

# NEURISA IGNITE SPATIAL VERMONT 2012

04.17.2012

## TRANSIT-SUPPORTIVE ZONES in the STATE of VERMONT

**NATHAN P. BELZ**, M.S., E.I.

*University of Vermont Transportation Research Center*

*Burlington, VT 05405-1757*

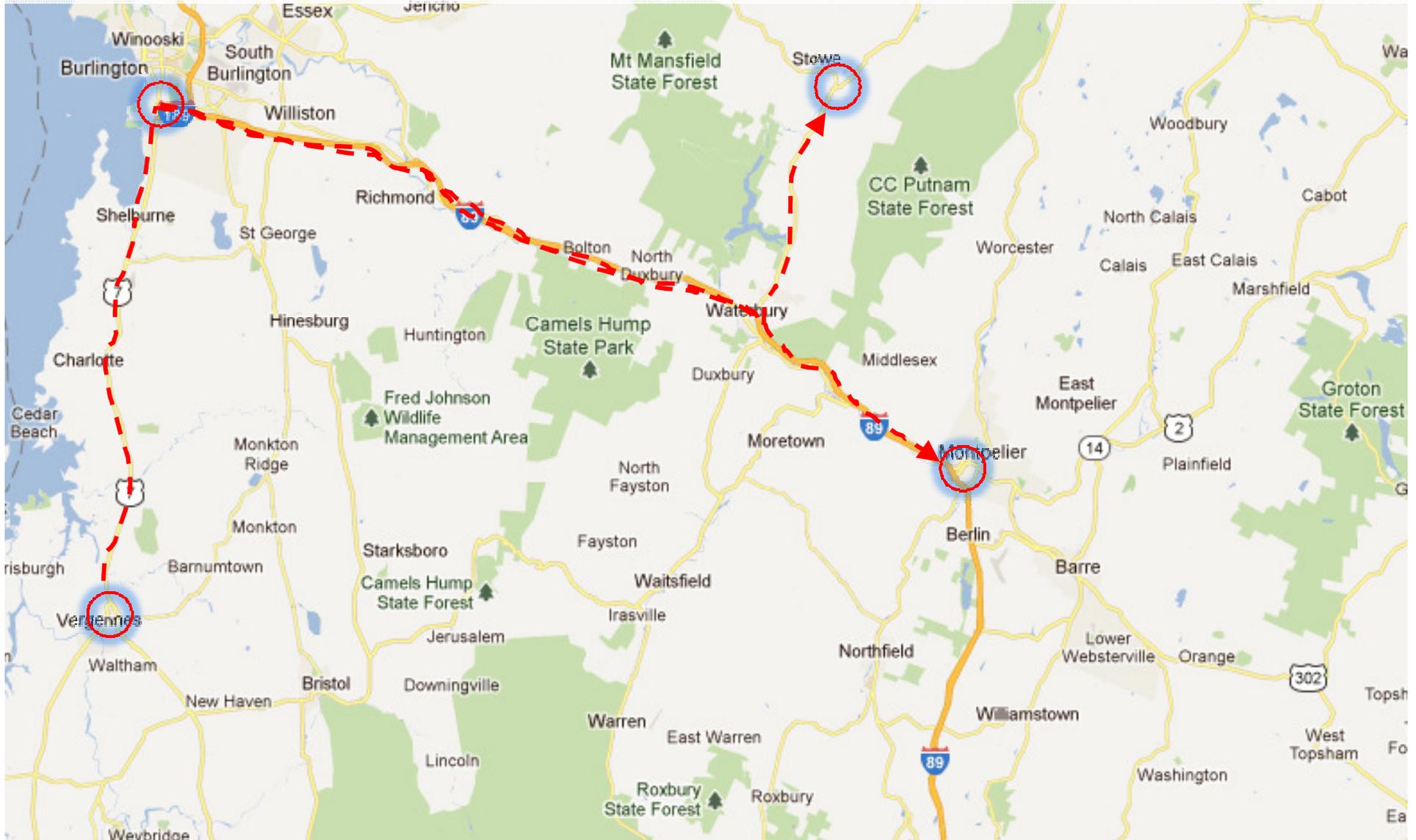
*Email: [nathan.belz@uvm.edu](mailto:nathan.belz@uvm.edu)*

**TRANSPORTATION**  
**RESEARCH CENTER**

MOBILITY. SUSTAINABILITY. LIVABILITY.

