Year 21 (2008-2009)

Annual Report

For the

University of California Transportation Center

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ABOUT UCTC: OUR 21st YEAR

The University of California Transportation Center (UCTC) is a multi-campus organization headquartered on the UC Berkeley campus. UCTC carries out basic and applied research, published in journals and on the Center’s web site. We organize and participate in conferences and workshops to discuss our research findings, inform public policy, and identify new and emerging research needs. We work with international, national, state, regional and local agencies and private organizations to put our research findings into practice. We offer fellowships and mount new courses to entice the best students into careers in transportation. We support education programs of UC academic departments offering transportation degrees, run training sessions, lectures, and symposia for practitioners, and publish a magazine designed to communicate our work to a broad nontechnical audience. We are funded by the US Department of Transportation and the California Department of Transportation.

2008-2009 was UCTC’s 21st year as the Federal Region 9 University Transportation Center (UTC). On the research front, a total of 15 new faculty initiated projects were started in 2008-9, along with another 15 projects that were carried forward from 2007-2008. A total of 36 faculty research reports were submitted during 2008-2009.

In addition, UC partnered with several organizations including the UC Transportation Sustainability Research Center, the Global Metropolitan Studies Center, the Traffic Safety Center, and the Center for a Sustainable California to expand research horizons and inform contemporary policy debates in the transportation field. UCTC also undertook a number of educational and tech transfer activities, supporting the UCLA Lake Arrowhead conference, the UCTC student conference held this year at Riverside, a speaker series devoted to achieving California’s greenhouse reduction targets through sustainable transportation initiatives, and various activities of the Transportation Research Board.

FY 2008-2009 saw a change in UCTC directorship. On March 1, 2009, Professor Elizabeth Deakin stepped down as UCTC Director after 10 years of devoted leadership. Betty’s departure leaves big shoes to fill however fortunately for all, she will remain active in UCTC affairs. Under Betty’s stewardship, a new Strategic Plan for UCTC covering the 2007-2009 period was approved in February of this year.

FY 2008-2009 will be remembered as a time of economic hardship, particularly in California where the state has been hit hard by the nation’s economic downturn. A Governor’s decree in February 2009 froze all state contracts with external parties. Caltrans was able to obtain an exemption of UCTC’s grants from the state freeze on the grounds that both matching money and considerable data would be lost if work were to halt midstream. USDOT funds remain critically important to UCTC as they are a main means of support for graduate students in transportation. Fortunately, following a period of uncertainty, the California budget was approved that provided necessary matching funds to sustain UCTC educational and research missions.

Despite past delays and uncertainties in funding, today UCTC stands as a healthy organization. UCTC is committed to help develop improved transportation services, more cost-effective and efficient project delivery, better transportation - environmental performance, and more equitable distribution of transportation benefits. Research on these topics helps find new processes, new technologies, and new institutional designs that pay off for all of us. Equally importantly, UCTC’s funding attracts the best and the brightest into the transportation field, helping to produce the leaders of the future.

Robert Cervero, September 2009
1. UCTC VISION AND THEME

Vision

UCTC’s vision is excellence in transportation education, excellence in transportation research, and a vibrant network of transportation professionals who will put their education and research findings into practice. We recognize that the State of California, Region 9, and the nation face important transportation challenges, among them:

- adjusting transportation services to respond to changes in demographics and activity patterns
- meeting the challenges of a changing economy and changing resource costs and prices
- managing our extensive transportation systems more efficiently
- improving intermodal connections
- providing high-quality freight transportation responsive to new patterns of production, consumption, and costs
- more effectively assessing, communicating, and managing the social, economic, and environmental consequences of transportation programs and projects
- more effectively identifying applications for new technologies that can improve transportation systems performance
- reducing unwanted effects of transportation including congestion, pollution, and global warming
- improving the equity of transportation programs and projects
- assuring that the public health effects of transportation are positive
- moving toward sustainable transportation and land use relationships
- designing better processes for the involvement of diverse public and private interests in transportation planning, decision making and deployment
- developing efficient and equitable mechanisms for transportation finance
- identifying more flexible, innovative, and responsive organizational frameworks for transportation planning and implementation.

We believe that the challenges confronting the transportation sector must be addressed through creative research, development, and deployment, education and tech transfer, all under a broadly scoped but strategically organized research agenda, or theme, that can make our vision a reality.

Theme

UTCs are asked to identify a “theme”, and the UCTC theme is transportation systems analysis and policy. This theme is at once broadly scoped and strategically focused, allowing us to conduct research that addresses the variety of challenges facing our nation, region and state and find ways to promote effective implementation, while complementing rather than duplicating other technology-oriented programs at UC such as PATH and the UC Pavement Center. The theme of “Transportation systems analysis and policy” has guided UCTC research since the Center’s very beginning, reflecting the breadth of knowledge in the transportation field found throughout the 5 UC campuses affiliated with UCTC and the instincts of faculty researchers to link technical analyses to contemporary policy concerns.

The development of new methods and approaches for transportation forecasting and analysis, explorations of alternative policy approaches, and evaluations of existing policies and programs are examples of the kinds of projects that UCTC supports. Our researchers come from a variety of disciplines,
including urban planning, engineering, economics, political science, computer science, policy studies, management, public health, environmental studies, geography, history, psychology, sociology, and the natural sciences. Increasingly, both our projects and the researchers themselves are multi-disciplinary. We emphasize surface transportation modes (highways, rail, etc.) rather than air or maritime transportation, but we support intermodal research involving the air and water modes if it has significant surface transportation components. Both passenger transport and freight transport topics are investigated though the UCTC.

2. OVERVIEW OF UCTC ACTIVITIES

In accordance with federal UTC program requirements, UCTC carries out an active program of research, educational support, and tech transfer – all made possible by strong institutional support from Caltrans and the University of California as well as USDOT.

Research

Research is a major focus of UCTC’s activities. UCTC research is framed by a clear research agenda, selected through peer review, structured as one year grants, and awarded to PIs on a one project at a time basis.

Research Agenda: All UCTC research grants are awarded through a process that is framed by our theme of systems analysis and policy and guided by specific research priorities called out from time to time by the Executive Committee, our sponsors, and our advisory board.

Peer Review: Project selection relies on outside peer review. Project selection is highly competitive, as we usually can fund less than half the research proposals that are received. To handle the difficult process of choosing new projects, we conduct a double-blind review of all proposals, and then call upon a panel of outside experts who serve much the same function as an editorial board, evaluating the reviews and advising the Director on the projects that appear most worthy of funding. In the Spring 2009 round of reviews, every proposal had at least four referees, drawn from a master list of several hundred candidates, who independently evaluated and rated proposals. Weighing inputs from Caltrans staff and the objective scores of external reviewers, the UCTC Director makes the final choices on research funding. Occasionally, research proposals receive conditional approval, requiring Principal Investigators to clarify certain aspects of work plans before funds are released. The peer review process is a major undertaking, requiring significant time commitments among many individuals, however overall, we believe it produces the best quality research possible.

One Year Grants: Our policy is to provide one year research grants with a report due at the end of the year. Multi-year projects can be proposed but must be structured to produce a publishable report every year, and a proposal must be submitted and evaluated for each additional year. Proposals involving faculty from multiple UC campuses are particularly encouraged.

One Project at a Time: Caltrans has asked all UTCs in California to implement a “one project at a time” rule, i.e., no Principal Investigator may have more than one incomplete project at any time. This policy took effect in the 2008-2009 grant cycle, meaning faculty who submitted proposals for 2009-2010 had to have completed their prior year’s work if they are to receive funding in 2009-2010.

The UCTC’s success in research relies upon a carefully managed solicitation and project selection process. For faculty research, the procedure for project awards is as follows.
Research Solicitation Process

UCTC makes research project awards either to individuals or to teams of researchers. The Principal Investigator must be a faculty member within the UC System; researchers from universities outside the University of California may be included through a subcontract with the PI's campus.

The UCTC request for proposals (RFP) is maintained on our website. About two months before proposals are due, we send an email notification to faculty members on our associates list as well as to deans, department heads, and research directors for circulation to their faculty. UCTC’s Associate Directors from the five campuses also notify faculty affiliates at their individual campuses.

Each proposal must be prepared in two parts. Part A is a description of the proposed research. Part B includes the vita of the principal investigator, a summary of accomplishments from the applicant’s recent UCTC research grants (if any) including a list of working papers and other publications produced, and a statement identifying any research finding from other organizations for work on the topic of the proposal. (Multiple sponsors are encouraged, as they expand the feasible scope of the research that can be supported with UCTC funds.) An itemized budget is also included in Part B. Proposals are submitted by email and reviews also are completed electronically.

Due to high demand for UCTC funding, budget restrictions were put in place in 1999-2000 and are applied in any year when funds actually received (after RABA or any other adjustments) fall short of authorization levels by more than ten percent. Under the restriction policies, summer salary for faculty is limited to one month and most projects are limited to one graduate student researcher or undergraduate intern per faculty member for the academic year. Costs of supplies, postage, computer expenses, travel, etc. are limited to amounts specified in the RFP unless additional, itemized expenses were justified as necessary for the conduct of the research. Secretarial and clerical support services are not allowed.

Proposal Review Process

All faculty research proposals undergo confidential external review by transportation experts - university researchers and practicing professionals. The UCTC Director selects three or four persons to review each proposal; a minimum of two, and preferably three, completed reviews are required for each proposal. Additional reviewers are sought if those initially contacted are unable to complete their reviews in a timely fashion. Recent experience is that it takes 3-4 requests to get two timely reviews. The Spring 2009 round of reviews had a minimum of four independent reviewers and as many as ten, with at least one reviewer being a Caltrans employee.

Reviewers are chosen based on their expertise with the subject matter of the proposal. A reviewer list of over 200 individuals is maintained and includes experts from universities, government (the US DOT, other federal agencies, Caltrans, other state agencies, regional agencies, local governments, nonprofits (research groups, foundations) and private for-profit organizations. Faculty members, advisors and sponsors are asked to provide additional names of reviewers from time to time, so that the list is regularly updated.

External reviewers are asked to rate the proposals excellent, very good, good, fair, or poor and to consider the following in their written evaluations:

- Extent to which the proposed research is original or creative and an important intellectual contribution to transportation scholarship
- Extent to which this research will advance professional practice or inform public opinion
- Appropriateness of the research methodology to the research question
• Appropriateness and feasibility of the data collection plan.
• Any other issues the reviewer deems important.

The Director and staff review the staffing plan and budget for compliance with UCTC rules, and consider the reasonableness of any special budget requests (e.g., additional direct expenses such as travel costs, survey costs, testing, etc.)

**Project Selection Process**

Reviews are compiled and the proposals are sorted into three categories: Definitely Fund, Consider Funding, and Do Not Fund. For proposals ranked in the middle category, additional reviews are conducted by a panel of outside experts, who advise the Director on the ranking of these proposals. UCTC staff members also review each PI’s past performance on UCTC-funded projects (if any) and evaluate the overall fit of the proposed work to the UCTC theme. The Executive Committee is also asked to comment. The UCTC Director then uses the reviews, the outside experts' recommendations, and the staff reviews in making the final selection of projects for funding. In making the final choices, the Director also takes into account the desirability of continuing an ongoing research project into a second phase, versus initiating research on a new topic of importance.

The Director may require changes on some proposals, for example, to fund selected tasks only or to seek revisions in response to reviewers’ comments. Further, the Director may provide “seed funding” to proposals in the middle-ranked category. These small grants allow a researcher to begin the investigation of the research topic and further develop the ideas and approach, with the possibility of applying for additional funds in later years.

**Research Performance Tracking**

The UCTC Director and administrator monitor research performance through periodic progress reports as well as through informal communications with researchers. We expect UCTC-funded researchers to publish their results, and consider their publication record in any subsequent applications for UCTC funding. We also provide funding for researchers (both as part of grants, and as funds allow, from UCTC headquarters funding) to present their work at conferences and symposia, reprint papers sponsored by UCTC, and publish research in the form of working papers, and final reports, web page postings, and ACCESS magazine articles.

The academic value of UCTC-supported research is evidenced by:

• publication in peer-reviewed journals
• academic awards
• citations in the literature
• invitations to organize and participate in important conferences and meetings
• requests for guest lectures
• requests for collaborative research and exchanges.

Our success in producing innovative, policy-relevant results is demonstrated by their use in practice. We count the following among the indicators of the success of our transportation research:

• adoption of UCTC-developed analysis methods
• use of UCTC-developed databases
• appointment of UCTC researchers to important policy-making and advisory positions
• invitations for UCTC researchers to testify before elected and appointed officials (Congress, the state legislature, city councils, county boards of supervisors, transit boards)
• requests for UCTC researchers to participate in meetings, briefings, and other collaborative activities and exchanges
• requests for UCTC researchers to provide technical assistance to government or the private sector
• changes in federal, state, regional and local transportation policies following recommendations based on UCTC research
• incorporation of UCTC research findings into governmental regulations, rules, and policies.

Education and Student Support

UCTC not only carries out research but also contributes to transportation education through fellowship programs, funding for course and curriculum development, our competitive PhD dissertation grant program, and the research assistantships offered as part of faculty research projects. Our objective is to help produce a vibrant network of transportation professionals who will put their education and research findings into practice.

Fellowships are offered only to graduate students enrolled in formal transportation programs. Under USDOT rules, only US citizens and permanent residents are eligible for fellowships. However, faculty from any of the UC campuses (except Davis, which has its own UTC) may apply for a research project and both international and domestic students may work on that project. Likewise, students from any of the UC campuses except Davis may apply for a dissertation grant, which is treated as a project if the student is a non-US citizen.

Course support is provided by application to the UCTC Director. Grants are typically under $20,000. Eligible activities include (in order of priority) 1) the development of a new, permanent course or curriculum, 2) the major revamping of an existing course or course sequence to incorporate new materials or new teaching approaches, and 3) occasionally, special seminars taught by visiting scholars, leading practitioners, or other temporary appointees that offer especially valuable opportunities for students to be exposed to new ideas and approaches. Both graduate courses and undergraduate courses in transportation have received UCTC support. UCTC will not support a new course for more than three years nor will UCTC support the redesign of an established course more often than once every six years.

More details on these programs are provided in the following sections.

Education Programs

Formal programs and concentrations in transportation are currently offered by UCTC-affiliated departments at Berkeley, Davis, Irvine, Riverside, UCLA, and UC Santa Barbara. Additional courses with significant transportation content are offered at other campuses of the UC system, including UC San Diego. Most UC transportation degree programs are in civil engineering or city planning. However, other departments including architecture, chemical engineering, computer science, economics, electrical engineering, energy resources, environmental studies, geography, landscape architecture, law, management, mechanical engineering, operations research, political science, public policy, sociology, and urban design now include transportation topics in one or more courses. The growth in transportation offerings and in the inclusion of transportation topics in a variety of courses reflects the increased faculty interest in transportation, for which UCTC can take considerable credit.
As a research unit, the UCTC does not itself offer courses, admit students, hire faculty, or award degrees; instead, we provide support to the academic departments and units that carry out these functions in the UC system. In addition, UCTC research appointments for graduate and undergraduate students are a form of education and training, and many students receive course credit for participation in UCTC-funded faculty projects.

- **Graduate Programs**

Formal degree graduate programs or concentrations in transportation are offered on several campuses in the UC system, including Berkeley, Irvine, UCLA, Santa Barbara and Riverside. The civil and environmental engineering departments at Berkeley and Irvine offer transportation engineering degrees. Programs in transportation planning and policy are offered at Berkeley, Irvine, and UCLA, and a concurrent degree program in transportation engineering and planning is also offered at Berkeley. At Irvine, the Department of Economics administers an interdisciplinary doctoral program in transportation science. The Berkeley transportation program has strong offerings in traffic operations, logistics, systems analysis, and transportation science; Berkeley also has extensive offerings in transportation, land use, and urban design. UCLA is developing a specialty in equity and the transportation needs of low-income communities. Santa Barbara works on GIS applications and advanced modeling, and Riverside focuses on transportation and air pollution.

Each of the campuses continues to maintain and improve their transportation programs, and to update courses and add new course offerings and programmatic specialties as opportunities arise. UC Santa Barbara and UC Riverside’s transportation programs are now formally approved and are offering UCTC fellowships. At Berkeley, a new, interdisciplinary Global Metropolitan Studies (GMS) program is underway and has hired its first three of five new faculty members. In the latest review of transport planning programs, Berkeley and UCLA were rated in the top three and Irvine in the top 10. The CEE program at Berkeley consistently ranks in the top three nationally, and the Santa Barbara Geography Department is ranked fourth.

- **Undergraduate Programs**

UCTC funding for undergraduate education at the various campuses has continued to be focused on the development of new transportation courses. UCTC will fund a new course for up to three years after which it should be approved and funded as part of the regular curriculum. For example, in Spring 2009, UCTC supported a new upper-division undergraduate lecture course on good movement and logistics taught by UCLA Professor Goetz Wolff. Over 40 students were enrolled in the course: 35 undergraduates and 6 graduates. Overall, undergraduate transportation courses offered with UCTC sponsorship have been well subscribed and well received, and have helped to spark interest in careers in transportation. A number of the undergraduates from these courses enroll in graduate transportation programs at UC or other top transportation programs.

- **Continuing Education**

UCTC-sponsored conferences, symposia, and lecture series offer opportunities for both academics, practitioners, and elected and appointed officials to learn about, discuss and debate new ideas in transportation. Each year UCTC supports such events and also provides funding so that UCTC faculty and students can attend other conferences to present their work.

In addition, transportation courses and other education and training opportunities are offered through the ITS Extension (which operates statewide) and the Extension programs of the various campuses. These courses reach transportation professionals and others who need a better understanding of transportation to
effectively carry out their work in fields such as air quality planning and land use planning. UCTC research is frequently included in short courses offered by the University Extension. The UCTC actively encourages researchers to participate in these activities and provides support for them to do so, to the extent that resources permit.

**Student Support**

UCTC provides student support in the form of fellowships, graduate student researcher appointments, doctoral dissertation grants, and an annual student of the year award.

- **Fellowships**

US graduate students enrolled in any of UC’s formal transportation programs (except Davis, which funds its programs through its own UTC) are eligible for UCTC fellowships. UCTC fellowships provide support for university fees and living expenses and may be combined with part-time research appointments not to exceed ten hours a week. Academic departments nominate the students on the basis of grades, test scores, letters of recommendation, record of accomplishments, and commitment to a career in surface transportation. Student must have an exceptional record and outstanding potential for a career in surface transportation to receive a UCTC fellowship. Overall fellowship funding is coordinated through the departments in accordance with University and departmental rules to assure an equitable distribution of financial support for top students. A student who is offered a fellowship from another program (e.g., an Eisenhower Fellowship or a UC Chancellor’s Fellowship) is generally not awarded full UCTC funding.

- **Graduate Student Researcher (GSR) Appointments**

Every faculty research project must include support for at least one graduate student at 49% (or 2 GSRs at 25%) during the academic year, with full-time summer salary if funds allow. Currently faculty members are limited to one GSR due to past RABA reductions from authorized funding levels and uncertainty of funding futures. The Executive Committee has concluded that this limitation will continue to be imposed unless actual funding allows a higher level of expenditure. Many faculty members would prefer to support more than one student and UCTC campuses have the students to fill the slots, so we hope that funds will eventually permit fuller funding.

GSRs are considered to be junior colleagues of the principal investigator and other faculty participants and often play a major role in the actual conduct of the research. Graduate student contributions to research projects are acknowledged in any publication resulting from research funded in whole or in part by the Center. The acknowledgment can range from a footnote recognizing the student’s participation and assistance to full co-authorship of reports and articles, depending upon the nature and extent of student contributions.

