



A New Course

How Innovative University Programs
Are Reducing Driving on Campus and
Creating New Models for Transportation

WashPIRG
Foundation

FRONTIER GROUP

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February 2014

Acknowledgments

The authors would like to thank the following reviewers for their insightful feedback on drafts of this report: Josh Cantor, Director of Parking and Transportation, George Mason University; Stephen Mattingly, Associate Professor, Department of Civil Engineering, University of Texas at Arlington; Kirstie Pecci, Staff Attorney, MASSPIRG Education Fund; and Phillip Winters, Director, Transportation Demand Management Program, Center for Urban Transportation Research, University of South Florida. Thanks also to John Ferrante, an intern with MASSPIRG Education Fund, who provided information on Massachusetts' Rideshare program. Additional thanks to Tony Dutzik and Elizabeth Ridlington at Frontier Group for their editorial assistance.

WashPIRG Foundation is grateful to the Rockefeller Foundation for making this report possible.

The authors bear any responsibility for factual errors. The recommendations are those of WashPIRG Foundation. The views expressed in this report are those of the authors and do not necessarily reflect the views of our funders or those who provided review.

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Photos on the report cover are for illustration purposes only. Note also that laws regarding bicycle helmet usage varies by state and sometimes city. The Centers for Disease Control recommends that bicycle riders of all ages wear helmets.

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Executive Summary

Universities and colleges across the country are taking steps to encourage their communities, students, faculty and staff to decrease their reliance on personal vehicles. These efforts are working well – saving money for universities, improving the quality of life in college towns, and giving today’s students experience in living life without depending on a personal car.

Across America, colleges and universities are showing that efforts aimed at reducing driving deliver powerful benefits for students, staff and surrounding communities. Policymakers at all levels of government should be looking to the innovative examples of these campuses. Universities and college towns also provide useful models for expanding the range of transportation options available to Americans while addressing the transportation challenges facing our communities.

Over the past two decades, colleges and universities have increasingly adopted the goal of reducing driving as part of their long-term plans to develop healthy, sustainable and successful institutions.

Reducing the number of cars traveling to and from campuses benefits universities in several ways:

- **Parking consumes land and is expensive.** The annualized cost of a single new parking space can exceed \$4,000 in a downtown parking structure, according to the Victoria Transport Policy Institute. In underground facilities, the up-front construction cost for a single space can run as high as \$30,000. Giving over campus real estate to parking lots reduces the space available for instructional facilities and other buildings while undermining the walkability of communities.

- **Reducing driving helps the environment.** Many universities strive to be environmental leaders and a commitment to sustainability motivates many college transportation plans.
- **Reducing driving helps “town-gown” relations.** Few things have greater potential to strain relations with the surrounding community than the seasonal influx of students, their cars and the resulting traffic. Reducing automobile use helps universities be good neighbors.
- **Young people often prefer communities that are served by multiple transportation options** rather than depending solely on a personal car.

America’s universities and colleges are leading the way in developing strategies to reduce driving.

- **Free or discounted access to transit services.** Universities often provide students unlimited access to local transit services with a Universal Transit Pass (“U-Pass”), offer their own free shuttle services, or even support the local transit agency in providing fare-free service.
 - *At the University of North Carolina at Chapel Hill*, the university provides financial support to enable fare-free transit service throughout the community. Between 1997 and 2011, the proportion of students using transit to commute to campus more than doubled, from 21 to 53 percent.
- **Programs to promote bicycle use.** Many colleges subsidize membership in existing bicycle sharing schemes in

the community and some create their own sharing programs on campus. Many also provide on-campus resources like free or at-cost bike repairs and bike racks.

- *At the University of Wisconsin-Madison*, 22 percent of students currently bike to campus in good weather, up eight percentage points since 2006, partly as a result of investments in on-campus bike repair services, subsidized membership in the city’s bikeshare program, and a plentiful and increasing supply of bike racks.
- **Building new biking and walking paths.** Universities invest in infrastructure like bike lanes and pedestrian underpasses under traffic-heavy streets, making it safer and more convenient to leave the car at home.
 - *The University of Colorado Boulder* has supported the build-out of bicycle and pedestrian paths in Boulder, including the city’s 58 miles of paved pathways and 78 underpasses. By 2012, roughly 60 percent of all trips made by students at CU-Boulder were by bike or foot, nearly nine percentage points more than in 1990.
- **Ridesharing initiatives.** Colleges encourage carpooling with incentive programs and through partnerships with online ridesharing services that connect drivers with others who would like a ride in their car. Some provide a guaranteed ride home, whereby universities pick up the tab for a taxi should an emergency require the student or employee to leave campus suddenly, making

carpooling and other forms of ridesharing more attractive.

- *The University of California, Davis*, encourages students and staff to share rides, resulting in an increase in carpooling. Among graduate students (more likely than undergraduates to live at a driving distance from school), carpooling to campus rose from 3.4 percent in the 2007-2008 academic year to 6.9 percent in 2011-2012.
 - **Carsharing programs.** Carsharing allows users to access cars located in their vicinity without having to bear the burden of owning one. Universities offer discounted memberships in carsharing programs, allowing students to make the most of transportation alternatives while maintaining access to a car when necessary.
 - **Distance learning and online resources.** Some colleges are beginning to conceive of distance learning – taking classes with at least some online component that limits the need for students to physically travel to campus – as part of their parking and transportation strategy.
- The policies adopted by colleges and universities to reduce driving have impacts that can be felt far beyond campus.**
- College transportation investments can expand transportation options for the entire community. For example, when schools invest in U-Pass programs they supply a steady source of revenue to the local transit agency, supporting better service for everyone.
 - University transportation plans provide a powerful example that can be followed by other institutions or cities or regions facing similar transportation challenges.
 - College students develop transportation habits that persist after graduation. According to a May 2013 survey conducted by Zipcar, approximately half (49 percent) of the class of 2013 did not plan to bring a car with them to their next endeavor after graduation.
 - Like colleges, states, municipalities and other communities can better attract and retain young talent by offering a variety of transportation options in settings where personal car ownership is not necessary. The Urban Land Institute reports that members of Generation Y desire interconnectedness and choice in travel and are thus turning toward walkable neighborhoods with access to public transportation.

Policymakers should learn from the success of college strategies to reduce driving, and:

- **Encourage local partnerships to expand transportation options.** Local communities can work together with schools, hospitals and other large institutions to improve transit services, install new infrastructure like bike lanes, and support bikesharing, ridesharing and carsharing programs.
- **Adopt explicit strategies to support non-driving modes of transportation,** including investments in transit, and bicycling and walking infrastructure; incentive programs; support for ridesharing and carsharing; and a proactive reassessment of car-oriented planning, zoning and parking rules.
- **Adapt to the transportation needs of a new generation.** Young Americans are leading the trend toward reduced driving and policymakers should adapt by devoting resources to planning and providing for non-driving modes of travel.

Introduction

Public officials in Palo Alto, California – a city in the dense and expensive San Francisco Bay Area – realized in the fall of 2013 that downtown growth was straining the area’s parking capacity. Left contemplating the construction of new parking facilities which, based on historical experience, could cost tens of millions of dollars, Palo Alto’s mayor thought there was another way.¹ A memo circulated among city lawmakers recommended that instead of building costly new parking garages, Palo Alto should develop a plan to reduce solo car trips by 30 percent – and reach out to nearby Stanford University for advice on how to do it.² The school had faced its own parking and congestion challenges in the 1990s and by encouraging alternatives to driving had avoided the cost of new parking construction, and slashed

the proportion of its employees driving solo by 30 percentage points.³

The city of Palo Alto recognized that universities and colleges offer instructive examples of innovative transportation policy for traffic-addled cities and metropolitan areas. Like small cities themselves, college campuses make compact use of land with a high concentration of residences, employment and leisure opportunities. They also face similar transportation challenges: limited financial resources, parking problems, traffic congestion and environmental concerns. Moreover, campuses are natural laboratories for innovation. Across the country, they are proving that fresh thinking can address transportation issues in ways that maximize value for the community.

An increasing number of campuses are successfully encouraging staff and stu-

dents to leave their cars at home – saving money for the university and commuters, easing congestion and improving air quality, and helping foster vibrant and walkable communities. Thousands of students, professors and other university employees who were once solo car drivers now bike, walk or ride, thanks to creative efforts by universities to expand the range of transportation options available to their communities.

These innovations are especially promising for communities that recognize the importance of attracting and retaining members of the Millennial generation (the population cohort born between 1983 and 2000, also known as Generation Y), who tend to value the availability of transportation alternatives that make it possible to live without depending on a personal car. According to the National Association of Realtors, 59 percent of young Americans (anyone under the age of 50 for the purposes of their survey) with college degrees believe

it should be a “high priority” for their state government to provide alternatives to driving.⁴ And the Urban Land Institute reports that Millennials are turning away from suburbs in favor of denser, urban neighborhoods where their desire for interconnectedness and mobility can be satisfied by public transportation and walkable amenities.⁵ Millennials are leading a national trend toward reduced driving. Between 2001 and 2009, Americans aged 16-34 reduced their annual vehicle miles travelled by 23 percent.⁶ At the same time, these young Americans traveled 40 percent more passenger-miles per capita via transit and are taking an increasing number of trips by bicycle and on foot.⁷

As in Palo Alto, public decision-makers around the country should look to universities and colleges for proven, forward-thinking ways to align transportation policy with the values and behaviors of a new generation, while delivering benefits for the community today.

Universities and Colleges Are Reducing Driving on Campus

Over the last two decades, universities and colleges have implemented campus transportation plans and policies that encourage students and other members of the campus community to reduce their use of cars.⁸ The reasons for doing so are clear: reducing driving by students and staff saves colleges money, enhances their reputation for environmental stewardship, and eases their relationship with the surrounding community, while making it easier to foster walkable communities that are increasingly preferred by young people.

Why Colleges Seek to Reduce Driving

Colleges and universities have many good reasons to encourage students and staff to get to and around campus by means other than driving.

