UHM Transportation Practicum

Strategies to reduce commuter Vehicle Miles Traveled (VMT) at the University of Hawai`i at Mānoa

Prepared For: University of Hawai`i at Mānoa, Department of Urban and Regional Planning
Prepared By: Chris Casne, Tara DePonte, and Kha Minh Ly
# Table of Contents

**Executive Summary** ............................................................................................................. 1  

1 – Introduction .......................................................................................................................... 3  

2 – Background .......................................................................................................................... 7  

2.1 Hawai’i’s Transportation Clean Energy Goals ..................................................................... 7  

2.2 American College and University Presidents’ Climate Commitment (ACUPCC)................. 8  

2.3 2007 Long Range Development Plan (LRDP) ................................................................... 8  

2.4 2012 Landscape Master Plan (LMP) .................................................................................. 9  

2.5 2012 Transportation Demand Management Plan (TDM) .................................................... 9  

3 – UHM Transportation Analysis ........................................................................................... 12  

3.1 2012 TDM Plan ................................................................................................................ 12  

3.2 Current Campus Access Conditions .................................................................................. 12  

3.2.1 Campus Population ....................................................................................................... 12  

3.2.2 SOV Use at UHM ......................................................................................................... 13  

3.2.3 Distance Between the Campus and Affiliate Residences ................................................. 14  

3.3 Barriers to SOV Reduction and Use of Alternative Transportation ................................. 14  

3.4 Commuting to UHM .......................................................................................................... 16  

3.4.1 Overview ...................................................................................................................... 16  

3.4.2 Single Occupant Vehicles (SOVs) ................................................................................ 17  

3.4.3 TheBus ......................................................................................................................... 19  

3.4.4 Walking ......................................................................................................................... 22  

3.4.5 Biking ............................................................................................................................ 22  

3.4.6 Rainbow Shuttle .......................................................................................................... 23  

3.5 Parking at UHM ................................................................................................................ 25  

3.5.1 On-Campus Parking ..................................................................................................... 25  

3.5.2 Parking Permit Types ................................................................................................... 25  

3.5.3 Neighborhood Parking ................................................................................................. 26  

4 – Cost of Commuting ............................................................................................................ 29  

4.1 Cost of Commuting via SOV ............................................................................................ 30  

4.2 Cost of Commuting by Commuter Group ......................................................................... 32  

4.3 “Market Clearing” Prices .................................................................................................. 37  

5 – Transportation Planning .................................................................................................... 40  

5.1 Commuter Benefit Programs .......................................................................................... 40  

5.1.1 Case Study: Stanford University .................................................................................. 40  

5.1.2 Case Study: Cornell University .................................................................................... 43  

5.1.3 Case Study: University of Washington ......................................................................... 44  

5.1.4 Case Study: Bus Transit at the University of British Columbia and University of California at Los Angeles .................................................................................................................. 45  

5.2 Commuter Benefit Program Comparison .......................................................................... 45  

5.3 Parking .............................................................................................................................. 49  

5.4 Individualized Marketing .................................................................................................. 55  

5.5 Housing’s Influence on Transportation ........................................................................... 58  

5.5.1 Case Study: University of Houston ............................................................................... 58  

6 – Identified Opportunities .................................................................................................... 60
6.1 Overview .............................................................................................................. 60
6.2 Overall Opportunities .......................................................................................... 61
6.3 Targeted Opportunities ....................................................................................... 63

7 – References .......................................................................................................... 69

List of Figures

Figure 1: Mānoa Campus Population, 2005-2011 ....................................................... 13
Figure 2: Proportion of Affiliate Type among UHM SOV Users .................................. 13
Figure 3: Transportation Mode Share of Affiliates ..................................................... 17
Figure 4: Transportation Mode Share Based on Commuter Groups ................................. 17
Figure 5: Percent of Primary Mode Users That Trip-Chain ........................................ 18
Figure 6: Percent of Primary TheBus Users ................................................................. 19
Figure 7: The Availability of TheBus at Respondent Locations .................................... 19
Figure 8: Bus Service Improvements That Would Encourage Respondents to Take TheBus more Often .......................................................... 20
Figure 9: Additional Improvements That Would Encourage Respondents to Use TheBus more Often .......................................................... 21
Figure 10: Primary Routes Used by UHM Commuters .................................................. 22
Figure 11: Mode Share of Affiliates within 1 and 2 Mile Radius ..................................... 23
Figure 12: Levels of Agreement on Bike Facilities and Safety ....................................... 24
Figure 13: Proportion of Affiliate Types for Primary Shuttle Users ............................... 24
Figure 14: Reasons Affiliates Do Not Use the Shuttle .................................................. 25
Figure 15: Annual UHM Parking Permit Costs Compared to the Annualized Cost of a Structured Parking Stall ................................................................. 52
Figure 16: Proposed Parking Rate Increase (2011) ....................................................... 53

List of Tables

Table 1: Permit Rates per Semester and Annual ......................................................... 26
Table 2. Daily Rates per Semester and Annual ........................................................... 26
Table 3: Cost of Commuting via SOV ......................................................................... 31
Table 4: Undergraduate Students with a Job & without a Job ..................................... 33
Table 5: Graduate Students with a Job & without a Job ............................................... 34
Table 6: Faculty and Staff ......................................................................................... 35
Table 7: Market “Clearing Prices” ............................................................................ 39
Table 8: University Commuter Benefit Programs ......................................................... 46
Table 9: Common Parking Regulations .................................................................... 54
List of Maps
Map 1: Neighborhood Street Parking ..............................................................27
Map 2: The Distance and Time to Walk from Parking Structure to Campus Center ........28
Map 3: The Distance and Time to Walk from McKinley St to Campus Center ...............28

Acronyms
ACUPCC American College and University Presidents’ Climate Commitment
CAFE Corporate Average Fuel Economy
DOE Department of Energy
GHG Greenhouse Gas
GIS Geographic Information System
GUP General Use Permit
HCEI Hawai`i Clean Energy Initiative
LMP Landscape Master Plan
LRDP Long Range Development Plan
PHEV Plug-in Hybrid Vehicles
PUC Primary Urban Center
R&D Research & Development
SOV Single Occupant Vehicle
TCRP Transit Cooperative Research Program
TDM Transportation Demand Management
TPB Theory of Planned Behavior
UBC University of British Columbia
UCLA University of California at Los Angeles
UH University of Houston
UHM University of Hawai`i at Mānoa
UHPA University of Hawai`i Professional Assembly
UW University of Washington
VMT Vehicle Miles Travelled
In 2012, the University of Hawai'i at Mānoa (UHM) completed a Transportation Demand Management Plan (TDM) that outlines a variety of strategies to increase the use of alternative transportation as a preferred form of transport over the single occupancy vehicle (SOV). It aims to mitigate a myriad of transportation challenges including congestion, safety, cost, and promote overall mobility. This report builds on the findings and recommendations of the 2012 UHM TDM Plan by assessing these issues more closely in the context of Vehicle Miles Travelled (VMT) reduction. It identifies potential strategies for UHM to reduce commute-based VMT, expand access to education by improving alternative transportation and short-term parking options, increase revenue, and reduce costs to UHM related to SOV-use.

The review process consists of previous UHM plans (including 2007 Long Range Development Plan and 2010 Landscape Master Plan), literature on TDM and VMT strategies, and best practices of universities who have successfully implemented TDM programs. In addition, this report pays particular attention to UHM’s current structure of parking permits and fees (as it likely a major contributor to the use of SOVs). The cost of commuting to UHM is evaluated through different transportation modes, commute origins, and types of commuters. Based on the aforementioned components of the review process, the report identifies opportunities to implement TDM policies to incentivize non-SOV trips and subsequently reduce total VMT to and from UHM. Overall opportunities (i.e. high-level organization efforts) and targeted opportunities, aimed at mitigating specific issues and barriers are briefly outlined as follows.

UHM should:

**Overall Opportunities**

- Adopt a comprehensive, strategic approach to implementing the 2012 TDM Plan.
- Prioritize TDM objectives based on VMT reduction targets;
- Develop and maintain a funding plan to implement a comprehensive TDM program;
- Implement improvements to its Commuter Services department, including the creation of a physical Commuter Services Office;
Targeted Opportunities

- Implement a comprehensive Commuter Benefits Program;
- Improve on-campus and off-campus parking efficiency;
- Improve internal transit systems and affect change to external transit systems serving the campus; and
- Improve TDM marketing efforts.

Review and analysis of mainland and overseas university TDM programs indicates that VMT reduction and increased use of alternative transportation is most successful when implemented as a comprehensive approach that consists of overall and targeted strategies. While these strategies may be phased and implemented over time, it is the period of complete, simultaneous implementation of strategies that, by far, yields the most successful results. As such, the planning team proposes that implementation of a comprehensive TDM program, as outlined in Section 6, will yield the most successful results in VMT reduction and increased use of alternative transportation at the University of Hawai‘i at Mānoa.
Universities operate in a unique context with regard to transportation. They support a diverse population and are often characterized by irregular schedules and continual movement of people throughout the day (Balsas, 2003). In addition, they are typically large destinations that contribute significantly to regions traffic problems (Balsas, 2003). High dependence on single occupancy vehicle (SOV) use is a major contributor to a university’s environmental impacts (Bonham & Koth, 2010). SOVs contribute to the campus affiliates’ vehicle miles traveled (VMT), fossil fuel consumption, and, ultimately, greenhouse gas (GHG) emissions. In general, SOV’s contribute more GHG emissions and have lower energy efficiency than alternative transportation, such as ride-sharing, car-pooling or bus transit (NWARPC, 2013). Further complicating universities’ internal transportation pressures are the often complex external conditions of campus surroundings, including a range of urban environments and regional transportation options. These external conditions place a variety of pressures on an affiliate’s daily university commute. The varied affiliate demography and functions of universities creates complex transportation needs, which must be addressed by a comprehensive network of transportation options.

Many universities are exploring a range of environmentally appealing solutions to mitigate transportation challenges—increasing congestion, lack of land for parking, high cost of constructing parking structures, pressures to reduce traffic’s impact on surrounding neighborhoods, constraints on financial resources, and the need to abide by federal air quality requirements (Poinsatte and Toor, 2001). Many of the solutions to these challenges are based on Transportation Demand Management (TDM) concepts, which include establishing market prices for parking, expanding transit access, complementing “park and ride” lots with bus shuttles, developing rideshare programs, and installing bicycle and pedestrian facilities and traffic-calming schemes (Balsas, 2003). Particularly at universities, many of these TDM solutions take the form of providing incentives for walking, bicycling, taking mass transit, ride-sharing and discouraging the use of SOVs through parking pricing. Additionally, linking transportation to land-use planning results in elevating transportation issues and opportunities to an important and explicit component of campus plans (Balsas, 2003). Beyond the traditional
campus master plan, universities across the globe are developing specific “TDM plans” that establish institutional TDM goals and methods for implementing a suite of TDM strategies.

In 2012, the UHM completed such a Plan. Of the approximately 30,000 affiliates who commute to the UHM—students, faculty, staff, and administration—43% of commuters utilize SOVs (Nelson\Nygaard Consulting Associates Inc., 2012). As such, the use of SOVs is a significant contributor to UHM’s transportation issues. This report builds on the findings and recommendations of the 2012 UHM TDM Plan, which outlines a variety of strategies to increase the use of alternative transportation as a preferred form of transport over the SOV. While TDM recommendations often target issues of congestion, safety, cost, and overall mobility, the study team assessed these issues more explicitly from a fifth lens: VMT reduction. This report identifies and examines potential strategies for UHM to:

1) reduce commute-based VMT;
2) expand access to education by improving alternative transportation options;
3) increase revenue and reduce costs to UHM related to SOV-use; and,
4) improve short-term parking options.

This report is an evidence gathering exercise, providing additional insight into selected TDM plan recommendations while presenting additional opportunities that are rooted in improving access to education—a fiduciary responsibility of UHM and a critical component of the University’s mission. These strategies will provide synergistic opportunities for VMT reduction through changes to parking policies and pricing, encouragement of mass-transit and multi-modal commuting strategies, provision of alternative commuter benefits, and a marketing program that will facilitate long-lasting behavior change.

The methodology utilized by the study team consists of a review of previous UHM plans, academic literature on TDM and VMT reduction strategies—particularly as it pertains to university campuses—as well as a review of best practices at national and international universities who have proven to be leaders in implementing successful TDM programs. In addition to the 2012 TDM, the study team reviewed UHM’s 2007 Long Range Development Plan (2007 LRDP) and 2010 Landscape Master Plan (2010 LMP). It is evident that in the years between the 2007 LRDP (which identified potential locations for new parking structures) and the 2010 LMP (which calls for the removal of vehicles on certain roadways in favor of pedestrian circulation), the philosophy on TDM at UHM is growing increasingly progressive—a positive sign for the future of UHM and the State of Hawai‘i.
The university case studies discussed in this report are either particularly illustrative or comparable. For example, Stanford University is highlighted because of its’ progressive TDM program and not because its’ similar budget or urban environment. On the other hand, the University of Washington is chosen because it is a State institution and its’ demographic profile is comparable to UHM.

In this report, the study team reviews the following:

- Current commute and transportation trends relevant to UHM;
- Best practices in VMT reduction strategies from other universities;
- Potential barriers to implementation and strategies to overcome them; and,
- Evidence to assess which policies are potentially most effective at UHM.

The report pays particular attention to UHM’s current structure of parking permits and fees, which seems to encourage continued use of SOVs by a large number of affiliates at a significant cost to the University’s construction, operation, and maintenance budget. To provide evidence for revisions to the current permit and fee structure, the study team examines the cost of commuting to UHM via three different transportation modes, seven different commute origination locations, and six different types of commuters. Drawing on this information, the study team is able to more accurately recommend methodologies that UHM could employ to incentivize non-SOV trips and subsequently reduce total VMT to and from UHM. This information, consolidated into Table 3, Cost of Commuting via SOV, is discussed in Section 4: The Cost of Commuting.

The report is organized into three main sections. Section 2 provides background on the State and University’s transportation-related clean energy goals as well as the University’s to-date pursuit of TDM planning (and subsequent VMT reduction). Section 3 describes the current state of transportation at UHM while Section 4 provides analysis of the “true cost of commuting” to the campus via SOV, TheBus and biking. Section 5 discusses the current commute and transportation trends at UHM and reviews case studies of other universities that have illustrative VMT reduction strategies and barriers to reducing SOV use while simultaneously increasing the use of alternative transportation at UHM. This includes strategies that both were highlighted within the TDM as well as new strategies that the study team believes should be dually considered. Section 6 provides “identified opportunities” that the study team recommends UHM
undertake to implement its TDM policies—particularly to attain VMT, energy, and GHG emissions reductions.
The following section includes background information on past and current UHM planning efforts to reduce the use of SOVs, beginning with context of relevant State initiatives and goals related to VMT and energy use.

