

Year 22 (2009-2010) Annual Report

University of California Transportation Center

Director: Robert Cervero

(08/1/09-07/31/10)



ANNUAL REPORT
Year 22
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Region IX

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ABOUT UCTC: OUR 22ND 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. The UCTC designated campuses are UC Berkeley, UC Irvine, UCLA, UC Riverside, and UC Santa Barbara. We are funded by the US Department of Transportation and the California Department of Transportation.

2009-2010 was UCTC's 22nd year as the Federal Region 9 University Transportation Center (UTC). Officials from the University Transportation Centers (UTC) program of the Research and Innovative Technology Administration (RITA) of U.S.DOT conducted a site visit of UCTC in October of 2009, providing constructive feedback on what we are doing well and how we might go about making even more improvements in the future. On the research front, a total of 16 new faculty initiated projects were started in 2009-10, along with another 17 projects that were carried forward from 2008-2009. A total of 44 faculty research reports were submitted during 2009-2010.

In addition, 10 doctoral dissertation grants were awarded and 112 students completed transportation-related graduate degrees across the UCTC campuses (92 masters and 20 doctorate degrees). Our graduates have joined private transportation firms, universities, nonprofits, and federal, state, and local government agencies.

UCTC undertook a number of educational and tech transfer activities, supporting the UCLA Lake Arrowhead conference, the UCTC student conference held this year at Irvine, three special educational programs targeted at undergraduates and young professionals, and various activities of the Transportation Research Board. UCTC also partnered with Caltrans and California University Transportation Centers (UC Davis, USC, San Jose State, the Leonard Center for California Stated Universities) on a series of webinars aimed at practitioners that focused on research funded by the California UTCs. UCTC staff and researchers also began work during this year with Caltrans to develop a statewide strategic transit plan in partnership with transit agencies in the state and the California Transit Association.

Of note, Faculty members and graduate students affiliated with UCTC presented numerous papers at sessions of the annual meeting of the Transportation Research Board in January 2010. Former UCTC Director Martin Wachs gave the 2010 Thomas B. Deen Distinguished Lecture at the Annual Meeting of the Transportation Research Board (TRB). Also, the TRB Pyke Johnson Award was given to UC Irvine researchers and faculty affiliates Gunwoo Lee, Soyoung (Iris) You, Stephen Ritchie, Jean-Daniel Saphores, Mana Sangkapicha, and R. Jayakrishnan for their UCTC-supported paper, "Environmental Impacts of a Major Freight Corridor: A Study of I-710 in California."

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. Transportation is an exciting and crucially important field, and in this regard UCTC remains committed to advancing knowledge and informing practice to promote efficient, sustainable, and socially just transportation systems of the future.

—Robert Cervero, October, 2010

1. UCTC VISION AND THEME

1.1 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.

1.2 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. This theme has guided UCTC research since the Center's very beginning, reflecting the breadth of knowledge in the transportation field found throughout the five 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 through the UCTC.

2. OVERVIEW OF UCTC ACTIVITIES

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

2.1 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. 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.

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.

At Caltrans' request to all UTCs in California, we have a policy to implement a "one project at a time" rule, i.e., no Principal Investigator may have more than one incomplete project at any time. For example, faculty who submitted proposals for 2009-2010 had to have completed their prior year's work to be eligible for funding support.

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 Web site. 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 a decade ago 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.

Research Proposal Review Process

All faculty research proposals undergo confidential single-blind 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, with at least one from a Caltrans representative. 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.

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 reviewed with Caltrans. 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 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". 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, ACCESS magazine articles and UCTC policy briefs.

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.

2.2 Educational 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. More details 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. This 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.

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. In a recent review of transportation planning programs in North America by Planitzen, 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



UC Berkeley Undergraduate Transportation Week

UCTC funding for undergraduate education at the various campuses has continued to be focused on the development of new transportation courses, consistent with the objectives set in UCTC's latest Strategic Plan. 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. 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.

Of note in Year 22, UCTC offered several three new educational opportunities for undergraduates and young professionals interested in the field. In Spring 2010, UCTC Assistant Director Karen Frick hosted an undergraduate transportation week that included site visits, meetings with professionals & lectures/discussions to provide context. Approximately 15 students from a diverse range of fields, including engineering, planning, social sciences participated. The week's topics included transit service planning, transit-oriented development (TOD), waterfront planning, overview s of state and regional planning and engineering efforts, such as traffic operations systems, traveler information systems (511.org) as well as pedestrian and bicycle planning and the New Bay Bridge.

In Summer 2010, UCTC co-sponsored [IN]CITY, Introduction to Sustainable Cities, which is a unique six-week intensive summer program to expose approximately 75 students to sustainability and city planning issues, including transportation, land use, climate change, and related fields. It is designed especially for recent graduates holding bachelors degrees and senior undergraduates. The program is offered through the Department of City and Regional Planning (DCRP) and the College of Environmental Design at UC Berkeley, with UCTC Assistant Director Karen Frick as the lead instructor and special lectures by DCRP faculty.



[IN]CITY Program at UC Berkeley: Caltrans spokesman Bart Ney on the Bay Bridge Tour

The program offered daily seminar and studio with City of Berkeley as the client as well as a special tour of the New Bay Bridge by Caltrans. The studio portion of the class examined the Berkeley Climate Action plan in comparison to other cities internationally. Several studio final projects

for the client focused on transportation-related recommendations for the climate action plan related to street and TOD improvements, streetscapes, pedestrian/bicycle access, bicycle sharing. Several city staff, including the Mayor's office, and MTC attended studio presentation and participated as studio jurors.



UCLA Summer Undergraduate Seminar on site visit at Port of Long Beach

In Summer 2010, UCLA also offered a special undergraduate course to 23 students also from a diverse range of fields including geography and environmental studies, anthropology, economics, English, international development, pre-psycho-biology, and Spanish. Students went on several field trips and were exposed to contemporary transportation issues and challenges, particularly in Southern California. In particular, students participated in tours of the Port of Long Beach, Alameda Corridor, Los Angeles Airport, the bus and rail system, and bicycle and pedestrian facilities and a traffic control center. Local officials and course instructors Alison Yoh and Michael Smart of UCLA led the tours.

Also, as discussed below, we made a special effort to attract over a dozen undergraduates to the annual UCTC student conference held at UC Irvine. The undergraduates were paired with graduate students with similar interests to participate in poster presentations and to serve as mentors during the conference.

Finally, UCTC launched its “post-undergraduate intern” program for recently matriculated undergraduates to work with us on tech transfer and other projects. Our first intern was Justin Shiu who received his Bachelor's Degree in Urban Studies at UC Berkeley and worked with us for one year before starting his graduate studies in city planning at California Polytechnic State University, San Luis Obispo.

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. 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 or permanent residents 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, domestic or international, 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. 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.

In years past, the grants were set at \$15,000 (plus indirect costs if applicable). In fall 2009 the amount was 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 Web site, 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 Web site along with faculty research projects and completed dissertations are published on the Web site as well.

Student of the Year Award



*UCTC Student of the Year
Dan Work, from UC Berkeley.*

Each year UCTC Executive Committee members choose a Student of the Year, who is awarded \$1,000 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 2009-2010 was Dan Work, a PhD student in Systems Engineering in UC Berkeley’s Department of Civil and Environmental Engineering and a visiting researcher at Nokia Research Center Palo Alto.

2.3 Technology Transfer

UCTC’s technology transfer efforts aim to translate research results in an accessible format and in ways that reach the broader practitioner community and general public. 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. These activities are discussed in more detail below.

Publications

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

The results of UCTC faculty research and dissertations are printed in hardcopy and are also made available in electronic form. To date, 930 UCTC research papers on transportation planning and policy analysis are available online at www.uctc.net. Research areas include transportation and land use, transit-oriented development, transportation finance and pricing, energy and fuel consumption, travel behavior, parking policies, public transit, pedestrian and bicycle planning, urban design, and traffic operations.



We remind UCTC faculty affiliates periodically 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 Web site 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 were prepared from UCTC faculty research projects, targeted at policymakers and others seeking a short distillation of research findings. To date, UCTC has issued four Policy Briefs on diverse subjects that include transit-oriented development, pavement deteriora-

tion, parking pricing and historic building reuse, and transportation-related carbon emissions. Briefs are mailed and emailed to targeted recipients and posted on UCTC's website at <http://www.uctc.net/research/briefs.shtml>.

UCTC also 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.

Year 22 saw Donald Shoup, Professor of Urban Planning at UCLA assume the post of ACCESS Managing Editor. Under Shoup's leadership, UCLA is assuming the responsibility of soliciting and editing manuscripts as well as the production and distribution of ACCESS. As in the past, guest editors will be looked to for producing specialized issues of ACCESS from time to time.



Printed copies of ACCESS are distributed free to 15,000 hard copy subscribers. Of note, there were more than 7,300 page views of ACCESS number 35 articles in html, which was the first time that ACCESS was made available in this format. There also were 18,000 downloads of PDFs of articles from ACCESS 35 in the year, with a total of 118,000 PDFs of ACCESS articles downloaded overall. The current issue and back issues can be found by visiting <http://www.uctc.net/access/access.shtml>.

Also, using the services of a professional Web editor, UCTC updated its Web site to incorporate newer, more efficient coding (CSS, which is also more accessible to sight-impaired users) and a more graphically friendly user interface. UCTC also installed a new traffic-counting program, which took effect in the start of December 2009. As part of the Web site upgrade, more of the information was presented in formats that are easier to view online and are more findable by search engines (e.g., html instead of PDF). We also invited visitors to sign up for an e-alert of the electronic version of ACCESS. At the same time, we ceased mailing ACCESS to overseas addresses with the Fall 2009 issue, which is expected to save \$6,000 in postage and printing, with the expectation that the electronic version will pick up the overseas subscriptions to some extent.

Conferences and Symposia

UCTC grant recipients are expected to participate in conferences, public lectures and seminars to communicate their research findings to both academics and practitioners. UCTC also helps faculty members to organize special research conferences and events as opportunities arise, when funds are available.



Participants take a break during the Conference on Transit-Oriented Development and Social Equity: An Agenda for Research and Action,

Of note, UCTC annually supports the Lake Arrowhead Conference on Transportation, Land Use and the Environment, designed to bring together over 100 researchers, practitioners, and elected officials to discuss and debate important policy issues. This year's conference title was "Economic Crisis as Opportunity for Reform." UCTC-affiliated presenters were co-organizers Brian Taylor and Allison Yoh of UCLA, Marlon Boarnet of UC Irvine, Martin Wachs, professor emeritus of UCLA and Berkeley, J.R. DeShazo and Donald Shoup of UCLA. UCTC Advisory Committee members Gail Goldberg of the City of Los Angeles and Jose Luis Moscovich of the San Francisco County Transportation Authority also gave presentations.

UCTC also annually supports 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. This year the conference



UCTC Student Conference at UC Irvine, April 2010.

was held at UC Irvine with approximately 200 students in attendance, including 16 undergraduates who were paired with graduate students as mentors during the conference and to participate in poster presentations. There were approximately 100 student and faculty presentations in lectern or poster format. Keynote presentations were made by Robert L. Bertini, Deputy Administrator of the Research and Innovative Technology Administration (RITA) of USDOT for the Mel Webber lecture; Dr. Scott Samuelsen, Professor of Mechanical, Aerospace, and Environmental Engineering at UC Irvine for the faculty keynote

and James Pinheiro, Caltrans District 12 Deputy Director of Operations and Maintenance for the industry keynote. A panel discussion also was held with Deputy Administrator Bertini and UCTC Advisory Committee members Jose Luis Moscovich, Executive Director of the San Francisco County Transportation Authority, and Lawrence D. Dahms, former Executive Director of the Metropolitan Transportation Commission.

Additional highlights from FY 2009-2010 are:

- Martin Wachs Lecture given by Professor Alan Althshuler of Harvard University on “Equity, Pricing and Surface Transportation Politics” which was followed by discussant Robert Garcia, Executive Director and Council, the City Project; held at UCLA in April 2010;
- UCTC partnered with Caltrans and California University Transportation Centers (UC Davis, USC, San Jose State, the Leonard Center for California Stated Universities) on a series of webinars aimed at practitioners that focused on researched funded by the California UTCs. UCTC research presenters during Year 22 were Steven Ritchie of UC Irvine, Matt Barth of UC Riverside, and Joe Butler of CCIT;
- Three related seminars by UCLA for key policymakers and in Sacramento in a series entitled, “Financing California’s Transportation System: Strategies for Moving from Crisis to Stability” with UCLA affiliates Brian Taylor and Alison Yoh and practitioner speakers including Steve Heminger, Executive Director of the Metropolitan Transportation Commission and Susan J. Binder, Former Majority Senior Policy Advisor, U.S. Senate Committee on Environment and Public Works; and Former Senior Policy Official, U.S. Department of Transportation in Spring 2010. UCTC was a co-sponsor with Caltrans, the California Transportation Commission and UCLA;
- Lecture with Professor Robert E. Paaswell, Interim President, City College of New York in a talk, “Current Issues in Transportation: the Case of New York City and Beyond” in Berkeley in April 2010;
- Conference on Transit-Oriented Development and Social Equity: An Agenda for Research and Action, in Berkeley in June 2010, co-sponsored with the UC Berkeley Center for Community Innovation and featuring several UCTC-affiliated speakers;



Deputy Administrator Robert Bertini, RITA at UCTC Student Conference giving the Annual Mel Webber Lecture.

- Seminar, “Busting Silos: How the Obama Administration’s Agenda is Broadening the Reach of the Transportation Profession,” presented by Therese McMillan, Deputy Administrator, Federal Transit Administration, in April 2010 on the UC Berkeley campus, co-sponsored with ITS Berkeley;
- Seminar entitled “TOD 3.0 and Beyond: a reality check,” by William Kohn Fleissig in March 2010 on the UC Berkeley campus, co-sponsored with the Institute of Urban and Regional Development;
- National Evacuation Conference in New Orleans organized by the Stephenson Disaster Management Institute and the Gulf Coast Research Center for Evacuation and Transportation Resiliency both at Louisiana State University and the University of New Orleans, with UCTC serving as co-sponsor and co-funding several Californian speakers.

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, 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

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, 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.