- **Parking consumes land and is expensive.** Land is often at a premium on college campuses. Student housing, instructional facilities and campus amenities all must compete for limited space. Parking facilities

consume large amounts of space, reducing the amount of real estate available to schools for other uses. When universities look to expand, the most appealing spaces to repurpose tend to be surface parking lots. Multi-level parking or underground structures become more expensive to build and maintain the more intensively universities try to squeeze more parking in. The up-front construction cost of a single parking space runs from \$15,000 to as much as \$30,000 in an underground facility.⁹ But parking facilities also require maintenance and security and may have been built using borrowed money, all of which leads to ongoing costs. According to the Victoria Transport Policy Institute, the annualized cost of a single new parking space can be more than \$4,000 in an inner-city parking structure.¹⁰ Stanford University estimates it has avoided more than \$100 million in parking construction costs over the past decade due to its efforts to discourage driving.¹¹ Big stretches of parking lots lead to sprawling campuses that are less walkable and less dynamic as social centers. The more campuses are oriented around accommodating cars, the harder it is for them to be vibrant and lively places for people.

- **Reducing driving helps the environment.** Many universities strive to be environmental leaders. More than 600 university presidents have signed on to a national climate agreement, committing them to eliminate operational greenhouse gas emissions and engage in research and community education that will enable the rest of society to do the same.¹² Reducing transportation-related emissions is a major

component of the agreement. The University of Colorado in Boulder, for instance, cites its environmental goals as underpinning its campus-wide transportation plan.¹³ Many campuses have been trailblazers in improving the environmental bonafides of their transit services, such as electric buses at the University of Utah that can recharge wirelessly.¹⁴

- **Reducing driving helps “town-gown” relations.** Universities work to be good neighbors to their surrounding communities. Strong “town-gown” relations can help universities by making it easier to gain approval for new projects and other priorities. Few things have greater potential to strain town-gown relations more than the seasonal influx of students and their cars, which can tie up traffic and consume parking spaces that would otherwise be available to town residents. At Harvard University in Cambridge, Massachusetts, university officials produce an annual “Town Gown Report” for the city. It assesses, among other things, Harvard’s record of mitigating the impact of campus-related transportation on the surrounding neighborhoods. As well as offering an annual rundown of key facts and figures related to the campus and upcoming development plans, the report also addresses specific information requests from the city of Cambridge.¹⁵
- **Providing transportation options is appealing to young people.** Colleges seek to attract and retain students and can do so in part by building communities that match the wants and needs of young people. As an increasing number of teenagers delay or entirely forgo learning how

to drive, this means providing transportation alternatives that make it possible to live without depending on a personal car.¹⁶ Millennials are also leading a national trend away from driving and toward other modes of travel.¹⁷

Campus Transportation Planning

Colleges and universities are communities that make extensive use of planning. This is most evident in the campus “master plans” that many universities produce. School officials use these plans to lay out how best to advance the institution’s mission over the long run and set measurable targets, outlining what to build, prioritize and fund to achieve their goals.

University and college planning began to focus on sustainable transportation in the early 1990s with the culmination of many long-term trends. As campus enrollments swelled and automobile use and ownership soared in the decades after the Second World War, universities and colleges struggled with too much car traffic and shortages of parking. As Will Toor and Spenser Havlick point out in a

leading study of transportation policies in university settings, the rise and dominance of car travel in the United States “had a major negative impact on the quality of life in campus communities.” In response, major universities across the country began to change how they planned for and approached transportation challenges.¹⁸ At the same time, greater environmental awareness was taking hold at universities. The signing of an international campus sustainability pact in 1990 and the “Campus Earth Summit,” held at Yale University in 1994, made environmental sustainability a top priority in campus transportation planning.¹⁹

The outcome was a major shift – “fundamental changes” in the words of Toor and Havlick – in the way many schools approached transportation planning. Institutions married long-term sustainability concerns with short-term worries over parking and congestion to inform the long-term planning process. A similar shift by cities and regions, using some of the policies described in the next section of this report, could provide effective, long-lasting solutions to the similar transportation challenges that exist beyond campus boundaries.

How Colleges Are Reducing Driving: Examples from Across the United States

Colleges and universities across the United States use a wide variety of strategies to reduce the number of cars around campus. Some build more residence halls on campus to increase the number of students living within walking distance of their classes. Many schools make changes to their transportation policies and infrastructure by improving public transportation, supporting bikesharing, ridesharing and carsharing programs, and constructing bike lanes and pedestrian paths to create viable alternatives to car ownership and use for university communities. Many of the most successful colleges combine these strategies and extend participation to the community at large – helping universities to become part of the trans-

portation solution for the communities in which they reside, rather than a source of transportation problems.

Free or Reduced-Cost Transit

Universities across the country work in collaboration with local public transportation agencies to provide students free or heavily discounted access to local transit networks. The arrangement can benefit both sides with increased ridership and revenue for transit agencies, and increased accessibility to services that discourage students from bringing cars to campus.

The most common method for providing discounted transit is a Universal

Transit Pass, or “U-Pass,” that gives students unlimited, free access to local transit. (A few colleges also provide financial support to local transit providers enabling any member of the community to use transit for free. See “Close Up: University of North Carolina at Chapel Hill,” below.) U-Pass programs eliminate the hassle of paying a per-ride fare, which speeds up the boarding process and cuts transit travel times. Fare-free transit produces an even greater benefit by eliminating the need for per-ride fares for *all* riders, and thus also allowing for boarding through all vehicle doors.

According to the Association for the Advancement of Sustainability in Higher Education, there are currently 104 U-Pass or fare-free transit programs in operation at American colleges and universities, plus many more university programs that entitle users to a heavy

discount on local public transportation (see Appendix). Universities typically defray the cost of providing the service with funds raised from student fees, parking permit sales or other sources.²⁰

In 2011, for example, the University of Missouri at Kansas City (UMKC) and the Kansas City Area Transportation Authority (KCATA) implemented a new U-Pass initiative to address perennial parking issues on the downtown campus. Students can now ride local buses for free simply by swiping their student ID. With an estimated one-in-seven students making use of the U-Pass, local transit ridership climbed 8.9 percent in the first half of 2012. The experience has been so positive that other schools in the area are investigating similar programs.²²

Other colleges and universities augment local transit service by providing private, university-run shuttle buses. A

Figure 1. Colleges and Universities with U-Pass, Transit Discount or Fare-Free Transit Programs in the Conterminous United States²¹



shuttle service is typically free of charge for students and employees of the university. The best shuttle services run frequently, provide easy access for disabled community members, and post schedules and real-time vehicle location updates online in a format that can be easily accessed through mobile devices like smartphones.

The Boston University Shuttle (BUS), for example, operates seven days per week from 7 a.m. until midnight, providing connections between the university's often distant residence halls and instructional facilities.²³ Students and staff can easily track the location of the next bus using a smartphone application provided for free by the university.²⁴

In western Massachusetts, the University of Massachusetts Amherst partners with the Pioneer Valley Transit Authority (PVRTA) to provide free transit for the students, faculty and staff of the region's five colleges.²⁵ Remarkably for a rural transit authority, PVRTA carried more than 10 million passengers in 2010 – far more than any other regional transit authority in Massachusetts.²⁶

Smartphone apps can be an important way to get information about services in the hands of students in a way that they can use and integrate with their lifestyle. The University of California, Berkeley's Night Safety Shuttle provides free shuttle services through the night, providing students a safe alternative to driving solo to and from campus after dark. As with Boston University's shuttle, real-time tracking and live schedule updates are available for students.²⁷ At Vanderbilt University, Vandy Vans run through the night to take students to and from campus. Three students recently improved on the university's Vandy Vans smartphone app by creating their own open-source version with added functions, such as automatic alerts when buses are two minutes away.²⁸

Close Up: University of North Carolina at Chapel Hill

“While 30 percent of students drove alone to campus in 1997, just 18 percent did so in 2011.”

The University of North Carolina at Chapel Hill (commonly referred to as “UNC”) – has grown dramatically in recent years. Between 2001 and 2011, the square footage of UNC's buildings increased 50 percent. UNC's student population grew from 22,626 in 1997 to 28,206 in 2013.²⁹ As university leaders sketched out their expansion plans in the 1990s, they worried that campus growth would weigh heavily on campus and local infrastructure, much of which was already suffering from congestion.³⁰

In response, UNC launched two programs in 2002 that sought to reduce the number of students (as well as faculty and staff) driving alone to and from campus. One of these programs is known as the Commuter Alternative Program (CAP).³¹ Supported by a combination of parking revenue, student activity fees, and a grant from North Carolina's Department of Transportation, students living off-campus (as well as employees of the university and its associated hospital) can join CAP if they do not want to travel to campus alone by car. In return, program participants are eligible for benefits including:³²

- Free access to Triangle Transit, a regional bus operator in the Raleigh-Durham-Chapel Hill area;
- A \$20 discount on monthly vanpool fares;
- Free ride-matching through Zimride and ShareTheRideNC to facilitate carpooling;

- Discounted Zipcar membership of \$10 per year with a waived application fee;
- Free “Emergency Ride Home” service; and
- Discounts at local restaurants and merchants.

