



Year 12 (1999-2000)

Annual Report
for the
University of California Transportation Center
Region IX

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ANNUAL REPORT

(October 1, 1999-November 30, 2000)

University Transportation Centers Program
Region IX

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TABLE OF CONTENTS

OVERVIEW: CENTER THEME AND ACTIVITIES	3
MANAGEMENT STRUCTURE AND CENTER STAFF	6
ACCOMPLISHMENTS: EDUCATION, RESEARCH, TECH TRANSFER	11
RESEARCH PROJECT STATUS	26
FUNDING SOURCES AND EXPENDITURES	45

LIST OF TABLES

TABLE 1. UCTC FACULTY ASSOCIATES	9
TABLE 2. UCTC 1999-2000 PUBLICATIONS	19

LIST OF FIGURES

FIGURE 1. UCTC 1999-2000 REVENUES	45
FIGURE 2. UCTC 1999-2000 EXPENDITURES	46

APPENDIX 1. GLOSSARY	47
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OVERVIEW: CENTER THEME AND ACTIVITIES

This has been the University of California Transportation Center's 12th year as the Region IX University Transportation Center (covering Arizona, Nevada, Hawaii, and Guam as well as our home state of California.) Headquartered at UC's Berkeley campus, the UCTC supports transportation research, education, and technology transfer designed to advance the state of the art and the state of the practice of transportation.

We are very pleased that in 1999 we received another five-year renewal of federal designation as the Region IX center, making us eligible for federal funding for the period 1999-2000 through 2004-2005. We also are fortunate that US Department of Transportation (US DOT) funds were once again matched dollar-for-dollar by the California Department of Transportation (Caltrans). While Federal cutbacks in Center funding required us to scale back our activities from what we proposed in our strategic plan, we nevertheless were able to launch new research, support educational efforts, and carry out a variety of technology transfer activities.

Each university transportation center receiving funding from the USDOT has a "theme", or area of focus for its research, education, and technology transfer programs. At the UCTC, we have chosen the theme, "Transportation Systems Analysis and Policy." 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 are eligible for UCTC support. As long as policy relevance is demonstrated, research may be in any discipline, including (but not limited to) planning, engineering, economics, political science, policy studies, management, public health, environmental studies, and the natural sciences. We especially welcome interdisciplinary and multi-disciplinary work.

The UCTC emphasizes 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. The word "systems" is included in the Center's theme specifically to encompass intermodal research and research that covers both passenger and freight issues.

Faculty members at all nine campuses of the UC system are eligible to apply for funding for their research projects. Researchers from other Region 9 institutions also may be included in UCTC projects through subcontracting. Grants are awarded through a process that relies on outside peer review. The process is highly competitive, as available funds are sufficient to cover less than half of the amounts requested.

The UCTC's educational objective is to help produce a vibrant network of transportation professionals who will put their education and research findings into practice. The UCTC does not directly offer courses, enroll students, or offer degrees - within the UC system, those functions are reserved for academic departments. The UCTC does, however, support transportation education through fellowship programs, course support, and a competitive PhD dissertation grant program. Fellowship and course support grants are focused on the four campuses that have formal transportation programs - Berkeley, Davis, Irvine, and UCLA. However, students from any of the nine UC campuses may apply for a dissertation grant. In 1999-2000 we spent almost half of our total budget on these educational items. Student support on research projects is also educational, of course, and students receive about two-thirds of the total of our research budget.

The UCTC's technology transfer programs are aimed at communicating research results to a broad audience. Our web page provides information on our programs, summaries of our research, and electronic access to an increasing number of our publications. Free copies of all research papers funded by UCTC are provided to those who request them. We distribute 15,000 hard copies of our transportation magazine, ACCESS, which we publish twice a year; many others read ACCESS on the web.

In 1999-2000, the UC Transportation Center received \$890,000.00 from the US DOT and a matching \$890,000.00 from Caltrans, for a budget of \$1,780,000. This support enabled us to fund nearly \$864,000 in faculty research, \$147,000 in PhD dissertation research, and \$460,000 in fellowships. We also were able to provide \$50,000 in support for publications, conferences and symposia and \$35,000 in support for new transportation courses. We kept our administrative costs to about 10 percent of the total funds available.

The substantial support we receive from the University of California and our faculty greatly aids the UCTC's programs. Substantial permanent financial support comes from the University for transportation research and education programs. The US DOT requires a \$200,000 commitment in regularly budgeted institutional funds for a university to be eligible for Center designation; even a fraction of the salaries and benefits for the 104 full-time faculty members who conduct transportation research at Berkeley, Davis, Irvine and UCLA sums to an amount far in excess of the \$200,000 required. In addition, several permanently (separately) funded research institutes and academic departments administer individual UCTC research grants and fellowships. The Institutes of Transportation Studies at Berkeley, Davis, Irvine and UCLA and the Institute of Urban and Regional Development at Berkeley provide major assistance each year. UCTC faculty and students also benefit from their access to University computer, data, and library resources. Of particular note is the Library of the Institute of Transportation Studies, which was established in 1948 and is supported with Caltrans funds allocated through a direct line item in the state budget.

In our dozen years as the Region IX university transportation center, the UCTC has made significant progress in research, education, and technology transfer. We have been able to expand and enrich our education programs, which in turn have attracted an increased number of faculty, students, and staff into transportation, including individuals from a variety of economic, social, and ethnic backgrounds. Our graduates are well-trained academics and professionals known for their skills, creativity, and motivation, and many of them are now in positions of leadership and responsibility in the transportation profession. Our research and professional activities are reflected in new approaches to a variety of transportation concerns, from ways to extend the life of asphalt pavements, to the use of improved methods for transportation and activity analysis and forecasting, to the development of new federal, state, and local programs to support transit-oriented development, implement traffic calming, and more effectively reduce vehicle emissions.

While we are proud of our accomplishments, we continue to believe that there is much more to be done. The State of California, Region IX, and the nation face important transportation challenges, among them:

- managing our extensive transportation systems more efficiently
- improving connections among the modes of transportation
- providing high quality transport services to meet diverse and changing needs in both the passenger and freight sectors
- adjusting programs to respond to growth and to changes in activity patterns
- introducing and accommodating new technologies

- more effectively assessing and communicating the social, economic, and environmental consequences of transportation programs and projects
- improving the equity of transportation programs and projects
- moving toward sustainable transportation and land use patterns
- designing better processes for the involvement of diverse public and private interests in transportation planning, decision making and deployment
- developing efficient mechanisms for transportation finance.

We believe these challenges confronting the transportation sector must be addressed through innovative and rigorous educational programs, creative systems analysis and policy research, and active technology transfer. Thus, we are committed to continue to our work over the years to come, serving Region 9 and the nation as a center of excellence.

--- Elizabeth Deakin
Nov. 2000

MANAGEMENT STRUCTURE AND CENTER STAFF

The University of California Transportation Center is 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 drawn from several campuses of the UC system. Coordination with other California Transportation Centers and with out Caltrans sponsor takes place through twice-yearly meetings. The UCTC also draws upon a variety of institutional resources at participating campuses, including the administrative services of researchers' academic departments and research institutes, whose support is donated.

Center Director

Since March 1999, Professor Elizabeth Deakin of the Dept. of City and Regional Planning at UC Berkeley has been UCTC Director. Prof. Deakin has been a member of the faculty at the University since 1985 and has had additional affiliations with the Civil Engineering, Urban Design, and Energy Resources groups for much of that time. Her interests include transportation and land use, transportation policy, and the social, economic, and environmental impacts of transportation. She has conducted research with ITS, PATH, and IURD as well as with the UC Energy Institute and the UC Policy Center. She has served on the UCTC Executive Committee since its inception and previously was a member of the ITS and IURD executive committees. She was acting director of the IURD in 1997-98. In addition to teaching at Berkeley, she has taught at UCLA and lectured at Davis. Her familiarity with the University and the UCTC's partners facilitates her management of the UCTC.

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. Members of the UCTC Executive Committee volunteer significant amounts of time to the Center. They meet in person at least once a year, and transact business in the interim through telephone conference calls and e-mail.

