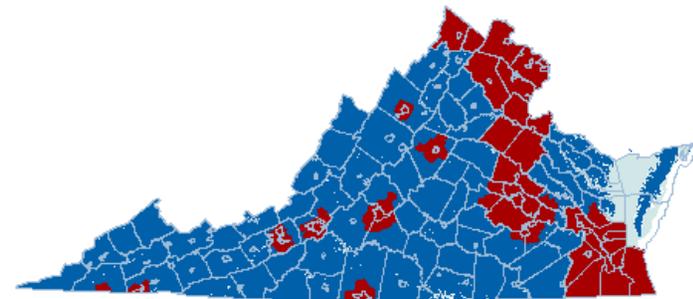




Overview of Travel Demand Modeling
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What Is a Travel Demand Model?

Typical Definition:

A series of mathematical models that attempt to simulate human travel behavior, executed in a sequence of steps that answer a series of questions about traveler decisions.

Attempts are made to simulate choices travelers make in response to a given system of highways, transit and transportation policies

The output is a measure of future travel demand that is expressed in terms of future traffic volumes.

Simply: A forecast of future travel

Where are people traveling to and from.

What routes are they choosing to get there.

Future year-forecasts are only as good as the assumptions that are made

Why Are Models Important?

Travel demand models are fundamental to transportation planning and used to meet federal requirements in a number of areas.

Models:

- Are the major tool used to guide the development of Long-Range Transportation Plans (Metropolitan Planning Regulations “Title 23”)
- Support Transportation Studies at the Corridor Level
- Allow decision makers to make informed decisions with the best possible information about future needs
- Are used for determining where congestion may be in the future
- Are used for determining what projects will alleviate or minimize that congestion
- Are used for scenario analyses (What ifs?)
- Determine traffic impact due to land use changes (Chapter 527)
- Guide future investment strategies (PPTA)
- Are important to almost all transportation projects (EIS)

Building a Travel Demand Model

What do we need to start? DATA!!!

- Population (how many people do we have?)
- Households (where do they live)
- Employment (jobs, shopping, restaurants, recreation, etc.)
- Traffic Analysis Zones
- Roadway Network
- Travel Surveys (Travel Patterns, by trip purpose, by mode)
 - Basis for statistical travel models

The Four Steps- Fundamental to all Travel Demand Models:

1. Trip Generation - How many trips?
2. Trip Distribution - Where are they going?
3. Mode Choices – Auto, Transit, Carpool, Bus, Walk, Bike?
4. Trip Assignment - What path are they taking?

What's Next?

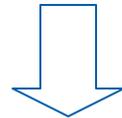
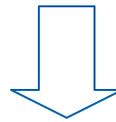
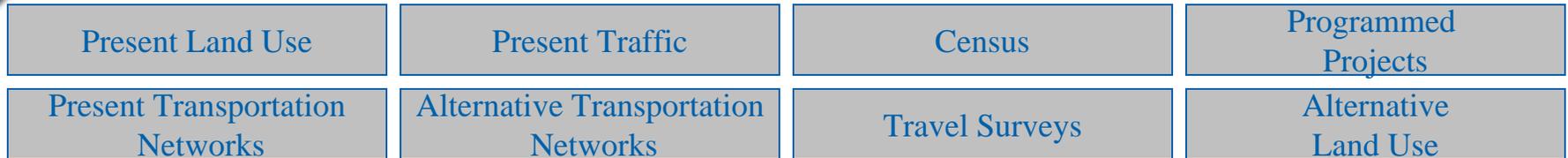
Calibration/ Validation - Does the Model work?

- **The Model is built with:**
 - Existing Roadway
 - Existing Demographics, Land use and Economic data
- **Does model output statistically in line with survey results**
- **Is model statistically in line with observed traffic counts, speeds, etc.**
- **If so we move on, if not adjustments are made (calibration)**

Scenario Analysis (The What ifs)

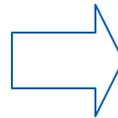
- **Future Alternative Networks**
- **Future Alternative Population and Land use Scenarios**
 - Usually limited to MPO approved data and within VEC limits

Travel Demand Modeling- Input/ Output Diagram



Model Outputs:

- Performance Measures
- Traffic Forecasts
- Corridor Demand
- Trip Distributions
- Mode Distribution
- Alternative Feasibility
- Input into micro-analysis



Applications of Model Outputs:

- Metropolitan Long-Range Plans
- Air Quality Data
- Traffic Studies (Corridor, EIS, PPTA, TIA)
- Highway Needs Assessment
- Rural Long Range Plans
- Surface Transportation Plan
- VTRANS
- Project Prioritization

Virginia's Travel Demand Model Responsibilities



CENTRAL OFFICE

- 1 Blacksburg/Christiansburg
- 2 Charlottesville
- 3 Danville
- 4 Fredericksburg
- 5 Hampton Roads
- 6 Harrisonburg
- 7 Lynchburg
- 8 Richmond/Tri-Cities
- 9 Roanoke
- 10 Winchester
- 11 Statewide

