
VDOT
Virginia Department of Transportation

NOVA DISTRICT TRANSPORTATION PLANNING

Travel Demand Forecasting Guidance Overview

VDOT NOVA Transportation Planning September 18, 2026

Dan Goldfarb, PE, PTP – Sr. Planning Specialist

Agenda

- Introduction
- Overview of the NOVA District Travel Demand Forecasting
- Current Activities and Initiatives
- Forecasting Guidance
- Recent Improvements and Future Direction

Role of Travel Demand Forecasting in NOVA District

- Supports planning, project development, and NEPA studies
- Provides data-driven insights for roadway and multimodal needs
- Ensures consistency between District, Central Office, the jurisdictions, and MWCOG/TPB modeling

Current Activities & Initiatives

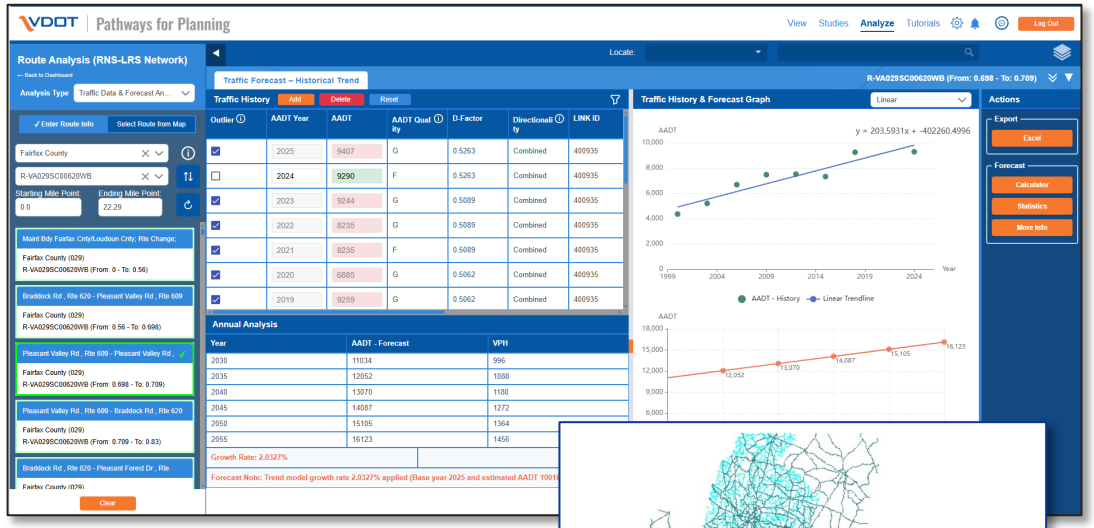
- **Forecasting efforts**
- **Support for project under development**
- **Integration of updated land-use data and observed traffic datasets**

PROJECT PIPELINE PLANNING FOR PERFORMANCE

SMART SCALE *Funding the Right Transportation Projects in Virginia*

Tools and Data Sources

- **MWCOG/TPB regional model inputs**
- **VDOT standard datasets and assumptions**
- **Local jurisdiction plans and scenario data**
- **Use of observed data for validation**