The Executive Committee consists of the UCTC Director, the directors of the four Institutes of Transportation Studies or their representatives, the director of the Institute of Urban and Regional Development or her representative, and faculty representatives of the major transportation degree-granting programs in the UC system. 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 1999-2000 were:

Marlon Boarnet, Assoc. Prof. of Urban & Regional Planning, UC Irvine
Robert Cervero, Prof. of City & Regional Planning, UC Berkeley
Elizabeth Deakin, UCTC Director, Assoc. Prof. of City & Regional Planning, UC Berkeley
Robert Johnston, Prof. of Environmental Science & Policy, UC Davis
Samer Madanat, Prof. of Civil & Environmental Engineering, UC Berkeley
Michael McNally, Assoc. Prof. of Civil and Environmental Engineering, UC Irvine
Patricia Mokhtarian, Prof. of Civil and Environmental Engineering, UC Davis
Debbie Niemeier, Assoc. Prof. of Civil and Environmental Engineering, UC Davis
Will Recker, Director, Institute of Transportation Studies, UC Irvine
Amelia Regan, Asst. Prof. of Civil & Environmental Engineering, UC Irvine

Donald Shoup, Director, ITS UC Los Angeles
Daniel Sperling, Director, ITS Davis
Brian Taylor, Asst. Prof. of Urban Planning, UC Los Angeles
Martin Wachs, Director, Institute of Transportation Studies, Berkeley

The Executive Committee is responsible for establishing the theme for the Center, allocating funds among research, education, and technology transfer programs, determining subject matter priorities for research funding, setting rules for allowable expenditures on research projects, and making final recommendations on research awards. In addition, the Executive Committee conducts an annual review of the Center's overall performance and redirects activities as necessary. When the Directorship of the UCTC becomes vacant, the Executive Committee conducts the search and recommends a Director to the Office of the President of the University, which so far has always acted favorably on the Executive Committee's recommendations.

The Executive Committee's time is donated.

Center Faculty

Faculty affiliates of the UCTC include individuals throughout the UC system. Our affiliates have participated in the research, teaching, and continuing education programs funded by the UCTC or have served the Center in a review capacity over the past 12 years. We maintain contact with our faculty affiliates by inviting them to participate in our research, education, and technology transfer programs, by coordinating UCTC research with other research activities these faculty members are conducting, and by providing them with publications and other information services. Table 1 lists current faculty affiliates.

Staff

The UCTC staff consists of the director plus two full time administrative staff members, and a half time staff editor, plus an emeritus faculty member who is paid a nominal sum for his time as editor of ACCESS. 1999-2000 staff members were:

Elizabeth Deakin, Associate Professor of City and Regional Planning, Director (half time)

Briggs Nisbet, Senior Analyst. Ms. Nisbet handles budgets and administration for the Center.

Chow Saephanh, Administrative Assistant. Ms. Saephanh is responsible for bookkeeping and billings at the UCTC.

Melanie Curry, Editor (half time). Ms. Curry joined UCTC in February 1999. Ms. Curry is responsible for ACCESS, UCTC's twice-yearly magazine.

Melvin Webber, Professor Emeritus of City and Regional Planning, UC Berkeley and former Director of UCTC. Prof. Webber was the creator of ACCESS magazine and serves as its editor in chief.

Institutional Support

The UCTC depends upon the support of several academic departments and research institutes for most of its day-to-day operations. The departments and research institutes manage education grants, fellowship

funds and research grants, and contribute the office and laboratory space, instructional facilities, computational equipment, accounting services and other administrative support needed to carry out these programs and activities. Most of this support is provided without charge. In addition, the University provides administrative services, but does not charge overhead on the portion of funds used for fellowships, and to date has waived overhead on matching funds from Caltrans. It is only because the UCTC can rely on these university resources that we are able to devote most of our funding to the direct costs of research, education, and technology transfer.

The University also provides resources in the form of access to data centers, computer facilities, and libraries. 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. Our computer facilities include advanced CAD and GIS systems. 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.

Faculty members' time commitments to research projects are another highly valuable resource provided to the UCTC. Faculty members typically hold nine-month (academic year) appointments that are fully funded by the University. They are expected to spend a substantial portion of this University time on research. Consequently, UCTC faculty grant recipients typically devote a third or more of their time during the academic year to their research projects. The UCTC itself funds only a portion of their summer salaries. The UC-funded time on research multiplies the UCTC's salary support for research by a factor of three or four. Likewise, students with fellowships from the University, from NSF, and from a variety of other sources often participate in UCTC projects without being paid with UCTC funds.

Participation in the governance of the UCTC is a second way that faculty time is donated. Indeed, the willingness of faculty members and others to provide these services is critical to the Center's mode of operation. 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.

California Transportation Centers

Two other University Transportation Centers have been established in California, the Norman Y. Mineta International Institute for Transportation Policy Studies (IITPS) at San Jose State University and the - the Center for Metropolitan Transportation Studies at the University of Southern California in Los Angeles. These two centers, like UCTC, receive matching support from Caltrans. To coordinate our efforts, the Center Directors and key administrators meet together with Caltrans staff three times a year, rotating among campuses.

Table 1. UCTC Faculty Associates

Professor	Department	Campus	Email
Matthew Barth	Civil Engineering	Riverside	barth@cert.ucr.edu
Antonio Bento	Economics / Environment	Santa Barbara	bento@bren.ucsb.edu
Evelyn Blumenberg	Urban Planning	Los Angeles	eblumenb@ucla.edu
Marlon Boarnet	Urban & Regional Planning	Irvine	mgboarne@uci.edu
Peter Bosselmann	City & Regional Planning	Berkeley	pbossel@uclink.berkeley.edu
David Brownstone	Economics	Irvine	dbrownst@uci.edu
Michael Cassidy	Civil Engineering	Berkeley	cassidy@ce.berkeley.edu
Robert Cervero	City & Regional Planning	Berkeley	robertc@uclink4.berkeley.edu
William Clark	Geography	Los Angeles	wclark@geog.ucla.edu
Theodore E. Cohn	Vision Science	Berkeley	tecohn@spectacle.berkeley.edu
Randall Crane	Urban Planning	UCLA	crane@ucla.edu
Carlos Daganzo	Civil Engineering	Berkeley	daganzo@ce.berkeley.edu
Elizabeth Deakin	City & Regional Planning	Berkeley	edeakin@uclink.berkeley.edu
Joseph Dimento	Social Ecology	Irvine	jfdiment@uci.edu
G.J. "Pete" Fielding	Social Science	Irvine	gjfieldi@uci.edu
William Garrison	Civil Engineering	Berkeley	garrison@ce.berkeley.edu
David Gillen	Economics/Civil Engineering	Berkeley	dgillen@ce.berkeley.edu
Amihai Glazer	Economics	Irvine	aglazer@uci.edu
Reginald Golledge	Geography	Santa Barbara	golledge@geog.ucsb.edu
Judith Gruber	Political Science	Berkeley	jgruber@socrates.berkeley.edu
Mark Hansen	Civil Engineering	Berkeley	hansen@ce.berkeley.edu
Robert A. Harley	Civil Engineering	Berkeley	harley@ce.berkeley.edu
Karl Hedrick	Mechanical Engineering	Berkeley	khedrick@ce.berkeley.edu
Judith Innes	City & Regional Planning	Berkeley	jinnes@uclink.berkeley.edu
Allan B. Jacobs	City & Regional Planning	Berkeley	none
R. Jayakrishnan	Civil Engineering	Irvine	riyakri@uci.edu
Robert Johnston	Environmental Studies	Davis	rajohnston@ucdavis.edu
Adib Kanafani	Civil Engineering	Berkeley	kanafani@ce.berkeley.edu
Theodore Keeler	Economics	Berkeley	keeler@econ.berkeley.edu
John Landis	City Planning	Berkeley	ilandis@uclink.berkeley.edu
Charles Lave	Economics	Irvine	calave@uci.edu
Ana. Loukaitou-Sideris	Urban Planning	Los Angeles	sideris@ucla.edu
Samer Madanat	Civil Engineering	Berkeley	madanat@ce.berkeley.edu
Michael McNally	Civil Engineering	Irvine	mmcnally@uci.edu
Patricia Mokhtarian	Civil Engineering	Davis	plmokhtarian@ucdavis.edu