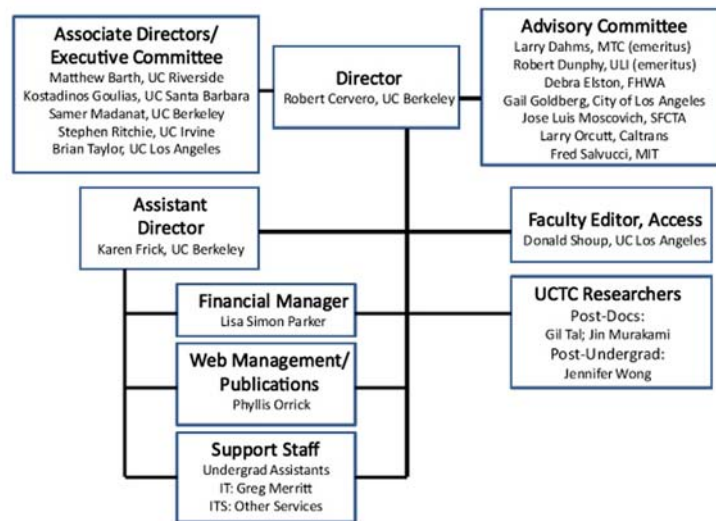
Policy-related tech transfer activities in Fiscal Year 2009-2010 include:

- UCTC researchers began work with Caltrans to develop a statewide strategic transit plan in partnership with transit agencies in the state and the California Transit Association.
- UCTC initiated research for Caltrans to assess the benefits and challenges associated with technology and other research efforts. An initial article was published in ACCESS Magazine, entitled “Transport of Today and Tomorrow—How Can Technology and Transport Policy Help Us Steer the Future?” by Elizabeth Deakin, Karen Trapenberg Frick and Alexander Skabardonis.
- Four tech transfer papers were presented at the 2010 Annual TRB meeting and made available on the CD conference compendium:
 - “The Transfer of Innovative Policies Between Cities to Promote Sustainability,” G. Marsden, K.T. Frick, A.D. May, E. Deakin (TRB #10-3263);
 - “Markets for Dynamic Ridesharing? The Case of Berkeley,” E.Deakin, K.T. Frick and K. Shively (TRB #10-3629);
 - “Station Area Planning and Parking Management,” E. Deakin and K.T. Frick (TRB #10-3279);
 - “What Makes Public Transit a Success? Perspectives on Ridership in an Era of Uncertain Revenues and Climate Change,” E. Deakin, G. Tal and K.T. Frick (TRB #10-2646).

3. MANAGEMENT STRUCTURE & 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 with center directors and Caltrans staff. 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 Exhibit 1 for an organizational chart of UCTC for Year 22.



Center Director

Professor Robert Cervero of the Department of City and Regional Planning (DCRP) at UC Berkeley is the current UCTC Director. Professor Cervero has been a faculty member since 1980 and maintains affiliations with a number of other research units on the UC Berkeley campus, including the Energy Resource Group, Center for a Sustainable California, and the Berkeley Volvo Center of Excellence on Future Urban Transport. His interests span the areas of sustainable transportation systems, transportation and land use interactions, and comparative international analyses of infrastructure investments. Since 2009, Professor Cervero has also served as Interim Director of the Institute of Urban and Regional Development (IURD).

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 2009-2010 were:

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

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. Exhibit 2 lists current faculty affiliates. The list is updated annually and is posted on the UCTC Web site, 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 2009-2010 were:

- Robert Cervero: Professor of City and Regional Planning, Director (half time, plus partial 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.
- Sylvia Barnes, Financial Manager (August 2009-February 2010; Lisa Simon-Parker (September 2010-present).
- Donald Shoup: Professor of Urban Planning, University of California Los Angeles and Editor of Access Magazine.
- Gil Tal (August 2009-May 2010); Jin Murakami (August 2010-present): UCTC post-doc, responsible for assistance with tech-transfer and tech-assistant projects.
- Phyllis Orrick: Web management, publications management, and editorial assistance.
- Gregory Merritt: Information-technology services.

Student Assistants: Undergraduate students are hired to provide clerical support, reporting to the Assistant Director. UCTC als has created a “post-undergraduate” intern position for newly graduated students to work on tech transfer and other projects.

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.

Exhibit 2. UCTC Faculty Affiliates

Alexandre	Bayen	Berkeley
Peter C.	Bosselman	Berkeley
Michael J.	Cassidy	Berkeley
Robert	Cervero	Berkeley
Karen	Chapple	Berkeley
Daniel	Chatman	Berkeley
Jason	Corburn	Berkeley
Carlos	Daganzo	Berkeley
Elizabeth A.	Deakin	Berkeley
William L.	Garrison	Berkeley
Steven	Goldman	Berkeley
Michael	Hanemann	Berkeley
Mark	Hansen	Berkeley
Robert	Harley	Berkeley
J. Karl	Hedrick	Berkeley
Arpad	Horvath	Berkeley
Judith	Innes	Berkeley
Allan B.	Jacobs	Berkeley
Adib	Kanafani	Berkeley
Elizabeth	Macdonald	Berkeley
Samer	Madanat	Berkeley
John M.	Quigley	Berkeley
John	Radke	Berkeley
David R.	Ragland	Berkeley
Steven	Raphael	Berkeley
Raja	Sengupta	Berkeley
Alexander	Skabardonis	Berkeley
Michael	Southworth	Berkeley
Pravin	Varaiya	Berkeley
Paul	Waddell	Berkeley
Joan	Walker	Berkeley
Marlon G.	Boarnet	Irvine
David	Brownstone	Irvine
Jan	Brueckner	Irvine
Linda	Cohen	Irvine

Kristen	Day	Irvine
Joseph	DiMento	Irvine
J. Gordon	Fielding	Irvine
Amihai	Glazer	Irvine
Thomas	Golob	Irvine
John D. (Doug)	Houston	Irvine
R.	Jayakrishnan	Irvine
Wenlong	Jin	Irvine
Michael G.	McNally	Irvine
Raymond W.	Novaco	Irvine
Will	Recker	Irvine
Amelia	Regan	Irvine
Stephen G.	Ritchie	Irvine
Jean Daniel	Saphores	Irvine
Kenneth A.	Small	Irvine
Evelyn	Blumenberg	Los Angeles
William A.V.	Clark	Los Angeles
Randall D.	Crane	Los Angeles
Bryan	Ellickson	Los Angeles
Jess	Kraus	Los Angeles
Robin	Liggett	Los Angeles
Anastasia	Loukaitou-Sideris	Los Angeles
Paul	Ong	Los Angeles
Allen J.	Scott	Los Angeles
Donald C.	Shoup	Los Angeles
Michael A.	Stoll	Los Angeles
Brian D.	Taylor	Los Angeles
Rui	Wang	Los Angeles
Arthur	Winer	Los Angeles
Allison	Yoh	Los Angeles
Richard	Arnott	Riverside
Matthew J.	Barth	Riverside
Kanok	Boriboonsomsin	Riverside
Antonio M.	Bento	Santa Barbara
Richard	Church	Santa Barbara
Konstadinos	Goulias	Santa Barbara
Mohan	Trivedi	San Diego
Richard	Gil	Santa Cruz
Justin	Marion	Santa Cruz

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 latest agreement, signed in April 2007, provided matching funds through the end of the fiscal year of this Annual Report (FY 2009-2010). A new contract is being entered into for continued Caltrans matching support for Fiscal Year 2010-2011 and onwards.

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.

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. UCTC itself funds only a portion of their summer salaries. The UC-funded time on research multiplies UCTC's salary support for research by a factor of three or four.

Participation in the governance of 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 directly paid with UCTC funds. Students, for instance, do most of the work organizing the annual UCTC Student Conference on a pro bono basis. UCTC funding for graduate students is often amplified by pairing UCTC support with other funding sources.

Research Partnerships

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 per-

taining 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.

SAFETREC

The Safe Transportation Research and Education Center (SafeTREC) 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.

GLOBAL METROPOLITAN STUDIES

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, Global Metropolitan Studies, 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

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 METTRANS - 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. RESEARCH PROJECT STATUS

A total of 32 projects were underway at the University of California Transportation Center (UCTC) in 2009-10 and are summarized here. During the year, 36 research papers were completed as were four Policy Briefs that were widely distributed to practitioners, as shown in Tables 1 and 2.

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 22nd year, 2009-10, with 16 projects carried forward. An additional 16 new projects were selected for Year 22 funding. During the year, 10 prior year projects were completed. The other projects were carried forward into Year 22 (see 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 22) fall into the completed category and some into the continuing category.

Table 1: Research Papers 2009-2010

Karthikgeyan Sivakumaran; Yuwei Li; Michael J Cassidy; Samer Madanat	Cost-Saving Properties of Schedule Coordination in a Simple Trunk-and-Feeder Transit System	August 2010	UCTC-FR-2010-33
Erick Guerra and Robert Cervero	Cost of a Ride: The Effects of Densities on Fixed-Guideway Transit Ridership and Capital Costs	August 2010	UCTC-FR-2010-32
W. Recker, J. Marca and C. Rind, R. Dechter	The Personal Travel Assistant (PTA): Measuring the dynamics of human travel behavior	August 2010	UCTC-FR-2010-31
Wen-Long Jin and Bruce Wang	Connectivity of vehicular ad hoc networks with continuous node distribution patterns	August 2010	UCTC-FR-2010-30
Wen-Long Jin, Daji Yuan, Hao Yang	A Study on Potential Environmental Benefits of Green Driving Strategies with NGSIM Data	August 2010	UCTC-FR-2010-29
Hao Yang, Daji Yuan, Wen-Long Jin	Simulation Evaluation of Green Driving Strategies Based on Inter-Vehicle Communications	August 2010	UCTC-FR-2010-28

Wen-Long Jin	Modeling connectivity of inter-vehicle communication networks along discrete traffic streams	August 2010	UCTC-FR-2010-27
Adib Kanafani and Rui Wang	Measuring Multimodal Transport Level of Service	August 2010	UCTC-FR-2010-26
Brendan Tran Morris and Mohan Manubhai Trivedi	Contextual Activity Visualization from Long-Term Video Observations	August 2010	UCTC-FR-2010-25
Marlon Boarnet, Gavin Ferguson, Rufus Edwards, Marko Princevac	Fine Particulate Concentrations Near Arterial Streets: The Influence of Building Placement and Wind Flow	August 2010	UCTC-FR-2010-24
Hansheng Pan, Christian Bartolome, Marko Princevac, Rufus Edwards, Marlon Boarnet	Investigation of Roadside Particulate Matter Concentration Surrounding Major Arterials in Five Southern Californian Cities	August 2010	UCTC-FR-2010-23
Rui Wang	Leaders, Followers and Laggards: Adoption of the U.S. Conference of Mayors Climate Protection Agreement in California	August 2010	UCTC-FR-2010-22
David Gaker, Yanding Zheng, Joan Walker	Experimental Economics in Transportation: A Focus on Social Influences and the Provision of Information	August 2010	UCTC-FR-2010-21
Kanok Boriboonsomsin, Alexander Vu, and Matthew Barth	Eco-Driving: Pilot Evaluation of Driving Behavior Changes among U.S. Drivers	August 2010	UCTC-FR-2010-20
Karthikgeyan Sivakumarana, Yuwei Lia, Michael J. Cassidy, Samer Madanat	Cost-Saving Properties of Schedule Coordination in a Simple Trunk-and-Feeder Transit System	August 2010	UCTC-FR-2010-19
Weihua Gu, Yuwei Li, Michael J. Cassidy, Julia B. Griswold	On the capacity of isolated, curbside bus stops	August 2010	UCTC-FR-2010-18
Björn Hårsman and John M. Quigley	Political and Public Acceptability of Congestion Pricing: Ideology and Self-Interest	August 2010	UCTC-FR-2010-17
Erin Machell, Troy Reinhalter, and Karen Chapple	Building Support for Transit-Oriented Development: Do Community-Engagement Toolkits Work?	July 2010	UCTC-FR-2010-16
Dev E. Millstein and Robert A. Harley	Effects of Retrofitting Emission Control Systems on In-Use Heavy Diesel Vehicles	July 2010	UCTC-FR-2010-15
W. W. Recker and J. E. Kang	An Activity-Based Assessment of the Potential Impacts of Plug-In Hybrid Electric Vehicles on Energy and Emissions Using One-Day Travel Data	July 2010	UCTC-FR-2010-14
Robert Cervero, Yoshifumi Komada, and Andrew Krueger	Suburban Transformations: From Employment Centers to Mixed-Use Activity Centers	July 2010	UCTC-FR-2010-13
Elizabeth Macdonald, Rebecca Sanders, and Alia Anderson	Performance Measures for Complete, Green Streets: A Proposal for Urban Arterials in California	July 2010	UCTC-FR-2010-12
Matthew Barth and Kanok Boriboonsomsin	Real-World Carbon Dioxide Impacts of Traffic Congestion	May 2010	UCTC-FR-2010-11
Mana Sangkapichai, Jean-Daniel Saphores, Oladele Ogunseitan, Stephen Ritchie, Soyoung (Iris) You, and Gunwoo Lee	An Analysis of the health impacts from PM and NOx emissions resulting from train operations in the Alameda Corridor, CA	March 2010	UCTC-FR-2010-10

Ayala, Roberto, Soyoung (Iris) You, Jean-Daniel Saphores, Stephen Ritchie, Gunwoo Lee, and Mana Sangkapichai	A Preliminary Analysis of the Environmental Impacts of the Clean Truck Program in the Alameda Corridor, CA	March 2010	UCTC-FR-2010-09
Lee, Gunwoo, Soyoung (Iris) You, Mana Sangkapichai, Stephen G. Ritchie, Jean-Daniel Saphores, Oladele Ogunseitan, Roberto Ayala, R. Jayakrishnan, and Rodolfo Torres	Assessing the Environmental and Health Impacts of Port-Related Freight Movement in a Major Urban Transportation Corridor	March 2010	UCTC-FR-2010-08
You, Soyoung (Iris), Gunwoo Lee, Stephen G. Ritchie, Jean-Daniel Saphores, Mana Sangkapichai, and Roberto Ayala	Air Pollution Impacts of Shifting San Pedro Bay Ports Freight from Truck to Rail in Southern California	March 2010	UCTC-FR-2010-07
Li, Phillip	Estimation of Sample Selection Models With Two Selection Mechanisms	March 2010	UCTC-FR-2010-06
Kim, Jinwon and David Brownstone	The impact of residential density on vehicle usage and fuel consumption	March 2010	UCTC-FR-2010-05
Brownstone, David, and Hao (Audrey) Fang	A Vehicle Ownership and Utilization Choice Model with Endogenous Residential Density	March 2010	UCTC-FR-2010-04
Manville, Michael, and Donald Shoup	Parking requirements as a barrier to housing development: regulation and reform in Los Angeles	March 2010	UCTC-FR-2010-03
Cui, Tingting, Yanfeng Ouyang, and Zuo-Jun Max Shen	Reliable Facility Location Design under the Risk of Disruptions	February 2010	UCTC-FR-2010-02
Anani, Shadi B., and Samer M. Madanat	Estimation of Highway Maintenance Marginal Cost under Multiple Maintenance Activities	February 2010	UCTC-FR-2010-01
Gil, Ricard, and Justin Marion	The Role of Repeated Interactions, Self-Enforcing Agreements and Relational [Sub]Contracting: Evidence from California Highway Procurement Auctions	Fall, 2009	897
Altmaier, Monica, Elisa Barbour, Christian Eggleton, Jeffier Gage, Jason Hayter, and Avrin Zahner	Make It Work: Implementing SB 375	Fall, 2009	896