# WHAT ARE THE CHALLENGES OF TRANSIT IN RURAL STATES?

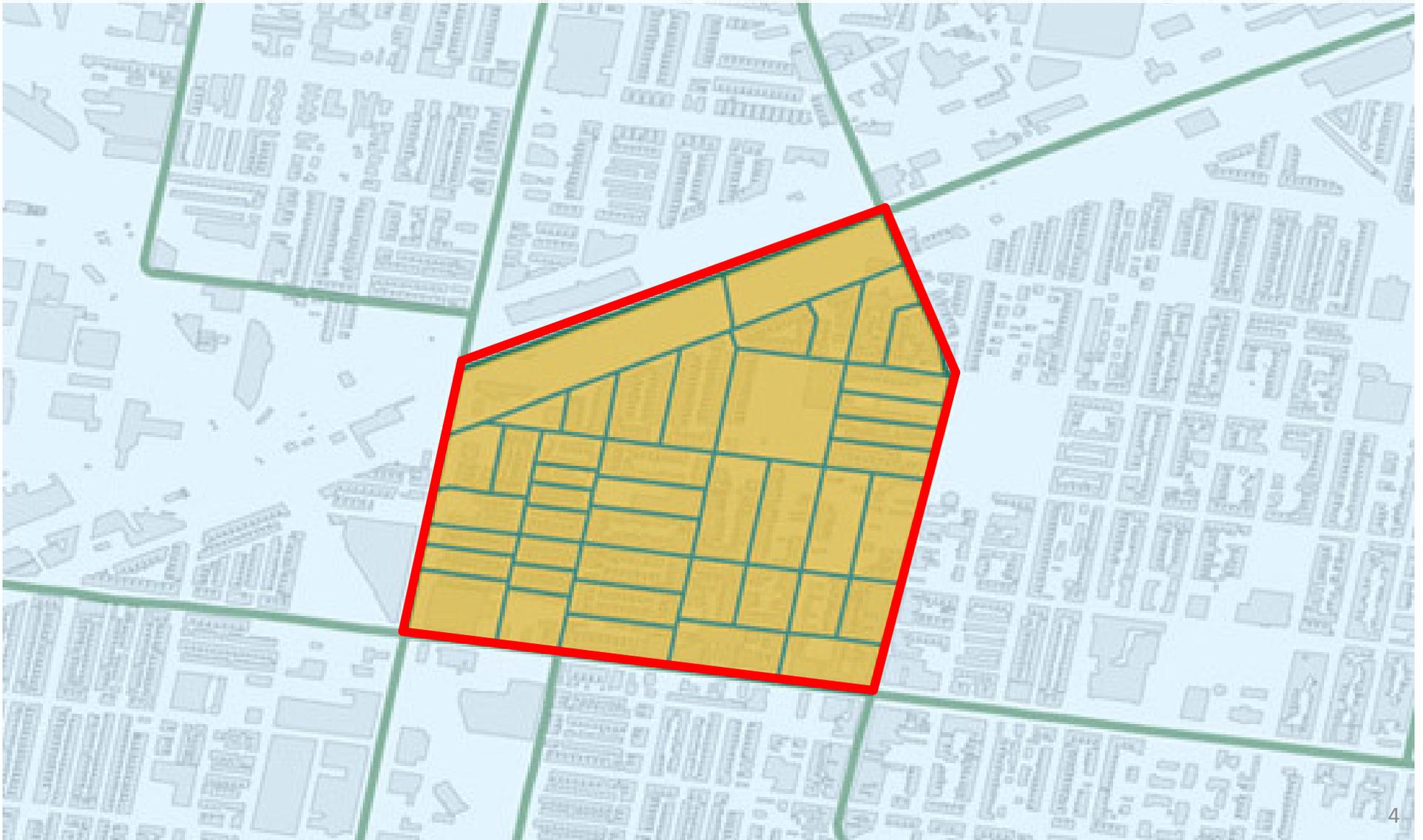
(Spatial Constraints: Long Travel Distances & Low Densities)