Augmenting CAP, the university worked with Chapel Hill Transit – the bus operator in the city of Chapel Hill – to make local buses fare-free.³³ Before eliminating bus fares, Chapel Hill Transit already received most of its revenue from UNC either through pre-paid passes or personal fares paid by students and employees. But, starting in 2002, UNC formalized its financial relationship with Chapel Hill Transit with a contract that contributes 38 percent of the bus operator’s funding – more than any other entity – and makes all buses within the agency’s service territory fare-free.³⁴

UNC students have responded positively to CAP and fare-free transit. While 30 percent of students drove alone to campus in 1997, just 18 percent did so in 2011, the most recent year for which data are available. Over the same time period, the proportion of students using transit more than doubled from 21 percent to 53 percent. Similar changes have also taken hold among university employees: while three in four employees drove alone to campus in 1997, just 51 percent did so in 2011.³⁵ As a result, the University of North Carolina has grown its enrollment and physical campus size while avoiding an increase in local traffic congestion and parking woes.³⁶

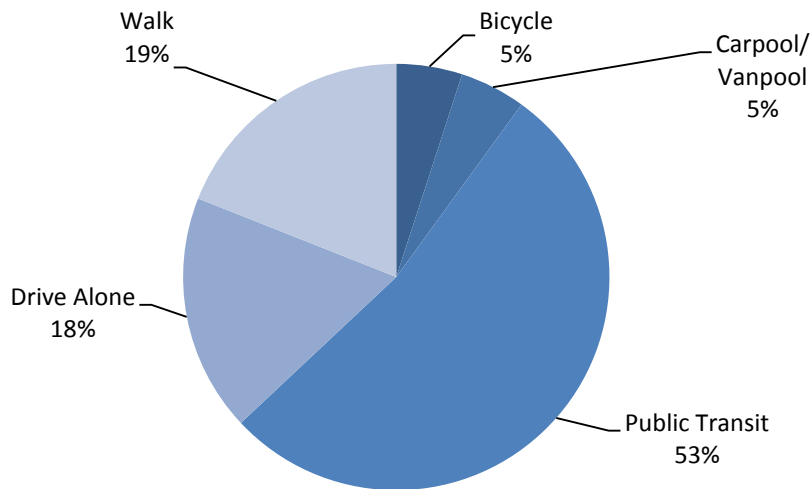
The university’s decision to facilitate fare-free transit has also benefited the entire Chapel Hill community. Between 2001 and 2011 (the most recent year for which data are available), ridership on the local bus system surged



UNC partners with Chapel Hill Transit to provide fare-free service to the entire Chapel Hill community.

Photo: bendertj, via Flickr.

Figure 2. UNC Student Mode Share, Commuting To Campus, 2011



from approximately 3 million annual trips to more than 7 million.³⁷ Chapel Hill Transit is now the second largest transit system in the state, and free transit service won the town a 2009 City Livability Award from the U.S. Conference of Mayors.³⁸

Encouraging Bicycle Use

Biking allows students and staff to get to and around campus quickly, produces no pollution, and creates little noise. Bikes require only a small fraction of the space that must be devoted to cars for parking or roadway space. In addition, at many campuses, a high percentage of students (as well as faculty and staff) live either on campus or within a reasonable cycling or walking distance of class, making bicycling an efficient and effective mode of transportation.³⁹

To encourage biking, schools sometimes subsidize bikeshare and bike rental programs, fund campus-based resources for bike owners such as free or at-cost repairs, and educate community mem-

bers on bicycling's benefits. Schools also typically collect, monitor and evaluate data on campus bicycle usage to inform investments in bicycling infrastructure.⁴⁰

The University of California, Irvine (UC-Irvine) created California's first fully automated bikesharing program, called ZotWheels, back in October 2009. This was forward thinking at a time when California's major cities were still years from launching their own bikeshare programs: San Francisco, for example, did not begin a bikeshare program until September 2013 and Los Angeles' attempt to launch one is ongoing.⁴¹ For \$40, students at UC-Irvine get an annual membership and ZotWheels card that provides access to the four computerized and networked ZotWheels stations strategically located at high-volume locations throughout campus. Each station accommodates eight to 12 bikes that can be rented on demand and returned to any of the ZotWheels stations. An interactive online map updates bicycle availability at each station in real time, providing

greater convenience to ZotWheels members.⁴² Six months after the rollout of ZotWheels' first 25 bikes, there were as many 49 rentals per day. These took place mostly on weekdays, suggesting that members were using the bicycles as an alternative means of getting to, from and around campus.⁴³

For students who come to campus without a bike of their own, some schools around the country are partnering with urban bikeshare programs in the surrounding community to provide convenient, affordable, on-demand access to bicycles. At the University of Wisconsin–Madison, for example, students can join the city's bikeshare program, B-cycle, at a discounted rate and make use of B-cycle stations on the university campus. Since its launch, Madison's B-cycle has grown quickly in members and popularity: annual memberships rose 356 percent between 2011 and 2012.⁴⁴

After the successful launch of its own bikeshare initiative in 2011, the University of Dayton in Ohio has gone a step further and now provides bikes to some students for free. In the summer of 2013, the university launched a program and advertising campaign asking incoming freshmen to pledge that they would not bring a car to school, at least during their first two years on campus. Of those that signed the pledge cards, 100 were randomly selected to receive a free bike and safety helmet.⁴⁵ Similar bike giveaway programs exist at the University of New England in Biddeford, Maine, and Ripon College in Wisconsin.⁴⁶ Ripon's president told *The New York Times* in 2008 that “We did it as a means of reducing the need for parking.” And in part because of the program, just 25 percent of freshmen brought cars to campus in 2008 compared to 75 percent in 2007.⁴⁷

Nationwide, there are at least 33 campus-based bikeshare programs in the United States.⁴⁸

Close Up: University of Wisconsin–Madison

The University of Wisconsin–Madison (UW-Madison) is a leader in encouraging bicycling among its students, faculty and staff, winning accolades from groups like the League of American Bicyclists.⁴⁹

Over the last decade, part of the university's strategy has been to cap the number of on-campus parking spaces for staff, while severely limiting students' access to on-campus parking for cars.⁵⁰ At the same time, the university has expanded and improved facilities for bicycles, providing bike paths and bike racks, and offering creative on-campus amenities and services that make using a bike more convenient and cost-effective.⁵¹

UW-Madison's University Bicycle Resource Center, located in the middle of campus and staffed by student employees, offers cyclists free use of tools and other supplies needed for tune-ups, as well as free bicycle repair manuals and bicycle maps.⁵² The university also provides plentiful bicycle parking. Free bike racks are located near almost every building on campus and sheltered bike lockers and cages are also available to rent on a semester or annual basis.⁵³ All told, on-campus bike racks have capacity for 12,000 bikes – enough for 28 percent of all UW-Madison students to bike to campus – with plans to expand this by 25 percent over the next four years.⁵⁴

Bicycling has become so central to the UW-Madison experience that it is even a feature of football game days, with bicycle valet parking provided near the university's football stadium. From two hours before until one hour after the game, fans can pull off the bike path that runs near the stadium and have their bikes parked and watched for the duration of the game, free of charge.⁵⁵

By providing an array of resources for those new to biking as well as cycling



UW-Madison provides students with discounted membership in the city's bikeshare program, B-cycle. Photo: Adam P. Fagen, via Flickr.

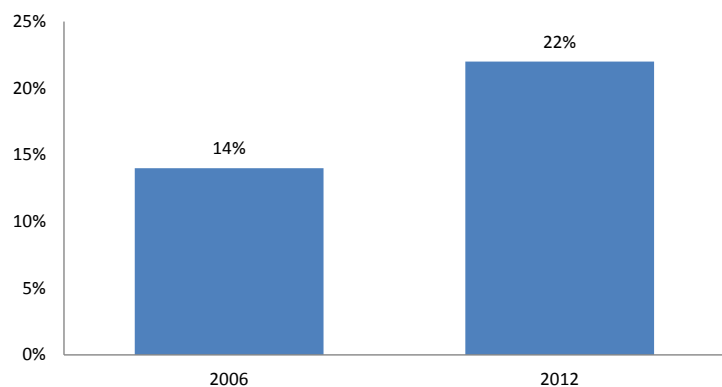
enthusiasts, UW-Madison has made cycling a particularly popular option for students. In good weather, 22 percent of students travel to campus by bike, a figure that has risen in recent years, making biking to class the second most popular choice after walking.⁵⁶ After a decline in the late 1990s and early 2000s, the share of students biking to campus has climbed eight percentage points since 2006.⁵⁷ All told, about 12,000 people bike to campus each day in Madison and just 6.5 percent of students drive alone.⁵⁸

Biking is popular among faculty, staff and the broader community, too. In 2012, 6.2 percent of all Madison commuters biked to work (compared to 0.61 percent nationally), up from 3.2 percent in 2000.⁶⁰ Though these data reflect the commuting behavior of people with and without direct ties to the university, they are indicative of a culture of bicycling that has taken root in the city at large.

Building New Biking and Walking Paths

All forms of transportation require infrastructure. Cars require roads, parking lots, gas stations and maintenance facilities. Public transportation requires roads or rails on which to travel, as well

Figure 3. Share of UW-Madison Students Biking to Campus in Good Weather in 2006 and 2012⁵⁹



Harvard University's Participation in Hubway, Metropolitan Boston's Bikeshare Program: Support the Stations and the System Will Grow

Kris Locke, Associate Director of CommuterChoice, Transportation Demand Management and Sustainability at Harvard University's Transportation Services, acknowledged that there were some challenges that had to be conquered in establishing a bikesharing program at the oldest college in the country. "Like any urban campus there were abandoned bikes clogging the bike stands. Students were only biking a few hours a semester even if they brought their own bikes to school." However, Harvard was seeing a growing interest among students, faculty and staff in the bicycle as a healthy and efficient transportation option, and the university wanted to respond to that demand by providing better connectivity among its three primary campuses and public transit.

Working closely with the cities of Boston and Cambridge, the Metropolitan Area Planning Commission, and Alta Bicycle Share (the company that established the Hubway bikesharing system), Harvard has been able to support the addition of a dozen bikeshare stations that connect residential dorms, academic buildings and the Cambridge, Allston and Longwood Medical Area (LMA) campuses. "The key is investing in enough stations and building a community around cycling. People become members and use the bikes if there are stations where they are or need to go." Harvard hosts annual bicycle breakfasts and safety trainings, and offers all students, faculty and staff a 40 percent discount on annual Hubway memberships. Since the summer of 2013 Harvard has registered over 800 Hubway annual members and that number continues to grow.

Locke is convinced that participation will increase as more stations are added throughout the region.