Carl Monismith	Civil Engineering	Berkeley	monismith@ce.berkeley.edu
Gordon Newell	Civil Engineering	Berkeley	newell@ce.berkeley.edu
Debbie Niemeier	Civil Engineering	Davis	dniemeier@ucdavis.edu
Raymond Novaco	Social Ecology	Irvine	rwnovaco@uci.edu
Paul Ong	Urban Planning	Los Angeles	pmong@ucla.edu
John Quigley	Public Policy	Berkeley	quigley@econ.berkeley.edu
Wilfred Recker	Civil Engineering	Irvine	wwrecker@uci.edu
Amelia C. Regan	Civil Engineering	Irvine	aregan@uci.edu
Stephen Ritchie	Civil Engineering	Irvine	sritchie@uci.edu
David Roche	Management	Davis	dmrocke@ucdavis.edu
Paul Sabatier	Environmental Studies	Davis	pasabatier@ucdavis.edu
Allen Scott	Regional Policy	Los Angeles	ajscott@geog.ucla.edu
Donald Shoup	Urban Planning	Los Angeles	shoup@ucla.edu
Kenneth Small	Economics	Irvine	ksmall@uci.edu
Daniel Sperling	Civil Engineering	Davis	dsperling@ucdavis.edu
Michael Southworth	City & Regional Planning	Berkeley	msouthw@uclink.berkeley.edu
Brian Taylor	Urban Planning	Los Angeles	btaylor@ucla.edu
Abel Valenzuela, Jr.	Public Policy	Los Angeles	abel@ucla.edu
Martin Wachs	ITS / Civil Engineering	Berkeley	mwachs@uclink4.berkeley.edu
Melvin Webber	City & Regional Planning	Berkeley	webber@uclink.berkeley.edu
H. Michael Zhang	Civil Engineering	Davis	hmzhang@ucdavis.edu

ACCOMPLISHMENTS: EDUCATION, RESEARCH, TECH TRANSFER

Education Programs

As we noted earlier, the UCTC does not itself offer courses, admit students, hire faculty, or award degrees; those functions are the responsibility of the various academic departments and the academic units of the University administration. We rely on the departments and academic units to maintain and expand their course offerings and enrollments, and the departments have explicit incentives to do so.

The UCTC does, however, provide financial and other support to the academic programs in transportation. In this way, the UCTC is helping to produce many of the transportation leaders of the future. In 1999-2000, UCTC helped departments to maintain and expand their course offerings, supporting new courses that address emerging technologies and their policy implications, and strengthening our studio and fieldwork offerings.

Courses specifically focusing on various aspects of transportation are available for both undergraduates and graduates. Many of these courses are offered through the formal programs and concentrations in transportation offered by the Berkeley, Davis, Irvine, and UCLA campuses' civil engineering, city and regional planning, economics, and public policy departments. Additional courses with significant transportation content are offered in other departments at these universities and at other campuses of the UC system, including Riverside, Santa Barbara, and San Diego. Energy resources, environmental studies, management, geography, political science, law, mechanical engineering, electrical engineering, chemical engineering, operations research, architecture, landscape architecture, and urban design now include transportation topics in one or more courses, reflecting the increased faculty interest in transportation largely generated by the UCTC.

Ten formal degree programs or concentrations in transportation are now offered in the UC system, with three each at Berkeley, Davis and Irvine, and one at UCLA. The civil and environmental engineering departments at Berkeley, Davis, and Irvine offer transportation engineering degrees. Programs in transportation planning and policy are offered at Berkeley, Davis, 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. Davis has recently established an interdisciplinary program in Transportation Technology and Policy.

The several campuses have slightly different program emphases and they try to complement rather than duplicate one another. The Davis transportation engineering program provides a focus on energy and air quality, and Irvine and Davis both emphasize demand analysis and travel behavior. The Berkeley transportation program has strong offerings in traffic operations, logistics, systems analysis, transportation science, and the analysis and improvement of pavements. Irvine has an especially strong program in transportation economics, while UCLA is developing a specialty in equity and the transportation needs of low-income communities; Berkeley has extensive offerings in transportation, land use, and urban design.

In 1999-2000, the campuses continued to maintain and refine their transportation programs, and to add new course offerings and programmatic specialties as opportunities arise. For example, Berkeley added a new course in Intelligent Transportation Systems to disseminate the knowledge that has been developed in its pioneering Program for Advanced Transit and Highways (PATH), and focused an undergraduate urban planning studio on transportation planning applications. The UCTC assisted these efforts.

Undergraduate Education Programs

UCTC funding for undergraduate education at the various campuses has been focused on the development of new transportation courses. Proposals are submitted to the Director, who evaluates them and decides on funding. The proposals may be for specialty courses addressing an important current topic and designed to be offered once or twice, or for more basic courses designed to become a part of the permanent offerings of the university after a year or two of UCTC support.

Undergraduate courses thus offered with UCTC sponsorship have been well subscribed and well received, and they have helped to spark interest in careers in transportation. We therefore will continue supporting undergraduate course initiatives. We also will work with the various departments offering transportation courses for undergraduates to help advertise and promote these courses and to coordinate course offerings with transportation research opportunities for undergraduates.

A new course offered at UC Berkeley as an undergraduate studio in Spring 2000, taught by UCTC Director Elizabeth Deakin, led to bicycle parking improvements that were implemented by the City of Berkeley.

More extensive undergraduate programs proposed in our strategic plan have had to be postponed because of federal cutbacks in funding, which also reduced Caltrans funding since the Caltrans money matches federal funds dollar for dollar.

UCTC Graduate Education Programs

The UCTC assists graduate programs in transportation both through course support and through the provision of funding and research opportunities that are critical to graduate students. Graduate course support, like that for undergraduate courses, is in response to applications that are reviewed and approved by the Director.

A new activity that we initiated, in cooperation with academic departments and the PATH research program, is UC Berkeley's development of a curriculum on Intelligent Transportation Systems. A new course was developed in 1999-2000 and is being offered in the Fall 2000 semester. In addition, a new course on transportation-land use modeling was offered on the Berkeley campus.

Student of the Year

Each year UCTC Executive Committee members choose a Student of the Year, who is awarded \$1000 and the costs to attend the award ceremony held during the annual meeting of the Transportation Research Board (TRB) in Washington, DC each January. In 1999-2000, the vote was a tie, and with the permission of our sponsors we selected two students of the year. The two winners were: Caroline Rodier of UC Davis (faculty adviser: Robert Johnston) and Jennifer Dill of UC Berkeley (faculty adviser: M. Wachs.)

Fellowships

Graduate students also are eligible for UCTC fellowships, which provide support for university fees and living expenses and may be combined with part-time GSRs. UCTC fellowship recipients are nominated by academic departments on the basis of grades, test scores, letters of recommendation, and record of accomplishments. Students must demonstrate that they have an exceptional record and outstanding potential 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, so that a student who is offered a transportation fellowship from another program is generally not awarded full UCTC funding.

In 1999-2000, the UCTC committed \$460,000 to graduate student fellowships at the Berkeley, Davis, Irvine, and UCLA campuses.

Graduate Student Research Appointments

Graduate student research appointments and fellowships have always been the UCTC's single biggest budget item. In 1999-2000, these two items accounted for about two-thirds of our total budget.

Cutbacks in federal funding, which also reduced Caltrans funding dollar for dollar, necessitated the imposition of a limitation on research project support of graduate student researchers (GSRs) to one per research project this year. Nevertheless we were able to support 25 students in 1999-2000.

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. It is the policy of the UCTC that graduate student contributions to research projects are acknowledged in any publication resulting from research funded 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

The UCTC offers up to ten doctoral dissertation grants of \$15,000 each year. Applicants must be students at the University of California and must be carrying out dissertation research related to transportation engineering, planning, economics or policy. Applicants must have advanced to candidacy for the Ph.D. degree prior to the application deadline and must submit a synopsis of the dissertation proposal for review. The synopsis can be no longer than five pages in length and must present the research problem, discuss its significance, and describe the research methodology, data sources, and expected results. The student's curriculum vita and graduate school transcripts must be forwarded with the application, along with a letter of nomination from the student's principal academic advisor.