Table 2: Policy Briefs Published 2009-2010

Matthew Barth and Kanok Boriboonsomsin	“Intelligent” Ways to Cut Transportation’s CO2 Emissions	PB-2010-03 Based on UCTC Faculty Research Paper FR-2010-11 and “Traffic Congestion and Greenhouse Gases,” in ACCESS 35
Michael Manville and Donald Shoup	The Price of Unwanted Parking	PB-2010-02 Based on UCTC Faculty Research Paper FR-2010-03.
Samer Madanat and Shadi Anani,	Repricing Highway Pavement Deterioration	PB-2010-01 Based on UCTC Faculty Research Paper FR-2010-01.
Robert Cervero, Arlie Adkins, and Cathleen Sullivan	Are TOD’s Over-Parked?	PB-2009-01 Based on UCTC Research Paper 882

Table 3a. Projects Completed in Year 22

Taxi Drivers in Los Angeles: Profile of a Workforce Facing Change	Jacqueline Leavitt UCLA	YR 19
The Personal Travel Assistant (PTA): Measuring the Dynamics of Human Behavior	Will Recker and Rina Dechter UC Irvine	YR 20
Revisiting The Estimation Of Marginal Cost In Highway Pavement Deterioration Pricing	Samer Madanat UC Berkeley	YR 20
Experiments to Improve the Benefits of Freeway Carpool Lanes	Michael Cassidy and Carlos Daganzo UC Berkeley	YR 21
Theoretical and simulation studies of information throughput and communication delay of inter-vehicle communication networks	Wenlong Jin UC Irvine	YR 21
Mitigating the Social and Environmental Impacts of Multimodal Freight Corridor Operations at Southern CA Ports	Steve Ritchie, Jean-Daniel Saphores UC Irvine	YR 21
Unhiding the Cost of Residential Parking	Donald Shoup UC Los Angeles	YR 21
Towards an Understanding of Intermodal Roles in Intercity Transportation	Adib Kanafani UC Berkeley	YR 21
Employment Centers to Mixed-Use Activities: Commuting and Environmental Impacts	Robert Cervero UC Berkeley	YR 21
Public Acceptance of Congestion Pricing: Understanding Citizen Preferences	John Quigley UC Berkeley	YR 21
Can technology make us greener drivers? An investigation of the potential benefits of ACC and IVC	Wenlong Jin UC Irvine	YR 22
Formulating and Applying Models for Planning and Designing Integrated Public Transit	Michael Cassidy and Samer Madanat UC Berkeley	YR 22
An Activity-Based Assessment of the Potential Impacts of Plug-In Hybrid Electric Vehicles (PHEVs) on Energy and Emissions Using One-Day Travel Data	Will Recker UC Irvine	YR 22
Incorporating vehicular emissions into an efficient mesoscopic traffic model - An application to southern California	Jean-Daniel Saphores, Wenlong Jin, and Stephen Ritchie UC Irvine	YR 22
Measuring Multimodal Transport Level of Service	Adib Kanafani UC Berkeley	YR 22

Table 3b. Projects Continuing in Year 22

Congestion and Accessibility: What's the Relationship?	Brian Taylor UCLA	YR 19
Immigrants and Travel Behavior: Effect of Ethnic Neighborhoods on Commute Time and Mode	Evelyn Blumenberg UCLA	YR 20
Costs and Effectiveness of Lower-Speed, Environmentally-Friendly Urban Highway Designs	Kenneth Small UC Irvine	YR 20
Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge	Brian Taylor UCLA	YR 20
Sex, Race, and the Journey to Work: Tracking and Testing Convergence and Divergence Trends using a National Panel, 1985 to 2005	Randall Crane UCLA	YR 21
Large Scale Real Options Models for Network Investment Planning and Operational Risk Hedging	Amelia Regan UC Irvine	YR 21
Forecasting with Dynamic Microsimulation: Design, Implementation, and Demonstration	K. Goulias UC Santa Barbara	YR 22
Mobile Transit Trip Planning and Accessibility Assessment with Real-Time Data	Alexandre Bayen UC Berkeley	YR 22
Price and Frequency Competition in Freight Transportation	Jan K. Brueckner UC Irvine	YR 22
How Much Do Highway Dedication Laws Tax Housing to Subsidize Driving?	Donald Shoup UCLA	YR 22
The Presentation of Self in Everyday [Transit] Life: An Ethnographic Study of Public Transit Culture and Behavior in Los Angeles	Brian Taylor UCLA	YR 22
CAL-Sentry: Computational Framework and Algorithms for Live Video-Sensor Stream Assimilation and Analysis for Congestion, Emission and Safety Studies.	Mohan M. Trivedi UC San Diego	YR 22
Employing lessons from Behavioral Economics to Promote Sustainable Behaviors and Improve Travel Demand Models	Joan Walker UC Berkeley	YR 22
An Aggregate Model of Downtown Parking and Traffic Congestion: Incorporating Mass Transit	Richard Arnott UC Riverside	YR 22
Evaluation of Traffic Safety in Sprawl and Urban Growth in California Metropolitan Areas	David Ragland, UC Berkeley	YR 22
Determinants of Bicycle-transit Integration in U.S. Cities	Rui Wang UCLA	YR 22
Mitigating the Air Quality Impacts of San Pedro Bay Port Drayage Truck Operations on Arterials	Steve Ritchie UC Irvine	YR 22

A) PROJECTS COMPLETED IN YEAR 22 (2009-10)

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

Taxi Workers in the U.S.A. (formerly Taxi Drivers in Los Angeles: Profile of a Workforce Facing Change) (YEAR 19)

Principal Investigator: Jacqueline Leavitt (Gary Blasi co-PI for earlier parts of work)

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Abstract: There is little disagreement that women continue to make up only small percentage of taxi drivers, though just how few they are remains unclear. Census data does show an increase from 3 percent women in 1960 to 11 percent in 1990 and 13 percent by 2000. These include both taxi and limousine drivers. It is also clear that we know little about what women driver experience and what special challenges they face—data are especially sparse regarding women drivers in the U.S. Nonetheless, due to issues of female rider safety, a more general increase of women in traditionally male jobs throughout society, an increasing trend of women driving taxis is observable worldwide. Cities in several countries even feature a few female-owned and operated cab companies. Blogs and a few books by women drivers are mainly descriptive. This research brings together findings from in-depth interviews with 10 to 12 women drivers and existing secondary literature. We began the research with the hypothesis that women's entry into this occupation may be different; e.g. men's responses were primarily due to ease of entry into the workforce and secondarily the flexibility. We thought that women's primary care for children may mean that taxi work as a flexible job is pre-eminent. We found that women's entry was similar to men's in that ease of entry into taxi work was compelling but in comparison immigrant men may have professional backgrounds or be highly skilled and the women did not think they had the skills for anything else. Either newly divorced or having broken up with a boyfriend, degrees of knowledge about the cab industry (either through husbands or boyfriends) also influenced women's entry. We found that rather than being afraid for their safety, those women who enter the world of taxi driving have thought about how they would counter attacks and felt that they were up to it. As women in a male-dominated profession, customers and colleagues alike exhibit behavior in a cab or in the holding areas where taxi cabs wait that can be sexually provocative. The women interviewed did not see that as a deterrent either.

Key Words: taxi, women taxi drivers, lease driver, owner driver, sexual identity, entry.

Objective: Three objectives exist: the first two overlap; they were to document the working lives of taxi cab drivers in the City of Los Angeles and to uncover the history of taxi organizing with particular attention to the formation of the Los Angeles Taxi Workers Alliance (LATWA). This included research about the franchise system that the City of Los Angeles uses and the history of taxi cooperatives in relation to earlier organizing. The third objective grew out of the absence of women drivers in the survey of 300 drivers and more than 20 in-depth interviews despite secondary literature reporting that women drivers (of taxis and limousines), although a minority, were part of this workforce. This objective was to analyze whether any differences exist by gender regarding reasons for entry into the workforce, pros and cons of taxi work for women, identifying working conditions and impact on living conditions for women.

Tasks: August 2006-December 2008: Reviewing literature of taxi industry; developing survey instrument; conducting surveys; completing surveys of Los Angeles taxi drivers; analyzing data; developing questionnaire; conducting in-depth interviews with L.A. drivers; writing report.

January 2008-January 2009: through interviews with leaders in the Los Angeles Taxi Workers Alliance; writing paper.

January 2009-present: focusing a new literature review on women drivers in the taxi industry, identifying women drivers in San Francisco, CA, and Santa Monica, CA, interviewing, content analysis of interviews, developing outline for paper.

Milestones, Start and End Dates: August 31, 2006-December 31, 2009.

Student Involvement: Dustianne North has been the Research Assistant. She has conducted literature search, helped in development of the questionnaire, been responsible for logistics in setting up interviews, and surveyed women taxi drivers in San Francisco. She is also co-writing an article with me.

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: Several benefits have occurred. First, the work has filled a knowledge vacuum about Los Angeles taxi drivers. The “Driving Poor” report, the first from the perspective of the taxi driver, was presented at a forum sponsored by LATWA and where then City Councilperson Wendy Gruel presided. Information in the report was presented at City Council and staff was asked to respond to driver complaints. The report has been used in other cities where researchers are investigating taxi drivers; this includes New York and Chicago. The article, “The Los Angeles Taxi Drivers Alliance (LATWA)”, was published in a book, Working for Justice: the LA Model of Organizing and Advocacy (edited by Ruth Milkman, Joshua Bloom, and Victor Bloom). There seems to be nothing specific about women drivers and the research on this will also fill a gap about an industry that is male dominated (some first person accounts are available but they tend to be descriptive rather than analytic).

Papers to Date: “Driving Poor” (Blasi and Leavitt); The Los Angeles Taxi Workers Alliance (Leavitt and Blasi).

Conferences Attended to Date: Two conferences sponsored by the UCLA Institute for Labor Research and Employment, Los Angeles. One Industry Studies Conference sponsored by the Industry Studies Association, Chicago, Illinois, May 2010.

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.

**The Personal Travel Assistant (PTA):
Measuring the dynamics of human travel behavior (YEAR 20)**

Principal Investigator: Will Recker
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Abstract: The fundamental research question that was addressed with the project is whether a simple, continuously collected GPS sequence can be used to accurately measure human behavior. The research builds upon a personal information device (PTA, Personal Travel Assistant) that serves both as a research tool and as a testbed for application. To learn behaviors given an extended GPS data stream, we apply Hybrid Dynamic Mixed Network (HDMN) modeling techniques. We design and deploy a prototype personal travel assistant system for initial testing in the Orange County, California area. In addition to collecting travel information for the initial deployment period, we analyzed 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: traveler information system, route guidance, GPS, traveler enroute behavior.

Research Objective: The fundamental research question that was addressed with the project is whether a simple, continuously collected GPS sequence can be used to accurately predict travel behavior decisions, including route and destination choice.

Tasks: Design a prototype personal travel assistant system for initial testing in the Orange County, California area; Collect travel information for the initial deployment period; apply Hybrid Dynamic Mixed Network (HDMN) modeling techniques to predict travel behavior; analyze longitudinal behavior for individuals and households; analyze the collected data for developing detailed models of human behavior; streamline learning and inference using the baseline HDMN model and the collected travel data; implement algorithms for estimating network demands using PTA data.

Start and End Dates: 09/01/07–07/31/09.

Student Involvement: Yosuke Arai, GSR M.S. Department of Civil and Environmental Engineering, UCI and Tuan Nguyen, GSR, M.S. Department of Computer Science, UCI.

Technology Transfer Activities: Detailed Final Report summarizing findings and conclusions submitted to UCTC for publication on UCTC website.

Relationship to Other UCTC Research: New Project.

Potential Benefits: This research may be valuable for determining the correct range of travel behaviors we can expect from the general population. In addition, aggregated information from individuals will help reduce uncertainty and improve decisions by transportation system operators.

Papers to Date: UCTC-FR-2010-31.

Total Direct Cost: \$63,421.

Revisiting The Estimation Of Marginal Cost In Highway Pavement Deterioration Pricing (Year 20)

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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, 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. Task 4 - Documentation of Findings.

Milestones, Start and End Dates: September 1, 2007-August 31, 2009.

Student Involvement: Graduate Student Researcher.

Technology Transfer Activities: Publications were posted on UCTC's Website: UCTC Policy Brief PB-2010-01. UCTC FR-2010-01.

Relationship to Other UCTC Research: New project.

Potential Benefits: This research provides 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.

Papers to Date: Anani S. and Madanat S., "Highway maintenance marginal costs: what if the fourth power assumption is not valid?" *Journal of Transport Policy*, Vol. 17, pp 486-495, 2010.

Anani S. and Madanat S. "Estimation of Highway Maintenance Marginal Cost under Multiple Maintenance Activities", *Journal of Transportation Engineering*, doi: 10.1061/ (ASCE) TE.1943-5436.0000150, 2010.

Conferences Attended to Date: Applications of Advanced Technology in Transportation, May 27-30, 2010 in Athens, Greece. World Conference on Transportation Research, July 11-15, 2010 in Lisbon, Portugal.

Direct Cost: \$44,612.

Experiments to Improve the Benefits of Freeway Carpool Lanes (YEAR 21)

Principal Investigators: Michael Cassidy and Carlos Daganzo

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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 Web site.

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: Cassidy, M.J., Daganzo, C.F., Jang, K. and Chung, K. (2009) Spatiotemporal effects of segregating different vehicle classes on separate lanes. International Symposium of Transportation and Traffic Theory (W. Lam, S.C. Wong and H.K. Lo, Eds), Springer, pp 57-74.

Cassidy, M.J., Daganzo, C.F. and Jang, K. (2008) The smoothing effect of freeway carpool lanes on bottlenecks and the implications of managing freeways with and without these lanes. Submitted for journal publication.

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.

Theoretical and simulation studies of information throughput and communication delay of inter-vehicle communication networks (YEAR 21)

Principal Investigator: Wenlong Jin
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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: Discussions of implications of this research; Task 6: 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 Web site 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: Jaeyoung Jung, Rex Chen, W.-L. Jin, R. Jayakrishnan, Amelia Regan, “An Empirical Study Of Inter-vehicle Communication Performance Using NS-2”, Proceedings of ITS World Congress, 2010. To be presented.

Rex Chen, Hao Yang, W.-L. Jin, Amelia Regan, “Dynamic Transmission Range in Inter-Vehicle Communication with Stop-And-Go Traffic”, Proceedings of IEEE Intelligent Vehicles Symposium, June 2010.

Rex Chen, W.-L. Jin, and Amelia Regan, “Multi-Hop Broadcasting in Vehicular Ad Hoc Networks with Shockwave Traffic”, Proceedings of IEEE 2nd Intelligent Vehicular Communications System Workshop, January 2010.

W.-L. Jin and Bruce Wang, “Connectivity of vehicular ad hoc networks with continuous node distribution patterns” Proceedings of Transportation Research Board Annual Meeting, 2010. Presented.

Rex Chen, W.-L. Jin, and Amelia Regan, “Broadcasting in Vehicular Networks: Issues and Approaches”, IEEE Network Magazine, 24(1): 20-25, 2010.

W.-L. Jin and W. W. Recker, “Instantaneous connectivity of one-dimensional inter-vehicle communication networks with general traffic conditions” Proceedings of Transportation Research Board Annual Meeting, 2009.

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.

Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations - PHASE II (Year 21 Project)

Principal Investigator: Stephen Ritchie

Co-PI: Jean-Daniel Saphores

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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, 2008, end March 31, 2010.

Student Involvement: Four Graduate Student Researchers, one undergraduate assistant.

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: continuation of year 20 project: Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations - PHASE I.

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: Lee, G., S. You, S. G. Ritchie, J. Saphores, M. Sangkapichai and R. Jayakrishnan (2009). "Environmental Impacts of a Major Freight Corridor: A study of the I-710 in California." Proceedings of the Annual Meeting of the Transportation Research Board, Washington, DC., and Transportation Research Record, National Research Council (winner of the 2010 TRB Pyke Johnson Best Paper Award; forthcoming).

Sangkapichai, M., J. Saphores, S. G. Ritchie, S. You and G. Lee, G. (2009). "An Analysis of PM and NOx Train Emissions in the Alameda Corridor, CA." Proceedings of the Annual Meeting of the Transportation Research Board, Washington, DC.

Lee, G., S. You, M. Sangkapichai, S. G. Ritchie, J. Saphores, O. Ogunseitan, R. Ayala, R. Jayakrishnan, R. Torres (2009). "Assessing the Environmental and Health Impacts of Freight Movement in a Major Urban Transportation Corridor." Proceedings of the 2010 Annual Meeting of the Transportation Research Board, Washington, DC.

Ayala, R., S. You, J. Saphores, S. Ritchie, G. Lee, M. Sangkapichai (2009). "A Preliminary Analysis of the Environmental Impacts of the Clean Truck Program in the Alameda Corridor, CA." Proceedings of the 2010 Annual Meeting of the Transportation Research Board, Washington, DC.

You, S., G. Lee, S. G. Ritchie, J. Saphores, M. Sangkapichai, R. Ayala (2009). "Air Pollution Impacts of Shifting San Pedro Bay Ports Freight from Truck to Rail in Southern California." Proceedings of the 2010 Annual Meeting of the Transportation Research Board, Washington, DC., and Transportation Research Record, National Research Council (forthcoming).

Sangkapichai, M., J. Saphores, O. Ogunseitan, S. Ritchie, S. You, G. Lee (2009). "An Analysis of the health impacts from PM and NOx emissions resulting from train operations in the Alameda Corridor, CA." Proceedings of the 2010 Annual Meeting of the Transportation Research Board, Washington, DC.

Conferences Attended to Date: Transportation Research Board Annual Meetings: 2009 and 2010, Washington, D.C.

UCTC Student Conference, 2009, invited presentation: S. Ritchie, "Environmental Impacts of a Major Freight Corridor: A study of the I-710 in California."

TRB Conference on Data for Goods Movement Impacts on Air Quality, NAS Beckman Center, Irvine, California, 2009: S. G. Ritchie, J. M. Saphores, G. Lee, S. You, and M. Sangkapichai, "Estimating the Air Quality Impacts of a Major Freight Corridor: A Study of the Alameda Corridor in Southern California."

2nd International Symposium on Freeway and Tollway Operations, Honolulu, 2009, invited presentation: S. Ritchie, Lee, G., S. You, J. Saphores, M. Sangkapichai and R. Jayakrishnan, "Estimating GHG and Other Emissions of Freeway Freight Corridor Operations by Microscopic Traffic Modeling."

INFORMS 2009 Annual Meeting, October 2009, invited presentation: J. Saphores, S. Ritchie, M. Sangkapichai, O. Ogunseitan, and R. Raymond, "An Analysis of Train Emissions and their Health Impacts in California's Alameda Corridor."

INFORMS 2009 Annual Meeting, October 2009, invited presentation: S. Ritchie, J. Saphores, G. Lee, I. You, R. Ayala, M. Sangkapichai, "Microscopic Modeling of Air Quality Impacts of Drayage Truck Operations in the Alameda Corridor."

Caltrans Research Webinar on Freight and Goods Movement, May 12, 2010, Sacramento, invited presentation: S. G. Ritchie, G. Lee, S. You, , J. Saphores, M. Sangkapichai and R. Jayakrishnan, "Environmental and health impacts of freight transportation to and from the Ports of Long Beach and Los Angeles."

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.

Unhiding the Cost of Residential Parking (Year 21)

Principal Investigator: Donald Shoup

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Abstract: Residential minimum parking requirements increase the cost of housing and decrease the cost of driving. But because the requirements are ubiquitous, accurately measuring their effects is difficult. The partial deregulation of parking in downtown Los Angeles makes it possible to examine how parking requirements stop inner city housing development and delay urban revitalization. We use an original data set collected, as well as interviews and secondary data on housing prices, in order to estimate the results of parking deregulation. Removing parking requirements stimulates the construction of more and more varied housing, and enables the reuse of vacant historic buildings. Of particular importance for downtown areas is the removal of *locational* requirements--mandates to provide parking on-site. Developers freed from minimum parking requirements are more likely to unbundle parking from rent, and unbundled parking delivers a substantial price reduction for households without cars.

Key Words: Parking, Regulatory Barriers, Redevelopment.

Objective: This research furthers our understanding of the relationship between land use regulation, transportation, and housing. Policymakers can use the results to evaluate their approaches to redevelopment in areas with older, underused buildings.

Tasks: 1. Literature Review; 2. Assemble data via survey of buildings; 3. Interviews; 4. Assemble data through real estate records; 5. Analysis; 6. Writing.

Milestones, Start and End Dates: Start date: August 1, 2008, end date July 31, 2009.

Student Involvement: This project employed eight students as research assistants.

Technology Transfer Activities: Publications will be posted on UCTC's Website; working paper is already posted. As is policy brief. UCTC-FR-2010-03, PB-2010-02.

Relationship to other UCTC research: New project.

Potential Benefits: The research contributes to our understanding of how land use laws designed to accommodate driving can also make housing development more expensive, and prevent investment in dense, inner city areas.

Papers to Date: Working paper on the UCTC web site, journal article to be submitted summer /fall of 2010.

Conferences Attended to Date: The paper was presented at a meeting of the Associated Collegiate Schools of Planning.

Direct Cost: \$55,000

Towards an Understanding of Intermodal Roles in Intercity Transportation (YEAR 21)

Principal Investigator: Adib Kanafani

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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; Task 5: Policy Recommendations.

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 Web site and distributed in hard copy, in most instances free of charge.

Relationship to Other UCTC Research: new project.

Potential bBenefits: 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.

Employment Centers to Mixed-Use Activity Centers: Commuting and Environmental Impacts (YEAR 21)

Principal Investigator: Robert Cervero

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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; work extended to and completed in mid-2010, per approved No-Cost Extensions.

Student Involvement: Two 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. Posted FR-2010-13.

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.

Papers to Date: Cervero, R., Komada, Y. and Krueger, A. Suburban Transformations: From Employment Centers to Mixed-Use Activity Centers July 2010, UCTC-FR-2010-13.

Cervero, R., Murakami, J., and Miller, M. Direct Ridership Model of Bus Rapid Transit in Los Angeles County, *Transportation Research Record*, No. 2145, 2010, pp. 1-7.

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Kang, C. and Cervero, R. From Elevated Freeway to Urban Greenway: Land Value Impacts of Seoul, Korea 's CGC Project, *Urban Studies*, Vol. 46, No. 13, 2009, pp. 2771-2794.

Cervero, R. and Murakami, J. Rail + Property Development in Hong Kong: Experiences and Extensions, *Urban Studies*, Vol. 46, No. 10, pp. 2019-2043, 2009.

Cervero, R., Sarmiento, O., Jacoby, E., Gomez, L. and Neiman, A. Influences of Built Environments on Walking and Cycling: Lessons from Bogotá, *International Journal of Sustainable Transport*, Vol. 3, 2009, pp. 203-226.

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Cervero, R., Kang, J., Shively, K. From Elevated Freeways to Surface Boulevards: Neighborhood and Housing Price Impacts in San Francisco, *Journal of Urbanism*, Vol. 2, No. 1, 2009, pp. 31-50.

Conferences Attended to Date: Speaker: "Shifting Demographics: Implications for Future Housing and Transportation", Policy Session on "Livability", Transportation Research Board Executive Committee Summer Meeting, Woods Hole, Massachusetts, June 2010.

Speaker: "Destination Matters", Conference on TOD and Social Equity, Center for Community Innovations, Berkeley, CA, June 2010.

Invited Speaker: "Mobility and Economic Development", STC Distinguished Speaker, University of California, Davis, Sustainable Transportation Center, April 2010.

Invited Speaker: “TOD and Urban Betterment”, Luncheon Speaker Series, Kansas City Section of the American Planning Association, Kansas City Design Center, Kansas City, Missouri, April 2010.

Invited Speaker and Panelist: “Transit-Oriented Development: Opportunities and Challenges, 2010 Real Estate Law and Business Forum, USC Gould School of Law, Los Angeles, April 2010.

Invited Speaker: “Mobility Strategies that Work”, Capitals Alliance International Conference, Capital Alliance and Brazilian Secretary of Urban Development and Environment, Brasília, Brazil, March 2010.

Invited Speaker and Panelist: “Resourceful Mobility: Lessons for Los Angeles”, The Rosenfield Forums: “Changing Lanes: Bold Ideas to Solve L.A.’s Traffic Problems, UCLA School of Public Affairs, Los Angeles, March 2010.

Invited Lecture: “Mobility, Livability, and Prosperity”; Annual Comeaux Lecture, Department of Geography and Urban Planning, Arizona State University, Tempe, Arizona, March 2010.

Invited Public Seminar: “Transport Investments and Global Competitiveness”, Hong Kong Society for Transportation Studies, Hong Kong Polytechnic University, Hong Kong, February 2010.

Public Lecture, “Transit Oriented Cities”, Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey, February 2010.

Invited Lecture, College of Architecture Speaker Series: “Public Transit and Sustainable Urbanism”, College of Architecture, Georgia Institute of Technology, January 2010.

Speaker, Chair, Organizer, Moderator: Session on “Sustainable Transportation Policy and Planning”, World Future Energy Summit, Abu Dhabi, United Arab Emirates, January 2010.

Speaker: “Advancing Green TODs in China”, spotlight session on: “Bold Ideas and Big Challenges: Transportation Infrastructure in China”; “Direct Ridership Model of Bus Rapid Transit in Los Angeles County”, session on: “Developing Ridership for BRT”. 89th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2010.

Direct Cost: \$61,910.

Public Acceptance of Congestion Pricing: Understanding Citizen Preferences (Year 21)

Principal Investigator: John M. Quigley

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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 provides the first hard quantitative evidence on citizen preferences about road pricing. We 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 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: congestion pricing, tolls, plebiscite, public choice.

Objective: To estimate the link between transport improvements and citizen approval.

Tasks: combination of voting data with engineering data on congestion tolls for small areas of Stockholm.

Milestones, Start and End Dates: Start: August 2008. Completion December 2009.

Student Involvement: Two Graduate Student Researchers.

Relationship to Other UCTC research: Linkage to other road pricing efforts.

Potential Benefits: Better understanding of citizen acceptance of road pricing.

Papers to Date: UCTC FR-2010-17; Political and Public Acceptability of Congestion Pricing: Ideology and Self-Interest in the Journal of Policy Analysis and Management forthcoming.

Direct Cost: \$62,609.

Can technology make us greener drivers?

An investigation of the potential benefits of ACC and IVC (YEAR 22)

Principal Investigator: Wenlong Jin

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Abstract: The transportation sector accounts for nearly one third of the US greenhouse gas (GHG) emissions (Green and Shafer, 2003), and until recently, its emissions have kept on increasing. Transportation is also producing a large percentage of local pollutants such as PM, NO₂, or CO. Much discussed solutions to address this problem include raising efficiency standards, blending low-carbon fuels with gasoline, or changing land-use patterns through urban design and planning. Another possibility, which has not attracted much attention so far, is to rely on new technologies such as adaptive cruise control (ACC) and inter-vehicle communications (IVC) to improve traffic flow and vehicle fuel economy while reducing the emissions of various pollutants. The purpose of this project is to address this knowledge gap. Using micro-simulation, we will investigate the impact on highway capacity and vehicle emissions when a subset of vehicles are equipped with ACC and IVC technologies, with an application to a section of the I-80. We will then develop driving strategies to maximize energy efficiency of vehicles equipped with IVC and ACC. Quantifying the environmental benefits of these new technologies is important to understand if new technologies like ACC and IVC could contribute significantly to greening transportation.

Key Words: Vehicle emissions; Micro-simulation; Inter-vehicle communication; Green driving strategies.

Objective: In this project, we will examine the potential impacts of ACC and IVC technologies on driving behaviors by incorporating ACC and IVC into a microscopic traffic flow model. Using microscopic traffic simulation, we will quantify the reduction in fuel consumption and vehicle emissions for different traffic conditions. Furthermore, we will explore greener driving strategies that rely on ACC and IVC to best improve road capacity and reduce fuel consumption as well as vehicle emissions for different market penetration of these technologies.

Tasks: Task 1: Evaluate highway capacity and emissions for the I-80 study area; Task 2: Set up a simulation platform of traffic flow and ACC/IVC technologies; Task 3: Assess the impacts of ACC and IVC on highway capacity and emissions; Task 4: Develop green driving strategies based on ACC and IVC; Task 5: Discuss impacts on ACC and IVC technologies and policies; Task 6: Write final Summary report and academic papers.

Milestones, Start and End Dates: Official start date August 1, 2009, end 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: New project.

Potential Benefits: This study will help us systematically understand the potential impacts and benefits of ACC and IVC technologies and provide suggestions on whether policy makers should foster the development and the implementation of these technologies to make motor vehicles more energy efficient and environmentally friendly. In addition, this study will provide a framework and tools for evaluating the energy efficiency and the environmental benefits of other emerging technologies.

Papers to Date: Rex Chen, Hao Yang, W.-L. Jin, and Amelia Regan, "Dynamic Transmission Range in Inter-Vehicle Communication with Stop-And-Go Traffic", Proceedings of IEEE Intelligent Vehicles Symposium, June 2010.

W.-L. Jin, Daji Yuan, and Hao Yang, "A study on potential environmental benefits of green driving strategies with NGSim data" Submitted to Transportation Research Board Annual Meeting, 2011.

Hao Yang, Daji Yuan, W.-L. Jin, and Jean-Daniel Saphores, "Simulation evaluation of green driving strategies based on inter-vehicle communications" Submitted to Transportation Research Board Annual Meeting, 2011.

Conferences Attended to Date: Preliminary findings were presented in the 2010 IEEE Intelligent Vehicles Symposium in San Diego, CA, June 2010, titled: "Dynamic Transmission Range in Inter-Vehicle Communication with Stop-And-Go Traffic."

2010 Transportation Research Board Annual Meeting, in Washington DC, January 2010.

Direct Cost: \$ 93,955.