"As Hubway expands to area communities and the number of stations increases,

more members will join. The more members there are, the more our community will see bicycles and bikeshare as a viable and safe transportation option for traveling to and within our campus. That will in turn attract even more members and spur the building of more stations. We've seen it here at Harvard, and I hope to see it throughout the whole region." Other educational institutions in the area supporting Hubway include Northeastern University, the University of Massachusetts Boston, College of the Fenway and Massachusetts Institute of Technology.⁶¹



The Hubway bikeshare program is increasingly popular at Harvard University. Photo: Benjamin Hammer

as maintenance and storage facilities for buses and trains. Bicycling requires bike racks and safe spaces – either on-street bike lanes or dedicated paths – on which to travel. Walking requires safe and pleasant sidewalks and paths for pedestrians.

In recent years, many universities have invested in improved infrastructure for bicycling and walking – things like bike racks, bike lanes, and pedestrian bridges over busy roadways that run through campus. Good biking and walking facilities send a clear signal that the campus values those modes of transportation, encouraging students and others to get out from the behind the wheel. University investments in biking and walking infrastructure can even encourage the use of those modes by residents of the broader community.

Campus planning that favors bicycle and pedestrian modes of travel includes:

- On-road facilities, such as bicycle lanes and “share the road” signs;
- Off-road infrastructure such as separated bike paths, underpasses, bridges and sidewalk networks; and
- On-campus amenities like bike racks and shelters, bike lockers, and shower facilities.

The University of Arizona was recently recognized for its increasing emphasis on cycling by the League of American Cyclists.⁶² Campus bike racks can currently accommodate 9,699 bicycles – enough for almost one in four students – and the university campus also boasts 178 bike lockers, shower facilities for bicycle commuters and a bike valet program in front of the admissions building at the heart of campus.⁶³ The valet program saw a 75 percent increase in usage between its first and second years of operation.⁶⁴ In 2010, the latest year for which data are available, 20 percent of students who did not live

on campus or in a fraternity or sorority house biked to campus.⁶⁵ According to the latest bicycle and pedestrian plan for the university, campus officials are aiming to further boost this figure, with plans for an incentive program to encourage bicycle commuting, education campaigns on issues of bike safety, and giveaways of bicycle accessories such as headlights to address a lack of equipment among potential bicycle commuters.⁶⁶

Close Up: University of Colorado Boulder

The University of Colorado Boulder (popularly known as “CU-Boulder”) is Colorado’s flagship university and is nationally recognized for its commitment to sustainability. Reducing transportation-related emissions is a major component of the university’s plan to be carbon neutral by 2050.⁶⁷ Complementing the university’s efforts to promote ridesharing and transit use, CU-Boulder has made significant investments in pedestrian and bicycle-friendly infrastructure.⁶⁸

For example, the university partners with city of Boulder to help fund the construction of underpasses allowing pedestrians and cyclists to access campus safely and conveniently without having to cross traffic-heavy streets. Most recently, in 2011, the university contributed \$1.6 million to help construct an underpass on Broadway, a busy thoroughfare through town that borders the core campus.⁶⁹ All told, 24 of the city’s 78 underpasses are within the university’s boundaries, providing pedestrians and cyclists uninterrupted access to campus from the surrounding community’s 58 miles of paved bike and footpaths that avoid crossing busy roadways.⁷⁰

The university has also invested \$300,000 in bike racks to accommodate almost 10,000 bicycles on campus –



Pedestrian and bicycle underpass at Broadway bordering the CU-Boulder campus.

Photo: Raymond Johnson, via Flickr, under Creative Commons license BY-NC-SA.

enough for roughly one-third of students to ride to school.⁷¹ Coupled with the university's investments in city underpasses, these infrastructural improvements provide both the connections to the surrounding city and the campus capacity to support the widespread use of bicycles as a means of getting around. In 2012 approximately 60 percent of all trips made by students at CU-Boulder were by bike or foot, a nearly nine percentage point increase over 1990.⁷²

Ridesharing Initiatives

Ridesharing increasingly harnesses modern technological innovations such as route-mapping software, smartphones and Internet-based social networks to connect drivers and their cars' empty seats with car-free travelers going the same way, for the purpose of sharing a regular commute or a one-time trip. Social media can help build trust among ridesharers thanks to publicly shared reviews of drivers. In the university context, ridesharing reduces vehicle traffic, alleviates demand for on-campus parking and

helps reduce global warming pollution.

Ridesharing has a long history on college campuses, going back to the days when students seeking a ride home for the holidays would post index cards on bulletin boards in student union buildings. Today, some universities manage and operate their own ride-matching databases, but many are collaborating with services that facilitate ridesharing over the web for many campuses, connecting drivers with riders and facilitating payment.⁷³ One of the better known service providers is Zimride. A typical university will pay \$10,000 per year to use the platform, which has been adopted by both occasional student users (those just looking to catch a ride out of town for the weekend) as well as those looking to share their daily commute.⁷⁴ Zimride now has a presence on 130 university and corporate campuses and the company's three most popular commute routes nationwide serve college campuses.⁷⁵ In one six-month period at Cornell University between 2008 and 2009, Zimride facilitated over 4,000 one-time shared trips which the company estimates took 2,000 cars off the road.⁷⁶

Close Up: University of California, Davis

Riding a bike, catching a bus, carpooling and walking are the norm at the University of California, Davis (UC-Davis), where *goClub*, the university's comprehensive transportation program, has been offering incentives to students and staff who avoid driving solo since its launch in 2009.⁷⁷ The club is a feature of UC-Davis' long-standing commitment to environmental sustainability. In order to join the club, commuters must commit to using bikes, trains, buses, carpools, vanpools or walking for a majority of their trips to campus.⁷⁸

The university is famous for its bike culture – nearly 40 percent of students and staff bicycle to class or work – but *goClub* has also supported the use of carpools and vanpools for those who live beyond easy biking distance (especially graduate students and university faculty and employees).⁷⁹ *goCarpool*, one element of the *goClub* program, offers a number of incentives that encourage students (and faculty and staff) to share rides to campus by making it cheap and more convenient, as well as providing alternatives to ensure

that people are not left without easy transportation if rideshare options are not available. These measures include:

- Discounted parking permits (up to 60 percent off regular permit rates for carpools);
- Reserved parking spaces for regular carpools;
- Limited free parking permits for days when sharing a ride is not possible;
- Complimentary ride-matching service;
- Pre-tax payroll deduction for the cost of carpool parking permits for staff and faculty,
- Emergency ride home service (if a student or employee needs to leave campus suddenly before their scheduled carpool, the university will pay for a taxi);
- One complimentary rental car voucher per quarter;⁸⁰ and
- Automatic entry into prize drawings for restaurant gift cards, and other discounts and rewards provided by local sponsors.⁸¹



UC-Davis promotes its carpool program online.

goVanpool is a similar employee-focused initiative within the *goClub* program, that additionally offers commuters the use of a van.⁸²

Carpooling is the second-most popular commuting option for those getting to campus from outside of the city.⁸³ On an average weekday in 2012 roughly 11 percent of undergraduate students living outside of Davis shared a ride to campus. This figure climbs to approximately 17 percent among graduate students. Counting both students who live in Davis and those who live outside the city, the share of UC-Davis graduate students who carpool to campus has risen from 3.4 percent in the 2007-2008 academic year to 6.9 percent in 2011-2012.⁸⁴

A significant share of UC-Davis employees also carpool. In the 2011-2012 academic year, approximately 17 percent

of employees commuting from outside of the city carpooled or vanpooled to work on an average weekday. The overall share of faculty, regardless of where they live, carpooling to campus has risen from 6.7 percent in the 2007-2008 academic year to 8.9 percent in 2011-2012; among non-academic staff, the figure has jumped from 10.1 percent to 12.6 percent.⁸⁵

Carsharing Services

Universities and colleges partner with companies that provide students (and staff) with discounted membership in carsharing services, well-known examples of which include Zipcar and Enterprise (though several other companies offer similar services). Carsharing enables subscribers to access cars located nearby, providing participants with the mobility benefits of access to a car without having to bear the burden of owning one. Campus planners are keen on carsharing programs because they reduce demand for on-campus parking and alleviate congestion.⁸⁶ Research also indicates that people who participate in carsharing are likely to drive less, less likely to purchase a personal vehicle or continue owning an existing one, and more likely to use other modes of travel more.⁸⁷ Enterprise's campus-based carsharing program alone currently serves 82 universities and colleges across the country and Zipcar boasts a presence on more than 300 campuses across North America.⁸⁸

The best college-sponsored carsharing programs require only a simple online application process, provide discounted membership, and offer convenient, self-service access to cars at rates that include gas and insurance, two of the most expensive recurring costs associated with car ownership.

The Massachusetts Institute of Technology (MIT) is one campus that has



Shared vehicles, like this Zipcar parked at Arizona State University's campus in Tempe, Arizona, are available for students and staff to rent at hundreds of colleges and universities in the United States. Photo: ASU Enrolment Marketing & Communications, via Flickr.

encouraged carsharing on its campus. High property values that make the construction of additional parking lots prohibitively expensive have pushed MIT to discourage its students and staff from commuting to campus by car. Zipcar's on-campus fleet of 20 cars is a key component of the school's strategy, and more than half of the student body – about 5,500 students – as well as approximately 300 staff members have a Zipcar account. MIT credits Zipcar with helping students forgo the temptation to bring cars to campus and sees shared vehicles as a way to limit the need for academic departments to keep their own cars on campus for business purposes.⁸⁹

Distance Learning and Online Resources

American college students are increasingly taking advantage of distance learning and other online resources to limit the need to physically travel to campus. Distance learning – taking classes with at least some online content such as live-streaming lectures – means students can attend class anywhere they have an Internet connection, while electronic copies of reading materials and digital repositories like JSTOR save students a trip to the library.