The pool of applications is reviewed by a committee of faculty and recent doctoral graduates from several UC campuses, appointed by the UCTC Director. 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. Awards are made each March for funding the next fall, and November for funding in the winter/spring term. The awards for 1999-2000 are listed in the section, Research Project Status.

Tracking Alumni

During the 1999-2000 academic year, in consultation with administrators at the degree-offering departments at the four campuses, we began to develop a system for tracking students supported by the UCTC in programs on the four campuses that grant transportation degrees. An alumni database is now under development at UC Irvine, for use on all UC campuses. Its completion will depend on the availability of funds in future years.

Research Programs

Research grants to faculty and PhD candidates account for about 45 percent of the UCTC's budget. Hence, a substantial portion of our efforts are devoted to the solicitation of research proposals, proposal review, selection of projects, and performance monitoring. In Year 12, we maintained a high level of interest in our program, as indicated by the 35 faculty proposals and 20 PhD dissertation grant applications received.

All research funded by the UCTC must respond to the Center's theme, transportation systems analysis and policy. The UCTC Director and Executive Committee annually review our research selection procedures to evaluate their objectivity and fairness, and make adjustments as appropriate. We also meet to discuss our theme and the scope and mix of the projects we are funding, and from time to time issue special calls for research on particular topics to improve the overall balance and policy relevance of the UCTC research program.

The UCTC's success in research relies upon a carefully managed solicitation and project selection process, designed to support creative and innovative work on a variety of topics relevant to current and emerging policy needs, and to communicate our results to a broad audience. The process for dissertation research grants was described under the educational programs. For faculty research, the general procedure for project awards is as follows.

Research Solicitation Process

Research project awards through the UCTC are made to individuals or 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.

Each winter a request for proposals (RFP) is sent to researchers who have previously engaged in transportation research on the UC campuses as well as to deans and department heads for circulation to their faculty. In addition, the RFP is posted on the UCTC web site. A firm deadline is set for submission of proposals. In 1999-2000, the RFP was released on January 27, 1999 and proposals were due on March 31, 1999 for awards beginning Fall term 2000.

Each proposal was required to include a description of the proposed research; a summary of accomplishments from the applicant's past UCTC research grants (if any), including a list of working papers and other publications produced; and a statement identifying any research funding 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.) A curriculum vita or statement of qualifications for all of the principal research participants also was required.

An itemized budget was required for each proposal. For 1999-2000 grants, due to budget reductions, summer salary for faculty generally was limited to one month and most projects were limited to one graduate student researcher or undergraduate intern for the academic year. Costs of supplies, postage, computer expenses, travel, etc. were limited to \$1500 unless additional, itemized expenses were justified as necessary for the conduct of the research. Secretarial and clerical support services were not allowed.

The 35 proposals received in response to the 1999-2000 RFP came from six UC campuses.

Proposal Review Process

The UCTC has an established review process for all faculty research proposals. All proposals undergo confidential external review by university researchers or practicing professionals in the field of transportation. The UCTC Director selects three or four persons to review each proposal; a minimum of three reviews is required for each proposal. Additional reviewers are sought if those initially contacted are unable to complete their reviews in a timely fashion.

Reviewers are chosen based on their expertise with the subject matter of the proposal. They are drawn from universities, the US DOT, other federal agencies, Caltrans, other state agencies, regional agencies, local government, research groups, foundations and private organizations. Over 100 individuals served as reviewers for the 1999-2000 grant cycle.

External reviewers were asked 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
- Reasonableness of the budget for the scope of work proposed (sufficient to allow for the successful completion of the project without being extravagant)
- Competence of the PI and other researcher(s) in the area of the proposed research
- Extent of student involvement
- Any other issues the reviewer deems important.

Review Selection Process

The Executive Committee is primarily guided by outside reviewers' assessments in its selection of projects for funding. However, the Executive Committee also considers the PI's past performance on UCTC-funded projects and evaluates the overall fit of the proposed work to the UCTC theme. In addition, the Executive Committee may take into account the desirability of continuing an ongoing research project into a second phase, or initiating research on a new topic of importance.

Based on the assessments of the reviewers and the Executive Committee members, the Director may ask for certain changes to a proposal, for example, to fund selected tasks only, or may ask that the proposal be revised to respond to reviewers' concerns and submitted for reconsideration.

As in previous years, in Year 12, we received far more highly rated proposals than available funds could support. While 20 proposals of the 35 proposals we received were provided some financial support, only 10 of the 35 proposals were fully funded. We provided partial funding to another six proposals and seed funding only to four others.

Research Performance

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 to present their work at conferences and symposia, reprint papers sponsored by UCTC, and publish research in the form of working papers, and final reports, web page postings, and ACCESS magazine articles.

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 to testify before elected and appointed officials
- requests for meetings, briefings, and other collaborative activities and exchanges
- requests for technical assistance from UCTC researchers
- changes in federal, state, regional and local transportation policies following recommendations based on UCTC research.

Our research results also have proven useful to other researchers in academia, government, and the private sector, as evidenced by citations in the literature, invitations to participate in important conferences and meetings, requests for briefings, and other collaborative activities and exchanges.

The following list presents an overview of the projects funded in 1999-2000 as well as a status report. Because federal and state funds were received well after the start of the fall term, research commencement also had to be delayed, and all projects have been granted extensions to June 30, 2001.

Technology Transfer

The UCTC's goal for technology transfer is the availability of research results in a form that a variety of users can readily apply. We view technology transfer as including publications, both on the web and in hard copy; continuing education offerings; conferences and symposia; policy advising and public service; and outreach efforts to business and community groups and the general public. Their ultimate objectives are to increase public understanding of transportation problems and opportunities for improvement, and to produce a cadre of skilled, creative, connected transportation professionals who will effectively address these problems and develop innovations and improvements.

The UCTC encourages its researchers to engage in a variety of public service and professional activities, through which they communicate UCTC-funded research findings to a broad audience. These activities include appointments to committees and boards of federal, state, regional, and local transportation agencies; provision of expert testimony and advice to the Congress, State Legislatures, and regional and local bodies; technical assistance to public and private transportation organizations; and public service on transportation and related matters. When needed, the UCTC provides travel expenses or other support to enable faculty to provide these public services.

The UCTC also provides information on transportation to the general public. We do this through faculty participating in lectures, symposia and other events designed to inform the general public and by working with the popular press to educate a broader audience on transportation issues. We have asked our staff editor, a former writer for a local paper, to make special efforts to communicate our research results to her colleagues in the press.

Faculty affiliated with UCTC also have been involved with a planning exercise in a local high school which gives students hands-on experience with a land use and transportation project design, and support this activity on an annual basis.

Publications

The UCTC considers publications to be a vital way to communicate our research findings. Each project funded by the UCTC ordinarily produces several papers and reports, which we disseminate both in hard copy and increasingly, on the Web. In addition, we produce the twice-yearly ACCESS Magazine, which summarizes UCTC-sponsored work in a style designed for a general audience.

In 1999-2000, our faculty associates added 44 publications to our list, bringing the total to 405 papers and reports. In addition, we now list about a dozen books produced with UCTC support. Graduate students also completed several dissertations funded with UCTC grants, bringing the dissertation total to 52.

We distribute UCTC publications free of charge, and also make reprints of journal articles available. Approximately 1000 requests for papers and articles were filled in 1999-2000. In addition, 500 requests to be added to the ACCESS magazine mailing list, bringing the total number of hard-copy subscriptions to about 15,000. ACCESS has proven to be an especially valuable way to communicate our work to a broad audience; academics, business leaders, elected officials, and government staff members all over the United States and abroad read ACCESS. ACCESS and many of our publications also can be downloaded from our website and we get over 1 million "hits" a year.

Table 2 lists the papers added to the UCTC publications in 1999-2000. Note that some of these papers derive from UCTC research funded in previous years; likewise we expect that future lists will include additional papers funded by the UCTC in 1999-2000. For a full listing of publications, see the UCTC website.

