DRAFT PROPOSAL

Evaluation of Impact of Transit-Oriented Affordable Housing on Travel Demand

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Check if applicable:
Animal subjects _____
Human subjects ___X____

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ABSTRACT

The objectives of the research project are (1) to evaluate the impact that preserving and building affordable housing in transit-oriented areas has on travel demand and vehicle miles traveled (VMT), and (2) to assess the economic, health, and well-being impacts on the residents of these areas. The proposed study will aid policy makers by generating evidence on the implications of transit-oriented affordable housing for VMT and the other benefits that such development generates. In this study transit-oriented affordable housing (TOAH) will be defined as affordable-housing projects in close proximity to a transit station, coupled with urban design elements and a mix of land uses that support transit, walking, and bicycling. To assess the VMT implications and co-benefits of such projects, we will employ a novel mixed-methods approach comprising surveys of and interviews with residents of transit-oriented affordable housing (TOAH sites) and closely matched affordable housing sites that are not transit-oriented (AH control sites) and transit-oriented market-rate sites (MR control sites). Our approach leverages a related data collection effort being undertaken for a current Caltrans-funded project, led by Kelly Clifton at Portland State University, to ensure a larger sample and more robust data analysis than would otherwise be possible.

INTRODUCTION

The California State Budget allocated $130 million of the 2014/2015 proceeds from Cap and Trade to support an Affordable Housing and Sustainable Communities Program, part of which will fund affordable housing projects near transit stations in order to reduce greenhouse gas (GHG) emissions. The justification for this allocation is the assumption that the preservation and development of affordable housing opportunities near public transit will reduce vehicle travel in addition to increasing the viability of the public transit system and providing mobility options to populations with the greatest need. Although the latter two benefits are well established, there is little empirical evidence that directly supports the first assumption.

An extensive literature on the connection between the built environment and travel behavior suggests that land use policies can be an effective way of reducing vehicle travel (Transportation Research Board, 2009; Salon, et al., 2012). For example, a study of Northern California neighborhoods found significantly lower weekly vehicle miles of driven for households living in traditional neighborhoods (with closer proximity to destinations, better walking environments, and better transit access) than in suburban neighborhoods (Handy, et al. 2005). As another example, a study of residents of Baltimore and Washington, DC found that living in a transit-oriented development (TOD) was associated with as much as 20 percent less vehicle travel than living in a non-TOD area. Such studies are suggestive of the impact that land use policies can have on vehicle travel.

Several studies within this literature quantify the relationship between access to transit and vehicle miles of travel (VMT). A synthesis of the available evidence for the Air Resources Board (ARB) concluded that living right next to a transit station is associated with up to 6 percent less VMT than living one mile away from the station (Tal, et al., 2013). Another recent ARB project used travel survey data from throughout California to quantify the effect of transit access, among other variables, on VMT (Salon, et al., 2014). This analysis found that a 1 percent increase in transit access (measured by a proxy variable, the share of neighborhood residents usually commuting by transit) was associated with a 0.2 percent decline in household weekday VMT in urban areas with high transit use. Such results are indeed supportive of the assumption that increasing the availability of housing in close proximity to public transit is likely to reduce VMT and thus GHG emissions, but few published studies focus on the effect of public transit proximity for residents of affordable housing.

While this evidence could be used as a basis for estimating the effect on VMT of expanding affordable housing in proximity to transit, the estimates would be highly uncertain. This approach would underestimate the reduction in VMT if the effect of transit proximity were greater for affordable housing than for market-rate housing. Lower-income households living in affordable housing may be more likely to take advantage of the opportunity afforded by convenient public transit to forgo auto ownership, for one thing. Indeed, income is a primary predictor of auto ownership and transit use. Other benefits of transit access could also be substantially larger for lower-

income households as a result: the savings in transportation costs, improved accessibility to jobs as well as non-work destinations, and opportunities for increased physical activity through use of active modes are all more important for these households.

On the other hand, the impacts on VMT could be less than the available evidence might suggest. Households that need – or want – to use transit are more likely to locate in areas with good transit proximity (Chatman, 2009), at least to the degree that they have a choice as to where to locate. This means that the estimates of VMT effects presented above reflect not only the effect of transit access but also the preferences of the households that have chosen to live in close proximity to transit. As a result, it is not certain that people currently living in areas without good transit access would reduce their vehicle travel to the level of current residents of transit-oriented areas if they were to move to these areas. In fact, disregarding travel preferences when analyzing the connection between the built environment and travel behavior can lead to over-prediction or *under*-prediction of the effects of the built environment (Cao & Chatman, 2012; Chatman, 2009).