- **Doctoral Dissertation Grants**

Each year, the UCTC offers up to 10 (occasionally, 11) doctoral dissertation grants. The grants are currently set at $15,000 (plus indirect costs if applicable) however in fall 2009 the amount is to be increased to $20,000. Funding permitting, we envisage increasing awards to $30,000 over two more $5,000 increments. Applications for the grants are due April 1 for funding the next fall, and November 1 for funding in the winter/spring term. The RFP for dissertation grants is maintained on the UCTC website, and notices of impending due dates are sent to faculty associates for distribution. Applicants must be students at the University of California and must be carrying out dissertation research on transportation topics consonant with UCTC’s theme of systems analysis and policy. The applicant must
have advanced to candidacy for the Ph.D. degree prior to the application deadline and must submit a brief synopsis of the dissertation proposal for review, along with a curriculum vita, graduate school transcripts, and a letter of nomination from the student's principal academic advisor. The pool of applications is reviewed by a committee of faculty and/or recent PhD graduates from several UC campuses, appointed by the UCTC Director. Every effort is made to strike a disciplinary balance of reviewers that span both technical and policy arenas. Grants are awarded on the basis of reviewers' assessments of the originality and significance of the research topic, the applicant's overall record of academic and professional accomplishment, and the relevance of the research topic to current issues in transportation policy. The dissertation grant abstracts are listed on our website along with faculty research projects and completed dissertations are published on the website as well.

- **Student of the Year Award**

Each year UCTC Executive Committee members choose a Student of the Year, who is awarded $1000 plus costs to attend the award ceremony held during the annual meeting of the Transportation Research Board (TRB) in Washington, DC each January. The award acknowledges superior academic performance, commitment to transportation research and/or practice, and prospects for contributing to the transportation profession in the future. The Student of the Year for FY 2008-2009 is Doug Houston, who with the help of a UCTC dissertation grant received his doctoral degree from the urban planning program at UCLA and is presently on the faculty of the urban planning program at UC Irvine.

**Technology Transfer**

The UCTC’s technology transfer aims for the availability of research results in a form that a variety of users can readily apply. We view technology transfer as including publications, both on the web and in hard copy; conferences and symposia; policy advising and public service; and outreach efforts to business and community groups and the general public. Continuing education, discussed earlier, is also a tech transfer activity. Our ultimate objectives are to increase public understanding of transportation problems and opportunities for improvement, and to help transportation professionals to address transportation problems using the latest research findings and innovations.

UCTC has made an ongoing commitment to fund 1) The UCLA Lake Arrowhead Conference on Transportation, Land Use and the Environment; and 2) the UCTC student conference, organized by students and rotated among the five campuses with transportation programs. In addition, in 2008-9 UCTC joined with PATH and the other California UTCs to offer a major conference on our research. In spring 2010, the conference will be sponsored solely by California’s UTCs with the focus of the event still to be determined.

Each of these activities is discussed in more detail below.

**Publications**

The UCTC considers publications to be a vital way to communicate our research findings. Each project funded by the UCTC ordinarily produces several papers and reports, which we make available in hard copy form and disseminate as PDFs on the UCTC website.

The results of UCTC faculty research and dissertations are printed in hardcopy and are also made available in electronic form. To date, more than 875 UCTC research papers on transportation planning and policy analysis are available online at [www.uctc.net](http://www.uctc.net). Research areas include transportation and land use, transit-oriented development, transportation finance and pricing, energy and fuel consumption, travel behavior, parking polices, public transit, pedestrian and bicycle planning, urban design, and traffic
operations. Periodically we remind UCTC faculty affiliates to send us their papers produced in whole or in part with UCTC funding. We publish most of these papers or reprints on the UCTC website and provide links to others. UCTC publications and reprints of UCTC-funded journal articles are distributed free of charge. In addition, we post copies of the dissertations funded with UCTC’s assistance (See www.uctc.net.)

Starting in fall 2009, two-page UCTC Policy Briefs will also be prepared from UCTC faculty research projects, targeted at policy-makers and others seeking a short distillation of research findings. Policy Briefs will be prepared by a professional editor in concert with faculty authors.

In addition to research papers, twice a year UCTC publishes ACCESS Magazine, the official magazine of UCTC. ACCESS summarizes UCTC-sponsored work as well as other relevant work at the University of California in a style designed for a general audience. Printed copies of ACCESS are distributed free to over 20,000 readers across the U.S. and abroad. An additional 15,000 readers download access electronically from UCTC’s web site each time it is published. Electronic copies are available at: http://www.uctc.net/access/access.asp

The Managing Editor of ACCESS during Year 21 was Melanie Curry, who works closely with researchers to produce informative, readable articles, even on topics that are highly technical and specialized. Starting with the fall 2009 issue of ACCESS, Professor Donald Shoup of the UCLA Department of Urban Planning will take the helm as the Faculty Editor for ACCESS. After ten years of service as ACCESS’s managing editor, Melanie Curry is stepping down in fall 2009 to pursue graduate studies in transportation planning at UC Berkeley. Under Donald Shoup’s leadership, UCLA will assume the responsibility of soliciting and editing manuscripts as well as the production and distribution of ACCESS starting with the fall 2009 issue. As in the past, guest editors will be looked to for producing specialized issues of ACCESS from time to time.
**Conferences and Symposia**

UCTC grant recipients are expected to participate in conferences and symposia to communicate their research findings to both academics and practitioners. We expect UCTC researchers to give public lectures and seminars in the ongoing events series held at the four campuses, as well as in national and international meetings on transportation research and practice.

The UCTC annually supports the Lake Arrowhead Conference on Transportation, Land Use and the Environment, designed to bring together researchers, practitioners, and elected officials to discuss and debate important policy issues, as well as the UCTC Student Conference, designed to give graduate students the experience of organizing a conference, presenting their work, and discussing the work of their peers. The UCTC also helps faculty members to organize special research conferences and events as opportunities arise, when funds are available. Exhibit 1 highlights some of UCTC-supported events in Fiscal Year 2008-2009.

In 2008-9, UCTC was a co-sponsor of several special conference, seminars, and speaking series that brought together scholars and practitioners on important and contemporary transportation themes and issues. These included: the Martin Wachs Lecture Series, the Women Transportation Seminar, and the speaker series on Growing Sustainably in a Low Carbon World.

Travel to conferences is supported as part of research grants, and each campus is provided a travel fund so that faculty and students can participate in the Annual Transportation Research Board meeting. As funds allow and on a case by case basis, the UCTC also will fund travel to meetings of other learned societies and professional organizations such as the Institute of Transportation Engineers, the American Society of Civil Engineers, the American Planning Association, the Association of Academic Schools of Planning, the American Association of Geographers, the American Political Science Association, and the American Economic Association. In addition, faculty members are provided travel support when they serve on committees for federal, state and local agencies as well as independent organizations such as the National Academy of Sciences.

**Policy Advising and Outreach**

The UCTC encourages its researchers to engage in a variety of public service and professional activities, through which they communicate UCTC-funded research findings to a broad audience. These activities include appointments to committees and boards of federal, state, regional, and local transportation agencies; provision of expert testimony and advice to the Congress, State Legislatures, and regional and local bodies; technical assistance to public and private transportation organizations; and public service on transportation and related matters. When needed and as funds allow, the UCTC provides travel expenses, meeting expenses or other support, including research support, to enable faculty to provide these public services. Upon request, UCTC faculty members also work with the news media to provide research findings, data, and expert opinions for articles and reports on current transportation issues. In addition, UCTC sets aside funds to respond to requests of policy officials at all levels of government to address contemporary issues in the transportation field. See Exhibit 2 for UCTC’s policy-related tech transfer activities in Fiscal Year 2008-2009.
Exhibit 1. UCTC-Supported Conferences (Year 21)


This annual conference brings together over 250 policymakers, staff, and researchers to discuss the policy implications of transportation research conducted at five California University Transportation Centers and PATH. The two-day conference has been designed to bridge research and practice, with presentations, a poster session, and ample time for participant comments, questions, and discussion.

The year’s event was entitled, “Tackling Congestion in an Era of Climate Change” Cities around the world are facing tremendous challenges related to mounting traffic congestion and its impact on climate change, safety, quality of life and overall system performance. This year’s conference tackled these critical issues through presenting new directions in congestion management research and practice. The topic was examined from all angles — technology, policy, planning, engineering, social and environmental effects, institutional barriers, and finance.

UCTC Advisory Committee members played a prominent role with Gail Goldberg, planning director of the City of Los Angeles as the keynote speaker and Larry Orcutt of Caltrans participating on panels. UCTC-affiliated faculty also gave presentations including UCLA Professors Anastasia Loukaitou-Sideris and Brian Taylor, UC Riverside Professor Matt Barth, UC Santa Barbara Professor Kostas Goulias, UC Irvine Professors Stephen Ritchie and Wen Long Jin, UC Berkeley Professors Michael Cassidy and Alex Skabardonis, and UCLA/UC Berkeley Professor Emeritus Martin Wachs.

Approximately 200 attendees were at the event, including 100 practitioners representing Caltrans, local government and non-profit and private organizations as well as 100 students, faculty and researchers.
Exhibit 1. UCTC-Supported Conferences (Year 21) continued

- **Annual UCLA Lake Arrowhead Conference. October 19-21, 2008**

  The UCLA Lake Arrowhead conference is held annually and attended by approximately 100 policymakers and staff. Elected officials, senior staff and researchers attend and provide presentations related to the conference’s overall theme of transportation, land use and the environment. This year’s conference was entitled, “The Future of Cities and Travel.” Over the course of the two and a half day event, conference attendees explored the many factors affecting the transportation system and their use, and examined future trends in land development. UCTC faculty Professor Brian Taylor of UCLA and Professor Jay Jayakrishnan UC Irvine were conference presenters. Approximately 85 practitioners and policymakers and 15 faculty and students were in attendance.

- **Martin Wachs Distinguished Lecture in Transportation, UCLA and UC Berkeley. October 17, 2008**

  Now in its third year, the annual Martin Wachs Distinguished Lecture draws innovative thinkers to the University of California to address the most pressing issues in transportation. Created by graduate students to honor Professor and former UCTC Director Martin Wachs upon his retirement from the University, the lecture rotates between Berkeley and UCLA, the campuses at which Professor Wachs taught. Professor Susan Hanson of Clark University delivered this year’s lecture entitled, “Gender and Mobility: A Feminist Geographer's Perspective.” The lecture was followed by commentary from prominent local practitioners, Therese McMillan, Deputy Executive Director of Policy of the Metropolitan Transportation Commission and Celia Kupersmith, Director and Chief Executive Officer of the Golden Gate Bridge, Highway, and Transportation District. Approximately 75 attendees were at this year’s event with about half as practitioners and the other half representing students and faculty. The overall lecture fund is supported by contributions from UCTC and the significant generous donations from students, alumni, organizations and others.

- **Lecture by Professor Emeritus Allan Jacobs, UC Berkeley. November 21, 2008**

  Professor Emeritus Professor Allan Jacobs gave a distinguished lecture at UC Berkeley entitled “Curitiba, Brazil: Twenty-Five Years of Planning and Developing: Tendency is Not Destiny: Make Each Day Better Than The Last.” The lecture reflected on Professor Jacobs’s early research on and professional experience working in Curitiba, Brazil, a city well known for its bus rapid transit system and integrated land-use planning. The lecture focused on what the transportation and city planning community can learn from the remarkable 25 year plus period of planning, designing, building, social programming, including successes, failures, and, the mindset of its leaders. Approximately 150 attendees were at the event with three-quarters attended by practitioners and the other quarter by students and faculty.

UCTC co-sponsored an eight-event speaker series on California’s landmark legislation, Senate Bill 375 that seeks to promote integrated transportation and land development as a means toward reducing sprawl and achieving the state’s ambitious greenhouse gas emissions reduction targets. More than 40 speakers from across the country, spanning both academia and professional practice, including Mark DeSaulnier (State Senator and co-sponsor of SB 375), Peter Calthorpe of Calthorpe and Associate, Reid Ewing of the University of Utah, and Carol Whitehead of the Great Valley Centre, interacted with hundreds of audience members to discuss and debate sustainable community strategies for reducing carbon emissions. A DVD of the highlights of the event is available from the Center for a Sustainable California at the Institute of Urban and Regional Development at UC Berkeley: http://iurd.berkeley.edu/
The 15th Annual University of California Transportation Center (UCTC) Student Conference was held by CE-CERT’s graduate students on February 12th and 13th, 2009. The total number of participants was 126, which included 118 from UC schools, and others from private and state universities as well as outside industry. The goal of the conference was to welcome academia and professionals to share their research in the field of transportation. The participants from engineering, planning, and many other fields were encouraged to interact with one another.

On the opening night at CE-CERT, students and faculty from the UC campuses filled the training room to listen to a talk by Mr. Wolfgang Hall, who is a Principle Consultant at ESRI. Mr. Hall’s lecture include demos on geographic information systems (GIS) in transportation. His talk was well-received by faculty and students, stimulating a lot of discussions afterward.
Exhibit 1. UCTC-Supported Conferences (Year 21) continued

- UCTC Student Conference, UC Riverside. February 12-13, 2009 continued

On the second day, the conference took place at the new UC Riverside New Commons Building. The conference started with a plenary session given by faculty from the UC system and professionals from Caltrans. Following the plenary session, the faculty research session featured presentations by a number of faculty from UC Berkeley, UC Davis, UCLA, UC Irvine, and CSU San Bernardino. The luncheon talk was given by Professor Charles Wyman, on “Powering Sustainable Transportation by Plants.” After lunch, the students held a poster presentation where there were over 32 participating posters. The posters were judged by faculty and Caltrans government administrators. Finally, Julie Kang, who is a UCR graduate student in the department of psychology, got the best poster award and Anh Vu, a graduate student in Electrical Engineering received second place. The student presentations took place after the poster presentation, where students from the UC campuses and USC shared some of the work and results that they performed in transportation. During the dinner event, Professor Mohan Trivedi from UCSD presented “Human Centered, Holistic Systems for Safer and Smoother Traffic” as the Mel Webber memorial annual lecture.

The conference received many positive responses and was a tremendous success thanks to the graduate students and the CE-CERT staff who put in the time to organize the conference and to the sponsors who funded the conference.
Exhibit 2. UCTC-Supported Policy-Related Tech Transfer Activities (Year 21)

- **California Growth Project. Requested by the California State Legislature.**

  California’s population is anticipated to reach 50 million in the next 15 to 20 years. This study examined how California could accommodate this growth while also recognizing the huge impact this growth will have on climate change, infrastructure, social services, and land development, among other critical issues. Several University of California faculty researchers participated in this effort, publishing their findings in widely read and well-received articles related to transportation for UCTC’s *Access* magazine in 2008. These included:

  - Elizabeth Deakin, “California Futures: Accommodating Growth in an Era of Climate Change and Rising Fuel Prices” (*Access* # no. 32)
  - Marlon Boarnet, “Transportation Infrastructure and Sustainable Development: New Planning Approaches for Urban Growth” (*Access* # no. 33)
  - Adib Kanafani, “Multimodal Transportation in California: Connecting Trains, Planes and Automobiles” (*Access* # no. 33)

- **Sustainable Transport Project. Requested by the California Department of Transportation, City of Berkeley, and California Air Resources Board.**

  This sustainable transport project had two distinct components related to sustainable transport and climate change: 1) what makes public transit a success in an era of uncertain revenues and climate change, and 2) what are potential avenues can cities take to develop policies to reduce transportation-related greenhouse gas emissions as they respond to SB 375 and AB 32. Abstracts from the two papers produced are provided below.

  - **What Makes Public Transit a Success? Perspectives on Ridership in an Era of Uncertain Revenues and Climate Change**

    This paper examines perspectives on what makes transit a success and the role of ridership levels in that assessment. We draw upon the literature, discussions with experts and elected officials, and interviews with transit managers in the San Francisco Bay Area. We identify the considerations that lead to policies that urge transit agencies to expand, and those that raise operator concerns about such growth. The researchers and policy makers we interviewed saw transit’s prospects quite differently from transit managers and senior staff. The researchers and policy makers believed that transit agencies could increase ridership at reasonable cost by optimizing networks, matching services to markets, adjusting schedules, adopting
Exhibit 2. UCTC-Supported Policy-Related Tech Transfer Activities (Year 21) Continued

new technologies, expanding service to new areas, partnering with local government and the private sector, and encouraging transit-oriented development. Transit agency managers, in contrast, felt strongly that simply keeping their existing systems running was a major challenge, especially in light of funding constraints. Operating current services well and keeping current customers happy were their key objectives. This gap in expectations was widened by current methods of transit finance, which are both uncertain and demanding of staff time. This suggests that relieving funding pressures will be a necessary first step if transit operators are to be asked to take on larger social roles, such as helping to mitigate global warming in a significant way. Market segment studies, partnerships with other agencies and the private sector and demonstration projects also could help transit agencies to increase ridership in financially responsible ways.

• Bridging the Gap between Local Greenhouse Gas Inventories and Policies

This study reviews California cities' efforts to formulate policies to reduce transportation-related greenhouse gas emissions. It also reviews the methods cities are using to forecast impacts of planned interventions. City emissions inventories show that transportation is a major source of urban CO2 emissions, and much of that transportation is local. A number of cities have begun to switch to lower carbon vehicle fleets and fuels as a way of cutting emissions. However, relatively few cities have explicitly tied local transport investments or development policies to strategies that reduce emissions. Even fewer have developed monitoring and evaluation programs to assess performance of the interventions. A major concern for many cities is that the cost of such evaluations could be out of scale with the modest impacts of the interventions.

• Transportation and Urban Development Images Project. Continuation of multi-year project supported by project sponsors.

This project digitizes and makes available several thousand high quality transportation and city images collected by a number of photographers, including a large collection of photographs of UC Berkeley Professor Allan Jacobs. Digital copies of these slides are available for use by all UC campuses through the College of Environmental Design Library at Berkeley. It is hoped and expected images will appear in future publications by UC researchers, Access magazine, and UCTC’s web site, among other venues. The next page shows several of the digitized images that have been catalogued.
Digitized images from the photo collection of Professor Allan Jacobs, UC Berkeley. Left: main street in Carmel, California, 1960s; Right: Jacobs’s plan view drawing of street grid in San Francisco’s Noe Valley.

Digitized image from the photo collection of Allan Jacobs, showing a freeway in San Diego spanned by local streets connecting adjoining neighborhoods.
3. MANAGEMENT STRUCTURE AND CENTER STAFF

The University of California Transportation Center is a multi-campus center currently headquartered on the Berkeley campus of the UC system. Center personnel include a half-time director who also is a faculty member, plus a small administrative and editorial staff. Direction for the UCTC comes from a faculty Executive Committee constituted by faculty members from each of the five main UC campuses, also serving in the role as Associate Directors. Coordination with other California Transportation Centers and with our Caltrans sponsor takes place through meetings held three times a year (once at each of the three California UTCs.) The UCTC also draws upon a variety of institutional resources at participating campuses, including the administrative services of researchers’ academic departments and research institutes, whose support is donated. See Figure 1 for an organizational chart of UCTC.

Center Director

Professor Elizabeth Deakin of the Dept. of City and Regional Planning at UC Berkeley served as the UCTC Director through the end of February 2009, having served in this capacity for ten years. Prof. Deakin has been a member of the faculty at the University since 1985 and has had additional affiliations with the Civil Engineering, Urban Design, and Energy Resources groups for much of that time. Her interests include transportation and land use, transportation policy, and the social, economic, and environmental impacts of transportation. In March 2009, Professor Robert Cervero of the Department of City and Regional Planning at UC Berkeley took over the helm from Professor Deakin. Professor Cervero has been a faculty member since 1980 and maintains affiliations with Civil Engineering and the Energy Resource Groups. His interests span the areas of sustainable transportation systems, transportation and land use interactions, and comparative international analyses of infrastructure investments. During 2009, Professor Cervero is serving as Interim Director of the Institute of Urban and Regional Development. The familiarity of both Professors Cervero and Deakin with the University and the UCTC’s partners facilitates their management of the UCTC.

