



Economic Impact of Bicycling and Walking in Vermont

Working Paper 1: Analysis Approach

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9 December 2010
Draft

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1.0 INTRODUCTION

The purpose of this study is to estimate the total economic benefits of walking and biking in Vermont during a typical year. The results will be used to help educate decision makers, the business community, planners, advocates and other stakeholders; and may suggest policy changes and other actions that should be pursued to further the economic and other benefits of these two non-motorized modes of transportation. The project tasks and status are summarized in Table 1.

Table 1: Project Tasks and Status

<i>Task</i>	<i>Description</i>	<i>Status - December 2010</i>
1	Project Initiation	Complete: Project kick-off meeting held in September 2010
2	Data Collection and Approach and Public Meeting 1	Underway and addressed in this Working Paper 1
3	Transportation System Cost Analysis and Real Estate Impact	Underway and preliminary results presented in Working Paper 1. Final results will be presented in Working Paper 2
4	Economic Analysis Impact/Output Model	To be completed with results summarized in Working Paper 3
5	Final Report and Public Meeting 2	To be completed
6	Public Information Video	To be completed

Working Paper 1 describes the overall methodology and identifies potential data sources. It also presents the results of an initial estimate of the amount of annual walking and biking trips for the entire state, notes areas where additional data are necessary and summarizes next steps for the project.

The study is being conducted by a consultant team with expertise in economic impact analyses and transportation system planning and is guided by a Study Task Force with representatives from state government, regional planning, and bicycle and pedestrian stakeholders (Table 2).

Working Paper 1 is presented for review by the Task Force to document the status of the data collection effort and the consultant team's latest thinking on approach. It should be considered a "living document" and will eventually be revised and incorporated into a final report with other findings and results.



Table 2: Study Task Force

Name	Organization
Jon Kaplan	VTrans Project Manager
Scott Bascom	VTrans
David Ellenbogen	Vermont Bicycle and Pedestrian Coalition
Greg Gerdel	VT Department of Commerce and Community Development
Bruce Hyde	VT Department of Commerce and Community Development
Suzanne Kelley	VT Department of Health
Susan Schreibman	Rutland Regional Planning Commission
Justine Sears	UVM Transportation Research Center
Jennifer Wallace-Brodeur	AARP
Sherry Winnie	VT Dept. of Forests, Parks & Recreation

2.0 METHODOLOGY OVERVIEW

The desired outcome of this study is an estimate of the number of jobs created and personal income generated during one typical year in Vermont due to the investment in and use of walking and biking facilities by residents and visitors. The resulting impact on revenues that support the state’s general budget is another economic benefit that will also be estimated. The methodology is based on the consultant team’s review of numerous documents provided by VTrans since the September kick-off meeting, other research and their experience with economic impact and transportation system analyses. A list of documents reviewed is provided in Attachment 1.

In the recently completed *Vermont Pedestrian and Bicycle Policy Plan*, one of the action strategies was to “conduct a research study to determine the overall economic and environmental benefits of bicycling and walking on the State’s economy.” [Such a] “study would be a one-time snapshot of the total economic and environmental benefit (direct, secondary, and spin-off benefits) of bicycle and pedestrian facilities and activities, including tourism, environmental, air quality, and green house gas emissions, real estate, health, reduction in demand on the transportation systems and other economic benefits.”

As noted in the *Vermont Pedestrian and Bicycle Policy Plan* and elsewhere, cycling and walking provide significant environmental, transportation, health and economic benefits. Though such benefits are obviously enjoyed at an individual level; in aggregate, there are the various benefit streams that flow to society from active forms of transportation including:

- reduced health costs (e.g., reduced risks of chronic diseases and ill-health);
- reduced costs related to air pollution and greenhouse gas emissions;
- reduced traffic congestion and increased vehicle operating costs savings;
- increased productivity and reduction of sick days in the workplace; and



- increased demand for recreational/leisure goods and services.

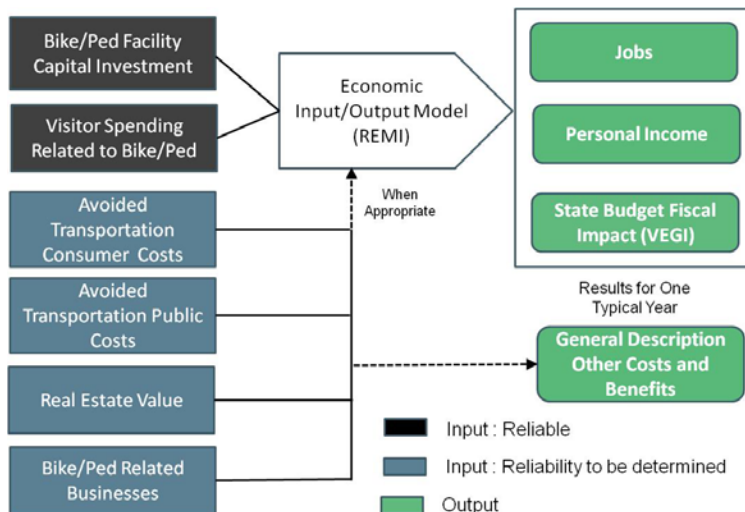
In addition, bicycling and walking are viewed as opportunities to grow the regional economy. As the number of active transportation participants and individual trips in the region increases, so does the impact of bicycling and walking on state and local economies. Investments in pedestrian and bicycling infrastructure generate economic returns in the form of increased visitation of travelers and tourism and related expenditures. And, there is evidence to suggest that property values increase along greenways and trails as well as pedestrian and cycling-friendly neighborhoods and communities.