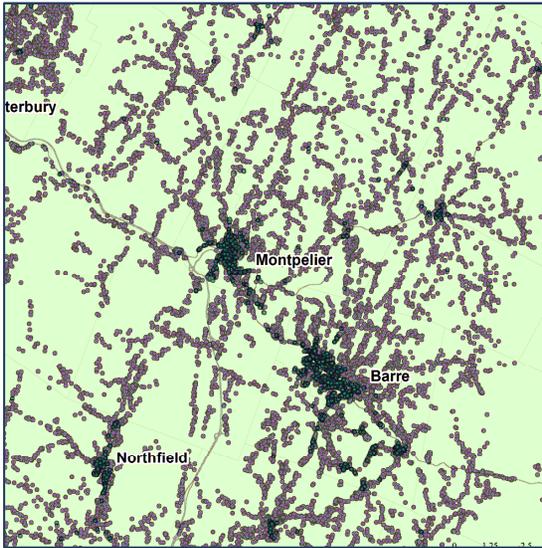


**STATEWIDE**

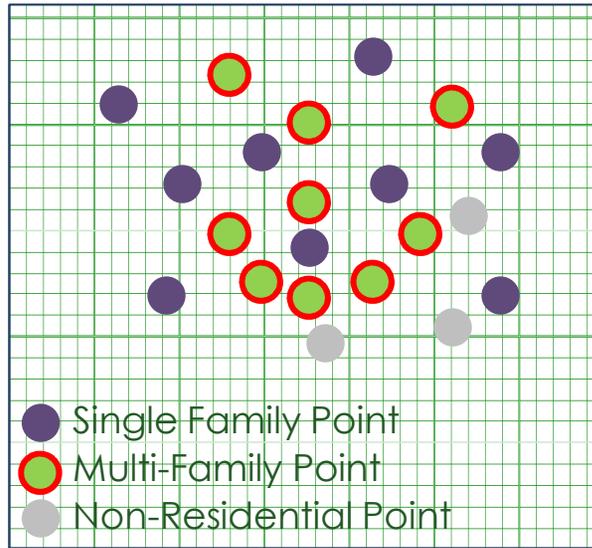
# WHAT ARE THE SHORTFALLS OF PAST SPATIAL RESEARCH?

(Zonal level analysis based on urban focus, assumptions of homogeneity within zones)

