CarShare Vermont (CSVT) is investigating other Vermont towns in which to locate a pod. The purpose of this study is:

1. **To update the 2008 Market Study for Burlington.**
   1. Summarize the 2008 Study methodology and findings.
   2. Update that study with 2010 Census data.
   3. Compare the findings to CSVT utilization data: do the locations estimated to be most fertile for carsharing correspond to the best performing pods?
   4. Examine the 2012 CSVT Member Survey results and reservation data for additional insight that can be used to revise the methodology and improve it as a predictor of feasibility.

2. **To apply the update to three other places in Vermont to assess the feasibility of locating a carshare pod in each.**
   - Montpelier
   - Essex Junction
   - Williston
This report documents the project and presents the findings. The report is organized as follows:

<table>
<thead>
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<th>Phase 1-Burlington Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Burlington Market Study Recap</td>
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<tr>
<td>2013 Burlington Market Study Update</td>
</tr>
<tr>
<td>Comparison to CSVT Utilization Data</td>
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<tr>
<td>2012 CSVT Member Survey Review</td>
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<tr>
<td>Phase 1 Conclusions</td>
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</table>

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<th>Phase 2-Feasibility Studies</th>
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<tr>
<td>Methodology</td>
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<tr>
<td>Montpelier</td>
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<tr>
<td>Essex Junction</td>
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<td>Williston</td>
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<td>Phase 2 Conclusions</td>
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<tr>
<th>Project Recommendations and Conclusions</th>
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<th>Attachments</th>
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<tbody>
<tr>
<td>Household Income Data</td>
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<tr>
<td>Land Use by Pod</td>
</tr>
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</table>
In 2008, RSG identified locations in Burlington estimated to be most feasible for carsharing.
This section summarizes that study.
2008 Study: Background

- The 2008 study was based on the methodology in the 2007 TCRP Report 108 Car-Sharing: Where and How it Succeeds and used 2000 Census data.

- However, that methodology is based on urban carsharing organizations: “In less urban areas... car-sharing is characterized by a high degree of member involvement, and programs are often volunteer-run. According to studies in Britain, the presence of a strong local champion is the most important ingredient for success, outweighing factors such as good public transportation” (Celsor & Millard-Ball, 6).

- While Burlington is a small city by any standard, guidelines and criteria from studies that examined much larger urban areas such as San Francisco and New York were applied to this study.
Objective: To determine potential locations in Chittenden County, Vermont to place a carshare pods.

Methodology: Demographic data was attained on the 2000 Census Block and Traffic Analysis Zone (TAZ) level that would indicate areas of Chittenden County that could support a carshare pod.

- 6 different types of demographic data were analyzed and mapped on a case-by-case basis, and then overlaid to determine Census Blocks that met multiple criteria.

Findings: Census blocks meeting 5/6 of the criteria and 4/6 of the criteria were identified as areas that could potentially support a carshare pod.

- No Census Block met 6 of the 6 criteria.
- 12 potential sites county-wide.
  - 4 downtown Burlington sites met 5/6 criteria.
  - Remaining 8 sites (in Burlington and Winooski) met 4/6 criteria.
## Data Used in the 2008 Study

### Criteria Considered

- Age
- Age of neighborhood
- Car ownership
- Density
- Education
- Household size
- Income
- Means of commuting
- Parking
- Rent vs. own
- Zoning

<table>
<thead>
<tr>
<th>Factors Used</th>
<th>Definition</th>
<th>Data Source</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>Median age 18–39 years old</td>
<td>2000 Census Block</td>
</tr>
<tr>
<td>Rent vs. Own</td>
<td>More rental units then owned units (At least 100 renters per census block)</td>
<td>2000 Census Block</td>
</tr>
<tr>
<td>Household Size</td>
<td>Less than 2 people (Average HH Size &lt; 1.5)</td>
<td>2000 Census Block</td>
</tr>
<tr>
<td>Density</td>
<td>More than 3 households per acre</td>
<td>2000 Traffic Analysis Zone (TAZ)</td>
</tr>
<tr>
<td>Car Ownership</td>
<td>0 or 1 car per person</td>
<td>2000 Traffic Analysis Zone (TAZ)</td>
</tr>
<tr>
<td>Means of Commuting</td>
<td>Non-auto</td>
<td>Township</td>
</tr>
</tbody>
</table>
Methodology

Map Census Data

- HH Size
- Age
- Rental Properties

Locate Census Blocks that meet at least 2 of 3 criteria

Map TAZ and Town Data

- Commute
- Density
- Cars per person

Combine with Census Block Data identified as meeting 2 of 3 criteria

Identify Census Blocks meeting the most criteria
The four most feasible sites are located in downtown Burlington.

Eight other feasible sites are in Burlington and Winooski.