Another complication is the possibility that transit-oriented areas will not remain affordable over time and that low-income households will be pushed out of these areas by higher income household and into areas with poorer transit access. A current ARB-funded study at UC Berkeley is examining the effect of Sustainable Communities Strategies (SCSs) on the displacement of low-income households from transit-oriented areas and the implications of this displacement on travel behavior. A second project, funded by Caltrans through the National Center for Sustainable Transportation at UC Davis, is using a regional transportation-land use model to simulate the effects of SCS plans on the location of low-income households relative to transit-oriented areas and the implications for VMT. Such concerns have become especially acute in the San Francisco Bay Area, and these two studies will help to illuminate the nature and extent of the problem.

The proposed study helps to fill the first two gaps: the lack of evidence on the impacts of transit proximity for affordable housing projects, and the need to control for attitudes and preferences when examining this connection. This study will aid policy makers by generating evidence on the implications of transit-oriented affordable housing for VMT and the other benefits that such development generates. In this study transit-oriented affordable housing (TOAH) will be defined as affordable-housing projects in close proximity to a transit station, coupled with urban design elements and a mix of land uses that support transit, walking, and bicycling. To assess the VMT implications and co-benefits of such projects, we will employ a novel mixed-methods approach comprising surveys of and interviews with residents of transit-oriented affordable housing (TOAH sites) and closely matched affordable housing sites that are not transit-oriented (AH control sites) and transit-oriented market-rate sites (MR control sites). Our approach leverages a related data collection effort being undertaken for a current Caltrans-funded project, led by Kelly Clifton at Portland State University (see Clifton CV), to ensure a larger sample and more robust data analysis that would otherwise be possible.

OBJECTIVES

The objectives of the research project are to evaluate the impact that preserving and building affordable housing in transit-oriented areas has on travel demand and vehicle miles traveled (VMT), and to assess the economic, health, and well-being impacts on the associated residents.

The project will provide important information to metropolitan planning organizations, county and local city planning departments, housing agencies, and local climate action planning efforts on the efficacy of transit-oriented affordable housing as a VMT and GHG reduction strategy, as well as the range of co-benefits this strategy generates. In addition, the results can aid in the evaluation of affordable housing projects funded by the Cap and Trade auction proceeds, and inform future Cap and Trade proceeds investment plans. The results will also support the shift to a VMT standard in traffic impact analyses within the CEQA process triggered by the implementation of SB743.

TECHNICAL PLAN

We will meet the objectives of the project through a novel mixed-methods approach that employs surveys of and interviews with residents of transit-oriented affordable housing (TOAH sites) and closely matched affordable housing sites (AH control sites) and transit-oriented market-rate sites (MR control sites). The surveys and interviews will be used to complete assessments of the impacts of transit-oriented affordable housing on VMT and the co-benefits of proximity to transit for affordable housing residents. The structure of the data collection effort is depicted in Table 1.

Table 1. Data Collection Overview

		Sites			**Effects**	
	Type of data	**TOAH Sites**	**AH Control Sites**	**MR Control Sites**	**VMT Effects**	**Co-Benefits**
Household surveys	Quantitative	X	X	X	X	X
Resident interviews	Qualitative	X				X

Assessing the VMT impacts of TOAH requires a comparison condition or "counter-factual." One question we would like to answer is: What would a household's VMT have been had they not been living in TOAH? It is impossible to answer this question directly, but it can be answered indirectly in different ways. One approach is to compare the VMT of TOAH households to the VMT of other households. Two different types of households might be used as the comparison or "control" group. If the primary interest is the effect of the transit-orientation of a site on VMT for residents of affordable housing, then the "treatment" is transit-orientation and the control group is residents of affordable housing that is not transit-oriented (AH control sites). If the primary interest is the effect of affordable housing in transit-oriented areas, then the treatment is affordable

housing and the control group is residents of transit-oriented areas that do not live in affordable housing. The challenge in this cross-sectional approach is that each group – the TOAH households (the treatment group) and the two control groups – consists of different households with different needs, attitudes, preferences, and constraints. Thus, it is important to statistically control for such differences when analyzing the effect of TOAH relative to the controls. We will design the household survey to enable this analysis.