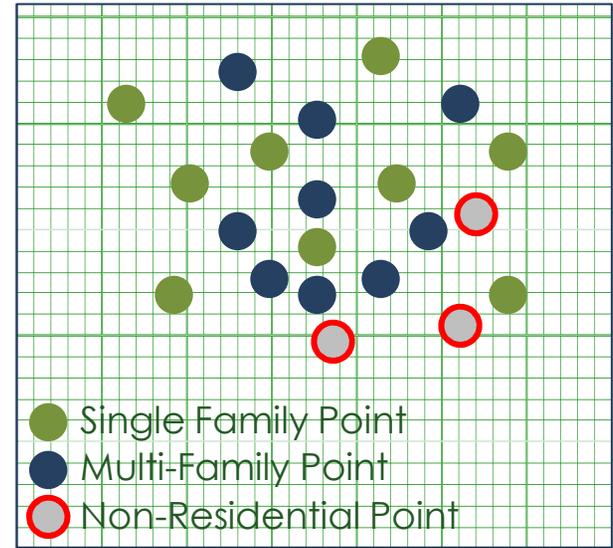




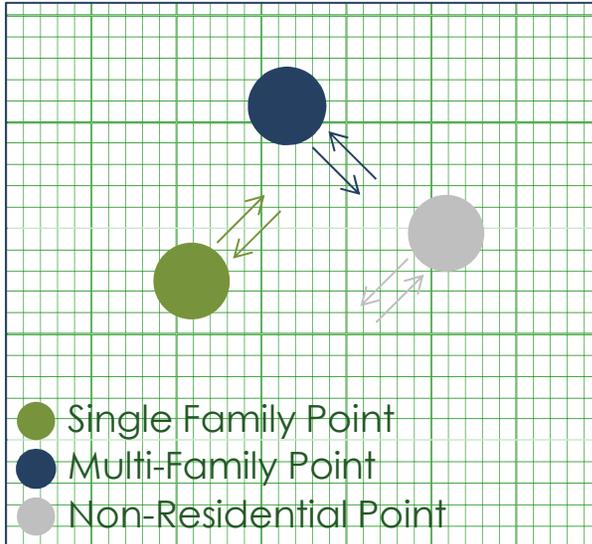
1



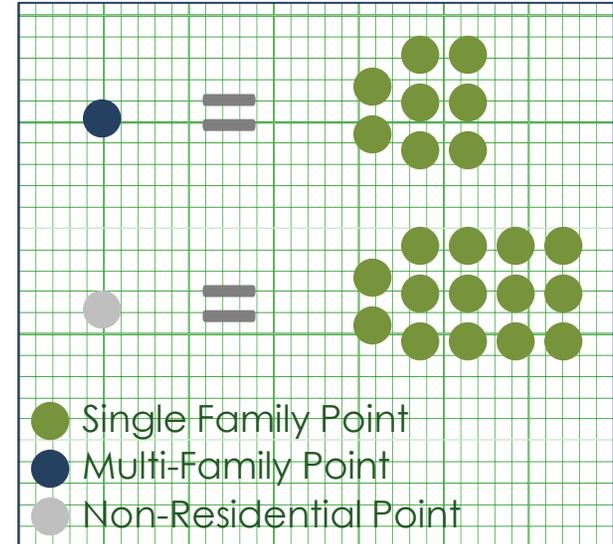
2



3



4 **Demand Potential (DP)**



5 **Equivalent DP**

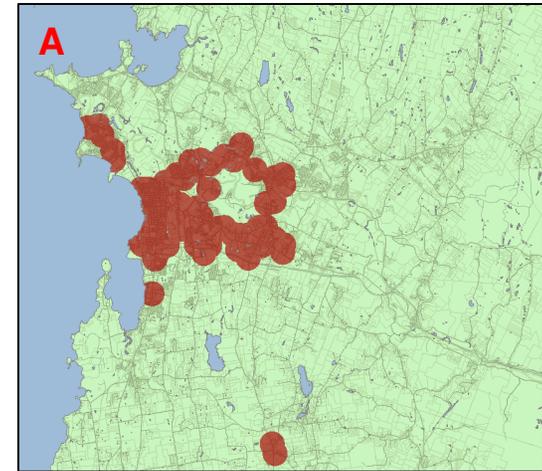