Figure 1. Organizational Chart of UCTC, Summer 2009
Executive Committee

The UCTC Executive Committee is a faculty committee that sets the overall policy direction for the Center and assures coordination with the major transportation research and education groups on the various campuses. The Executive Committee consists of the UCTC Director plus faculty representatives of the five UC campuses, spanning the directorships of the various campuses’ Institutes of Transportation Studies or their representatives as well as other transportation-related institutes. This representative membership facilitates information exchange about education programs, recruiting, and other academic matters and aids in the coordination of research among the campuses and research units. Members of the Executive Committee for 2008-2009 were:

- **Robert Cervero**, Professor of City & Regional Planning, Institute or Urban and Regional Development (2008) representative and UCTC Director (2009), UC Berkeley
- **Elizabeth Deakin**, UCTC Director (2008), Professor of City & Regional Planning, UC Berkeley
- **Samer Madanat**, Director, Institute of Transportation Studies, Prof. of Civil and Environmental Engineering, Berkeley (2008-2009)
- **Steve Ritchie**, Director, Institute of Transportation Studies, Prof. of Civil and Environmental Engineering, UC Irvine (2008-2009)
- **Brian Taylor**, Professor of Urban Planning and Director of Institute of Transportation Studies, UCLA (2008-2009)
- **Kostas Goulias**, Professor of Geography, UC Santa Barbara (2008-2009)
- **Matthew Barth**, Professor of Electrical Engineering, UC Riverside (2008-2009)

The Executive Committee is responsible for 1) establishing the theme for the Center as set forth in the UCTC strategic plan, 2) advising and assisting the director in the development of the strategic plan, which establishes the allocation of funds among research, education, and technology transfer programs, 3) working with the Director in consultation with USDOT, Caltrans, and transportation advisors to identify and designate specific subject matter priorities for research funding in a particular year, 4) setting rules for allowable expenditures on research projects, consistent with USDOT and Caltrans requirements, 5) conducting an annual review of the Center’s overall performance and resources, and redirecting funds and activities as necessary, and 6) when the Directorship of the UCTC becomes vacant, selecting a new director for UCTC.

Members of the UCTC Executive Committee meet in person at least once a year and transact business in the interim through telephone conference calls and e-mail. The Executive Committee’s time is donated.

Center Faculty

Faculty affiliates of the UCTC are individuals throughout the UC system who participate in the research, teaching, and continuing education programs funded by the UCTC. We maintain contact with our faculty affiliates by inviting them to participate in our research, education, and technology transfer programs, by coordinating UCTC research with other research activities these faculty members are conducting, and by providing them with publications and other information services. Table 1 lists current faculty affiliates. The list is updated annually and is posted on the UCTC website, [www.uctc.net](http://www.uctc.net), with full addresses, telephone and fax numbers, and email addresses.
Staff

UCTC maintains a small staff, located at the UCTC headquarters office at 2614 Dwight Way, 2nd Floor Berkeley, CA 94720-1782. (See: http://www.uctc.net/contact.shtml). The staff members in Fiscal Year 2008-9 were:

- **Elizabeth Deakin** (July 2008-February 2009), Professor of City and Regional Planning, Director (half time plus summer salary)
- **Robert Cervero** (March 2009-present), Professor of City and Regional Planning, Director (half time plus summer salary)
- **Karen Frick**, Assistant Director (50% time). Dr. Frick has been in charge of tech transfer and education activities since joining the UCTC staff while also assisting the Director on special projects.
- **Melanie Curry**, Editor (60% time.) Ms. Curry was the managing editor responsible for ACCESS (UCTC’s twice-yearly magazine) in Year 21; these functions will shift to UCLA, under the leadership of Professor Donald Shoup, starting in fall 2009.
- **Webmaster.** Assistance has been obtained as needed under purchase order. Starting in the summer of 2009, web management and information-technologies functions will be carried out by professional staff from UC Berkeley’s Institute of Transportation Studies. Web management functions are being carried out by Ms. Phyllis Orrick while Mr. Gregory Merrick is responsible for information-technology services.
- **Student Assistants.** Undergraduate students are hired to provide clerical support, reporting to the Assistant Director.
- **Accounting and Personnel Staff.** UCTC Headquarters accounting and personnel support is provided by the business-service staff of the Institute of Transportation Studies, UC Berkeley. All other campus-based research, education, fellowship and tech transfer accounting and personnel services are provided by participating research units and departments.
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4. INSTITUTIONAL SUPPORT

UCTC’s success depends on our strong working partnership with the California Department of Transportation (Caltrans), as well as on the broad support we receive from the University of California. The UC Office of the President, the administrations of the various campuses, the research institutes and departments of those campuses that offer transportation degrees, and the faculty who participate in UCTC activities all contribute to UCTC’s activities. Because the UCTC can rely on this substantial institutional support, we are able to devote most of our funding to the direct costs of research, education, and technology transfer.

Caltrans Support of UCTC

As it has done since the UCTC’s inauguration, Caltrans matched US Department of Transportation (US DOT) funds dollar-for-dollar. The new agreement, signed in April 2007, provides for match through FY 2011.

UC Support

Since the creation of the Center, the University of California has waived overhead on the matching funds from Caltrans, recognizing the vital educational objectives of the UCTC program and noting that Caltrans funds UCTC’s administration and participates in shaping, but does not control, the research agenda. The University again has waived overhead on Caltrans matching funds for the new grant signed earlier this year. In addition, the University provides administrative services, but does not charge overhead on the portion of USDOT funds used for fellowships.

The University has made an even larger commitment to transportation research and education programs through its permanent financial support for faculty positions in transportation. The US DOT now requires a $400,000 commitment in regularly budgeted institutional funds for a university to be eligible for Center designation; salaries and benefits for the full-time faculty members who conduct transportation research at Berkeley alone greatly exceed that amount.

The UCTC depends upon the support of several academic departments and research institutes for most of its day-to-day operations. The departments and research institutes manage education grants, fellowship funds and research grants, and contribute the office and laboratory space, instructional facilities, computational equipment, accounting services and other administrative support needed to carry out these programs and activities. Most of this support is provided without charge. The Institutes of Transportation Studies at Berkeley and Irvine, the Lewis Center / ITS at UCLA, the Institute of Urban and Regional Development at Berkeley, the Department of Geography at UC Santa Barbara, and the UC Riverside CE Center for Environmental Research and Technology (CE-CERT) provide research administration and support for UCTC grants.

UCTC faculty and students also benefit from their access to University computer, data, and library resources. The University is a federal data repository and has developed extensive capabilities to support the efficient retrieval and analysis of information from a variety of sources. A US Census Center at UC Berkeley makes this important data source far more accessible. Our computer facilities include advanced software for modeling, analysis, and data display. A major resource is the University of California library system. We are especially proud of the Harmer E. Davis Library of the Institute of Transportation Studies at Berkeley, which houses one of the largest collections of transportation materials in the world and provides a wide range of support services to UCTC faculty and student researchers on all campuses.
Finally, faculty members’ time commitments are a substantial source of support for UCTC. Faculty members typically hold nine-month (academic year) appointments that are fully funded by the University. They are expected to spend a substantial portion of this University time on research. Consequently, UCTC faculty grant recipients typically devote a third or more of their time during the academic year to their research projects. The UCTC itself funds only a portion of their summer salaries. The UC-funded time on research multiplies the UCTC’s salary support for research by a factor of three or four.

Participation in the governance of the UCTC is a second way that faculty time is donated. Faculty members serve on the Executive Committee, on committees that review fellowship applications and dissertation grant proposals, and on ad hoc committees formed to develop conferences, workshops, and other outreach activities. All of this service is provided all free of charge to UCTC.

Likewise, students with fellowships from the University, from NSF, and from a variety of other sources often participate in UCTC projects without being paid with UCTC funds. UCTC funding is amplified by the pairing with these other funding sources.

**Research Partnerships**

The UCTC works closely with the following research centers to coordinate research. It is our intent to complement and sometimes to jointly fund research projects while avoiding duplication.

**PATH**

California Partners for Advanced Transit and Highways (PATH) is a multi-disciplinary program headquartered at Berkeley with staff, faculty and students from universities statewide, and cooperative projects with private industry, state and local agencies, and non-profit institutions. PATH's mission is to develop solutions to surface transportation systems problems through cutting edge research and development in the fields of information technology, electrical engineering, mechanical engineering, economics, transportation policy and behavioral studies. Research is organized into program areas: Traffic Operations, Transit Operations, Transportation Safety, and Behavioral Studies.

**CCIT**

The California Center for Innovative Transportation (CCIT) was founded by the University of California and the California Department of Transportation to facilitate the development, commercialization and deployment of promising transportation technologies and systems. It is headquartered at UC Berkeley.

**NEXTOR**

The National Center of Excellence for Aviation Operations Research (NEXTOR) is a consortium sponsored by the Federal Aviation Administration (FAA), consisting of UC Berkeley, the Massachusetts Institute of Technology, the University of Maryland at College Park and Virginia Polytechnic and State University. Research areas addressed by NEXTOR include advanced air traffic management systems, air traffic safety and security, and the performance and productivity of the nation's aviation system.

**Pavement Research Center**

The Pavement Research Center (PRC) is an international authority on pavement structures, materials, and technologies. The PRC’s core mission is to research questions for the California Department of Transportation pertaining to the design, construction, rehabilitation and maintenance of the state's 75,000-lane-kilometer network of roads. PRC has branches at both UC Berkeley and UC Davis.


Traffic Safety Center

The Traffic Safety Center (TSC) is a joint venture of the Institute of Transportation Studies and the School of Public Health at UC Berkeley. Its goals are to reduce traffic fatalities and injuries through multi-disciplinary collaboration in education, research, and outreach, and to make traffic safety information widely available. The Center’s fields of research include pedestrian safety, passenger safety, and safe mobility for older drivers, and cost-benefit analysis of traffic safety interventions.

Volvo Center for Future Urban Transport

The UC Berkeley Volvo for Future Urban Transport was established in 2004 with funding from the Volvo Research and Educational Foundations after a competition involving a large field of international candidates. The Center's mission is to study the mutual interdependence of urban transportation policy and technology and use the understanding of that concept to devise sustainable transportation strategies for the world's cities. Faculty and students from several engineering departments and from City and Regional Planning are the core researchers.

Center for Global Metropolitan Studies

The Center for Global Metropolitan Studies is a new initiative on the Berkeley campus involving 70 faculty members from a dozen departments. The interdisciplinary center carries out research and outreach and supports teaching on urban and metropolitan problems and opportunities worldwide. Transportation is a significant subject of analysis for GMS and several projects are being provided support by UCTC in the form of office space. In turn, UCTC will publish the results of the work. Faculty members from other campuses participate in GMS activities including research projects and conferences.

Sustainable Transportation Research Center

The Sustainable Transportation Research Center is the newest transportation research initiative at Berkeley, jointly sponsored by ITS, UCTC, the Global Metropolitan Studies Center, the UC Energy Institute, and the UC Berkeley Energy and Resources Group. The center’s mission is to find effective responses to the energy and environmental challenges facing transportation systems world-wide while also assuring that they are equitable, economic, and a significant contributor to the quality of life for all.

Center for a Sustainable California

This newly established center under the Institute of Urban and Regional Development at Berkeley is devoted to advancing economic and environmental strategies that place the state of California on a more sustainable pathway. Its focus is on promoting low-carbon cities and transportation systems and linking major infrastructure investments, like California’s planned High Speed Rail system, with urban development strategies that enhance accessibility and promote sustainable mobility options.

Other Partnerships

The UCTC benefits from additional partnerships with other UTCs located in California. Two other University Transportation Centers have successfully competed for UTC designation, the Mineta Center at California State University, San Jose and METRANS - the Center for Metropolitan Transportation
Studies at the University of Southern California in Los Angeles. In addition, Congress designated two additional new centers in California, at UC Davis (as noted earlier) and at Cal State San Bernardino (the Leonard Center). Caltrans has agreed to provide matching funds to all five centers. To coordinate our efforts, the Center Directors and key administrators meet together with Caltrans staff three times a year, with the meeting location rotating among campuses. UCTC invites both faculty and students from the other centers to participate in the annual student transportation conference that we sponsor, to join us at conferences and symposia, and to exchange research results.

UCTC also benefits from the advice and participation of transportation professionals drawn from a variety of public and private organizations. Over 200 individuals outside the UC system are on our reviewer list and over one-quarter of them participated in reviews during the latest grant cycle. About half of the reviewers are from other universities; 20 percent are from federal, state and regional agencies, and thirty percent are from the private sector. In addition, UCTC has received funding from several private firms to help support conferences and workshops.
5. ACCOMPLISHMENTS IN 2008-9

Highlights for the 2008-9 grant year at UCTC include the following:

- During 2008-9, UCTC researchers completed 12 projects and made progress on an additional 19.

- UCTC researchers published. The final papers from these projects are published on the UCTC website and many are also published in journals. Additional papers from previously completed projects also are published by UCTC, making the final report but one of a number of products from UCTC research.

- Faculty members from five UC campuses and 8 academic departments submitted 23 proposals in response to the RFP for the 2008-9 grant cycle. Sixty two individuals served as reviewers, with 34 from universities, 12 from private firms, 2 from nonprofits, 9 from Caltrans, 2 from USDOT, and 3 from other government agencies. Our outside reviewers rated the majority of the 2008-9 proposals as very good or excellent. However, we were able to fund or partly fund only the 15 most highly ranked proposals. The new project awards went to faculty at Berkeley (7), Irvine (3), Los Angeles (2), Riverside (2), and Santa Barbara (1) campuses.

- The UCTC awarded dissertation grants to 9 UC students, selected from the 15 applications received. Previous UCTC dissertation grant winners served as the reviewers for these awards. The grants went to PhD students at Berkeley (4), Los Angeles (2), Irvine (1), Riverside (1), and Santa Barbara (1).

- The UCTC provided $1.44 million in graduate student fellowships, dissertation grants, and in-state fees for graduate student researchers (GSRs), or about 43% of the UCTC budget. GSR salaries and benefits brought the student share of the total UCTC budget to 58%.

- UCTC-affiliated transportation programs awarded 90 new Masters and 25 new PhD degrees, and retained high levels of undergraduate enrollments in transportation courses. Our graduates have joined private transportation firms, universities, nonprofits, and federal, state, and local government agencies.

- The UCTC added 36 research papers to our website (Table 2). The UCTC website was visited some 290,000 times in FY 2008-2009 and some 240,000 papers and reports were downloaded.

- We published two more editions of ACCESS, our transportation magazine, and distributed 20,000 hard copies to readers across the US and overseas. However, more than twice as many readers obtained ACCESS electronically than in hard copy this year—ACCESS downloads totaled 54,000. The ACCESS magazine web page recorded 69,400 hits in FY 2008-2009.

- The UCTC co-sponsored the annual Lake Arrowhead conference, organized by the UCLA Public Policy Extension. The October 2008 event focused on the role of planners, forecasters, and policymakers as change agents in preparing for uncertain futures.

- The Second Annual Martin Wachs Distinguished Lecture in Transportation was held at Berkeley in October 2008. Prof. Susan Hansen of Clark University gave the keynote address. The Wachs Lecture was established in honor of Emeritus Professor Marty Wachs, who taught for many years first at UCLA and then at Berkeley, by his former students.
• UCTC hosted the joint California UTC-PATH research conference in Los Angeles. The multiday conference was attended by over 350 participants from the UTCs, PATH, Caltrans, other state agencies, transit operators, city governments, federal agencies, nonprofits, consulting firms, and other private sector organizations.

• Faculty members and graduate students affiliated with UCTC presented over 100 papers at sessions of the annual meeting of the Transportation Research Board in January 2009. UCTC’s faculty affiliate, Dr. Adib Kanafani, took over as the 2009 Chairman of the TRB Executive Committee.

• Doug Houston was elected the University of California's Student of the Year for 2008-2009. Doug received his Ph.D. degree from UCLA in 2008. His research focused on the near-roadway air pollution impacts of goods movement and transportation corridors, showing that health impacts are highly concentrated immediately downwind of major roadways. Doug is currently an Assistant Professor in the Department of Urban Planning at UC Irvine.

• Graduate students from UC Riverside organized the February 2009 UCTC Student Conference, with Professor Moshan Trivedi of the Electrical and Computer Engineering program at UC San Diego giving the Mel Webber Lecture.

• UCTC faculty affiliates Adib Kanafani, Robert Cervero, Elizabeth Deakin and David Dowall prepared papers and briefed staff at a workshop in Sacramento attended by over 40 legislative staff and agency department heads.
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6. RESEARCH PROJECT STATUS

A total of 30 projects were underway at the University of California Transportation Center (UCTC) in 2008-9 and are summarized here.

While UCTC projects are designed to be one year in duration, extensions may be granted for good cause. Most commonly, extensions are requested when funding reaches the UC campus considerably after the school term has already begun, making it difficult to arrange student appointments until the following term. That has been the case for UCTC for the last several years because of late or two-phase receipt of funding.

UCTC began its 21st year, 2008-9, with 16 projects carried forward (1 from Year 18, 5 from Year 19, and 10 from Year 20). An additional 15 new projects were selected for Year 21 funding. During the year, the one Year 18 project, 3 of the Year 19 projects and 5 of the Year 20 projects were completed. In addition, 5 of the Year 21 projects were completed. Hence a total of 14 projects were completed. The other 16 projects were carried forward into Year 22 (Table 3).

In the pages that follow, the projects completed this year are presented first, in order of date of award year. Then the projects that are continuing are presented, also in order of date of award. Note that some of the projects new this year (UCTC Year 21) fall into the completed category and some into the continuing category.
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<td>Ken Small, UC Irvine</td>
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<td>Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge</td>
<td>Brian Taylor, UCLA</td>
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A) PROJECTS COMPLETED IN YEAR 21 (2008-9): 13 PROJECTS


A.1.1. Project Title: Emission and Air Quality Impacts of New Diesel Engine Control Technologies (YEAR 18)

Principal Investigator: Robert Harley
University: UC Berkeley
Email: harley@ce.berkeley.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Diesel engines are now responsible for half or more of the total nitrogen oxide (NOx) and exhaust particulate matter (PM) emissions from on-road vehicles nationally. There has been recent progress in developing control technologies such as selective catalytic reduction, lean NOx traps, NOx storage catalysts, and diesel particulate filters. Although these technologies have not yet been widely deployed in on-road vehicles, their use will soon be required due to new heavy-duty engine emissions standards that will take effect in the U.S. starting with the 2007 model year. In this research, we will review control technologies available for future use, assess control efficiency, cost, durability and robustness in service, and the potential for undesirable side-effects on exhaust emissions. Emissions estimates will be developed for historical, current and future year scenarios that span a 20-year time period. We will use a 3-D photochemical model to predict the effects of changes in vehicle emissions on air pollution levels in the Los Angeles area.

Key Words: air pollution, diesel, emission controls, nitrogen oxides, particulate matter

Objective: Assess changes in emissions and air quality likely to occur in the next 10 years due to new emission control requirements for diesel engines.

Tasks: Task 1: Review of new diesel exhaust control techniques; Task 2: Estimate emissions for historical, current, and future year scenarios; Task 3: Assess air quality impacts of changing emissions in the Los Angeles area


Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project

Potential Benefits: Quantify expected improvements in air quality over the next decade as a result of major investments in diesel emission control technologies.

Papers to Date: None

Conferences Attended to Date: WCTR Berkeley, Fall 2007

Direct Cost: $44,834

A.2.1 Project Title: Robust Traffic Assignment via Convex Optimization (YEAR 19)
Principal Investigator: Laurent El Ghaoui
University: UC Berkeley
Email: elghaoui@berkeley.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: The static traffic assignment problem with deterministic demand is often formulated as a linear, or, more generally, convex optimization problem. It has long been recognized that various uncertainties may affect the input data, such as origin-destination demands, or network topology. In turn, these uncertainties may greatly deteriorate the optimality of solutions to the traffic assignment problem. Thus, it is desirable to obtain a traffic assignment that is robust with respect to uncertainties affecting the model. Recently, new approaches to decision-making under uncertainty have been proposed, under the name of robust optimization. The methodology has been successful in many areas of engineering, such as communications, filter design, control systems, and also in machine learning and statistics. The goal of this project is to evaluate the potential benefits of using a robust optimization approach in the context of traffic assignment, both for static and dynamic problems. It is expected that the proposed approach will provide a traffic assignment methodology that provides solutions that are far more robust than the original ones, yet give up relatively little in terms of performance. A more long-term potential benefit is that our research contributes to the growing interplay between robust optimization and transportation research.