2.1 Hawai`i’s Transportation Clean Energy Goals

In January 2008, the U.S. Department of Energy (DOE) and the Governor of the State of Hawai`i signed a memorandum of understanding launching the Hawai`i Clean Energy Initiative (HCEI) to transform the energy sector in Hawai`i by achieving 70% clean energy by 2030, with 40% of net electricity sales from renewables, 30% reduction through end-use efficiency, and 70% petroleum displacement used for ground transportation (NREL, 2011; DSIRE, 2012). The state’s pursuit of 70% clean energy is touted to address core challenges, including greater economic stability, to attract expertise and energy-related R&D to the state, and to position Hawai`i as a worldwide leader in clean energy (NREL, 2012). Specifically, towards the 70% reduction of petroleum in ground transportation by 2030 (approximately 385 million gallons), strategies include: 1) improving standard vehicle efficiency of fleet; 2) reducing vehicle miles traveled; 3) incorporating renewable fuels into the transportation sector; and 4) accelerating the deployment of electric vehicles and supporting infrastructure (NREL, 2011).

Currently, imported oil supplies 90% of Hawai`i’s energy, with more than 60% of energy used for transportation (NREL, 2012). There is ongoing research on switching vehicles to bio-based fuels as an alternative to fossil fuels with the potential of these bio-based fuels being grown in Hawai`i—a potential new market. However, the Hawai`i Clean Energy Initiative Scenario Analysis (2012) states that locally produced biofuels would likely be insufficient in supply to cover demand for transportation (and electricity) needs (NREL, 2012). While the 2012 report states that energy efficiency in the transportation sector can be achieved through increased use of plug-in hybrid vehicles (PHEV), increased fuel economy of traditional vehicles (as a result of tightened CAFE standards), and increased use of biodiesel, the report also encourages a reduction in VMT as a means to achieve greater energy efficiency (Braccio, Finch, and Frazier, 2012). However, it identifies VMT reduction as the least probable contributor to a reduction in
the use of energy for transportation, rating biofuels and increased vehicle efficiency as having the greatest impact by 2030.

Despite this statement, out of all of the aforementioned strategies in the 2012 HCEI Scenario Analysis, VMT reduction is an objective that everyone can impact—most notably by a reduction in the use of SOV. Consequently, as the transition from traditional vehicles to PHEV, improvements in fuel economy of vehicles, and production of biodiesel are long-term solutions, the study team recognizes that the state has the immediate opportunity to engage in significant VMT reduction. Further, the study team recognizes that, as a large state institution, UHM has a tremendous opportunity to lead the state in reducing VMT, particularly the VMT of commuting affiliates.

2.2 American College and University Presidents’ Climate Commitment (ACUPCC)

As one of 665 signatories to the American College and University Presidents’ Climate Commitment (ACUPCC), UHM has publicly committed itself to implementing sustainable strategies and initiatives. According to the ACUPCC website, higher education represents about 2-3% of the country’s carbon footprint. The ACUPCC commits presidents and chancellors of institutions for higher education to reduce their campus’ GHG emissions in addition to integrating issues of sustainability into curriculum. As part of the overall emissions reduction strategy, the ACUPCC recommends institutions implement transportation management strategies. Though not explicitly stated, the ACUPCC’s goal of reducing campus GHG emissions and the implementing transportation management strategies point towards the reduction of VMT as a means of achieving both objectives. The ACUPCC and UHM have not set specific targets for VMT reduction.

2.3 2007 Long Range Development Plan (LRDP)

The purpose of UHM’s 2007 Long Range Development Plan (LRDP) was to update the campus’ previous 1987 LRDP “to reflect current and upcoming educational priorities” (Group 70, 2007). The 2007 LRDP makes reference to the campus’ 1987 LRDP, which envisioned the future UHM campus as a “vital urban setting not unlike that of a successful small town” with “enhanced environments for learning, working, and living” (Group 70, 2007). The plan proposed to reverse the existing orientation on campus from vehicles to pedestrians by proposing the removal of roads and parking facilities from the heart of the central campus to peripheral locations (Group
Sustainability also plays a major role in the plan, which states that a goal of the campus is to increase the area of the campus’ permeable surfaces from 40% to 60% (Group 70, 2007). These objectives are reflected in the LRDP’s major themes, including a “Livable urban campus” and “UHM—Leader in Environmental Sustainability.”

However, a large component of the Plan’s proposed new construction is multiple parking structures, including three four-level garages to add approximately 1,800 parking stalls to the campus (Group 70, 2007). The costs to construct these three structures were estimated at $43.5 million, or a cost of approximately $24,206 per stall (Group 70, 2007). While construction of the proposed additional structures and depaving of some existing surface parking lots would support the campus’ goal of increased ground-surface permeability, the construction of more parking supports an increase in the use of SOVs, and, therefore, an increase in VMT and GHG emissions which do not support the campus’ larger sustainability goals.

2.4 2012 Landscape Master Plan (LMP)

In an effort to improve the pedestrian experience on campus, the 2012 UHM Landscape Master Plan (LMP) calls for the removal of some Upper Campus surface parking lots and conversion of some vehicle thoroughfares to pedestrian-only malls. In addition to increasing the safety of pedestrians and improving the campus’ visual aesthetics, the LMP’s recommendations will improve the campus’ walkability and biking conditions. Implementation of the LMP’s recommended improvements in pedestrian and bicyclist safety should make bicycling, in particular, more attractive to affiliates living near to campus—contributing to a positive affect on the use of alternative transportation.

2.5 2012 Transportation Demand Management Plan (TDM)

The 2012 TDM Plan sought to assess current transportation patterns as well as identify means to increase the number of viable and economical access options for all affiliates. UHM contracted Nelson Nygaard Consulting Associates, Inc., based in Portland, Oregon, as the campus’ consultant for the TDM Plan, which was completed in April 2012. The plan is guided by the UHM “fiduciary responsibility to expand access to education” (Nelson\Nygaard Consulting Associates Inc., 2012). As such, UHM recognizes the need to develop a mobility strategy with a multi-modal lens (Nelson\Nygaard Consulting Associates Inc., 2012). The TDM states that facilitating and encouraging use of sustainable transportation modes to and on campus is a
reflection of the University’s overarching campus access strategy of providing affordable, efficient, and diverse options for transportation to and from campus (Nelson\Nygaard Consulting Associates Inc., 2012). The plan asserts that the UHM Administration recognizes that:

- Access to the Mānoa campus is not a singular approach and must balance the needs of various modes of transportation; and
- Auto access to campus is critical to ensure access to education and University employment (Nelson\Nygaard Consulting Associates Inc., 2012).

UHM understands that improving access to the campus involves improvements to transportation systems at multiple, intertwined levels: regional and local, motorized and non-motorized, on and off-campus parking, and consideration of new, evolving transportation technologies. As such, the TDM plan recognizes that strategies to improving access to campus must accommodate a range of modality options at various costs for a wide demographic of users from students to faculty, staff, and administration. The TDM plan states that the University should take active steps to invest in transit, shuttle, bicycle, and pedestrian infrastructure and programs; manage existing parking supply; and expand automobile access options, including ridesharing, car-sharing, and electric vehicles (Nelson\Nygaard Consulting Associates Inc., 2012).

The TDM plan offers the following goals:

- **Goal 1:** Recruit and retain world-class faculty and students by providing high quality campus access.
- **Goal 2:** Optimize campus access with constrained parking supply.
- **Goal 3:** Be a leader in sustainability.
- **Goal 4:** Create a vibrant and livable campus environment.
- **Goal 5:** Develop cost-effective solutions for campus access.
- **Goal 6:** Effectively communicate, market, and promote the variety of campus transportation options to ensure campus affiliates know their travel options.
- **Goal 7:** Provide equitable access to campus by investing in all modes of transportation.
- **Goal 8:** Foster connections between neighboring educational institutions and the broader University of Hawai`i system to improve transportation program effectiveness.

For the TDM to serve as a viable solution to UHM’s transportation issues and needs, the TDM strategy must operate as a comprehensive approach to affect current behaviors and include a variety of flexible, convenient transport options. To achieve success, the campus must address a host of existing internal and external barriers to TDM implementation, many of which have
been highlighted in the 2012 TDM plan. Internal issues are those within the control of UHM directly while external issues may be outside its’ purview. For example, the campus’ external barriers range from cuts in TheBus service to congestion in the Mānoa ahupua`a to City imposed parking requirements. Internal barriers include program funding, parking permit requirements (as outlined in UHM’s faculty and staff contracts), and the need for many affiliates to “trip-chain” during their daily UHM commute.

Universities are uniquely positioned to affect change. One aspect often overlooked by campus administrators and planners is the institution’s potential to affect the transportation habits and environmental awareness of students, since students are generally more open-minded and have the potential to become ‘movers and shakers’ (Balsas, 2003). Utilizing TDM strategies, UHM has the opportunity to improve and increase the use of alternative transportation and reduce the use of SOV, thereby reducing the campus’ consumption of fossil fuels, GHG emissions, and costs to construction, operate, and maintain on-campus parking. As a State institution, the University is positioned to not only to reduce the campus’ environmental impact but to take a leadership role within the State to influence and encourage the use of alternative transportation.
3.1 2012 TDM Plan

UHM recognizes the need to develop a mobility strategy with a multi-modal lens, which means that UHM should invest in infrastructure and programs for both alternative and environmentally-friendly alternative transportation modes as well as automobile transportation (Nelson\Nygaard Consulting Associates Inc., 2012). The TDM plan states that facilitating and encouraging the use of alternative transportation modes to and on campus is a reflection of the University’s overarching campus access strategy of providing affordable, efficient, and diverse options for transportation to and from campus (Nelson\Nygaard Consulting Associates Inc., 2012). As such, the plan recognizes that strategies to improve access to campus must accommodate a range of modality options at various costs for a wide demographic of users from students to faculty, staff, and administration.

For the TDM plan to serve as a viable solution to UHM’s transportation issues and needs, TDM strategies must offer a comprehensive approach to implement a network of alternative transportation options that begins with affecting affiliate perspectives on alternative transportation and perceived rights to parking. This section identifies current UHM commuting conditions and barriers to reducing VMT and increasing the use of alternative transportation.

3.2 Current Campus Access Conditions

3.2.1 Campus Population

UHM is located in the Primary Urban Center (PUC) of O‘ahu. The campus’ current population includes approximately 30,000 affiliates (Nelson\Nygaard Consulting Associates Inc., 2012). Students are the largest affiliate group on campus and thus account for the largest proportion of affiliates in each transportation mode. Current statistics from the UHM-Office of the Vice Chancellor for Academic Affairs reveal that the campus’ population has not changed significantly—either increasing or decreasing—over the past decade. As can be seen in Figure 1, the number of UHM affiliates fluctuated by only 500 students between the fall 2005 and the spring 2011 semesters.
3.2.2 SOV Use at UHM

51% of SOV commuters are students, while the other 49% of commuters are faculty, staff and administrators (see Figure 2). In the 2010-2011 academic year the staff and faculty accounted for 28% of the affiliates but accounted for almost half (49%) of the SOV users. This off-campus population segment tends to use SOV because according to the 2012 TDM report, “Oahu’s linear corridor development pattern driven by physical and typological constraints promotes longer commute patterns to downtown Honolulu” (Nelson\Nygaard Consulting Associates Inc., 2012).

Source: UH Mānoa Office of the Vice Chancellor for Academic Affairs, Mānoa Institute Research
From a VMT standpoint, what is of greatest concern is the number of affiliates who commute via SOV, now and in the future. Thus, it is necessary to pay extra attention to this target group (SOV users) in the UHM proposed VMT reduction strategies.

3.2.3 Distance Between the Campus and Affiliate Residences

Data from the 2011 UH Campus Transportation Survey was used to analyze the locations of affiliate residences. According to the 2011 Transportation Survey, approximately 77% of affiliate survey respondents reside off-campus. Of that 77%, 43% utilize SOV to commute to UHM from residential areas across the island. Currently, 43% of affiliates living off-campus access the campus by driving alone, while 48% of affiliates access campus by using alternative modes of transportation such as transit, Rainbow Shuttle, walking, bicycling, and carpooling (UHM, 2011).

Seventeen percent of affiliates live within one “network” mile, which is considered within the walking distance of the UHM. Thirty-six percent of affiliates live within three “network” miles - within bicycling distance. This means that the 53% of affiliates who live within three miles of the campus have the opportunity to use alternative travel modes such as walking and biking.

3.3 Barriers to SOV Reduction and Use of Alternative Transportation

Within the field of UHM transportation planning, there are many barriers (both external and internal) that affect commuter’s daily transit decisions. External barriers are defined as those over which the university does not have direct control and internal barriers are those over which the university has control. With respect to SOV use at UHM, the following external barriers exist:

External Barriers

- Commute costs relative to affiliate demographics. Many universities reside in locations with high costs of living and high average salaries; consequently, universities are challenged to reduce SOV use since it is often times the most convenient and efficient means of commuting to and from campus.
- Convenience (need to “trip-chain,” etc). Alternative forms of transportation are often times inflexible with regards to accommodating “trip-chaining” commuters—commuters who need to drop-off children at school, or run errands before and/or after work.
Therefore, SOVs are the preferred method of transportation for affiliates who need to trip-chain.

- **Transit coverage.** Universities are limited to their city or county’s current transit infrastructure and coverage, which may not adequately serve affiliate communities with frequent, direct routes. Coordinating with a public transit system to implement improvements that make transit an easier and more attractive transportation alternative for affiliates is often a challenge for universities but essential to SOV reduction.

- **Location of affiliate residence.** The location of affiliate residences determines, to a great extent, affiliate transportation decisions. Affiliates living further from campus experience high SOV commute costs and limited routes and long commute times via transit—resulting, essentially, in a lose-lose for the commuter. For universities, catering transportation alternatives to commuters from all affected affiliate locations and satisfying the plethora of commuter needs is very challenging.

- **Lack of an efficient and comprehensive O`ahu-wide alternative transportation network.** Insufficient alternative transportation infrastructure across O`ahu, and, especially in close proximity to the campus, limits the adequacy of service to UHM. Data from the 2011 transportation survey show 62% of respondents said that it takes too long to reach their destination. Thirty-one percent of bus riders have to transfer prior to arriving to UHM campus, which is a major contributor to trip time. In addition, 85% of participants in the survey said improved frequency of service would encourage them to take the bus more often. Furthermore, the lack of bicycle infrastructure and the perception that routes are unsafe are a major barrier that discourages bike use. Fifty-eight percent of the participants stated they are not comfortable with bicycle facilities such as bike lanes, signed bicycle routes, and way finding signs connecting to the campus; only 28% of the participants stated they feel safe while bike commuting to campus.

- **Unregulated parking in surrounding neighborhoods.** The most prudent parking efficiency standards and alternative transportation practices are often times nullified if there is ample, free parking in a university’s surrounding neighborhood.

- **Site characteristics.** UHM is situated within a particularly congested area of greater Honolulu that includes residential areas with unregulated street parking and several private and public schools. The enrollments at these private schools are comprised of students who reside in all areas of O`ahu, which means that a large majority of these students are dropped off at school by automobile. In addition, the road infrastructure in Mānoa is rather limited—built to support a more residential neighborhood. These three
factors—roadway network, unregulated parking in surrounding residential areas, and multiple schools—contribute to congestion and parking issues at UHM.

