

# Towards More Robust Spatial Sampling Strategies for Non-motorized Traffic

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## ABSTRACT

There is a reasonable assumption that levels of non-motorized traffic are directly related to land use. However, planners and analysts for non-motorized transportation modes still rely on very limited data resources and are therefore limited in identifying demand patterns and moving forward with more productive management and planning schemes. In this study, we propose a spatial-based clustering analysis which identifies five land use categories to assist planning practitioners in selecting sampling locations that are representative for generating consistent non-motorized traffic counts for entire network. We utilized continuous non-motorized traffic counts collected along four shared use paths in Chittenden County, Vermont and analyzed the association between hourly distribution patterns at each count station and adjacent land use. Our findings show the linkage is not as evident as expected. This is likely due to the existing counts not being conducted at diverse locations. The robust sampling strategy developed to classify counts in this study could be extended to select better locations that allow extrapolation of a limited number of counts into region-wide travel estimates.

## DATA

- Geo-coded land use data and street network for Chittenden County
- Geo-coded Champlain Valley pedestrian/bikeways network
- Multiple-day continuous pedestrian and bicyclist counts collected between 2007 and 2009 at 9 locations along four shared use paths

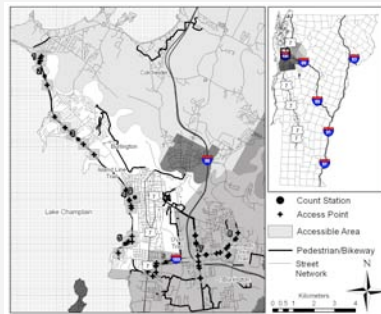
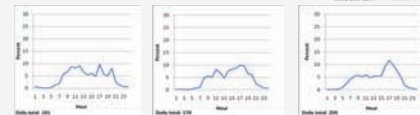


Table 1. Count Stations

Shared use path	Station #	Count Duration	# of Weekdays	# of Saturdays	# of Sundays	# of Holidays
Island Line Trail	1	June 11 – August 18, 2008	36	7	7	1
	2	July 3 - July 31, 2007	20	4	4	1
	3	August 20 - September 23, 2008	24	5	5	1
	4	May 3 - May 20, 2007	12	3	3	0
	5	August 5 - September 1, 2008	19	4	4	1
UVM Trail	6	July 26 – August 3, 2008	5	2	2	0
		Sep 2 – Sep 30, 2008				
Kennedy Drive Trail	7	May 1 - May 26, 2009	38	8	8	1
Downtown	8	July 12 - July 24, 2008	9	2	2	0
	9	April 26 - May 27, 2007	18	4	4	1

## ANALYSIS

- Hourly distribution of non-motorized traffic on an average Saturday, Sunday and Weekday
- Continuous counts from Island Line Trail station 2
- Limited access (within 1.5 km)
- From left to right: Saturday, Sunday, Weekdays (with holidays excluded)



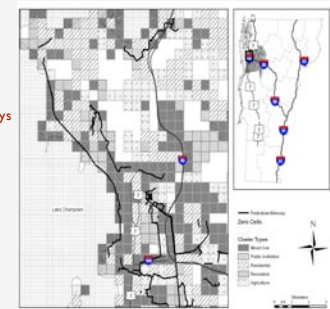
- Continuous counts from Kennedy Drive station 7
- Easy access (within 1.5 km)
- From left to right: Saturday, Sunday, Weekdays (with holidays excluded)

- Land use cluster procedure
- 0.5 kilometer by 0.5 kilometer square polygons were generated
- Each polygon was defined by land use types
- K-means clustering to categorize polygons by land use mix
- Access areas classified for count stations

Table 2 Land use clusters (non-zero road density)

Land use type	Mixed use	Public institutional	Residential	Recreational	Agricultural
Residential	23	9	75	17	17
Commercial	8	1	1	1	0
Recreation	4	2	2	63	1
Public institution	3	80	1	0	0
Transportation	16	3	5	5	4
Agriculture	16	3	16	9	75
Others	30	2	2	6	2
# of cells in County	518(15%)	101(3%)	1451(42%)	140(4%)	1242(36%)
# of Share Use Path Count Locations	1(11%)	1(11%)	6(67%)	1(11%)	0(0%)
# of all CCMPO Count Locations	2 (12%)	1(6%)	12(71%)	2(12%)	0(0%)

Land use patterns identified by cluster analysis for the grid cells in study area



## ACKNOWLEDGEMENTS

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## CONCLUSIONS

- A robust random procedure was developed to factor land use patterns, type of bikeways, and road network density into bike/pedestrian count location selection
- The existing CCMPO count stations were not representative of the range of land use mix found within the county
- Differences were noted between limited and easy-accessed shared use path volume distributions