



Improvement and Operation of the Vermont Travel Model

James Sullivan, Karen Sentoff
 Transportation Research Center
 University of Vermont



Model Improvement – New External Travel Module

Recently on this project the research team developed a new external travel module for estimating and distributing trips between Vermont and the rest of the northeastern U.S. and Quebec – places likely reachable by highway in a day or less. Urban areas within 100 miles of the Vermont border and urban clusters within 50 miles of the Vermont border in the U.S. were included as part of the Vermont “highway-shed”, along with Census metropolitan areas and Census agglomerations within 100 miles of the Vermont border in Canada (see Figure 1). Each of these 84 external places was made into a new external zone and the Model road network was expanded to encompass these places. Outside of Vermont, only interstates, federal highways, and state highways are included.

Estimating the number of trips between each new external zone and Vermont (see Figure 1B) was accomplished by distributing the counts from the Vermont border according to selected characteristics of the TAZ (passenger-vehicle ownership and age distribution) and its distance from the Vermont border. The estimation process included 4 distinct steps:

1. Constraining trips to external zones with average daily traffic on external connectors
2. Constraining the distribution of external-external trips (see Figure 1A)
3. Calibration of the new external sub-module
4. Constraining trip purposes for E-I and I-E trips

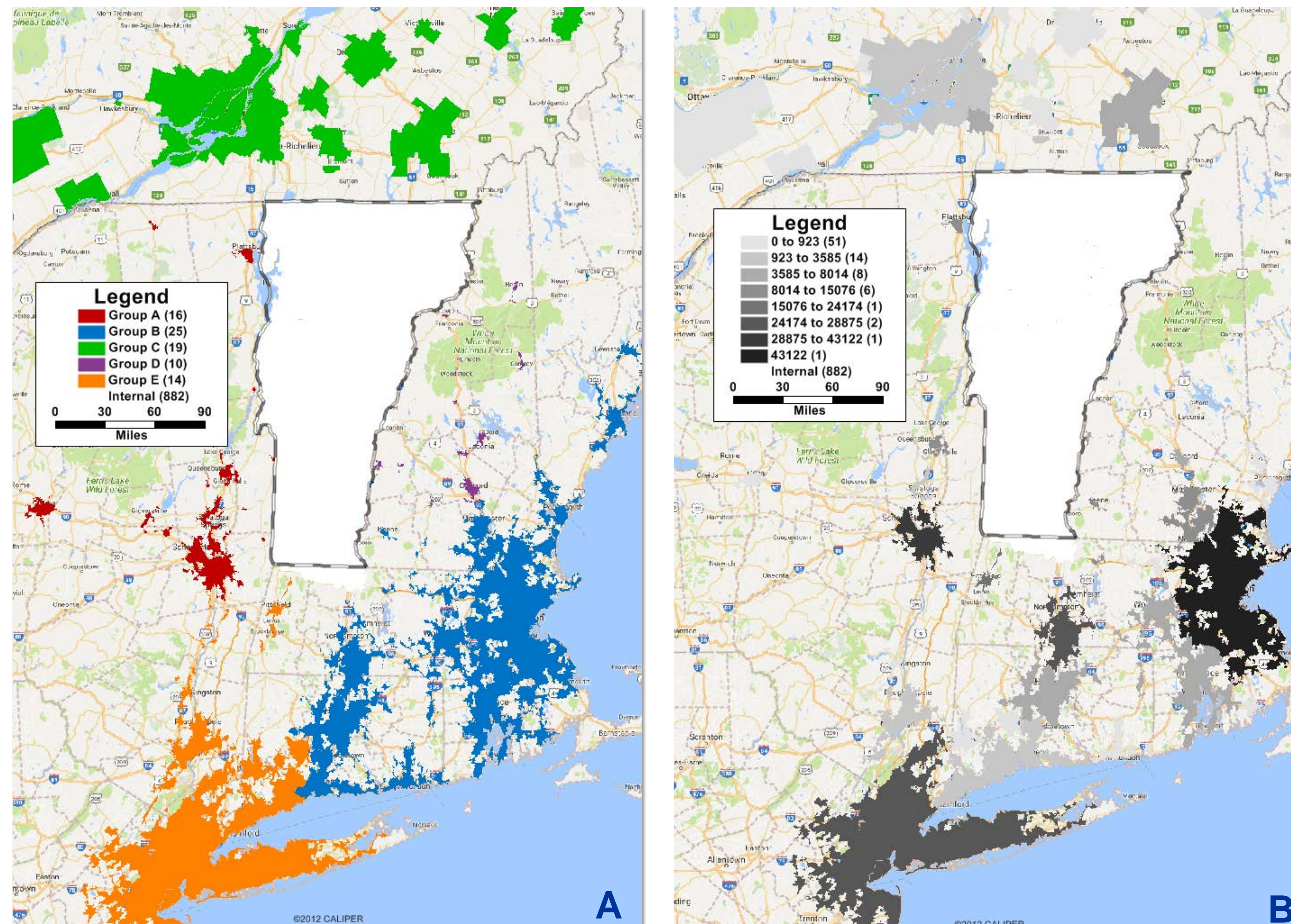


Figure 1. The External Travel Module Considers Patterns (A) and Volumes (B) of Highway Travel between Vermont and Each of the 84 Urban Areas in Vermont’s Passenger-Vehicle “Travel Shed”