Formulating and Applying Models for Planning and Designing Integrated Public Transit (YEAR 22)

Principal Investigators: Michael Cassidy, Samer Madanat
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Abstract: The research will i) formulate continuum models for the planning and design of more integrated public transit systems that better synchronize passenger transfers (between trunk and feeder lines), and that better coordinate the delivery of differentiated (local and express) services; and ii) use the insights garnered from these models to develop improved guidelines for transit system design. In their current forms, continuum models used for transit design tend to over-simplify, and often even ignore, key elements that characterize the

kinds of systems we envision. Yet, we are greatly encouraged by findings from our preliminary work showing that with suitable enhancements, these models can unveil new insights into how inputs (e.g. passenger demand for travel) affect decision variables (e.g. service frequency and network structure). Since these insights can significantly influence the choices made when designing a transit system, we will exploit them in developing improved design guidelines. We expect that these guidelines could be used by transit agencies to plan and deliver more competitive transit service.

Key Words: Continuum approximation, schedule coordination, trunk, feeder, transit, express, local.

Objective: To develop improved guidelines for integrated transit system design through service models for both trunk-and-feeder transit systems as well as differentiated (local-express) transit service.

Tasks: Task 1: Literature review; Task 2: Further Model Development; Task 3: Simulation Tests; Task 4: Design Guidelines; Task 5: Documentation of Findings.

Milestones, Start and End Dates: September 1, 2009-August 31, 2010.

Student Involvement: Graduate Student Researchers (2).

Technology Transfer Activities: Publications will be posted on UCTC's Website and distributed in hard copy.

Relationship to Other UCTC Research: New project.

Potential Benefits: The research showed how schedule coordination cannot only reduce the generalized user cost, but the costs to both trunk and feeder operators within a system. This finding speaks to the importance of institutional cooperation in cases where the trunk and feeder systems are operated by distinct agencies.

Papers to Date: "Cost-Saving Properties of Schedule Coordination in a Simple Trunk-and-Feeder Transit System" Transportation Research, Part A (under review).

Conferences Attended to Date: World Conference on Transportation Research, from July 11-15 in Lisbon, Portugal.

Direct Cost: \$129,645.

An Activity-Based Assessment of the Potential Impacts of Plug-In Hybrid Electric Vehicles (PHEVs) on Energy and Emissions Using One-Day Travel Data (YEAR 22)

Project Director: Will Recker

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Abstract: With the success of Hybrid Electric Vehicles (HEVs) in the automobile market, Plug-In Hybrid Electric Vehicles (PHEVs) are emerging as the next evolution of this attractive alternative. PHEV market penetration is expected to lead to lower gasoline consumption and less emission. The main objective of this project is to assess PHEVs' emission reduction and energy profile impacts based on simulation of vehicles used in activity and travel patterns drawn from the 2000-2001 California Statewide Household Travel Survey. Simulations replicating reported continuous one day data will be used to generate realistic emissions and energy impact assessment of PHEV market penetration. A secondary objective is to estimate the decreased gasoline consumption and increased electricity demand in California. This will involve testing various electric pricing

strategies designed to mitigate the recharging demands placed on the grid during periods of peak consumption. This assessment of emission and energy requirements of PHEVs will provide a benchmark that will assist in determining the impacts of future PHEV penetration into the automobile market. Specifically, the study will provide an upper bound on the potential demand on the existing grid, as well as categorize expected energy and emissions impacts by time of day and source.

Key Words: energy, emissions, plug-in hybrid electric vehicles, activity-base analysis.

Objective: The main objective of this project is to assess PHEVs' emission reduction and energy profile impacts on the transportation sector.

Tasks: 1: Analyze each vehicle's activity and travel patterns from the California Statewide Travel Survey. Derive three dimensional vehicle paths (two-dimensional space plus time). 2: Under network routing choice and driving behavior assumptions, several scenarios will be set. Optimal and conservative scenarios will generate boundary emission/energy consumption estimates. 3: Each vehicle with reported activity/travel patterns will be simulated for each scenario. Existing micro-level vehicle operational emissions model (CMEM) will be integrated into activity-based simulation at this stage. 4: Assess overall emission and energy profile based on reported vehicle usage patterns. 5: Integrate microscopic PHEV emissions/power simulator into activity-based simulation. 6: Assess overall emission and energy profile based on PHEV vehicle usage patterns. 7: Evaluate impact of grid pricing strategies on PHEV charging schedules.

Start and End Dates: 08/01/09 – 07/31/10.

Student Involvement: GSR J.E. Kang, M.S. Department of Civil and Environmental Engineering, UCI.

Technology Transfer Activities: Detailed Final Report summarizing findings and conclusions submitted to UCTC for publication on UCTC website.

Relationship to Other UCTC Research: New Project.

Potential Benefits: This assessment of emission and energy requirements of PHEVs will provide a benchmark that will assist in determining the impacts of future PHEV penetration into the automobile market.

Papers to Date: Kang, J. E. and W. W. Recker (2009). An activity-based assessment of the potential impacts of plug-in hybrid electric vehicles (PHEVs) on energy and emissions using one-day travel data. Transportation Research, Part D: Transport and Environment, 14, pp. 541-556.

Total Direct Cost: \$54,382.

Incorporating vehicular emissions into an efficient mesoscopic traffic model - An application to southern California (YEAR 22)

Principal Investigator: Jean-Daniel Saphores, Co-PIs: Wenlong Jin and Stephen Ritchie
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Abstract: With the increasing public understanding of the health impacts of air pollution from motor vehicle operation, policy makers need better tools for analyzing the effectiveness of regional policies designed to reduce air pollution. Indeed, the four-step process, which is the current state-of-the-practice in transportation modeling, is inadequate for this task, and micro-simulation, while promising, is very time consuming. We therefore

propose to incorporate vehicular emissions into a dynamic mesoscopic traffic model to create a tool that will generate information about traffic flow, vehicle speeds, and emissions of CO₂ and various criteria pollutants (PM₁₀, NO₂, and CO) on large scale networks. This tool will help evaluate the effectiveness of regional policies such as mandating a certain concentration of biofuels in gasoline or diesel, promoting hybrid electric vehicles (cars or trucks), or replacing older trucks with cleaner ones as is currently done for the San Pedro Bay Ports drayage trucks. In addition, our application to the road network linking the SPBP to the Inland Empire via downtown Los Angeles will provide new insights into various policies that could relieve the dual burdens of congestion and air pollution from communities affected by freight transportation to and from the SPBP.

Key Words: Mesoscopic model; air pollution; freight; scenario analysis.

Objective: The objective of this research is to incorporate vehicular emissions into a dynamic mesoscopic traffic model to create a tool that will generate information about traffic flow, vehicle speeds, and emissions of CO₂ and various criteria pollutants (PM₁₀, NO₂, and CO) on large scale networks with a case study analyzing traffic between the San Pedro Bay Ports, downtown Los Angeles, and San Bernardino.

Tasks: Task 1. Assemble relevant data and code mesoscopic traffic model for the Alameda corridor area. Task 2. Collect relevant data for the I-10, I-210 and the CA 60. Task 3. Compare results from mesoscopic traffic model for the Alameda corridor with micro and mesoscopic simulation in Transmodeler. Task 4. Model the dispersion of selected criteria pollutants. Task 5. Select and simulate scenarios for mitigating emissions in the extended study area. Task 6. Write final Summary report and academic papers.

Milestones, Dates: Official start date August 1, 2009, end July 31, 2010.

Student Involvement: 2 Graduate Student Researchers and 1 Undergraduate Student Researcher (summer).

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 expected benefits include new capabilities for modeling traffic, the resulting air pollution at the regional level and greenhouse gases, as well as new insights into strategies that could be used to mitigate the air pollution impacts of traffic between the San Pedro Bay Ports and the Inland Empire.

Papers to Date: Incorporating Vehicular Emissions into an Efficient Mesoscopic Traffic Model - An Application to the Alameda Corridor, CA – submitted for presentation at TRB's annual conference.

Direct Cost: \$130,957.

Measuring Multimodal Transport Level of Service (YEAR 22)

Principal Investigator: Adib Kanafani

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Abstract: One of the challenges facing intermodal integration is that the planning framework needed for it lacks appropriate measures of level of service that cut across the modes involved and the connections between them. In this study we develop a framework and a set of metrics to assess level of service in a multimodal context. We propose a conceptual framework in which we identify the attributes of level of service elements

and the method of their integration. These measures of performance are defined from two perspectives: the user's perspective (the demand side) and the provider's perspective (the supply side). An analytical framework is then proposed in which a working definition of a "multi-modal corridor" is adopted and a methodology for defining and combining measures of performance for such a corridor is developed. The methodology is defined in the context of evaluation for the purpose of choosing among alternative corridors. Quantitatively, these measures of performance are defined as indirect utility functions of the type used in choice models.

In combining the measures of performance for different elements of a multi-modal corridor, the methodology recognizes that some are additive, either simply or with appropriate weights, while others are not additive at all and exhibit phenomena such as weakest link, or maximal effort. Safety is a good example of this. The basic proposition is that many level of service metrics are non-additive and their combination for a multimodal systems requires specific models that reflect the way level of service attributes impact users of different modes and during different elements of a multimodal journey.

This research looked at the question of measures of performance at the urban and regional levels and identifies metrics that can be used to assess the performance of intermodal connections and combinations. This study concludes by recommending some research directions to develop the models needed for the integration of level of service measures for multi-modal corridors and for their inclusion in indirect utility function.

Key Words: Transportation Planning. Regional Transportation. Multimodal Transportation. Level of Service Measures.

Objective: The objective of this research is to develop a conceptual and an analytical framework for defining and modeling measures of level of service for multi-modal transportation systems.

Tasks: Literature Search. Re-defining the performance characteristics of highway, rail and air at the regional level. Integrating measures of performance at the multimodal level. Analytical framework for evaluating multimodal transportation using defined measures of performance. Policy Recommendations.

Milestones, Dates: August 1, 2009 to July 31, 2010.

Student Involvement: One graduate student researcher, Rui Wang, doctoral student in Transportation Engineering at UC-Berkeley.

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: This is a follow-on research from a previous UCTC project in which barriers to multimodal integration were explored, and where the absence of measures of level of service was identified as a shortcoming of planning methodology for multimodal systems.

Potential Benefits: The models framework developed in this research can enhance the modeling framework for the evaluation of multimodal systems, and specifically utility-based choice models.

Papers to Date: Kanafani, Adib and Rui Wang: "Measuring Multimodal Transport Level of Service", Draft Research Report. Berkeley, August 2010.

Direct Cost: \$56,738.

B) PROJECTS CONTINUED IN YEAR 22 (2009-10)

Congestion and Accessibility: What's the Relationship? (YEAR 19)

Principal Investigator: Brian D. Taylor

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

Tasks: Task 1: Literature review / Task 2: Develop congestion measures / Task 3: Develop accessibility measures / Task 4: Congestion / accessibility comparative analysis / Task 5: Final report.

Project Status: Tasks 1 through 4 have been completed, with Task 5 (Final Report), which draws on the conference papers presented at the scholarly and professional conferences and events listed below, near completion. Key results and findings from the project include the development of localized measures of accessibility and congestion and the identification of neighborhoods which support high levels of activity despite heavy congestion, suggesting both the scale and nature of policies that may increase accessibility despite high levels of congestion. Additional work on the project will consist of revisions to the conference paper for submission to a journal, based on reviewers' comments on the conference papers and comments received at conferences. Overall, the objective of the project has been met, and this research, which investigated the understudied empirical and conceptual relationship between congestion and accessibility, will serve as a foundation for future research, including the role of transit service in improving accessibility in congested urban regions.

Public Research Presentations: Mondschein, Andrew. "Congestion and Accessibility: What's the Relationship?" 2010 World Conference on Transportation Research, Lisbon, Portugal, July 2010.

Taylor, Brian D. "Bad Congestion, Good Congestion? Examining Traffic Congestion in Los Angeles," Institute of Transportation Studies Seminar Series, University of California, Irvine, California, April 2010

Mondschein, Andrew. "Congestion and Accessibility: What's the Relationship?" 2010 Annual Meeting of the Association of American Geographers, Washington, DC, April 2010.

Taylor, Brian D. "Re-Thinking Traffic Congestion in Los Angeles," at *Changing Lanes: Bold Ideas to Solve LA's Traffic Problems*, UCLA Rosenfield Forum, Japanese-American National Museum, Los Angeles, California, March 2010.

Mondschein, Andrew, Stephen Brumbaugh, and Brian D. Taylor. "Congestion and Accessibility: What's the Relationship?" 2009 Annual Meeting of the Transportation Research Board, Washington, DC, January 2009.

Brumbaugh, Stephen. "Congestion and Accessibility: What's the Relationship?" 2008 ACSP/AESOP Joint Congress, Chicago, IL, July 2008.

Conference / Working Papers: Mondschein, Andrew, Stephen Brumbaugh, and Brian D. Taylor. "Congestion and Accessibility: What's the Relationship?" 2010 World Conference on Transportation Research.

Mondschein, Andrew, Stephen Brumbaugh, and Brian D. Taylor. "Congestion and Accessibility: What's the Relationship?" 2009 Annual Meeting of the Transportation Research Board.

Mondschein, Andrew, Stephen Brumbaugh, and Brian D. Taylor. 2008. "Congestion and Accessibility: What's the Relationship?" *4th Joint Congress of the Association of Collegiate Schools of Planning and the Association of European Schools of Planning*.

Immigrants and Travel Behavior: Effect of Ethnic Neighborhoods on Commute Time and Mode (YEAR 20)

Principal Investigator: Evelyn Blumenberg

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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: Identify ethnic neighborhoods in Los Angeles and New York. Compare transportation characteristics of between ethnic and non-ethnic neighborhoods. Compare the transportation patterns of immigrants by major immigrant group and central city/suburban location. 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. Use descriptive statistics to examine the relationship between residential location and commute travel. 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: Commute Mode and Ethnic Neighborhoods, unpublished.

Ethnic Enclaves and Commute Behavior in Los Angeles and New York, unpublished.

Measuring the Effects of Immigrant Ethnic Neighborhood Specification on Commute Mode Choice (submitted to the Annals of Regional Science).

“Moving In and Moving Around: Immigrants, Travel Behavior, and Implications for Transport Policy,” published in Transportation Letters.

Commute Distance and Ethnic Neighborhoods (submitted for presentation at the 2010 Transportation Research Board Conference).

Conferences Attended to Date: Impact of Changing Demographics on the Transportation System Conference.

Transportation Research Board, Washington, DC, October, 2008.

Transportation Research Board, Washington, DC, January 2009.

Annual conference of the Association of Collegiate Schools of Planning (October 2009).

Direct Cost: \$53,371.

Costs and Effectiveness of Lower-Speed, Environmentally-Friendly Urban Highway Designs (YEAR 20)

Principal Investigator: Kenneth Small

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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.

Milestones, Dates: Official start date August 1, 2007, end July 31, 2008. Extended end date: July 31, 2009.

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

Technology Transfer Activities: Publication is being considered by the journal, *Transportation*. Links and a working paper will be on UCTC's Web site, to be supplemented by a second working paper. Interest in the work has been expressed by the editors of the following on-line publications, who have requested a copy when it is finalized: Toll Road News; Surface Transportation Innovations (Reason Foundation).

Relationship to Other UCTC Research: new project.