Finally, an overall economic assessment of bicycling and walking activities includes a group of industries and businesses comprised of manufacturers of bicycles and parts, running/cycling gear and apparel, wholesalers/distributors, tour operators, and retailers and repair services.

In summary, the economic assessment will be based on:

1. The economic returns of capital investments in cycling and walking infrastructure;
2. Economic impacts associated with tourism and visitor spending;
3. Avoided transportation consumer costs realized by pedestrians and cyclists compared to travelling by automobile. Examples include vehicle ownership and operations, value of time lost in congestion and health benefits;
4. Avoided transportation public costs realized by society at large due to the shift of automobile travel to walking and biking. Examples include greenhouse gas and other emissions, traffic enforcement, noise impacts and safety;
5. The effect of walking and biking facilities on real estate values; and
6. Revenues and jobs created by walking and biking related businesses (Figure 1).

Figure 1: Overall Approach



The annual costs and benefits in dollars for all these components will be estimated and used as inputs to an economic impact “input/output” model, which has already been developed specifically for Vermont. The core economic impact model was developed by Regional Economic Models, Inc. (REMI), and is widely used throughout Vermont State government. The model is maintained by the Vermont Economic Progress Council (VEPC) and the legislative Joint Fiscal Office (JFO) for analytic work associated with legislative economic and fiscal analyses. REMI is also used by the Vermont Department of Public Service.

An additional step in the impact analysis process is the computation of all direct and indirect state revenues and costs associated with the State’s bicycle and pedestrian facilities and activities. This will be completed using the Vermont Employment Growth Incentive (VEGI) fiscal cost/benefit model as maintained by the VEPC. The VEGI fiscal cost/benefit model has had a long and proven record as the most valid state fiscal impact model available for use in Vermont State fiscal analysis. The VEGI model’s cost-benefit structure has been successfully employed for the past fifteen years—with appropriate periodic modifications as specified by changes in the program and in cooperation with the goals and objectives for the program as articulated by the Vermont General Assembly. The model was approved by the Joint Fiscal Committee and also has undergone several audits by the State Auditor of Accounts and the Legislative Joint Fiscal Office. Minor modifications will be made for this study, where appropriate, to adapt the model for assessing the fiscal impacts of the State’s bicycle and pedestrian facilities and activities.

Ideally, all of the costs will be used as inputs to the REMI economic impact model. However, the level of confidence associated with each of the economic impact categories described above and shown in Figure 1 will vary based on the quality of available data and whether or not the data needs to be processed further using other estimation techniques. An example of an economic impact category with a high level of confidence is the investment in walking and biking infrastructure which will be based primarily on the actual costs of completed projects. An example of an economic impact category with less confidence is the public costs associated with green house gas emissions which will be based on (1) an estimate of vehicle miles travelled shifted to walking and biking in Vermont derived from a statewide household travel survey and (2) a general cost per vehicle miles travelled available from a third party source. As the study progresses, the consultant team with assistance from the Task Force will determine which impact categories should be evaluated in the economic impact input/output model and which should be documented and discussed more qualitatively.



3.0 DATA SOURCES

This section provides an overview of potential data sources that will be used to estimate annual costs of the economic impact categories listed above and describes potential issues and gaps.

Bicycle and Pedestrian Facility Capital Investments

Data Sources:

- Annual VTrans capital programs for the last five fiscal years. The capital program identifies the amount of federal and state funds programmed for all phases of pedestrian and bicycle facilities (planning/design/permitting, right-of-way acquisition and construction). Project managers will be identified and contacted to verify project status and latest costs as available.
- Municipal budgets and capital programs. Municipalities also use local funds with no state or federal contribution to maintain existing sidewalks and bike paths and to construct new facilities. Municipal budgets and capital plans will be reviewed on-line when available. When these documents are not available, the consultant team will contact municipalities directly and ask for information. A preliminary list of municipalities to be contacted is identified in Attachment 2. The list generally includes all of the larger cities in the state and other towns that may have village centers or other activity areas that may have sidewalks and bicycle facilities (based on RSG's general knowledge of the state). Suggested additions from the Task Force are welcome.

Potential Issues:

- Bicycle and pedestrian facilities are often incorporated with roadway projects and may not be specifically identified as such in the VTrans capital program. RSG will work with VTrans to identify these types of multi-modal projects and will develop cost estimates for the pedestrian and bicycle components of the infrastructure using unit costs.

Visitor Spending/Tourism Related to Walking and Biking

Data Sources:

- Visitor activity and expenditures within Vermont's hospitality and recreation sector are estimated on an every other year basis through a benchmark analysis, with a tracking estimate completed in between benchmark study years. Both domestic and Canadian visitors to Vermont are estimated on a person-trip basis (day and overnight). Visitor expenditures are estimated within the following



hospitality and recreation sectors of hotel and lodging, eating and drinking, recreation and entertainment, transportation, gasoline and oil, and retail trade.