*Key to numbers on next slide

- Red: Primary Census Blocks
- Yellow: Secondary Census Blocks
2008 Study: Key to Numbered Census Blocks

As shown below, the most feasible sites ("Primary Census Blocks") have a combination of the following demographics:

- Relatively young (18–39 years old)
- More renters than owners
- Small household size
- High density neighborhoods
- Low vehicle ownership

<table>
<thead>
<tr>
<th>#</th>
<th>Census Block</th>
<th>Avg. HH Size</th>
<th>Median Age</th>
<th>Renters</th>
<th>% Rent</th>
<th>Non-Auto Commute</th>
<th>0 or 1 Cars Per Person</th>
<th>Density More than 3 HH/acre</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500070004003005</td>
<td>1.49</td>
<td>28.80</td>
<td>65</td>
<td>94%</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Downtown</td>
</tr>
<tr>
<td>2</td>
<td>500070010001003</td>
<td>1.16</td>
<td>71.80</td>
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<td>No</td>
<td>Yes</td>
<td>Downtown</td>
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<tr>
<td>3</td>
<td>500070004002003</td>
<td>1.61</td>
<td>31.00</td>
<td>114</td>
<td>90%</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Downtown</td>
</tr>
<tr>
<td>4</td>
<td>500070005002003</td>
<td>1.82</td>
<td>26.00</td>
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<td>Yes</td>
<td>Yes</td>
<td>Downtown</td>
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<tr>
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<td>26.00</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Downtown</td>
</tr>
<tr>
<td>6</td>
<td>500070005002004</td>
<td>2.12</td>
<td>22.80</td>
<td>131</td>
<td>89%</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Downtown</td>
</tr>
<tr>
<td>7</td>
<td>500070006002009</td>
<td>2.01</td>
<td>22.20</td>
<td>197</td>
<td>86%</td>
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<td>Yes</td>
<td>No</td>
<td>Downtown</td>
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<tr>
<td>8</td>
<td>500070009003002</td>
<td>1.38</td>
<td>46.60</td>
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<td>97%</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Downtown</td>
</tr>
<tr>
<td>9</td>
<td>500070002001000</td>
<td>2.34</td>
<td>35.40</td>
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<td>62%</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Greater Burlington</td>
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<td>10</td>
<td>500070024002000</td>
<td>3.05</td>
<td>25.40</td>
<td>116</td>
<td>79%</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Greater Burlington</td>
</tr>
<tr>
<td>11</td>
<td>500070025003026</td>
<td>1.61</td>
<td>27.60</td>
<td>194</td>
<td>83%</td>
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<td>Yes</td>
<td>Yes</td>
<td>Greater Burlington</td>
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<tr>
<td>12</td>
<td>500070006001008</td>
<td>2.25</td>
<td>28.70</td>
<td>154</td>
<td>67%</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Greater Burlington</td>
</tr>
</tbody>
</table>

Red: Primary Census Blocks  Yellow: Secondary Census Blocks
2013 Market Study Update

The 2008 Market Study was based on 2000 Census data; this section updates that study using 2010 Census data.

Currently, CSVT has 10 vehicles in 8 pods throughout Burlington. These pods can be categorized into three types:

- Residential Neighborhoods
- On-Campus Pods
- Downtown
Map Census and Town Data

- HH Size
- Age
- Rental Properties
- Commute
- Density
- Cars per person

Identify Census Blocks meeting the most criteria
Areas with large percentages of non-family households have been shown to be more likely to use car-sharing programs. Average household size varies across the city, but downtown and the UVM area have the lowest average household sizes.
Downtown pod Ramona has the lowest average household size within ½ mile; residential pod Horatio has the highest average household size within ½ mile.
Burlington: Median Age by Block

The 2008 Study indicated that areas with lower median ages tend to more feasible for carsharing. Median age throughout Burlington is relatively young (mostly under 30). Areas with slightly older populations are primarily north and south of downtown, though there is a pocket of older residents near the waterfront.

1 Data source: 2010 Census Blocks
Nora (farthest south) and Ace (farthest north) have the oldest populations within $\frac{1}{2}$ mile (though still within the expected range). Ramona (near the waterfront) also has a somewhat older population.

\[\text{Data source: 2010 Census Blocks}\]
Communities with large rental populations have been shown to be more likely to accept and use carsharing. The lowest proportion of rented households is to the south, and some to the north (corresponding somewhat with higher income areas).

1 Data source: 2010 Census Blocks
Burlington: Percent Renter Households by Pod

The downtown pods and residential pods in the Old North End (Horatio and Tammy) have the highest proportion of rented households within ½ mile.

1 Data source: 2010 Census Blocks
The density of rental households is also a critical criterion; density is highest just south of downtown and in the Old North End, particularly around North Winooski Avenue and North Union Street.

1 Data source: 2010 Census Blocks
Overall number of rented households within ½ mile of each pod is highest near Horatio and Otto. Nora has the fewest number of renters of the residential pods.
The areas with the highest proportion of people who commute by alternative means is to the east (near the campus pods) and in the Old North End (near Horatio).
The campus pods have the overall highest proportion of residents commuting by alternative means (46-52%); of the residential pods, Tammy has the highest non-car commute mode share.

Data source: 2010 Census Tracts (ACS 5-Year Estimates)
According to Census data, households in the most western tracts (including much of the Old North End) have the lowest vehicle ownership.

2 Data source: 2010 Census Tracts (ACS 5-Year Estimates)
Downtown pod Otto has the highest proportion of low-vehicle households within ½ mile. Downtown pod Ramona and residential pods Horatio and Ace have only slightly lower proportions of low-vehicle households.

2 Data source: 2010 Census Tracts (ACS 5-Year Estimates)
Burlington: Households per Acre by Block

The 2008 Study noted that areas with high densities of households have consistently been shown to have higher participation in carsharing. As Burlington is already relatively dense (most blocks have >3 households/acre), this factor may be less significant than others, such as vehicle ownership, commute mode, etc.. However, a level of 3 households per acre (as used in the 2008 study) is an appropriate minimum to apply to other locations to be considered in Phase 2 of the feasibility study.