Another approach to answering this question is to use an individual household's VMT at their prior residence, as long as it is not TOAH, as the counterfactual. In this approach, VMT at the current residence is compared to VMT at the prior residence. Ideally, data would be collected at each point in time through repeated surveys, a longitudinal approach. More practical, although almost certainly less accurate, is to use one survey in which households report their current VMT and give an indication of the degree to which their VMT has changed from their previous residence. This quasi-longitudinal approach was pioneered by Handy, et al. (2005) as a way of generating stronger evidence of a causal relationship from a single survey than is generated by cross-sectional analysis alone. For this approach, the survey must also include information about the characteristics of the previous residence (in particular, whether it was transit-oriented and/or affordable housing) as well as changes within the household (e.g. increase or decrease in number of household members, income, car ownership, etc.) that could also lead to a change in VMT. As with the cross-sectional analysis, it is important to statistically control for such differences when analyzing the effects of a move to TOAH. Because such an analysis becomes more complicated and arguably less valid the longer ago the move, these questions will be asked only of participants who have moved relatively recently. Data from all such households will be useful to the analysis, but we will need a sufficient number of households moving from either non-transit-oriented affordable housing sites or transit-oriented non-affordable housing sites to TOAH sites to complete this analysis.

The product of these analyses will be estimated effect sizes, with confidence intervals, for the impact of TOAH on VMT. Effect sizes will be estimated for several different situations, for example, the effect of transit-orientation given affordable housing, or the effect of affordable housing given transit-orientation. In addition, it may be possible to quantify the combined effect of an upper-income household moving into a transit-oriented site and a lower-income household moving out of a transit-oriented site, an important effect to understand when assessing the impact of gentrification in transit-oriented areas.

The assessment of co-benefits will use both quantitative and qualitative data. The survey, administered at TOAH, AH control sites, and MR control sites, will provide quantitative information that is helpful in understanding co-benefits. An important co-benefit, for example, could be a reduction in unrealized travel demand (Hough, et al. 2015): travel that an individual needs or would like to do (tied to the need or desire to participate in activities out of the home) but is unable to do. An important form of unrealized travel demand is an inability to get to medical appointments, with negative

implications for health. Health benefits may be assessed in part by levels of physical activity, which have positive implications for health. A reduction in transportation costs – with a concurrent increase in funds available for other purposes – is another likely co-benefit of TOAH . Statistical analysis will be used to determine the effect of a transit-oriented location on these co-benefits while controlling for other factors. This analysis will enable a test of the hypothesis noted earlier that the co-benefits of transit-orientation are greater for low-income than higher income households. As a complement to this quantitative analysis, in-depth interviews with residents of TOAH sites will provide a broader and deeper exploration of the co-benefits of TOAH. Qualitative analysis techniques will be used to identify the nature and extent of such benefits. The product of this assessment of co-benefits will include both estimates of effect sizes and an in-depth discussion of the range of co-benefits.

We propose to partner with the PSU-based project team for the current Caltrans project entitled "Affordable Housing Trip Generation Strategies and Rates." The purpose of the Caltrans project is to develop a method to estimate the transportation impacts, particularly vehicle trip generation, of multifamily housing, including subsidized housing options and sites with transportation demand management (TDM) programs. The research design for this project includes surveys of households in subsidized multifamily housing and non-subsidized multifamily housing with site-specific TDM strategies. The former category overlaps with the focus of the ARB study on affordable housing, and this overlap creates an opportunity for a collaborative effort that would enable data collection for each project at a larger number of sites than would be possible for either project on its own. Multifamily housing projects that are transit-oriented will qualify for both studies (either as a TOAH site or a MR control site), and a combined survey can be implemented at these sites.

The UC Davis team will collaborate with the PSU team on the identification and selection of study sites (Task 2, described below) as well as the development and implementation of the survey (Tasks 3 and 4). Kelly Clifton and the nonprofit organization TransForm, from the PSU team, will be subcontractors on the ARB project, and Susan Handy, the PI for the UC Davis team, is a subcontractor on the Caltrans project. Alainna Thomas, a post-doctoral scholar at UC Davis, will be another key member of the UC Davis team.

The major tasks of the ARB project are as follows:

Task 1: Literature Review

The first task is to complete a thorough review of the relevant literature to provide a solid foundation for the subsequent tasks. As noted above, few studies directly address the objectives of this study. As a result, the review will focus on two closely related topics: the impact of transit-oriented development and transit proximity on vehicle travel (but not exclusively focused on residents of affordable housing), and the impact of low income (or residence in affordable housing) on vehicle travel. The literature review will also cover a third important topic: the co-benefits of transit-oriented development and proximity to transit. We will prepare a synthesis of the key points that emerge from the

literature that are relevant to the proposed study. We will also draw on the literature in developing an operational definition of transit-oriented affordable housing.

Task 2: Site Selection, Recruitment, and Characterization

The second task is to identify and select potential study sites, recruit them to participate in the study, and collect data on their built environment characteristics.