Potential Issues:

- In the Vermont Travel and Tourism Industry benchmark studies, no distinction or special surveys have been made to estimate the number of bicycling tourists. Data on bicycle tourism in Vermont are dated—prior studies date back to 1995 and 1992.
- Bicycle tourism is essentially divided into two types—self-guided and guided tours. Bicycle tour companies in Vermont could be surveyed to obtain bicycle tourism counts (number and visitor days) and bicycle visitor-related expenditures in Vermont. Self-guided bicycle visitors and related expenditures will need to be estimated.

Transportation System Related Consumer and Public Costs

The transportation system related consumer and public costs resulting from walking and biking will be developed from the same data sets. The approach involves two steps: (1) estimating the amount of walking and biking that occurs annually in the state and (2) calculating the costs associated with avoided vehicle miles of travel and costs associated with miles walked and biked.

Data Sources:

- National Household Travel Survey (NHTS). To quantify the transportation related economic benefits of walking and biking, it will be necessary to develop a reasonable and defensible estimate of the annual number and distances of trips made on foot and on bikes in Vermont. The estimate will be based on data available in the 2009 NHTS. The 2009 NHTS includes data on daily trips collected over a 24-hour period for households and persons. VTrans, the Chittenden County Metropolitan Organization (CCMPO) and the UVM Transportation Research Center purchased an add-on option which includes survey responses from approximately 1,500 households in the state. RSG has the data from the add-on option in hand and has prepared a preliminary estimate of walking and biking trips which is summarized in Section 4.0.
- Per Mile Costs for Automobile, Walking and Biking. Definitions for the transportation related costs are indicated in Table 3. The definitions and unit costs (Table 4) have been developed by the Victoria Transport Policy Institute (VTPI) and are published in the 2009 Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications. Values include the cost to the individual (consumer) and costs that are passed along to society at-large (public costs).



Table 3: Transportation System Cost Definitions

Transport Related Cost Category	Definition
Vehicle Ownership	Fixed costs of owning an automobile, bike and walking
Vehicle Operation	Variable vehicle costs, including fuel, oil, tires, tolls and short-term parking fees.
Operating Subsidy	Financial subsidies for public transit services.
Travel Time	The value of time used for travel.
Internal Crash	Crash costs borne directly by travelers.
External Crash	Crash costs a traveler imposes on others.
Internal Health Ben.	Health benefits of active transportation to travelers (a cost where foregone).
External Health Ben.	Health benefits of active transportation to society (a cost where foregone).
Internal Parking	Off-street residential parking and long-term leased parking paid by users.
External Parking	Off-street parking costs not borne directly by users.
Congestion	Congestion costs imposed on other road users.
Road Facilities	Roadway facility construction and operating expenses not paid by user fees.
Land Value	The value of land used in public road rights-of-way.
Traffic Services	Costs of providing traffic services such as traffic policing, and emergency services.
Transport Diversity	The value to society of a diverse transport system, particularly for non-drivers.
Air Pollution	Costs of vehicle air pollution emissions.
Green House Gas (GHG)	Lifecycle costs of greenhouse gases that contribute to climate change.
Noise	Costs of vehicle noise pollution emissions.
Resource Externalities	External costs of resource consumption, particularly petroleum.
Barrier Effect	Delays that roads and traffic cause to nonmotorized travel.
Land Use Impacts	Increased costs of sprawled, automobile-oriented land use.
Water Pollution	Water pollution and hydrologic impacts caused by transport facilities and vehicles.
Waste	External costs associated with disposal of vehicle wastes.

Source: "2009 Transportation Cost and Benefit Analysis; Techniques, Estimates and Implications"; VTPI

Table 4: Transportation System Unit Costs

Cost Category	Auto		Bike		Walk	
	Consumer	Public	Consumer	Public	Consumer	Public
Vehicle Ownership	\$0.27	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00
Vehicle Operation	\$0.16	\$0.00	\$0.03	\$0.00	\$0.05	\$0.00
Operating Subsidy	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Travel Time	\$0.13	\$0.00	\$0.38	\$0.00	\$1.25	\$0.00
Internal Crash	\$0.12	\$0.00	\$0.08	\$0.00	\$0.08	\$0.00
External Crash	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00
Internal Health Ben.	\$0.00	\$0.00	(\$0.10)	\$0.00	(\$0.24)	\$0.00
External Health Ben.	\$0.00	\$0.00	\$0.00	(\$0.10)	\$0.00	(\$0.24)
Internal Parking	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
External Parking	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.00
Congestion	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00
Road Facilities	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00
Land Value	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.00
Traffic Services	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
Transport Diversity	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
Air Pollution	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.00
GHG	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00
Noise	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
Resource Externalities	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.00
Barrier Effect	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
Land Use Impacts	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.00
Water Pollution	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
Waste	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

1. Source: "2009 Transportation Cost and Benefit Analysis; Techniques, Estimates and Implications"; VTPI

2. All costs are in 2007 U.S. Dollars

3. Auto costs assume 20% of travel occurs on urban highways during peak hours, 40% on urban highways during off-peak periods, and 20% on rural highways.



Potential Issues

- The unit costs provided by the VTPI are based on a comprehensive literature review of thirty-three reports and studies from multiple countries, different agencies, institutions and organizations with dates ranging from 1975 to 2009. About half of the studies were conducted in the United States. It provides a readily available and consolidated source of data. Some additional research will be undertaken to verify values and to determine if more applicable costs are available.
- The unit costs for automobile travel assume 20% of travel occurs on urban roadways during the peak hours, 40% occurs on urban roadways during the off-peak hours and 20% occurs on rural roadways. This distribution is a default assumption and will be refined to reflect the travel in Vermont. The distribution in Vermont will be based on traffic data readily available from VTrans.