Many university transportation departments do not yet consider these technologies part of their transportation management strategies, but this is beginning to change. School officials are recognizing that distance learning is an extension of the more long-standing practice of telecommuting – a work arrangement that offers staff the flexibility to work from home at least part of the time, easing congestion on roads.⁹⁰ A recent study tied distance learning to reductions in campus greenhouse gas emissions, showing that online education – by taking cars off the road – is gaining

recognition as a means of achieving environmental goals.⁹¹

Commuter schools are likely to see the greatest reductions in driving due to distance learning and are the institutions that most commonly include distance learning in their approaches to transportation challenges. At Portland Community College's Cascade Campus, for instance, distance learning is a component of the school's transportation demand management strategy and the school is actively working to increase the proportion of students that “commute” to class using web-based technologies.⁹² By 2021, the Cascade Campus aims to increase the proportion of students attending campus via distance learning to 4 percent, a one point increase over the 2011 baseline.⁹³ Across all three of the college's campuses, the school aims to increase the share of students using technology to commute to class to 8 percent.⁹⁴

At Madison Area Technical College in Madison, Wisconsin, distance learning is also a core part of the school's transportation plan. Madison College is hoping to reduce the number of commuters physically attending its campuses by maximizing distance learning opportunities. Madison College hopes that with video conference technology, instructors will be able to teach students on several campuses concurrently, eliminating the need for many to commute to the central campus at all. In 2010 the school projected that with up to 108 classes each week incorporating this technology, as many 3,240 students would not have to travel to the core campus for instruction.⁹⁵

Why Colleges and Universities Matter: Implications for Transportation Policy

“Of the 30 places in the United States where bicycle commuting is most common, the large majority are college towns.”

Colleges and universities can be major sources of transportation demand in their host communities. By reducing the number of trips students and staff take by automobile, colleges can reduce congestion, improve the efficiency of the transportation system, and improve quality of life in university communities. But the steps colleges take to reduce driving can also have ripple effects that extend far off campus – enhancing the transportation options available to members of the broader community, setting an example for effective transportation planning that can be adopted by other large institutions and municipalities, and instilling transportation habits in college students that some will take with them into their lives after college.

College Transportation Investments Can Expand Options for Nearby Communities

Investments in expanded transportation options for campus commuters can also expand the transportation options available to other local residents. This is because many of the investments described in this report are investments in public goods – transit services, bike lanes, footpaths and so on – that everyone can enjoy and benefit from. Universities can also anchor new initiatives that will subsequently benefit from economies of scale as they further involve the surrounding community.

For example, when the University of North Carolina partnered with the town of Chapel Hill to provide fare-free local transit, local bus ridership soared in response. Similarly, when colleges invest in U-Pass programs they can supply a steady source of revenue for the local transit agency, allowing it to provide better service, keep fares down for all riders, and boost ridership.

The same pattern is evident when universities offer discounted membership in local bikesharing and carsharing systems. By providing a steady source of demand from students, colleges support a service that is available to the whole community. This could be especially important in college towns that may otherwise be too small to profitably support a bikesharing or carsharing scheme that, nonetheless, would benefit local residents.

Many schools also work with local authorities to provide bike lanes, better signage and public service announcements that make it safer and more desirable for cyclists to share the road with automobiles. Though the aim is to encourage students, faculty and staff to bike to campus, the improvements in infrastructure make it more desirable for any community member to ride their bike and foster a city-wide culture of bicycling. In fact, of the 30 places in the United States where bicycle commuting is most common, the large majority are college towns – places that have invested in making biking around town safe and easy.⁹⁶

College Transportation Plans Provide an Example That Can Be Followed by Others

The transportation challenges faced by colleges and universities are not unique. Other major institutions and local communities struggle with chal-

lenges brought about by overreliance on single-occupancy vehicles, such as traffic congestion, the loss of land to vehicle storage, and diminished air quality and overall quality of life. By harnessing a variety of tools as part of a comprehensive plan to reduce vehicle travel, colleges and universities provide powerful examples of individual strategies and can act as a proving ground for other communities that might otherwise doubt that ambitious new initiatives can make a difference.

College Students Develop Transportation Habits That Stay with Them after Graduation

Years spent in college are particularly formative ones and academic research tells us that student experiences shape long-lasting lifestyle habits and values. For example, undergraduates who participate in community service activities are more likely than their peers to continue participating in community organizations and service after graduation.⁹⁷ Similarly, students with physical education requirements in college have more positive exercise attitudes and behaviors in the working world.⁹⁸ Tobacco companies have long been accused of targeting young people precisely because those who do not start smoking as teens are less likely to do so later in life, and because the earlier people start smoking, the more difficult they find it to quit down the line.⁹⁹

The same appears to be true of transportation habits. At the University of Florida (UF), for example, students ride local buses for free and transit is a popular means of getting around: 51 percent of undergraduate students and 47 percent of graduate students ride the bus to campus.¹⁰⁰ A survey of both incoming

freshmen and alumni asked respondents if they ever used transit in their home cities, defined as where freshmen attended high school and where alumni lived at the time of the study. While a large majority of incoming freshmen – 82 percent – never used transit in their home cities, the proportion of UF graduates never using transit in their new, post-college homes was 18 points lower, at 64 percent.¹⁰¹ The experience of living at UF seems to have shifted transportation preferences for the longer term.

Similar results were found in a survey at North Dakota State University. Just 33 percent of incoming freshmen there report ever having used a transit bus in the past. But after studying at a school where four in 10 students use buses at least occasionally, two-thirds of graduating seniors reported that they planned to use transit buses occasionally or regularly in their lives after college.¹⁰²

Overall, college graduates demonstrate a proclivity for car-free or car-light living. Those with a college degree or higher are more likely than average to use public transit.¹⁰³ The preference for transit among college graduates also leads them to vote with their feet. According to one study, the construction of a “walk and ride” subway station (as opposed to one primarily accessed by car) in a neighbor-

hood with income and population density above the metropolitan area median increases the neighborhood’s share of college graduates by approximately 5 percentage points, relative to the population breakdown before the station was built.¹⁰⁴

Whether they plan to use transit to get around or intend to make the most of other transportation options, many of America’s graduates plan to take their first steps into the world after college without an automobile. According to a recent poll conducted by carsharing company Zipcar, approximately half (49 percent) of the class of 2013 did not plan to bring a car with them to their next endeavor after graduation.¹⁰⁵

For many students, living in a college town is their first experience of a lifestyle in which owning a car is not necessary or, in some cases, even desirable. For many students, the difference may simply be experiencing that driving need not always be the default option, or that there could be convenient, cost-effective alternatives to owning a personal car. As colleges and universities continue to develop campuses where multiple options exist for meeting transportation needs, they will foster more and more students who look for those options when they enter the working world.

Policy Recommendations

Transportation infrastructure lasts for decades. From transit systems to roads and bridges, transportation investments represent large financial commitments, both in terms of up-front capital costs and ongoing maintenance obligations. With such high stakes, it is no wonder that decision-makers seek policies and models with a proven track record of success. As this report shows, a wide range of universities and colleges have been implementing such policies to reduce driving over the last 20 years, providing valuable examples for public officials across the country.

These policies are also contributing to shifting transportation preferences that public officials need to contend with. Young college graduates are now increasingly leaving college campuses and arriving in the “real world” with the

experience of having used public transportation, having taken part in a carsharing service, or having used bicycles as a primary form of transportation. Many of those students – especially those leaving school with the heavy financial burden of student loans – may look for opportunities to continue their use of non-driving forms of transportation after graduation.

Policymakers – especially at the local level – are coming to recognize that the Millennial generation is seeking to live in areas with affordable and convenient transit; plentiful opportunities to walk and bike; and accessible, shared cars for when driving makes the most sense. Millennials have led the national shift away from driving, and toward increased use of other travel modes. They also increasingly articulate a desire to live in places that do not require a personal car for day-

to-day life. Policymakers should understand that Millennials are both the largest generation in the country and the group that will inherit and live with the transportation infrastructure we support and built today. Policy leaders should adapt to the needs and desires of the Millennial generation by reducing expenditures on unnecessary new highways and instead devote resources toward expanding access to the non-driving modes of travel that Americans, especially young people, increasingly desire.

The immediate lessons for policymakers can be summed up in terms of forging campus-community partnerships and drawing on the success stories of universities and colleges across the country in order to prepare our transportation infrastructure to meet the demands of the future, which will be strongly influenced by the preferences and behaviors of the country's largest and youngest generation – the Millennials.

Encourage Campus-Community Partnerships to Expand Transportation Options

Following the lead of schools like those discussed in this report, campuses and communities should work together where possible to expand transportation options in their cities and towns. Campus-community partnerships allow stakeholders to pool resources and can deliver benefits for a wider population. University and public officials should work together to:

- **Establish U-Pass programs or fare-free transit.** Universal transit passes give students, faculty and staff unlimited access to local transit, while going fare-free extends these benefits to all community members and eases administration and transit

boarding.¹⁰⁶ In both instances, local transit agencies benefit from a reliable source of funding while the entire community sees increased ridership on local buses and trains from students and others, reducing traffic congestion and parking problems.

- **Provide additional transit services.** Universities can encourage and provide funding for additional service frequency and longer schedules at local transit agencies, or even the establishment of entirely new routes. Until August 2013, Arlington, Texas, was the largest city in the United States without any form of transit service, but collaboration between the city and the University of Texas at Arlington (plus a handful of other stakeholders, including local businesses) led to the launch of a two-year pilot program offering limited bus service in the city for the first time.¹⁰⁷ Campuses can also foot the bill for new or refurbished stations or bus stops near campus, or for new amenities such as location tracking of transit vehicles and on-board Wi-Fi. Such investments can have a big impact. At the University of Tennessee, for example, the provision of USB charging stations on board campus buses and the roll-out of a bus tracking mobile app are being credited, in part, with boosting ridership by 55 percent in a one year period.¹⁰⁸
- **Construct pedestrian and bicycle-friendly infrastructure.** Installing bike lanes, “share the road” signage, dedicated bike- and footpaths, and underpasses at busy streets or intersections can make cycling and walking more attractive, while also connecting campus to surrounding neighborhoods in a way that encour-

ages more bike and foot travel. To maximize benefits, universities and the surrounding communities should establish consistent, shared standards for the infrastructure they build so that all new roads have bike lanes and signage even if they are farther from campus. Universities may provide funding to support construction.

- **Support community bikesharing, ridesharing and carsharing systems.** Universities and colleges can support local bikesharing and carsharing programs by offering students, faculty and staff discounted memberships or placing bike and car stations on campus. Similarly, universities can support and integrate the information infrastructure required for mobile app-based and online ridesharing.