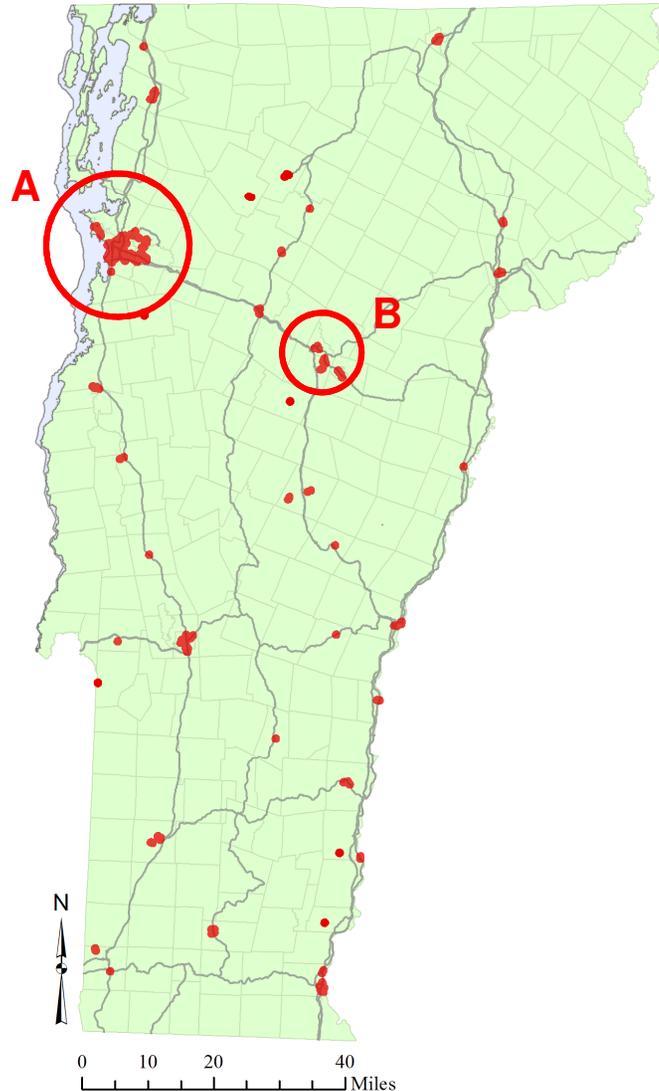
# Criteria to be a Transit-Supportive Zone

1. Centroid must be a local density maximum
2.  $\Sigma$  EDP must be greater than or equal to transit viability threshold
3. Assumes transit riders are willing to walk one-half mile