Model Operation

The research team also operates the Model for Planning and Operations studies at the Agency to predict changes in travel patterns when changes are made to the Model network, or as time passes. Model operation activities conducted this year included measuring the impacts of simultaneous construction projects on traffic from delays and re-routing as a result of work zone restrictions in October 2017.

To conduct the analysis, work zones for planned construction projects are entered into the Model as disruptions to roadway capacity and free-flow travel time. Following the adjustments, the Model is re-run to simulate how drivers will respond to the disruptions – either by shifting routes to avoid delays, or by being forced to endure them. In the Barre-Montpelier area, the projects shown in Table 1 were considered.

Table 1. Construction Projects Planned in the Barre-Montpelier Area in October 2017

Town	Roadway	Project Type	Project No.	Bridge No.
Montpelier	I-89	Bridge & Culvert	IM 089-2(41)	
Barre City	US-302	Paving	NH 2961(2)	
Montpelier	VT-12	Paving	STP 2950(1)	
E. Montpelier	VT-14	Bridge & Culvert	BRF 037-1(7)	BR68 VT-14
Barre City	VT-14	Paving	STP 2961(1)	

As shown in Figure 2, the results of this analysis showed that projects NH 2961(2) on US-302 and STP 2961(1) on VT-14 in the Barre area will cause significant increases in traffic, particularly on Summer Street, River Street, Prospect Street, Church Street, Elm Street, and VT-14. Summer Street (average v/c 0.95) and Elm Street (v/c 1.1) in Barre may both experience unacceptable levels of congestion as travelers shift routes to avoid work zones.