It should be noted that this dataset only indicates the intensity of residential use and does not reflect the mix of other land uses that may be in the area. Therefore, an area with a relatively low number of households per acre may be an area with a diverse mix of offices, commercial, retail, and other uses that might be fertile for carsharing.

Data source: 2010 Census Blocks
Horatio has the highest average household density within ½ mile, followed by Otto. The UVM pods have the lowest overall household density because the pods are located in the campus core away from residential areas. Nora has the lowest average density of the residential pods.
Additional Land Use Considerations and Potential Data Sources

To address the fact that the available data (that is, Census data) only indicates the residential characteristics of an area, we evaluated 2008 data on land use parcels. By considering

- Percent Retail/Restaurant,
- Percent Office, and
- Percent Residential

we can take into account the mix of land uses in a location, as presented on the following page.

* Classifications based on Land Based Classification System Activity codes

* Parcels and Data from Chittenden County Regional Planning Commission (CCRPC)

We also reviewed the 2011 Retail Market Feasibility Analysis prepared for planBTV, Burlington’s recently approved Downtown and Waterfront Master Plan. A summary of insights is provided following the Land Use map.

Additional data sources were consulted to address the data gap, but these sources were not used because of lack of relevance or detail:

- Burlington Land Use Data/Zoning Info
- Chittenden County Regional Planning Commission Survey
- Community and Economic Development Office Jobs & People Report
- Chittenden County Transit Authority Survey

RSG also reviewed recent carsharing research to see if there have been any progress in estimating pod feasibility since the 2008 study, but there were no significant findings.
This map indicates that in addition to the central business district of Burlington, the Pine Street, Battery Street, North Street, and upper North Winooski Avenue corridors have a diverse mix of land uses.
“Unlike most downtown areas, Burlington includes a disproportionately large share of specialty retail…there is almost 1 million square feet of retail space in the Study Area, one of the two largest concentrations of retail space in the state (the other is in Williston).” page 19

“Downtown [Burlington] remains the regional financial center, but is losing businesses as Class A office tenants relocate to suburban sites with lower rents and more available free parking. There are approximately 5,868 office workers in downtown Burlington in 2011.” page 22

“Downtown’s residential base reportedly totals about 6,600 residents in 3,800 households, at all income levels. Downtown housing options include single family homes, duplexes, and multifamily rentals and condominiums, with most new market rate construction occurring along Battery Street and the waterfront area.” page 22

Residents who live within one-half mile of the intersection of Church Street and Main Street are “likely to visit downtown on foot and regularly patronize businesses for day-to-day goods and services. This are consists of a diverse mix of affluent condominium owners, college-age students living off campus, and working class families and individuals.” page 30

“Places with a diverse mix of residential and office uses are able to penetrate multiple consumer markets throughout different times of the day and parts of the week. When a resident living downtown leaves the area to commute to work, that resident is replaced by an office worker who is arriving from elsewhere in Burlington or from one of the surrounding jurisdictions.” page 36

## Locations meeting the most criteria

<table>
<thead>
<tr>
<th>Map Label</th>
<th>Census Block ID</th>
<th>Ave HH Size</th>
<th>Median Age</th>
<th>Rented</th>
<th>% Renters</th>
<th>Non Auto Commute</th>
<th>Vehicles per HH</th>
<th>Density</th>
<th>CRITERIA MET</th>
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<tbody>
<tr>
<td>1</td>
<td>500070004002006</td>
<td>1.44</td>
<td>37.5</td>
<td>112</td>
<td>96%</td>
<td>47%</td>
<td>78%</td>
<td>15.8</td>
<td>5.0</td>
</tr>
<tr>
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<td>28.8</td>
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<td>63%</td>
<td>47%</td>
<td>8.6</td>
<td>4.5</td>
</tr>
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<td>29.3</td>
<td>31</td>
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<td>24%</td>
<td>79%</td>
<td>10.3</td>
<td>4.5</td>
</tr>
<tr>
<td>4</td>
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<td>1.42</td>
<td>38.5</td>
<td>57</td>
<td>70%</td>
<td>24%</td>
<td>79%</td>
<td>21.4</td>
<td>4.5</td>
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<td>24%</td>
<td>79%</td>
<td>8.7</td>
<td>4.5</td>
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<td>1.91</td>
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<td>72%</td>
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<td>62%</td>
<td>3.4</td>
<td>4.0</td>
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<td>1.61</td>
<td>36.7</td>
<td>128</td>
<td>96%</td>
<td>47%</td>
<td>78%</td>
<td>22.9</td>
<td>4.0</td>
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<td>24%</td>
<td>79%</td>
<td>15.4</td>
<td>4.0</td>
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<td>47.3</td>
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<td>42%</td>
<td>63%</td>
<td>37.7</td>
<td>4.0</td>
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<td>47%</td>
<td>59%</td>
<td>26.9</td>
<td>4.0</td>
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<td>11</td>
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<td>2.34</td>
<td>22.6</td>
<td>134</td>
<td>94%</td>
<td>47%</td>
<td>59%</td>
<td>20.7</td>
<td>4.0</td>
</tr>
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<td>47%</td>
<td>59%</td>
<td>15.6</td>
<td>4.0</td>
</tr>
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<td>47%</td>
<td>59%</td>
<td>15.0</td>
<td>4.0</td>
</tr>
<tr>
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<td>209</td>
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<td>15.0</td>
<td>4.0</td>
</tr>
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<td>15</td>
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<td>30.3</td>
<td>101</td>
<td>80%</td>
<td>47%</td>
<td>78%</td>
<td>13.5</td>
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<td>110</td>
<td>98%</td>
<td>42%</td>
<td>63%</td>
<td>18.9</td>
<td>4.0</td>
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<tr>
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<td>1.68</td>
<td>32.9</td>
<td>109</td>
<td>96%</td>
<td>24%</td>
<td>79%</td>
<td>5.9</td>
<td>4.0</td>
</tr>
</tbody>
</table>