Continuing Education

Transportation courses and other education and training opportunities are offered through the ITS Extension (which operates statewide) and the Extension programs of the various campuses. These courses reach transportation professionals and others who need a better understanding of transportation to effectively carry out their work in fields such as air quality planning and land use planning. UCTC research is frequently included in short courses offered by the University Extension. The UCTC actively encourages researchers to participate in these activities and provides support for them to do so, to the extent that resources permit. Courses specifically stimulated by UCTC activities include offerings on transportation and air quality as part of a certificate program, a specialty course on traffic calming, and a course on transportation and land use. A weeklong intensive short course on transportation planning methods was developed in Year 12.

Conferences and Symposia

In addition to publishing all work supported by the Center, UCTC grant recipients are expected to participate in occasional UCTC-sponsored conferences and symposia, including the annual student conference sponsored by the UCTC. We expect UCTC researchers to give public lectures and seminars in the ongoing events series held at the four campuses, as well as in national and international meetings on transportation research and practice. Travel to conferences is supported as part of research grants, and additional travel grants are made on a case-by-case basis when funds are available.

UCTC has been a major sponsor of two permanent conferences, the annual Lake Arrowhead Conference on the Transportation/Land Use/ Air Quality Connection and the Asilomar Conference on Transportation and Energy Policy. These conferences bring together policy makers and opinion leaders in retreat settings to discuss critical policy issues facing the region. They have been widely cited as effective and influential. Several important pieces of transportation legislation, such as the California Employer Parking Cashout legislation and efforts to incorporate remote sensing of vehicular air pollutants into ongoing state pollution control programs, originated from discussions that have taken place at these conferences. UCTC also helps faculty members to organize special research conferences and events as opportunities arise.

Nine conferences and symposia received UCTC funding and sponsorship in 1999-2000. Each of these events is briefly described in the list that follows. Proceedings are available for the Asilomar and Lake Arrowhead conferences and will be forthcoming for the Welfare Reform and Transportation symposium.

Table 2. UCTC 1999-2000 Publications

Chan, Shirley, Matthew Malchow, and Adib Kanafani	An Exploration of the Market for Traffic Information	1999, Winter	390
Small, Kenneth and José A. Gomez-Ibañez	Road Pricing for Congestion Management: The Transition from Theory to Policy	1999, Winter	391
Hansen, Mark, Mohammad Qureshi and Daniel Rydzewski	Improving Transit Performance with Advanced Public Transportation System Technologies	1999, Winter	392
Malchow, Matthew, Adib Kanafani and Pravin Varaiya	The Economics of Traffic Information: A State-of-the-Art Report	1999, Winter	393
Kanafani, Adib, Asad Khattak, Melanie Crotty, and Joy Dahlgren	A Planning Methodology for Intelligent Urban Transportation Systems	1999, Winter	395
Malchow, Matthew, Adib Kanafani and Pravin Varaiya	Modeling the Behavior of Traffic Information Providers	1999, Winter	396
Kanafani, Adib	Methodology for Mode Selection in Corridor Analysis of Freight Transportation	1999, Winter	397
Hansen, Mark, David Gillen, Allison Dobbins, Yuanlin Huang, and Mohnish Puvathingal	The Air Quality Impacts of Urban Highway Capacity Expansion: Traffic Generation and Land Use Change	1999, Winter	398
Rhoades, Krista, Shomik Mehndiratta, and Mark Hansen	Airlines and Airport Ground Access: Current Arrangements and Future Opportunities	1999, Winter	399
Kiesling, Max K. and Mark Hansen	Integrated Air Freight Cost Structure: The Case of Federal Express	1999, Winter	400
Gosling, Geoffrey D. and Mark M. Hansen	Practicality of Screening International Checked Baggage for U.S. Airlines	1999, Winter	401
Hansen, Mark and Adib Kanafani	International Airline Hubbing in a Competitive Environment	1998, Winter	402
Maillebiau, Eric and Mark Hansen	Demand and Consumer Welfare Impacts of International Airline Liberalization: The Case of the North Atlantic	1999, Winter	403
Hansen, Mark and Qiang Du	Modeling Multiple Airport Systems: A Positive Feedback Approach	1999, Winter	404
Youssef, Waleed and Mark Hansen	The Consequences of Strategic Alliances Between International Airlines: The Case of Swissair and SAS	1999, Winter	405
Vetrovsky, Dan and Adib Kanafani	The Potential Role of Airports as Intermodal Terminals: Lessons from International and Domestic Experiences	1999, Winter	406
Gillen, David W., Mark Hansen, and Robson Ramos	Free Trade in Airline Services: Accessing the Proposals to Liberalize the Canada - U.S. Air Transport Bilateral	1999, Winter	407
Hansen, Mark and Adib Kanafani	Hubbing and Rehubbing at JFK International Airport - The ALIGATER Model	1999, Winter	408
Kwan, Mei-Po, Jon M. Speigle, and Reginald G. Colledge	Developing an Object-Oriented Testbed for Modeling Transportation Networks	1999, Winter	409

Kanafani, Adib and Mark Hansen	Hubbing and Airline Costs	1999, Winter	410
Kirchstetter, Thomas W., Brett C. Singer, Robert A. Harley	Impact of California Reformulated Gasoline On Motor Vehicle Emissions. 1. Mass Emission Rates	2000, Spring	411
Kwan, Mei-Po, Reginald G. Golledge, and Jon M. Speigle	A Review of Object-Oriented Approaches in Geographical Information Systems for Transportation Modeling	2000, Spring	412
Kirchstetter, Thomas, Brett Singer, and Robert Harley	Impact of California Reformulated Gasoline on Motor Vehicle Emissions. 2. Volatile Organic Compound Speciation and Reactivity	2000, Spring	413
Dill, Jennifer, Todd Goldman, and Martin Wachs	The Incidence of the California Vehicle License Fee	2000, Spring	414
Mokhtarian, Patricia L. and Dennis Henderson	Analyzing the Travel Behavior of Home-Based Workers in the 1991 CALTRANS Statewide Travel Survey	2000, Spring	415
Johnston, Robert A., Daniel Sperling, Mark A. DeLuchi, Steve Tracy	Politics and Technical Uncertainty in Transportation Investment Analysis	2000, Spring	417
Johnston, Robert A., Mark A. DeLuchi	Evaluation Methods for Rail Transit Projects	2000, Spring	418
Loukaitou-Sideris, Anastasia, Robbin Liggett, Hiro Iseki, and William Thurlow	Measuring the Effects of Built Environment on Bus Stop Crime	2000, Spring	419

UCTC-SPONSORED CONFERENCES AND SYMPOSIA

Transportation Energy & Environmental Policy for the 21st Century August 24-27, 1999

Michelle D. McGuire
Institute of Transportation Studies
One Shields Avenue
University of California, Davis
Davis, CA 95616
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(530) 752-4909

The week-long conference, held at the Asilomar Conference Center in Monterey, California, was organized under the auspices of the National Research Council, Transportation Research Board, and the Committee on Energy and Committee on Alternative Fuels. Conference agenda included remarks by Phil Patterson of the U.S. Department of Energy, and Mike Walsh, editor of "Car Lines." Panels included 1) "Lessons From 30 Years of Automotive Energy & Air Policy," Jeff Alson, US EPA; Linda Lance, White House Council on Environmental Quality; Kelly Brown, Ford Motor, Co.; David Hawkins, NRDC; Greg Dana, Assoc. of Internatl. Auto. Mfgs. 2) "Technology Choices for the Next Century," Alan Lloyd, CARB; Ferdinand Panik, Daimler-Chrysler; Jim Patten, Cummins Diesel; Andrew Burke, UC Davis 3) "Policy Implications of Transportation Fuel Pathways," Steve Gougen, DOE; Jason Mark, Union of Concerned Scientists; Lew Fulton, Energy & Environmental Analysis, Inc. 4) "Environmental Policy & Technological Change," Steve Plotkin, Argonne Natl. Lab.; Craig Marks, Univ. Of Michigan; Tom Wenzel, Lawrence Berkeley Natl. Lab.; Paul Leiby, Oak Ridge Natl. Lab.; Alex Farrell, Carnegie Mellon, 5) "How to Market Clean & Efficient Vehicles," Ben Knight, Honda Motor Co.; Kenneth Kurani, UC Davis, 6) "Toward a Sustainable Transportation Future," Chris Grundler, US EPA; Michael Love, Toyota Motor Sales, USA, Inc.; David Hawkins, NRDC; David Rodgers, DOE.