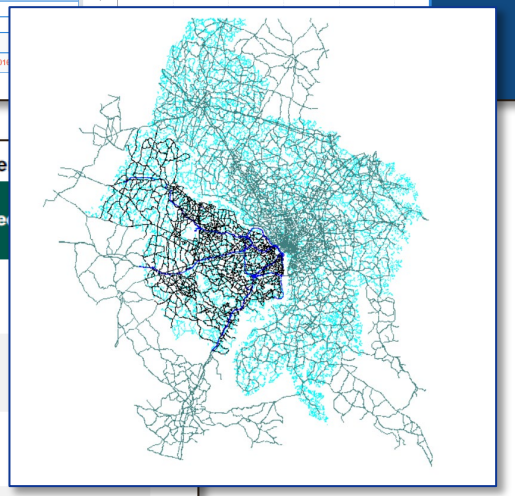
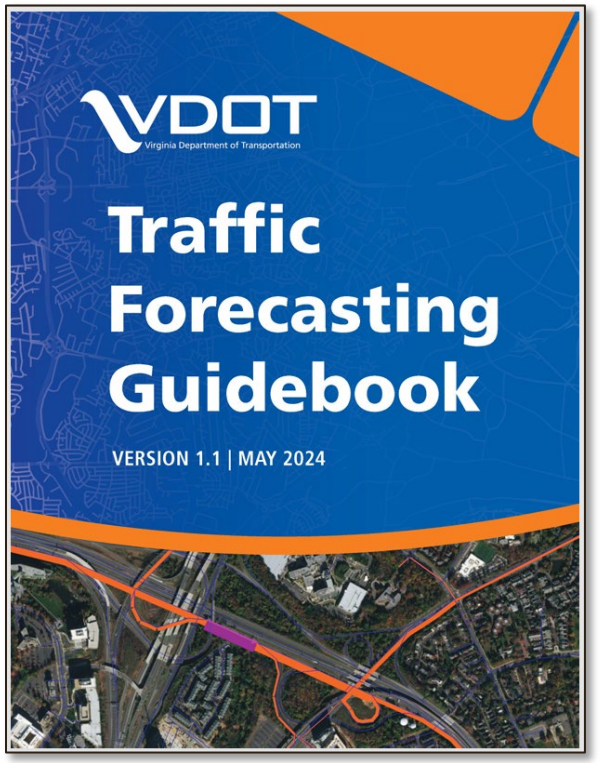


Table 1. Six-TAZ MXD Comparison of 2045 Baseline and 2045 Preferred Sce

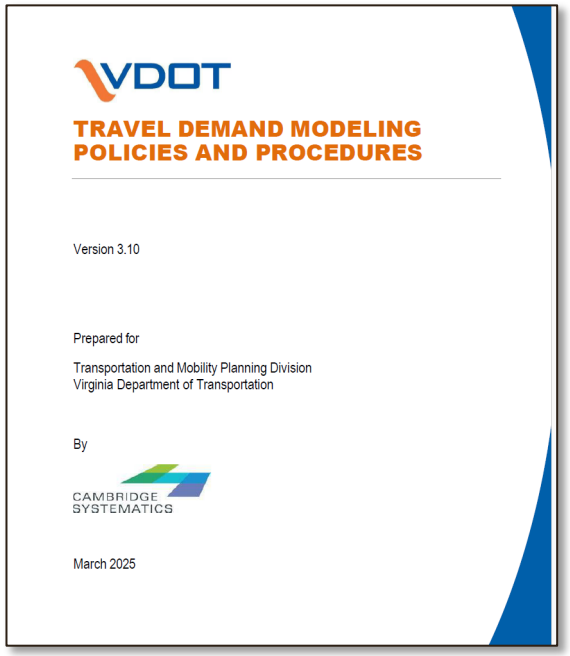
Metric	Baseline	Preferred	Preferre
Dwelling units	9,670	15,138	+5,468
Jobs	21,435	19,536	-1,899
Daily vehicle trips	164,576	162,462	-2,114
AM peak-hour trips	8,937	9,211	+274
PM peak-hour trips	15,194	15,098	-96

Forecasting Guidance & Procedures

- VDOT forecasting guidance overview
- Standardized inputs and assumptions
- Calibration and validation practices
- Documentation and quality assurance expectations



VDOT Traffic Forecasting Guidebook Version 1.1



VDOT Travel Demand Modeling Policies and Procedures

VDOT Traffic Forecasting Guidebook v1.1 (May 2024)

Purpose & Overview of the Guidebook

- VDOT uses traffic forecasting to support planning, design, construction, and environmental studies across Virginia's roadway network.
- The guidebook establishes consistent statewide forecasting approaches, documenting methods, inputs, assumptions, and relationships with other VDOT policies.
- Focuses on vehicular traffic forecasting, offering guidance across seven chapters that span scoping, data sources, forecasting techniques, and model application.