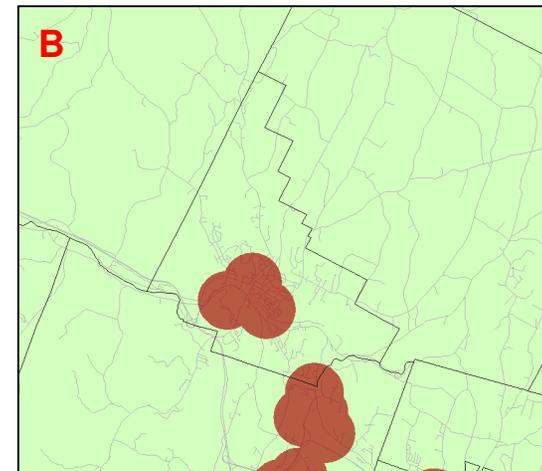
1% of land

43% of trips  
(86% intercity)

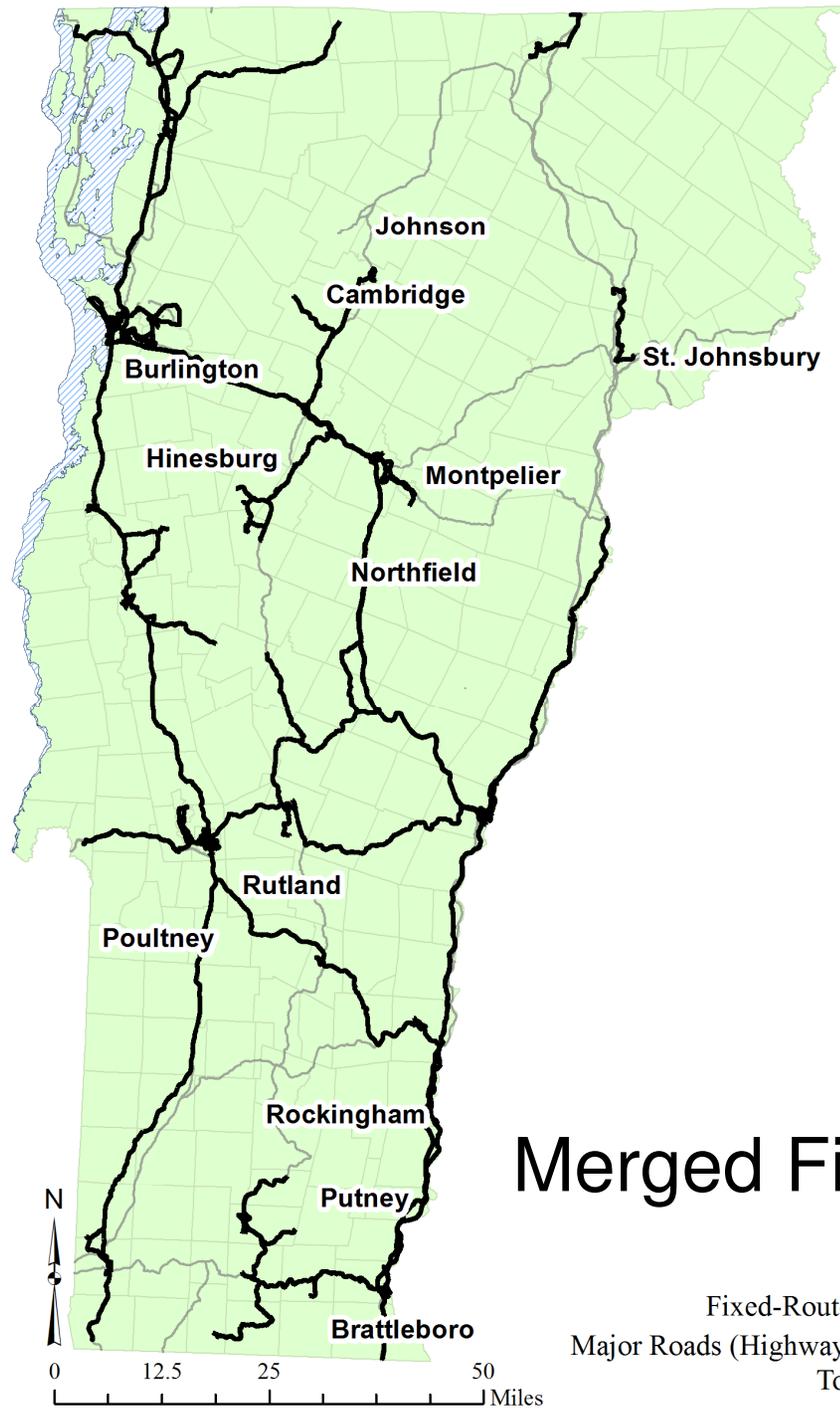
21% of VMT



*Burlington, VT & Surrounding*



*Montpelier, VT*



# Merged Fixed-Route Network

**LEGEND**

- Fixed-Route Public Transit
- Major Roads (Highway and Interstate)
- Town Boundaries



# Energy-Efficient Network

**LEGEND**

- Energy Efficient Transit Network —
- Major Roads (Highway and Interstate) —
- Town Boundaries



# Equitable Fairness Network

## LEGEND

- Equitably-Augmented Transit Network —
- Energy Efficient Transit Network —
- Major Roads (Highway and Interstate) —
- Town Boundaries



# Equitable Access Network

**LEGEND**

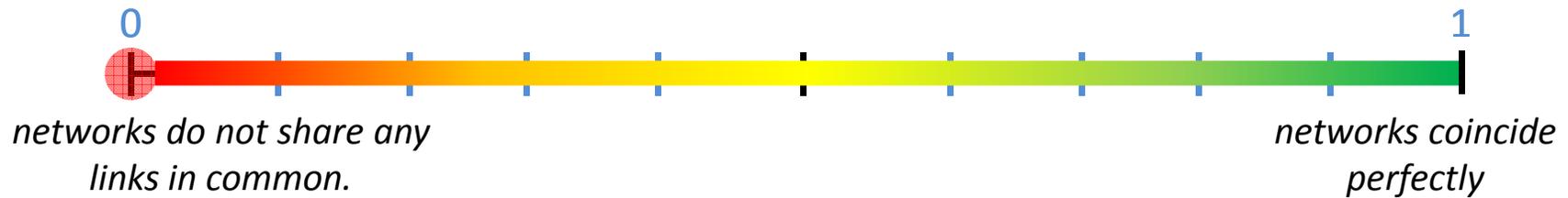
- Socially/Equitably-Augmented Transit Network —
- Equitably-Augmented Transit Network —
- Energy Efficient Transit Network —
- Major Roads (Highway and Interstate) —
- Town Boundaries

# Network-Overlap Ratio

Evaluate existing merged and idealized networks of fixed-route transit in Vermont