Task 2.1: Site Selection

The team will work with TransForm and collaborate with the PSU team to identify potential TOAH sites, AH control sites, and MR control sites. AH control sites will be selected to closely match TOAH sites on key characteristics other than transit access, and MR control sites will be selected to closely match TOAH sites on key characteristics other than affordable housing status. We anticipate that TOAH sites will consist primarily of multi-family housing, so AH and MR control sites will also consist primarily of multi-family housing. Key characteristics may include but are not limited to the location of the site within the urban context, number of units on site, variability in the size of the residential units, and other relevant characteristics. Where possible, the team will make use of an extensive database collected by TransForm as part of the Bay Area Residential Parking Database (80 to 100 sites) to inform site selection. The database includes affordable and market-rate sites from around the San Francisco Bay area in a range of place types. In addition, the PSU team has agreed to collaborate with the City of Los Angeles where possible to increase the number of sites included in the study and share data collection efforts. Our goal is to maximize the number of sites that meet the criteria for both the ARB and Caltrans projects in order to ensure efficient use of project resources and achieve the largest possible sample size for both studies.

Task 2.2: Site Recruitment

Once a set of potential sites are identified, the team will work with TransForm to leverage existing relationships with the housing community to secure the participation of sites from owners, developers and/or property managers. This includes obtaining permission for the residential household travel surveys and resident interviews. The PSU team will be recruiting a minimum of 20 subsidized multi-family sites for the Caltrans study. Most of these sites should also meet the needs of the ARB study. We anticipate that we will be able to recruit up to 20 additional sites for the ARB study to ensure an adequate number of sites in each category (TOAH, AH control, MR control). The total number of sites included in the study will depend upon the overall project budget, the number needed to ensure robust and statistically significant findings, and our ability to successfully recruit potential sites.

Task 2.3: Site Characterization

For the selected sites, we will collect data on key characteristics of the built environment on the site and in the surrounding area. The literature review in Task 1 will inform the choice of characteristics to include in this effort. Key

characteristics are likely to include walking distance to transit stations and stops, transit level of service, quality of the walking environment, proximity to retail and services, availability of bicycle infrastructure, and other characteristics likely to influence the decision to use transit, as well as parking availability and other characteristics that are likely to influence the decision to own and/or use an automobile.

Task 3: Data Collection Plans

The second task is prepare data collection plans for the two parts of the study: the assessment of the impacts of transit-oriented affordable housing on VMT, and the assessment of the co-benefits of proximity to transit for affordable housing residents. This task also includes the completion of the Institutional Review Board (IRB) process for human-subjects research.

Subtask 3.1: Quantitative Data Collection Plan

The data collection plan for the quantitative component includes the development of the survey instrument, recruitment approach, and survey administration framework. The literature review in Task 1 will inform the development of survey questions. We will work in partnership with the PSU team on this subtask to produce a combined survey to be administered at sites that meet the criteria for both projects; for sites exclusive to the ARB project, only the ARB portion of the survey will be used.

The primary purpose of the survey for the ARB project is to collect data on household VMT (Table 2). The survey instrument will include questions about auto ownership and access and vehicle miles traveled. In developing the survey, we will consider and test different methods for collecting accurate data about VMT (e.g. odometer reading for one week, self-reported VMT for one week or one year, etc.). To understand changes in VMT, respondents will be asked when they moved to their current resident, where they previously lived, and the degree to which their vehicle use increased or decreased after the move. To enable analysis of VMT while controlling for other factors, the survey will also include questions on socio-demographic characteristics, work status and work location, and attitudes and preferences.

To further understand the impact of transit access on travel patterns, the survey will include questions about a household's daily trips (for either a typical day or the previous day), including mode and destination. Data from these questions can be used to quantify co-benefits of transit access in terms of access to jobs and other destinations, as well as the amount of active travel, an important influence on health. To further quantify co-benefits, the survey will include questions on unrealized travel demand (i.e. trips that residents wish to make that they are unable to make) and on household expenditures on transportation.

The survey will be administered using the best practices in survey methodologies (Salant & Dillman, 1994). Residents will initially be contacted to participate by

mail, with property management receiving prior notice. Participants will have the option to fill out a paper survey and return it by pre-paid mail or to take the survey online. To ensure a good response rate, reminders will be sent by postcard to those households that fail to respond in a timely fashion. The survey will be piloted prior to administration in the field.