Use Lessons Learned on Campus to Address Transportation Challenges Elsewhere

Colleges and university campuses are like small cities unto themselves and can learn from the successes of universities in encouraging non-automotive travel beyond the university. Like campuses, cities should adopt comprehensive transportation plans designed to achieve specific objectives such as preserving the beauty and character of the campus, reducing expenses for parking infrastructure, reducing congestion, and protecting the environment.

Policymakers at the local, regional, state and federal levels should follow the example of colleges and universities by providing adequate support for non-driving modes of transportation. They should:

- **Establish tangible, short- and long-term goals** for increases in the use of non-driving modes of transportation. By setting these goals, cities, towns and large institutions will have a framework for measuring success. Benchmarking allows educational and other institutions to strive for greater progress, emboldening new initiatives by seeing what has been possible elsewhere and fostering healthy competition among communities striving to be leaders in these areas. Washington State's Commute Trip Reduction Program is an important model of this. Working with employers and local governments to set local goals and strategies to reduce traffic congestion and air pollution, the program now has more than 530,000 participating commuters and has helped those commuters avoid 154 million vehicle miles in driving since 2007.¹⁰⁹ Elsewhere, the Massachusetts Rideshare Program (MRP) is setting out to achieve similar success but has yet to reach its potential. This program requires employers with over 1,000 employees and universities with over 1,000 commuting students and faculty to collect data on commuting habits. After filing a base-year report, these institutions must then demonstrate progress toward a 25 percent reduction in drive-alone commuting trips.¹¹⁰ While the program lacks strong measures to ensure implementation, it nonetheless represents a model for statewide benchmarking that provides a framework for measuring progress toward transportation policy goals.

- **Improve public transportation,** with increased service frequency, extended service hours, creation of new bus routes or rail lines in underserved areas, and expansion of novel pricing options, such as discounted transit passes modeled on the popular U-Pass system or fare-free service. An innovative example is the transit system in Corvallis, Oregon, which went fare-free in 2011. The program is funded with a “Transit Operations Fee,” which in the first year cost \$3.80 per month per residence, paid as a surcharge on family utility bills. The program led to a 38 percent increase in ridership in its first year and bus boarding times dipped substantially.¹¹¹
- **Improve bicycling and walking infrastructure.** Like universities, local officials should expand investment in infrastructure that makes walking and bicycling safer and more appealing. Examples include the construction of bike lanes and dedicated bike paths; expansion of bikesharing services; and ample provision of bike racks. Policymakers should also integrate transportation modes to encourage the use of different options under different circumstances, such as by placing bike racks on buses, locating bikesharing and carsharing facilities adjacent to transit stops, and making transit passes for one service usable on others.
- **Integrate information technology.** Public officials should take steps to unlock the potential of technology-enabled transportation services to provide more and better transportation choices, in part by making real-time transit information available to the developer community for the creation of mobile apps. Americans are making increasing use of Internet-connected mobile devices such as smartphones, which can be used to improve an individual’s travel experience in a variety of ways. From onboard Wi-Fi to real-time transit tracking and ridesharing apps, the latest technological advances can make it easier and more convenient to make use of multiple modes of transportation as circumstances change.
- **Adjust incentive structures.** One factor in universities’ success in reducing driving has been their aggressive use of a variety of incentives to make the use of non-driving modes cheaper and more convenient than owning and using a car. Successful campus programs like UC-Davis’ *goClub* are an example of how universities have created incentive structures that actively reward participants for using transportation alternatives. Local government employers should lead by example and establish similar incentive structures for their employees.
- **Support telecommuting.** Decision-makers should support efforts to reduce congestion by encouraging work from locations outside a central office. Government agencies can lead the way by promoting alternative working arrangements and schedules, and can provide technical assistance and guidance for companies that seek to embrace telecommuting. The state of Washington’s Commute Trip Reduction Law, for example, requires certain large employers to reduce the number of miles driven by their staff while Virginia uses the Telework Tax Credit to promote telecommuting at private employers.¹¹²

- **Support carsharing and ridesharing.** Governments should consider establishing their own on-demand ridesharing services in areas where they can deliver a net benefit for the public, but the potential for near-term profit is insufficient to spur private investment in a program. Additionally, governments should seek to break down barriers that limit participation in carsharing and ridesharing services, which are often designed on the assumption that users have a credit card or bank account, and access to the Internet. Working with local communities, policymakers should aim to develop novel approaches to expand access to carsharing and ridesharing services in places where economic, physical or other barriers would otherwise prevent it.
- **Reassess automobile-oriented planning and zoning rules.** University programs to reduce driving emerge in part from a desire to preserve the beauty and functionality of college campuses and maximize the use of available land for produc-

tive purposes. Unfortunately, many municipalities still maintain planning and zoning policies that make the kind of walkable communities that are such prized characteristics of college towns difficult or impossible to create. For example, developments are often required to provide a minimum number of parking spaces either in large parking garages or surface lots. Such facilities disrupt the aesthetics and functionality of the neighborhood in which they are situated, making it both less pleasant and less convenient to walk or bike through the area. These drawbacks are even more pronounced when large parking structures or lots are constructed in a city's downtown core where density supports walkable neighborhoods and districts that can be a draw for retail and dining establishments. In addition to reassessing planning rules, municipalities should look again at zoning rules and consider how to lift barriers to the sensible, multi-purpose development of towns where alternatives to driving alone are a viable option.

Appendix: List of Colleges and Universities with U-Pass, Transit Discount or Fare-Free Transit Programs in the United States.¹¹³

U-Pass or Fare-Free Transit Programs	
Alaska Pacific University	Roger Williams University
Appalachian State University	Salve Regina University
Arizona State University	San Jose State University
Boise State University	Seattle Pacific University
Brown University	Skidmore College
Bryant & Stratton College	St. Ambrose University
Buffalo State College	St. Cloud State University
California Polytechnic State University	St. Thomas University
California State University, Fullerton	The College of Saint Scholastica
California State University, Monterey Bay	The Ohio State University
Case Western Reserve University	University at Albany
Central New Mexico Community College	University of Alaska Anchorage
Champlain College	University of California, Berkeley
Charter College	University of California, Irvine
City Colleges of Chicago, Kennedy-King College	University of California, Riverside
Clemson University	University of California, San Diego
Cleveland Institute of Art	University of California, Santa Barbara
Cleveland Institute of Music	University of California, Santa Cruz
Cleveland State University	University of Colorado Boulder
Colorado School of Mines	University of Denver
Colorado State University	University of Florida
Columbia College Chicago	University of Illinois at Chicago
Cornell University	University of Kansas
DePaul University	University of Mary Washington
Edmonds Community College	University of Michigan
Erie Community College	University of Minnesota, Duluth
Humboldt State University	University of Minnesota, Twin Cities
Illinois Institute of Technology	University of Nebraska - Lincoln
Indiana University Bloomington	University of New Hampshire
Indiana University-Purdue University Indianapolis	University of North Carolina at Chapel Hill
Ithaca College	University of North Carolina, Greensboro
Jacksonville State University	University of North Carolina, Wilmington
Johnson & Wales University	University of Oregon
Lake Superior College	University of Pittsburgh

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U-Pass or Fare-Free Transit Programs	
Lane Community College	University of South Florida
Los Medanos College	University of Texas at Austin
Los Rios Community College District Office	University of Utah
Marquette University	University of Vermont
Meredith College	University of Wisconsin-Eau Claire
Naropa University	University of Wisconsin-Green Bay
North Carolina State University	University of Wisconsin-La Crosse
Northern Kentucky University	University of Wisconsin-Madison
Northwestern University	University of Wisconsin-Milwaukee
Old Dominion University	University of Wisconsin-Oshkosh
Pennsylvania State University	University of Wisconsin-Stevens Point
Peralta Community Colleges District Office	University of Wisconsin-Superior
Purdue University	Vanderbilt University
Rensselaer Polytechnic Institute	Washington University in St. Louis
Rio Hondo College	Western Washington University
Robert Morris University	Westminster College
Rocky Mountain College of Art + Design	
Transit Pass Discount Programs	
Argosy University (Honolulu)	University of Hawaii - West Oahu
Chaminade University of Honolulu	University of Hawaii at Manoa
Cleveland State University	University of Hawaii Honolulu Community College
Cornell University	University of Hawaii Kapiolani Community College
Edmonds Community College	University of Hawaii Leeward Community College
Hawaii Medical College	University of Hawaii Windward Community College
Hawaii Tokai International College	University of Iowa
Heald College, Honolulu	University of Minnesota, Twin Cities
Massachusetts Institute of Technology	University of Missouri, Kansas City
Med-Assist School of Hawaii	University of South Florida
Old Dominion University	University of Tennessee at Knoxville
Pennsylvania State University	University of Washington, Bothell
Remington College-Honolulu Campus	University of Washington, Seattle
Roger Williams University	University of Washington, Tacoma
The University of Arizona	University of Wisconsin-La Crosse
The University of New Mexico	Utah Valley University
University of California, Berkeley	Western Washington University
University of California, Riverside	
University of California, Santa Barbara	