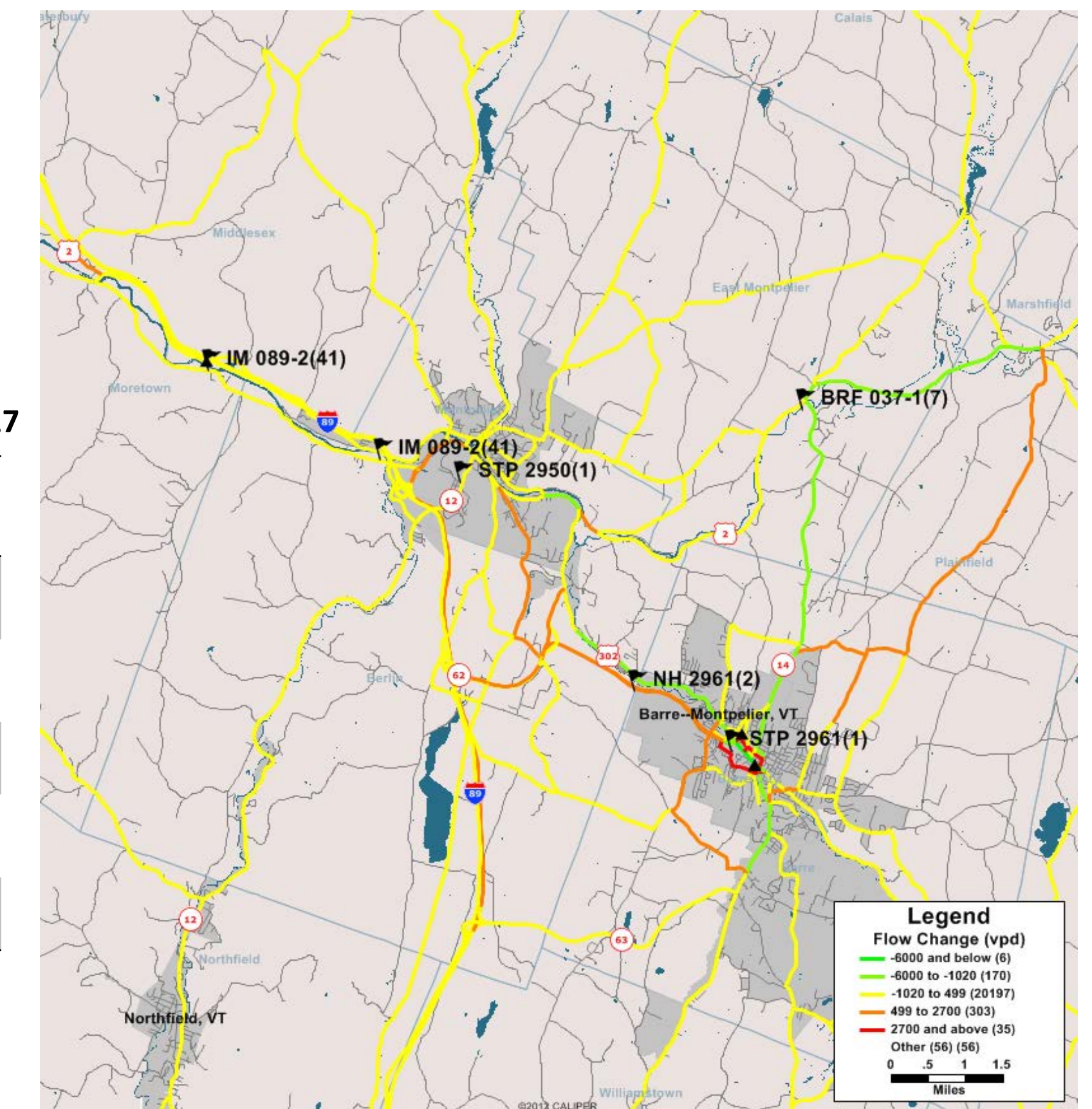


Figure 2. Traffic flow changes resulting from projects STP 2961(1) and NH 2961(2) in Barre, STP 2950(1) in Montpelier, BRF 037-1(7) in East Montpelier, and IM 089-2(41) in Montpelier and Middlesex.

Acknowledgments

The authors would like to acknowledge VTrans for providing funding for this work, and thank the project’s sponsors, Costa Pappis (Transportation Planning Coordinator) and Joe Segale (Policy, Planning, and Research Director)

References

FHWA, 2013. Vermont Agency of Transportation (VTrans) Statewide Travel Model Peer Review Report. Prepared by a Peer Review Panel under the Travel Model Improvement Program for the Federal Highway Administration, September 2013.

Sullivan, James and Karen Sentoff, 2016. Vermont Travel Model 2016-2017 Report. Report No. 17-005. Prepared by the UVM Transportation Research Center for the Vermont Agency of Transportation, Policy & Planning Section, December 2017.

UCSB, 2017. American Community Survey 5-Year Estimates. Accessed from the American FactFinder website of the United States Census Bureau on September 4th, 2017. <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.

VHB, 2007. Vermont Statewide Travel Demand Model Improvements: Updated Passenger and Truck Models in CUBE/Voyager. Prepared by Vanasse Hangen Brustlin, Inc. for the Vermont Agency of Transportation, June 2007.