"Rented" and "% Renters" are combined into one criterion.
Locations meeting the most criteria
Locations meeting the most criteria
Comparison to CSVT Utilization Data
2013: Existing CSVT Pods

Annual Average Revenue by Vehicle: February 2012-January 2013

Fully Allocated Cost per Vehicle = $2340
Utilization data indicate that Otto, Ramona, and Nora are the top 3 performing pods.

The 2013 study update suggests that Otto and Ramona are adjacent to blocks with at least 4 of the 6 criteria met.

Nora is a successful pod, yet the Census analysis does not suggest that it would be. It is likely that community outreach and neighborhood support are factors in the success of this pod, which past research indicates is critical in smaller and less urban areas (see slide 5).
# Neighborhood Characteristics of Best-performing Pods

<table>
<thead>
<tr>
<th>Variable</th>
<th>Otto (best Downtown pod)</th>
<th>Nora (best Residential pod)</th>
<th>Significant Factor for CSVT?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commute</td>
<td>Slightly higher proportions of non-car commute than other pods</td>
<td>Proportion of non-car commute is “middle of the road”</td>
<td>Maybe for downtown pods</td>
</tr>
<tr>
<td>Vehicle ownership</td>
<td>Only marginally higher proportion of low- or no-vehicle households than other pods</td>
<td>Slightly lower proportion of low- or no-vehicle households than other pods</td>
<td>Probably not</td>
</tr>
<tr>
<td>Income</td>
<td>Lower median income than all other pods except Horatio</td>
<td>Somewhat higher income than all other pods except UVM pods</td>
<td>Maybe for residential pods</td>
</tr>
<tr>
<td>Residential density</td>
<td>Somewhat higher density than all other pods except Horatio</td>
<td>Lower density than all other pods except UVM pods</td>
<td>Probably not; may be inversely related to income</td>
</tr>
<tr>
<td>Household size</td>
<td>Only marginally smaller than residential pods (and slightly higher than other downtown pod)</td>
<td>Only slightly smaller than other residential pods</td>
<td>Probably not; all HHs in Burlington are relatively small</td>
</tr>
<tr>
<td>Age</td>
<td>Median age is “middle of the road”</td>
<td>Somewhat older population than all other pods</td>
<td>Maybe for residential pods; may be related to income</td>
</tr>
<tr>
<td>Household tenure</td>
<td>Higher overall number of renters than all other pods except Horatio</td>
<td>Lower overall number of renters than all other pods except UVM pods</td>
<td>Maybe; may be related to density</td>
</tr>
<tr>
<td>Land use</td>
<td>Highest proportion of retail and office land use, but also relatively high residential land use area</td>
<td>Slightly higher proportions of retail and office land use than other residential pods; average residential proportions</td>
<td>Maybe</td>
</tr>
</tbody>
</table>
Findings from CSVT Member Survey

In 2012, CSVT conducted its first member survey. In this section, we review the findings in order to gain additional insight to CSVT members and how they use the service.
# Demographic Summary of CSVT Member Survey

<table>
<thead>
<tr>
<th>Closest Pod¹</th>
<th>All Members</th>
<th>Average Income²</th>
<th>Average Age²</th>
<th>% Live Alone</th>
<th>Average # Vehicles³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ace</td>
<td>13% (89)</td>
<td>$70,400 (25)</td>
<td>41 yrs (26)</td>
<td>15% (4 of 27)</td>
<td>0.9 (27)</td>
</tr>
<tr>
<td>Clementine</td>
<td>4% (24)</td>
<td>$66,000 (6)</td>
<td>47 yrs (6)</td>
<td>33% (2 of 6)</td>
<td>0.8 (6)</td>
</tr>
<tr>
<td>Clovis</td>
<td>4% (26)</td>
<td>$83,300 (3)</td>
<td>37 yrs (3)</td>
<td>33% (1 of 3)</td>
<td>0.7 (3)</td>
</tr>
<tr>
<td>Dewey</td>
<td>13% (86)</td>
<td>$51,900 (4)</td>
<td>42 yrs (6)</td>
<td>33% (2 of 6)</td>
<td>1.0 (6)</td>
</tr>
<tr>
<td>Horatio</td>
<td>14% (90)</td>
<td>$41,900 (13)</td>
<td>32 yrs (14)</td>
<td>19% (3 of 16)</td>
<td>0.4 (16)</td>
</tr>
<tr>
<td>Nora</td>
<td>22% (144)</td>
<td>$73,400 (21)</td>
<td>44 yrs (21)</td>
<td>22% (5 of 23)</td>
<td>0.7 (23)</td>
</tr>
<tr>
<td>Otto</td>
<td>8% (53)</td>
<td>$42,300 (13)</td>
<td>43 yrs (14)</td>
<td>29% (4 of 14)</td>
<td>0.3 (14)</td>
</tr>
<tr>
<td>Pearl</td>
<td>7% (49)</td>
<td>$38,300 (5)</td>
<td>36 yrs (5)</td>
<td>60% (3 of 5)</td>
<td>0.6 (5)</td>
</tr>
<tr>
<td>Ramona</td>
<td>4% (29)</td>
<td>$87,500 (1)</td>
<td>40 yrs (1)</td>
<td>0% (0 of 1)</td>
<td>1.0 (1)</td>
</tr>
<tr>
<td>Tammy</td>
<td>11% (76)</td>
<td>$58,100 (11)</td>
<td>40 yrs (12)</td>
<td>31% (4 of 13)</td>
<td>0.8 (13)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100% (666)</strong></td>
<td><strong>$59,500 (102)</strong></td>
<td><strong>41 yrs (108)</strong></td>
<td><strong>25% (28 of 114)</strong></td>
<td><strong>0.7 (114)</strong></td>
</tr>
</tbody>
</table>