Key words: Traffic assignment, robustness, optimization

Objective: The goal of this project is to evaluate the potential benefits of using a robust optimization approach in the context of traffic assignment, both for static and dynamic problems.

Tasks: Analyze the traffic optimization problem with uncertain demand through robust optimization techniques; Report on the results on simulated data.

Milestones, start and end dates: Wrote a report in July 2009; Expect to submit this to Transportation Research within two months.

Student Involvement: One graduate student participated in the research.

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: New project.

Potential benefits: With the budget cuts across California, a large number of cities are redesigning bus routes. Therefore the traffic assignment problem becomes an important component of a more efficient and budget-conscious traffic plan.

Papers to Date: The work is in the process of being submitted.

Conferences Attended to Date: SIAM Conf. Optimization (2008) where the main ideas were presented.

Direct Cost: $70,240
A.2.2 Project Title: Approach to Real-Time Commercial Vehicle Monitoring (YEAR 19)
Principal Investigator: Stephen Ritchie
University: UC Irvine
Email: sritch@uci.edu
External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Vehicle classification algorithms allocate vehicles to predefined classes based on selected vehicle characteristics. Such algorithms have important applications in travel forecasting, goods movement studies, road design and maintenance, traffic flow modeling, and more. We will collect a large and unique dataset of commercial vehicle (CV) signatures using conventional inductive loops and a new wireless sensor with potential for cost-effective and widespread use. The data will be used to develop detailed, accurate vehicle classification algorithms for CVs, and will provide important insights into the strengths and limitations of a new wireless traffic sensor.

Key Words: vehicle classification, algorithms, commercial vehicles, inductive loops, wireless traffic sensor,

Objective: Collect a dataset of commercial vehicle signatures and development accurate and detailed commercial vehicle classification algorithms, utilizing a new traffic sensor

Tasks:
Task 1: Design of data collection setup, and assemble equipment.
Task 2: Collect signature data and video data at both locations.
Task 3: Investigate signature preprocessing requirements for Sensys data.
Task 4: Ground truth vehicle signature data.
Task 5: Investigate feature correlation and error analysis for vehicles belonging to similar classes for both loop and Sensys data.
Task 6: Develop vehicle classification algorithm for Sensys data.
Task 7: Develop improved vehicle classification algorithm for loop data.
Task 8: Recommendations for potential of loop and Sensys sensors for vehicle classification applications.
Task 9: Develop commercial vehicle re-identification model for Sensys to Sensys and loop to Sensys sensors.
Task 10: Final Summary Report.


Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project

Potential Benefits: New insights into the structure and formulation of improved vehicle classification algorithms for commercial vehicles, and development of more accurate and detailed vehicle classification algorithms

Direct Cost: $57,349

A.2.3 Subcontracting Decisions in California Highway Procurement Contracts (YEAR 19)
Principal Investigator: Justin Marion and Gil Richard
University: UC Santa Cruz
Email: marion@ucsc.edu; rgil@ucsc.edu
External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

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Abstract: Theories of the firm suggest that problems such as contractual incompleteness and hold-ups lead firms to produce inputs in-house rather than purchasing them from potentially more efficient suppliers. Repeated interactions between firms and their suppliers are often thought to relieve such problems, as the risk of putting in jeopardy future business opportunities often outweighs the short-run gains from providing suboptimal levels of non-contractible output or holding up production to capture more rents. This research empirically examines the role of relationships, in the form of repeat interactions, between contractors and subcontractors in the California state highway procurement market. Data from auctions awarding highway construction and repair contracts will be used to assess several questions. First, what determines relationship formation? Second, how do such relationships improve firm productivity? Third, how do these relationships lead to improved performance after the contract is awarded? These results will be discussed in the context of Caltrans policies, such as affirmative action programs.

Key Words: Highway procurement, subcontracting, relational contracting.

Objective: The goal of this research is to provide insight into relationships between contractors and subcontractors, including factors influencing their formation, and how they affect firm efficiency and performance.

Tasks:
Task 1: Collect data on prices charged for items within contracts, and the actual value of subcontractor payments
Task 2: Data management including creating tracking variables for subcontractors across projects, generating contractor-subcontractor relationship measures, and generating geocoded firm locations and distance measures. Task 3: Statistical and economic analysis, including estimating determinants of relationship formation, how relationships impact firm costs, and how relationships affect project performance. Task 4: Write final report.


Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project

Potential Benefits: Better understanding of the impact of current and future policies relating to subcontracting, an important component of the production decision of highway construction firms.

Direct Cost: $58,641


A.3.1. Project Title: Are TOD’s Over-parked? Exploring Housing, Neighborhood, and Environmental Impacts (YEAR 20)
Principal Investigator: Robert Cervero
University: UC Berkeley
Email: robertc@berkeley.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O St., MS #83, Sacramento, CA 95814, tel. 916-657-4723

Abstract: Recent studies on car ownership levels and vehicle trip generation rates suggest that many large-scale housing projects near urban rail stations are “over-parked” – more parking is provided than is needed. This can drive up the cost of housing, consume valuable land near transit stops, and impose such environmental costs as
increased impervious surface area. Part of the blame for the over-supply of parking in transit-oriented developments (TODs) could be the reliance on ITE parking generation figures. This research compares actual parking demand with parking supplies and ITE rates for 20 large-scale multi-family housing projects in four rail-served metropolitan areas: Portland, San Diego, San Francisco, and Washington, D.C. The impacts of over-supplying parking on housing affordability, project profitability, land consumption, environmental pollution, travel demand, and other areas will be explored. This will be supplemented by case studies on the evolution of zoning and building codes in TODs, including their rationales, institutional and political contexts, influences on TOD planning and designs, and views of local residents. Based on both quantitative and qualitative results, possibilities for various reforms – such as transit eco-pass substitutions, unbundling parking and housing provisions/costing, flexible parking codes, and near-site carsharing – will be examined.

**Key words:** Transit-oriented development; parking supplies; housing affordability; zoning standards; environmental impacts

**Objective:** Clarify the potential full-range of costs of excessive parking requirements of U.S. TODs with an eye toward promoting reforms, such as flexible parking codes and provisions of eco-pass options.

**Tasks:**
- Task 1: Review literature;
- Task 2: Measure parking generation rates for 20 transit-based housing projects;
- Task 3: Compare rates to parking supplies and ITE parking generation rates;
- Task 4: Using secondary data sources, estimate impacts on housing affordability, development profitability, land consumption, impervious surface area (and impacts on water quality and heat island effects), land-use separation, and walking/travel activities;
- Task 5: Conduct case studies on the evolution of parking codes and standards for TODs in two metropolitan areas;
- Task 6: Interview planners, developers, and residents about their views on parking policies in TODs as well as their receptivity to in-lieu programs (like transit pass substitutions) and other reforms (like carsharing);
- Task 7: Prepare working paper report; publish and present peer-reviewed articles.

**Milestones, start and end dates:** Official start date August 1, 2007, end July 31, 2008

**Student Involvement:** Graduate Student Researchers

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge. The first UCTC Policy Brief was prepared based on this research.

**Relationship to other UCTC research:** New project

**Potential benefits:** Lower housing costs, higher ridership, reduced land consumption, and environmental/energy savings due to aligning parking supplies more closely with market demand.

**Papers to Date:**


Shorter version of the report is being review for possible publication with the Journal of Public Transportation

**Conferences Attended to Date:**

A.3.2. Project Title: Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations (YEAR 20)

**Principal Investigator:** Stephen Ritchie  
**University:** UC Irvine  
**Email:** s-ritchie@uci.edu

**External Project Contact:** All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** The San Pedro Bay Ports (SPBP) of Los Angeles and Long Beach in Southern California are one of the major container port complexes in the world; in 2004, for example, the SPBP processed over 36% of the U.S. container trade. However, the SPBP complex is also a major source of air pollution caused largely, on the land-side, by diesel locomotives and trucks that transport containers to and from the ports. The resulting annual health costs may exceed $2.5 billion. Low income and minority communities along the major Alameda corridor, a 20-mile railroad line that connects the SPBP to the transcontinental rail network east of downtown Los Angeles, are particular affected. This study will create a tool that will quantify links between SPBP freight traffic, air pollution, and the health of local communities. This tool will help evaluate the effectiveness of various alternatives (such as congestion pricing to decrease peak container traffic flows, biofuels for trucks and locomotives, or intermodal and route shifting of container traffic) in order to mitigate the environmental and health impacts of SPBP activities. Expected results include new insights into the spatial, socioeconomic, public health, and social justice consequences of alternative SPBP multimodal freight operations strategies.

**Key Words:** Port, air pollution, air quality, freight, container, corridor, truck, locomotive, simulation, social impact, environmental impact, public health, social justice

**Objective:** This study seeks to create a tool that will shed light on the links between Alameda Corridor freight traffic from the SPBP, air pollution, and the health of local communities, and in so doing help to evaluate the effectiveness of various alternatives (such as congestion pricing, biofuels for trucks and locomotives, and intermodal and route shifting of container traffic) to mitigate the environmental and health impacts of port activities.

**Tasks:** Task 1: Assemble relevant data and code PARAMICS network; Task 2: Select corridor strategies to be simulated; Task 3: Run PARAMICS simulations; Task 4: Assemble emission factors for road and rail traffic; Task 5: Model the dispersion of criteria pollutants in the corridor; Task 6: Assemble demographic data and public health impacts; Task 7: Assess environmental justice implications for corridor population; Task 8: Write final Summary report and academic papers.

**Milestones, Dates:** Official start date August 1, 2007, end July 31, 2008

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to Other UCTC Research:** new project

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**Direct Cost:** $59,543

**Success stories:** This work has been sent to BART, MAX, and other transit agencies in the region. The paper is being used by the Tysons Corner Task Force to set parking policies for four new metrorail stations in Fairfax County, Virginia.
**Potential Benefits:** The expected benefits include new insights into the spatial, socioeconomic and public health air quality impacts, and thus social justice consequences, of alternative SPBP freight operations strategies in the Alameda corridor, and development of a tool that will be useful for ongoing policy analyses pertaining to this corridor and which could be adapted and/or expanded for analysis of other corridors and strategies.

**Papers to Date:**


**Conferences Attended to Date:**

Transportation Research Board Annual Meeting, 2009: see 1 and 2 above, which both appeared in the Meeting Proceedings


**Direct Cost:** $89,869

**Success Stories:** An excellent collaborative relationship has been established with the Port of Long Beach transportation planning group and City of Los Angeles Department of Transportation through this research, that will continue in ongoing UCTC research. The research tools developed in this project and the results to date have been extremely well received by the Port and by researchers and practitioners at the conferences we have attended.

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**A.3.3. Project Title:** Near Source Modeling of Transportation Emissions in Built Environments Surrounding Major Arterials (YEAR 20)

**Principal Investigator:** Marlon Boarnet, Rufus Edwards, Marko Princevac

**University:** Boarnet/Edwards, UC Irvine; Princevac, UC Riverside

**Email:** mgboarne@uci.edu, edwardsr@uci.edu, marko@engr.ucr.edu

**External Project Contact:** All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** Though much of the research on the environmental health effects of vehicular emissions has been around freeways, there is reason to suspect arterials as a major source of risk. Especially considering present-day trends of infill development, patterns of built form around arterials may trap elevated concentrations of air pollutants (e.g., street canyons created by multi-storey condominiums and office buildings) in close proximity to residences. Bringing together expertise in transportation and land use planning and environmental modeling, the research team proposes an unprecedented analysis of the environmental impacts of major arterials. Using a fine-scale wind field and dispersion model (Quick Urban and Industrial Complex), the team will simulate the transport of vehicular particulates (2.5 micron diameter) around five heavily-traveled Southern California arterials chosen to correspond to five land use types. The model is able to account for the effects of the micro-environment (i.e., built form and other infrastructure) on pollutant transport. The research will also include field measurements of fine particulate concentration in five urban environments. The research will enable us to assess the urgency of incorporating arterials into the environmental planning programs of resource, land use, and transportation agencies, and will provide a method for doing so.
Key words: particulate emissions, arterial streets, emissions measurement; emissions modeling

Objectives:
1. Computer and Laboratory Simulation: We will develop a building-scale model of particulate pollution (PM1.0) from line sources (arterial roadways) based on realistic parcel-to-parcel representations of five major arterials in the Los Angeles metropolitan area. UC Riverside (Princevac) takes the lead on this portion.
2. Field Measurement: We will obtain field measurements of particulate (PM2.5) pollution along and in the vicinity of the five chosen arterials. Edwards and Princevac have primary responsibility for data collection.
3. Data and Policy Analysis: All data (field measurement and laboratory/computer simulations) will be analyzed to assess interactions between built environment and PM2.5 concentrations. All investigators have lead responsibilities in this stage.

Tasks:
1. Select five arterials and surrounding study areas.
2. Measure PM2.5, traffic, wind speed around each arterial.
3. Set up computer simulation of PM2.5 transport around each arterial, using QUIC software.
4. Water channel simulations of particle transport in study areas.
5. Analyze data.
6. Write final report.

Milestones, start and end dates: Research is complete as of August, 2009.

Student Involvement:
UCR Student Participation
Undergraduate students: Anh Nguyen, Christian Bartolome, Ahmad Uzair, Eric Wittenmeier, Chai Yang, George Knight and Brian Proctor. Undergraduate students, under supervision from graduate students, prepared laboratory models and conducted field measurements in five southern California cities.
Graduate students Hansheng Pan, Sam Pournazeri (partially supported in year 2). Due to the complexity and intensity of experiments, several graduate students joined the project to assist without compensation from the project. These students are: Xiangyi Li, Yanyan Zhang and Shiyan Chen.
UC Irvine Student Participation. Graduate Students: Gavin Ferguson, Anahita Sfazl, Hsin-Ping Hsu (Ferguson and Hsu are Ph.D. students in Planning, Policy, and Design). The following Masters in Urban and Regional Planning students assisted with traffic count data entry: Annette Tam, AiViet Huynh, Roas Azizi, Chris Diwa, Daniel Chuong, Jessica Debats, Jessica DeLora, Kawin Sawangarom, Malancha Ghosh, Ming Hu, Michael Mills, Roland Ok, Sean Habibi, Yu Xie

Technology Transfer Activities: Several papers have been presented at conferences. See below. Final report and related working papers will be posted on the UCTC web site where they will be available to researchers.

Relationship to other UCTC research: New project (2007-2008 cycle)

Potential benefits: This is the first study that examines the impact of the built environment on PM 2.5 transport and concentration at the building-to-building scale in urban areas. As California’s and the nation’s urban areas grow more dense through infill development, it will be important to understand how building patterns associated with compact development are associated with PM 2.5 concentrations. The results can inform modeling improvements, as currently the fine-grained patterns of building location and wind flow that we studied in this project are outside of models used in the policy arena. The results of this research will also inform planning and policy efforts designed to incorporate compact development in ways consistent with public health.

Papers to Date:


Boarnet M., R. Edwards, G. Ferguson, M. Princevac, J. Wu, R. Lejano "Planning To Reduce Fine Particulate Exposure Near Arterial Streets" Association of Collegiate Schools of Planning Annual Conference, 4, Crystal City, Virginia, October 2009

Conferences Attended to Date:


Direct Cost: $124,550 (UC Irvine) plus $72,069 (UC Riverside) = $196,619

A.3.4. Project Title: Microscopic Analysis of Travel Behavior Change (YEAR 20)
Principal Investigator: Kostas Goulias.
University: UC Santa Barbara
Email: goulias@geog.ucsb.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: This project objective is to examine person and household behavioral histories over a long period (1989 to 2003) offering a unique opportunity to differentiate individual variation in behavior due to age, period, and cohort membership as well as other person-specific changes (e.g., entry to and exit from the labor force) and household changes (e.g., entry or exit of household members). Second, it offers a new approach of studying within-household dynamics and the impact events of within-household change have on individual as well as household behavior using latent variables. Third, the substantive analysis of travel behavior offers a comprehensive analysis of human and social (household) behavior in time and space. The most important analytical method in this project is a set of latent variable structural equations models longitudinal data to build trajectories of behavioral change. During the first portion of this study we tested a variety of hypotheses correlating travel behavior to cross-sectional data available in the Puget Sound region where the travel behavior longitudinal histories were collected. We repeated the same SEM as in another context to verify relationships of this type are stable over different geographical contexts. Based on the research findings (longitudinal information was not sufficiently rich but offered a good base) we changed emphasis to the assembly of a variety of cross-sectional databases that complement the longitudinal record and allow more in depth analysis of behavior. Seo Youn Yoon continued this project with research on intrahousehold interaction and individual accessibility measurement. Kate Deutsch continued this project with a survey on sense of place and destination choice. Goulias and Abreu used the longitudinal record of commuters to study land use and travel interactions (see paper below).

Key Words: within-household dynamics, structural equations model, longitudinal data, land use travel interactions.

Objective: Create a model system that explains travel behavior as a function of contextual circumstances.

Tasks: Task 1: Data Assembly; Task 2: Data Analysis; Task 3: Write Report and Papers for Publication.

Milestones, Dates: Official start date August 1, 2007, end July 31, 2008 (extended due to major delays)

Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.
Relationship to Other UCTC Research: new project

Potential Benefits: Achieve better understanding of travel behavior to design better travel demand forecasting tools.

Papers to date:

Conferences Attended to date: TRB in 2008 and 2009

Direct Cost: $56,843

Success Stories: K. Deutsch worked on this project and started developing the ideas of sense of place and travel behavior that gave her the 2009-2010 Eisenhower fellowship ($35,500/year). Seo Youn also worked in this project and learned the statistical techniques she is using in her UCTC and Dean’s fellowship supported dissertation in 2009-2010. The project continues with funding from the UC Office of the President to Geotrans and LANL.


A.4.1. Project Title: The Effects of Transportation Corridors’ Roadside Design Features on User Behavior and Safety, the Environment, and Community Vitality: Phase One (YEAR 21)
Principal Investigator: Elizabeth Macdonald
University: UC Berkeley
Email: emacdon@berkeley.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract:
The purpose of this research is to identify quantifiable performance measures for transportation corridor design features related to user behavior and safety, the environment, economic vitality and community quality of life. The results of this study will support Caltrans’ planning, design, and implementation of transportation corridors responsive to the contextual environments of Caltrans partner communities and will provide a model for transportation and urban planners and designers. The research study features a comprehensive literature review and analysis of relevant research from multiple academic disciplines. The literature review identified innovative professional practices, gaps in the research and directions for further research. An Advisory Group composed of leading experts in the field assisted the research team with analyzing the literature, shaping the performance measures, and framing new approaches to evaluating the costs and benefits of various investments in state highway system right-of-ways and associated community environments. The project resulted in performance measures for non-motorized users and the local environment on and around Caltrans roadways.

Key words: Performance measures; roadside design; urban arterials; pedestrians; bicyclists; community vitality

Objective: A comprehensive literature review of research related to corridor roadside design elements, and the development of a performance measurement framework for “complete, green urban arterials” that derives from the literature review.
**Tasks:** Task 1: Literature Review; Task 2: Creation of Study Website; Task 3: Expert Advisory Group Formation and Input; Task 4: Development of Performance Measures Framework

**Milestones, start and end dates:** This research represents phase 2 of a two-year project. The Phase 1 Literature Review was completed on November 25, 2008. The Phase 2 Performance Measures research was completed on August 20, 2009.

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge. As well, articles have been prepared for publication in ACCESS.

**Relationship to other UCTC research:** New project.

**Potential benefits:** The main expected result of the research project is a series of clearly defined quantifiable performance measures that can be used to ascertain the performance of transportation corridor design features that address safety, quality of life and environmental objectives. These measures fill a gap in Caltrans’ current performance measurement system and should be useful to transportation and design professionals working at Caltrans and elsewhere.