Effect on Real Estate Value

As noted in the scope of work, there are numerous publications with study results that show the change in property value for homes located near bicycle facilities. Examples cited include:

- A report published by the Rails-to-Trail Conservancy in 2008, *Active Transportation for America* states that developers were able to charge \$5,000 more for homes located near trails.
- A study published in the Fall 2004 issue of *the Journal of Park and Recreation Administration* suggests that a home located near trails had appraised values 11% greater than similar homes located further away.

Another study uncovered during research for this working paper is *How Walkability Affects Home Values in U.S. Cities* (CEOs for Cities, August 2009). It found that houses with above average levels of walkability command a premium of about \$4,000 to \$34,000 over houses with just average levels of walkability in the typical metropolitan areas included in the statistical analysis. The study evaluated over 90,000 house sales in metropolitan areas with populations that range between 670,000 to six million persons. It was based on actual sales and controlled for other key factors affecting price including size, number of bedrooms, number of bathrooms, age, neighborhood characteristics and location relative to employment centers. Walkability was quantified using “Walk Score” a free on-line tool. As described in the study, the “... Walk Score algorithm looks at destinations in 13 categories and awards points for each destination that is between one-quarter mile and one mile of the subject residential property”. Examples of the destinations include grocery stores, restaurants, library, fitness center, bookstores, movie theatres, and schools. The Walk Score considers proximity, but does not account for the availability, connectivity or pedestrian environment between the homes and the destinations. It may be possible to apply the methodology in Vermont, but additional



research is necessary to determine if the sales data are readily available for a reasonable sample size.

Another option is the case study approach described in the scope of work. The before and after appraised values of homes located near a multi-use path for three to five locations in Vermont would be documented depending on the availability of data. Assistance from the Task Force is requested help identify representative case study locations.

Data Sources:

- House sales and related attributes in Vermont from the National Association of Realtors (for the walkability statistical analysis approach). A request has been made to the National Association of Realtors for compiling sales price for specific houses, addresses and other characteristics necessary for the statistical analysis of the contribution of walkability to price.
- Municipal Grand Lists (for the case study approach). Grand lists are typically published every year and show the appraised value for each property in a municipality. Assuming the completion date of a nearby sidewalk or bicycle facility project is known, it will be possible to document the before and after appraised value of a house.

Potential Issues:

- The Walk Score that will be used to quantify walkability and its effect on sales price (if this approach is used) considers proximity, but does not account for the availability, connectivity or pedestrian environment between the homes and the destinations.
- While it will be possible to document the before and after appraised value of a house published in a grand list, correlating change in property value to a sidewalk or bicycle facility project may not be possible. The appraised value is determined by appraisers that work directly for or are contracted by a municipality. The goal is to determine the fair market value of a property which is then used to determine the amount of property taxes paid. There are many factors that affect the appraised value. Access to sidewalks and bicycle facilities is not considered explicitly, but may affect how some appraisers rate the overall quality of a neighborhood. Town-wide appraisals are completed every five years. Between those years, the appraised value of a house will not change unless physical alterations are made. This five year cycle, general inflation and changes in the overall housing market may create too much noise to confidently conclude whether or not a sidewalk or bicycle facility has resulted in a change in property value.



Bicycle and Pedestrian Related Businesses

Sales and jobs associated with walking and biking businesses will be based on a telephone survey of related businesses to be conducted by Local Motion.

Primary Data Sources:

- List of bicycle and pedestrian related businesses. A preliminary list is provided in Attachment C.

Potential Issues:

- It is desirable to collect information on annual revenue, number of employees and the value of payroll. Many businesses may provide other unrelated products and services making it necessary to determine the proportion of revenue and jobs that are related to walking and biking. We anticipate developing some simple questions such as:
 - How many people do you employ?
 - In a typical year, within what range does your revenue fall (example: less than \$100,000; \$100,000-\$500,000, \$500,000-\$1 million, etc. Ranges will be determined)
 - What proportion of your business/revenue is related to walking and biking?

This type of financial information is proprietary and many business owners are unlikely to provide detailed information. The information may also be speculative when a business owner is asked to estimate the proportion of sales related to walking and biking. As a result, the data will not have a high level of certainty, and may not be used as an input to the economic impact model. The information collected will still be valuable in providing a general description of this overall cost category.

Data Source Summary

The data sources listed above will be organized into three categories:

- The first category involves identified costs and benefits for which the consultant team is able to identify or develop valid and defensible activity estimates. Data and activity estimates in this first category will have to meet a rigorous analytical standard that allows them to be included into the input/output model.
- The second category involve those sources where some informing data was available, but the available data--whether taken from secondary sources or developed during this study—is not up to a minimum analytical standard that would allowed it to be included into the economic impact input/output model.



- The third category of data and information involves those sources for which the investigators and the Task Force knew were of importance to bicycle and pedestrian facilities and activity estimates but for which there was little credible information available.

Table 5 presents the preliminary organization of the data described above into these three categories.