NOVA DISTRICT

- 12 Northern Virginia

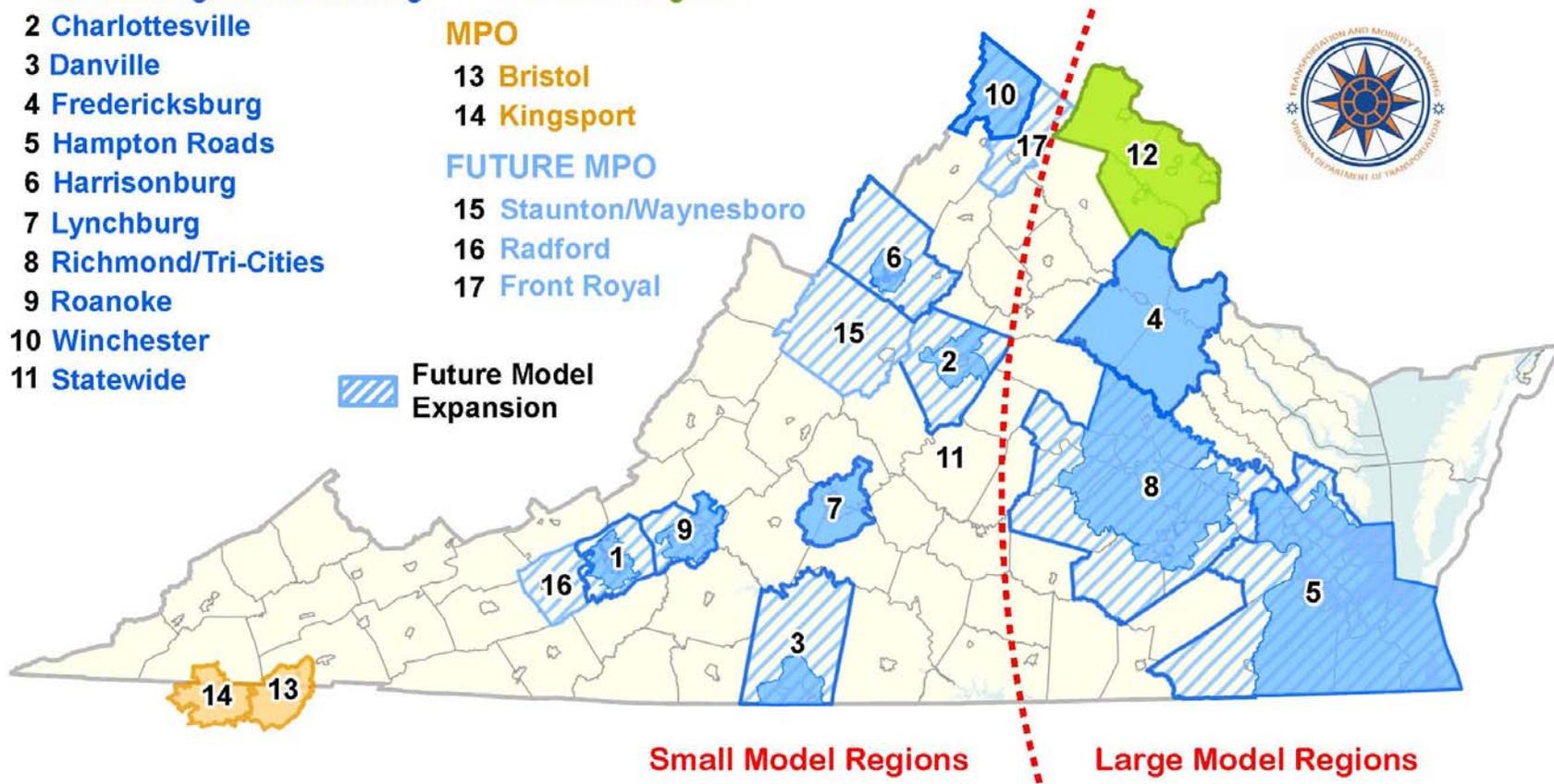
MPO

- 13 Bristol
- 14 Kingsport

FUTURE MPO

- 15 Staunton/Waynesboro
- 16 Radford
- 17 Front Royal

 Future Model Expansion



14 Current Travel Demand Models

13 MPO

1 Statewide



VTM Modeling Program

Mission: To improve the state of the practice of travel demand modeling in Virginia to support both State and MPO travel demand modeling needs.

