

Appendix B

Analysis Methods

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Future year population and employment in the corridor study area	Statewide travel demand model	Appropriate “baseline” forecast	(Existing data)	Existing, consistent statewide forecast of population and employment by town	Assumptions underlying forecasts may not fully reflect local conditions
	Trend analysis	Appropriate in absence of other data Can be tempered with judgment on expected future trends	Historical trends in study area population, employment, development permits	Reflects past/current trends	Assumes past/current trends will remain consistent in the future
	Build-out analysis	Appropriate for towns with rapid growth/approaching build-out in analysis period, or for studies taking long-term (>20 year) perspective	Study area zoning (allowable densities, types of uses) Locations of existing development Locations with environmental constraints to development	Reflects current local plans and policies Supports a “worst-case” scenario of growth	Not possible in towns without zoning; difficult without electronic zoning map Forecast year development may be much less than build-out
	Estimate future development based on known plans	Best for short-term studies, or areas with slow change Can be combined with longer-term estimation methods	Permitted or planned developments (industrial park expansion, subdivision applications)	Realistic picture of near-term future development	Likely to underestimate 20-year development
	Expert judgment (e.g., Delphi/expert panel method)		Past trends Permitted/planned developments Knowledge of corridor economic and planning environment	Can combine other methods and data to arrive at a consensus forecast	Subjective – Different “experts” are likely to disagree
	Scenario planning	Best for regions that want to conduct proactive and long-term planning for future growth	Varies; may utilize other planning and forecasting tools	Involves public and stakeholders in discussing alternative futures and their potential impacts	Process involving significant effort

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Specific locations of future year development	Known plans method	(See above)			
	Build-out analysis	(See above)			
	GIS-based forecasting tools	Examine changes in development patterns based on major trans. investments and land use policies Provides inputs to detailed trans. model, GIS-based environmental analysis	Areawide population and employment control forecasts Planned land use/zoning Developmental constraints Transportation accessibility measures	Rational/consistent method for allocating development	Data and resource-intensive to develop and apply
Future traffic volumes on study area roadways	VTrans statewide travel demand model	Baseline traffic growth projections on major roads	(Existing data)	Accounts for forecast statewide development patterns and transportation network improvements	Not available for roads not included in statewide model
	VTrans growth factors	Baseline traffic growth projections	(Existing data)	Based on historic trends on roadway	Assumes historic growth trends will continue in future
	Traffic impact study	Assess impacts of growth policies regarding specific major developments, or general location of development in corridor	Locations, type, and size of new high-trip generators Trip generation rates (ITE manual or other source)	Accounts for traffic impacts specifically from study area development Can account for seasonal trip generation, e.g., from recreational sources	Needs to be added to background traffic levels Caution required to avoid double-counting
	Rural Traffic Shed Model ²	Forecast traffic volumes from development in a “traffic shed” area served by a single major road	Future land use and development by “traffic shed” Trip generation rates associated with various land uses	Similar to an areawide trip generation study	Not tested in Vermont

² See: Federal Highway Administration. *Tool Kit for Integrating Transportation and Land Use Decision-Making*.

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Intersection performance (delay, LOS) given future traffic volumes	Highway Capacity Manual (HCM) Chapters 16 and 17 ³	Estimate delay, LOS, V/C, queue lengths at controlled intersections	Traffic volumes (including turning movements), control type, through and turn lanes	Standard, widely applied methodology	Requires detailed traffic and geometric data for each intersection analyzed
Road segment performance (speed, LOS) given future traffic volumes	HCM Chapter 20	Estimate speeds, LOS for roadway segments	Traffic volumes, lane and shoulder widths, trucks, directional split, passing zones, free flow speed	Standard, widely applied methodology	Requires traffic and geometric data for each road segment analyzed LOS is subjective depending upon expectations for road
Corridor performance and delay	HCM Chapter 29	Combines intersection and segment level techniques; most applicable for urban, multimodal corridors	See above	Can account for demand-shifting between modes (e.g., highway and transit) and parallel facilities	Analysis procedures can be somewhat complex
Overall corridor travel time given future traffic volumes	Ski Corridor Travel Time Model (combines intersection and road segment methods) ⁴	Best for analyzing: intersection improvements, roadway segment improvements, changes in study area trip generation	Same data requirements as for HCM analysis Requires corridor travel time data for validation	Proven overall corridor-level measure of travel time performance Sensitive to development traffic and mitigation measures	Does not provide reliable estimate under severely congested conditions
	Statewide travel demand model	Primary use is forecasting traffic volumes statewide – Not roadway-specific travel times	Change in capacity for roadway corridor	Reflects statewide travel patterns	Not sensitive to intersection or small-scale improvements Limited accuracy of speed estimation May require calibration for corridor-specific application
	Statewide travel demand model – Enhanced for corridor study area	Best for analyzing: shifting growth within study area locations, adding links to roadway network, major capacity upgrades	Refined level of detail on road network, study area population and employment	Can account for shifting of growth or trip generation within study area, traffic diversion to alternate facilities	May involve considerable effort Not sensitive to intersection or small-scale improvements