Transportation and the Environment: the 1999 Seaborg Symposium

Brian D. Taylor, Associate Director
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btaylor@ucla.edu
(310) 825-7442

The Institute of Transportation Studies co-sponsored the 1999 Seaborg Symposium on Transportation and the Environment with the Departments of Chemistry and Biochemistry and the Institute of the Environment. The symposium, named in honor of a Nobel prize-winning UCLA professor, featured five speakers who gave presentations on transportation and the environment including Jesse Ausubel, Director for the Program for Human Environment at Rockefeller University and John Gibbons, the former director of the White House Office of Science and Technology Policy.

**Arrowhead Transportation / Land Use / Air Quality Symposium
October 24-26, 1999**

Joanne Freilich, Program Director
UCLA Extension Public Policy Program
10995 Le Conte Avenue, # 613
Los Angeles, CA 90024
jfreilic@unex.ucla.edu
(310) 825-7885

The Lake Arrowhead Transportation / Land Use / Air Quality Symposium, convened by the UCLA Extension Public Policy Program in association with UCTC, focused on the growth of interregional travel between metropolitan areas, the nation, and internationally, and examined the consequent need for new or expanded facilities. It looked at air travel, highways, high-speed rail, and ports. A critical component of the discussions was the balance policymakers and practitioners must strike between the benefits of increased passenger and goods movements, and the more local and regional land use, air quality, energy, and congestion problems arising from these increased movements.

The invitational retreat has 120 participants, including 20 academics / researchers of national prominence; policymakers and advisors from different levels of government; public agencies in the transportation and air quality realms; environmental organizations; and private industry (e.g. developers, utilities, and other industry groups). Especially unique and valuable about this symposium series is that it allows people in the policy and practitioner realms to engage the research community in an interactive mode by probing, asking for explanations, and learning what is genuinely relevant. Additionally, they have an opportunity to introduce researchers to the constraints and opportunities that exist in the policy world, and to share their own policy challenges. Alternatively, members of the research community are afforded direct channels for sharing the results of their research and learning more about how to enhance the relevance of their work. The program emphasized in-depth dialogue, exchange of information, and opportunity to examine new strategies, and options for policy deliberation. This symposium, and prior ones in the annual symposia, have served as the “fermenting ground” and springboard for a number of other activities: legislative bills, policy initiatives and implementation measures have evolved from analysis and contacts shared at these programs. Also, the series has been successful in engaging people who might not otherwise have opportunity to interact, and through networking has led to agreements and new working relationships being established.

Telecommunities: Planning and Design Challenges
November 11, 1999

Professors Robert Cervero and Elizabeth Deakin
Department of City & Regional Planning
University of California, Berkeley
Berkeley, CA 94720
edeakin@uclink.berkeley.edu
(510) 642-4749
(510) 643-5456

This event focused on the broader urbanization, mobility, environmental, and urban design challenges posed by emerging information technologies and telematics. A new form of community is taking place throughout the world – places designed and marketed explicitly for telecommuters. Some telecommunities lie near transit stops, others on the suburban fringe, and others in far-flung, largely rural settings. An international panel discussed, debated, and shared research results on the community design, zoning, infrastructure, and land-use planning challenges posed by emerging telecommunities. Panel participants were: Phil Burgess (Center for the New West); Wallace Siembab (Televillage Project); Pamela Blais (Metropole Consultants); and Patricia Mohktarian (UC Davis).

2000 UCTC Student Conference
February 11 & 12, 2000

Michelle D. McGuire
Institute of Transportation Studies
One Shields Avenue
University of California, Davis
Davis, CA 95616
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The annual conference brings together students from all four of the University of California campus Institutes of Transportation Studies to meet and share their work and to participate in presentations with their peers and with academics and professionals from the broader transportation community. This year the conference was held on the UC Davis campus and was attended by 75 students. Other participants included The Surface Transportation Policy Project, The Union of Concerned Scientists, Chevron Corporation's Long Range Research Program, the California Air Resources Board, and the San Joaquin Valley Council of Governments.

**Consensus Building: Absence of Leadership of New Paradigm?
March 9, 2000**

David Booher, AICP
Visiting Scholar & Policy Consultant
Institute of Urban & Regional Development
104 Wheeler Hall
University of California
Berkeley, CA 94720
(510) 642-4874

All over California, consensus building is emerging as a more prevalent policy process to address vexing issues in housing, transportation, land use, environmental protection, water, and public finance.

This seminar invited attendees to hear David Booher share his experiences and explore the meaning of this new dynamic in planning.

**The UC Davis Sustainable Communities Consortium
March 12, 2000**

Professor Robert A. Johnston
Institute of Transportation Studies
One Shields Avenue
University of California, Davis
Davis, CA 95616
rajohnston@ucdavis.edu
(530) 752-3015
(530) 582-0700

This was a one-day workshop for California State agency leaders on Projecting Urban Growth and Its Impacts. We produced a paper outlining data needs and modeling capabilities. We are now working with Legislative committees on bills to fund these efforts. Professor Robert Johnston was an organizer of this workshop. He is also helping to shape a bill in the Legislature to require MPOs to design and analyze at least one alternative growth scenario featuring non-auto modes and compact growth.

**The Journey to Work: UCLA Symposium on Welfare Reform and Transportation
April 2000**

Brian D. Taylor, Associate Director
Institute of Transportation Studies
UCLA School of Public Policy and Social Research
3250 Public Policy Building
Los Angeles, CA 90095-1656
btaylor@ucla.edu
(310) 825-7442

Leading scholars from across the country met at UCLA in April 2000 to present the latest research on the relationship between transportation and welfare reform. The Conference brought together experts in welfare reform and transportation to examine how welfare recipients' access to transportation affects their ability to find and keep jobs. Over 100 participants attending the two-day conference, which included presentations on the travel behavior of welfare recipients, their access to jobs and public transportation, and the relationship between auto ownership and recipients' ability to find a job.

Presenters at the 2000 conference included Scott Allard (University of Michigan), Neil Bania (Case Western University), Evelyn Blumenberg (UCLA), Randall Crane (UCLA), Elizabeth Deakin (UC Berkeley), John Horton (UCLA), Dr. Manuel Moreno (Los Angeles County), Paul Ong (UCLA), Steve Raphael (UC Berkeley), Sandra Rosenbloom (University of Arizona), Phyllis Scheinberg (U.S. General Accounting Office), Brian Taylor (UCLA), Margy Waller (Progressive Policy Institute), and Michael Wiseman (University of Wisconsin).

**UCTC Research Symposium on Induced Travel Demand
June 15, 2000**

Professors Elizabeth Deakin and Martin Wachs

This symposium brought together researchers from UC Berkeley, UC Davis, UC Irvine, the University of Texas, and Portland State to discuss current research on induced travel demand. The two day meeting allowed researchers to present their work and discuss conceptual and methodological challenges. Participants included: Elizabeth Deakin, Martin Wachs, Robert Cervero, Mark Hansen, Patricia Mohktarian, Marlon Boarnet, Kara Kockelman, Ken Dueker, Jim Stratham, Hairi Mahmassani.

RESEARCH PROJECTS STATUS

This section lists all research projects funded by the UC Transportation Center in 1999-2000. In addition, the current status of each project and accomplishments to date are noted.

All projects are new grants for 1999-2000. Projects are ordinarily funded for one year only, but because of delays in the receipt of funds in 1999-2000, all 1999-2000 projects were extended to June 30, 2001. No other projects were completed during this reporting period; see previous years' annual reports and the UCTC publication list for completed project information.