Many of the barriers faced by UHM are somewhat universal to large institutions within an urban/suburban environment. Although internal barriers are controllable by a University, they are still very difficult to overcome without a comprehensive strategy. The following internal barrier was identified by the study team as being consistent across multiple university case studies:

**Internal Barriers**

- **Inefficient parking permit structures and fees.** Universities (and businesses in general) tend to both underprice parking and set parking pricing so that they represent sunk costs (i.e., semester permit) to the commuter instead of daily costs (i.e., voucher). Parking is therefore seen by many affiliates as a "guaranteed right" versus a daily decision, keeping commuters in their cars without much thought to reevaluating their transportation choices. Because of this structure and lacking a significant cost difference between parking permits and transit passes, SOVs remain the optimal transportation option for UH commuters across affiliate types.

### 3.4 Commuting to UHM

#### 3.4.1 Overview

Of UHM’s approximately 30,000 affiliates, roughly one-third commuting to the campus are from communities on the western half of O`ahu via the H-1 freeway (Nelson\Nygaard Consulting Associates Inc.,2012). As previously discussed, transportation networks, commuter needs and site characteristics all play a role in affecting affiliates’ commute mode. Currently, 43% of affiliates drive alone to campus (SOV), 22% take TheBus, 11% ride bicycles, 7% walk and 1% takes the Rainbow Shuttle. Sixteen percent of UHM affiliates use motorcycle, scooter, carpool, or are dropped off at the campus by car (see Figure 3).
The mode shares of students, faculty and staff vary significantly. While students tend to walk more, faculty and staff tend to drive more. Thirty percent of students and 7-8% of staff and faculty walk. Staff tend to drive the most, with a 60% SOV mode share among this group. Similarly, SOV is also the largest mode share among faculty (52%), see Figure 4 below.

3.4.2 Single Occupant Vehicles (SOVs)

Why are people driving?
As stated in the 2012 TDM, one of the reasons for SOV use is the need for trip chaining; for example to grocery shopping or picking up a child from school. This is validated by 37% of campus transportation survey respondents who claimed that they make at least one stop before
arriving at their final destination (UHM, 2011). Among this group of respondents, more than 52% choose to drive as a single occupant for their primary mode of transportation, as shown in Figure 5. The need to trip-chain is one of the reasons that lead to the decision to drive.

**Figure 5: Percent of Primary Mode Users That Trip-Chain**

![Bar chart showing percent of primary mode users that trip-chain, with SOV at 52.4% and Others at 16.7%.]

Source: Data analyzed from 2011 UH Transportation survey

The Campus Access Policy recognizes that many affiliates need to drive to campus for various reasons. For people with longer commutes, inflexible schedules, daily storage needs, and physical disabilities, driving alone to campus may be the only viable option (Nelson\Nygaard Consulting Associates Inc., 2012). According to an affiliate Focus Group that participated in the survey, the following factors were identified as reasons for commuting to campus by car:

- difficulty carrying baggage;
- travel distance;
- lack of late night express bus service;
- the need to go other places after work; and
- the cost of transit.

Additionally, commute time should also be considered as a reason for affiliates to drive. For example, commute time by car from UHM to the North Shore takes around 45 minutes, while it takes approximately 2 hours and 20 minutes by bus for commuters needing at least one transfer (travel time calculated via Google maps).

**When are people driving?**

Among the Focus Group participants, roughly 54% of affiliates arrived on campus between 8:00 AM and 10:00 AM and about 34% left campus between 2:00 PM and 4:00 PM (Nelson\Nygaard
Consulting Associates Inc., 2012). These commute times fell into peak traffic hours in Honolulu, which are between 6:30 to 9:30 AM and 3:30 to 6 PM. With UHM’s thousands of affiliates on the road during peak Honolulu traffic hours, congestion to and from UHM is further magnified.

3.4.3 TheBus

Transit makes up approximately 22% of the transportation mode share in commuting to and from UHM (UHM, 2011). Students comprise the majority of UHM’s transit riders (84%), while faculty and staff comprise 16% (8% each) as shown in Figure 6.

According to the 2011 Transportation Survey, accessibility to the bus is found to be quite high. Seventy-eight percent of participants said they resided near a convenient bus stop. However, current transit users identified frequency of service, night service and reliability as major barriers to utilizing transit (shown in Figure 7). Therefore, improvements to commute time and frequency have the opportunity to improve transit ridership.

Expanding service time to later at night and improving reliability (better adherence to posted schedules) were also identified as improvements to increase transit usage (see Figure 8). The 2011 Transportation Survey offered a range of choices for improvements on what should be done in the future to encourage UHM affiliates use the bus more. The results were that 85% of the participants in the survey “agree” or “strongly agree” that the improvement in the frequency of the service would encourage them use TheBus more often.
respondents would use TheBus more if it ran later at night, and 82% agreed that improved reliability would encourage riding TheBus more often.

**Figure 8: Bus Service Improvements That Would Encourage Respondents to Take TheBus more Often**

Furthermore, the primary factor for people not choosing TheBus was that the wait times and the travel time were too long. Sixty-eight percent of the participants said they do not use TheBus because it takes too much time to wait at the bus stop, and 62% said that it takes too long to reach their destination (UHM, 2011). In the same survey, 81% of the participants said they would take TheBus if they knew more clearly where to get route and schedule information. Seventy-seven percent said they would be more likely to ride the bus if it ran every 15 minutes or sooner. Fifty-four percent of participants said they would take the bus only if they do not have to transfer (see Figure 9). This means that an increase in the frequency and areas serviced is needed to get more people to use the bus.
Among 17 routes serving UHM, 5 of those comprise those used by UHM affiliates the most (more than 10%). These routes include: Route A city express (63%), Route 4 (61%), Route 6 (46%), Route 18 (28%), Route 1 (19%), and Route 1L (10%), as shown in Figure 10.

**Figure 10: Primary Routes Used by UHM Commuters**

Source: Data analyzed from 2011 UH Transportation survey
According to the transportation survey data, walking accounts for 7% of UHM’s distribution. Seventeen percent of participants live within one “network” mile of campus – implying that the proportion of walkers could be reasonably increased. Among the 7% participants in the survey who chose walking as a primary commuting mode, 90% of them were students. The remaining 10% were shared by faculty and staff. Consistent with the planning norm that a one-mile radius is what constitutes a “walkable” area, the biggest barrier discouraging walking is distance from campus. Seventy-one percent of the participants in the survey said that they would never consider walking to campus because they live too far from campus. UHM affiliates who live far from campus tend to walk less than those living nearer the campus. As can be seen in Figure 11, in the one-mile radius catchment, walking occupies 42% of mode share, while it is only 18% within two miles radius.

**Figure 11: Mode Share of Affiliates within 1 and 2 Mile Radius**

![Mode Share Graph](Image)

Source: Data analyzed from 2011 UH Transportation survey

3.4.5 **Biking**

Biking accounts for 11% of the transportation mode share in commuting to and from UHM (UHM, 2011). Among 11% of survey participants who said they bike as a primary commute mode, 70% are students. The remaining 30% are faculty and staff, 25% and 5%, respectively.

A major factor affecting bicycle usage is travel distance (and consequently the amount of physical effort needed). Bicycling use drops precipitously as distance from campus increases. In fact, less than 5% of primary bicycle users live beyond a 3-mile commuter shed of UHM (Nelson\Nygaard Consulting Associates Inc., 2012). Affiliates who live on-campus and primarily bike to campus only occupy 18% of survey participants (most walk). Thirty-six percent of survey participants said they would consider
bicycling to campus and 97% of these people live within 3 miles from campus; 39% of them said that they would not because they live too far away from UHM campus.

The lack of bicycle infrastructure and the perception that routes are unsafe are a major barrier that discourages bike use. In terms of safety, UHM’s key access corridors coincide with the area’s high volume and high speed arterials that make bicyclists (and pedestrians) feel unsafe when they share the routes with high speed vehicles. Among the participants in the survey, 77% of them said that they would be more likely to ride their bike to campus if there were better on-street facilities and low-stress bicycle routes. Fifty-eight percent of the participants said that there are not comfortable bicycle facilities such as bike lanes, signed bicycle routes, and finding route signage connecting to the campus. Only 28% of the participants said they feel safe while bike commuting to campus. Moreover, on campus, 39% do not think that there is a convenient and safe place to store a bike. These results are as shown in Figure 12.

**Figure 12: Levels of Agreement on Bike Facilities and Safety**

![Figure 12: Levels of Agreement on Bike Facilities and Safety](image)

Source: Data analyzed from 2011 UH Transportation survey

### 3.4.6 Rainbow Shuttle

Affiliates who ride the Rainbow Shuttle comprise about 1% of the primary transportation mode share (UHM, 2011). Among them, 89% are students. The remaining are faculty, 7%, and staff, 4%, as shown in the Figure 13. Among participants who use the shuttle, 41% use it only once per month.
The primary barriers to shuttle usage is that commuters are not familiar with the schedule and the routes (62%), they have to wait too long (36%), and the shuttle stops is too far from where they live (45%), as shown in Figure 14.

**Figure 14: Reasons Affiliates Do Not Use the Shuttle**

Shuttle users usually combine this mode with other modes such as walking and driving. For example, 12% of participants said they drive and then park on or off-campus to get to the shuttle stop. Most (86.6%) walk to the shuttle stop.

**3.5 Parking at UHM**
3.5.1 On-Campus Parking

The campus’s perspective on parking has changed dramatically since 2007. The trend has shifted from supporting SOV use with the proposal of additional parking structures to a philosophy of “no new parking construction” and increased support of alternative transportation. For example, in the 2012 LMP, UHM proposes to limit upper campus parking to increase walkability and biking.

Based on the UHM parking map, there are a total of 7,048 parking spaces campus-wide that include 280 off-campus parking spots (located next to Church of The Crossroads, Japanese Cultural Center) and 6,768 campus parking spots, 57% of which are located in Lower Campus. Commuter parking consumes 80% of total parking supply (Nelson\Nygaard Consulting Associates Inc., 2012). Among the campus parking lots, short-term parking comprises 76 stalls, or 1% of the total parking spaces.

3.5.2 Parking Permit Types

UHM has four types of permits for the semester, summer, year and day. Tables 1 and 2 show the breakdown of fees. To park in the primary lot (lower campus) it costs $142 per semester or $4 per day.

In 2010, UHM requested the Pacific Intermountain Parking & Transportation Association to conduct a program review of its parking operations. The study compared UHM to seven peer institutions, including the University of Arizona, University of Wisconsin, and University of Colorado at Boulder, UC Santa Barbara, San Francisco State University, Boise State University, and Cal Poly San Luis Obispo.
The study concluded that UHM annual parking permits appeared to be significantly underpriced compared to the local market. For example, many condo/apartment rental units near campus (representing a portion of the local parking market) charge more per month for resident parking than UHM charges (Nelson\Nygaard Consulting Associates Inc., 2012). Demand for parking is, of course, a function of its price. If the price is too low, the parking lot will be continually full. If too many spaces are vacant, this is a sign that prices are too high (Shoup, 2008).

3.5.3 Neighborhood Parking

The areas surrounding UHM currently experience “spillover” parking from UHM affiliates who commute and do not wish to pay for parking on campus or cannot find a parking stall.

Although parking permits at UHM have been found to be reasonably inexpensive in comparison to other university campuses, the fact that free street parking remains

Table 1: Permit Rates per Semester and Annual

<table>
<thead>
<tr>
<th>Permit Rates</th>
<th>Semester Fee</th>
<th>Summer Fee</th>
<th>Annual Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Campus (Employees)</td>
<td>$193</td>
<td>$193</td>
<td>$579</td>
</tr>
<tr>
<td>Lower Campus (Employees &amp; Students)</td>
<td>$142</td>
<td>$142</td>
<td>$426</td>
</tr>
<tr>
<td>Moped/Motorcycles (Employees &amp; Students)</td>
<td>$30</td>
<td>$30</td>
<td>$90</td>
</tr>
<tr>
<td>Evening</td>
<td>$24</td>
<td>$24</td>
<td>$24</td>
</tr>
</tbody>
</table>

Source: UH Manoa Parking Services Website “Permit Fee Schedule 2011-2012”

Table 2: Daily Rates per Semester and Annual

<table>
<thead>
<tr>
<th>Daily Rates</th>
<th>Fee</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Structure</td>
<td>$4</td>
<td>5:00 AM-4:00 PM</td>
</tr>
<tr>
<td>Upper Campus Lots</td>
<td>$5</td>
<td>4:00 PM - 11:59 PM</td>
</tr>
<tr>
<td>Upper Campus Lots</td>
<td>$2 per half hour</td>
<td>6:30 AM - 4:00 PM</td>
</tr>
<tr>
<td></td>
<td>$5 flat fee</td>
<td>After 4:00 PM M-F and all day weekends</td>
</tr>
</tbody>
</table>

Source: UH Manoa Parking Services Website “Permit Fee Schedule 2011-2012”

Map1: Neighborhood Street Parking
nearby means that many people will opt out of paying for parking at all. In some cases, because the neighborhood parking is more convenient to upper campus and it may make sense from a walking time standpoint as well. For example, when comparing the distances between the lower campus parking structure to Campus Center and McKinley St (used as an average distance from neighborhood parking streets to Campus center), it takes longer to walk from parking structure to Campus Center, at approximately 0.6 miles from the parking structure to campus center while only 0.5 miles away McKinley St (using Google maps to estimate), as shown in the map 2 and map 3 below.

Therefore, some affiliates prefer to park in the neighborhood because of zero costs and proximity to upper campus. This creates a parking “donut” around UHM, which leads to potential conflicts within the residential neighborhood as well as limits the effectiveness of UHM efforts to reduce VMT.
In addition, a sizeable number of cars parked on neighborhood streets are from UHM affiliates who live on-campus. According to the 2011 Campus Transportation Survey, 23% of UHM students live on-campus (4,698 students). A survey of dormitory residents conducted by UHM estimates that 20% of students who live on campus own a car (940). With only 143 parking stalls available at the residence halls, there are an estimated 800 cars left to park on Dole Street and surrounding neighborhoods. The Chairwoman of the St. Louis Heights Neighborhood Board recently said, "They (students) go into the neighborhood, they park and don't come back until the weekend when they need their cars" (Moreno, 2006).

The number of cars parked in neighborhood streets creates issues such as blocked mailboxes, trash pickup and driveways – ultimately creating an “inconvenience for residents.” Although UHM has a suggestion to “Be a Good Neighbor” (on the Commuter Services website), the impact of UHM on the nearby residences has been an ongoing one.

Source: UHM Commuter Services

Be a Good Neighbor

Our campus shares this beautiful part of the island with the friendly, supportive communities of Mānā Valley, St. Louis, Mōʻiliʻili, and Makiki. If you park in and travel through these neighborhoods, please do so responsibly and with consideration. Follow all state and city laws and ordinances; arrive and depart quietly and without littering. Your show of respect for our neighboring communities speaks well for your University and for us all.

Mahalo for your kōkua.

Source: UHM Commuter Services
To understand the incentive structure of the typical UHM commuter, the study team started by calculating the “cost of commuting to UHM” from several different locations, travel modes, and for different affiliate types. By capturing affiliate costs, including the value of time, UHM can more effectively identify policies that might promote changes in mode choice. This analysis was broken down into seven distinct commuter locations (Pearl City, Kapolei, Kailua, Hawai`i Kai, Hale`iwa, Mānoa, Waikīkī, and Kaimukī), six categories of commuters (faculty, staff, and undergraduate and graduate students with and without part-time jobs), and three modalities: SOV, TheBus, and bicycling. The focus of this analysis is to determine the optimal commute mode based on driving costs and the time value of money. The goal of the analysis is to show which mode of transportation makes the most fiscal sense from each distinct commuter location for each category of commuter.