Table 5: Summary of Confidence Level for Potential Data Sources

Category	High level of certainty – use in I/O Model	Medium level of certainty – may use in I/O model	Low level of certainty – Results presented for information only
Bike/Ped Facility Capital Investment	<ul style="list-style-type: none"> • VTrans Capital Programs • Municipal Capital Budgets/Annual Reports 		
Visitor Spending Related to Bike/Ped	<ul style="list-style-type: none"> • Tourism spending • Tour operators 		
Transportation System Costs		<ul style="list-style-type: none"> • 2009 NHTS Data for VT • VMT Unit Costs from VTPI 	
Real Estate Value			<ul style="list-style-type: none"> • Case Study Approach • Statistical Analysis Approach
Bike/Ped related Businesses			<ul style="list-style-type: none"> • Business survey

4.0 PRELIMINARY ESTIMATE OF WALKING AND BIKING TRIPS IN VT

Based on the 2009 National Household Travel Survey (NHTS), Vermonters travelled approximately 69 million miles on foot and 28 million miles by bike during 2009 (Table 6). The NHTS utilizes a telephone survey to document the trip making characteristics of survey participants in a 24 hour period. It documents:

- Purpose of the trip (work, shopping, etc.);
- Means of transportation used (car, bus, subway, walk, etc.);
- How long the trip took, i.e., travel time;
- Distance travelled;
- Time of day when the trip took place;
- Day of week when the trip took place; and
- If a private vehicle trip:
 - number of people in the vehicle , i.e., vehicle occupancy;



- driver characteristics (age, sex, worker status, education level, etc.); and
- vehicle attributes (make, model, model year, amount of miles driven in a year).

The estimates presented in Table 6 are based on a statistical analysis by RSG of responses from the 1,486 Vermont residents that participated in the survey. The responses were weighted based on socioeconomic and demographic characteristics to estimate total statewide values.

Table 6: Preliminary Estimate of Walking and Bike Trips in Vermont in 2009

<i>Measure</i>	<i>All Trips</i>	<i>Walking</i>	<i>Biking</i>
Number of Trips per Person/Day	3.70	0.42	0.04
Number of Trips per Household/Day	7.76	0.88	0.09
Annual Trips in Vermont	801,164,769	87,155,983	9,285,656
% of Total Trips	100%	10.9%	1.2%
Average Miles Travelled per Trip	7.92	0.83	2.53
Total Annual Miles Travelled	8,344,827,820	68,248,876	28,337,598
Percentage of Miles Travelled	100%	0.8%	0.3%

Additional analyses will be conducted to develop the margin of errors for the estimates presented in Table 6. The total estimates may also be refined further to isolate recreation only related trips, which can be estimated from the NHTS data. This distinction may be important because walking and biking trips made for recreational purposes do not off-set vehicle trips, and therefore do not result in the same avoided costs associated with trips made for other purposes. Some benefits will still be assigned to recreation-only trips, such as the health effects.

5.0 SUMMARY AND NEXT STEPS

Working Paper 1 describes the overall methodology and potential data sources that will be used to determine the economic impact of walking and biking in Vermont. It also presents the results of an initial estimate of the amount of annual walking and biking trips for the entire state, and notes areas where additional data are necessary.

Next steps include:

- Gather comments from the Task Force on overall approach and identification of other data sources. Specific comments are requested on:
 - The list of municipalities to be contacted regarding expenditures on pedestrian and bicycle projects (Attachment 2);
 - Location for real estate impact case studies; and
 - The list of pedestrian and bicycle related businesses (Attachment 3).



- Prepare for and conduct a public meeting to increase awareness about the study and to gather feedback from stakeholders on methodology.
- The consultant team will:
 - Compile infrastructure costs from VTTrans capital programs and contacts with municipalities;
 - Explore data sources that could be used to estimate the impact of walkability on residential real estate sales in Vermont;
 - Conduct additional research for additional information on the per mile transportation system costs;
 - following the public meeting, initiate the telephone survey of bicycle and pedestrian related businesses; and
 - Refine the estimate of walking and biking trips.

Working Paper 2 on transportation system and real estate cost impacts will be reviewed at the third meeting of the Task Force which will occur sometime after the public meeting.



Attachment 1: Sources reviewed

Abelson, Peter. 2008. *Establishing a Monetary Value for Lives Saved: Issues and Controversies*. Working papers in cost-benefit analysis (WP 2008-02). Prepared for Office of Best Practice Regulation. Department of Finance and Deregulation, Government of Australia, Canberra. Submitted--November 2008.

AECOM Australia Pty Ltd. 2010. *Inner Sydney Regional Bicycle Network: Demand Assessment and Economic Appraisal*. Prepared for the City of Sydney, Australia. Submitted—15 April 2010.

American Public Health Association. 2010. *The Hidden Health Costs of Transportation*. Washington, DC: American Public Health Association.

Anable, Jillian, Geertje Schuitema, Yusak Susilo, Paulus Aditjandra, Mark Beecroft, and John Nelson. 2010. *Walking and cycling and socio-economic status in Scotland: analysis of statistical data and rapid review of the literature*. Edinburgh, Scotland, UK: NHS Health Scotland.

Argys, Laura M. and H. Naci Mocan. 2000. *Bicycling and Walking in Colorado: Economic Impact and Household Survey Results*. Prepared for the Colorado Department of Transportation, Bicycle/Pedestrian Program. University of Colorado at Denver, Center for Research on Economic and Social Policy. Submitted—April 2000.

Bassett, Jr., David R., John Pucher, Ralph Buehler, Dixie L. Thompson, and Scott E. Crouter. 2008. "Walking, Cycling and Obesity Rates in Europe, North America and Australia." *Journal of Physical Activity and Health*. 5: 795-814.