¹-Closest pod to members’ home addresses (excludes 108 members without known addresses and 56 “outlier” members whose homes are > 20 miles from the nearest pod).
²-Average Income/Age: survey respondents assigned midpoint value of category.
³-Average number of vehicles survey respondents own “now” (n-values in parentheses)
### CSVT Member Activity

<table>
<thead>
<tr>
<th>Pod (within ½ mile)</th>
<th># Members w/in ½ Mile(^3)</th>
<th>Active (1+ Trips/Month)</th>
<th>Inactive (0-0.99 Trips/Month)</th>
<th>Average Trips/Month(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ace</td>
<td>9% (74)</td>
<td>22% (16)</td>
<td>78% (58)</td>
<td>0.70</td>
</tr>
<tr>
<td>Clementine</td>
<td>17% (147)</td>
<td>20% (30)</td>
<td>80% (117)</td>
<td>0.88</td>
</tr>
<tr>
<td>Clovis</td>
<td>17% (151)</td>
<td>20% (30)</td>
<td>80% (121)</td>
<td>0.75</td>
</tr>
<tr>
<td>Dewey</td>
<td>9% (80)</td>
<td>20% (16)</td>
<td>80% (64)</td>
<td>0.63</td>
</tr>
<tr>
<td>Horatio</td>
<td>19% (162)</td>
<td>23% (37)</td>
<td>77% (125)</td>
<td>0.77</td>
</tr>
<tr>
<td>Nora</td>
<td>10% (83)</td>
<td>22% (18)</td>
<td>78% (65)</td>
<td>0.81</td>
</tr>
<tr>
<td>Otto</td>
<td>18% (159)</td>
<td>20% (32)</td>
<td>80% (127)</td>
<td>0.74</td>
</tr>
<tr>
<td>Pearl</td>
<td>10% (90)</td>
<td>21% (19)</td>
<td>79% (71)</td>
<td>0.72</td>
</tr>
<tr>
<td>Ramona</td>
<td>10% (85)</td>
<td>14% (12)</td>
<td>86% (73)</td>
<td>0.44</td>
</tr>
<tr>
<td>Tammy</td>
<td>17% (149)</td>
<td>23% (35)</td>
<td>77% (114)</td>
<td>0.83</td>
</tr>
<tr>
<td>No Pod w/in ½ mi(^1)</td>
<td>35% (250)</td>
<td>08% (21)</td>
<td>92% (229)</td>
<td>0.30</td>
</tr>
<tr>
<td>All Members(^2)</td>
<td>100% (870)</td>
<td>17% (144)</td>
<td>83% (726)</td>
<td>0.55</td>
</tr>
</tbody>
</table>

---

1. Total Members with known home addresses NOT within ½ mile of any pod (n=722)
2. Total Members (includes 148 members without known home addresses)
3. Members whose home addresses are within ½ mile of pod (does not add to 100% - many members are within ½ mile of multiple pods)
4. Average trips per month of members who live within ½ mile of the pod (n-values in parentheses)
It is important to keep in mind that this map indicates how much the members who live within ½ mile of a particular pod use a CSVT vehicle— not how much they use the vehicle that they live near. The members who live within ½ mile of Clementine are the most active, making an average of .88 trips per month. Members living near Nora and Tammy are the next most active.
## CSVT Member Survey

The majority of members (47%) take 0.1-0.9 trips per month. The most active members (2+ trips per month) have a lower average income than the average member, are about 38 years old, and live with someone else.

<table>
<thead>
<tr>
<th>2012 Activity Level</th>
<th>All Members</th>
<th>Average Income</th>
<th>Average Age</th>
<th>% Live Alone</th>
<th>% 0 Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Trips</td>
<td>37% (318)</td>
<td>$73,900 (11)</td>
<td>50 yrs (12)</td>
<td>42% (5 of 12)</td>
<td>25% (3)</td>
</tr>
<tr>
<td>0.1 – 0.9 Trips/Month</td>
<td>47% (408)</td>
<td>$65,700 (70)</td>
<td>42 yrs (73)</td>
<td>16% (12 of 76)</td>
<td>25% (19)</td>
</tr>
<tr>
<td>1 – 1.9 Trips/Month</td>
<td>8% (71)</td>
<td>$43,700 (18)</td>
<td>35 yrs (18)</td>
<td>26% (5 of 19)</td>
<td>63% (12)</td>
</tr>
<tr>
<td>2+ Trips/Month</td>
<td>8% (73)</td>
<td>$49,300 (30)</td>
<td>38 yrs (34)</td>
<td>35% (13 of 37)</td>
<td>76% (28)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (870)</td>
<td>$59,500 (129)</td>
<td>41 yrs (137)</td>
<td>24% (35 of 144)</td>
<td>43% (62)</td>
</tr>
</tbody>
</table>