The cost of driving was calculated by examining the following statistics for each user commuter group and commute location:

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How many miles do you drive to &amp; from University of Hawai`i each day?</td>
<td></td>
</tr>
<tr>
<td>How many days per month do you travel to school?</td>
<td></td>
</tr>
<tr>
<td>How many miles per gallon does your vehicle average?</td>
<td></td>
</tr>
<tr>
<td>How much does fuel cost per gallon?</td>
<td></td>
</tr>
<tr>
<td>How much do you pay for parking per month?</td>
<td></td>
</tr>
<tr>
<td>How much do you pay for insurance per month?</td>
<td></td>
</tr>
<tr>
<td>What is the average cost per mile for maintenance, repairs, depreciation, etc.?</td>
<td></td>
</tr>
</tbody>
</table>
Miles driven to and from the UHM campus each day were calculated assuming a five-day/week, non-stop commute. 20 miles per gallon (an average fuel mileage) at $4.20 per gallon (the current average price of fuel per gallon in Honolulu) was utilized (AAA, 2013). Current FY2013 UHM parking permit rates are used for each commuter group. Insurance costs are based on the state average of $786 per year, plus or minus 10% depending on user group average age (AAA, 2013). Finally, the average cost of $0.45 per mile for maintenance, repairs, and depreciation is taken directly from the AAA website (AAA, 2013). The financial costs of the other modes of transportation are disregarded due to the fact that UHM subsidizes the bus pass for students and biking has little to no cost on a daily basis.

4.1 Cost of Commuting via SOV

The amount of time spent commuting by car, bus, and bike from the seven aforementioned commute locations is calculated utilizing Google’s transportation mapping software (Google, 2013). The hourly wage “tipping point,” i.e. the wage a person would have to earn more than in order to prefer driving, are calculated by dividing the annual cost of driving by the time lost by commuting via alternate forms of transport (i.e. bus and bike). Simply put, if a commuter values her time at an hourly rate higher than the estimated tipping point, then it makes more fiscal sense for her to commute to UHM by car (see Table 3. Cost of Commuting via SOV on the following page for more information and specific cost of driving calculations).
Table 3: Cost of Commuting via SOV

<table>
<thead>
<tr>
<th>Questions</th>
<th>Pearl City</th>
<th>Kapolei</th>
<th>Kailua</th>
<th>Hawaii Kai</th>
<th>Haleiwa (North Shore)</th>
<th>Manoa</th>
<th>Waikiki</th>
<th>Kaimuki</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many miles do you drive to &amp; from University of Hawaii each day?</td>
<td>30.4</td>
<td>49.2</td>
<td>30.4</td>
<td>20.2</td>
<td>67.8</td>
<td>3.8</td>
<td>5</td>
<td>5.6</td>
</tr>
<tr>
<td>How many days per month do you travel to school?</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>How many miles per gallon does you vehicle average?</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>How much does fuel cost per gallon?</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
<td>$4.28</td>
</tr>
<tr>
<td>Insurance Cost Per Month</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
<td>$72.00</td>
</tr>
<tr>
<td>What is the average cost per mile for maintenance, repairs, depreciation, etc.?</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
<td>$0.45</td>
</tr>
<tr>
<td>Your monthly cost of driving to UH is:</td>
<td>$514.96</td>
<td>$764.63</td>
<td>$514.96</td>
<td>$379.51</td>
<td>$1,011.63</td>
<td>$161.71</td>
<td>$177.65</td>
<td>$185.62</td>
</tr>
<tr>
<td>Your annual cost of driving to UH is:</td>
<td>$6,179.54</td>
<td>$9,175.51</td>
<td>$6,179.54</td>
<td>$4,554.07</td>
<td>$12,139.61</td>
<td>$1,940.57</td>
<td>$2,131.80</td>
<td>$2,227.42</td>
</tr>
<tr>
<td>Amount of Time Spent in Traffic per Day (minutes)</td>
<td>58</td>
<td>74</td>
<td>50</td>
<td>44</td>
<td>104</td>
<td>14</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Amount of Time Spent on The Bus per Day (minutes)</td>
<td>108</td>
<td>274</td>
<td>176</td>
<td>144</td>
<td>274</td>
<td>42</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>Difference in Time Per Day (minutes)</td>
<td>110</td>
<td>200</td>
<td>126</td>
<td>100</td>
<td>170</td>
<td>28</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>Time Difference Per Month (hours)</td>
<td>3.67</td>
<td>6.67</td>
<td>4.00</td>
<td>3.33</td>
<td>5.67</td>
<td>9.33</td>
<td>11.33</td>
<td>14.00</td>
</tr>
<tr>
<td>Time Difference Per Year (hours)</td>
<td>440.00</td>
<td>800.00</td>
<td>504.00</td>
<td>400.00</td>
<td>680.00</td>
<td>112.00</td>
<td>138.00</td>
<td>188.00</td>
</tr>
<tr>
<td>Amount of Time Spent Biking per Day (minutes)</td>
<td>112</td>
<td>312</td>
<td>214</td>
<td>114</td>
<td>404</td>
<td>20</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>Difference in Time Per Day vs. Car (minutes)</td>
<td>112</td>
<td>238</td>
<td>164</td>
<td>70</td>
<td>300</td>
<td>6</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Time Difference Per Month (hours)</td>
<td>37.33</td>
<td>79.33</td>
<td>54.67</td>
<td>23.33</td>
<td>100.00</td>
<td>2.00</td>
<td>4.00</td>
<td>3.33</td>
</tr>
<tr>
<td>Time Difference Per Year (hours)</td>
<td>448</td>
<td>952</td>
<td>656</td>
<td>280</td>
<td>1200</td>
<td>24</td>
<td>48</td>
<td>40</td>
</tr>
<tr>
<td>Hourly Wage &quot;Tipping Point&quot;</td>
<td>$13.79</td>
<td>$9.64</td>
<td>$9.42</td>
<td>$16.26</td>
<td>$10.12</td>
<td>$80.86</td>
<td>$44.41</td>
<td>$55.69</td>
</tr>
</tbody>
</table>
4.2 Cost of Commuting by Commuter Group

The next portion of the cost of commuting study focuses on the aforementioned commuter groups—faculty, staff, and undergraduate and graduate students with and without part-time jobs—to determine their current mode choice based on the time value of money. To determine this, the time value of money lost by taking the bus or biking is calculated by multiplying the hourly wage of each user group by the amount of additional hours spent on the bus or riding a bike (when compared to driving a car from each commute location). Once that amount is determined, the mode choice is calculated by subtracting the time value of money lost by taking the bus or bike from the annual cost of driving. If the final amount is negative, then an alternate form of transport (either bike or bus) makes fiscal sense for that specific commuter type and commute location (see Tables 4, 5, and 6 on the following pages for more information).
### Cost of Commuting by Commuter Group

#### Table 4: Undergraduate Students with a Job & without a Job

<table>
<thead>
<tr>
<th>Commute Origination Location</th>
<th>Pearl City</th>
<th>Kapolei</th>
<th>Kailua</th>
<th>Hawaii Kai</th>
<th>Haleiwa (North Shore)</th>
<th>Manoa</th>
<th>Waikiki</th>
<th>Kaimuki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Value of Money Lost by Taking The Bus</td>
<td>$5,547.00</td>
<td>$9,540.00</td>
<td>$6,010.20</td>
<td>$4,770.00</td>
<td>$8,109.00</td>
<td>$1,335.60</td>
<td>$1,621.80</td>
<td>$2,003.40</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus subtracted from annual cost of driving to &amp; from UH.</td>
<td>$352.54</td>
<td>$564.99</td>
<td>$165.34</td>
<td>$215.93</td>
<td>$4,030.61</td>
<td>$1,904.57</td>
<td>$510.00</td>
<td>$224.02</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike</td>
<td>$5,342.40</td>
<td>$11,352.60</td>
<td>$7,822.80</td>
<td>$3,339.00</td>
<td>$14,310.00</td>
<td>$286.20</td>
<td>$572.40</td>
<td>$477.00</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike subtracted from annual cost of driving to and from UH.</td>
<td>$837.14</td>
<td>$2,177.09</td>
<td>$1,643.26</td>
<td>$1,215.07</td>
<td>$2,170.39</td>
<td>$1,654.37</td>
<td>$1,559.40</td>
<td>$1,750.42</td>
</tr>
<tr>
<td>Better to Drive, Take the Bus, or Ride Bike to UH?</td>
<td>Bus</td>
<td>Drive</td>
<td>Bus</td>
<td>Bike</td>
<td>Bus</td>
<td>Bike</td>
<td>Bike</td>
<td>Bike</td>
</tr>
</tbody>
</table>

| Undergraduate Student w/ Part Time Job Average Yearly Wage ($26,712 Tuition + $15,000 Part Time Job) | Yearly Wage | Hourly Wage |
|------------------------------------------------|
| Undergraduate Student w/ out a Part Time Job ($26,712 Tuition) | $25,712.00 |
| Undergraduate Student w/ Part Time Job Average Yearly Wage ($26,712 Tuition + $15,000 Part Time Job) | $41,712.00 |

<table>
<thead>
<tr>
<th>Commute Origination Location</th>
<th>Pearl City</th>
<th>Kapolei</th>
<th>Kailua</th>
<th>Hawaii Kai</th>
<th>Haleiwa (North Shore)</th>
<th>Manoa</th>
<th>Waikiki</th>
<th>Kaimuki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Value of Money Lost by Taking The Bus</td>
<td>$8,193.43</td>
<td>$14,897.14</td>
<td>$9,385.20</td>
<td>$7,448.57</td>
<td>$12,662.57</td>
<td>$2,085.60</td>
<td>$2,532.51</td>
<td>$3,128.40</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus subtracted from annual cost of driving to &amp; from UH.</td>
<td>$2,013.88</td>
<td>$5,721.63</td>
<td>$3,205.66</td>
<td>$2,894.50</td>
<td>$522.96</td>
<td>$145.03</td>
<td>$400.71</td>
<td>$900.98</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike</td>
<td>$8,342.40</td>
<td>$17,727.60</td>
<td>$12,215.66</td>
<td>$5,214.00</td>
<td>$22,345.71</td>
<td>$446.51</td>
<td>$893.83</td>
<td>$744.86</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike subtracted from annual cost of driving to and from UH.</td>
<td>$2,162.86</td>
<td>$8,552.09</td>
<td>$6,036.11</td>
<td>$659.93</td>
<td>$10,206.11</td>
<td>$1,493.65</td>
<td>$1,237.97</td>
<td>$1,482.56</td>
</tr>
<tr>
<td>Better to Drive, Take the Bus, or Ride Bike to UH?</td>
<td>Car</td>
<td>Car</td>
<td>Car</td>
<td>Car</td>
<td>Car</td>
<td>Bike</td>
<td>Bike</td>
<td>Bike</td>
</tr>
</tbody>
</table>

Note - Tuitions based on 2013/2014 rates (http://www.hawaii.edu/finaid/tuition.html)
Note - Hourly wage based on 40 hour "work week".
Note - Assumption that students stays in Hawaii in the Summer, commutes to UH 5 Days per week for 56 weeks per year.
Note - $39.25 monthly parking fee estimate based on FY13 $471 annual student parking permit cost
Note - Bike routes were taken from google maps; however, it cannot be assumed that all routes have dedicated bike lanes.
Note - The costs of bike ownership were not computed.
Note - Insurance costs are based on state average of $786 per year + 10% since most students are under 25 years of age (http://www.carinsurancelist.com/states-hawaii.htm)
## Cost of Commuting by Commuter Group

### Table 5: Graduate Students with a Job & without a Job

<table>
<thead>
<tr>
<th>Commute Origination Location</th>
<th>Yearly Wage</th>
<th>Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Hawaii Graduate Students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Student w/out Grad Assist Job Average Yearly Wage ($29,880 Tuition)</td>
<td>Yearly Wage</td>
<td>Hourly Wage</td>
</tr>
<tr>
<td>Commute Origination Location</td>
<td>Pearl City</td>
<td>Kapolei</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus</td>
<td>$5,869.29</td>
<td>$10,671.43</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus subtracted from annual cost of driving to &amp; from UH.</td>
<td>$(156.26)</td>
<td>$1,549.92</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike</td>
<td>$5,976.00</td>
<td>$12,699.00</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike subtracted from annual cost of driving to and from UH.</td>
<td>$(149.54)</td>
<td>$3,577.49</td>
</tr>
<tr>
<td>Better to Drive, Take the Bus, or Ride Bike to UH?</td>
<td>Bus</td>
<td>Car</td>
</tr>
<tr>
<td>Grad w/ Grad Assist Job Student Average Yearly Wage ($29,880 Tuition + 17,800 Grad Assistant Job)</td>
<td>Yearly Wage</td>
<td>Hourly Wage</td>
</tr>
<tr>
<td>Commute Origination Location</td>
<td>Pearl City</td>
<td>Kapolei</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus</td>
<td>$9,365.71</td>
<td>$17,028.57</td>
</tr>
<tr>
<td>Time Value of Money Lost by Taking The Bus subtracted from annual cost of driving to &amp; from UH.</td>
<td>$3,410.17</td>
<td>$7,907.06</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike</td>
<td>$9,535.00</td>
<td>$20,264.00</td>
</tr>
<tr>
<td>Time Value of Money Lost by Riding Bike subtracted from annual cost of driving to and from UH.</td>
<td>$3,410.46</td>
<td>$11,142.49</td>
</tr>
<tr>
<td>Better to Drive, Take the Bus, or Ride Bike to UH?</td>
<td>Car</td>
<td>Car</td>
</tr>
</tbody>
</table>

**Note:** Tuitions based on 2013/2014 rates (http://www.hawaii.edu/finaid/tuition.html)

**Note:** Hourly wage based on 40 hour "work week".

**Note:** Assumption that students stays in Hawaii in the Summer, commutes to UH 5 Days per week for 56 weeks per year.

**Note:** $39.25 monthly parking fee estimate based on FY13 $471 annual student parking permit cost

**Note:** Bike routes were taken from google maps; however, it cannot be assumed that all routes have dedicated bike lanes.

