOT volume counts
  - General Transit Feed Specification (GTFS), Observed Functional Classes (FC), Posted Speeds, etc.

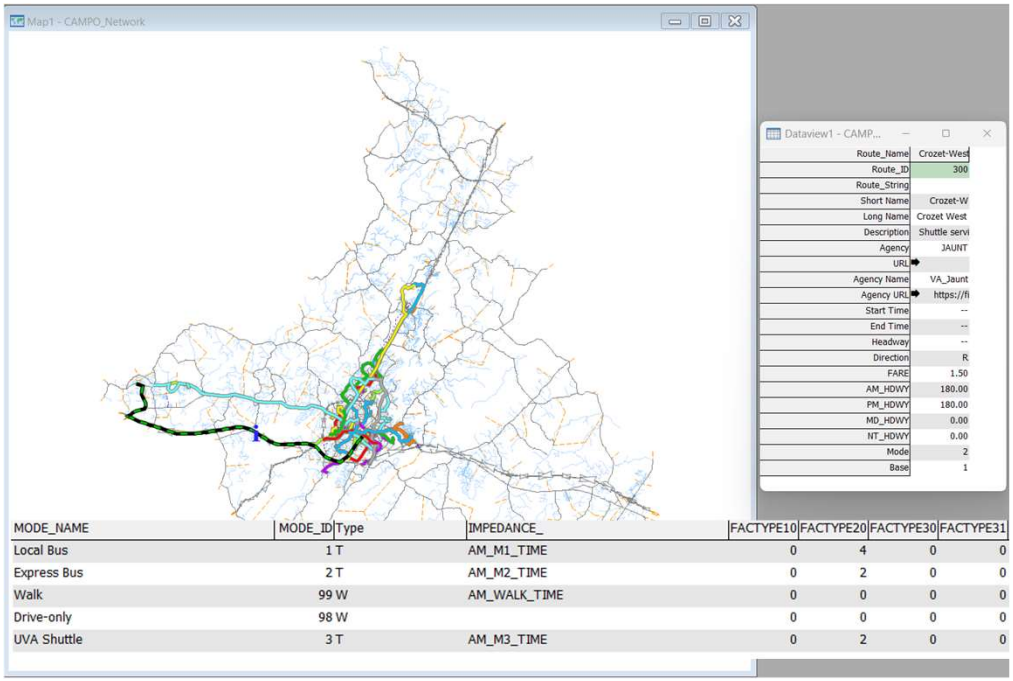
What does the CAMPO model need?

- **Highway network**
  - Geometry
  - Length
  - Travel speed/time
  - Facility type
  - Number of lanes
  - Area type
  - Other attributes, width, name etc.



What does the CAMPO model need?

- **Transit network**
  - Operator
  - Mode (Premium, local bus, etc.)
  - Route number and name
  - Fare
  - Operational speed
  - Operational headway
  - Stops/stations
  - Others, service hours, etc.



MODE_NAME	MODE_ID	Type	IMPEDANCE_	FACTYPE10	FACTYPE20	FACTYPE30	FACTYPE31
Local Bus	1	T	AM_M1_TIME	0	4	0	0
Express Bus	2	T	AM_M2_TIME	0	2	0	0
Walk	99	W	AM_WALK_TIME	0	0	0	0
Drive-only	98	W		0	0	0	0
UVA Shuttle	3	T	AM_M3_TIME	0	2	0	0

Why update the model?

- **Input data review and refinement**
  - Land use data
  - Transportation networks
- **Reality check on the modeling results**
  - Travel market is dynamic and constantly changing
  - Roadway traffic
  - Transit Ridership
  - Other data from National Household Travel Survey (NHTS), etc.
- **Model parameter adjustments**

Input data review and refinement

- Presented CAMPO Model Update process in August 2025 MPO Policy Board Meeting
- Discussed the current TAZ structure used in the model
- Demographic variables and methods of estimation for 2022 model year
- Presented 2022 demographics summaries and plots
- Presented base year network plots
- Discussed potential uses of the model
- The MPO Board approved the 2022 base year demographic data

Current Status and Next Steps

- Completing the Data Development and Model Input Updates tasks
- Working on the Model Validation tasks to finish before January 2026
- Finish Sensitivity Testing or Dynamic Validation before February 2026
- Develop and test the Future Year Model before March 2026
- Provide Model Documentation by mid March 2026
- Support Model Training before end of April 2026

Questions?