Potential Benefits: Building substantial additions to capacity at more affordable costs than those envisioned in current metropolitan transportation plans.

Papers to Date: Ng, Chen Feng, and Kenneth A. Small, "Tradeoffs among Free-flow Speed, Capacity, Cost, and Environmental Footprint in Highway Design," U.C. Irvine Economics Working Paper 08-09-04 (Aug. 2008). <http://www.economics.uci.edu/docs/2008-09/small-04.pdf>. Submitted to *Transportation*, revision requested.

Conferences Attended to Date: The paper listed above was presented at the following conferences: Third Kuhmo-Nectar Conference on Transport and Urban Economics, Amsterdam, July 2008; UCTC annual conference, Los Angeles, November 2008.

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.

Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge (Year 20)

Principal Investigator: Brian Taylor
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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 smartcard 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 review of the literature and in-depth, focused interviews of transit agency officials working on the implementation and adoption of distance-, time-of-day-, and mode-based fares. We ask 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. Final stages of the project include a national survey of transit agencies to expand our analysis. 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, 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: 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.

Conferences to Date: Gahbauer, John, Allison C. Yoh, and Brian D. Taylor, 2009. "Reforming Transit Fare Policies: Reconciling Academic, Organizational, and Political Perspectives," presented at the 50th Annual Conference of the Association of Collegiate Schools of Planning, Crystal City, VA, October.

Direct Cost: \$41,234.

Success Stories: Los Angeles County Metropolitan Transportation Authority (MTA) staff referred to this research and conference paper in response to a Board directive to explore distance- and time-based fares using new smart card fare collection technology. Staff at MTA consulted with researchers on this project to obtain literature sources and cited this conference paper in its report to the Board of Directors.

Sex, Race and Travel (Year 21)

Principal Investigator: Randall Crane

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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, 2010 – no cost extension to June 30, 2011.

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: "Sex Changes Everything: The Recent Narrowing and Widening of Travel Differences by Gender," Public Works Management & Policy 13, 2009. (with L. Takahashi).

Conferences Attended to Date: "Travel Behavior and the Scope for Smart Mobility Policies" Symposium on Smart Mobility, Florida State University, April 2010.

"Advanced Transportation Planning" workshop, 102nd National Planning Conference, APA, New Orleans, April 2010.

"Global Issues in Transportation Policy," at The Rosenfield Forum, "Changing Lanes: Bold Ideas to Solve L.A.'s Traffic Problems," Japanese American National Museum, Los Angeles, March 2010.

"Sources of the Narrowing and Widening of Travel Differences by Gender" TRB 4th International Conference on Women's Issues in Transportation, Beckman Center, Irvine, October 2009.

"Sex Changes Everything: The Recent Narrowing and Widening of Travel Differences by Gender" 50th Anniversary ACSP Conference, Washington, DC, October 2009.

Direct Cost: \$44,565.

Large Scale Real Options Models for Network Investment Planning and Operational Risk Hedging (YEAR 21)

Principal Investigator: Amelia Regan

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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 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 , Multi-Objective Radial Basis Function Method for Robust Network Toll Pricing Profiles with Correlated Stochastic Capacity, in preparation for submission to the Journal of Advanced Transportation.

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.

Forecasting with Dynamic Microsimulation: Design, Implementation, and Demonstration (Year 22)

Principal Investigator: Konstadinos G. Goulias

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Abstract: In this project we develop a new travel demand forecasting system that integrates demographic microsimulation with urban simulation and travel demand model systems. The basic ingredients of this new model system are: a) a dynamic demographic simulator designed and tested with repeated observations of the same individuals in another context that will be transferred to a case study in Santa Barbara, CA; b) a modified version of the recently finalized Urbansim model that will also be calibrated with data from Santa Barbara, CA; and c) travel demand models that account for intra-household interactions and path based accessibility that were estimated with data from California. The model system is unique because it combines within a day and across years human behavior dynamics and it will push the frontier of modeling and simulation one step further. A demonstration of the new systems forecasting capabilities will be offered using data from Santa Barbara, CA.

Key Words: Microsimulation, Demographic Forecasting, Travel behavior, UrbanSim.

Objective: Identify the barriers in integrating complex simulation models and eliminate them by offering a demonstration of problems and solutions.

Tasks: Task 1 Develop UrbanSim Application; Task 2 Develop Synthetic Population; Task 3 Finalize Activity Models; Task 4 Produce Future Scenarios.

Milestones, Start and End dates: 1) Development of theoretical framework, February 1, 2010 to June 15, 2010; 2) Development of the land parcel database with required attributes, February 5, 2010 to October 30, 2010; 3) Test the DEMOS code with Santa Barbara data, February 1, 2010 to October 30, 2010; 4) Create Scenarios using combined URBANSIM and DEMOS, June 1, 2010 to December 31, 2010.

Student Involvement: Graduate Student Researcher.

Technology Transfer Activities: Presentations at Conferences and Publications Posted on UCTC Website.

Relationship to Other UCTC Research: New project.

Potential Benefits: This research will contribute to our understanding of barriers to integrated model implementation for small metropolitan areas.

Papers to Date: Goulias K. G. (2009) Travel Behavior Dynamics from a Lifespan Development Perspective. Paper presented at the 12th International Conference on Travel Behavior Research, December 13-18, Jaipur, India, and included in the CD ROM proceedings.

Conferences Attended to Date: 12th International Conference on Travel Behavior Research, December 13-18, 2009, Jaipur, India, 89th Annual Transportation Research Board Meeting, January 10-14, 2010, Washington, D.C., 3rd Conference on Innovations in Travel Modeling, May 10-12, 2010, Tempe, Arizona, 32nd Time Use Conference, 7-10 July, 2010, Paris, France, 12th World Conference on Transport Research, July 11-15, 2010, Lisbon Portugal.

Direct Cost: \$79,802.

Mobile Transit Trip Planning and Accessibility Assessment with Real-Time Data (YEAR 22)

Principal Investigator: Alexandre Bayen

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Abstract: Mobile phones equipped with GPS and Internet access are promising platforms upon which future transportation information will be shared and collected. With these devices, real-time monitoring of the transportation system will become not only feasible, but ubiquitous. The Internet has expanded these capabilities significantly, with various mapping providers (i.e. Google and Navteq) merging static and real-time traffic data to help drivers make the most of their commute. Yet, relatively little attention has been paid to public transportation and real-time data applications. The purpose of this research was to build and to evaluate the performance of Transitr, a real-time public transit trip planning system accessible on mobile devices designed to use this information. Transitr combines a user's location with real-time transit information provided by transit agencies to determine the fastest route to a desired destination. It fuses real-time data feeds with the existing technology of schedule-based transit trip planners (TTPs) currently available online. Using data from hundreds of trips planned in San Francisco, the performance of Transitr was compared with a schedule-based TTP. The tools developed in the course of this work also enable isochrone analysis to compute detailed accessibility maps.

Key Words: real-time, public transit, trip planning, GPS, accessibility, isochrone curves, minimum travel time, multi-modal, published schedule vs. actual schedule.

Objective: The goal of this research was to demonstrate a prototype system that provides information useful to travelers to make multi-modal travel decisions in the presence of schedule delays.

Tasks Completed: Task 1: Two client applications: (1) for the iPhone, written in Objective C, and (2) another application that will run on any device with a JavaScript enabled web browser. Task 2: Routing engine: finds shortest paths through the transit network. The set of all possible paths through the network is represented as a dynamic time expanded graph. Construction of the shortest path can be computed using standard dynamic programming tools. The routing engine (1) pre-computes the list of feasible paths; (2) prunes paths unlikely to become optimal to reduce database size; and (3) dynamically updates the list of feasible paths as real-time data becomes available. Task 3: Bus arrival information from real-time feeds (such as NextBus): Transitr has been implemented for four agencies: SFMTA, BART, AC Transit, and TriMet. Task 4: Preliminary measure of accessibility through isochrone analysis in San Francisco: Baseline isochrone computed from static bus schedule; isochrone captures effect of time-of-day, and delayed buses. Task 5: Two pilot test deployments: (1) Berkeley proof-of-concept experiment; and (2) analysis of the NYC ITS World Congress -- 5 days; used by 1,000 transit riders. Task 6: Evaluation: based on 600 randomly generated trips in SF Bay Area; used actual AVL data as ground truth; measured accuracy of NextBus predictor; compared % error in travel time (with or without real-time data). Real-time data enables marginally better travel time estimates, but its current level of performance is severely limited by the quality of real-time arrival estimates provided by third parties.

Milestones, Dates: Review the literature for computation of travel time: 08/01/09-09/01/09; Review of the system already in place to compute travel time: 08/01/09-09/01/09; Automation of accessibility maps computation: 09/01/09-03/01/10; Analysis of published/actual accessibility: 03/01/10-04/01/10; Analysis of reliability of accessibility: 04/01/10-06/01/10; Case study for additional deployments: 06/01/10-07/01/10; Reporting, software documentation: 07/01/10-08/01/10.

Student Involvement: Jerald Jariyasunaut, Daniel B. Work, Branko Kerkez.

Relationship to Other UCTC Research: Potential collaboration with Thomas James Pingel and Keith Clarke of UC Santa Barbara, who proposed “Strategic Elements of Route Choice for Next Generation Digital Navigation Systems.”

Potential Benefits: This research leverages information made available through mobile GPS devices and the Internet to make high-resolution measurements of accessibility. The practical benefit is to provide real-time transit information useful to travelers in planning their trips. Alleviating the travel-time uncertainty in transit trips may lead toward increased adoption of mass transit services. The scientific benefit is to enable the construction of detailed isochrone maps, and to characterize the time-dependency and variability of accessibility over a spatial extent of a city.

Papers to Date: Mobile Transit Trip Planning with Real-Time Data, J. Jariyasunant, D. Work, B. Kerkez, R. Sengupta, S. Glaser, and A. Bayen. Transportation Research Board 89th Annual Meeting, Washington, D.C., Jan. 10-14, 2010.

Conferences Attended to Date: (1) Transportation Research Board 89th Annual Meeting, Washington, D.C., Jan. 10-14, 2010.

Direct Cost: \$ 65,252.

Success Stories: Following a successful 5-day field operational test which was performed at the NYC ITS World Congress, several key findings were made. Using the data collected as Transitr was used by 1000 transit riders to schedule public-transit trips around Manhattan and the five Burroughs, some data was collected. A user feedback survey revealed 93% of respondents appraised Transitr as either extremely useful or useful.

Price and Frequency Competition in Freight Transportation (YEAR 22)

Principal Investigator: Jan K. Brueckner

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Abstract: Service frequency is an important quality dimension in passenger transportation, with frequent service allowing a good match between passengers' actual and preferred departure times. Frequency is thus a key dimension of competition between passenger carriers, along with the fare charged. Frequency is also a key quality determinant in freight transportation, since low frequencies require cargo to accumulate while awaiting shipment, imposing inventory costs on firms. Frequent service, by contrast, allows inventory stocks to be kept low, reducing costs. While this trade-off has become more prominent in recent years with the advent of "just in-time" production methods, the economics-oriented transportation literature lacks a conceptual framework for analyzing the provision of high-frequency freight service by competitive suppliers. The purpose of the proposed research is fill this gap by developing a theoretical model of frequency and price competition among the providers of freight services, paralleling the author's previous analysis of such competition in passenger services. While the two models will have a similar structure, key details differ given that the demand for freight services arises from firm profit maximization rather than consumer utility maximization. The research will provide a new conceptual framework for the analysis of competition in freight transportation.

Key Words: freight, frequency, competition.

Objective: develop a theoretical model of competition between freight carriers, with a special focus on frequency competition.

Tasks: survey institutional literature, develop model, carry out comparative-static analysis, carry out welfare analysis, analyze provision of excess capacity.

Milestones, Dates: Start date, August 1, 2009; end date, July 31, 2011.

Student Involvement: Ph.D. student Nilopa Shah served as Research Assistant and coauthor of paper.

Relationship to Other UCTC Research: New project.

Potential Benefits: Improved conceptual understanding of the nature of competition among providers of freight services.

Papers to Date: Nilopa Shah and Jan K. Brueckner, "Price and Frequency Competition in Freight Transportation."

Conferences Attended to Date: Kuhmo-Nectar Conference on Transport Economics, Valencia, Spain, July 2010; World Conference on Transportation Research, Lisbon, July 2010.

Direct Cost: \$67,095.

How Much do Highway Dedication Laws Tax Housing to Subsidize Driving? (YEAR 22)

Principal Investigator: Donald Shoup

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Abstract: Highway dedication laws are an important but understudied link between transportation and land use. By requiring developers to widen streets before they can build new housing, these laws increase the costs of housing construction and decrease the costs of driving. Moreover, unlike similar zoning laws that favor cars at the expense of homes, such as parking requirements, the mobility benefits of highway dedication ordinances may be almost completely illusory. In this research I will explain highway dedication ordinances, and then use data from Los Angeles to quantify their impacts on housing development and driving. The research should have implications for efforts to reduce overall vehicle miles travelled; for plans to better integrate transportation and land use goals; and for attempts to create accessible and vibrant communities in dense center-city areas.

Key Words: Zoning, Street Standards, Housing Costs, Regulatory Barriers.

Objective: This research examines one of the largest but most under-studied ways that zoning codes restrict housing development in order to make driving easier—laws that require developers to widen streets. The goal of this project is to document the origin and incidence of these laws in Los Angeles County, and then to use case studies to make estimates about the laws' effects. We further hope to identify possible reforms.

Tasks: Task 1: Literature Review. Task 2: Survey local governments about highway dedication laws. Task 3: Research history of the law. Task 4: Identify case studies and conduct in-depth interviews. Task 5: Analysis. Task 6: Writing.

Milestones, Dates: Official start date August 1, 2009, end July 31, 2010. Tasks 1-3 are complete, Task 4 is nearly complete and a no-cost extension was approved.

Student Involvement: One undergraduate student, two graduate students, one post-doctoral 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 should help researchers and policymakers understand the hidden costs that street standards impose on housing development, and help clarify the origins of many street standards.

Direct Cost: \$58,000.

The Presentation of Self in Everyday [Transit] Life: An Ethnographic Study of Public Transit Culture and Behavior in Los Angeles (Year 22)

Principal Investigator: Brian D. Taylor

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Objective: Collect and analyze photographs and text by transit users to better understand the experiences of using public transit.

Tasks: Task 1: Literature review (100% complete); Task 2: Development of online data collection website (100% complete - website complete and functional); Task 3: Participant recruitment/data collection (80% complete – 4 weeks of additional recruitment/data collection to be completed); Task 4: Coding and analysis (75% complete – preliminary coding scheme and first stage coding complete; final coding scheme and additional coding to be completed); Task 5: Production of deliverables (60% complete – conference paper completed and presented October 2010; final report preparation in progress; additional papers to be completed and submitted to journals during winter 2011).