**Note:** The costs of bike ownership were not computed.

**Note:** Insurance costs are based on state average of $736 per year (http://www.carinsurancelist.com/states-hawaii.htm)
Cost of Commuting by Commuter Group

<table>
<thead>
<tr>
<th>Commute Origination Location</th>
<th>Faculty Yearly Wage</th>
<th>Faculty Hourly Wage</th>
<th>Staff Yearly Wage</th>
<th>Staff Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$98,000.00</td>
<td>$43.75</td>
<td>$65,500.00</td>
<td>$31.49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Yearly Wage</th>
<th>Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl City</td>
<td>$19,250.00</td>
<td>$35,000.00</td>
</tr>
<tr>
<td>Kapolei</td>
<td>$12,050.00</td>
<td>$17,500.00</td>
</tr>
<tr>
<td>Kailua</td>
<td>$12,807.93</td>
<td>$17,472.39</td>
</tr>
<tr>
<td>Hawaii Kai</td>
<td>$2,821.43</td>
<td>$3,680.20</td>
</tr>
<tr>
<td>Haleiwa (North Shore)</td>
<td>$4,900.00</td>
<td>$5,950.00</td>
</tr>
<tr>
<td>Manoa</td>
<td>$4,900.00</td>
<td>$5,900.00</td>
</tr>
<tr>
<td>Waikiki</td>
<td>$4,900.00</td>
<td>$5,950.00</td>
</tr>
<tr>
<td>Kaimuki</td>
<td>$4,900.00</td>
<td>$5,950.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Staff</th>
<th>Yearly Wage</th>
<th>Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl City</td>
<td>$13,855.77</td>
<td>$25,192.31</td>
</tr>
<tr>
<td>Kapolei</td>
<td>$15,871.15</td>
<td>$21,413.46</td>
</tr>
<tr>
<td>Kailua</td>
<td>$12,596.15</td>
<td>$18,904.08</td>
</tr>
<tr>
<td>Hawaii Kai</td>
<td>$3,526.32</td>
<td>$4,282.69</td>
</tr>
<tr>
<td>Haleiwa (North Shore)</td>
<td>$5,290.38</td>
<td>$6,224.97</td>
</tr>
</tbody>
</table>

**Note:**
- Salary based on average UH Faculty & Staff for FY13 (Scaled from 9 to 12 months for faculty, 11 months for staff).
- Hourly wage based on 40 hour “workweek”.
- Assumption that faculty/staff commutes to UH 5 days per week for 56 weeks per year.
- $62.75 monthly parking fee estimate based on FY13 $753 upper campus staff annual parking permit cost.
- Bike routes were taken from google maps; however, it cannot be assumed that all routes have dedicated bike lanes.
- The costs of bike ownership were not computed.
- Insurance costs are based on state average of $786 per year - 10% since most faculty and staff are over 35 years of age.
### Table 7: Market “Clearing Prices”

#### Parking Permit “Market Clearing” Price (Semester)

<table>
<thead>
<tr>
<th>Undergrad, Grad, Faculty, or Staff</th>
<th>Pearl City</th>
<th>Kapolei</th>
<th>Kaliou</th>
<th>Hawaii Kai</th>
<th>Haleiwa (North Shore)</th>
<th>Manoa</th>
<th>Waikiki</th>
<th>Kaimuki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergrad Student w/out Job</td>
<td>$310.85</td>
<td>$121.50</td>
<td>$56.45</td>
<td>$405.02</td>
<td>$1,343.54</td>
<td>$551.46</td>
<td>$519.80</td>
<td>$583.47</td>
</tr>
<tr>
<td>Undergrad Student with Job</td>
<td>$671.23</td>
<td>$1,507.21</td>
<td>$1,068.55</td>
<td>$213.98</td>
<td>$174.32</td>
<td>$497.88</td>
<td>$412.66</td>
<td>$494.19</td>
</tr>
<tr>
<td>Graduate Student w/out Job</td>
<td>$85.42</td>
<td>$516.64</td>
<td>$199.15</td>
<td>$258.02</td>
<td>$1,004.96</td>
<td>$522.14</td>
<td>$479.17</td>
<td>$546.61</td>
</tr>
<tr>
<td>Graduate Student with Job</td>
<td>$1,080.06</td>
<td>$2,635.69</td>
<td>$1,534.15</td>
<td>$480.64</td>
<td>$796.23</td>
<td>$458.57</td>
<td>$352.03</td>
<td>$440.66</td>
</tr>
<tr>
<td>Faculty</td>
<td>$4,310.82</td>
<td>$8,562.16</td>
<td>$5,244.15</td>
<td>$2,519.31</td>
<td>$5,824.13</td>
<td>$342.85</td>
<td>$56.60</td>
<td>$205.14</td>
</tr>
<tr>
<td>Staff</td>
<td>$2,512.74</td>
<td>$5,292.93</td>
<td>$3,184.54</td>
<td>$1,375.08</td>
<td>$3,045.28</td>
<td>$440.93</td>
<td>$252.75</td>
<td>$368.60</td>
</tr>
</tbody>
</table>

#### Permit Parking Prices (Semester)

<table>
<thead>
<tr>
<th>Student</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$157.00</td>
<td>$185.00</td>
<td>$174.00</td>
<td>$182.00</td>
<td>$192.00</td>
</tr>
<tr>
<td>Faculty/Staff (Lower Campus)</td>
<td>$534.00</td>
<td>$615.00</td>
<td>$648.00</td>
<td>$681.00</td>
<td>$717.00</td>
</tr>
<tr>
<td>Faculty/Staff (Upper Campus)</td>
<td>$753.00</td>
<td>$867.00</td>
<td>$912.00</td>
<td>$960.00</td>
<td>$1,008.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TDM Planned Parking Prices</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>$142.00</td>
<td>$157.00</td>
<td>$173.00</td>
<td>$182.00</td>
<td>$192.00</td>
</tr>
<tr>
<td>Faculty/Staff (Lower Campus)</td>
<td>$426.00</td>
<td>$534.00</td>
<td>$615.00</td>
<td>$648.00</td>
<td>$681.00</td>
</tr>
<tr>
<td>Faculty/Staff (Upper Campus)</td>
<td>$579.00</td>
<td>$753.00</td>
<td>$867.00</td>
<td>$912.00</td>
<td>$960.00</td>
</tr>
</tbody>
</table>
This section examines university transportation planning, including commuter benefit programs, parking policies, individualized marketing, and housing’s influence on campus transportation. The discussion includes case studies of universities that have successfully implemented TDM strategies to reduce SOV use and increase the use of alternative transportation.

5.1 Commuter Benefit Programs

Commuter Benefit programs are largely defined as “federally approved employer-provided incentives for employees to save money on their transit, vanpool and parking expenses” (SF Environment, 2013). For the purposes of this report, “Commuter Benefit” programs or packages are defined as a suite of benefits provided by an institution to its affiliates, which may or may not be offered as pre-tax payroll deductions. The study team analyzed the alternative transportation and commuter benefits of several mainland U.S. universities, including Stanford University, Cornell University, and the University of Washington. The demographics of these universities range from rural to suburban, 20,000-50,000 affiliates, public and private, comparable and non-comparable. Of the universities studied, all currently have a comprehensive and wide-reaching commuter benefit program. The remaining portion of this section of the report will examine each commuter benefit program in detail.

5.1.1 Case Study: Stanford University

Of all the colleges and universities studied for this report, Stanford University, a private institution located in Palo Alto, California, offers the most comprehensive alternative transportation and commuter benefits program. Stanford has been actively pursuing strategies to encourage people to switch from SOVs to bicycle, bus transit, rail, and carpool for over a decade. Transportation demand management at Stanford is a multi-pronged effort led by a comprehensive commuter benefit program called the “Commute Club,” with incentives that range from free bus passes cash payments for relinquishing parking permits and using alternative transport to commute to campus. According to school officials, the program is paying off both financially and in less tangible ways—not the least of which is employee and student health and satisfaction (Stanford University, 2013). As a result of Stanford’s TDM initiatives, which were deployed in 2002, the use of SOVs by employees has decreased from 48.9% in 2003 to 35.8% in 2007, Commute Club membership has increased 82%, peak-hour commute counts have been
below the morning and afternoon baseline even with an increase of 1,500 new staff, and parking permit sales have decreased by 7% (Hamilton, 2008).

**The Rise of Stanford’s TDM Program**

In 2000, Stanford University’s General Use Permit (GUP) was approved, which placed many conditions on Stanford’s planned land use, growth, and development (Hamilton, 2008). One of the conditions of the GUP states that Stanford shall mitigate the transportation impact of its additional development and population growth either through a program of “no net new commute trips” or through proportional funding of mitigation measures for specified impacted intersections—Stanford chose the former (Hamilton, 2008). The goal of the “no net new commute trips” option is to reduce local and regional traffic congestion, improve air quality, and minimize environmental impacts of Stanford commuters (Hamilton, 2008). To gauge the success of this goal, traffic levels at 16 entry and exit points to and from Stanford are measured in the spring and fall of each year to determine if the University is meeting the GUP trip limit goal, of which attainment has posed a significant challenge (Hamilton, 2008). To meet the goal, in 2002, the University implemented a wide range of new TDM measures and marketing efforts to reduce SOV commute levels (Hamilton, 2008). These efforts focused heavily on university employees, as they generate the vast majority of the University’s peak-hour trips (Hamilton, 2008).

Stanford’s TDM strategies include a heavy emphasis on communicating the alternative transportation options to the Stanford community and providing rewards for participation (Hamilton, 2008). From 2002-2007, the University saw a 20% decrease in the employee drive alone rate, an 82% increase in Stanford’s Commute Club participation (described in the following paragraphs), a decrease in commuter parking permit sales, and significant increase in the use of the university shuttle system for commute purposes (Hamilton, 2008).

**The “Commute Club”**

Stanford’s alternative transportation program, the Commute Club, began in 2002 and currently includes approximately 8,000 members—1/3 of the total Stanford affiliates. The Commute Club provides members with cash incentives to utilize alternative transportation, carpool and vanpool parking permits and benefits, and a variety of non-monetary prizes and services. The cash incentive—“Clean Air Cash”—is one of the main rewards of the Commute Club. Students and eligible staff and faculty who ride a bike, take transit, carpool or vanpool to campus can receive a $25/month (up to $300/year) monetary credit. Essentially, Stanford’s program pays its members to be participants, and of all the university commuter benefit programs studied, Stanford’s Commute Club and its Clean Air Cash benefit
are by far the most comprehensive and financially lucrative transportation demand management programs.

**Marketing the Commute Club**

Stanford’s TDM strategies thrive on a framework of personal marketing and outreach to publicize the Commute Club program and encourage alternative transportation. Stanford’s Parking & Transportation Services (P&TS) has found that the most effective method of communication with new employees and peak-hour drivers is to call parking permit holders to inform them about alternative transportation program elements directly applicable to them (Stanford University, 2008). In addition, targeted mailings/emails, posters and banners that focus on raising awareness of individual commuters of the impact that drive alone commutes can have on the environment (Stanford University, 2008). “Transportation Love Stories,” posted on the Commute Club website, encourages members to submit personal testimonials on the benefits of using alternative transportation, including buying a new bike with Clean Air Cash and de-stressing by walking (Stanford University, 2008).

**Carpool and Vanpool**

Stanford utilizes two ride-matching services: ZimRide and a University-hosted online service. Carpool members register their carpool with the University and the cost of the permit is split equally via payroll deduction. Carpoolers are eligible for monetary rewards, including the aforementioned Clean Air Cash, receive one free daily parking permit per month with the option of purchasing additional day permits, and reserved parking spaces.

**Parking Philosophy**

Stanford parking policies include the prohibition of freshman vehicles. As freshman are required to live in residence halls and on-campus employment for these first-year students is guaranteed, the University believes that Freshman are least impacted group to which a stringent parking policy can be applied. To offset the impacts of this policy, Enterprise Rent-A-Car operates an on-campus location (with free hourly rentals for Commute Club members), discounted rates for Stanford faculty, staff, and students are offered, and ZipCar provides a self-service, on-demand car sharing program.

In addition to detailed information about the University’s transportation policies and benefits, Stanford’s P&TS website includes explicit statements regarding the University’s philosophy on providing parking for affiliates. The website describes the University's parking permit as, “…just that; permission to park in designated areas on University lands. It is not a guarantee that you will always be able to find a space
in your favorite lot” (Stanford University, 2013). In an effort to curb student parking in the surrounding residential neighborhood, the website also includes the following statement, “…we ask that students comply with the spirit of this policy by not bringing cars to campus with the expectation that they can be parked on the streets or public areas of our neighboring communities. Stanford works with its neighbors to reduce traffic flow and parking in nearby off-campus neighborhoods, and students are expected to help Stanford be a good neighbor” (Stanford University, 2013). Of all the universities’ parking and commuter services website, none included such bold language as this to impact driver perspectives on on-campus and off-campus parking.

5.1.2 Case Study: Cornell University

Cornell University, the largest employer in the Ithaca, New York, has been providing commuter benefits to its affiliates through a variety of TDM programs for over 18 years. Cornell estimates that through its commuter benefits program it has been able to reduce employee parking requirements by approximately 2,200 parking spaces. In addition to saving on parking construction and maintenance, Cornell notes that because of its commuter benefit program, employees drive about 10 million miles less each year—generating important air quality benefits and significantly reducing traffic congestion on and around the campus. In addition, traffic congestion through adjacent neighborhoods and municipalities has been reduced, and the University has benefited from improved community relations. In total, the University estimates that these programs have saved more than $40 million in net costs.

On an average day at Cornell, about 30,000 pedestrians, 10,000 cars, 5,000 cyclists and hundreds of buses and trucks commute to the campus (Cornell, 2013). Cornell’s Commuter and Parking Services (C&PS) department is committed to providing commuting alternatives to reduce the percentage of SOV commuters. The ACUPCC cites Cornell University as a “model initiative” with a suite of SOV-reducing strategies that includes raised parking fees, redrawn parking systems to favor carpooling, integrated school transit systems with the City’s, and free public transit throughout the county to anyone who does not receive a parking pass (ACUPCC, 2013). These efforts have saved 417,000 gallons of fuel and 10,000,000 vehicle miles traveled annually, cutting costs by more than $36 million and reducing GHG emissions by 51,100 tons over 12 years (ACUPCC, 2013).

Carpool and Vanpool

At Cornell, carpools are both organized in two ways: by the University’s “RideShare” program, which is restricted to faculty and staff, and by students and other employees who utilize ZimRide and informal
networks. For both the RideShare program and self-organized carpools, carpoolers can link up to six license plates to the permit so that the permit can be swapped seamlessly among registered vehicles. To participate in RideShare, members must relinquish their individual parking permits and receive one permit on which all of their vehicles are listed (Cornell University, 2005). The cost of the discounted permit is paid by the primary permit holder via payroll deduction and the cost split amongst the group as they choose to. Increasing the carpool to three or more people provides increased benefits, including free parking permits and access to reserved carpool stalls. RideShare participants can also purchase books of ten-day parking permits for days that carpoolers need to drive alone and are able to cancel membership in the program within 30 days. Cornell also offers discounted permits to carpoolers who participate in the local Tompkins County vanpool program.

5.1.3 Case Study: University of Washington

The University of Washington (UW) has one of the largest commuter benefit programs of any university in the world due to the high number of its affiliates. In addition to its successful program, UW was selected as a case study for this report because of its status as a public university and because of its geographic similarities to UHM: Located in a residential area with a limited roadway network and in close proximity to a major city (Seattle). Compared to UHM, Stanford and Cornell, UW has the largest number of affiliates and, consequently, great transportation challenges.

UW launched its transportation demand management efforts in 1991. It aimed to reduce congestion coming to and from the campus and provided the UW community with an affordable and sustainable suite of transportation options. Moreover, it contributed to the minimization of congestion, noise, and emissions while creating a safer environment for pedestrians and bicyclists. In particular, the University’s U-PASS has been critical in limiting vehicle trips on Campus.