Supports the federally mandated (3-C) process

Partnership between VDOT and MPOs

Provides models that are consistent with Federal and State Modeling Requirements and Guidelines

Ensures that federal and state transportation dollars are spent effectively

**Use same software standard: Citilabs CUBE VOYAGER
Statewide Training**

**Prevent Redundant Model Development and Data Collection
“Economies of Scale”**

Supports numerous travel demand models:

11 MPO models

Virginia Statewide Model

Tidewater “Super-Regional” Model (Covers 3 MPO areas)

Provides model development support for MPOs within Virginia

TMPD provides the modeling tools, software, and training needed by MPOs

MPOs are responsible for their own model usage or analysis

Current Major Projects Using Models

Hampton Roads / Richmond Super-Regional Model

To support I-64 and US-460 Toll Analysis

Hampton Roads MPO Truck Model

Commodity based port trucks plus non-port heavy trucks

Freight Enhancements to Virginia Statewide Model

To support multi-modal freight study

HOT Lane Modeling

Toll and HOV facilities

For Hampton Roads, Richmond, and Fredericksburg

Transit Modeling

Fredericksburg, Richmond, and Hampton Roads

Comprehensive research studies

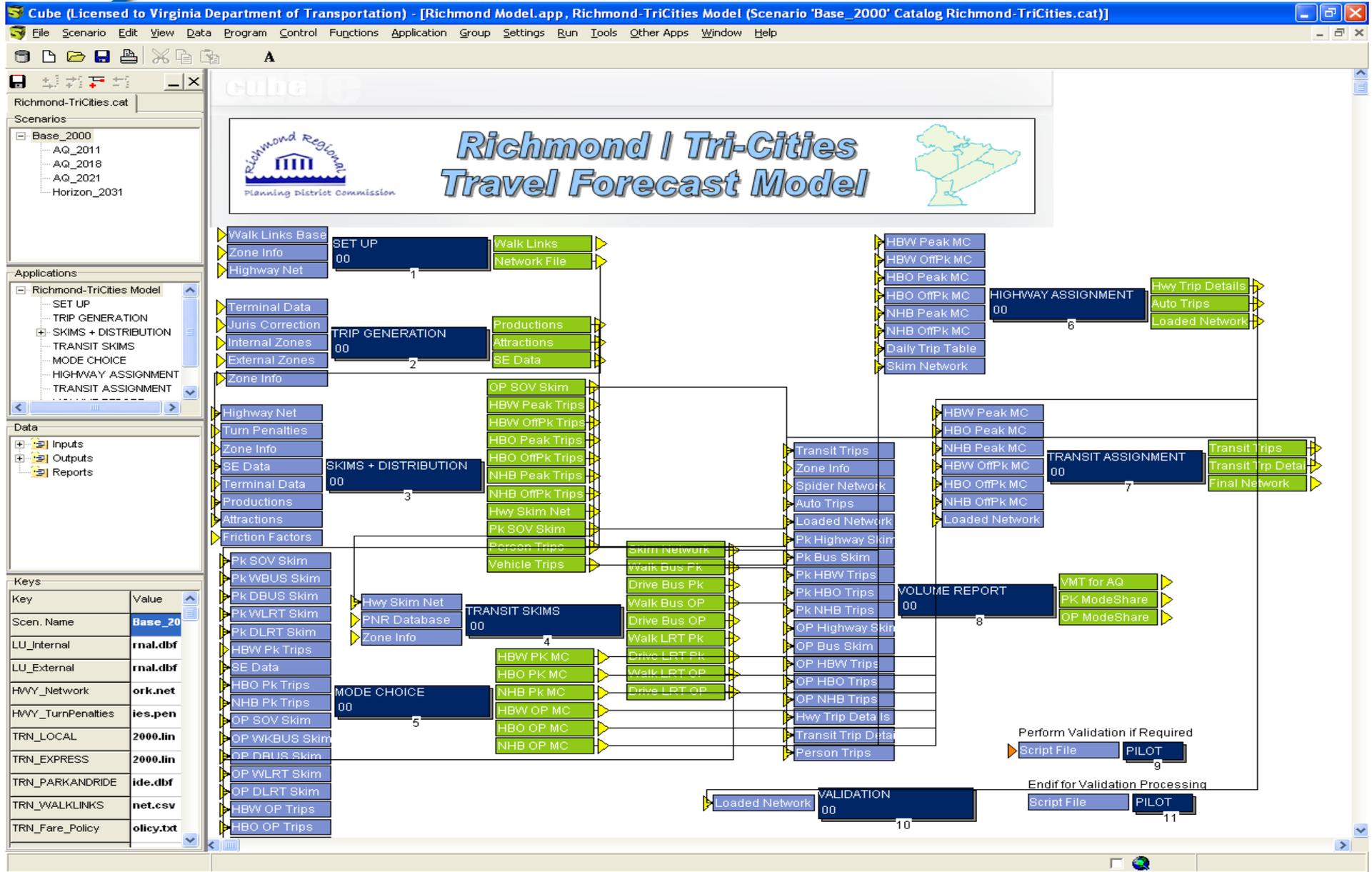
Speed/Flow for model calibration

Area Type analysis (Urban / Suburban / Rural)

Activity Based Model Usage in the US



Richmond/Tri-Cities Travel Forecasting Model Setup





Fredericksburg Regional Traffic Forecasting for I-95/395 HOT Lane Project

Fredericksburg
Highway Network





More Information

VTM Website

<http://www.virginiadot.org/projects/vtm/vtm.asp>

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