Table 2. Information Gathered in Surveys and Interviews

	Information gathered	**Purpose**
Household surveys	Vehicle access Vehicle miles traveled - weekly	VMT assessment – cross-sectional
	Date of move to current location Location of previous residence Change in VMT after move	VMT assessment – quasi-longitudinal
	Socio-demographic factors Work status and work location Attitudes and preferences for neighborhood, housing, and transportation	Controls for statistical analysis
	Trips by purpose and mode Unrealized travel demand Transportation expenses Change in travel, unrealized travel demand, and transportation expenses after move	Co-benefits assessment
Resident interviews	Factors influencing travel choices Benefits of transit-oriented location Challenges of transit-oriented location	Co-benefits assessment

Subtask 3.2: Qualitative Data Collection Plan

The data collection plan for the qualitative component includes the development of the interview guide, recruitment approach, and administration approach. The interview guide will include open-ended questions related to the co-benefits of TOAH, as informed by the literature search in Task 1. Interview participants will be recruited from the households completing the survey, using a method to be determined. Any household resident age 18 or over will be eligible to participate in the interview. We plan to conduct interviews in either English or Spanish; TOAH residents who do not speak these languages would be excluded from the interviews. We intend to conduct the interviews in-person, ideally in a community facility, if available. The timing of the interviews will depend on the availability of the participants. The interviews will be audio-taped and later transcribed. As the interviews are exclusive to the ARB project, we will not be working with the PSU team on this subtask.

Subtask 3.3: Institutional Review Board Approval

We will complete all forms required by the UC Davis Institutional Review Board and submit them for approval by the IRB. The survey instrument and interview

guide, as well as all recruitment materials, must be submitted to the IRB as a part of the review process. We will promptly address any issues raised by the IRB so as to ensure IRB approval in a timely manner.

Task 4: Data Collection

Subtask 4.1: Conduct survey
We will conduct the quantitative survey according to the plan developed in Subtask 2.2. Data from surveys completed on paper will be entered by hand into the survey database two times, and the results compared to identify errors in data entry. The final survey database will be checked for consistency and obvious errors by running descriptive analyses on all variables. We will work with the PSU team on this subtask.

Subtask 4.1: Conduct interviews
We will conduct the interviews according to the plan developed in Subtask 2.3. Recordings of the interviews will be professional transcribed, and the transcripts will be reviewed by the project team.

Task 5: Data Analysis

Subtask 5.1: Analysis of survey data
We will compare differences in VMT between TOAHs and control sites. We will estimate statistical models of VMT, with residence in TOAH as an explanatory variable while controlling for socio-demographic characteristics and other factors. We will also estimate statistical models of changes in VMT, with moving into a TOAH residence as an explanatory variable while controlling for socio-demographic characteristics and other factors. We will compare differences in measures of co-benefits between TOAHs and control sites.

Subtask 5.2: Analysis of interviews
We will employ best-practice qualitative analysis techniques, using a commercially available software package, to identify key themes from the interviews. The project team will complete an initial review of the interview transcripts to identify initial themes and develop a coding protocol. We will then code each interview according to this protocol, in an initial round of coding at a relatively general level, followed by a more focused round of coding. The codes will be used to group comments by theme and analyze patterns across the interviews.

Task 6: Draft Final Report
We will prepare a draft final report that incorporates the literature review, the data collection plans, and the results of the analysis. We will share the draft final report with ARB staff.

Task 7: Amend Final Report

After receiving comments from ARB staff, we will prepare a final report that responds to these comments.

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PROJECT SCHEDULE

Task 1: Literature review
Task 2: Site selection, recruitment, and characterization
Task 3: Data collection plan
Task 4: Data collection
Task 5: Data analysis
Task 6: Draft final report
Task 7: Amend final report

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TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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p = Quarterly progress report
d = Deliver draft final report (to be submitted 6 months prior to contract expiration)
f = Deliver final report
m = Meeting with ARB staff

CURRICULA VITAE

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PRESENT POSITION:

Professor, Department of Environmental Science and Policy, University of California, Davis.
Chair, 2011 –
Director, National Center for Sustainable Transportation, 2013 –
Director, Sustainable Transportation Center, 2006 – 2012
Associate Professor, 2002 – 2006

EDUCATION:

Doctor of Philosophy, City and Regional Planning, University of California at Berkeley, 1992.
Master of Science, Resource Planning Program, Civil Engineering, Stanford University, 1987.
Bachelor of Science and Engineering, Engineering and Management Systems Program, Civil Engineering, Princeton University, 1984.

PRIOR POSITIONS:

Associate Professor, Community and Regional Planning Program, School of Architecture, University of Texas at Austin, 1999 -2002. Assistant Professor 1993 - 1999.
Assistant Researcher, Institute of Transportation Studies, University of California Davis, 1992-1993.
Senior Transportation Analyst, Center for Urban Analysis, Santa Clara County, San Jose, CA, 1991-1993.
Assistant Planner, Metropolitan Transportation Commission, Oakland, CA, 1987-1990.
Transportation Analyst, Center for Urban Analysis, Santa Clara County, San Jose, CA, 1987.

CURRENT PROFESSIONAL APPOINTMENTS:

Associate Editor for Transportation, *Journal of the American Planning Association*, since 2008.
Associate Editor for *Journal of Transportation and Health,* since 2013
Member, Executive Board, World Society on Transportation & Land Use Research, since 2011.