**Papers to Date:** Under submission to TRB: “Performance Measures for Complete, Green Streets: A Proposal for Urban Arterials in California”

**Conferences Attended to Date:**
- UC Sustainable Transportation Conference, October 2007
- Transportation Research Board, January 2008
- UC Transportation Centers Student Conference, February 2008
- UTC/PATH Conference, October 2008

**Direct Cost:** $152,000

### A.4.2. Project Title: Why Build Affordable TOD? A Toolkit for Educating Residents about TODs and Housing in the Bay Area

**Principal Investigator:** Karen Chapple
**University:** University of California, Berkeley
**Email:** chapple@berkeley.edu

**External Project Contact:** UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** The Bay Area is struggling with how to accommodate future growth—and looking to transit-oriented development (TOD) as a potential solution. Yet, existing research fails to address one of TOD’s greatest barriers: the unwillingness of residents to support either transit investment or affordable housing construction in their communities. This project will evaluate tools to “sell” TOD affordable housing to different communities. We will hold four focus groups with residents in four communities with planned or proposed TODs. These focus groups will help us (a) learn about the arguments used against affordable housing around TOD and (b) figure out which approaches residents respond most positively to. The focus groups will result in a report on how best to educate TOD communities, including brochures, powerpoint presentations, and talking points for the advocates. We will also conduct two sessions with the advocates that typically use these tools in order to test our findings. The project will culminate in 2009-10 with a symposium on affordable housing and TOD for a more general audience of transportation practitioners.

**Key words:** TOD, NIMBY, citizen participation, educational tools, density, affordable housing
Objective: This project will evaluate and refine toolkits meant to build public support for affordable housing near transit-oriented development.

Tasks: Conduct literature review; conduct four focus groups; evaluate findings and improve the tools; write report; test findings in two presentations to practitioners

Milestones, start and end dates: Official start date August 1, 2008, end August 31, 2009

Student Involvement: two 25% graduate student researchers

Technology Transfer Activities: Presentations to the Association of Bay Area Governments and the Great Communities Collaborative will make them aware of these findings. Report will be published on the websites of UCTC and the Center for Community Innovation at UCB.

Relationship to other UCTC research: new project

Potential benefits: The project will help make it more politically feasible to house much of the Bay Area’s new population growth near transit stations.

Papers to Date: “Building support for transit-oriented development: Do community-engagement toolkits work?”

Direct Cost: $32,500

Success stories: Based on presentation to the Great Communities Collaborative, invitation to present to the Smart Growth Funders Network.

A.4.3. Project Title: Evaluation of Greenhouse Gas Emission Reduction Strategies for Interregional Travel (YEAR 21)

Principal Investigator: Mark Hansen

University: UC Berkeley

Email: mhansen@ce.berkeley.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: The warming of the Earth’s temperatures due to human activities, known as anthropogenic climate change, is a threat to the environment and human health. The transportation sector is a major contributor to anthropogenic climate change, being responsible for 27 percent of all domestic GHG emissions in 2003. Within this sector, urban travel has been the major focus of researchers and policymakers; to fill this gap, the proposed research focuses on interregional travel. Interregional travel emits pollutants in diverse regions, challenging current regulatory approaches and raising difficult jurisdictional issues. We seek to understand the contributions of interregional travel to transportation GHG emissions, and most importantly to develop methodologies for assessing emission reduction strategies that allow a diverse set of strategies to be compared. This study takes a multi-modal approach in that it considers both interregional line-haul travel and access to the line-haul modes, and also explores potential substitute modes. Furthermore, this research will estimate the relationship between implementation cost and GHG emission reduction for each strategy, to allow for a ranking of GHG emission reduction strategies for interregional travel as well as an estimation of the overall cost curve for GHG emission reduction.

Key words: interregional travel, aviation, maritime, California, Greenhouse Gas Emissions, port access.

Objective: To extend current UCTC funded research on the evaluation of GHG emission reduction strategies for interregional travel and include long-haul access modes, cost per ton reduction, and a definition of GHG emission reduction strategies for interregional travel in the state of California.
Tasks: Task 1: Systems Emissions Inventory; Task 2: High Level Strategy Evaluation; Task 3: Detail Assessment of Selected Strategies.

Milestones, start and end dates: Official start date August 1, 2008, end July 31, 2009.

Student Involvement: One GSR and one undergrad.

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: new project

Potential benefits: Policymakers looking to reduce GHG emissions from interregional travel will have a defined set of GHG emission reduction strategies with the highest reduction potential and a repeatable methodology for estimating the GHG emission strategies with the lowest dollar per ton reduction cost.

Papers to Date:
“Assessing the Role of Operating, Passenger, and Infrastructure Costs in Fleet Planning under Fuel Price Uncertainty,” Megan Smirti and Mark Hansen

“The Potential of Turboprops to Reduce Aviation Fuel Consumption,” Megan Smirti and Mark Hansen

“The Impact of Fuel Price on Large Jet Operating Cost and Scale Economies,” Megan Smirti and Mark Hansen

Conferences Attended to Date:
INFORMS Annual Meeting, Washington DC, October, 2009
ATM 2009, Napa CA, June, 2009
CORS/INFORMS International Toronto 2009
Transportation Research Board Annual Meeting, January, 2009

Direct Cost: $55,853

Success stories:
“Best Paper Award” at the NAPA Conference: “Assessing the Role of Operating, Passenger, and Infrastructure Costs in Fleet Planning under Fuel Price Uncertainty,” Megan Smirti and Mark Hansen

Results of the research were presented to the California Air Resources Board

A.4.4. Project Title: Eco-Driving: Pilot Evaluation of Behavior Changes in U.S. Drivers (YEAR 21)
Principal Investigator: Kanok Boriboonsomsin
University: UC Riverside
Email: kanok@cert.ucr.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Among several strategies to reduce greenhouse gas emissions from motor vehicles, “eco-driving” is one that has not received much attention, especially in the United States (U.S.). The core of eco-driving programs is to provide drivers with a variety of advice and feedback to minimize fuel consumption while driving. This project will design and develop an on-board eco-driving device that is capable of providing dynamic feedback to drivers. One feedback item is a real-time indicator of fuel-related information, e.g. fuel economy. This type of instantaneous feedback will allow the drivers to relate their driving style to their vehicles’ fuel economy, and adjust their driving behaviors accordingly to save fuel and reduce emissions. Another feedback item is a trip end summary of fuel cost, carbon dioxide emission, travel time, etc. on a trip-by-trip basis. By allowing drivers to realize and monitor their costs of driving, it may be possible that they change their travel behaviors in one way or another in an attempt to
lower their travel costs. In this Phase I of the 2-phased project planned, changes in driving behaviors as a result of eco-driving will be evaluated among U.S. drivers.

**Keywords:** Greenhouse gas emissions, fuel consumption, dynamic feedback, driving behavior

**Objective:** The overall research objective is to design and develop an on-board eco-driving device that is capable of providing dynamic feedback to drivers, and then evaluate its impact on users’ driving behaviors.

**Tasks:** Literature and Technology Review, Systems Design, Prototype Development, Testing and Validation, Pilot Evaluation, Data Analyses, Reporting

**Milestones, start and end dates:** Start February 1, 2009, end December 31, 2009

**Student involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to other UCTC Research:** New project

**Potential Benefits:** This project will provide a better understanding of the effectiveness of an on-board eco-driving device at improving users’ driving behaviors. The ultimate outcomes from eco-driving will be the reductions in fuel consumption and CO2 emission from motor vehicles.

**Direct Cost:** $48,577

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**A.4.5. Project Title: Group Behavioral Process Identification in the Interaction Between Location Choice and Travel Behavior (YEAR 21)**

**Principal Investigator:** K. Goulias  
**University:** UC Santa Barbara  
**Email:** goulias@geog.ucsb.edu

**External Project Contact:** UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** This project fills a critical gap of knowledge in the land use, transportation and environment relationship. It exploits recently developed data collection methods to include questions about sense of place, personality, location choices, lifecycle stages, lifestyle choices, and travel behavior in a set of nested surveys for households. It also uses large scale databases to study time allocation, accessibility, and intra-household interactions. In the project we also studied spatial allocation methods and experimented with a large scale simulator. The key product is hypotheses testing about the relationships among attitudes, location choices, and travel behavior merging theoretical constructs from environmental psychology, geography, urban economics, and travel behavior. In the project we also created a plan for research directions that enhance large scale data collection by Metropolitan Planning Organizations in the US that we intend to implement using a variety of funding sources.

**Key words:** Travel behavior, sense of place, survey methods, destination choice

**Objective:** Identify the behavioral relationships between locations choice and travel behavior

**Tasks:** Task 1 is completion of survey administration (August 1st, 2008 to December 31, 2008), Task 2 is data analysis (October 1st, 2008 to June 15, 2009), Task 3 is summary of findings and recommendations for practice and research (June 1st, 2009 to August 1st, 2009).

Student Involvement: Graduate Student Researchers

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: New Project.

Potential benefits: This research explains the role of attitudinal factors on travel behavior and creates a state of the art model systems for intra-household interactions. It also guides new theory development and data collection. It also explains failures of past destination choice models. Eventually research along these lines will lead to enhanced understanding of the land use transportation relationship and allow us to fine tune activity-based models for large regions. In the short term this work produced a prestigious National fellowship for the graduate student in the project and a variety of papers and professional presentations.

Papers to Date:


Conferences Attended to Date: Annual Meetings of AAG 2008 and 2009, TRB 2008 and 2009.

Direct Cost: $39,936

Success stories: Eisenhower fellowship for Kate Deutsch, Best paper award by AAG for Kate Deutsch, Acceptance of paper to IATBR, TRB, and AAG for Seo Youn Yoon and Kate Deutsch.

B) PROJECTS CONTINUING IN YEAR 22 (2009-10): 16 PROJECTS


B.1.1. Taxi Drivers in Los Angeles: Profile of a Workforce Facing Change (YEAR 19)
Principal Investigator: Jacqueline Leavitt
University: UC Los Angeles
Email: jleavitt@ucla.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Los Angeles taxi cab drivers are a poor immigrant work force toiling in a system that promises them the American Dream but delivers long hours, poor health, mental stress, isolation from their families, and low pay. The article, “Los Angeles Taxi Workers Alliance,” builds on “Driving Poor” that documented the history and structure of the taxi industry in Los Angeles and reported findings from surveys and in-depth interviews. For this research,
additional interviews and surveys were made including in-depth interviews with active members of the taxi cab driver organization LATWA. The first part of the paper documents the history of the industry and the evolution of taxi worker cooperatives into cooperatives that are not worker accountable. This forty year old history is the backdrop for understanding the reasons why LATWA formed, its structure, struggles, wins, relation to allies, and options for improving their living and working conditions. LATWA has developed as a visible stakeholder in the negotiations around the L.A. City Council’s upcoming review of renewing existing franchises.

**Key Words:** taxi cab, lease driver, owner driver, immigrant, LATWA, franchise, Los Angeles, organizing

**Objective:** First, to document for the first time the socio-economic profile of drivers in the City of Los Angeles and from the perspective of the drivers. Second, to understand the history of both the franchise industry (having begun with the notion of worker cooperatives the franchises are cooperatives in name only with little to no accountability to drivers) and the ways in which drivers have organized themselves over time. Third, to correct for the absence of women drivers in the original survey of 300 drivers and more than 20 in-depth interviews in order to identify the degree to which gender influences working conditions.

**Tasks:** To develop survey instrument and survey a random sample stratified by franchise of cab drivers; to do in-depth interviews with a subset of the drivers surveyed; to interview franchise owners and government related administrators/staff in the taxi industry; to interview past and present members of LATWA and their allies; to identify and interview women taxi drivers.

**Milestones, Dates:** The survey and in-depth interviews led to the publication of a report, “Driving Poor” that was submitted to the UCTC to show progress in the research. The paper, “Los Angeles Taxi Workers Alliance” was in draft form until the last year and is hereby submitted; it will appear in a book coming out in February 2010 on low income immigrant workers in Los Angeles. Third, the ongoing interviewing of women drivers will be completed by December 31, 2009 and the findings will be used to publish another paper.

**Student Involvement:** Two research assistants who are doctoral candidates were hired sequentially.

**Technology Transfer Activities:** The data set was made available to Linda Delp, UCLA LOSH Director, for a separate study that followed up on health related issues.

**Relationship to Other UCTC Research:** new project

**Potential Benefits:** Benefits have already occurred as it relates to the documenting of LATWA which in turn draw on Driving Poor. The article on LATWA is being published as noted above. Related benefits draws on the earlier report and was referred to and included in the contract the City Department of Transportation let to consultants who are studying renewal of the franchises by the City; the report was used in a forum sponsored by LATWA in which then City Councilwoman Wendy Gruel was present and who was responsible within the Council for responding to taxi driver complaints. Further Driving Poor has been cited by other cities where researchers are investigating taxi driver work conditions, notably Chicago. The Mayors Office in New York City was also interested in our findings and methodology. LATWA was able to make use of the study in their work with drivers. The article will likely be used by other organizations in the taxi industry, scholars of the organization of work, social movements, and organizing.

**Conferences Attended to Date:** Two conferences sponsored by the UCLA Institute for Labor Research and Employment.

**Direct Cost:** $35,029

**Success stories:** Visibility of taxi drivers as a stakeholder in the taxi cab industry in Los Angeles. LATWA has been looked to by drivers in other places where organizing is occurring to rectify working conditions.
B.1.2. Project Title: Congestion and Accessibility: What’s the Relationship? (YEAR 19)

Principal Investigator: Brian Taylor
University: UC Los Angeles
Email: btaylor@ucla.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: This research examines how measures of transportation accessibility and congestion vary and relate in metropolitan areas. While congestion has been a perennial concern for transportation policymakers, planners, and researchers, traditional measures of congestion say little about the range and extent of opportunities that individuals are either gaining access to or missing out on because of the regional transportation system’s functionality. Using GIS-based methods, empirical measures of accessibility will be developed that account both for mobility constraints at a given location and the potential destinations accessible within those constraints. These measures of accessibility will be compared to common measures of congestion at the local and regional scales. We hypothesize that the effects of congestion on accessibility are likely to vary considerably across a single region. Because of these differences, empirical measures of accessibility may provide different insights into the transportation system’s performance by emphasizing potential benefits for travelers rather than the mechanistic functioning of the infrastructure. This research seeks to shift the unit of analysis in congestion measurement from the transportation network to travelers by focusing on accessibility instead of system performance.

Key Words: congestion, accessibility, GIS.

Objective: Determine how measures of transportation accessibility and congestion vary and relate in metropolitan areas.


Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project

Potential Benefits: This research will contribute to our understanding of how congestion relates to individuals’ access to destinations (or the inverse, spatial isolation.

Direct Cost: $22,730

B.1.3. Project Title: Revisiting the Estimation of Marginal Cost in Highway Pavement (YEAR 20)

Principal Investigator: Samer Madanat
University: UC Berkeley
Email: madanat@ce.berkeley.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: There is usually a mismatch between the fees paid by highway users and the pavement damage costs that they cause to highway agencies. Pavement deterioration pricing, based on marginal costs, attempts to remedy that by creating user charges that reflect the maintenance, rehabilitation and reconstruction costs incurred by highway
agencies. In order for this marginal cost approach to achieve its benefits, i.e. fairness and efficiency, the estimates of marginal costs need to be accurate. From an engineering standpoint, we will question two assumptions that are commonly used when estimating marginal costs. The first assumption is that pavement damage caused by an axle is proportional to the axle load raised to the power four. The second is that maintenance cost is proportional to pavement roughness. We will then relax these assumptions by accounting for different types of damage and accurately modeling maintenance, rehabilitation and reconstruction policies of highway agencies. Under different scenarios, we will estimate the effect of such marginal-cost pricing on capital and maintenance costs, highway revenues, welfare of both truckers and shippers, and the change in traffic loads. Finally, we will explore the effect of accounting for highway user costs on marginal-cost pricing.

**Key Words:** pavement deterioration pricing, marginal cost, axle load, maintenance cost, pavement roughness.

**Objective:** The objective of this research is to provide a sounder engineering basis for the estimates of marginal costs used in pavement deterioration pricing.

**Tasks:**
Task 1 - Complete the Literature Review; Task 2 - Relax the Assumptions on Pavement Damage and Maintenance Cost; Task 3 - Perform Case Studies Location-specific case studies will be conducted in order to compare the results obtained using the two aforementioned assumptions with the results obtained when these assumptions are relaxed; Task 4 - Explore User Costs: The effects of accounting for highway user costs on marginal-cost pricing will be explored.

**Potential Benefits:** The main benefit of this research is that it will provide better estimates of the marginal costs of highway pavement maintenance, which can be used by transportation agencies to set more efficient and equitable roadway deterioration fees.

**Milestones, Dates:** Official start date Aug. 1, 2006, end July 31, 2007. No-cost extension approved because of delays in securing funds and hiring students.

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to Other UCTC Research:** new project

**Total Direct Cost:** $ 44,612


**B.2.1. Project Title: Immigrants and Travel Behavior: Effect of Ethnic Neighborhoods on Commute Time and Mode (YEAR 20)**
**Principal Investigator:** Evelyn Blumenberg
**University:** UC Los Angeles
**Email:** eblumenb@ucla.edu

**External Project Contact:** UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** Immigrants comprise a large and growing percentage of the population yet we know very little about their travel patterns particularly as they relate to residential location. This study, therefore, examines the travel of immigrants focusing on the relationship between immigrant enclaves and travel behavior. More specifically, the
study relies on census tract and micro data from the U.S. Census to test whether immigrants living in ethnic neighborhoods travel shorter distances and are more likely to use alternative travel modes (carpool, transit, walk) than other immigrants.

The findings from this study will help us better understand the travel of immigrants. Moreover, they will have implications for understanding the impact of land use on travel behavior and provide insight into the relative roles of acculturation, residential location, and economic status in shaping outcomes for immigrant families.

**Key words:** travel behavior, immigrants, commute

**Objective:** to test the relationship between immigrants’ residential location in ethnic enclaves and their travel behavior by examining the commute travel of immigrants in the two largest U.S. metropolitan areas—Los Angeles and New York.

**Tasks:**
1. Identify ethnic neighborhoods in Los Angeles and New York
2. Compare transportation characteristics of between ethnic and non-ethnic neighborhoods.
3. Compare the transportation patterns of immigrants by major immigrant group and central city/suburban location.
4. Determine the residential location of residents across four neighborhood types: central city immigrant enclave, suburban immigrant enclave, suburban outside of immigrant enclave, and central city outside of immigrant enclave.
5. Use descriptive statistics to examine the relationship between residential location and commute travel.
6. Develop statistical models to predict the travel behavior of immigrants controlling for the standard determinants of commute mode and time.

**Student Involvement:** two graduate students assistants; one doctoral student and one MA students have been involved in this research

**Relationship to other UCTC research:** new project

**Potential benefits:** (a) develop a better understanding of the travel behavior of a growing—but understudied—population group (b) examine the impact of immigrants on transportation systems (i.e. public transit ridership, traffic congestion)

**Papers to Date:**
4. Moving In and Moving Around: Immigrants, Travel Behavior, and Implications for Transport Policy,” published in *Transportation Letters*
5. Commute Distance and Ethnic Neighborhoods (submitted for presentation at the 2010 Transportation Research Board Conference)

**Conferences Attended to Date:**
1. Impact of Changing Demographics on the Transportation System Conference, Transportation Research Board, Washington, DC, October, 2008
2. Transportation Research Board, Washington, DC, January 2009
3. Annual conference of the Association of Collegiate Schools of Planning (to be presented, October 2009)

**Direct Cost:** $53,371
**B.2.2. Project Title: The Personal Travel Assistant (PTA): Measuring the Dynamics of Human Behavior (YEAR 20)**

**Principal Investigator:** Will Recker and Rina Dechter  
**University:** UC Irvine  
**Email:** wwrecker@uci.edu, dechter@ics.uci.edu

**External Project Contact:** All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** The fundamental research question that will be addressed with the project is whether a simple, continuously collected GPS sequence can be used to accurately measure human behavior. Our proposed research builds upon a personal information device (PTA, Personal Travel Assistant) that we have been developing (in a separate project) that will serve both as a research tool and as a testbed. To learn behaviors given an extended GPS data stream, we propose applying Hybrid Dynamic Mixed Network (HDMN) modeling techniques. We will design and deploy a prototype personal travel assistant system. The working prototype will be deployed for initial testing in the Orange County, California area. In addition to collecting travel information for the initial deployment period, the initial users of the PTA system will be asked questions about their attitudes towards the collection of travel data under various scenarios, and whether they ever used the PTA’s built in privacy guards. We will analyze the collected data to develop detailed models of human behavior, and streamline learning and inference using the baseline HDMN model and the collected travel data, as well as implement algorithms for estimating network demands using PTA data.