1-Average Income/Age: survey respondents assigned midpoint value of category
2-Percent of survey respondents who own 0 vehicles “now”

*(n-values in parentheses)*
## CSVT Member Activity

<table>
<thead>
<tr>
<th>2012 Activity Level</th>
<th>Avg # Pods w/in ½ mile</th>
<th>Avg # Pods w/in 1 mile</th>
<th>Avg Miles to Closest Pod</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Trips (267)</td>
<td>1.6</td>
<td>4.8</td>
<td>1.47</td>
</tr>
<tr>
<td>0.1 – 0.9 Trips/Month (287)</td>
<td>1.8</td>
<td>5.2</td>
<td>0.95</td>
</tr>
<tr>
<td>1 – 1.9 Trips/Month (52)</td>
<td>2.2</td>
<td>6.3</td>
<td>0.46</td>
</tr>
<tr>
<td>2+ Trips/Month (60)</td>
<td>2.2</td>
<td>6.2</td>
<td>0.53</td>
</tr>
<tr>
<td>Total¹ (666)</td>
<td>1.8</td>
<td>5.2</td>
<td>1.08</td>
</tr>
</tbody>
</table>

¹-Excludes outliers (56 members > 20 miles from closest pod, and 148 members where home address was not known)
This map displays the spread of member home locations throughout northwestern Vermont. The vast majority of members live within 5 miles of downtown Burlington, but there are several who also live 20 or more miles away.

This map does not show all members – a handful of members reported home addresses as far away as Colorado. These could be “billing addresses” of part time residents.
<table>
<thead>
<tr>
<th>Distance to Nearest Pod</th>
<th>Number of Members</th>
<th>% of Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.5 mi</td>
<td>472</td>
<td>65%</td>
</tr>
<tr>
<td>0.51-1 mi</td>
<td>52</td>
<td>7%</td>
</tr>
<tr>
<td>1.01-2 mi</td>
<td>61</td>
<td>8%</td>
</tr>
<tr>
<td>2.01-5 mi</td>
<td>47</td>
<td>7%</td>
</tr>
<tr>
<td>5.01-10 mi</td>
<td>17</td>
<td>2%</td>
</tr>
<tr>
<td>10.01-20 mi</td>
<td>17</td>
<td>2%</td>
</tr>
<tr>
<td>20.01-50 mi</td>
<td>23</td>
<td>3%</td>
</tr>
<tr>
<td>&gt; 50 miles</td>
<td>33</td>
<td>5%</td>
</tr>
<tr>
<td>Total w/ Known Address</td>
<td>722</td>
<td>100%</td>
</tr>
<tr>
<td>No known address</td>
<td>148</td>
<td></td>
</tr>
<tr>
<td>Total members</td>
<td>870</td>
<td></td>
</tr>
</tbody>
</table>

1-Calculated only for members with known home addresses
Phase 1 Summary
# Neighborhoods and Users of Best-Performing Pods

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Median age 18–39 years old</td>
<td>The more successful pods (Otto, Ramona, Nora) are in areas where the median age is 30-35 years (other pods are younger)</td>
<td>The average age of the “active” members (+ trips/month) is slightly younger (35-38 years) than that of less active users (40+)</td>
</tr>
<tr>
<td>Rent vs. Own</td>
<td>More rental units than owned units (At least 100 renters per census block)</td>
<td>The “downtown” pod areas have a high proportion of renters (77-80%/~3,600 HHs), while the successful “residential” pod (Nora) has the lowest amount of renters (51%/~800 HHs); Other, less successful, pods (e.g. Horatio) have as many renters (77%~3,700 HHs) in the area as the downtown pods</td>
<td>Unknown</td>
</tr>
<tr>
<td>Household Size</td>
<td>Less than 2 people (Average HH Size &lt; 1.5)</td>
<td>The more successful pod areas have slightly smaller household sizes (1.77-2.04) than the other pods (2.01-2.31)</td>
<td>A slightly higher proportion of “active” members live alone (26-35%) compared to infrequent users (16%)</td>
</tr>
<tr>
<td>Density</td>
<td>More than 3 households per acre</td>
<td>The downtown pods have average household densities (7-9 hh/acre); Horatio has the most density (11 hh/acre), while Nora has less density (3 hh/acre)</td>
<td>N/A</td>
</tr>
<tr>
<td>Car Ownership</td>
<td>0 or 1 car per person</td>
<td>There is little difference in neighborhoods with low vehicle ownership – Otto’s and Horatio’s areas both have about 65% low- or no-vehicle households; Nora’s area has about 55% low- or no-vehicle households</td>
<td>A higher proportion of “active” members own 0 vehicles (63-75%) compared to infrequent users (25%)</td>
</tr>
<tr>
<td>Means of Commuting</td>
<td>Higher Non-auto commute</td>
<td>There does not appear to be a correlation between a high non-auto commute neighborhood and pod success (Nora’s area is 32%, Horatio’s is 37%, Otto’s is 40%, Ramona’s is 27%)</td>
<td>Unknown</td>
</tr>
<tr>
<td>Income</td>
<td>Unknown</td>
<td>There does not appear to be a significant correlation between income and area success – Nora is in a slightly higher income neighborhood ($42K) than Horatio or the downtown pods, but the UVM pods are in the highest income neighborhoods</td>
<td>More “active” users tend to have moderate household incomes ($44-50K), possibly associated with more single-person households</td>
</tr>
<tr>
<td>Service Level</td>
<td>More pods within ½ mile</td>
<td>Otto is within ½ mile of four other pods; Nora is not within ½ mile of any other pods; Horatio is within ½ mile of one other pod (Tammy, the pickup truck)</td>
<td>More “active” users have more pods within a half-mile or mile of their home than infrequent users</td>
</tr>
</tbody>
</table>
Phase 1 Conclusions