Project Status: This research uses visual ethnography to document and understand both transit spaces and the transit experience. Researchers can gather visual ethnography data by capturing visual images themselves, by allowing research subjects to produce the images, or by collaborating with individuals in the field to create a visual story. For this project, riders captured their own journeys visually through photography (most using digital cameras or smart phones), uploaded a series of photos for each transit trip, and added captions and commentary about the photos with details about the trip (time/day, start/end locations, transit line, trip purpose, etc.). The image sets and text will be coded and analyzed to identify themes and patterns. Preliminary data analysis suggests that for some riders the trip description is chronological or procedural (e.g., elements of the ride from A to B). For others, the experience encompasses a less linear format where the built environment or other spatial markers form the narrative backbone of their trips. Riders also discuss challenges, difficulties, and likes/dislikes related to the trip; often these issues involved elements of the transit trip not related to the transit system itself – such as travel to and from a stop or station. The findings provide useful insight into the elements and features of transit trips most important to users, many of which are not identified or measured in conventional transportation research.

Public Research Presentations: Fink, Camille. “Zen in the Art of Travel Behavior: Using Visual Ethnography to Understand the Transit Experience” presented at the 51st Annual Conference of the Association of Collegiate Schools of Planning (ACSP), Minneapolis, Minnesota, October 2010.

Conference/Working Papers: Fink, Camille and Brian D. Taylor. 2010. “Zen in the Art of Travel Behavior: Using Visual Ethnography to Understand the Transit Experience” paper for the 51st Annual Conference of the Association of Collegiate Schools of Planning, Minneapolis.

Relationship to Other UCTC Research: New Project.

Potential Benefits: This research will provide new insight into transit environments, the ways in which people interact both with each other and their physical surroundings in these spaces, and the implications for transit system design and management in order to retain and attract riders.

Total Direct Cost: \$51,608.

CAL-Sentry: Computational Framework and Algorithms for Live Video-Sensor Stream Assimilation and Analysis for Congestion, Emission and Safety Studies (Year 22)

Principal Investigator: Mohan M. Trivedi

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Abstract: Vehicle detection and tracking, traffic flow characterization, vehicle activity detection, vehicle type classification and criticality assessment as highly relevant information for higher level understanding of transportation related issues. In this research we propose the development and experimental evaluation of efficient computer vision, machine learning, and multi sensory fusion algorithms to extract such needed information using a large network of video cameras. The capabilities of existing sensors and traditional techniques, e.g. inductive loops, will be augmented by information obtained from video sensors and will be integrated in a hierarchical fusion framework with contextual information, such as GPS and GIS, to provide real-time fleet composition, vehicle activity information, and site analysis while overcoming individual modality shortcomings. By incorporating varied sensing and information sources, the overall robustness of transportation analyses will be directly impacted to improve highway efficiency through evaluation of congestion events such as bottlenecks and collisions, provide more complete environmental emissions studies, knowledge of infrastructure load, and design of operational control strategies.

Key Words: Real-time machine vision, multisensory analysis, Statistical learning, Bayesian decision theory, Traffic flow analysis, vehicle activity analysis, congestion-emission analysis, Intelligent Transportation.

Objective: The overall goal of the proposed research is to develop and evaluate a computational framework and associated algorithms for multisensory information analysis, specifically for transportation planning and management applications.

Tasks: Task 1: Design and Modifications of the Instrumented Video Test bed over I-5 and UCSD Campus. Task 2: Video based real-time vehicle detection, classification and flow analysis algorithms. Task 3: Design of CANVAS: Contextual Activity Analysis and Visualization System Framework. Task 4: Design of multiple high resolution display based visualization platform for monitoring and interactivity and experimental evaluation Task 5: Incorporating CAL-Sentry output in Congestion and Emission studies (collaboration with Prof. M. Barth, UC Riverside).

Milestones, Start and End Dates: February 2010-February, 2011.

Student Involvement: Partial support for 2 Grad. Res. Assts, 2 Undergrad students and a Post Doc.

Relationship to Other UCTC Research: New Project.

Potential Benefits: The proposed research will result in the development of the “CAL-Sentry” system including a collection of algorithms for real-time video analysis, information assimilation, and visualization which should be general enough for duplication at other sites for traffic flow and emission studies.

Papers to Date: Brendan Morris and Mohan Trivedi, “Contextual Activity Visualization from Long-Term Video Observations” IEEE Intelligent Systems, Special Issue on Intelligent Monitoring of Complex Environments, 2010 (pdf).

Conferences Attended to Date: 16th UCTC Annual Student Conference, April 1, 2 2010, University of California, Irvine, (UC SD Team Presented one oral and six research posters).

Intelligent Transportation Society, ITS-America Annual Conference, Houston, TX, May 2010, Mr. Anup Doshi, UCTC Doctoral Dissertation Fellow at UCSD won the Best Student Essay (2nd Place) Award for, “LACASA: A Layered Architecture for Cooperative Active Safety Applications.”

IEEE International Intelligent Vehicles Symposium, IV 2010, La Jolla, CA, June 21-24, 2010.

Direct Cost: \$106,000.

Success stories: Anup Doshi, UCTC Doctoral Dissertation Fellow at UCSD won the Best Student Essay (2nd Place) Award for his paper, “LACASA: A Layered Architecture for Cooperative Active Safety Applications” at the Intelligent Transportation Society, ITS-America Annual Conference, Houston, TX, May 2010.

Employing lessons from Behavioral Economics to Promote Sustainable Behaviors and Improve Travel Demand Models (YEAR 22)

Principal Investigator: Joan Walker

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Abstract: A major aspect of transportation planning is understanding behavior: how to predict it and how to influence it over the long term. Behavioral models in transportation are predominantly rooted in the classic microeconomic paradigm of rationality. However, there is a long history in behavioral economics of raising serious questions about rationality. Behavioral economics has made inroads in transportation in the areas of survey design, prospect theory, and attitudinal variables. Further infusion into transportation could lead to significant benefits in terms of increased ability to both predict and influence behavior. The aim of this research is to investigate the transferability of findings in behavioral economics to transportation, with a focus on lessons regarding personalized information and social influences. We designed and conducted three computer experiments using UC Berkeley students: one on personalized-information and route choice, one on social influences and auto ownership, and one combining information and social influences and pedestrian safety. Our findings suggest high transferability of lessons from behavioral economics and great potential for influencing transport behavior. We found that person- and trip-specific information regarding greenhouse gas emissions has significant potential for increasing sustainable behavior, and we are able to quantify this Value of GREEN at around \$0.24/pound of greenhouse gas avoided. Congruent with lessons from behavioral economics, we found that information on peer compliance of pedestrian laws had a stronger influence on pedestrian safety behavior than information on the law, citation rates, or accident statistics. We also found that social influences positively impact the decision to buy a hybrid car over a conventional car or forgo a car altogether.

Key Words: Behavioral economics, demand modeling, behavior modification, value of green, social influences, information systems.

Objective: To transfer behavioral economics findings regarding social influences and personalized information and feedback to improve transport policy and models.

Tasks: Task 1: Literature review. Task 2: Design behavioral experiments. Task 3: Conduct behavioral experiments. Task 4: Analyze results. Task 5: Produce deliverable.

Milestones, Dates: Official start date August 1, 2009. Official end date July 31, 2010.

Student Involvement: Graduate student researcher.

Technology Transfer Activities: Findings presented at conferences, published in peer-reviewed journals, and posted on UCTC's Website.

Relationship to Other UCTC Research: New Project (although continuing work started with new faculty startup grant from 2008-09).

Potential Benefits: More effective strategies aimed at behavior modification more accurate forecasts.

Papers to Date: Gaker D, Zheng Y, Walker JL (2010) Experimental Economics in Transportation: A Focus on Social Influences and the Provision of Information, Transportation Research Record (forthcoming). Plus a paper currently under review and another chapter in a book also under review.

Conferences Attended to Date: Regional Science (11/2009), San Francisco, CA.
Transportation Research Board Annual Meeting (01/2010), Washington, DC.
World Conference on Transport Research (07/2010), Lisbon, Portugal.

Direct Cost: \$84,719.

Success stories: Our TRB paper presented in January of 2010 (cited above) was awarded the inaugural Kitamura Paper prize (for a paper in Travel Analysis Methods that is co-authored by faculty and students) – will be awarded at TRB 2011.

An Aggregate Model of Downtown Parking and Traffic Congestion: Incorporating Mass Transit (Year 22)

Principal Investigator: Richard Arnott
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Abstract: Over the last few years, the PI has been developing an aggregative model of downtown parking and traffic congestion, with the ultimate aim of having a user-friendly simulation model that can be applied as a practical planning tool in the economic evaluation of city-specific downtown transport and parking policies. The research strategy has been to start with a very simple model and to gradually introduce refinements in the direction of realism. The original model had identical individuals, only auto travel, and only curbside parking. That model has been extended to include private garage parking and individual variation in value of time and visit length. The aim of the proposed research is to extend the model to include mass transit. Planned future refinements include introducing resident parking (including a distinction between primary and secondary streets), freight transportation, and variation in demand over the day, replacing the current flow congestion with intersection queuing congestion, and refining the specification of the games between private parking garages and between private and public providers of parking.

Key Words: downtown parking, traffic congestion, mass transit, parking policy, garage parking, curbside parking.

Research Objective: To introduce mass transit into an aggregative model of downtown parking and traffic congestion and to illustrate extended model's application in policy analysis.

Tasks: 1. Extending an aggregative model of downtown parking and traffic congestion previously developed by the PI to include bus and subway travel. 2. Illustrating calibration of the model and its application to analyze a private garage parking tax in San Francisco and maximum parking requirements in Los Angeles.

Relationship to Other UCTC Research: No prior UCTC research.

Potential Benefits: Improving understanding of the economic effects of downtown parking and transport policies and developing a practical transport planning tool.

Direct Cost: \$69,578.

Evaluation of Traffic Safety in Sprawl and Urban Growth in California Metropolitan Areas (Year 22)

Principal Investigator: David Ragland

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Abstract: Urban sprawl has recently been considered as a major contributing factor to traffic fatalities and injuries. Recent findings regarding the impact of urban sprawl on traffic safety suggested that urban sprawl was directly related to traffic fatalities. However, the studies were conducted on a large scale and focused on the relationship between limited attributes of urban sprawl and traffic fatalities. Therefore, the relationship between diverse attributes of built environments and different types of crashes are not entirely explained or quantified. From this research we will 1) complete a descriptive analysis on the relationship between urban growth and the evolution of traffic safety in both cross-sectional and time-series using Geographical Information Systems (GIS) and 2) quantify the impacts specific factors of urban growth have on collision rates using Geographical Weighted Regression (GWR). Finally, the proposed research is expected to yield (1) an enhanced understanding of how urban growth patterns affect traffic safety while controlling for other influential factors; (2) quantification of the impacts of attributes in urban growth patterns on traffic safety; and (3) insights into what types of planning and policy solutions might best be effective for reduction in traffic fatalities and injuries.

Key Words: Urban growth, sprawl, traffic crashes, built environment, GIS, GWR.

Research Objective: Investigate the relationship between urban growth patterns and traffic crashes.

Tasks: Literature Review; Data Collection and GIS Analysis; Variable Selection; Statistical Modeling (Geographic Weighted Regression); Summary of Findings and Implications for Traffic Safety Policy.

Relationship to Other UCTC Research: New project.

Potential Benefits: We expect that the results can help guide future research concerning the relationship between urban planning and traffic safety.

Direct Cost: \$57,923.

Determinants of Bicycle-transit Integration in U.S. Cities (YEAR 22)

Principal Investigator: Rui Wang

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Abstract: Using the new National Household Transportation Survey and its California add-on sample, the proposed study quantitatively analyzes the factors influencing travelers' combined use of bicycle and public transit. The study mainly focuses on utilitarian rather than recreational demand for cycling to transit, with explicit considerations given to all stages of travel: residential collection, trunk line transportation and destination-end distribution.

Key Words: bicycle, transit, integration, US cities.

Objective: Results of this study is expected to provide planners with evidence on how effective different policy and planning tools are to facilitate the integration between transit use and cycling.

Tasks: Task 1: Literature review; Task 2: Data processing; Task 3: Data analysis; Task 4: Production of deliverables.

Milestones, Dates: Official start date August 1, 2009, end July 31, 2011.

Student Involvement: Graduate Student Researcher.

Technology Transfer Activities: Publications will be posted on UCTC's Website and distributed in hard copy.

Relationship to Other UCTC Research: new project.

Potential Benefits: The results will help the policy makers to better know when, where, and how to promote bicycle-transit integration, and how such policies may be different from general policies encouraging the use of bicycle. It also provides basis for cost-effectiveness analysis of alternative policy measures to increase transit ridership, reduce short-distance driving, and mitigate greenhouse gas emissions in U.S. cities.

Direct Cost: \$62,343.

Mitigating the Air Quality Impacts of San Pedro Bay Port Drayage Truck Operations on Arterials (YEAR 22)

Principal Investigator: Stephen G. Ritchie

(Co-PIs): R. Jayakrishnan, Jean-Daniel Saphores

UC Irvine

s-ritchie@uci.edu, rjayakri@uci.edu, saphores@uci.edu

Abstract: The San Pedro Bay Ports (SPBP) of Los Angeles and Long Beach in Southern California comprise one of the largest and busiest container port complexes in the world, and contribute significantly to both our regional and national economies. However, the SPBP complex is a major contributor to air pollution. Local communities adjacent to the ports and associated intermodal facilities are believed to bear a disproportionate burden of the health impacts (respiratory and cardiovascular illness, and premature death) associated with this pollution. A particular concern is emissions from heavy duty diesel vehicles (HDDVs), or drayage trucks, which form an unusually large proportion of vehicles on nearby freeways and arterials and which carry port cargo

(mostly containers) to and from the ports and intermodal rail and transloading facilities. Our existing UCTC research has developed a new modeling approach to evaluate the health and environmental justice impacts of various SPBP freight corridor operations and pollution mitigation strategies. However, our modeling of HDDVs only addresses the freeway network. This research will therefore complete a major missing link by modeling HDDV drayage truck operations on arterial roads, thereby providing new and more accurate insights into the emission impacts of alternative multimodal SPBP freight corridor operations.

Key Words: Traffic simulation; arterial; drayage truck; port; air pollution; scenario analysis.

Research Objective: This objective of this research is to develop a capability to model the air quality impacts of drayage truck operations on arterial roads adjacent to the San Pedro Bay Ports.

ean-Daniel Saphores build simulation network; compile traffic count data; define scenarios and mitigation strategies; run simulations; generate emissions; dispersion modeling for arterials, freeways and rail; public health impacts and environmental justice implications; data fusion framework for future real-time OD estimation; write report and journal papers.

Milestones, Dates: Official start date August 1, 2009, end August 31, 2010.

Student Involvement: Two Graduate Student Researchers.

Technology Transfer Activities: Caltrans Research Webinar on Freight and Goods Movement, May 12, 2010, Sacramento, invited speaker. 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 previous project - Mitigating the Social and Environmental Impacts of Multimodal Freight Transportation Corridor Operations - PHASE II.

Potential Benefits: By extending and completing our existing UCTC research, new and more accurate insights into the emission impacts of alternative multimodal San Pedro Bay Port freight corridor operations and mitigation strategies will be obtained. 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.