Notes

1. Construction of new parking facilities: Gennady Sheyner, “Council Members Take Aim at Solo Drivers,” *Palo Alto Weekly*, 13 September 2013; tens of millions of dollars: Victoria Transport Policy Institute, *Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications*, January 2009, 5.4-17.
2. City of Palo Alto Colleagues Memo, *Palo Alto Traffic Demand Management Plan*, 16 September 2013.
3. Reduction in solo drivers at Stanford: See note 1, “Gennady Sheyner;” Stanford is estimated to have saved approximately \$100 million dollars in new parking structure costs: Angie Schmitt, “Transport U: Stanford Turns Green Commuting into Greenbacks,” *DC.Streetsblog.org*, 17 April 2013.
4. National Association of Realtors, American Strategies and Myers Research | Strategic Services, LLC, *National Community Preference Survey*, October 2013.
5. PricewaterhouseCoopers and the Urban Land Institute, *Emerging Trends in Real Estate 2013* (Washington, D.C.: PricewaterhouseCoopers and the Urban Land Institute, 2012).
6. Based on 10,300 miles driven per capita in 2001 and 7,900 miles driven per capita in 2009, derived by dividing the total vehicle miles traveled by the total number of persons age 16-34 for 2001 and 2009, per the Federal Highway Administration, *National Household Travel Survey*, downloaded from nhts.ornl.gov/det, 14 October 2013.
7. Findings derived by dividing the number of transit miles travelled and the number of bicycle and pedestrian trips taken in 2009 by the corresponding number in 2001 for 16-to-34-year-olds using data from the Federal Highway Administration, *National Household Travel Survey*, downloaded from nhts.ornl.gov/det, 14 October 2013.
8. Will Toor and Spenser W. Havlick, *Transportation and Sustainable Campus Communities: Issues, Examples, Solutions* (Washington, D.C.: Island Press, 2004), 3.
9. Josh Cantor, Director, Parking and Transportation, George Mason University, personal communication, 3 January 2014.
10. Victoria Transport Policy Institute, *Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications*, January 2009, 5.4-10.
11. Adina Levin, “Stanford Has Avoided \$100,000,000 in Parking Structures over the Last Decade,” *peninsulatransportation.org*, 2 September 2013.
12. American College and University Presidents’ Climate Commitment, *Implementation Guide, Version 2.1 – 2012*, 2012.
13. LSC Transportation Consultants, Inc. and ALTA Planning + Design, *CU-Boulder Transportation Master Plan*, September 2011, 1-1.
14. “WAVE Tech. to Deploy First Commercial Electric Bus at U. of Utah,” *Metro Magazine*, 14 November 2013.
15. Harvard University, *2012 Town Gown Report for the City of Cambridge*, 2012.
16. Michael Sivak and Brandon Schoettle, “Update: Percentage of Young Persons with a Driver’s License Continues to Drop,” *Traffic Injury Prevention* 13 (4): 341, 20 July 2012.

17. Benjamin Davis and Tony Dutzik, Frontier Group, and Phineas Baxandall, U.S. PIRG Education Fund, *Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation Policy*, April 2012.

18. See note 8, 2-3.

19. Carlos J.L. Balsas, "Sustainable Transportation Planning on College Campuses," *Transport Policy* 10 (1): 35-49, January 2003, doi: 10.1016.

20. The Association for the Advancement of Sustainability in Higher Education, *Universal Access Transit Passes*, downloaded from www.aashe.org/resources, 14 October 2013. Note that this source inaccurately reports the University of Missouri-Kansas City's (UMKC) bus pass program as a discount program. In fact, UMKC operates a U-Pass program for its students (see note 22).

21. Ibid.

22. Kansas City Area Transportation Authority, *U-Pass Program Wins Sustainability Award*, downloaded from www.kcata.org/news, 14 October 2013.

23. Boston University Parking & Transportation Services, *The B.U.S.*, downloaded from www.bu.edu/thebus, 14 October 2013.

24. Amy Laskowski, "BU on the iPhone," *BU Today*, 29 September 2010.

25. University of Massachusetts Amherst, *Transit Services: PVRTA Buses*, downloaded from www.umass.edu/transit, 4 December 2013.

26. Massachusetts Department of Transportation, *RTA Profile: Pioneer Valley Transit*, downloaded from www.massdot.state.ma.us/planning, 4 December 2013. Note that Massachusetts' largest transit authority by ridership is the Massachusetts Bay Transit Authority (MBTA), operating in the Boston

metropolitan area. The MBTA is a *metropolitan* agency rather than a regional transit authority like the PVRTA.

27. Berkeley VCAF – Business and Administrative Services, *Night Safety Services*, downloaded from www.nightsafety.berkeley.edu, 14 October 2013.

28. "Student-designed Vandy Vans App Now Available on iTunes," *insidevandy.com*, 13 December 2013.

29. Square footage: The University of North Carolina at Chapel Hill, *2011 Campus Sustainability Report*, 2011, 5; student population numbers: The University of North Carolina at Chapel Hill, Office of the University Registrar, *Reports*, downloaded from www.registrar.unc.edu/reports, 14 October 2013.

30. Bergen C. Watterson, Master's Thesis at The University of North Carolina at Chapel Hill, *Transportation Demand Management on UNC's Campus: Evaluation, Best Practices and Recommendations for Reducing Single-Occupancy Vehicle Use*, 2011, 15-16.

31. Ibid.

32. GoTriangle, *Go Local: UNC*, downloaded from www.gotriangle.org/go-local, 14 October 2013.

33. Town of Chapel Hill, *Transit Fund: Major Revenue Sources – Descriptions and Estimates*, n.d., p. 181. Note: though the document is undated, it cites budget figures for Fiscal Year 2012.

34. Eric Jaffe, "How Free Transit Works in the United States," *The Atlantic Cities*, 6 March 2013; *ibid.*

35. 1997 data: see note 30, 16; 2011 data: The College Sustainability Report Card, *Report Card 2011: University of North Carolina at Chapel Hill*, downloaded from www.greenreportcard.org/report-card-2011, 4 December 2013.

36. VHB Engineering NC, P.C., *Eubanks Road Park-and-Ride Expansion Feasibility Study*, Chapel Hill, North Carolina, January 2013, 4.
37. 2001 ridership: National Transit Database, *Chapel Hill Transit*, 2001; 2011 ridership: National Transit Database, *Chapel Hill Transit*, 2011.
38. U.S. Conference of Mayors, *U.S. Conference of Mayors Announce 2009 City Livability Award Winners*, downloaded from www.us-mayors.org/content/2009/, 18 October 2013.
39. See note 19.
40. Sam Corbett, Joe Gilpin, and Rory Renfro, "Best Practices in Campus Bicycle Planning and Program Development," *Perspectives in Planning*, 1(1): 1-8, 2012.
41. San Francisco's bikeshare program: Mary Forgione, "California: Bay Area Kicks Off New Bike-Share Program," *Los Angeles Times*, 2 September 2013; Los Angeles efforts ongoing: Laura J. Nelson, "L.A. Bike-Sharing Program Hits a Snag," *Los Angeles Times*, 26 June 2013.
42. University of California, Irvine, Transportation and Distribution Services, *ZotWheels: Automated Self-Service Bikeshare System*, downloaded from www.parking.uci.edu/zotwheels, 14 October 2013.
43. The Association for the Advancement of Sustainability in Higher Education, *Implementation of ZotWheels Automated Bikeshare at the University of California, Irvine*, downloaded from www.aashe.org/resources/case-studies, 14 October 2013.
44. Madison B-Cycle, *Trek: Welcome Spring with Today's Madison B-Cycle Launch* (press release), 20 March 2013; University of Wisconsin-Madison, Transportation Services, *Bike Sharing*, downloaded from www.transportation.wisc.edu/transportation, 14 October 2013.
45. Stuart Elliott, "Never Mind Citi Bike, Here's Campus Bike," *The New York Times*, 26 August 2013.
46. Keith Zezima, "With Free Bikes, Challenging Car Culture on Campus," *The New York Times*, 9 October 2008.
47. Ibid.
48. Micheline Maynard, "What's Big with the College Kids? Bike Sharing," *Forbes*, 30 July 2013.
49. Dennis Chaptman, "UW-Madison Recognized as a Bicycle-Friendly Campus," *University of Wisconsin-Madison News*, 6 April 2009.
50. Chuck Strawser, Pedestrian and Bicycle Transportation Planner, University of Wisconsin in Madison, personal communication, 26 August 2013.
51. University of Wisconsin-Madison, *Campus Master Plan 2005*, 2005, 14.
52. University of Wisconsin-Madison, Transportation Services, *University Bicycle Resource Center*, downloaded from www.transportation.wisc.edu/transportation, 14 October 2013.
53. University of Wisconsin-Madison, Transportation Services, *Free Bicycle Parking*, downloaded from www.transportation.wisc.edu/transportation, 14 October 2013.
54. Chuck Strawser, Pedestrian and Bicycle Transportation Planner, University of Wisconsin-Madison, Transportation Services, personal communication, 26 August 2013; 28 percent of all students based on student population of approx. 42,000 per University of Wisconsin-Madison, *Facts*, downloaded from www.wisc.edu/about, 14 October 2013.
55. "Cheering for the Football Badgers Just Got a Lot Easier," *UWBadgers.com*, 6 August 2012.

56. University of Wisconsin-Madison, Transportation Services, *2012 Biennial Transportation Survey Report*, 26 March 2013. Note: in bad weather, students continue to stay away from cars, but tend to leave their bikes at home in favor of the bus.

57. 2006 baseline figure: University of Wisconsin-Madison Transportation Services, *Fall 2010 UW Transportation Survey: Survey Report* (draft), December 2010. Note that between the 2007 and 2010 iterations of this survey (there were none in the intervening years) the university switched the survey format from paper to online. In addition, administration of the survey changed hands from the university's Survey Center to the Transportation Services department. We cannot rule out that these changes may have had some impact on the composition and biases of the sample population which may influence the results to some degree.

58. 12,000 bicyclists to campus each day: Tom Held, "UW-Madison Earns Silver in Bicycle Friendly University Rankings," *Milwaukee Journal-Sentinel*, 11 March 2011; share of students driving alone: University of Wisconsin-Madison, Transportation Services, *2012 Biennial Transportation Survey Report*, 26 March 2013.

59. 2006 figure: University of Wisconsin-Madison, Transportation Services, *Fall 2010 UW Transportation Survey: Survey Report* (draft), December 2010; 2012 figure: University of Wisconsin-Madison, Transportation Services, *2012 Biennial Transportation Survey Report*, 26 March 2013.

60. 2012 data: United States Census Bureau, *2012 American Community Survey*, downloaded from www.census.gov/acs, 14 October 2013; 2000 data: Federal Highway Administration, Census Transportation Planning Products, *2000-2010: Changes in Transit, Walk and Bike Commute Shares*, downloaded from www.fhwa.dot.gov/planning/, 14 October 2013.