Projects at the Berkeley Campus (6)

Induced Travel Demand: A Systems Analysis of Longer Term Impacts of Road Expansion

Robert Cervero, City and Regional Planning, Berkeley

Induced travel demand has been mired in legal and political controversy in recent years. This project will examine the longer term structural forces behind induced increases in traffic following road expansion. Using the technique of path analysis, the research will investigate the degree to which traffic volume increases over a four- to six-year time frame are accounted for by land development and land-use changes as well as increased vehicle ownership along impacted corridors. Whether road improvements function more as lead or lag factors in explaining structural shifts in land use and vehicle ownership was investigated. Analyses have been carried out demonstrated road supply-demand relationships work in both directions, with investments shaping demand but demand also influencing decisions on capacity expansions. Based on 18 years of California data and using simultaneous econometric techniques, the elasticity of demand as a function of road investments was found to be higher than the elasticity of demand of road supply based on past travel levels, though both elasticities were significant. The analysis also demonstrated that variations in road investments are significantly shaped by political and socio-economic factors, in addition to needs-based influences like rising traffic levels. Work is presently continuing on tracing the causal chain of events between road investments and structural changes, notably building permit activities, which in turn induce travel. To the degree that induced demand are found to be a consequence of long-term structural adjustments, land-use management and planning gains all the more importance as a mechanism for managing traffic levels.

Papers to date:

"Road Supply and Demand Relationships: Unraveling the Causal Chain" To be presented at the Annual TRB Meeting, January, 2001

Conferences Attended:

TRB, 2001

Other Accomplishments:

A draft of the paper was presented at a special conference on Induced Demand, sponsored by the U.S. Environmental Protection Agency and the Federal Highway Administration, and the University of California Transportation Center, held at UC Berkeley in June 2000.

Percent Complete:

60%

Direct Cost:

\$50,000

Measuring the Impact of the Internet on the Trucking Industry

Carlos Daganzo, Civil & Environmental Engineering, Berkeley

The objective of this project was to explore the effect of the Internet on transportation networks, and an overarching goal was to do so in an educational context that would allow students to investigate aspects of the problem of particular interest to them. Therefore, the activities we undertook differ slightly (and in a good way) from those that were originally envisioned.

We expect to produce as an outgrowth of this project one PhD thesis (K. Smilowitz's) that deals with the optimal structure of multi-commodity multi-service transportation networks such as those of integrated carriers (e.g., UPS). One working paper, dealing with a highly technical aspect of the thesis, was recently finished (and may still be modified); see below. The support of UCTC is and will be acknowledged in these publications.

The other two students are now in the formative portions of their work; one will work on the "last mile" problem of e-commerce firms and the other one on dynamic (many-to-many) routing problems that arise in related contexts. Because these students were recruited as GSI's, their progress was slower than anticipated (and so were our expenditures). Their theses should not be finished for another 2 years, but UCTC's partial support will be acknowledged.

Support of their initial work is extremely important and therefore we are asking for a no-cost extension.

Papers to date:

Daganzo, Carlos and Karen Smilowitz, "Asymptotic Approximations for the Transportation LP and Other Scalable Network Problems", ITS WP 2000-2, November 2000.

Conferences Attended:

INFORMS (GSR K. Smilowitz), Spring 2000

Other Accomplishments:

N/A

Percent Complete:

50%

Direct Cost:

\$55,600

Roadway Tunnel Measurements of Carbon and Nitrogen-Containing Air Pollutants

Robert Harley, Civil & Environmental Engineering, Berkeley

Ammonia and other vehicle exhaust emissions were measured from a large sample of on-road vehicles using California Phase 2 reformulated gasoline. Measurements were made in the center bore of a San Francisco Bay area highway tunnel on eight 2-h afternoon sampling periods during summer 1999.

Ammonia concentrations were divided by total carbon (mainly CO₂) concentrations to compute an emission factor of 475 +/- 29 mg/L. Emissions of nitrogen oxides (NO_x) and carbon monoxide (CO) have been measured at this site since 1994. From 1994 to 1999, emissions decreased by 41 +/- 4% for NO_x and 54 +/- 6% for CO. While use of three-way catalytic converters has contributed to decreases in NO_x and CO emissions, their use, in combination with fuel-rich engine operation, is the likely cause of ammonia emissions from motor vehicles observed in this study.

Papers to date:

Kean, A.J. et al., "On-road measurement of ammonia and other motor vehicle exhaust emissions", Environ. Sci. Technol., vol. 34, pp. 3535-3539, (2000).

Conferences Attended:

Coordinating Research Council (CRC) Workshop on On-Road Vehicle Emissions, San Diego, March 2000.

Other Accomplishments:

N/A

Percent Complete:

75%

Direct Cost:

\$38,235

The Effects of Urban Land Use Patterns on Household Trip-Making Behavior: An Empirical Analysis

John D. Landis, City & Regional Planning, Berkeley

Little empirical work has been done to confirm or reject the belief, held by most planners, that land use patterns and forms significantly affect travel behavior. Studies of household trip-making behavior typically focus on household economic and demographic characteristics, regional activity patterns and densities, and the availability and cost of competing travel modes, usually to the exclusion of local land use measures. We propose to measure the statistical relationships between non-work travel behavior in the San Francisco Bay Area and the distribution and quality of nearby land uses (including transportation facilities and transportation-related land uses). Using 1) a 1995 household travel survey conducted by the Metropolitan Transportation Commission, and 2) a data set of urban land uses collected by the Association of Bay Area governments, we propose to test the hypothesis that households which reside in cities with a "fine-grained" land use (and street) pattern--where land uses and activities are contained in a small area--will make more home-based trips, and will make greater use of non-auto travel modes as compared with demographically similar households residing in communities with a more homogenous urban land use pattern.

Papers to date:

(in progress)

Conferences Attended:

None to date

Other Accomplishments:

N/A

Percent Complete:

50%

Direct Cost:

\$10,704

Estimation of Latent Pavement Properties Using Condition Survey Data

Samer M. Madanat, Civil and Environmental Engineering, Berkeley

The availability of high-speed sensors for pavement inspection makes it possible to infer the causes of observed pavement deterioration. The simultaneous measurement of multiple pavement distresses can provide sufficient information to statistically estimate underlying pavement properties such as moduli. By inferring the values of the such variables in-situ, pavement engineers can use them for purposes of deterioration prediction. Furthermore, inferring the causes of the observed deterioration allows pavement engineers to select more effective maintenance strategies. The objective of this research is to use a latent

variable model framework for the estimation of underlying pavement properties, using data from condition surveys.

Papers to date:

In progress.

Conferences Attended:

None to date.

Other Accomplishments:

N/A

Percent Complete:

50%

Direct Cost:

\$42,223

Regional Transportation Infrastructure Finance in the U.S.

Martin Wachs, Institute of Transportation Studies, Berkeley

This study examines the extent to which states have devolved one of the most fundamental decisions in transportation policy -- whether to use taxation powers to fund transportation improvements -- to local and regional governments. The purpose of the study is to generate a baseline of knowledge on "local option transportation taxes" in all fifty states, including the relevant legislative authority for these taxes, the extent to which local areas have adopted them, and the roles they play within their states' overall transportation finance frameworks.

Our work is nearly complete. The first stage of our research, started in January, involved an examination of existing sources of data on local transportation finance, including publications from the Federal Highway Administration, Federal Transit Administration, and the U.S. Census Bureau, as well as publications by non-governmental entities such as the Commerce Clearing House. These were followed in the spring by information requests to state departments of transportation, departments of revenue, and major transit agencies. A third step, completed over the summer, involved a state-by-state examination of laws governing local option taxes and a search of state web pages for data on actual tax rates and revenues. In the fall, we surveyed city and county governments in a dozen states (Arizona, Colorado, Florida, Georgia, Illinois, Missouri, Nevada, New York, Ohio, Pennsylvania, Texas, and Washington) to develop a more detailed picture of how various local option transportation taxes are actually implemented. The final step, currently underway, is to ask transportation finance experts in each state to review our preliminary findings, to ask for their assistance in filling data gaps, and to interview them about overall issues and trends in their states.

The major end product of our research will be a compendium of information on local option transportation finance, which we hope will serve as an important resource for future research in local transportation finance. For each state, the compendium will contain a narrative description of our findings, a table summarizing the legal authority for local option taxes, and a table showing the extent to which counties, cities, and special districts have adopted these taxes. The compendium will also contain an executive summary and a bibliography. This document should be completed by mid-December.

Papers to date:

None currently complete; a 250-page compendium of our results will be finished by the end of the year, followed by a journal article.

Conferences Attended:

None to date.