VDOT Traffic Forecasting Guidebook v1.1 (May 2024)

VDOT Traffic Forecasting Process

- Three core steps: Scoping, Data Collection, and Forecast Analysis & Documentation.
- Scoping identifies project purpose, horizon years, assumptions, data needs, stakeholders, and required review roles.
- Data collection draws from VDOT-maintained counts, field data, planning datasets, and travel demand models.
- Documentation must be thorough, repeatable, and uploaded to Pathways for Planning (P4P).

VDOT Traffic Forecasting Guidebook v1.1 (May 2024)

Data Sources & Tools

- VDOT-maintained datasets include AADT publications, Traffic Monitoring System (TMS), STARS map, and P4P data including D-LITE intersection forecasting modules.
- Field data includes roadway counts, classification counts, turning movement counts, heavy vehicle counts, and O-D data.
- Planning data includes Census, OnTheMap, socioeconomic datasets, and emerging big-data probe sources (LBS/GPS).
- Virginia has 18 travel demand models including MPOs, and several locality models

VDOT Traffic Forecasting Guidebook v1.1 (May 2024)

Forecasting Techniques

- Trend Analysis: Linear, exponential, or declining growth based on historical counts or model outputs.
- Intersection Forecasting: Uses simplified growth methods or Fratar (NCHRP 765) balancing for turning movements.
- Site-Specific Generation: Uses ITE Trip Generation or VDOT's mixed-use methodology (non-ITE), ensuring site trips aren't double-counted.
- Travel Demand Model Methods: Applying regional models, modifying and/or validating models, or creating refined subarea models for detailed analysis

VDOT Traffic Forecasting Guidebook v1.1 (May 2024)

Advanced Applications & Considerations

- **Post-Processing Model Outputs: Average of the ratio, difference adjustments; cutline refinement improves consistency.**
- **Peak Spreading: Addresses extended congestion where demand exceeds capacity; diurnal curves are used for hourly distribution.**
- **O-D Matrix Estimation: ODME used for existing and future patterns, including internal–external and external–external trip differentiation.**
- **Forecast Uncertainty & Sensitivity: Forecasts face uncertainty from land use, travel behavior, network changes, and emerging technologies; sensitivity analyses help evaluate robustness.**

VDOT Travel Demand Modeling Policies and Procedures Manual (Version 3.10, March 2025)

Overview of the Manual

Purpose

- Provide uniform policies and procedures for developing, validating, and applying travel demand models across Virginia.
- Ensure consistency in transportation planning for VDOT, MPOs, PDCs, and consultants.

Scope

- Applies to all Virginia travel demand models except multistate MPOs (TPB, Bristol, Kingsport).
- Based on conventional 4-step modeling: Trip Generation, Trip Distribution, Mode Choice, Trip Assignment.

VDOT Travel Demand Modeling Policies and Procedures Manual (Version 3.10, March 2025)

Regulatory Framework & VDOT Role

Key Regulations

- Virginia Employment Commission population control totals.
- Federal metropolitan planning requirements (23 CFR 450).
- Transportation conformity under Clean Air Act.
- Federal Transit Administration (FTA) requirements for New Starts projects.

VDOT Responsibilities

- Maintain statewide and 11 regional models.
- Support MPOs in model development, updates, and applications.
- Ensure models follow acceptable and recommended practices.

VDOT Travel Demand Modeling Policies and Procedures Manual (Version 3.10, March 2025)

Model Development & Improvements

- Model Development
  - New base year, major updates every 10 years.
- Major Revisions
  - Structural additions (truck model, time-of-day, tolls), reviewed every 5 years.
- Minor Revisions
  - Correct inputs/errors; reviewed annually.
- Versioning Example
  - Base 2020 v1.0 → minor update v1.01 → major update v2.0, etc.
- Emerging Transportation Trends
  - Incorporating TNCs, shared micromobility, connected/autonomous vehicles into models.