Bicycle Federation of Wisconsin and the Wisconsin Department of Transportation. 2006. *The Economic Impact of Bicycling in Wisconsin*. Prepared for the Governor's Bicycling Coordinating Council.

Birk, Mia and Jessica Roberts. 2008. *The Value of the Bicycle-Related Industry in Portland*. Portland, OR: Alta Planning + Design.

Buis, Jerome and Roelof Wittink. 2000. *The Economic Significance of Cycling: A Study to illustrate the costs and benefits of cycling policy*. The Hague, Netherlands: Interface for Cycling Expertise.

Burgess, Bruce. 1995. *Bicycle Touring in Vermont and Vermont's Scenic Byways Program*. Montpelier, Vermont: Vermont Agency for Transportation.

Burgess, Bruce. 1992. "The Impact of Bicycle Touring on the Economy of Vermont." Presentation made at the Conference Velo Mondiale, Montreal, Quebec, Canada.

Cavill, Nick, Sonja Kahlmeier, Harry Rutter, Francesca Racioppi, and Pekka Oja. 2008. "Economic analyses of transport infrastructure and policies including health effects related to cycling and walking: a systematic review." *Transport Policy*. 15:291-304.

Cavill, Nick, Sonja Kahlmeier, Harry Rutter, Francesca Racioppi, and Pekka Oja. 2008. *Methodological Guidance on the Economic Appraisal of Health Effects Related to Walking and Cycling: Economic Assessment of Transport Infrastructure and Policies*. Copenhagen, Denmark: World Health Organization, Europe Regional Office.



- Cavill, Nick, Sonja Kahlmeier, Harry Rutter, Francesca Racioppi, and Pekka Oja. 2008. *Health Economic Assessment Tool for Cycling (HEAT for cycling) User guide, version 2*. Copenhagen, Denmark: World Health Organization, Europe Regional Office.
- Center for International Public Management. 1998. *Assessing Community Impacts from Greenways: Recommendations for Identifying, Measuring and Estimating the Benefits and Costs of Corridors*. Tallahassee, FL: Florida Department of Environmental Protection, Office of Greenways and Trails.
- Chenoweth & Associates. 2009. *The Economic Costs of Overweight, Obesity, and Physical Inactivity Among California Adults, 2006*. A Study for the California Center for Public Health Advocacy. Davis, California.
- City of Copenhagen. 2009. *Copenhagen City of Cyclists: Bicycle Accounts 2008*. Copenhagen, Denmark: City of Copenhagen, Technical and Environmental Administration and Traffic Department.
- City of Copenhagen. 2009. *Copenhagen City of Cyclists: Bicycle Life*. Copenhagen, Denmark: City of Copenhagen, Technical and Environmental Administration and Traffic Department.
- Colgan, Charles. 2008. Changes in the Maine Economy from Strategic Investments in the Transportation System. Maine Department of Transportation and Center for Business and Economic Research, University of Southern Maine.
- Cycling Promotion Fund. 2008. *Economic Benefits of Cycling for Australia*. Auburn, Victoria, Australia: Cycling Promotion Fund.
- Davis, Adrian. 2010. *Value for Money: An Economic Assessment of Investment in Walking and Cycling*. National Health Service, Bristol, UK. Submitted--March 2010.
- Dill, Jennifer and Theresa Carr. 2003. "Bicycle Commuting and Facilities in Major US Cities: If You Build Them, Commuters Will Use Them—Another Look." Presented at the Annual Meeting of the Transportation Research Board (TRB), Portland Oregon.
- Flusche, Darren. 2009. *The Economic Benefits of Bicycle Infrastructure Investments*. Policy Research Report. League of American Bicyclists.
- Genter, J.A., S. Donovan, B. Petrenas, and H. Badland. 2008. *Valuing the health benefits of active transport modes*. NZ Transport Agency Research Report 359. Wellington, NZ: New Zealand Transport Agency.
- Grabow, Maggie, Micah Hahn, and Melissa Whited. 2010. *Valuing Bicycling's Economic and Health Impacts in Wisconsin*. Prepared for Wisconsin State Representative Spencer Black. University of Wisconsin-Madison, Nelson Institute of Environmental Studies.
- Gotschi, Thomas and Kevin Mills. 2008. *Active Transportation for America: The Case for Increased Federal Investment in Bicycling and Walking*. Washington, DC: Rails-to-Trails Conservancy.
- Hausauer, Brenda. 1999. *Vermont Bicycle and Walking Fact Sheet: Bicycling and Walking in Vermont*. Montpelier, Vermont: Vermont Governor's Council on Physical Fitness and Sports and Vermont Bicycle and Pedestrian Coalition
- Herby, Jonas. 2009. *Economic evaluation of cycle projects—methodology and unit prices*. Working paper produced by COWI for the City of Copenhagen, Denmark.



Jolicoeur, Marc, France Dumesnil, Gary Lawrence, and Gordon Martin. 2006. *Bicycling in Quebec, 2005*. Montreal, Quebec, Canada: Velo Quebec Association.

Lawrie, Judson, John Guenther, Thomas Cook, and Mary Paul Meletiou. 2004. *The Economic Impact of Investments in Bicycle Facilities: A Case Study of the Northern Outer Banks*. Prepared for the North Carolina Department of Transportation, Division of Bicycle and Pedestrian Transportation. North Carolina State University, Institute for Transportation Research and Education.