- The residential characteristics of an area immediately surrounding a pod do not necessarily correlate to the pod’s utilization because members who live elsewhere may be using that pod more heavily than members who live within ½ mile of it. In fact, about 1/3 of member survey respondents indicated that they don’t live within ½ mile of a pod. This suggests that their trips using CSVT may originate from their place of employment rather than their residence.

- There may be some correlation between employment density and pod use (particularly for the downtown pods – Otto and Ramona – where there is a high level of retail and office use). However, data on employment density are not available at a fine enough resolution to identify precise neighborhoods.

- In a town of Burlington’s size, utilization may be comparable to “choice riders” on transit.

- Research on rural or small town carshare programs suggests that community support is more important than household density, transit access, parking inconvenience or other neighborhood characteristics that decrease the attractiveness of personal car ownership.

- Consistent with the 2007 TCRP Report 108 Car-Sharing: Where and How it Succeeds, “In less urban areas... car-sharing is characterized by a high degree of member involvement, and programs are often volunteer-run. According to studies in Britain, the presence of a strong local champion is the most important ingredient for success, outweighing factors such as good public transportation” (Celsor & Millard-Ball, 6).
Phase 2: Estimates of CSVT Feasibility in Montpelier, Essex Junction, and Williston

Phase 2 applies the methodology used in Phase 1 to evaluate three other locations in Vermont to determine whether they are feasible locations for carsharing.

- Montpelier
- Essex Junction
- Williston
Montpelier
The blocks with the smallest average household sizes are primarily in or near the downtown area.
Montpelier: Median Age

Not surprisingly, Montpelier is an older city than Burlington (likely due to UVM, Champlain College, etc.). However, CSVT member survey data indicated that the average member is 35-38 years old. The blocks closest to downtown Montpelier have populations most likely to carshare.
Montpelier: Number of Rented Households

In terms of rented households, the darkest red blocks (showing more than 80 renters per block) are most fertile for carsharing.
The tract within Main, Northfield, and Berlin Streets shows the largest portion of non-car commuting residents, who are most likely to adapt to carsharing. This downtown area is on par with Otto’s 40% non-car commute rate.
Downtown Montpelier has the residential density (3 households/acre minimum) shown to support carsharing.
Montpelier: Percent Low-Vehicle Households

The tract south of the river has the highest percent of households with 0-1 vehicles, however there are very few households in that tract. The majority of households in downtown Montpelier only have 0-1 vehicle and therefore is a better candidate for a pod.
Land use data for Montpelier or Washington County had not been found at the time of the report. However, a Google Maps search for “Offices”, “Restaurants”, and “Shops” displays the high concentration of retail activity downtown, with more offices just northwest of downtown.
There are two locations in Montpelier that meet at least four of the six criteria for a carsharing location.

<table>
<thead>
<tr>
<th>Map Label</th>
<th>Census Block ID</th>
<th>Ave HH Size</th>
<th>Median Age</th>
<th>Rented</th>
<th>% Renters</th>
<th>Non Auto Commute</th>
<th>Vehicles per HH</th>
<th>Density</th>
<th>CRITERIA MET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500239549002006</td>
<td>1.33</td>
<td>37</td>
<td>2</td>
<td>67%</td>
<td>&gt;50%</td>
<td>67%</td>
<td>13.5</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>500239548002005</td>
<td>1.8</td>
<td>35.7</td>
<td>114</td>
<td>84%</td>
<td>&gt;50%</td>
<td>67%</td>
<td>8.9</td>
<td>4.0</td>
</tr>
</tbody>
</table>

"Rented" and "% Renters" are combined into one criterion.
Montpelier locations meeting the most criteria
Montpelier: Summary

- Montpelier may have potential for a successful carshare pod:
  - Downtown has
    - A high proportion of small households
    - A high proportion of low-vehicle households
    - Higher non-car commute mode shares
    - Mid-level incomes
    - Younger residents

- However, it also has relatively low residential densities even within the downtown area.