In 2009, the University’s Commuter Services Department started the UW Commute Champion recognition program to help recognize individuals in the UW community who model smart commute choices. Each quarter a new Commute Champion is chosen from peer nominations and honored with a framed award certificate plus a $50 gift card from the UW Bookstore and other gifts from corporate sponsors like REI. The UW Commute Champion is featured in a story on the UW Commuter Services website, newsletter, and in the Department’s lobby.
Notably, the UW transportation services office provides a one-on-one transportation planning service for students, faculty, and staff. The goal of the one-on-one service is to provide an individual plan for each commuter to have them make the most informed decision possible on their commuting decision.

As a result of these efforts, even though UW’s campus population rose approximately 31% over 20 years, vehicle traffic volumes on and around campus decreased. Traffic inbound to the campus during peak morning commuting hours decreased by 44% and traffic outbound from the campus during peak afternoon commuting hours decreased by 36%. Less than one-fifth of the campus population drives alone to campus and there has been a significant reduction of vehicle trips entering and exiting the UW campus at peak hours.

5.1.4 Case Study: Bus Transit at the University of British Columbia and University of California at Los Angeles

The most significant observation of the bus transit systems of the University of British Columbia (UBC) and the University of California at Los Angeles (UCLA) was the willingness of these university affiliates to utilize public transportation if services were improved. Surveys of driving affiliates at these universities stated that:

- 88% would be receptive to using public transportation if wait times were reduced;
- 80% cited increasing the feasibility of public transportation as important; and,
- 77% cited reduced bus transit travel times as critical to influencing a driver’s decision to switch from SOV to bus transit as their preferred commute mode.

UCLA’s BruinGO program, established in 2001, has allowed the university’s 68,000 affiliates to utilize bus transit at no cost to the affiliate. Establishment of the program has resulted in 73% more bus commutes per day by faculty and staff, 51% by students; 6% fewer vehicle trips per day to campus by faculty and staff, 11% by students; and a reduction in campus parking demand of 1,380 stalls. Since its inception, the BruinGO program has resulted in a benefit-cost ratio of 5.4 to 1.

5.2 Commuter Benefit Program Comparison

The table on the next three pages compares Cornell University, Stanford University, and the University of Washington’s commuter benefit programs with respect to the services that they provide and how they provide those aforementioned services. Constant among all campuses is the comprehensive approach to provide multiple, flexible modes, permits, and fee structures that make it possible for
affiliates of all income backgrounds to benefit from. From this table, UHM can gain perspective into how other major universities are managing their transportation programs with the possibility of applying some of these concepts to a future UHM commuter benefit program.

Table 8: University Commuter Benefit Programs

<table>
<thead>
<tr>
<th></th>
<th>Cornell University</th>
<th>Stanford University</th>
<th>University of Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Affiliates</strong></td>
<td>30,900 affiliates: 14,200 undergraduates, 7,000 graduate students, 1,600 faculty, 8,100 staff.</td>
<td>26,800 affiliates: 7,000 undergraduates, 8,800 graduate students, 2,000 faculty, 9,000 staff.</td>
<td>49,200 affiliates: 35,200 undergraduates, 12,000 graduate students, 2,000 staff.</td>
</tr>
<tr>
<td><strong>Transportation Services Departments</strong></td>
<td>Transportation and Mail Services (TMS)</td>
<td>Parking &amp; Transportation Services (P&amp;TS)</td>
<td>Transportation Services</td>
</tr>
<tr>
<td><strong>Monetary incentives</strong></td>
<td>n/a</td>
<td>Clean Air Cash: $25/month, up to $300/year</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Bus program</strong></td>
<td>OmniRide</td>
<td>Marguerite Shuttle</td>
<td>UW Shuttles</td>
</tr>
<tr>
<td><strong>Students</strong></td>
<td>Unlimited rides: $125/semester or $200/year</td>
<td>Free to affiliates and the public. Affiliates who ride are eligible for Clean Air Cash.</td>
<td>4 types of shuttles—all are wheelchair accessible</td>
</tr>
<tr>
<td><strong>Employees</strong></td>
<td>Employees can exchange parking pass for free OmniRide card</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Park &amp; Ride</strong></td>
<td>11 locations</td>
<td>10 locations</td>
<td>6 locations</td>
</tr>
<tr>
<td><strong>Support Services</strong></td>
<td>Real time app and live online mapping</td>
<td>Real-time arrival app and live online map</td>
<td>Live online map</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Direct bus routes linking NYU, Cornell, and Ithaca University w/ internet service and food available.</td>
<td>1.8mil riders annually, 175 shuttle stops, 37 buses running at a time, 85,000 hours of service annually.</td>
<td></td>
</tr>
<tr>
<td><strong>U-Pass</strong></td>
<td>No</td>
<td>n/a</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Student: $125/semester or $200/year. Employees are free in exchange for relinquishing parking permit.</td>
<td>Free</td>
<td>Student: $76 per quarter. Staff: $44 per month.</td>
</tr>
<tr>
<td><strong>Rail program</strong></td>
<td>n/a</td>
<td>“Go Pass” allows free use of CalTrain</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Parking program</strong></td>
<td>Permits and pay stations</td>
<td>Permits, vouchers, and pay stations</td>
<td>Permits, vouchers, and pay stations</td>
</tr>
<tr>
<td><strong>Freshmen</strong></td>
<td>On-campus permit parking is not allowed</td>
<td>On-campus permit parking is not allowed</td>
<td>Freshmen can purchase parking permits</td>
</tr>
</tbody>
</table>
### Parking program

<table>
<thead>
<tr>
<th>Student permits</th>
<th>Faculty &amp; Staff permit</th>
<th>Visitor permit</th>
<th>EV charging station</th>
<th>Carpool program</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Commuter” permit: $725/year</td>
<td>“Commuter” permit: $115-$725 per year. Includes free OmniRide card.</td>
<td>“Visitor” permit: $10/day, $6/four hours, $3/two hours</td>
<td>Free</td>
<td><strong>Students</strong> The cost of a “Commuter” permit is split by carpoolers. See rates above. Link up to 6 license plates to a single permit.</td>
</tr>
<tr>
<td>“Short-term” permits: $40/week, $103/month</td>
<td>“Short term” permit: $40 week, $110 month</td>
<td>“Visitor” permit: $12/day, $1.50/hour meters</td>
<td>$2/hour</td>
<td><strong>Employees</strong> 1,500 RideShare participants. Restricted to eligible employees. 2-person permit: $202-$424 year. 3+: Free.</td>
</tr>
<tr>
<td>“Student Resident” permit: $725/year</td>
<td></td>
<td>“Visitor” permit: $15/day, $5.00/night, $5.00 on weekends</td>
<td>Free</td>
<td><strong>Other programs</strong> ZimRide partner, university organized ride-matching program</td>
</tr>
<tr>
<td>“Occasional Parker” permit. Books of 10 one-day passes for graduate and professional students.</td>
<td></td>
<td></td>
<td></td>
<td><strong>Vanpool program</strong></td>
</tr>
<tr>
<td><strong>“Academic 10-month” permit: $257.50-$660</strong></td>
<td><strong>“Annual 12-month” permit: $309-$792</strong></td>
<td></td>
<td></td>
<td><strong>Cornell University</strong> Free parking in designated parking areas. $50-$70 per person per month, based on 5 passengers, fuel not included. Operated by Tompkins County.</td>
</tr>
<tr>
<td>“Short-term” permit: $25.75-$66/month</td>
<td>“Commuter” permit: $423/quarter, $1,682/year</td>
<td></td>
<td></td>
<td><strong>Stanford University</strong> Free parking in designated parking areas 7-15 passengers, full-time or occasional basis, eligible for “Clean Air Cash,” vanpools</td>
</tr>
<tr>
<td></td>
<td>“Daily” permit: $7/day</td>
<td></td>
<td></td>
<td><strong>University of Washington</strong> Free parking in designated parking areas 5-15 people who live at least 3 miles away from campus, Park free of charge in any University permit parking lot.</td>
</tr>
</tbody>
</table>

### Carpool program

**Students** The cost of a “Commuter” permit is split by carpoolers. See rates above. Night and evening-shift employees or employees at off-campus sites are not eligible. Each member of the carpool is eligible for a credit of $12.50/month or up to $150/year. One free day parking permit per month per member.

**Employees** 1,500 RideShare participants. Restricted to eligible employees. 2-person permit: $202-$424 year. 3+: Free.

**Other programs** ZimRide partner, university organized ride-matching program
Cyclists

| Bike racks are mounted on buses; cyclists can use athletic locker rooms free of charge, on-campus bike lanes. | Eligible for “Clean Air Cash,” $16/year commuter clothes lockers, | A green transportation options supported by UW Transportation Services |

Walkers

| No costs or monetary incentives |

Additional incentives

| Telework | Available |

Emergency Ride

| Free |

Emergency services

| Free: Motorist Assist Program (MAP): Tire inflation, jump-start, call locksmith/tow truck. | n/a |

Rental car program

| Yes. Electric cars available. | Enterprise Rent-A-Car; ZipCar, $35 to join and receive $35 driving credit from university | Yes |

*Information in this Table was sourced January-June 2013 from the University of Washington Commuter Services website (https://www.washington.edu/facilities/transportation/commuterservices/parking), Cornell University Commuter & Parking Services website (http://transportation.fs.cornell.edu/parking/campusparking/faculty/default.cfm), and the Stanford University Parking & Transportation Services website (http://transportation.stanford.edu/).

Consistent for all successful university commuter benefit programs studied, program expenses are covered by a combination of parking permit revenue fee assessments. Unique to other schools, Stanford University also levies a special fee assessed to schools and departments who increase their gross square footage—simultaneously incentivizing departments to increase the utilization of their existing spaces and establish is fair method to pass the cost of parking to the “consumer.” By penalizing departments for increasing their floor area, Stanford ensures that new development, and, subsequently, the construction of additional on campus parking, is not the school’s first solution to accommodating growth.

Stanford’s Director of Parking and Transportation Services stated the following have been instrumental to the success of the school’s commuter benefit program (Hamilton, 2008):

- A clear understanding of the commuter population through the use of employee and student data in conjunction with readily available GIS or mapping services;
• Close proximity of regional rail and bus services and strong partnerships with the agencies providing these services;
• Financial resources to establish a comprehensive and expanding array of transportation options and programs that encourage both full-time and part-time alternative transportation use;
• Continuous and varied targeted marketing and outreach to all commuters;
• Incentives for commuters to join and remain among the ranks of alternative transportation users;
• Dedicated and capable staff to develop, implement, integrate, and sell the program elements; and,
• Strong support from University administration.

5.3 Parking

As discussed in Section 3, the use of SOV and on-campus parking is UHM’s biggest transportation challenge and an area that the University has the ability to dramatically affect in a relatively small amount of time. This sub-section explores best practices in parking planning, with a focus on SOV reduction, and, therefore, VMT and GHG reduction.

Inefficient (underpriced) parking permit structures and costs is one of the largest barriers to reducing the use of SOV by commuting affiliates. When exploring parking permit structures and costs, studying both successful and unsuccessful strategies implemented by other universities is crucial to developing sound recommendations for change. The Victoria Transport Planning Institute (VTPI) is an independent Canadian research organization that develops innovative and practical solutions to transportation problems. VTPI’s website provides a wealth of information on alternative transportation plans and strategies. VTPI and successful parking management and pricing practices from the cities of Portland, Seattle, and Vancouver (British Columbia) include:

• **Charge motorists directly for using parking facilities.** If parking must be subsidized, offer comparable benefits for use of other travel modes, such as cash out payments. Stanford’s Clean Air Cash is one such example.

• **Manage and price the most convenient parking spaces to favor priority users.** Charge higher rates and structure pricing periods to be shorter at more convenient parking stalls (such as on-street spaces, and parking near building entrances) to increase turnover and favor higher-priority uses. On-street and parking stalls near building entrances are examples.
• **Apply performance-based parking prices.** Set the price of parking stalls such that at least 10% of parking spaces are unoccupied at any time: Prime spaces suitable for short-term use should generally be at least twice as expensive per hour as less-convenient spaces suitable for longer-term uses (Shoup, 2006 & 2008). The ratio between short- and long-term spaces may need occasional adjustment to optimize use.

• **Improve pricing methods to make parking pricing more cost effective, convenient and fair.** For example, install electronic pricing systems, such as pay stations, that accommodate various payment methods and rates and allow motorists to pay for just the amount of time they will be parked. For short-term parking, charge by the minute rather than by the hour. For long-term parking, charge by the hour rather than by the day or month.

• **Minimize discounts for long-term (semester and annual) parking passes.** For example, set daily rates at least 6 times the hourly rates, and monthly rates at least 20 times daily rates. **An aggressive but successful alternative that universities have employed is to eliminate semester and annual parking passes altogether.** Instead, sell books of daily tickets so that a commuter’s mode of transportation becomes a daily decision rather than a given to use SOV. In addition, eliminate the use of early-bird discounts to further disincentivize driving.

• **Set parking prices to equal or exceed transit fares.** For example, set daily rates at least equal to two single transit fares and monthly rates at least equal to a monthly transit pass.

• **Avoid operating with an excessive parking supply.** Use parking management to encourage more efficient use of existing parking facilities and address any spillover problems that result from pricing.

• **Price on-street parking in residential neighborhoods.** Create Parking Benefit Districts, with revenues used to benefit local communities (Shoup, 1995). Allow motorists to lease on-street parking spaces (Solomon, 1995). For example, let residents and businesses lease the parking spaces in front of their homes or shops, which they could use themselves, reserve for their visitors and customers, or rent to other motorists.

• **Use TDM marketing and other information resources to provide information on parking prices and availability, and on alternative travel options.**

• **Provide free or discounted parking to rideshare and carpool vehicles.**

Efficient—or “right-priced”—parking pricing would significantly increase revenue for UHM. Parking facilities represent 5-15% of the annualized cost of a typical municipality and/or university, so charging motorists directly for using parking rather than incorporating parking facility costs into tuition/fees could
increase University revenues or reduce tuition by nearly this amount (additional revenues minus any costs associated with collecting fees). Shoup (2002) estimates that charging market-rate prices for curb parking could yield more revenue than total property taxes in many neighborhoods. Although this scenario does not directly apply to UHM, it still demonstrates the true value of UHM’s parking supply.

An important component of implementing a more efficient parking permit structure and costs is how parking is actually paid for: directly or indirectly, i.e., making commuters pay the full cost of parking at the time of use or subsidizing commuter parking via other revenue streams. Paying directly for parking is more equitable and efficient than the opposite and turns commuter’s decision to drive into a daily consideration (rather than the semester decision). Paying indirectly for parking through increased overall tuition and fee rates places the costs of parking on all university affiliates equally; therefore, rewarding affiliates who utilize parking facilities and punishing those who do not.

UHM’s current parking permit system results in the University subsidizing a majority of the cost of each campus parking stall. As Figure 16 demonstrates, the affiliate annual permit cost (2x semester) only accounts for 7.1-11.8% of the annualized cost of constructing, maintaining, and operating one of UHM’s structures parking stalls (Nelson\Nygaard Consulting Associates Inc.,2012). Therefore, UHM is currently subsidizing 88.2-92.9% of a structured parking stall’s annualized costs.