Conferences Attended to Date: Transportation Research Board Annual Meeting, 2010, Washington, D.C.

INFORMS 2009 Annual Meeting, October 2009, invited presentation: J. Saphores, S. Ritchie, M. Sangkapichai, O. Ogunseitan, and R. Raymond, "An Analysis of Train Emissions and their Health Impacts in California's Alameda Corridor."

INFORMS 2009 Annual Meeting, October 2009, invited presentation: S. Ritchie, J. Saphores, G. Lee, I. You, R. Ayala, M. Sangkapichai, "Microscopic Modeling of Air Quality Impacts of Drayage Truck Operations in the Alameda Corridor."

Caltrans Research Webinar on Freight and Goods Movement, May 12, 2010, Sacramento, invited presentation: S. G. Ritchie, G. Lee, S. You, , J. Saphores, M. Sangkapichai and R. Jayakrishnan, "Environmental and health impacts of freight transportation to and from the Ports of Long Beach and Los Angeles."

Direct Cost: \$114,651.

6. 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 2009-2010. The \$2,085,000 funded by U.S. DOT matched by \$2,085,000 from Caltrans yielded a total budget of \$4,170,000.

Table 4. Allocated Amounts for Year 22: University of California Transportation Center Budget for 2009-2010

ITEM	USDOT	Caltrans	SUM
Faculty Salaries	\$337,778	\$319,482	\$657,260
Other Staff Salaries	\$0	\$212,421	\$212,421
Student Salaries	\$36,494	\$759,786	\$796,280
Staff Benefits	\$2,157	\$63,027	\$65,184
A- SUBTOTAL SALARIES AND BENEFITS	\$376,429	\$1,354,716	\$1,731,145
Scholarships, including student fees and tuition when applicable	\$1,420,000	\$230,047	\$1,650,047
Permanent Equipment	\$0	\$2,000	\$2,000
Expendable Property & Supplies	\$2,796	\$82,937	\$85,733
Domestic Travel	\$30,000	\$60,000	\$90,000
Foreign Travel	\$5,000	\$0	\$5,000
Other Direct Costs (Specify)	\$19,000	\$355,300	\$374,300
B- SUBTOTAL DIRECT COSTS NOT INCLUDING SCHOLARSHIPS ETC	\$56,796	\$500,237	\$557,033
Subtotal All Direct Costs	\$1,853,225	\$2,085,000	\$3,938,225
C-TOTAL SUBJECT TO IND.COSTS	\$433,225	\$0	\$433,225
Facilities & Admin. (Indirect) Costs	\$231,775	\$0	\$231,775
TOTAL COSTS	\$2,085,000	\$2,085,000	\$4,170,000
Percents	50%	50%	100%

7. 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 2009-2010.

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

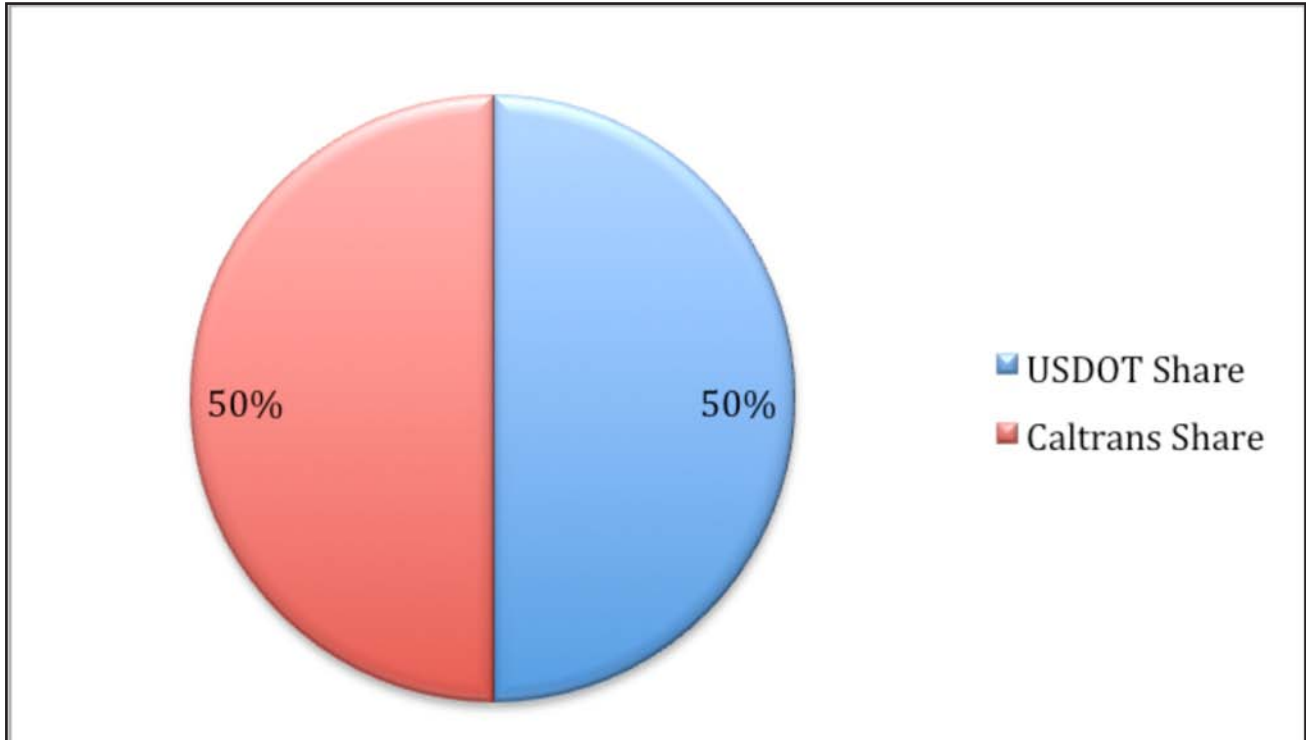


Figure 1 UCTC Revenues, Year 22 (2009-2010)

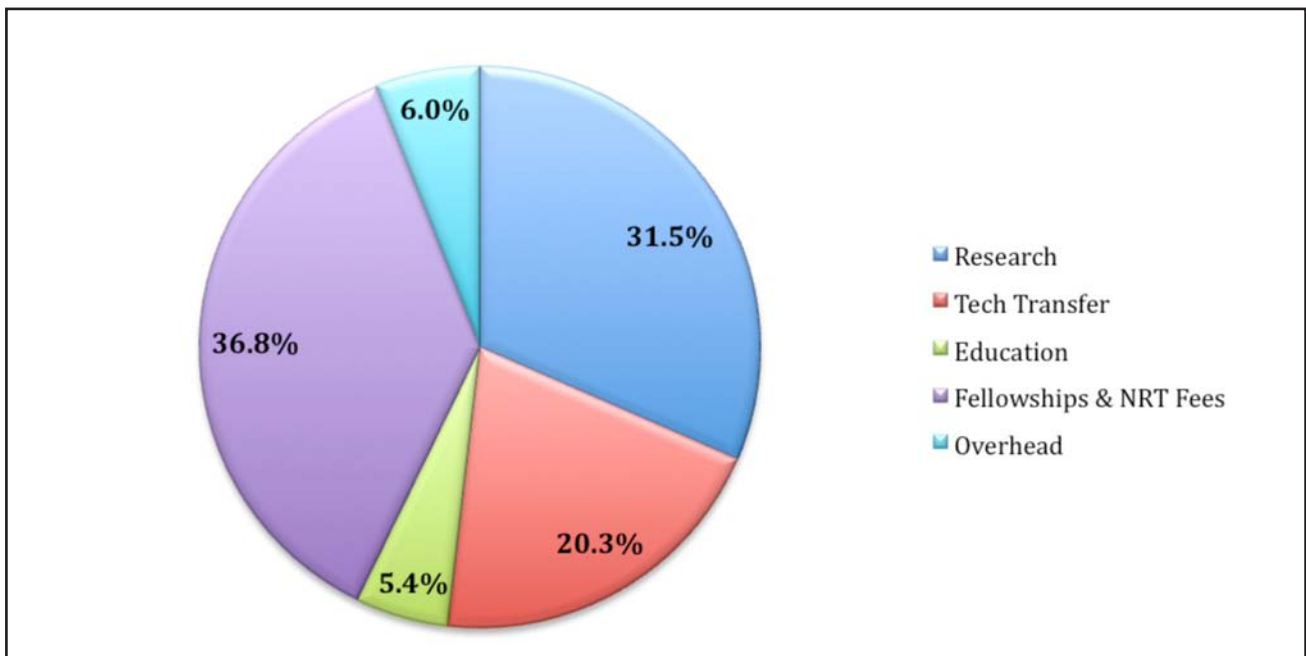


Figure 2 UCTC Expenditure Allocations, Year 22 (2009-2010)

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
UCLA- the Los Angeles 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 2010

TOTAL COMPLETED PROJECTS: 143

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

YEAR 15 (2002-2003) COMPLETED RESEARCH PROJECTS (17 PROJECTS)

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

How Safe Is the Ride? Evaluation of Design and Policy Responses to Women's Fear of Victimization in Transportation Settings

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 Kanafani, 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 and 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

YEAR 22 (2009-2010) COMPLETED RESEARCH PROJECTS (15 COMPLETED PROJECTS)

Taxi Drivers in Los Angeles: Profile of a Workforce Facing Change	Jacqueline Leavitt UCLA	YR 19
The Personal Travel Assistant (PTA): Measuring the Dynamics of Human Behavior	Will Recker and Rina Dechter UC Irvine	YR 20
Revisiting The Estimation Of Marginal Cost In Highway Pavement Deterioration Pricing	Samer Madanat UC Berkeley	YR 20
Experiments to Improve the Benefits of Freeway Carpool Lanes	Michael Cassidy and Carlos Daganzo UC Berkeley	YR 21
Theoretical and simulation studies of information throughput and communication delay of inter-vehicle communication networks	Wenlong Jin UC Irvine	YR 21
Mitigating the Social and Environmental Impacts of Multimodal Freight Corridor Operations at Southern CA Ports	Steve Ritchie, Jean-Daniel Saphores UC Irvine	YR 21
Unhiding the Cost of Residential Parking	Donald Shoup UC Los Angeles	YR 21
Towards an Understanding of Intermodal Roles in Intercity Transportation	Adib Kanafani UC Berkeley	YR 21
Employment Centers to Mixed-Use Activities: Commuting and Environmental Impacts	Robert Cervero UC Berkeley	YR 21
Public Acceptance of Congestion Pricing: Understanding Citizen Preferences	John Quigley UC Berkeley	YR 21
Can technology make us greener drivers? An investigation of the potential benefits of ACC and IVC	Wenlong Jin UC Irvine	YR 22
Formulating and Applying Models for Planning and Designing Integrated Public Transit	Michael Cassidy and Samer Madanat UC Berkeley	YR 22
An Activity-Based Assessment of the Potential Impacts of Plug-In Hybrid Electric Vehicles (PHEVs) on Energy and Emissions Using One-Day Travel Data	Will Recker UC Irvine	YR 22
Incorporating vehicular emissions into an efficient mesoscopic traffic model - An application to southern California	Jean-Daniel Saphores, Wenlong Jin, and Stephen Ritchie UC Irvine	YR 22
Measuring Multimodal Transport Level of Service	Adib Kanafani UC Berkeley	YR 22

APPENDIX 3. CONTINUING PROJECTS – UNIVERSITY OF CALIFORNIA TRANSPORTATION CENTER

TOTAL: 17 PROJECTS CONTINUING INTO 2010-11

Congestion and Accessibility: What's the Relationship?	Brian Taylor UCLA	YR 19
Immigrants and Travel Behavior: Effect of Ethnic Neighborhoods on Commute Time and Mode	Evelyn Blumenberg UCLA	YR 20
Costs and Effectiveness of Lower-Speed, Environmentally-Friendly Urban Highway Designs	Kenneth Small UC Irvine	YR 20
Transportation Decision-Makers, Practitioners, and Researchers: Differences in the Production and Use of Knowledge	Brian Taylor UCLA	YR 20
Sex, Race, and the Journey to Work: Tracking and Testing Convergence and Divergence Trends using a National Panel, 1985 to 2005	Randall Crane, UC Los Angeles	YR 21
Large Scale Real Options Models for Network Investment Planning and Operational Risk Hedging	Amelia Regan UC Irvine	YR 21
Forecasting with Dynamic Microsimulation: Design, Implementation, and Demonstration	K. Goulias UC Santa Barbara	YR 22
Mobile Transit Trip Planning and Accessibility Assessment with Real-Time Data	Alexandre Bayen UC Berkeley	YR 22
Price and Frequency Competition in Freight Transportation	Jan K. Brueckner UC Irvine	YR 22
How Much Do Highway Dedication Laws Tax Housing to Subsidize Driving?	Donald Shoup UCLA	YR 22
The Presentation of Self in Everyday [Transit] Life: An Ethnographic Study of Public Transit Culture and Behavior in Los Angeles	Brian Taylor UCLA	YR 22
CAL-Sentry: Computational Framework and Algorithms for Live Video-Sensor Stream Assimilation and Analysis for Congestion, Emission and Safety Studies.	Mohan M. Trivedi, UC San Diego	YR 22
Employing lessons from Behavioral Economics to Promote Sustainable Behaviors and Improve Travel Demand Models	Joan Walker UC Berkeley	YR 22
An Aggregate Model of Downtown Parking and Traffic Congestion: Incorporating Mass Transit	Richard Arnott UC Riverside	YR 22
Evaluation of Traffic Safety in Sprawl and Urban Growth in California Metropolitan Areas	David Ragland, UC Berkeley	YR 22
Determinants of Bicycle-transit Integration in U.S. Cities	Rui Wang UCLA	YR 22
Mitigating the Air Quality Impacts of San Pedro Bay Port Drayage Truck Operations on Arterials	Steve Ritchie UC Irvine	YR 22

APPENDIX 4. PERFORMANCE INDICATORS

UNIVERSITY OF CALIFORNIA TRANSPORTATION CENTER UCTC BASE YEAR: 2008-2009

Research Selection

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

2006-2007	2009-2010
14	16

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.

	2006-2007	2009-2010
Basic Research	9	8
Advanced Research	2	4
Applied Research	9	7

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

2006-2007	2009-2010
\$1,165,317	\$1,167,138

Research Performance

3. Number of transportation research reports published. Papers, articles, research reports total—UCTC sponsored only.

2006-2007	2009-2010
60	68

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

2006-2007	2009-2010
90	104

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.

	2006-2007	2009-2010
Undergraduate	20	28
Graduate	70	83

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

	2006-2007	2009-2010
Undergraduate	90	39
Graduate	220	137

Human Resources

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

	2006-2007	2009-2010
Master's Level	16	15
Doctoral Level	16	12

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

	2006-2007	2009-2010
Master's Level	132	154
Doctoral Level	40	125

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

	2006-2007	2009-2010
Master's Level	80	92
Doctoral Level	10	20

Technology Transfer

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

2006-2007	2009-2010
4	26

10 a. Number of transportation professionals participating in those events.

2006-2007	2009-2010
1500	1110