**Key Words:** Bayesian model, human dynamics, travels information system.

**Objective:** The objective of this research is to develop a real-time longitudinal activity/travel data collection and modeling system that can assist travelers in negotiating unforeseen, detrimental, traffic conditions. A secondary objective is to provide transportation suppliers with a cheap and effective way to measure and predict demand dynamics.

**Tasks:**
Task 1: We will design and deploy a prototype personal travel assistant system. The working prototype will be deployed for initial testing in the Orange County, California area, ideally recruiting households in the area of UC Irvine’s ATMIS testbed to leverage its advanced infrastructure monitoring capabilities;Task 2: Field survey. In addition to collecting travel information for the initial deployment period, the initial users of the PTA system will be asked questions about their attitudes towards the collection of travel data under various scenarios, and whether they ever used the PTA’s built in privacy guards; Task 3: Analyze longitudinal behavior for individuals and households. Analyze the collected data for developing detailed models of human behavior; Task 4: Streamline learning and inference using the baseline HDMN model and the collected travel data; Task 5: Implement algorithms for estimating network demands using PTA data.

**Milestones, Dates:** Official start date August 1, 2007, end July 31, 2008

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to Other UCTC Research:** new project

**Potential Benefits:** Research about how people use such information and how willing they are to share their own behavior will inform the subsequent development of an aggregate travel demand prediction system that transportation system operators can use to better understand the dynamic demand for transport.

**Direct Cost:** $63,421
B.2.3. Project Title: Costs and Effectiveness of Lower-Speed, Environmentally-Friendly Urban Highway Designs (YEAR 20)

Principal Investigator: Kenneth Small
University: UC Irvine
Email: ksmall@uci.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Adding capacity to ameliorate urban road congestion is often thought to be infeasible due to its great expense. This proposal seeks to investigate differentiated design standards as a source of capacity additions that are more affordable and have smaller “footprints,” thus smaller aesthetic and environmental impacts. The research will examine the tradeoff between providing capacity for high-speed off-peak travel, when peak travel is severely congested, versus providing more capacity but only for moderate-speed travel. It will also examine the potential savings in cost and footprint from designing certain roads to be for passenger vehicles only. Thus, the research will show under what conditions lower-speed, environmentally-friendly highway designs are cost-effective. The results will provide guidance for metropolitan transportation planning, in particular guidance concerning the emphasis given to different types of highways for handling anticipated traffic growth.

Key Words: capacity, congestion, highway design.

Objective: Examine conditions under which lower-speed, environmentally-friendly highway designs are cost-effective alternatives to high-speed expressways in crowded urban areas.

Tasks:

Task 1: Collect data on costs, capacities, and accident experience with alternative high-capacity highway designs;
Task 2: Compare costs of specific alternative designs providing a given amount of capacity but at different speeds;
Task 3: Develop an analytical model to measure the total social costs of travel under alternative investment strategies using alternative designs;


Student Involvement: Graduate Student Researchers (1 full-year appointment, 2 partial appointments)

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Interest in the work has been expressed by the editors of the following on-line publications, who have requested an update when it is ready for public dissemination: Toll Road News; Surface Transportation Innovations (Reason Foundation)

Relationship to Other UCTC Research: new project

Potential Benefits: We may uncover possibilities for building substantial additions to capacity at more affordable costs than those envisioned in current metropolitan transportation plans.

Papers to date:

Conference Attended to Date:
The paper listed above was presented at the following conferences:
Direct Cost: $39,923

Success stories:
The Principal Investigator has been asked to serve as the first President of a new organization being formed to continue the series of Kuhmo-Nectar Conferences, at which the paper was presented in 2008.

B.2.4. Project Title: Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge (YEAR 20)
Principal Investigator: Brian Taylor
University: University of California, Los Angeles (UCLA)
Email: btaylor@ucla.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: This research examines how transportation scholars, practitioners, and policymakers differ in their levels of understanding of and attitudes toward transit costs and fares. We focus on transit fares because the recent and relatively widespread adoption of smart card technology allows transit agencies to implement fares that vary by distance, time-of-day, and/or mode to reflect differences in marginal costs. Scholars have long argued that fares set to reflect often large variations in transit costs by distance, time-of-day, and/or mode could substantially improve both the efficiency and effectiveness of transit services. Most transit agencies, however, have not moved to implement any form of marginal cost fares. This research uses a survey of a variety of people in transit agencies about their understanding of marginal costs, their basis for fare setting, and whether they have considered using smart cards to move toward marginal cost forms of pricing.

We also use in-depth interviews to test for differences among the three groups in their rationales for pricing transit services, and what kinds of information they deem relevant to making fare policy. Our goals are, broadly, to understand how information about transportation costs, prices, and behavior are communicated among different types of transportation professionals. More specifically, we seek to understand how smart cards can be used creatively to improve the efficiency and effectiveness of public transit services.

Key words: transit costs, transit fares, smartcard technology, survey, fare setting, marginal cost forms of pricing, interview, efficiency, effectiveness, public transit.

Objective: This research examines how transportation scholars, practitioners, and policymakers differ in their levels of understanding of transportation-related problems, and how these differences affect information about them is perceived, and solutions to them are devised.

Tasks: Task 1: Literature review; Task 2: Survey design and administration; Task 3: Survey analysis; Task 4: In-depth interviews; Task 5: Interview analysis; Task 6: Production of deliverables.

Milestones, start and end dates: Official start date August 1, 2008, end July 31, 2009

Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: New research

Potential benefits: This research will contribute to our understanding of how and why some ideas and policy solutions are accepted and implemented, while others are not; and how different scholars, practitioners, and policymakers approach transportation problems and solutions.
**Papers to Date:** Under review

**Conferences Attended to Date:**

“Reforming Transit Fare Policies: Reconciling Academic, Organizational, and Political Perspectives,” to be presented at the 50th Annual Conference of the Association of Collegiate Schools of Planning, Crystal City, Virginia, October 1-4, 2009

**Direct Cost:** $41,234

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**B.3 YEAR 21 (2008-9) PROJECTS CONTINUING IN YEAR 22 (2009-10): 9 PROJECTS**

**B.3.1 Project Title: Towards an Understanding of Intermodal Roles in Intercity Transportation (YEAR 21)**

**Principal Investigator:** Adib Kanafani  
**University:** UC Berkeley  
**Email:** kanafani@berkeley.edu

**External Project Contact:** UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

**Abstract:** Intermodal integration has always been accepted as a sound principle, but has consistently faced daunting challenges. For one thing, the institutional framework within which policy is made and investment decisions are justified continues to be modally centered. At best, surface transportation modes are integrated in policy analysis and in legislation. But the barriers between surface and air or water modes remain insurmountable. Yet, it is clear that many transportation problems, both regional and metropolitan, can only be resolved if these three media are integrated. This research proposes to clarify and redefine the characteristics of the intermodal system and to explore the barriers to the integration of different transportation modes. Using the California Corridor as a case study, the research proposes to analyze strategies for “stitching” the various modal elements together. The basic proposition is that this can be done by concentrating on facilitating the intermodal transitions that need to occur in origin-to-destination travel. It is also proposed that only an integrated intermodal system can play the role of supporting regional development goals. Modally fragmented systems or single mode systems can result in distortions in regional accessibility that may violate regional development goals. Improvements on funding mechanism, institutional structure, and physical connections of intermodal transportation will remove the barriers within intermodal transportation planning; therefore ultimately improve the overall performance of the transportation system.

**Key words:** Regional Transportation Planning, Transportation Planning Policy, Transportation Economics and Investment Analysis.

**Objective:** Develop an understanding of the roles and barriers of intermodal transportation in intercity travel. Defining strategies for better intermodal transportation at the regional level.

**Tasks:**

- Task 1: Literature Review;
- Task 2: Re-defining the characteristics and current status of intermodal transportation;
- Task 3: Analysis of barriers to intermodal integration;
- Task 4: Analysis of potential benefits of intermodal integration;

**Milestones, start and end dates:** Official start date August 1, 2008, end July 31, 2009

**Student Involvement:** Graduate Student Researcher
Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: new project

Potential benefits: Innovative intermodal intercity transportation service.

Papers to Date: Towards an Understanding of Intermodal Roles in Intercity Transportation.

Conferences Attended to Date: TRB 88th Annual Meeting, Washington D.C.; UCTC 15th Student Conference, UC Riverside.

Direct Cost: $64,949

B.3.2 Project Title: Experiments to Improve the Benefits of Freeway Carpool Lanes (YEAR 21)

Principal Investigator: Michael Cassidy and Carlos Daganzo

University: UC Berkeley

Email: Cassidy@ce.berkeley.edu  daganzo@ce.berkeley.edu

External Project Contact: UCTC faculty research projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: Recent evidence shows that a carpool lane reduces vehicle lane-changing maneuvers along a freeway and by so doing, can smooth and increase the discharge flows through its bottlenecks. The proposed research seeks to develop and field test traffic control strategies for freeways with carpool lanes that will amplify this so-called “smoothing effect” by inducing further reductions in vehicle lane changing near bottlenecks. Additionally, we will design and test new strategies that reinforce the beneficial effects of reduced lane changing by increasing carpool-lane utilization in bottleneck vicinities. Strategies will be tested on one or more freeway carpool-lane facilities in the San Francisco Bay Area, and will be refined and generalized. These strategies should reduce people hours and vehicle hours traveled in both a freeway’s carpool and regular-use lanes, and as such would reduce the environmental impacts of freeway congestion. Thus from this research we will (i) convincingly demonstrate the feasibility of environmentally-friendly control strategies for freeway carpool facilities; (ii) develop guidelines for the general deployment of these strategies; and (iii) better understand cause and effect relations (e.g. between lane-changing and bottleneck discharge) to further advance traffic theory and control.

Key words: Freeway carpool lanes, Traffic control, Freeway bottlenecks, Traffic experiments.

Objective: To design and field test traffic control strategies for reducing people hours and vehicle hours traveled on freeway carpool-lane facilities.

Tasks: Task 1: Site Selection; Task 2: Preliminary Experiment Designs; Task 3: Experiments and Design Refinements; Task 4: Develop General Design Criteria (for Control Strategies).

Milestones, start and end dates: Official start date August 1, 2008, end July 31, 2009

Student Involvement: Two Graduate Student Researchers

Technology Transfer Activities: Publications will be posted on UCTC’s Website

Relationship to other UCTC research: new project

Potential benefits: The work will furnish design guidelines for controlling traffic on freeway carpool facilities in environmentally-friendly ways; demonstrate the effectiveness of these strategies; and uncover traffic flow details to advance traffic theory.
Papers to Date:


Conferences Attended to Date:
PATH/UCTC Conference, Los Angeles, Nov 2008
Transportation Research Board Annual Meeting, Washington, D.C., Jan 2009
International Symposium of Transportation and Traffic Theory, Hong Kong, July 2009

Direct Cost: $136,445

Success stories: Findings have been reported in several newspaper articles throughout California, and were featured in a 1-hour news/talk show on National Public Radio.

B.3.3 Project Title: Employment Centers to Mixed-Use Activity Centers: Commuting and Environmental Impacts (YEAR 21)
Principal Investigator: Robert Cervero
University: UC Berkeley
Email: robertc@berkeley.edu

Abstract: Some U.S. edge cities are experiencing a second generation of development – a make-over of strategic infill, land-use diversification and often transit-orientation and pedestrian-friendly streetscape design. This research will use 1990 and 2000 census data to create a typology of Employment Centers (ECs) in the San Francisco Bay Area, focusing on changes in development scale, densities, land-use mixes, employment compositions, and site-design elements during the 1990s. EC prototypes, such as “second-generation mixed-use edge cities” and “single-use office parks”, will be identified using cluster analysis techniques. Changes in commuting choice and behavior during the 1990s will be measured for each EC prototype, using metrics related to modal splits, commute distances and durations, and VMT/employees as well as estimated fuel consumption, mobile-source emissions, and greenhouse gas emissions. Case-study work will probe the influences of market forces (e.g., housing targeted at professional workers) and planning interventions (e.g., rezoning; infrastructure provisions) in explaining why and how different ECs underwent different land-use and employment transformations during the 1990s. The research will shed important light on the broader transportation and environmental policy implications of land-use transformations among traditional employment centers in U.S. metropolitan areas.

Key words: Edge cities; employment centers; commuting; land use; environmental footprint; planning interventions.

Objective: Examine the impact of employment-center transformations – from low-density, single-use office parks to mixed-use activity centers – on commuting choices and travel trends, and the roles of market forces and public policies in contributing to these transformations.

Tasks:
Task 1: Review literature;
Task 2: Define employment centers;
Task 3: Build typology of employment centers and changes in employment centers based on 1990-2000 changes in development scale, density, diversity, site design, and employment composition;
Task 4: Examine changes in commuting patterns that might be associated with changes in built environments;
Task 5: Carry out case-study research to examine the role of market forces, planning interventions, and public policies in bringing about employment center transformations;  
Task 6: Examine the policy implications of research findings;  
Task 7: Prepare working paper report;  
Task 8: Publish and present peer-reviewed articles.

**Milestones, start and end dates:** Official start date August 1, 2008, end July 31, 2009

**Student Involvement:** Two Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to other UCTC research:** New project

**Potential benefits:** Insights and supporting data on the transportation impacts of employment-center transformations that can be used for intermediate- and long-term planning and travel modeling.

**Direct Cost:** $61,910

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**B.3.4 Project Title: Public Acceptance of Congestion Pricing: Understanding Citizen Preferences (YEAR 21)**

**Principal Investigator:** John Quigley  
**University:** UC Berkeley  
**Email:** quigley@econ.berkeley.edu

**External Project Contact:** All UCTC projects are co-sponsored by Caltrans, Contact CoCo Briseno, Caltrans, 1120 N St., Sacramento, CA 94305, tel. 916 324-2440

**Abstract:** "Political feasibility" has been cited as the major obstacle to road pricing for three decades. But almost all the evidence on views of citizens about congestion pricing is anecdotal. This project will provide the first hard quantitative evidence on citizen preferences about road pricing. We will analyze the one clear example of a popular vote on congestion tolls, taken after an experiment in congestion fees had been implemented and after citizens had had the opportunity to observe and absorb its costs and benefits.

We will analyze the 2006 Swedish referendum on road pricing by merging voting information on over four hundred election districts with socioeconomic information about the residents of those districts and with engineering estimates of the distribution of time savings and incremental fees across origins and destinations in the Stockholm Metropolitan Area. These engineering data, as well as other qualitative indicia, were available well before the referendum vote was held.

**Key Words:** Road pricing, political feasibility, self-interested voting, referendum.

**Objective:** This project will verify the extent to which the time savings enjoyed citizens and the out-of-pocket costs they pay affect their acceptance of road pricing.

**Tasks:** Task 1: Merge voting, socioeconomic, and engineering data; Task 2: Devise models; Task 3: Estimate models; Task 4: Interpret results.

**Milestones, Dates:** Official start date August 1, 2008, end July 31, 2009

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.
Relationship to Other UCTC Research: new project

Potential Benefits: This project will provide the first credible quantitative evidence measurement of “political feasibility” in road pricing.

Direct Cost: $57,609

B.3.5. Project Title: Large Scale Real Options Models for Network Investment Planning and Operational Risk Hedging (YEAR 21)
Principal Investigator: Amelia Regan
University: University of California, Irvine
Email: aregan@uci.edu

External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O St., MS #83, Sacramento, CA 95814, tel. 916-657-4723

Abstract: Whereas in the past, a transportation agency’s primary objective was to allocate its budget to minimize travel costs in its network, today the same agency needs to improve a mature network to address other operational goals such as flexibility or survivability. These goals arise from more attention being placed on the transportation network because of incidents such as a natural disasters, and terrorist attacks as well as rising gas prices. This recent trend shows an increased interest in formulating investment problems with flexibility in mind because of two interrelated reasons: there is a shift in the role of transportation agencies from capital development to operations and management. Because Network Design Problem (NDP) models can capture the performance of a network for a decision-maker, they have great potential as analytical tools for use in considering strategic managerial options. Unfortunately, such a model would require the benefits of an NDP under multi-period, time-varying, demand flow because many of those managerial problems can only be addressed under such circumstances. Our work develops such complex network design problems as well as heuristics for solving these problems.

Key words: Network Design, Flexibility, Survivability, Optimal Investments, Real Options

Objective: The objective of our earlier research was to develop a network investment model that can incorporate different investment and management strategies to deal with these growing needs, particularly network operational risk hedging. To develop this model, an alternative approach to investment valuation with a network-based design objective was needed. We have developed a very successful prototype and solution technique and have demonstrated its effectiveness using the classical Sioux Falls, South Dakota, network (Chow and Regan, 2008). In this work we propose to develop algorithms which will allow us to solve larger, more relevant network problems as well as to focus on several important extensions.

Tasks:

Task 1. We first propose to develop efficient algorithms (heuristics) for solving networks of realistic sizes. The current solution algorithm, coded in MATLAB will be recoded in C++ and will be improved in a variety of ways. We have already coded up networks for the greater Los Angeles Region – both for passenger and multimodal freight transportation. Our goal will be to solve our problem using these networks and data from Caltrans on future potential network improvements.

Task 2. Include other network objectives, such as mixed network design or facility location.

Task 3. Examine at other types of network design strategies, such as ramp metering, signal setting, or congestion pricing.

Task 4. Considering other real option strategies, such as project abandonment, entering or exiting a market, etc. By considering these options within a network setting, new issues and insights may be raised.
Task 5. Develop a model suitable for multimodal networks that includes freight design; and regional transportation management with multiple network operators sharing a fixed budget to improve their respective networks. In the multimodal networks, more efficient solution algorithms would be needed to handle the increased complexity, and for the regional management, a game theoretic approach would be needed to consider the option value of cooperation or competition among agencies.

**Milestones, Dates:** Official start date August 1, 2008, end July 31, 2009

**Student Involvement:** Joe Chow (Civil Engineering PhD student); James Benvenuto (Computer Science, PhD student); Dmitri Arkipov (Computer Science, Undergraduate).

**Technology Transfer Activities:** We have submitted a paper for presentation at TRB and are pursuing publications opportunities.

**Relationship to other UCTC research:** This is a new project.

**Potential benefits:** This work will result in significant improvements in network design and planning.

**Papers to Date:**

Chow, Y.J., A.C. Regan, D. Arkhipov, A faster converging global heuristic for continuous network design using radial basis functions, Submitted to the 2010 Meeting of the Transportation Research Board and for Publication in the Transportation Research Record.


Chow, Y.J., and A.C. Regan. Real option pricing of continuous network design investments. Transportation Science, under review.

Chow, Y.J., and A.C. Regan. Dynamic air tanker location and relocation problem in regional wildland fire planning, INFORS, under review.

**Direct Cost:** $45,719

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**B.3.6. Project Title:** Theoretical and simulation studies of information throughput and communication delay of inter-vehicle communication networks (YEAR 21)

**Principal Investigator:** Wenlong Jin

**University:** UC Irvine

**Email:** wjin@uci.edu

**External Project Contact:** All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O St., MS #83, Sacramento, CA 95814, tel. 916-657-4723

**Abstract:** With the wide-spread of wireless communication units, it is probable to establish an inter-vehicle communication (IVC) network to collect and distribute traffic and other information in a distributed fashion. Key performance measures of such a system include information throughput and communication delay between a pair of source-destination pair. In this research we propose to study the performance of IVC in traffic streams on unidirectional roads, bidirectional roads, and road networks both theoretically and with simulations based on Network Simulator 2. We will investigate the impacts on IVC of different market penetration rates, transmission ranges, number of information source-destination pairs, and routing protocols. The research would be helpful for better understanding of the feasibility and benefits of an advanced traveler information system based on an IVC system.
**Key words:** Inter-vehicle communications; Information throughput; Communication delay; Network Simulator 2

**Objective:** Understand the impacts of vehicle mobility patterns on communication performance in inter-vehicle communication systems under various traffic conditions.