RECENT RESEARCH GRANTS:

Principal Investigator, "Impact of Transportation and Land-Use Related Policies on Greenhouse Gas Emissions," California Air Resources Board, 2012-2014.
Principal Investigator, "Non-Motorized Travel: Analysis of the National Household Travel Survey California Add-On Data," California Department of Transportation, 2011-2013.
Principal Investigator, "Trip-Generation Rates Spreadsheet for Smart-Growth Land-Use Projects," California Department of Transportation, 2009-2013.

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Salon, D., M.G. Boarnet, S.Handy, S. Spears, G. Tal. 2012. How do local actions affect VMT? A critical review of the empirical evidence. *Transportation Research Part D* 17: 495-508.

Evenson, K., J. Sallis, S. Handy, R. Bell, L.K. Brennan. 2012. Evaluation of Physical Projects and Policies from the Active Living by Design Partnerships. *American Journal of Preventive Medicine* 43 (5S4): S309 –S319.

Hoehner, C.M., S.L. Handy, Y. Yan, S.N. Blair, D. Berrigan. 2011. Association between neighborhood walkability, cardiorespiratory fitness and body-mass index. *Social Science and Medicine* 73: 1707-1716.

Bao, S., D. Niemeier, and S. Handy. 2011. Linking Land Use, Transportation and Air Quality: Impact of Urban Growth Patterns on Vehicle Travel and Pollutant Emissions. *Journal of Transportation and Land Use* 4(3): 65-80.

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EDUCATION

2014 University of California, Berkeley Ph.D., City and Regional Planning
2007 University of California, Berkeley MCP, City and Regional Planning
1996 University of California, Santa Cruz B.A. Asian/Islamic History
Honors in Thesis.

FELLOWSHIPS AND AWARDS

2012 University of California Transportation Center Dissertation Grant ($20,000)
2011 Liu Graduate Research Fellowship in Chinese Studies, UC Berkeley ($3,500)
2011 David L. Boren Graduate Fellowship, National Security Education Program ($20,000)
2010 National Association of University Women, Doctoral Fellowship ($5,000)
2010 Women in Transportation Seminar, Elaine Dezenski Legacy Scholarship ($5,000)
2007-13 University of California Transportation Center/DCRP Grants ($5,000/annually)
2009 U.S. Department of State Critical Language Scholarship (Mandarin)
2009 Dwight D. Eisenhower Transportation Program Graduate Fellowship
2008 Outstanding Graduate Student Instructor, Graduate Council's Advisor Committee

ACADEMIC AND PROFESSIONAL EXPERIENCE

2014-15 Postdoctoral Scholar, National Center for Sustainable Transportation and China Center for Energy and Transportation, Institute of Transportation Studies
University of California, Davis (Research Supervisor/Mentor: Professor Susan Handy)
Coordinate studies to identify electric vehicle (EV) infrastructure and promotion policies needed to assist national and local Chinese government agencies. Conduct extensive literature search on US national, state, and municipal EV policies including tax incentives, building codes, rebates, and HOV lane access. Organize and manage a qualitative study on "non-traditional" electric bicycle users in the San Francisco Bay Area (e.g. women, parents, older adults). Identify barriers and opportunities for greater electric bike use in the Bay Area.

2011-12 Consultant, The Energy Foundation's China Sustainable Energy Program Beijing, PRC
Drafted white paper on the state of professional capacity in urban planning and identified training needs for all levels of government involved in urban planning. Provide on-call research support for sustainable urban planning projects.

2006-11 Graduate Researcher/Project Manager, Global Metropolitan Studies-China University of California, Berkeley (PI: Professor Elizabeth Deakin)
Collaborated with Chinese and international transportation experts team on sustainable development strategies for Chinese cities. Identified and gathered sustainable transportation best practices to assist Chinese cities in improving sustainable transportation measures.

2002-05 Program Analyst, Energy Foundation's China Sustainable Energy Program
Researched and analyzed major environmental and energy issues in China including sustainable transportation systems, industrial sector programs, renewable energy, and low carbon development.

PEER-REVIEWED PUBLICATIONS

Creutzig, Felix, Alainna Thomas, Elizabeth Deakin and Dan Kammen. (2011) "Transport Demand Management in Beijing" *Low Carbon Transport in Asia,* Institute for Global Environmental Strategies (IGES).

Thomas, Alainna and Elizabeth Deakin (2008)."Land Use Challenges to implementing transit-oriented development in China: Jinan, Shandong- a case study." *Transportation Research Record: Journal of the Transportation Research Board*, 2077:80-86.