## Formulation

- N-O Ratio =  $L_{n,m} / L_m$



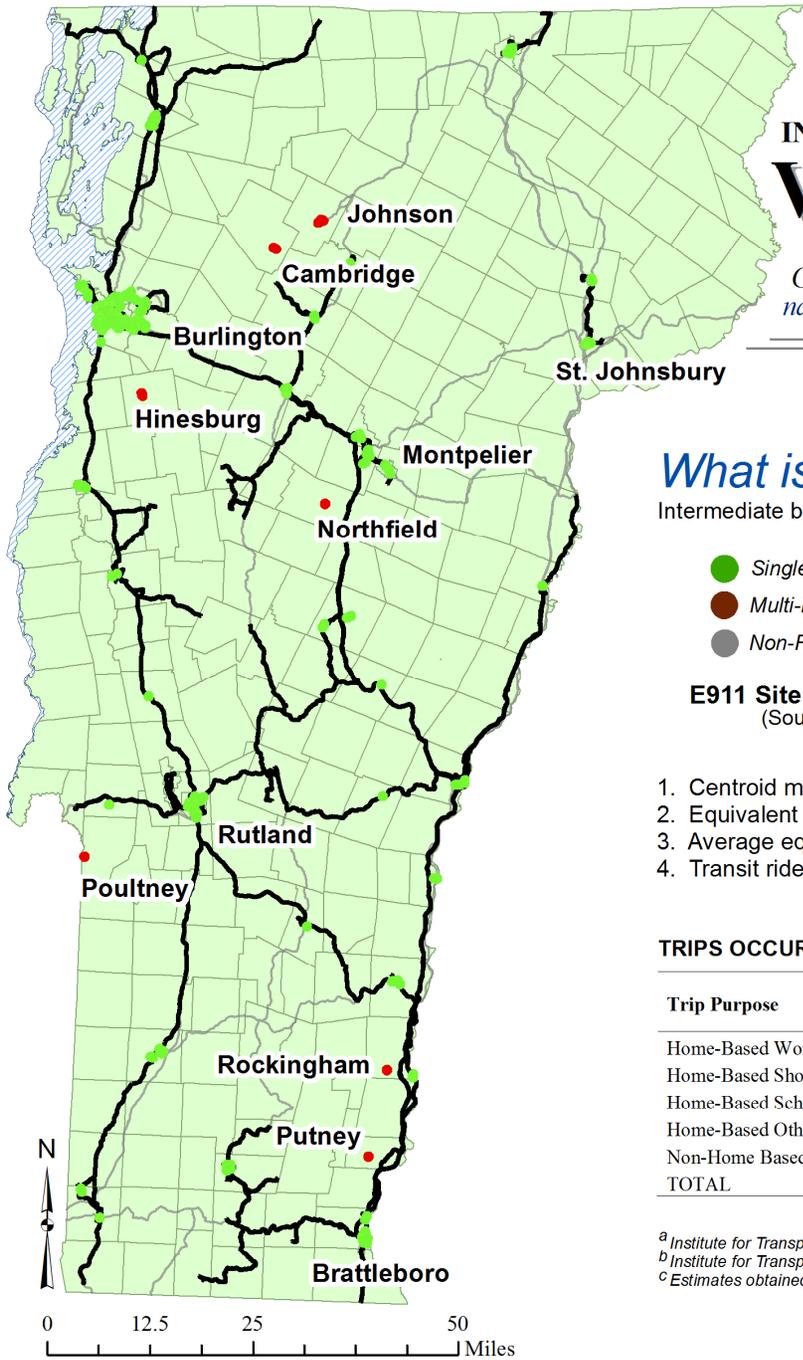
Transit Network	Total Miles of Network	% Vermont Towns Reached (of 255)	% Population Reached (of 609,000 in 2000)	Population Reached Per Mile of Network	N-O
Existing	1,318	44	77	358	--
Energy-Efficient	1,153	39	75	395	0.58
Connectivity-Fairness	1,388	46	79	349	0.58
Access to Critical Locations	2,039	63	90	269	0.64

# MAP OF TRANSIT-SUPPORTIVE ZONES IN THE STATE OF VERMONT

Created by: Nathan P. Belz  
nathan.belz@uvm.edu

## LEGEND

- Transit-Supportive Zones (Served) ■
- Transit-Supportive Zones (Not Served) ■
- Fixed-Route Public Transit
- Major Roads (Highway and Interstate)
- Town Boundaries

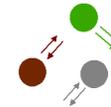


## What is a Transit-Supportive Zone?

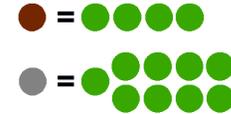
Intermediate bus service (30-minute intervals) is viable at a density of seven dwelling units per acre<sup>a</sup>

- Single Family Dwelling
- Multi-Family Dwelling
- Non-Residential

**E911 Site Location Type**  
(Source: VCGI)



**Trip Generation Rates<sup>b</sup>**  
(Demand Potential)



**Equivalent Demand Potential**  
(measured in dwelling units)

1. Centroid must be a localized density maximum
2. Equivalent demand potential is greater than or equal to seven at the central acre
3. Average equivalent demand potential is greater than or equal to seven for the entire service zone
4. Transit riders are willing to walk one-half mile to access service

## TRIPS OCCURRING WITHIN AND BETWEEN TRANSIT-SUPPORTIVE ZONES<sup>c</sup>

Trip Purpose	Auto Trips	Auto VMT (miles)	% Potential Reduction	
			Trips	VMT
Home-Based Work	137,210	938,895	37	21
Home-Based Shopping	62,910	392,408	38	20
Home-Based School	4,964	25,443	38	19
Home-Based Other	133,599	601,829	34	16
Non-Home Based	194,161	635,924	64	33
<b>TOTAL</b>	<b>532,844</b>	<b>2,594,499</b>	<b>43</b>	<b>21</b>

<sup>a</sup> Institute for Transportation Engineers (1989), *A Toolbox for Alleviating Traffic Congestion*.

<sup>b</sup> Institute for Transportation Engineers (2008), *Trip Generation Manual (8th Edition)*.

<sup>c</sup> Estimates obtained using origin-destination traffic flows from the Vermont Statewide Travel Demand Model.