- A pod may be more successful if it balances its location to attract both downtown residents and employees.
Essex Junction is dominated by households with more than 1.5 people, which could be families or non-related people sharing a household.
Essex: Median Age

Median ages in downtown Essex Junction are primarily between 30-40 years old (on par with successful pods in Burlington). The northern areas have slightly older populations.
The rental density in Essex Junction is low, which is not favorable for carsharing.
The percentages of the population which do not use a car to commute are very low, which is not favorable for carsharing. The northwest area of Essex has a higher non-car commute mode share, though still significantly lower than that in Burlington.
The residential density in Essex Junction just meets the minimum suggested for a feasible pod. Some blocks in the downtown area have slightly higher densities, but very few within the range of Burlington’s successful car-share pods.
Essex Junction has moderate proportions of low- or no-vehicle households (slightly lower than the average vehicle ownership in the area around Nora).
Essex: Land Use

Essex Junction has minimal retail and office land uses. There is a small cluster of retail and office parcels at the west end of Pearl Street.
Different properties of the environment are critically evaluated.
Williston
Williston: Average Household Size

With the exception of four blocks, the average household size in Williston is more than 1.5 people and relatively higher than the areas near successful carshare pods in Burlington.
The majority of Williston is relatively older than the areas near the successful carshare pods in Burlington.
Williston has an extremely low density of rented households, which is not favorable for carsharing.
The percent of residents who don’t use a car to commute is very low in Williston, which is not favorable for carsharing.
Williston has very low density and does not meet the minimum suggested to be feasible for carsharing.
Williston’s proportion of low-vehicle households is slightly higher than the surrounding area, but still lower than the neighborhoods of the successful Burlington car-share pods.
Williston has some small concentrations of retail land uses near Essex Rd and Williston Rd. It has very few office parcels.
Williston: Summary

- No blocks met at least 4 of the 6 criteria.
- Williston is not a good candidate for a carshare vehicle. It has:
  - Low residential densities,
  - Larger household sizes,
  - A relatively low proportion of non-car commuters,
  - A relatively low proportion of low- or no-vehicle households, and
  - Relatively low office and retail land use densities
Phase 2: Recommendations and Conclusions

- Essex Junction and Williston will not likely support a successful carshare pod
- Montpelier may support a successful carshare pod downtown, located to maximize proximity to
  - Higher residential density
  - Higher proportion of small households, households with fewer vehicles, households with higher non-car commute rates, and younger residents
  - Higher employment density
- This is most likely near the intersection of State St and Main St:
  - Accessible to office workers just west of the Winooski River
  - Accessible to preferred residential neighborhoods just east of the river
Project Recommendations and Conclusions
Overall Recommendations and Conclusions (1)

- **Typical demographic indicators of carshare success in larger cities are only moderately correlated with carshare success in Burlington. Some factors are similar to research findings:**
  - The median age associated with pod success tends to match the ideal age range suggested by research (35-45 years)
  - Household sizes in areas near successful pods tend to be smaller, as suggested by research
  - Residential densities are generally at the low end of the range suggested by research (7-25 HHs per acre)
  - Median household incomes tend to be at the lower end of the ranges reported by research, but higher than incomes near less successful pods

- **Associations with other factors are unclear**
  - Proportions of renters, commute mode and car ownership do not appear to be consistently associated with successful pods

- **The combination of factors may be more important than any single factor.**
Overall Recommendations and Conclusions (2)

- As previous research suggests, in less urban areas like Burlington community support and involvement is critical to carsharing feasibility and in some cases is a more significant factor for success than neighborhood demographics.

- The resolution of available data does not lend itself to a desirable degree of precision in predicting carsharing feasibility.
  - For example, this analysis does not take into account parking availability, pod visibility, and other contributing factors because of the lack of data.
  - A major drawback to the available data is the fact that it is resident-centric and does not take into account employment locations.
  - Another drawback is that while household size is a criterion in the analysis, Census data does not distinguish between families and households with non-related members. One way to offset this shortcoming may be to develop a better understanding of household income as a factor in carsharing utilization. Incorporating the number of children in a household (available through Census data) may also help to distinguish between families and non-related households, but is still not a definite indicator of family vs. non-related.
  - There is inconsistency in Census data when it comes to college students: some students may complete Census forms based on their local data/address, while others may use their home data/address which could be in an entirely different state.

- Therefore, continued data collection specific to CSVT through the member survey will be a valuable source of data over time.
Household Income: Although not included in the analysis, data on household income was gathered and may be useful for additional insight.

- Land Use by Pod
The eastern and southern areas of the city have higher incomes than downtown and the Old North End. (However, the areas farther north and south have the highest incomes in the city).
The campus pods at UVM have the highest median incomes within ½ mile. Nora, the residential pod at the south end of the city, has the next highest income within ½ mile.
The area west of downtown has the highest median income. Downtown has the lowest median income, but it is still on par with the median income near Nora.
Downtown Essex Junction has moderate median incomes (slightly higher than the majority of Burlington); the northern areas of Essex has significantly higher median incomes.
Williston has a higher median household income than most areas of Burlington (which may be correlated with higher vehicle ownership).
The downtown pods have the highest proportion of retail land use within ½ mile. Of the residential pods, Nora and Horatio have equal proportions of retail land use within ½ mile.

*Note: Proportions are calculated based on land area only – does not account for multi-story buildings or number of employees.
The downtown pods have the highest proportion of office land use within ½ mile. Of the residential pods, Nora and Tammy have slightly higher proportions of office land use.

*Note: Proportions are calculated based on land area only – does not account for multi-story buildings or number of employees.
Horatio has the highest proportion of residential land use within ½ mile. Ramona has the lowest proportion, while the other downtown pod, Otto, has a somewhat higher proportion.

*Note: Proportions are calculated based on land area only – does not account for multi-story buildings or number of residents.