He, Dongquan, Michael Wang and Alainna Thomas (2007). "Air pollution challenges and solutions for China's urban transportation development," *International Journal of Environment and Pollution*, 30 (1): 154-171.

CONFERENCE PAPERS AND PRESENTATIONS

"Agents of Change: Policy transfer agents and their effectiveness in China" at the 45th Urban Affairs Association Conference, Miami, Florida, April 8-11, 2015.

"Beyond the Fiat Fallacy: The softer way to sustainable development in China" at the 54th Annual Conference of the Association of Collegiate Schools of Planning, Philadelphia, Pennsylvania, October 29-November 2, 2014.

"What Happens after Bus Rapid Transit Lands in China," at the Joint AESOP/ACSP Congress in Dublin, Ireland, July 15-19, 2013.

"It's all in the framing- A case study of Bus Rapid Transit traveling from Bogota, Colombia to Jinan, China," at the 43rd Annual Urban Affairs Association Conference, San Francisco, California, April 3-6, 2013.

"Planning Practices in China: Professional Networks, Organizations and Savvy" at the 53rd Annual Conference of the Association of Collegiate Schools of Planning, Cincinnati, Ohio, November 1-4, 2012.

"The Consequences of Rapid Motorization in Chinese Cities-- A case study of Jinan" at the 52nd Annual Conference of the Association of Collegiate Schools of Planning, Salt Lake City, Utah, October 13-16, 2011.

"Parking in Chinese Cities—How municipal governments address parking needs in cities across China" at 12th World Congress on Transport Research, Lisbon, Portugal, July 11-15, 2010.

"The Impact of Personal Cars on Chinese Urban Planning" at 12th World Congress on Transport Research, Lisbon, Portugal, July 11-15, 2010.

"Transit-Oriented Development in China: Identifying Opportunities And Challenges In Jinan, Shandong Province" at the 48th Annual Association of Collegiate Schools of Planning in Milwaukee, Wisconsin, October 18-12, 2007.

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PRESENT POSITION:

Professor, Department of Civil and Environmental Engineering, Portland State University
Fellow, Institute for Sustainable Solutions
Director, Oregon Modeling Collaborative, 2010-
Associate Professor, 2010 – 2013

EDUCATION:

Doctor of Philosophy, Community and Regional Planning, University of Texas at Austin, 2001.
Master of Science, Planning, University of Arizona, 1995.
Bachelor of Science, Mechanical Engineering, West Virginia University, 1990.

PRIOR POSITIONS:

Associate Professor, Urban Studies and Planning/Civil and Environmental Engineering, University of Maryland, 2007-2008. Assistant Professor, 2003-2007.
Assistant Professor, Urban and Regional Planning, University of Iowa, 2000-2003.
Associate Transportation Planner, John F. Hickman and Associates, Austin, TX, 1999-2001.
Transportation Survey Project Manager, NuStats, Austin, TX, 1996.
Research Associate, Southern Arizona Housing Center, Tucson, AZ, 1995-1996.
Mechanical Engineer, Morgantown Energy Technology Center, US Department of Energy, Morgantown, WV, 1992-1993.

PROFESSIONAL APPOINTMENTS:

Treasurer and Board Member, International Steering Committee on Travel Survey Conferences, since 2008.
Chair, World Society on Transportation & Land Use Research, 2011-2014.

RECENT RESEARCH GRANTS:

Principal Investigator, "Affordable Housing Trip Generation Strategies and Rates," Caltrans, estimated start date May 2015-2017.
Principal Investigator, "Trip Generation Methodologies," National Institute for Transportation and Communities, 2015-2016.
Principal Investigator, "Developing a Framework for Incorporating Mitigation Effectiveness into the Transportation Planning Rule Process," Oregon Department of Transportation, 2014-2015.
Principal Investigator, "Contextual Influences on Trip Generation," Oregon Transportation Research and Education Consortium and Metro, 2010-2012.

SELECTED RECENT ARTICLES:

Currans, K.M. and Clifton K.J. "Improving Vehicle Trip Generation Estimations for Urban Contexts: Using Household Travel Surveys as a method to Adjust ITE Trip Generation Rates," *Journal of Transport and Land Use, forthcoming.*

Singleton, P. A., & Clifton, K. J. "Exploring Synergy in Bicycle and Transit Use: Empirical Evidence at Two Scales," T*ransportation Research Record: Journal of the Transportation Research Board*, Transportation Research Board of the National Academies, Washington, D.C., *forthcoming*.

S.R. Gehrke & K.J. Clifton. "Operationalizing Land Use at Varying Geographic Scales and its Connection to Mode Choice: Evidence from Portland, Oregon," *Transportation Research Record: Journal of the Transportation Research Board*, Transportation Research Board of the National Academies, Washington, D.C., *forthcoming*.