³ Transportation Research Board. *Highway Capacity Manual 2000*. National Research Council, Washington, D.C., 2000.

⁴ Developed for the Southern Windsor County Regional Planning Commission by Resource Systems Group, Inc.

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Analysis Methods (continued)

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Crash reductions from safety and operational improvements	NCHRP Report 500 ⁵ – Information on effectiveness of strategies	Analyze potential safety benefits of various roadway and operational improvements	Existing conditions Improvement being proposed Traffic volumes	Low cost/easy to apply	Results reported from other studies – Actual benefits may vary widely depending upon context
Traffic reductions from alternative mode strategies	Sketch-plan assessment of mode shifts	Analyze vehicle traffic reduction or nonmotorized traffic increase from transit service, bicycle/pedestrian facilities, TDM strategies, pedestrian-friendly development	Observed or modeled travel behavior changes from similar strategies in other areas	Can provide quantitative estimate for this factor	May be difficult to find research from comparable situations
	Stated-preference surveys	Ask people to state choices for alternative modes under different scenarios	Survey – Original data collection	Can reflect specific facility/service improvement being proposed	Can be expensive to administer Survey must be carefully designed, otherwise people may overstate choices
Congestion and safety benefits of access management strategies	NCHRP Report 420 ⁶	Predict changes in crash rates based on addition of driveways, intersection spacing, median treatments	Number of unsignalized and signalized intersections per mile Type of median	Estimates based on empirical data	Crash rates and strategy impacts likely to vary depending upon context
	HCM Chapters 16, 17	Analyze delay at new/improved controlled intersections	(See above)		

⁵ Transportation Research Board. *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan Transportation Research*. National Cooperative Highway Research Program (NCHRP) Report 500, Volumes 1–13. National Academy Press, Washington, D.C., 2003-2004.

⁶ Gluck, Jerome S., Herbert S. Levinson, and Vergil G. Stover. *Impacts of Access Management Techniques*. National Cooperative Highway Research Program (NCHRP) Report 420, National Academy Press, Washington, D.C., 1999.

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Environmental and community impacts of transportation and development patterns	Qualitative assessment	Conduct sketch-level assessment of impacts of corridor strategies, based on professional and stakeholder knowledge	Various background data on existing conditions Proposed transportation and land use strategies	Low cost/easy to apply	Subjective – Will vary by person; non-quantifiable
	GIS-based community impact assessment tools	Scenario analysis of alternative transportation and development patterns producing indicators such as land developed, impermeable surface area, transit access, walkability, energy consumption	Existing and future land use/development patterns (GIS-based) Transportation network data Other land use, environmental data	Can assess a wide range of community impacts related to future development patterns	Data and resource-intensive Have primarily been applied in metropolitan area applications, not for rural areas
	Detailed analysis methods	Most appropriate for specific projects, typically conducted as part of the NEPA process	Varies depending upon impact and method	Provides in-depth information on impacts	Often data/resource intensive
Visual/aesthetic impacts	Visual preference surveys	Assess visual/aesthetic preferences	Images of different types of development or roadway design alternatives	Low cost – Can use existing images/examples from other areas	Does not show what actual project or development would look like
	Computer visualization techniques – Land use	Develop computerized representations of alternative development scenarios	Planned land use, including location of development, density, other physical design parameters	Powerful tool to communicate visual/aesthetic impacts related to development scenarios/alternatives	Requires detailed data Building design/architecture may not resemble actual development
	Computer visualization techniques – Transportation facilities	Develop computerized representations of alternative transportation facility designs	Landscape/background Transportation facility design	Powerful tool to communicate visual/aesthetic impacts related to development scenarios/alternatives	Requires detailed data Most appropriate for detailed project analysis, not corridor planning