Figure 15: Annual UHM Parking Permit Costs Compared to the Annualized Cost of a Structured Parking Stall

Source: 2012 TDM and UHM Commuter Services Website (April 2013)

While pricing parking permits at $2,400 annually is not necessarily feasible, a discussion of raising UHM’s current parking permit costs to be more inline with that of other universities previously cited is
certainly appropriate. Illustrated in Figure 17, a revised proposed UHM parking permit structure published in a December 2011 Star Advertiser article reflects a rate increase that is comparable to other U.S. mainland universities (Fujimori, 2011).

**Figure 16: Proposed Parking Rate Increase (2011)**

There are an estimated two off-street and one to two on-street parking spaces per vehicle in the U.S., with total annualized value of $1,500 or greater per vehicle (Litman, 2009). This averages 12¢ or more per vehicle-mile; however, this cost in Hawai`i is actually closer to $4,500 per parking stall, which amounts to approximately the average vehicle operating costs of 46¢ per mile (not including fuel costs). In short, charging motorists directly for the full price of parking would approximately double the perceived cost of driving and possibly result in a significantly lower use of SOV at UHM.

The “underpricing” of parking results in inefficient use of parking facilities and excessive parking demand. In particular, the most convenient parking spaces are often filled while less convenient spaces are unoccupied. This phenomenon reduces motorist convenience and increases traffic problems that can be reduced with more efficient pricing (Booze Allen Hamilton, 2005). Surveys indicate that 8-74% of urban traffic congestion is caused by vehicles cruising for on-street parking and that motorists spend an average of 3.5 to 13.9 minutes finding a curb parking stall—both indications of inefficiency due to underpricing (Shoup, 2007).

Parking touches all aspects of the environment and university life, and, therefore, the connections between SOV, the University, and its surrounding environment must be well understood in order to manage the current parking supply at UHM, including:
• **Parking consumes land.** The average parking stall consumes 330 square feet; consequently, parking consumes nearly two-thirds of the campus’ developed area at three spaces per 1,000 square feet.

• **Constructing, maintaining, and operating both structured and surface parking is a significant expense, especially for a university.** On average a new parking structure costs approximately $40,000 per parking space (Tumlin, 2012) in the mainland U.S., and, therefore, even more in Hawai‘i. Consequently, parking at UHM should be viewed as a precious resource and managed efficiently and effectively.

• **Parking and parking management can worsen traffic congestion.** Traffic congestion due to the “cruising” affect of motorists looking for available parking is, in part, created by poor parking management. Consequently, parking pricing is the most effective transportation demand management tool (Tumlin, 2012).

• **Parking can destroy walkability.** If parking is designed incorrectly it can lead to reduced walkability and increase the likelihood that people will drive to and around campus. The goal of successful parking lot design is to accommodate cars while also improving conditions for pedestrians, bicyclists, and bus transit users.

Consequently, there are, essentially, four broad-based tools UHM can utilize to balance parking supply and demand as well as reduce VMT, including:

• **Substitution:** Increasing the attractiveness of alternatives to driving a SOV (i.e. bus, bike, carpool, walk, shuttle, etc).

• **Regulation:** Developing strategies to restrict parking in such a way that will reduce VMT without sacrificing the overall parking revenue stream.

• **Price:** Pricing parking in a manner that maximizes profitability and reduces VMT without fully pricing the driving commuter out of the market.

• **Queuing:** Reducing the queuing effect (i.e., the amount of time people spend looking for a parking spot—which creates traffic congestion) through regulated neighborhood parking policies, such as striped on-street parallel parking stalls, and by installing “smart” parking signs that indicate the number of available stalls at on-campus parking garages.

Since the 1960s, parking fees have been cited as an efficient means of reducing travel demand (Albert & Mahalel, 2006). A 1998 Mildner et al. study concluded that cities with high parking prices and limited parking supply are likely to have high transit ridership. However, in order to provide for high transit
ridership, the transit supply must be available as well. Increases in parking pricing should be implemented simultaneously with improvements to transit service, particularly the travel time and frequency of bus and rail transit. Hess (2001) concludes that the number of drive-alone commuters will be reduced if the aforementioned actions are implemented. As several studies have concluded, high parking prices and limited supply affect drivers’ choices in selecting their commute mode. Therefore, UHM should provide additional and more flexible transportation options to commuters.

There is an unbroken relationship between parking price and supply, because parking supply is created by price. It is hard to make a judgment that the supply at a given location is adequate or insufficient. A 2003 study by Daggett & Gutkowski on twenty-three universities across the United State indicates that the demand and supply ratio is from 0.75:4 among 17 of 23 universities. According to the “Goldilocks Principle”, this ratio depends on the parking price. How many parking stalls occupied depends on the parking price, as “The price at any location is too high if many spaces are vacant, and to low if no spaces are vacant. When a few vacant spaces are available everywhere, the prices are just right and drivers can always find a place to park” (Shoup, 2008). Table 9 identifies parking policies that UHM could implement to improve parking supply, and, where feasible, increase parking revenue.

<table>
<thead>
<tr>
<th>Table 9: Common Parking Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Regulation</strong></td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>Time period restrictions</strong></td>
</tr>
<tr>
<td><strong>Employee restrictions</strong></td>
</tr>
<tr>
<td><strong>Residential parking permits</strong></td>
</tr>
<tr>
<td><strong>Options for special users</strong></td>
</tr>
<tr>
<td><strong>Restrict overnight parking</strong></td>
</tr>
<tr>
<td><strong>Street cleaning restrictions</strong></td>
</tr>
<tr>
<td><strong>Restrict large vehicles</strong></td>
</tr>
</tbody>
</table>

Source: Adapted from common parking regulations (Litman, 2006, p.16).

Where on-street parking is underpriced, such as free parking in neighborhoods surrounding universities, drivers tend to seek out free off-campus parking stalls rather than pay-only for on-campus stalls (Shoup, 2007). To deal with this issue in university neighborhoods and cities with high
concentrations of residential development, many municipalities implement permits for residential parking—in large part to protect residents of the neighborhood from competition over spaces. For example, the City of Menlo Park implements a daytime residential parking program that is designed to limit all-day commuter parking by allowing only residents to register for on-street parking permits. Similarly, the Portland Department of Transportation implements a two-hour visitor time limit in certain on-street parking areas.

5.4 Individualized Marketing

“Individualized marketing” programs, also dubbed “TravelSmart” and “SmartTrips,” are voluntary travel behavior change programs. It is an emerging category of the Travel Demand Management (TDM) initiative “designed to enable individuals to become more aware of their travel options and, where possible, exercise choices that reduce the use of private motor vehicles” (Rose & Ampt, 2003). Rather than assuming that travel choices are only influenced by time and other costs, the program is based on a premise that with useful information and encouragement people may change their behavior (Dill & Mohr, 2010). Individualized marketing involves providing customized information about alternate travel modes—including walking, biking, transit and carpooling—to individuals identified as willing to try other modes of travel (Mehta, 2011).

Pioneered by Germany-based company Socialdata in the 1970s, the concept of individualized marketing was developed primarily to meet the needs of public transportation agencies in Europe who wanted to know how they could achieve increased ridership (Mehta, 2011). Unlike traditional marketing, individualized marketing is a process whereby the segment of the population interested in the product—in this case, alternative modes of transportation—is narrowed through a round of interaction upfront so that the brunt of marketing efforts, including time and money, are focused on users with the most interest whose behaviors are most likely to change.

TravelSmart and SmartTrips, like other individualized or social marketing programs, aim to alter human behavior (Dill & Mohr, 2010). In a 2010 Oregon Transportation Research and Education Consortium (OTREC) report, authors Dill & Mohr introduced the Theory of Planned Behavior (TPB)—developed by Icek Ajzen—analyze the long-term effects of individualized marketing on affecting travel behavior. The theory holds that behavior is guided by: (1) a person’s attitude toward the behavior, including the likely consequences of the behavior, (2) subjective norms, including the expectations of others, and (3) the person’s perceived control over the behavior (Dill & Mohr, 2010).
Applying the TPB framework to an evaluation of an intervention attempting to change travel behavior can help explain why behavior change does or does not occur (Dill & Mohr, 2010). Two studies conducted in Germany (Garling et al (1998) and Bamberg et al (2003)) found that intervention—i.e., “Individualized Marketing”—influenced all three factors of TPB, thus leading to behavior change. In their study, Dill & Mohr identified that changing an individual’s attitude towards alternative transport via individualized marketing had the largest influence on pushing commuters with “intentions to use alternative transportation” into actually utilizing alternative transportation over vehicles for their commuting.

Socialdata found its initial pilot community for an individualized marketing program geared towards alternative transportation in Perth, Western Australia in 1997 (VTPI, 2013). The individualized marketing program was conducted as such: “Households are contacted and offered advice about the journeys they make. If they are interested, they can get information and personalized timetables by post or a telephone hotline, or a home visit from a consultant who analyses the trips they make and suggests alternatives to the car” (VTPI, 2013). The pilot project achieved a 10% reduction in car travel, 16% increase in walking, 21% increase in public transit use, and 91% increase in cycling (VTPI, 2013). Subsequent large-scale application of the program to the whole City of South Perth population (15,300 households) achieved a 14% reduction in car travel, 35% increase in walking, a 17% increase in transit use, and a 61% increase in cycling (VTPI, 2013). In addition, these changes in travel behavior were found to continue when measured one and two years later (VTPI, 2013).

In 2002, the City of Portland engaged Social Data to implement the Multnomah/Hillsdale Smart Trips pilot project, making it the first ever large-scale individualized marketing project in the US (Mehta, 2011). Following the success of the pilot project, the City of Portland decided to combine Smart Trips with the launch of the new Interstate MAX light-rail line in 2004 (Mehta, 2011). The individualized marketing projects run by the City of Portland have succeeded in reducing drive-alone car trips by 8-12% every year (2004-11), with a simultaneous increase in the use of walking, biking and public transit as well as carpooling (Mehta, 2011). In 2008, this change in modal behavior was estimated to result in a reduction of carbon dioxide emissions amounting to 19 million pounds (Mehta, 2011). A typical 20,000-household program in the Portland area costs $570,000, which translates into $10 per person in any Smart Trips area (Mehta, 2011).

In addition, cities and universities across the globe have been steadily embarking on implementing TravelSmart-like programs to encourage the use of alternative transportation by university students,
staff, faculty, and administration. One such university, the Clayton Campus of Monash University in Melbourne, Australia, implemented a TravelSmart program to incoming freshman in 2004 and 2005 (Rose, 2008). The pilot project was focused on first year students, an important target market for a travel behavior change program, as these students, by necessity, are going through a process of travel behavior change in the transition from secondary to university education (Cooper & Meiklejohn, 2003). At Monash, the program was delivered at the time of first contact and did not involve interaction over time or tailored feedback on the basis of a detailed travel survey (Rose & Ampt, 2001). During this initial interaction, transportation information disseminated to students was tailored to the needs of the individuals (Rose, 2008).

Analysis of the 2004 and 2005 program yielded the following information (Rose, 2008):

- **Analysis of before and after travel surveys identified a significant effect in terms of reducing single occupant commuting and increasing public transport use.**
  - Nearly one third of all students who registered for the TravelSmart program indicated that it had influenced them to the extent of thinking about using, trying, or regularly using environmentally friendly modes (carpool, public transport, walk, or cycle).
  - Travel survey results suggest statistically significant changes in mode choice between 2003 and 2004 with a reduction in car driver trips of about 9 percent and an increase in public transport trips of about 6 percent.
  - A statistically higher proportion of students who participated in the program in 2005 reported either regularly or always using environmentally friendly modes compared to those students who were not exposed to the program.
- **The information provided about public transport services was the most valued element of the program.**
- **A range of barriers to further affecting behavior was identified to overcome a number of those impediments and thereby increase the use of environmentally friendly modes for commuting to campus.**

Stanford University’s aforementioned “Commute Club” does not employ a true TravelSmart program but does offer trip-planning services via email with a two-week turnaround (Stanford, 2012), while UW offers a very similar TravelSmart system to the Portland system. With Stanford’s system, affiliates fill-in an online form with their origin address and campus destination and PT&S will reply with a customized transit and/or bike commute plan. Many universities provide a link to online trip-planning services
provided on the website of local and regional public transit operators. The significant time and energy spent upfront in developing a TravelSmart system could have a significant impact in affecting commuter's behavior at UHM.

5.5 Housing’s Influence on Transportation

Housing and transportation are the two largest household expenses for the typical American family (Center for Housing Policy, 2013). Students, faculty, and staff that move far from a University in order to find housing they can afford often trade lower-priced housing for increased transportation costs – in addition to the mental toll of long commutes and traffic congestion. According to the Center for Housing Policy, for every dollar a household saves on housing costs, it spends an additional 77 cents on transportation. Consequently, coordinating housing and transportation policies can increase a Universities’ housing affordability by alleviating the burdens of these combined costs.

Shannon et al. (2006) estimate that 20-30% of University students, faculty, and staff who drive could be convinced to change their travel behavior over the long-term by improving housing options near campus. One example of this policy having a lasting impact on parking reductions and SOV is the University of Houston.

5.5.1 Case Study: University of Houston

The University of Houston (UH) is widely considered a “commuter school” with its 62 parking lots and garages. In 2010, UH leaders decided that they wanted to transform the campus with more housing, restaurants, shops and other places to be outside the classroom. The goal, campus leaders said, was to create an environment that attracts the best scholars and encourages them to stick around (UH, 2013).

Overall, UH’s housing plan calls for doubling the usable square footage of classroom and office space, replacing parking lots with garages and closing part of a main street to create a tree-lined pedestrian walkway by 2020. Additionally, University officials are interested in developing a "town center" with shops and restaurants within the heart of the campus.

In addition to developing mixed use housing on campus, UH is also working with outside organizations like Habitat for Humanity to build multi-family housing on campus. This project is intended to target
students with children, especially single parents, who are struggling financially and are in need of affordable housing. UH students, faculty, and staff are being encouraged to help with the projects in an effort to build community collaboration and University pride.

Overall, the University of Houston is attempting to alter the University’s perception from a commuter campus with a plethora of parking to one that has a true sense of place and purpose. Constructing on campus housing and mixed-use development is projected to reduce parking demand by 20-30%—possibly saving the University millions of dollars per year in parking lot/garage construction and maintenance costs.

UHM has little affordable student and faculty housing surrounding it, as described numerous times within this report. Consequently, commuters are forced to use motorized transportation due to their home’s proximity to campus. UHM could learn a lot from school like University of Houston with respect to constructing more affordable housing close to campus and they effect it may have on their transportation infrastructure demand (namely parking).
6.1 Overview

During discussions with the TDM consultant in February 2013, Nelson Nygaard Planners stated that the 2012 TDM was authored as “more of a playbook strategy than a stringent step-by-step plan.” While this approach may provide a set of separate strategies that the University can implement when funds or opportunities become available, the lack of a strategic approach may result in ad-hoc implementation. Without a comprehensive set of strategies, phasing timeline, and funding concept, the study team believes implementation of 2012 TDM strategies will be far less successful than is possible.

As such, the study team recommends UHM adopt a comprehensive approach that—like Stanford University—leverages synergy among multiple program elements. The study team’s recommendations attempt to provide a comprehensive suite of strategies that could be undertaken by UHM. Some of these ideas are ‘out of the box’ and require multiple stakeholder groups—UHPA, TheBus, Board of Regents/Legislature, university departments, etc—to come to the table in order to encourage successful implementation.