Clifton, Kelly, Muhs, Christopher; Morrissey, Tomás, and Currans, Kristina. "Consumer behavior and travel mode: An exploration of restaurant, drinking establishment and convenience store patrons," *International Journal of Sustainable Transport*, *forthcoming*. DOI: 10.1080/15568318.2014.897404.

Clifton, Kelly J.; Currans, Kristina M. and Muhs, Christopher D. "Adjusting ITE's Trip Generation Handbook for Urban Context," *Journal of Transport and Land Use,* 8(1), 2015, pp 1-25.

Currans, K; Gehrke, S and Clifton K. "Visualizing The Housing, Accessibility, And Transportation characteristics Of A Neighborhood In A Stated Preference Survey: A Pilot Study," *Proceedings of the 94th Annual Meeting of the Transportation Research Board*, Washington, DC, January 11-15, 2015.

S.R. Gehrke, K.M. Currans & K.J. Clifton. "The Impact of Residential Location Decisions on Miles Traveled, Trip Frequency, and Automobile Ownership for Households in the Portland Metropolitan Region." *Proceedings of the 93th Annual Meeting of the Transportation Research Board*, 2014.

Clifton, Kelly J. "Collecting Qualitative and Quantitative Data on the Social Context of Travel Behaviour", in *Transport Survey Methods: Best Practice for Decision Making* (ed. Zmud, Lee-Gosselin, Munizaga, and Carrasco, JA), Bingley, UK: Emerald Press, 2013. pp.441-448.

Clifton, Kelly J.; Currans, Kristina Marie and Muhs, Christopher D. "Evolution of ITE Trip Generation Handbook: Proposal for Collecting Multimodal, Multi-context Establishment-Level Data," *Transportation Research Record: Journal of the Transportation Research Board,* No. 2344, transportation Research Board of the National Academies, Washington, D.C., 2013, pp. 107–117.

Chen, Roger B.; Gehrke, Steven R.; Currans, Kristina Marie; Clifton, Kelly J.; Liu, Jenny and Jang, Yunemi. "Exploring Residential Tenure and Housing Type Decisions and Household Activity Engagement," *Transportation Research Record: Journal of the Transportation Research Board,* No. 2344, Transportation Research Board of the National Academies, Washington, D.C., 2013, pp. 68–78.

Clifton, Kelly J.; Currans, Kristina M; Cutter, April C. and Schneider, Robert. "A Context-Based Approach for Adjusting Institute of Transportation Engineers Trip Generation Rates in Urban Contexts Using Household Travel Surveys," *Transportation Research Record: Journal of the Transportation Research Board,* No. 2307, 2013. pp. 108-119.

Clifton, Kelly J. and Muhs, Christopher. "Capturing and Representing Multimodal Trips in Travel Surveys: A Review of the Practice," *Transportation Research Record: Journal of the Transportation Research Board,* No. 2285, 2012. pp. 74-83.

Clifton, Kelly J. and Gregor, Brian J. "The Development of a Decision Tool for Greenhouse Gas Emissions Reduction Strategies: The Role of NHTS Data in GreenSTEP Model Development," *Transportation Research Record: Journal of the Transportation Research Board,* No. 2291*,* 2012, pp124-134*.*

Clifton, Kelly J. and Susan Handy L. Chapter 16: "Qualitative Methods in Travel Behaviour Research," in *Transport Survey Quality and Innovation*, P. Stopher and P. Jones (eds.), Oxford UK: Elsevier Science, Pergamon, 2003. pp. 283-302.

PRELIMINARY COST PROPOSAL

ESTIMATED COST BY TASK

Task	Labor	Employee Fringe Benefits	Subs	Travel	Photo-copying/ Printing	Mail, phone, fax	Materials and Supplies	Tran-scription Services	Student Fee remission	Misc-GAEL	Over-head	Total
1	$16,983	$2,019							$3,149	$87	$1,909	$24,147
2	$25,474	$3,029	$15,000						$4,724	$130	$4,363	$52,720
3	$25,474	$3,029	$5,000	$2,000					$4,724	$130	$3,563	$43,920
4	$42,456	$5,048	$15,000	$2,000	$4,000	$4,000	$1,213	$5,000	$7,873	$217	$7,894	$94,701
5	$33,965	$4,038							$6,298	$173	$3,818	$48,292
6	$16,983	$2,019							$3,149	$87	$1,909	$24,147
7	$8,491	$1,010							$1,575	$43	$954	$12,073
	$169,826	$20,192	$35,000	$4,000	$4,000	$4,000	$1,213	$5,000	$31,492	$867	$24,410	$300,000