Leadership Champlain Project. 2002. *Island Line Rail Trail: Analysis of Economic Impacts and Outline of Marketing Strategies*. Burlington, Vermont: Lake Champlain Regional Chamber of Commerce.

League of American Bicyclists. 2010. *American Community Survey Bicycle Commuting Trends, 2000-2008*. Washington, DC: Advocacy Advance Project of League of American Bicyclists and Alliance for Bicycling & Walking.

Litman, Todd Alexander. 2003. *Economic Value of Walkability*. Victoria, British Columbia, Canada: Victoria Transport Policy Institute.

Macbeth, Andrew G., Roger Boulter, and Paul S. Ryan 2005. *New Zealand walking and cycling strategies—best practice*. Land Transport New Zealand Research Report 274. Wellington, NZ: Land Transport New Zealand.

Moore, Roger and Kelly Barthlow. 1998. *The Economic Impacts and Uses of Long-Distance Trails: A Case Study of the Overmountain Victory National Historic Trail*. Prepared for the National Parks Service, US Department of the Interior.

MMM Group in association with Stantec and TransActive Solutions. 2008. *Town of Oakville Active Transportation Master Plan (Cycling and Walking Master Plan): Phase I Background Report*. Prepared for the City of Oakville, Ontario, Canada. Submitted--18 September 2008.

National Bicycle and Pedestrian Clearinghouse. 1995. *The Economic and Social Benefits of Off-Road Bicycle and Pedestrian Facilities*. Technical Assistance Series, Number 2.

Pedestrian and Bicycle Information Center. 2010. *The National Bicycling and Walking Study: 15-year Status Report*. US Department of Transportation, Federal Highway Administration.

PriceWaterhouseCoopers. 2009. *Evaluation of the costs and benefits to the community of financial investment in cycling programs and projects in New South Wales*. Sydney, New South Wales, Australia: Roads and Traffic Authority of NSW and NSW Department of Environment and Climate Change.

Pucher, John and Ralph Buehler. 2008. "Making Cycling Irresistible: Lessons from The Netherlands, Denmark, and Germany." *Transport Review* 28(4):495-528.

Sælensminde, Kjartan. 2004. "Cost-benefit analyses of walking and cycling track networks taking into account insecurity, health effects and external costs of motorized traffic," *Transportation Research Part A*, 38: 593-606.

Sloman, L. N. Cavill, A. Cope, L. Muller, and A. Kennedy. 2009. *Analysis and synthesis of evidence on the effects of investment in six Cycling Demonstration Towns*. London, UK: Report for the UK Department of Transport and Cycling England.

Snyder, Ryan. 2004. *The Economic Value of Active Transportation*. Los Angeles, CA: Ryan Snyder Associates, LLC



Southwick Associates and Harris Interactive. 2006. *The Active Outdoor Recreation Economy*. Produced for the Outdoor Industry Foundation, Washington, DC.

SQW. 2007. *Valuing the benefits of cycling: A Report to Cycling England*. London, UK: SQW, Ltd.

Steele, Kristen and Monica Altmaier. *Bicycling and Walking in the United States, 2010: Benchmarking Report*. Washington, DC: Alliance for Biking and Walking.

Strawser, Chuck, Tom Huber, and Marjorie Ward. 2005. *The Economic Impact of Bicycling in Wisconsin*. Prepared for the Governor's Bicycle Coordinating Council by the Bicycle Federation of Wisconsin in conjunction with the Wisconsin Department of Transportation.

Sustrans. 2005. *An Economic Appraisal of Local Walking and Cycling Routes*. Bristol, UK: Sustrans, National Cycle Network Centre.

Sustrans. 2007. *The Economic Impact of Cycle Tourism in North East England*. Bristol, UK: Sustrans, National Cycle Network Centre.

Tayside and Central Scotland Transport Partnership (tactran). (c2008). *Walking and Cycling Strategy and Action Plan*. Perth, Scotland, UK.

Tin Tin, Sander, Alistair Woodward, Simon Thornley, and Shanthi Ameratunga. 2009. "Cycling and walking to work in New Zealand, 1991-2006: regional and individual differences, and pointers to effective interventions." *International Journal of Behavioral Nutrition and Physical Activity* 6:64-75.

Wang, G., Macera, C., Scudder-Soucie, B., Schmid, T., Pratt, M. and Buchner, D. 2005 "A cost-benefit analysis of physical activity using bike/pedestrian trails," *Health Promotion Practice*, 6(2): 174-179.

Wilbur Smith Associates. 2001. *Bicycle Tourism in Maine: Economic Impacts and Marketing Recommendations*.(Final Report April 2001). Office of Passenger Transportation, Maine Department of Transportation.

Wilbur Smith Associates with Toole Design Group. 2008. *Vermont Pedestrian and Bicycle Policy Plan*. Submitted to Vermont Agency of Transportation. Submitted--January 17, 2008.