**Tasks:**
- Task 1: NS-2 simulation studies of information throughput and communication delay of IVC in unidirectional, bidirectional, and network vehicular traffic under various conditions;
- Task 2: Theoretical analysis of information throughput and communication delay of IVC in unidirectional, bidirectional, and network vehicular traffic;
- Task 3: Comparison of simulation and theoretical models;
- Task 4: Development of mathematical models of information throughput of IVC in various vehicular traffic scenarios;
- Task 5: Conduct case studies on the evolution of parking codes and standards for TODs in two metropolitan areas;
- Task 6: Discussions of implications of this research;
- Task 7: Prepare working paper report; publish and present peer-reviewed articles.

**Milestones, start and end dates:** Official start date August 1, 2008, end July 31, 2009

**Student Involvement:** Graduate Student Researcher

**Technology Transfer Activities:** Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to other UCTC research:** New project

**Potential benefits:** More efficient inter-vehicle communication systems, simpler formulas for evaluating the performance, better communication routing.

**Papers to Date:**


**Conferences Attended to Date:**

Preliminary findings were presented in the 2009 Transportation Research Board Annual Meeting, in Washington DC, January 2009, titled: “Instantaneous connectivity of one-dimensional inter-vehicle communication networks for general traffic conditions”.

Preliminary findings were presented in the 2nd Annual UTC-PATH Conference in Los Angeles, November 2008, titled: “Connectivity properties of vehicle-infrastructure integration systems as mobile ad hoc networks”.

**Direct Cost:** $48,971
Success stories: The work has been incorporated into developing new routing protocols for inter-vehicle communications. Preliminary results are very encouraging and show a lot of potential of the new performance models. The work has also been sent to California PATH for integrated infrastructure integration studies. It is too early to know the impact however.

B.3.7. Project Title: Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations - PHASE II (YEAR 21)
Principal Investigators: Stephen Ritchie; Jean-Daniel Saphores
University Campus: UC Irvine
Email: s-ritchie@uci.edu saphores@uci.edu
External Project Contact: All UCTC projects are co-sponsored by Caltrans. Christine Azevedo, Caltrans, 1227 O Street, MS #83, Sacramento, CA 95814, tel: 916/657-4723

Abstract: The San Pedro Bay Ports (SPBP) of Los Angeles and Long Beach in Southern California are one of the major container port complexes in the world: in 2004, for example, the SPBP processed over 36% of the U.S. container trade. However, the SPBP complex is also a major source of air pollution caused largely, on the land-side, by diesel locomotives and trucks that transport containers to and from the ports. The resulting annual health costs may exceed $2.5 billion. Low income and minority communities along the major Alameda corridor, a 20-mile railroad line that connects the SPBP to the transcontinental rail network east of downtown Los Angeles, are particular affected. This study will create a tool that will quantify links between SPBP freight traffic, air pollution, and the health of local communities. This tool will help evaluate the effectiveness of various alternatives (such as congestion pricing to decrease peak container traffic flows, alternative fuels for trucks and locomotives, or intermodal and route shifting of container traffic) in order to mitigate the environmental and health impacts of SPBP activities. Expected results include new insights into the spatial, socioeconomic, public health, and social justice consequences of alternative SPBP multimodal freight operations strategies.

Key Words: Port, air pollution, air quality, freight, container, corridor, truck, locomotive, simulation, social impact, environmental impact, public health, social justice

Objective: This study seeks to create a tool that will shed light on the links between Alameda Corridor freight traffic from the SPBP, air pollution, and the health of local communities, and in so doing help to evaluate the effectiveness of various alternatives (such as congestion pricing, alternative fuels for trucks and locomotives, and intermodal and route shifting of container traffic) to mitigate the environmental and health impacts of port activities.

Tasks:
Task 1: Assemble relevant data and code TransModeler network;
Task 2: Select corridor strategies to be simulated;
Task 3: Run TransModeler simulations;
Task 4: Assemble emission factors for road and rail traffic;
Task 5: Model the dispersion of criteria pollutants in the corridor;
Task 6: Assemble demographic data and public health impacts;
Task 7: Assess environmental justice implications for corridor population;
Task 8: Write final Summary report and academic papers.

Milestones, Dates: Official start date August 1, 2008, end July 31, 2009
**Student Involvement:** Graduate Student Researchers: Roberto Ayala, Gunwoo Lee, Mana Sangkapichai, Soyoung You. Undergraduate Research Assistant: Rose Raymond.

**Technology Transfer Activities:** Several invited conference presentations on the results of this research have been given or are scheduled, and additional conference presentations have been given or are under consideration. Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

**Relationship to Other UCTC Research:** continuation of year 20 Phase I project in 2007-08.

**Potential Benefits:** The expected benefits include new insights into the spatial, socioeconomic and public health air quality impacts, and thus social justice consequences, of alternative SPBP freight operations strategies in the Alameda corridor, and development of a tool that will be useful for ongoing policy analyses pertaining to this corridor and which could be adapted and/or expanded for analysis of other corridors and strategies.

**Papers to Date:**


**Conferences Attended to Date:**


**Direct Cost:** $130,921

**Success Stories:** An excellent collaborative relationship has been established with the Port of Long Beach transportation planning group and City of Los Angeles Department of Transportation through this research, that will continue in ongoing UCTC research. The research tools developed in this project and the results to date have been extremely well received by the Port and by researchers and practitioners at the conferences we have attended.
Abstract: How do race, age, sex and other social and economic circumstances influence both the demand for and supply of travel by place, means and purpose? Dozens of studies indicate that while women as a group drive more each year, and tend to take more trips than men, men still drive more overall. Explanations include women’s rising labor force participation and their enduring disproportionate share of domestic and child-oriented responsibilities. As these two trends continue to evolve, much remains unclear about how they and other changes in key demographic, family, and economic factors translate into changing driving patterns. In 1990 San Francisco, working men reported driving more than working women in all age groups but 23-39. By contrast, in 2000, travel times were the same by sex for all age groups but one. Women traveled less in single, childless adult families in 1990, but more by 2000. These trends have not been analyzed for individual-level, longitudinal national data containing rich detail on family structure. It is thus unknown whether the so-called gender gap is shrinking nationwide when using proper statistical controls. We will analyze the National sample from the American Housing Survey, comprising 11 waves from 1985 to 2005. The model specification conforms to urban form theory, the model estimation uses panel techniques, and the potential endogeneity of wages and land costs will be addressed statistically.

Key words: travel behavior, demographics, race, gender, commuting, travel trends, travel demand.

Objective: While we know that people make travel decisions for many reasons, the extent to which fundamental differences extend over time and across individual features, such as sex, are not clear. The proposed research is specifically aimed at clarifying how individual characteristics systematically contribute to travel demand.

Tasks: Task 1: Literature review; Task 2: Database construction and development; Task 3: Descriptive analyses; Task 4: Multivariate analyses; Task 5: Production of deliverables.

Milestones, start and end dates: Official start date August 1, 2008, end July 31, 2009 – no cost extension to July 31, 2010

Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to other UCTC research: Expansion of work started under a 2006/07 UCTC grant on gender and travel.

Potential benefits: This research has potential implications for several travel behavior hypotheses related to gender, race and other interactions of local labor and housing markets.

Papers to Date: "Public Works Management & Policy 13, 2009. (with L. Takahashi)

Conferences Attended to Date:

“Sources of the Narrowing and Widening of Travel Differences by Gender,” Fourth International Conference on Women’s Issues in Transportation, Beckman Conference Center of the National Academy of Sciences, Irvine, October 2009.

"Sex Changes Everything: Trends in the Demographics of the U.S. Commute," Visiting Scholars Seminar, University Transportation Research Center, The City College of New York, May 2009

"Sex Changes Everything: Trends in the Demographics of the U.S. Commute," National Center for Smart Growth, University of Maryland College Park, April 2009


Direct Cost: $66,418

**B.3.9  Project Title: Unhiding the Cost of Residential Parking (YEAR 21)**

**Principal Investigator:** Donald Shoup  
**University:** UC Los Angeles  
**Email:** shoup@ucla.edu

**Abstract:** Minimum parking requirements in zoning codes provide a large subsidy to drivers and impose high costs on housing developers. I will use data from housing developed under the Los Angeles Adaptive Reuse Ordinance (ARO) to estimate how minimum parking requirements subsidize driving and the increase the cost of housing. The ARO provides a natural experiment to evaluate the effects of minimum parking requirements. My preliminary results suggest that minimum parking requirements for downtown housing impose a cost of between $23,000 and $44,000 per dwelling unit and subsidize driving by at least 15¢ per mile driven. The research findings will have strong implications for efforts to reduce overall vehicle miles traveled; for plans to integrate transportation and land use goals; and for attempts to create accessible communities in dense downtowns. I expect the research to be of particular use to city planning agencies and transportation policymakers.

**Key Words:** Parking, subsidies, vehicle ownership, vehicle miles traveled.

**Objective:** The goal is to estimate how unbundling the cost of parking from the cost of housing will reduce vehicle ownership and vehicle travel.

**Tasks:**

Task 1: Gather information on the buildings that have been refurbished under the Adaptive Reuse Ordinance, specifically the total costs of converting the buildings and the costs of providing parking for them;

Task 2: Administer a survey to both residents of Adaptive Reuse dwellings and other downtown dwellings. The survey will seek to ascertain whether residents of ARO dwellings do in fact drive less and/or own fewer automobiles than residents of other downtown dwelling units, and if so whether the availability of parking plays a role in this difference;

Task 3: Using the data from steps 1 and 2, I will estimate both the “parking tax” that minimum parking requirements place on new infill developments, and the “parking subsidy” that accrues to drivers whose parking costs are hidden in their rent;

Task 4: Interview planners, developers and elected officials in order to identify the institutional and cultural obstacles to changing how we plan for parking. If unhiding the cost of parking would provide large benefits, why is progress toward that goal so slow?
Milestones, Dates: Official start date August 1, 2008, end July 31, 2009

Student Involvement: Graduate Student Researcher

Technology Transfer Activities: Publications will be posted on UCTC’s Website and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project

Potential Benefits: The research will enable planners elected officials to estimate the transportation and land use benefits of unbundling the cost of parking from the cost of housing. It will also identify political obstacles to unbundling, and suggest paths around those obstacles.

Direct Cost: $60,354
7. FINANCIAL STATUS

It is the UCTC’s longstanding policy to commit all funds authorized by our sponsors, the US Department of Transportation and the California Department of Transportation, in the year that they are authorized. If funds are not fully expended in the year they are allocated, they may be carried over into the next fiscal year with the permission of the UCTC Director. Carry-over funds remain committed to the categories to which they were initially allotted, except for Headquarters funds, which differ in some cases from amounts initially budgeted because of changes in salaries or expense items, or reallocations of administrative budget amounts to research and technology transfer accounts.

Table 4 shows the committed allocations of the budget for 2008-2009. The $1,686,000 funded by U.S. DOT matched by $1,686,000 from Caltrans yielded a total budget of $3,372,000.

Table 4. ALLOCATED AMOUNTS FOR YEAR 21: University of California Transportation Center Budget for 2008-9

<table>
<thead>
<tr>
<th>ITEM</th>
<th>USDOT</th>
<th>Caltrans</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Director Salary</td>
<td>22,000</td>
<td>65,000</td>
<td>87,000</td>
</tr>
<tr>
<td>Faculty Salaries (7)</td>
<td>112,500</td>
<td>256,280</td>
<td>368,780</td>
</tr>
<tr>
<td>Administrative Staff Salaries</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other Staff Salaries</td>
<td>41,162</td>
<td>221,996</td>
<td>263,158</td>
</tr>
<tr>
<td>Student Salaries</td>
<td></td>
<td>521,573</td>
<td>521,573</td>
</tr>
<tr>
<td>Staff Benefits</td>
<td>9,609</td>
<td>97,439</td>
<td>107,048</td>
</tr>
<tr>
<td><strong>A- SUBTOTAL SALARIES AND BENEFITS</strong></td>
<td>185,271</td>
<td>$1,162,288</td>
<td>1,347,559</td>
</tr>
<tr>
<td>Scholarships, including student fees and tuition when applicable</td>
<td>1,270,000</td>
<td>172,266</td>
<td>1,442,266</td>
</tr>
<tr>
<td>Permanent Equipment</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Expendable Property &amp; Supplies</td>
<td>9,000</td>
<td>123,108</td>
<td>132,108</td>
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<tr>
<td>Domestic Travel</td>
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<tr>
<td>Foreign Travel</td>
<td>6,000</td>
<td></td>
<td>6,000</td>
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<tr>
<td>Other Direct Costs (Specify)</td>
<td>38,624</td>
<td>188,338</td>
<td>226,962</td>
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<td><strong>B- SUBTOTAL DIRECT COSTS NOT INCLUDING SCHOLARSHIPS ETC</strong></td>
<td>86,624</td>
<td>351,446</td>
<td>438,070</td>
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<tr>
<td>Subtotal All Direct Costs</td>
<td>1,541,895</td>
<td>1,686,000</td>
<td>3,227,895</td>
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<tr>
<td><strong>C-TOTAL SUBJECT TO IND.COSTS</strong></td>
<td>271,895</td>
<td>0</td>
<td>271,895</td>
</tr>
<tr>
<td>Facilities &amp; Admin. (Indirect) Costs</td>
<td>144,104</td>
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<td>144,104</td>
</tr>
<tr>
<td><strong>TOTAL COSTS</strong></td>
<td>1,686,000</td>
<td>1,686,000</td>
<td>3,372,000</td>
</tr>
<tr>
<td>Percents</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: funding sources and expenditures
8. FUNDING SOURCES AND EXPENDITURES

Revenues for UCTC came in equal amounts from US DOT and Caltrans. Expenditures were made in accordance with the submitted budget. All funds were allocated to budgeted categories during 2008-2009.

Figure 1 illustrates revenues and Figure 2 illustrates direct expenditures (committed amounts by allocation category) for UCTC.
APPENDIX 1. GLOSSARY

ACCESS - the research magazine published by the University of California
CAD- computer-aided design
CALTRANS- the California Department of Transportation
CE-CERT – the Civil Engineering Center for Engineering Research and Technology at UC Riverside
CCIT- California Center for Innovative Transportation located at UC Berkeley
CMA- Congestion Management Agency, special-purpose county-level organizations in California
CST- Center for a Sustainable California, at UC Berkeley
CUTC - Council of University Transportation Centers
EPA- the Environmental Protection Agency
FHWA- the Federal Highway Administration of the US Department of Transportation (USDOT)
FTA- the Federal Transit Administration of the US Department of Transportation
FTE- full-time equivalent (a measure of staffing levels)
GIS-geographic information science / geographic information systems
GMS – Global Metropolitan Studies, an interdisciplinary initiative at UC Berkeley
GSR - graduate student researcher
IGS- the Institute of Governmental Studies at UC Berkeley
ISTEA- the Intermodal Surface Transportation Efficiency Act
ITS - the Institute of Transportation Studies (branches at the Berkeley, Davis, Irvine, and UCLA campuses)
IURD - the Institute of Urban and Regional Development at UC Berkeley
Leonard Center – the Leonard Transportation Center at San Bernardino State University, a UT
METRANS- the Center for Metropolitan Transportation Studies at the University of Southern California, a UTC
MPO- Metropolitan Planning Organization
MINETA - Mineta Transportation Institute at San Jose State University, a UTC
NEXTOR - National Center of Excellence for Aviation Operations Research headquartered at UC Berkeley
NRT – nonresident tuition
NSF- National Science Foundation
OECD- the Organization for Economic Cooperation and Development
PATH- Program for Advanced Transit and Highways headquartered at UC Berkeley
PI- Principal Investigator
RABA - Revenue Aligned Budget Authority
RITA – the Research, Innovations and Technology Administration of the USDOT
SAFETEA-LU - Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
TEA 21- the Transportation Efficiency Act for the 21st Century
TRB- the Transportation Research Board
UC- the University of California, a nine-campus public institution
UCB - the Berkeley campus of the University of California
UCD - the Davis campus of the University of California
UCI - the Irvine campus of the University of California
UCM – the Merced campus of the University of California
UCR – the Riverside campus of the University of California
UCSB – the Santa Barbara campus of the University of California
UCSC – the Santa Cruz campus of the University of California
UCSD – the San Diego campus of the University of California
UCSF – the San Francisco campus of the University of California
UCTC- the University of California Transportation Center
USC - the University of Southern California, a private university
US DOT - the US Department of Transportation
UTC Program - the University Transportation Centers Program
Volvo Center – the Center for Future Urban Transport, a Volvo Center of Excellence located at Berkeley
APPENDIX 2. COMPLETED RESEARCH PROJECTS – UCTC

PERIOD COVERED: FALL 2000 – SUMMER 2008 TOTAL COMPLETED PROJECTS: 128

YEAR 12 (1999-2000) COMPLETED PROJECTS (20 PROJECTS)

Induced Travel Demand: A Systems Analysis of Longer Term Impacts of Road Expansion
Robert Cervero, City and Regional Planning, Berkeley

Measuring the Impact of the Internet on the Trucking Industry
Carlos Daganzo, Civil & Environmental Engineering, Berkeley

Roadway Tunnel Measurements of Carbon and Nitrogen-Containing Air Pollutants
Robert Harley, Civil & Environmental Engineering, Berkeley

Estimation of Latent Pavement Properties Using Condition Survey Data
Samer M. Madanat, Civil and Environmental Engineering, Berkeley

Online Versus Rolling Horizon Algorithms for Dynamic Service Fleet Operations
Amelia Regan and Sandra Irani, Civil & Environmental Engineering

Regional Transportation Infrastructure Finance in the U.S.
Martin Wachs, Institute of Transportation Studies, Berkeley

Estimating Freeway Traffic Stream Modal Activities for Air Quality Modeling
H. Michael Zhang, Civil and Environmental Engineering, Davis

The Transportation Behavior and Needs of Welfare Recipients
Evelyn Blumenberg, Public Policy and Social Research, Los Angeles

New Highways and Urban Growth Patterns: Using Locally Weighted Regression to Measure the Development Impacts of the Orange County Toll Roads
Marlon Boarnet, Urban & Regional Planning, Irvine

GPS-Based Data Handling for Activity Based Modeling
Reginald G. Golledge, Department of Geography, Santa Barbara

Impacts of Shipping Changes on the Efficiency of the Freight Transportation Network
Tom Golob and Amelia Regan, Institute of Transportation Studies, Irvine

The Effects of Urban Land Use Patterns on Household Trip-Making Behavior: An Empirical Analysis
John D. Landis, City & Regional Planning, Berkeley

Putting Behavior in Household Travel Behavior Data: An Interactive GIS-based Survey Via the Internet
Michael G. McNally, Institute of Transportation Studies, Berkeley

Measuring the Role of Transportation in Facilitating the Welfare-to-Work Transition
Paul M. Ong, Public Policy and Social Research, Los Angeles

Development of Estimation Procedures for Activity-Based Model Forecasting
Will Recker, Institute of Transportation Studies, Irvine

Evaluating a University Transit Pass Program
Donald Shoup, Institute of Transportation Studies, Los Angeles

Journeys to Crime: Documentation and Evaluation of Crime Incidence on and around Railway Stations in Los Angeles
Anastasia Loukaitou-Sideris, Urban Planning, Los Angeles
The Viability of Value Pricing Demonstrations
Kenneth Small, Institute of Transportation Studies, Irvine

Greenhouse Gas Emissions Trading and the Transport Sector
Daniel Sperling, Institute of Transportation Studies, Davis

Driving for Dollars: How the Politics of Finance Has Shaped the California Highway System
Brian D. Taylor, Urban Planning, Los Angeles

YEAR 13 (2000-2001) COMPLETED RESEARCH PROJECTS (15 PROJECTS)

Does Commuting Distance Matter? Commuting Tolerance and Residential Change
William A.V. Clark, Geography, UCLA

An Evaluation of Local Option Transportation Taxes in California
Professor Martin Wachs, Institute of Transportation Studies, UC Berkeley