61. Information for this text box was gathered via personal communication with Kris Locke, Associate Director, Commuter-Choice, Transportation Demand Management and Sustainability, Harvard University Transportation Services, 16 January 2014.

62. The University of Arizona received a silver award in the League of American Cyclists' annual recognition of Bicycle Friendly Universities, per the League of American Cyclists, *Current Bicycle Friendly Universities: Spring 2013*, Spring 2013.

63. Proportion of students based on a student population of approximately 40,000 per the University of Arizona, *Fact Book*, downloaded from www.factbook.arizona.edu/2012-2013, 16 October 2013; number of bike parking spaces, lockers and valet program: Alta Planning + Design and Kimley-Horn and Associates, Inc., *University of Arizona Area Bicycle and Pedestrian Plan: Final Plan*, August 2012.

64. Ibid., "Alta Planning + Design and Kimley-Horn and Associates, Inc."

65. The University of Arizona, *Commuter Student Survey*, n.d. Note: though the published document was undated, it reported that the survey itself was conducted in April and May of 2010.

66. See note 63, "Alta Planning + Design and Kimley-Horn and Associates, Inc."

67. LSC Transportation Consultants, Inc. and ALTA Planning + Design, *CU-Boulder Transportation Master Plan*, September 2011.

68. Ibid., 2-5.

69. Heath Urie, "Boulder's Broadway Underpass Project to Begin Wednesday," *Daily Camera*, 14 November 2011.

70. 24 underpasses within campus boundaries: see note 67, 2-8; 58 miles of paved pathways in the city: City of Boulder Trans-

portation Division, *Transportation to Sustain a Community: A Report on Progress*, February 2012, 14.

71. University of Colorado Boulder Parking and Transportation Services, *2010 Annual Report*, 2010.

72. National Research Center, Inc., *Modal Shift in the Boulder Valley, 1990-2012*, January 2013, 16.

73. For an extensive list of ridesharing service providers, see National Center for Transit Research at the Center for Urban Transportation Research at the University of South Florida, *Ridematching Software*, downloaded from www.nctr.usf.edu/programs, 8 January 2014.

74. Bloomberg Businessweek, *2009 Finalists: America's Best Young Entrepreneurs: Zimride*, downloaded from www.images.businessweek.com, 14 October 2013.

75. Zimride, *American Road Trip (and Commute) Reborn with Zimride*, 2 July 2011, downloaded from www.zimride.com/blog, 14 October 2013; Jon LeSage, "Enterprise Adds Zimride Ridesharing to 'Total Transportation Solution,'" *Autoblog.com*, 15 July 2013.

76. Stephanie Schomer, "Zimride: Carpooling for College Students," *Fast Company* (151), December 2010/January 2011; cars off the road: Colin Sullivan, "Startup Bets That Social Networking Will Spur Carpool Craze," *The New York Times*, 29 July 2009.

77. Dave Jones, "Great Green Leap Forward in Campus Commuting," *UC Davis News and Information*, 25 September 2009, downloaded from www.dateline.ucdavis.edu, 14 October 2013.

78. University of California, Davis, Sustainable 2nd Century, *Campus Progress: Transportation*, downloaded from www.ucdavis.edu/progress, 14 October 2013.

79. Forty percent of commuters ride bicycles to campus: University of California, Davis, Sustainable 2nd Century, *Campus Progress: Transportation*, downloaded from www.ucdavis.edu/progress, 14 October 2013.

80. University of California, Davis, Transportation and Parking Services, *goClub General Guidelines*, downloaded from www.goclub.ucdavis.edu/guidelines, 14 October 2013.

81. goCarpool incentives: University of California, Davis, Transportation and Parking Services, *goCarpool!* downloaded from www.goclub.ucdavis.edu/carpool, 14 October 2013; prizes: University of California, Davis, Transportation and Parking Services, *Prize Drawings*, downloaded from <http://goclub.ucdavis.edu/prizes>, 14 October 2013.

82. University of California, Davis, Transportation and Parking Services, *goVarpool!* downloaded from www.goclub.ucdavis.edu/van, 14 October 2013.

83. Driving alone remains the dominant mode of travel for commuters coming from outside of the city of Davis.

84. 2007-2010 data: Kristin Lovejoy, Institute of Transportation Studies, University of California, Davis, *Results of the 2009-10 Campus Travel Survey*, July 2010; 2011-2012 data: Joshua Miller, Institute of Transportation Studies, University of California, Davis, *Results of the 2011-12 Campus Travel Survey*, June 2012.

85. Ibid.

86. See note 19.

87. Elliot Martin and Susan Shaheen, "The Impact of Carsharing on Household Vehicle Ownership," *ACCESS*, 38: 22-27, Spring 2011; Susan A. Shaheen and Adam P. Cohen, "Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends," *International Journal*

of *Sustainable Transportation*, 7(1): 5-34, 2012, doi: 10.1080/15568318.2012.660103.

88. Enterprise: Enterprise CarShare, *Find Car Share Near You*, downloaded from www.enterprise-carshare.com, 14 October 2013; Zipcar: Zipcar, *Zipcar Now Offers Campus Car Sharing With More Than 300 North American Colleges and Universities* (press release), 9 October 2012.

89. Angie Schmitt, "Transport U: Mode Shift at MIT," *DC.Streetsblog.org*, 18 April 2013.

90. Todd Litman, Victoria Transport Policy Institute, "Campus Transport Management: Trip Reduction Programs on College, University and Research Campuses," *TDM Encyclopedia*, downloaded from www.vtppi.org/tdm/tdm5.htm, 14 October 2013; see note 19.

91. J. Elliott Campbell and David E. Campbell, "Distance Learning Is Good for the Environment: Savings in Greenhouse Gas Emissions," *Online Journal of Distance Learning Administration* 14 (5), Winter 2011.

92. Nelson/Nygaard Consulting Associates Inc., *Portland Community College Transportation Study: Final Report*, December 2007.

93. Rick Williams Consulting, *Portland Community College: Cascade Campus Transportation Demand Management Plan*, April 2012, 47.

94. Portland Community College, *Climate Action Plan 2013*, 2013, 24.

95. JJR, LLC, *Transportation Demand Management Plan: Madison Area Technical College, Truax Campus, Madison, Wisconsin (Draft)*, 19 February 2010.

96. U.S. Department of Transportation, Federal Highway Administration, Census Transportation Planning Products, *2000-2010: Changes in Transit, Walk and Bike Commute Shares*, downloaded from www.fhwa.dot.gov/planning, 14 October 2013.

97. Danette Ifert Johnson, "Relationships between College Experiences and Alumni Participation in the Community," *The Review of Higher Education* 27 (2): 169-185, Winter 2004, doi: 10.1353.

98. T.M. Adams and B. Brynteson, "A Comparison of Attitudes and Exercise Habits of Alumni from Colleges with Varying Degrees of Physical Education Activity Programs," *Research Quarterly for Exercise and Sport* 63 (2): 148-152, June 1992.

99. U.S. Department of Health and Human Services, *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General* (Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012).

100. Renaissance Planning Group, *University of Florida Campus Master Plan, 2010-2020: Transportation Data and Analysis*, June 2010.

101. Alexander Bond, Master of Arts Thesis, *Impacts of Transportation Demand Management Policies and Temporary Campus Transit Use on the Permanent Transit Habits and Attitudes of University of Florida Alumni*, University of Florida, 2005.

102. David Ripplinger, Jill Hough and Bethany Brandt-Sargent, Small Urban & Rural Transit Center, Upper Great Plains Transportation Institute, *The Changing Attitudes and Behaviors of University Students toward Public Transportation: Final Report*, December 2009.

103. Sandra Rosenbloom with G.J. Fielding, *Transit Cooperative Research Program Report 28: Transit Markets of the Future: The Challenge of Change*, (Washington, D.C.: National Academy Press, 1998), 8-10.

104. Matthew E. Kahn, "Gentrification Trends in New Transit Oriented Communities: Evidence from Fourteen Cities that Expanded and Built Rail Transit Systems," *Real Estate Economics* 35 (2): 155-182, January 2007.

105. Zipcar, *Zipcar Survey Finds 2013 Grads Most Worried About Financial Stability; Nearly 70 Percent Believe Graduates Would Benefit From Car Sharing* (press release), 16 May 2013.

106. Note that fare-free transit can cause some challenges as well. Some transit systems that have experimented with fare-free services have been overwhelmed by the number of new passengers, straining existing infrastructure and fleet capacity, or faced greater numbers of disruptive passengers, per Joel Volinski, Transit Cooperative Research Program, *Implementation and Outcomes of Fare-Free Transit Systems: A Synthesis of Transit Practice* (Washington, D.C.: Transportation Research Board, 2012).

107. Gordon Dickson, “Arlington Launches Two-Year Bus Service That Could Shape Region’s Transit Plans,” *Fort Worth Star-Telegram*, 19 August 2013.

108. WATE ABC News, “T Bus Ridership on UT Campus Reaches All-Time High,” *www.wate.com*, 28 October 2013.

109. Washington State Department of Transportation, *CTR Overview*, downloaded from www.wsdot.wa.gov/Transit, 20 January 2014.

110. Massachusetts Executive Office of Energy and Environmental Affairs, *Massachusetts Rideshare Program*, downloaded from www.mass.gov/eea/, 9 January 2014.

111. See note 106, “Joel Volinski.” See also: City of Corvallis, “Corvallis Transit System,” downloaded from www.corvallisoregon.gov, 4 December 2013; and Oregon Department of Transportation, Oregon Sustainable Transportation Initiative, *Toolkit Case Study: Eliminate Transit Fares*, n.d. Note that while Corvallis, Oregon, is home to Oregon State University (OSU), this example of fare-free transit is particularly compelling because it does not rely predominantly on a university’s financial support (though OSU does contribute a small amount of annual funding), making this a model for communities across the country that may not be home to large, resource-rich colleges.

112. Washington’s trip reduction law: see note 109; Virginia telework tax credit: TeleworkVA, *Telework Tax Credit*, downloaded from www.teleworkva.org, 14 October 2013.

113. See note 20.