*Attachment 2: Municipalities to Contact regarding Bike/Ped
Infrastructure and Maintenance costs*

Barnet	Newport
Barre	Newport
Bellows Falls/Rockingham	North Bennington
Bennington	Northfield
Bethel	Norwich
Bradford	Pittsford
Brandon	Poultney
Brattleboro	Pownal
Bristol	Putney
Burlington	Randolph
Castleton	Richmond
Chester	Rutland
Colchester	Rutland Town
Danville	Saint Albans
Derby	Saint Johnsbury
Enosburg Falls	Saxtons River
Essex	Shelburne
Essex Junction	South Burlington
Fair Haven	South Royalton
Hardwick	Stowe
Hartford	Swanton
Jericho	Townshend
Ludlow	Vergennes
Lyndon	Vernon
Manchester	Wallingford
Middlebury	Waterbury
Milton	West Rutland
Montpelier	White River Junction
Morrisville	Wilmington
Newfane	Windsor



Attachment 3: Bicycle and Pedestrian Related Businesses

FN1	LN1	FN2	LN2	Title	Company	City
John	Freidin				25 Bike Tours of Vermont	Charlotte
Willy and Jenny	Williams				Adventure Trek USA	Thetford
Ray & Pam	Allen				Allenholm Farm	South Hero
Scott	Rieley				Alpine Shop	South Burlington
Massimo	Prioreshi				Backroads	Berkeley
Larry	Niles				Bike Vermont	Woodstock
Brenda	Lewis				Bredeson Outdoor Adventures	Bridport
Steve	Fuchs				Burlington Boot Camp	Essex Junction
Abbie & Eric	Bowker				Catamount Family Center	Williston
Eric	Bowker	Lucy	McCollough		Catamount Outdoor Family Center	Williston
Barry	Bender				Clearwater Sports	Waitsfield
Bill	Supple	Gribbin	Loring		Climb High	Burlington
					Country Inns Along the Trail	Brandon
Carolyn	Walters Fox			Public Relations	Country Walkers	Waterbury
Pat & Mike	Weisel				Cowpatty Bikes	Underhill Center
					Craftsbury Outdoor Center	
John	Worth				East Burke Sports	East Burke
Hans	Jenny				Fellowship of the Wheel	
Ian	Buchanan	Sarah	Shorett		Fit Werx	Waitsfield
George	Wisell	Mandy	Wisell		Five Trees Bikes / Bike 29	Waterbury Center
Bill	Salmon				Grafton Pond Mtn Bike Center	Grafton

FN1	LN1	FN2	LN2	Title	Company	City
Doon	Hinderyckx				Green Mountain Bicycle Services	Rochester
Kevin	Bessette			President	Green Mountain Bike Club	
Gary	Kessler			Race Director	Green Mountain Stage Race	Waitsfield
					IdeRide	East Burke
Jeannie & Chris	Houghton				Just Sports	Colchester
Ken	Johnston				Ken's Island Peddler	Grand Isle
Lou	Bresee				Lake Champlain Bikeways	Burlington
Chapin	Spencer				Local Motion	Burlington
				Manager	Louis Garneau	Newport
Pierre	Couture				Millstone Trails Association	Websterville
					Mount Snow Resort	West Dover
Bruce	Bell				Mountain Sports & Bike Shop	Stowe
					Mountain Top Inn	Chittenden
Pat & Jay	Miller	JP	Cousino		North Star Sports	Burlington
Glenn	Eames				Old Spokes Home	Burlington
Jamie	Huntsman	Carrie	Baker-Stahler		Onion River Sports	Montpelier
Marc	Sherman	Mike	Donahue		Outdoor Gear Exchange	Burlington
Jim	Walsh				Paradise Sports	Windsor
Eric	Krivitsky				Penguin Cycles	Brownsville
					Peter Glenn Ski & Sports	Essex
Rich	First				POMG Bike Tours of VT	Richmond
Rob	Maynard				Power Play Sports	Morrisville
John	Van Hazinga				Riding High Pedicab	Burlington
Jason	Carpenter				Royal Cycles	Burlington
Anna	Boisvert				Skihaus	Middlebury
Zandy	Wheeler	Spike	Clayton		Skirack	Burlington
Eli	Enman	Kasie	Wallace		Sleepy Hollow Inn	Huntington
Susan	Rand			President	Sojourn Bicycle Tours	Charlotte
Larry	Cruz	Chris	Ouellette		Sport Shoe Center	

FN1	LN1	FN2	LN2	Title	Company	City
					Sugarbush	Warren
Richard	Shappy				Tailwind Bikes	New Haven
Liz	Robert				Terry Bicycles	Burlington
David	Tier	Justin	Crocker		The Bike Center	Middlebury
					Trapp Family Lodge	Stowe
Jack	Nuber	Fred	Sperber		True Wheels	Killington
Gregg	Marston				VBT Bicycling Vacations	Bristol
Maurice	Cadotte	Julie	Toupin		Velo Chambly	
Steve and Sherry	Lulek				Vermont Adventure Tours	Rutland
Nancy	Schulz				Vermont Bicycle & Pedestrian Coalition	Montpelier
Bill	Cross				Vermont Ground Charter	Burlington
Patrick	Kell				Vermont Mountain Bike Advocates	Waterbury
Gray	Stevens				Vermont Outdoor Guide Association	North Ferrisburg
Gene	Bell	Gail	Center		Village Bicycle Shop	Richmond
Jeff	Manning				Village Bike Shop	Derby
John	Hibshman				Village Sport Shop	Lyndonville
Marty	Banak				Wilderness Trails	Quechee
Dave	Porter				Winooski Bicycle Shop	Winooski
					Wonder Walks	Bristol
					Bike Hub	Norwich