A 2008 article authored by Stanford University’s Director of Parking & Transportation Services stated that the positive results seen with the Stanford program are due in large part to a comprehensive approach that includes the following (Hamilton, 2008):

• A clear understanding of the commuter population through the use of employee and student data (residence, affiliation, whether they hold a parking permit, primary commute mode, etc.) in conjunction with readily available Geographic Information System (GIS) programs;
• Close proximity of regional rail and bus services, and strong partnerships with the agencies providing these services;
• Financial resources to establish a comprehensive and expanding array of transportation options and programs that encourage both full-time and part-time alternative transportation use;
• Continuous and varied targeted marketing and outreach to all commuters;
• Incentives for commuters to join and remain among the ranks of alternative transportation users;
• Dedicated and capable staff to develop, implement, integrate, and sell the program elements; and,
• Strong support from university administration.

These important points on Stanford’s comprehensive approach should be taken into consideration as UHM moves forward in addressing its transportation issues.

It should be noted that the identified opportunities herein may be in progress within a variety of UHM divisions and departments, including the Commuter Services office, Office of Planning, and through the UHM Transportation Coordinator. While this report does provide additional justification for implementing these strategies, the report does not outline a phasing timeline. Implementation of the outlined initiatives should be undertaken in phases, and, at some point in the near future, should be simultaneously and indefinitely in operation.

The opportunities outlined on the following pages are organized as “overall opportunities” and “targeted opportunities.” Overall opportunities include high-level organization efforts necessary at present, including the development and adoption of a multi-department approach and funding and phasing plans. Targeted opportunities are focused at mitigating specific issues and barriers, including improvements to parking efficiency, transit systems, walkability, and the establishment of a commuter benefits program and individualized marketing strategy. Targeted opportunities should be implemented following implementation of the broader Overall Opportunities.

6.2 Overall Opportunities

OVERALL OPPORTUNITY #1: UHM should adopt a comprehensive, strategic approach to implementing the 2012 TDM Plan

The study team believes the next step in building on the 2012 TDM Plan is to develop a comprehensive approach for implementing the recommended TDM strategies that identifies phasing and funding sources. With many departments across the campus currently involved in shaping the future of UHM transportation—including the Commuter Services department; Office of Physical, Environmental, and Long Range Planning; and Campus Transportation Coordinator—these stakeholders could form a working group to develop a comprehensive way ahead that all departments can buy-into and follow.

This “way ahead” would not only provide a comprehensive outline of phasing and funding, but would help to further define the scope of the University’s desired suite of commuter benefits. At Stanford
University, alternative transportation had been promoted for several years, but a dramatic increase in use of alternative modes came in 2002, when Stanford expanded its TDM efforts and introduced its Commute Club (Hamilton, 2008). Stanford’s comprehensive suite of alternatives offers users flexibility and incentives, playing to a myriad of transportation needs of its diverse affiliate community. Increased options, flexibility, and incentives coupled with a robust marketing and outreach program—all together, a comprehensive approach—are identified as the school’s combination for TDM success.

OVERALL OPPORTUNITY #2: UHM should prioritize TDM objectives based on VMT reduction targets.

As a member of the American College and University Presidents’ Climate Commitment (ACUPCC), UHM has agreed to “…exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions” (ACUPCC, 2013). In line with this commitment, UHM can serve as a leader in VMT reduction—an objective of minimizing global warming emissions. VMT reduction objectives UHM could adopt should include targets to reduce use of SOV and increase walking, biking, and public transit use. Therefore, VMT reduction objectives should serve as an explicit guiding principle for current and future campus transportation planning. Follow-on studies are needed to determine parameters of potential VMT reduction targets, feasibility of implementation, and calculate volume of potential reduced emissions.

OVERALL OPPORTUNITY #3: UHM should develop and maintain a funding plan to implement a comprehensive TDM program

In implementing a multi-modal transport program, an array of services must be provided for a widely varying UHM demographic. With the need to adopt a comprehensive and strategic approach to implementing the 2012 TDM Plan (Overall Opportunity #1), UHM should draft a plan that identifies current and potential funding opportunities to implement a comprehensive TDM plan, including, among others, an increase to the student transportation fee and partnerships with private entities at little to no cost to the University. In addition to the aforementioned potential funding sources, an increase to the current parking fees (outlined in Targeted Opportunity #2) are a critical source of TDM funding and have been identified as such at numerous universities. Of the 30 campus transit systems surveyed as part of the Transit Cooperative Research Program (TCRP) Synthesis of Transit Practice (published in 2001) student fees and parking permit revenue were used to fund 63.3% and 36.7%, respectively, of the campus transit systems (Miller, 2001). Of the 21 of 30 schools with a U-Pass system, 17 indicated that student fees contribute from 10-100% of their revenue (Miller, 2001). In short, the study team
recommends follow-on studies to determine potential revenue scenarios from various internal and external funding sources.

OVERALL OPPORTUNITY #4: UHM should establish guidelines for developing, maintaining, and funding a database and GIS maps of affiliate commuting data.

During discussion with TDM consultant Nelson Nygaard in February 2013, the consultant stated that one of UHM’s challenges is to maintain updates to transportation data. At Stanford University, a clear understanding of the commuter population through the use of employee and student data in conjunction with readily available GIS was noted as one of a handful of factors attributed to the success of the school’s TDM program (Hamilton, 2008). Through recent (April 2013) discussions with UHM Office of Planning staff, it is understood that an effort is underway to collect and maintain a database of affiliate transportation data. The study team recommends that in addition to current efforts, guidelines to continue to develop, maintain, and fund data should be developed.

OVERALL OPPORTUNITY #5: UHM should implement improvements to its Commuter Services department, including the creation of a physical and accessible Commuter Services Office.

UHM’s Commuter Services department should be tasked with implementing the campus’ TDM strategies and associated tasks. These responsibilities should include:

- Develop and operate “Transportation Concierge” services (see Targeted Opportunity #5);
- Improve and maintain Commuter Services website;
- Implement additional marketing efforts; and,
- Maintain UHM commuting data (see Overall Opportunity #4).

Coupled with the adoption of a comprehensive TDM program, UHM should consider establishing a physical Commuter Service office at a convenient, accessible location—such as the Campus Center—where it could be collocated with other student and staff service offices.

6.3 Targeted Opportunities

TARGETED OPPORTUNITY #1: UHM should implement a comprehensive Commuter Benefits Program.

As outlined in Section 5 Transportation Planning, one of the most successful strategies in implementing a successful campus TDM plan is to establish a Commuter Benefit Program. Of the universities studied for this report—Stanford University, Cornell University, and the University of Washington—all currently
have a comprehensive and wide-reaching commuter benefit programs. The goal of these programs is to provide incentives for commuters to join and remain among the ranks of alternative transportation users.

Similar to UHM, all of the commuter benefit programs studied offered a U-Pass or similar discounted or free bus service. However, unlike UHM, incentives to carpool, bike, and efficient parking pricing work in concert with a U-Pass system to provide variety and flexibility in alternatives to the SOV. As such, a UHM Commuter Benefit Program should include:

- **Extending the U-Pass to faculty and staff.** At other universities studied, extending the U-Pass to faculty and staff may require a minimal yearly fee paid by the affiliate.
- **Incentives to carpool or vanpool.** These incentives, as demonstrated at other universities, include reduced-rate parking passes, free parking, and priority reserved parking stalls.
- **A parking voucher system instead of OR in addition to a traditional semester parking permit** for those who regularly utilize alternative transport and need to commute occasionally via SOV. Affiliates utilizing alternative transport and who lack a semester parking permit could purchase sets (e.g., in quantities of 10) of daily parking “vouchers” to be used any time.
- **Additional incentives.** As discussed in Table 8 University Commuter Benefit Programs, other universities have implemented cash-back for affiliates who relinquish an SOV parking permit; free emergency rides home; free on-campus roadside assistance; and additional monetary and service incentives.

The case studies provided in previous sections of this report highlight that university TDM strategies which address walking, driving, and transit comprehensively—often via commuter benefit programs—often lead to successful adaptation of alternative transportation modes. Expenses from the successful commuter benefit programs that the study team studied are covered by a combination of parking permit revenue fee assessments.

**TARGETED OPPORTUNITY #2: UHM should improve campus parking efficiency.**

Previous sections of this report have indicated that the willingness to pay for parking is high for several UHM commuter types who live outside the 3-mile radius of the campus. While those who live within the bicycle network radius might be encouraged to bicycle as a result of higher parking prices, those living outside the 3-mile network might be encouraged to carpool or utilize transit. Based on the current price of a parking permit, it makes little sense for an undergraduate student living in Kaimukī to drive a SOV
to school. However, a UHM faculty member commuting from Kapolei would theoretically be willing to pay significantly more than the current fee for a parking permit based on the amount of time he/she would lose by commuting to campus via TheBus.

Consequently, there are several significant areas where UHM can utilize the aforementioned parking supply tools to not only increase the efficiency of the existing parking supply at UHM but also greatly reduce commuter VMT. By better managing parking supply, UHM has the ability to alter commuter behavior, reduce VMT, and possibly increase overall parking revenue. The following recommended revisions to UHM’s existing parking permit system include:

- **Eliminate semester parking permits in favor of daily parking vouchers.**
- **Eliminate parking passes for on-campus freshman.**
- **Increase supply of short-term parking stalls on upper campus.** As previously discussed, only 76 of the campus’ 6,768 existing parking stalls (1.1%) are considered short term/visitor parking. By providing a low number of short-term parking stalls, UHM is simultaneously encouraging long-term parking and eliminating opportunities for increased revenue from higher-priced short-term parking stalls.
- **Decrease the supply of upper campus faculty and staff permitted parking** per the landscape master plan.
- **Establish a special parking fee assessment for schools and departments when they increase their gross square footage requirement.** This penalizes departments for acquiring increased discretionary space to ensure they bear the full cost.
- **Conduct a follow on study to analyze the possibility of utilizing pay stations** within the lower campus parking garage—eliminating the paid attendant system.

**Pricing**

The following recommendations would encourage motorists to choose less expensive, less convenient modes of transportation:

- **Increase semester parking permit costs or eliminate semester and annual parking passes altogether.** Instead, sell books of daily tickets so that a commuter’s mode of transportation becomes a daily decision rather than a given to use SOV. The intent is to ensure parking prices fall more in line with the true cost of building and maintaining a parking stall in Hawai`i.
• Distribute a “true cost of parking” information sheet with the distribution of each semester parking permit in order to inform students, faculty, and staff of the true cost of parking.

• Decrease short term parking hourly fee costs and increase short term parking citation fees. Currently upper campus short-term parking is priced at $4 per hour and $16 to park all day; however, a UH commuter can park in the lower campus parking garage all day for only $5. Additionally, a short term parking violation ticket is currently priced at only $15 ($1 less than an all day pass). This short term parking fee structure is extremely inefficient and encourages UH commuters to park all day in the garage or simply run the risk of being ticketed in short term lots.

• Manage and price the most convenient parking spaces to favor priority users. Charge higher rates and structure pricing periods to be shorter at more convenient parking stalls (such as on-street spaces, and parking near building entrances) to increase turnover and favor higher-priority uses.

• Apply performance-based parking prices. Set the price of parking stalls such that at least 10% of parking spaces are unoccupied at any time: Prime spaces suitable for short-term use should generally be at least twice as expensive per hour as less-convenient spaces suitable for longer-term uses (Shoup, 2006 & 2008).

• Improve pricing methods to make parking pricing more cost effective, convenient and fair. For example, install electronic pricing systems, such as paystations, that accommodate various payment methods and rates and allow motorists to pay for just the amount of time they will be parked. For short-term parking, charge by the minute rather than by the hour. For long-term parking, charge by the hour rather than by the day or month.

• Set parking prices to equal or exceed transit fares. For example, set daily rates at least equal to two single transit fares and monthly rates at least equal to a monthly transit pass.

Off-Campus Parking

UHM should work with the neighborhoods and city and county of Honolulu to alter the neighborhood parking policies to reduce the queuing effect. The study team believes this can be done utilizing the following approach:

• Permit the Neighborhood Streets within the “parking donut” of UH. Change all adjacent streets parking to 2-hour maximum unless permitted. Allow neighborhood residents the ability to acquire permits for their vehicles as well as their visitors (2 visitor parking permits per resident).
• **Price on-street parking in residential neighborhoods.** Create Parking Benefit Districts, with revenues used to benefit local communities (Shoup, 1995). Allow motorists to lease on-street parking spaces (Solomon, 1995). For example, let residents and businesses lease the parking spaces in front of their homes or shops, which they could use themselves, reserve for their visitors and customers, or rent to other motorists.

**TARGETED OPPORTUNITY #3: UHM should improve internal transit systems and affect change to external transit systems serving the campus.**

UHM should consider the following improvements to alternative transportation systems:

- **Rainbow Shuttle:** Expand Rainbow Shuttle services to additional areas within 3-miles from the campus that include a high population of student residents—e.g., Waikiki.

- **TheBus:** Strengthen relationships with City bus and rail agencies to implement improvements to routes serving UHM, including additional buses, greater frequency, and express services. UHM should analyze opportunities to develop Park & Ride locations in communities with a high population of UHM affiliate residents. UHM could partner with landowners and TheBus—via public-private and public-public partnerships—to establish a Park & Ride permit fee to fund the use of vacant or underutilized parking lots and direct routes. Example locations include the Kamehameha Swap Meet adjacent to Pearlridge Shopping Center, Aloha Stadium, and large commercial parking lots in Kapolei. In addition, direct express routes from existing Park & Rides (e.g., Hawai’i Kai) to UHM could be established. During discussion with UHM Office of Planning staff, it was noted that UHM provided a similar service previously.

**TARGETED OPPORTUNITY #4: UHM should improve TDM marketing efforts.**

UHM does not currently operate an individualized marketing program to supplement its TDM efforts, neither was such a program included as a recommendation in the 2012 TDM. However, the study team posits that development of an individualized marketing program at UHM could positively impact the short and long-term viability of a comprehensive TDM program. Coupled with the adoption of a comprehensive TDM program, UHM should consider establishing a physical Commuter Service office at a convenient, accessible location such as the Campus Center where it could be collocated with other student and staff service offices (see Overall Opportunity #5).

The home visit aspect of SocialData’s approach in Perth, as compared to the telephone approach of the City of Portland and the online/email approach of Stanford University, could be a viable method to disseminated TDM information to UHM affiliates. UHM should study the feasibility of staffing a
Commuter Services office with part-time/work-study students who would serve as “Transportation Concierges.” These students would be responsible for scheduling and conducting brief (15-minute) meetings with UHM affiliates to discuss their individual commuting needs and assist in the development of an individually-tailored commute plan focused on the incorporation of alternative modes of transportation into their UHM commute. Modeled by the success of the Perth and Monash University programs, the study team posits that a face-to-face introduction of a TDM program to affiliates would positively influence affiliate behavior change and, therefore, success of a comprehensive TDM program. In addition, the Transportation Concierges would be responsible for conducting on-campus transportation awareness marketing programs, including staffing tables at campus events, posting fliers advertising the offices services and alternative transportation, and related tasks.


University of Hawai‘i at Mānoa (UHM). (2011). Campus Transportation Survey, University of Hawai‘i at Mānoa.