VDOT Travel Demand Modeling Policies and Procedures Manual (Version 3.10, March 2025)

Model Inputs and Data Requirements

- **Core Model Inputs**
  - **TAZ Structure**
    - Based on Census 2010/2020; sequential numbering; population range 1,200–3,000.
  - **Socioeconomic Data**
    - Population, households, employment (NAICS), school enrollment, autos per household.
    - Must align with Weldon Cooper Center projections.
  - **Transportation Networks**
    - Highway network with facility types, speeds, capacities.
    - Transit networks (for large MPOs): routes, schedules, access/egress, park-and-ride.
  - **Data for Validation**
    - Household travel surveys (NHTS Add-On encouraged).
    - Traffic counts (VDOT TMS).
    - Transit ridership counts.
    - Big Data (LBS, GPS, truck probe data).

VDOT Travel Demand Modeling Policies and Procedures Manual (Version 3.10, March 2025)

Validation Components

- Trip generation validation using NHTS/ACS benchmarks.
- Trip distribution using observed travel patterns.
- Mode choice validation using rider surveys & ridership counts.
- Highway assignment validation using RMSE, VMT, screenlines, cutlines.
- Transit assignment validation using boardings/alightings.

Model Applications

- Long-range plans (LRTP), short-range plans (TIP).
- Air quality conformity.
- Corridor and subarea studies.
- Scenario testing and uncertainty analysis (CAVs, TNCs, growth).

Traffic Forecast Approval Responsibilities IIM-TMPD-7.2

Project Type	Example Project Types	Approver (Non-NHS)	Approver (NHS)
Statewide & Regional Planning	VTrans plan; Comprehensive plan; MPO long-range plan	VDOT DTP or Designee	VDOT DTP & VDOT TMPD Director or Designees
Corridor & Project Planning	STARS study; Corridor study	VDOT DTP or Designee	VDOT DTP & VDOT TMPD Director or Designees
Design & Implementation	Roadway widening; Interchange redesign; New facility	VDOT DTP or Designee	VDOT DTP & VDOT TMPD Director or Designees
Environmental Studies	NEPA document	VDOT DTP or Designee	VDOT DTP & VDOT TMPD Director or Designees
Traffic Impact Analysis (TIA)	New development; Expansion; Zoning change	VDOT land-use engineer or designee	VDOT DTP & VDOT TMPD Director or Designees

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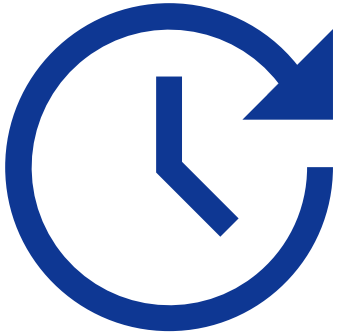
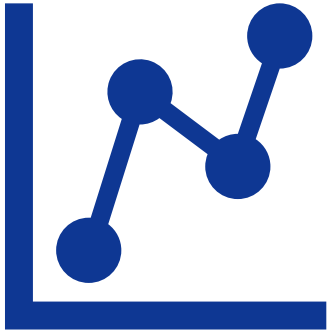
Scenario Development Practices

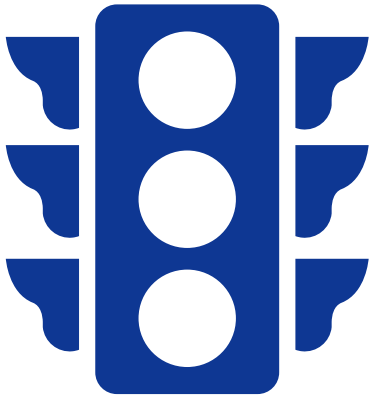
- **Baseline and future year assumptions**
- **Sensitivity tests and alternative development**
- **Coordination with jurisdictional model updates**





Recent Improvements

- Enhanced documentation and transparency
- Updated workflow for project level consistency
- Use of improved data sources (traffic, land-use, networks)



Future Direction

- Planned updates to guidance and procedures
- Technology improvements (automation, version control)
- Strengthened coordination with MWCOG/TPB modeling team

Summary

- **Modeling team supports district planning and project development**
- **Forecasting grounded in standardized guidance and QA practices**
- **Ongoing coordination improves consistency regionally**