Stationary Traffic Models and Freeway Geometry
Michael Cassidy, Civil and Environmental Engineering, UC Berkeley

E-Commerce and the Efficiency of the California Freight Network: Perspectives of Shippers, Carriers and Third Party Logistics and Information Services Providers
Thomas F. Golob and Amelia C. Regan, ITS, UC Irvine

Assessing the Influence of Residential Location Changes on Travel Behavior
Michael G. McNally, Civil and Environmental Engineering, UC Irvine

The Impact of Attitudes toward Mobility, Adoption of Previous Strategies, and Demographic Characteristics on Responses to Congestion
Patricia L. Mokhtarian, Civil and Environmental Engineering, UC Davis

Measuring the Role of Transportation in Facilitating the Welfare-to-Work Transition (Third Year)
Paul Ong, Urban Planning, UCLA

Systematic Transport Access and Policies for Low Wage Labor Markets
John M. Quigley, Public Policy, UC Berkeley

Activity-Based Forecasting Model for Planning Applications
Will Recker, Institute of Transportation Studies, UC Irvine

Inventory Theoretic Models of Freight Demand: Revisiting the Past in Light of the New Economy
Amelia Regan, Civil Engineering, and Charles Lave and Amihai Glazer, Economics, UC Irvine

The Environment - Transit Crime Connection: Continuing Study of the Metro Green Line and its Vicinity
Anastasia Loukaitou-Sideris, Urban Planning, UCLA

Has Parking Cashout Failed in California?
Don Shoup, Public Policy and Social Research, UCLA

Reconsidering the Effects of Fare Reductions on Transit Ridership
Brian D. Taylor, Urban Planning, UCLA

Planes, Trains, or Camionetas (little buses)? A Baseline Study of an Informal Travel Mode
Abel Valenzuela Jr., Public Policy and Social Research, UCLA

Understanding and Modeling Driver Behavior in Dense Traffic Flow
H. Michael Zhang, Civil and Environmental Engineering, UC Davis
YEAR 14 (2001- 2002) COMPLETED RESEARCH PROJECTS (15 PROJECTS)

How Does Travel Behavior Change When Households Change Jobs?
William Clark, Geography, UCLA

Design of Vehicle Routes and Driver Shifts for Systems with Uncertain Demand
Carlos Daganzo, Civil and Environmental Engineering, UC Berkeley

Effect of Driving Mode on Light-Duty Vehicle Emissions Measured On-Road
Robert Harley, Civil and Environmental Engineering, UC Berkeley

Using the Spatial Configuration of Cities to Estimate The Impact of Commuting Time on Hours of Work
Antonio Bento, Geography, UC Santa Barbara

Evaluation of the California Safe Routes to School Program
Marlon Boarnet and Kristen Day, City and Regional Planning, UC Irvine

Forecasting Demand and Values of Travel Time Savings for Freeway HOV, Toll and HOT Facilities: Incorporating Attitudes and Perceptions into Commuter Choice Models
David Brownstone and Thomas Golob, UC Irvine

Transit-Based Housing: Residential Sorting and Its Influence on Mode Choice
Robert Cervero, City and Regional Planning, UC Berkeley

Real-time Travel Data Collection System Augmented with Speech Interface
Reginald Golledge, Geography, UC Santa Barbara

Life -Cycle Environmental and Economic Assessment of Using Recycled Materials for Asphalt Pavements
Arpad Horvath, Civil and Environmental Engineering, UC Berkeley

Reinforcement Learning in Transportation Infrastructure Management
Samer Madanat, Civil and Environmental Engineering, UC Berkeley

Dissonance between Desired and Current Residential Neighborhood Type: Relationships to Travel-Related Attitudes and Behavior
Patricia Mokhtarian and Ilan Salomon, ITS, UC Davis

Optimal Control Policies for Urban Corridor Management
Wilfred Recker, ITS, UC Irvine

The Impact of Motor Vehicle Transportation on Water Quality
Jean Daniel Saphores, ITS, UC Irvine

Putting Back the Pleasure in the Drive: Reclaiming Urban Parkways for the 21st Century
Anastasia Loukaitou-Sideris, Urban Planning, UCLA

Equity and Environmental Justice in Transportation
Martin Wachs, ITS, UC Berkeley

Expanded Evaluation of the California Safe Routes to School Program
Marlon Boarnet, Kristen Day, and Craig Anderson, City and Regional Planning, UC Irvine

Verifying Regularities in Queued Freeway Traffic
Michael Cassidy, Civil and Environmental Engineering, UC Berkeley

Commuter Rail, Land Use and Travel Behavior
Robert Cervero, City and Regional Planning, UC Berkeley

Comparing White and Minority Household Commuter Behavior
William Clark, Geography, UC Berkeley

Storage System Dynamics and Management Policies
Carlos Daganzo, Civil and Environmental Engineering, UC Berkeley

Judging the Speed of Pedestrians and Bicycles at Night
Karen K. De Valois, Psychology, UC Berkeley

Policies for Safer and More Efficient Truck Operations on Urban Freeways
Thomas Golob and Amelia Regan, ITS, UC Irvine

High-Coverage Point-to-Point Transit
R. Jayakrishnan, ITS, UC Irvine

Incorporating Seismic Risk Considerations in Transportation Infrastructure Management
Samer Madanat, Civil and Environmental Engineering, UC Berkeley

Handheld Travel Survey Technology to Supplement Vehicle Tracking
Michael McNally, ITS, UC Irvine

I/O Analysis of Communications and Travel for Industry
Patricia Mokhtarian, Civil and Environmental Engineering, UC Davis

Car Ownership, Insurance Premiums and Employment Outcomes
Paul Ong, Urban Planning, UCLA

Public Transit and Residential Location Choices of Minorities and Transit Dependents
John Quigley and Stephen Rafael, Public Policy, UC Berkeley

An Evaluation of Employer-Based Transit Programs
Donald Shoup, Urban Planning, UCLA

Effects of Contracting on Fixed-Route Bus Cost-Efficiency
Brian Taylor, Urban Planning, UCLA, and Martin Wachs, ITS, UC Berkeley

Exploring the Marketability of Fuel-Cell Electric Vehicles
Thomas Turrentine, ITS, UC Davis

Theoretical and Empirical Investigations of Traffic Flow at Highway Merges
Michael Zhang, M., Civil and Environmental Engineering, UC Davis
YEAR 16 (2003-2004) COMPLETED RESEARCH PROJECTS (10 PROJECTS)

Experiments to Increase Freeway Merge Capacity
Michael Cassidy, Civil and Environmental Engineering, UC Berkeley

Death on the Crosswalk: A Study of Pedestrian Accidents in Los Angeles:
Anastasia Loukaitou-Sideris, Urban Planning, UCLA

Aggregate Structural Equations Modeling of the Relationships Between Consumer Expenditures on Communications and on Travel
Patricia Mokhtarian, ITS, UC Davis

Capacity Provision and Pricing in Road Transport Networks in an Imperfectly Competitive Economy
Kurt Van Dender, ITS, UC Irvine

Family Caregivers, the Elderly, and Land-Use: An Evaluation of Transportation in Two California Communities
Martin Wachs and Annie Decker, ITS, UC Berkeley

Amber Alert Policy: Laboratory Experiments to Improve a Policy
Theodore Cohn, Optometry, UC Berkeley

Improved Developer Models for the Sacramento Region
Robert Johnston, Environmental Sciences, UC Davis

Auctions for the Procurement of Transportation Service Contracts
Amelia Regan, ITS, UC Irvine

Identification and Measurement of Freeway Congestion
Alexander Skabardonis, PATH, UC Berkeley

Transportation Policy Development: Labor as a Missing Stakeholder
Margaret Weir, Sociology, UC Berkeley

YEAR 17 (2004-2005) COMPLETED RESEARCH PROJECTS (17 PROJECTS)

Similarity Analysis for Estimation of an Activity-based Travel Demand Model
Will Recker, ITS, UC Irvine

Auto-mobility, Spatial Isolation, and the Poor
Evelyn Blumenberg, Urban Planning, UC Los Angeles

Housing-Retail Balance, Travel Demand, and Physical Activity
Robert Cervero, City and Regional Planning, UC Berkeley

Transaction-Cost Economic Analysis of Institutional Change toward Design-Build Contracts for Public Transportation
David Dowall, Institute of Urban and Regional Development, UC Berkeley

Activity-Oriented Scheduling/Activity Survey and Analysis Via a Unified Real-time Data Collection Framework
Reginald Golledge, Geography, UC Santa Barbara

Wet Pavement Accidents on California Highways: Causes, Concentrations, and Potential Means for Reduction
Thomas Golob, ITS, UC Irvine

The UC Davis Bicycle Studies
Susan Handy, Transportation Technology and Policy, UC Davis
Testing Spatial Mismatch: A Structural Equations Modeling Approach
Robert Johnston, Environmental Sciences, UC Davis

Street Trees and Intersection Safety
Elizabeth Macdonald, City and Regional Planning, UC Berkeley

Robust Optimal Maintenance and Rehabilitation Policies in Asset Management
Samer Madanat, ITS, UC Berkeley

Modeling the Adoption of Teleshopping
Patricia Mokhtarian, Civil and Environmental Engineering, UC Davis

Estimating Activity Rates and Emissions from Heavy-Duty Construction Equipment
Debbie Niemeier, Civil and Environmental Engineering, UC Davis

Modeling Car Ownership Rates, and Age and Value of Vehicles
Paul Ong, Urban Studies, UC Los Angeles

Capacity Modeling for Large Scale Urban Multimodal Freight Transportation Systems
Amelia Regan, ITS, UC Irvine

Cruising for Parking
Donald Shoup, Urban Studies, UC Los Angeles

Why Do Inner City Residents Pay Higher Premiums? Determinants of Automobile Insurance Premiums?
Michael Stoll, Urban Studies, UC Los Angeles

Motor Fuel Price and Expenditure Effects on Vehicle Use in California
Martin Wachs, ITS, UC Berkeley

YEAR 18 (2005-6) COMPLETED RESEARCH PROJECTS (14 COMPLETED PROJECTS)

Congestion Control for Highway Network Systems
Alexandre Bayen, UC Berkeley

Is the Gender Gap History? Revisiting Sex Differences in Driving using a National Panel, 1985 to 2005
Randall Crane, UC Los Angeles

A Spatial Analysis of Self-Serving and Altruistic Travel Behavior
Konstadinos Goulias, UC Santa Barbara

Emission and Air Quality Impacts of New Diesel Engine Control Technologies
Robert Harley, UC Berkeley

Life-Cycle Environmental Assessment of Passenger Air and Rail Transportation
Arpad Horvath, UC Berkeley

Anastasia Loukaitou-Sideris, UC Los Angeles

A Model of Activity/Travel Scheduling/Rescheduling Decisions in an Uncertain Environment
Wilfred Recker, UC Irvine

An Empirical and Theoretical Study of Freeway Weave Analysis
Michael Cassidy, UC Berkeley
Freeway Deconstruction and Urban Renewal Land Market and Transportation Impacts
Robert Cervero, UC Berkeley

How Much Do Low Income and Foreign-Born Households Use Public Transportation?
William Clark, UC Los Angeles

The Effect of In-Transit WiFi Internet Access on The Value of Travel Time Implications for Mode-Choice Models
Adib Kanafani, UC Berkeley

Bottom-up Bridge Management System
Samer Madanat, UC Berkeley

The Political Calculus of Congestion Pricing
Donald Shoup, UC Los Angeles

Estimating Potential Exposure to Diesel Truck Freeway Emissions in Southern California A Methodology for Assessing Air Pollution Impacts of Goods Movement
Arthur Winer, UC Los Angeles

YEAR 19 (2006-7) COMPLETED RESEARCH PROJECTS (6 COMPLETED PROJECTS – 5 CONTINUING)

An Energy and Emissions Impact Evaluation of Intelligent Speed Adaptation
Matthew Barth, UC Riverside

Relieving Congestion by Real-time Monitoring of Traffic Conditions and Coordination of Traffic Signals across Zone Boundaries
Michael Cassidy and Carlos Daganzo, UC Berkeley

Evaluation of the Information Needs of the Distributed Landside Port Planning in California
Mark Hansen, UC Berkeley

Models for Evaluating General Truck Transportation Management Strategies
Amelia Regan, UC Irvine

Modeling Transportation Networks during Disruption and Emergency Evacuations
Zuo-Jun Max Shen, UC Berkeley

Mode Choice and Destination Choice: Estimations and Simulations for Airport Access in the San Francisco Bay Area, 2001/2002
Kurt Van Dender and David Brownstone, UC Irvine

YEAR 20 (2007-8) COMPLETED RESEARCH PROJECTS (5 COMPLETED PROJECTS – 5 CONTINUING)

Traffic Congestion: Quantifying the Real World Impact on Greenhouse Gases
Matt Barth, UC Riverside

Securing Linked Transportation Systems - Strategies for Urban transportation
Adib Kanafami, UC Berkeley

Measuring Travel Behavior of Low-Income Households Using GPS Technologies, Diary and Prompted Recall Methods
Paul Ong, UCLA

Real Option-based Procurement for Transportation Services
Amelia Regan and JP Saphores, UC Irvine
Modeling the Reliable Transportation Network Design Problems in Case of Disruptions
Max Shen, UC Berkeley

YEAR 21 (2008-9) COMPLETED RESEARCH PROJECTS (8 COMPLETED PROJECTS – 9 CONTINUING)

Effects of Transportation Corridor Features on Driver and Pedestrian Behavior: Literature Review.
Elizabeth Macdonald, UC Berkeley

Building Support for Transit-Oriented Development: Do Community Engagement Tools Work?
Karen Chapple, UC Berkeley

Assessing the Role of Operating, Passenger, and Infrastructure Costs in Fleet Planning under Fuel Price Uncertainty; The Potential of Turboprops to Reduce Aviation Fuel Consumption; The Impact of Fuel Price on Large Jet Operating Cost and Scale Economies
Mark Hansen, UC Berkeley

Explaining Sense of Place Attitudes as Indicators of Travel Behavior; Investigating the Impact of Sense of Place on Travel Behavior Using an Interpretative Survey Methodology; Constraint-based Assessment of Intra-Household Using Individual Accessibility Measures.
Konstadinos Goulias, UC Santa Barbara

Near-Source Modeling of Transportation Emissions in Built Environments Surrounding Major Arterials.
Marko Princevac, UC Riverside
Marlon Boarnet, UC Irvine

Are TODs Over-parked?
Robert Cervero, UC Berkeley

Investigating the Possibility of Using BART Air Freight Movement
Xiao-Yu Lu, UC Berkeley

Environmental Impacts of a Major Freight Corridor: A Study of the I-710 in California
Stephen Ritchie, UC Irvine
APPENDIX 3. CONTINUING PROJECTS – UNIVERSITY OF CALIFORNIA TRANSPORTATION CENTER

TOTAL: 19 PROJECTS CONTINUING INTO 2009-10

A -- Year 19 - 2006-7 Projects – Continued into 2009-10 (5 Projects)

Robust Traffic Assignment via Convex Optimization
Laurent El Ghaoui, UC Berkeley

Taxi Drivers in Los Angeles: Profile of a Workforce Facing Change
Jacqueline Leavitt, UC Los Angeles

Subcontracting Decisions in California Highway Procurement Contracts
Justin Marion and Gil Ricard, UC Santa Cruz

Approach to Real-Time Commercial Vehicle Monitoring
Stephen Ritchie, UC Irvine

Congestion and Accessibility: What’s the Relationship?
Brian Taylor, UC Los Angeles

B -- Year 20 - 2007-8 Projects – Continued into 2009-10 (5 Projects)

Immigrants and Travel Behavior: Effect of Ethnic Neighborhoods on Commute Time and Mode
Evelyn Blumenberg, UCLA

The Personal Travel Assistant (PTA): Measuring the Dynamics of Human Behavior
Will Recker, Rina Dechter, and C. Rindt, UC Irvine

Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations
Steve Ritchie, R. Jayakrishan, O. Ogunseitan, and R. Torres, UC Irvine

Costs and Effectiveness of Lower-Speed, Environmentally-Friendly Urban Highway Designs
Ken Small, UC Irvine

Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge
Brian Taylor, UCLA

C -- Year 21 - 2008-9 Projects – Continued into 2009-10 (9 Projects)

Towards an Understanding of Intermodal Roles in Intercity Transportation
Adib Kanafani, UC Berkeley

Experiments to Improve the Benefits of Freeway Carpool Lanes
Carlos Daganzo and Michael Cassidy, UC Berkeley

From Employment Centers to Mixed-Use Activity Centers: Commuting and Environmental Impacts,
Robert Cervero, UC Berkeley

Public Acceptance of Congestion Pricing: Understanding Citizen Preference,
John Quigley, UC Berkeley

Large Scale Real Options Models for Network Investment Planning and Operational Risk Hedging,
Amelia Regan, UC Irvine
Theoretical and Simulation Studies of Information Throughput and Communication Delay of Inter-Vehicle Communication Networks,
Wenlong Jin, UC Irvine

Mitigating the Social and Environmental Impacts of Multi-modal Fright Corridor Operations at Southern California Ports: Phase II,
Stephen Ritchie and Jean Daniel Saphores, UC Irvine

Sex, Race, and the Journey to Work: Tracking and testing Convergence and Divergence Trends using a National Panel, 1985 to 2005,
Randall Crane, UCLA

Unhiding the Cost of Residential Parking,
Donald Shoup, UCLA
APPENDIX 4. PERFORMANCE INDICATORS

UNIVERSITY OF CALIFORNIA TRANSPORTATION CENTER UCTC BASE YEAR: 2007-8

Research Selection
1. Number of transportation research projects selected for funding. UCTC PROJECTS

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Basic Research</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Advanced Research</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Applied Research</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

1a. Number of those projects that you consider to be: basic research, advanced research, and applied research. Projects may be included in more than one category if applicable.

2. Total budgeted costs for the projects reported in 1 above. -- direct costs only

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<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>$1,049,800</td>
<td>$1,011,899</td>
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</tbody>
</table>
**Research Performance**

3. Number of transportation research reports published. PAPERS, ARTICLES, RESEARCH REPORTS TOTAL - UCTC sponsored only

<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>42</td>
<td>55</td>
</tr>
</tbody>
</table>

4. Number of transportation research papers presented at academic/professional meetings. -- UCTC PAPERS ONLY

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</thead>
<tbody>
<tr>
<td></td>
<td>62</td>
<td>75</td>
</tr>
</tbody>
</table>
Education

5. Number of courses offered that you consider to be part of a transportation curriculum. Report courses shown in the university course catalog as being offered, whether or not they were conducted during the academic year being reported. **FIVE CAMPUSES WITH FORMAL TRANSPORT PROGRAMS ONLY**

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>Graduate</td>
<td>70</td>
<td>73</td>
</tr>
</tbody>
</table>

6. Number of students participating in transportation research projects. Count individual students (one student participating in two research projects counts as one student).

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>90</td>
<td>32</td>
</tr>
<tr>
<td>Graduate</td>
<td>225</td>
<td>161</td>
</tr>
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</table>

Human Resources

7. Number of advanced degree programs offered that you consider to be transportation-related.

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Level</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Doctoral Level</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>

8. Number of students enrolled in those transportation-related advanced degree programs. **FORMAL TRANSPORTATION SPECIALIZATIONS ONLY**

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Level</td>
<td>100</td>
<td>156</td>
</tr>
<tr>
<td>Doctoral Level</td>
<td>40</td>
<td>141</td>
</tr>
</tbody>
</table>

9. Number of students who received degrees through those transportation-related advanced degree programs.

<table>
<thead>
<tr>
<th></th>
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<th>2008-9</th>
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</thead>
<tbody>
<tr>
<td>Master’s Level</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Doctoral Level</td>
<td>11</td>
<td>25</td>
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</table>
Technology Transfer

10. Number of transportation seminars, symposia, distance learning classes, etc. conducted for transportation professionals.

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>5</td>
<td>19</td>
</tr>
</tbody>
</table>

11. Number of transportation professionals participating in those events.

<table>
<thead>
<tr>
<th></th>
<th>2007-8</th>
<th>2008-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>670</td>
<td>804</td>
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</table>