Other Accomplishments:

N/A

Percent Complete:

90%

Direct Cost:

\$30,183

Projects at the Davis Campus (2)

Greenhouse Gas Emissions Trading and the Transport Sector

Daniel Sperling, Institute of Transportation Studies, Davis

An extensive literature review of emissions trading schemes and experiences has been completed. We are now nearing completion of a draft report on developing baseline methodologies. This effort is being conducted in coordination with the International Energy Agency, which will play a central role in designing and overseeing an international emissions trading scheme. In this initial report, we are focusing on the difficult problem of determining what are the appropriate baselines to be using creating emission trading programs. Transportation is perceived as the the most difficult sector to deal with in this regard. This baseline methodology will be used in determining what emissions can be treated as credits and therefore be eligible for trading.

Papers to date:

D. Sperling, "Toward Effective Transportation Policy," Innovative Policy Solutions to Global Climate Change, Pew Center on Global Climate Change and Royal Institute of International Affairs, Washington, D.C., 26 April 2000.

Conferences Attended:

- Energy Roundtable, Aspen, Colorado, September 28, 2000 (invited, evening keynote)
- Toward a Greener Road Vehicle: Innovation Paths for Sustainability, Workshop at Aston University, Aston Business School, June 29-30, 2000 (kick-off presentation) (invited)
- Innovative Policy Solutions to Global Climate Change, Pew Center on Global Climate Change and Royal Institute of International Affairs, Washington, D.C., 26 April 2000 (invited)
- Transportation Research Board, Annual Meeting, January 11, 2000
- Energy Roundtable, Cambridge, England

Other Accomplishments:

Deborah Salon (grad student on project) was invited to spend 3 months at the International Energy Agency in Paris to develop a strategy for developing baselines to use for transportation emissions trading (internationally).

Percent Complete:

40%

Direct Cost:

\$53,034

Estimating Freeway Traffic Stream Modal Activities for Air Quality Modeling

H. Michael Zhang, Civil and Environmental Engineering, Davis

The proposed research develops a method that uses data provided by widely deployed point sensors, namely inductive loop detectors, to construct vehicle trajectories of freeway traffic, from which modal activities of traffic streams can be estimated. This method provides a cost-effective way to develop freeway driving cycles used in air quality models and emission adjustment factors for freeways whose traffic flow patterns largely differ from those embodied in the driving cycles, thereby improving the accuracy of emission estimates by those models. It also produces “the ground truth” for calibrating transportation planning models when accurate speed estimates are desired.

Research tasks include: (a) the generation of velocity field on dense time-space grids, (b) the construction of vehicles trajectories from velocity fields, (c) the extraction of traffic stream modal activities from vehicle trajectories, and (d) validation of the developed method.

Papers to date:

In progress.

Conferences Attended:

None to date.

Other Accomplishments:

N/A

Percent Complete:

50%

Direct Cost:

\$43,707

Projects at the Irvine Campus (6)

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

We have obtained data for all home sales in Orange County, California from 1988 through early 2000. The data were cleaned and address matched using a GIS program. Distances from each house to the nearest toll road and highway on-ramps were calculated. Several different regression techniques were used to analyze the impact of the Orange County toll roads on housing prices and development. Results show that the toll roads influenced house prices along nearby corridors.

Papers to date:

“New Highways, Urban Development, and Induced Travel,” working paper presented at conferences below and under submission at a refereed journal.

Conferences Attended:

- American Collegiate Schools of Planning, Nov. 2000
- North American Regional Science Association, Nov., 2000
- EPA symposium on induced travel, Berkeley, CA, June, 200

Other Accomplishments

The first paper from this project, "New Highways, Urban Development, and Induced Travel," won the Fannie Mae Foundation prize for best paper on a housing and community development topic at the 2000 American Collegiate Schools of Planning meeting.

Percent Complete:

50%

Direct Cost:

\$32,199

Impacts of Shipping Changes on the Efficiency of the Freight Transportation Network

Tom Golob and Amelia Regan, Institute of Transportation Studies, Irvine

We began with an in-depth examination of the third-party logistics industry. We subsequently have developed two surveys for early 2001 deployment. The first is a survey of the trucking industry to be launched as a CATI survey with funding from a closely related PATH project (the path project studies ATIS in the trucking industry). The second is an on-line survey of the 3PL industry which will launch in February. Results will inform the development of a survey of shippers which will launch in April and May. The survey results will be analyzed in the Spring and Summer of 2001.

Papers to date:

Regan, Amelia C. and Jiongjong Song, "An Industry in Transition: Third Party Logistics in the Information Age," Proceedings of the 80th meeting of the TRB, (2000).

The above paper is under revision for January 2001 submission to a special issue of the Transportation Journal.

Golob, T.F. and A.C. Regan (2000), Impacts of Information Technology on Personal Travel and Commercial Vehicle Operations: Research Challenges and Opportunities, Transportation Research, Part C, in press.

Conferences Attended:

TRB 2001

Other Accomplishments:

Project has caught the attention of industry professionals. Our work may be supported next year by one or more on-line freight marketplaces. The TRB paper led to these contacts.

Percent Complete:

60%

Direct Cost:

\$30,601

Putting Behavior in Household Travel Behavior Data: An Interactive GIS-based Survey Via the Internet

Michael G. McNally, Institute of Transportation Studies, Berkeley

An earlier research project produced a prototype of REACT!, a web-based, self-administered survey instrument for collecting household travel/activity data (see <http://www.its.uci.edu/react/>). In this follow-on study, a beta test of REACT! was performed followed by a formal field study where 47 households used REACT! to provide 24 hours of travel/activity data over a 7 day period. REACT! was run locally on the respondent's PC and data was transmitted via the internet to a server in ITS where the survey process was monitored by project GSRs. REACT! documents not only the resultant behavior but also the

scheduling process that produces that behavior by having respondents record activities as they are initially planned, updated, and executed. Formal analysis is currently underway. Preliminary results include the identification of distinct spatial and temporal behaviors for planned and unplanned activities. Classification and structural equation models are being developed to identify regularities in scheduling behavior.

Papers to date:

"A Microsimulation of Daily Activity Patterns", accepted for presentation at the 80th Annual Meeting of the Transportation Research Board, Washington, DC.

Lee, MS, Doherty, St, Rindt, CR, and McNally, MG (2000) "Extending the Scope of Computerized Household Activity Scheduling Surveys", presented at the 9th International Association of Travel Behavior Conference, Gold Coast, Queensland, Australia.

Kulkarni, AA and McNally, MG (2000) "An Activity-based Microsimulation Model for Generating Synthetic Activity-Travel Patterns: Initial Results," presented at the 9th International Association of Travel Behavior Conference, Gold Coast, Queensland, Australia.

Marca, JE, Rindt, CR, and McNally, MG (2000) "A Latent Factor Model of Observed Traveler Activity Sequences", presented at the 9th International Association of Travel Behavior Conference, Gold Coast, Queensland, Australia.

Kulkarni, AA and McNally, MG (2000) "An Activity-based Travel Pattern Generation Model", presented at the 39th Annual Meeting of the Western Regional Science Association, Kauai, Hawaii, February 2000

Lee, MS, Doherty, ST, Sabetiashraf ,R, and McNally, MG (2000). "iCHASE: An Internet Computerized Household Activity Scheduling Survey", presented at the 79th Annual Meeting of the Transportation Research Board, Washington, DC.

Marca, JE, Rindt, CR, and McNally, MG (2000). "A Simulation Framework and Environment for Activity-based Transportation Modeling", presented at the 79th Annual Meeting of the Transportation Research Board, Washington, DC.

Conferences Attended:

- The 9th International Association of Travel Behavior Conference, Gold Coast, Queensland, Australia, July 2000.
- The 39th Annual Meeting of the Western Regional Science Association, Kauai, Hawaii, February 2000
- The 79th Annual Meeting of the Transportation Research Board, Washington, DC, January 2000.

Other Accomplishments:

REACT!, web-based software with integrated GIS for Computer-Assisted Self-Administered Interviews (CASI) for household travel-activity scheduling behavior (see <http://www.its.uci.edu/react/>)

Percent Complete:

33%

Direct Cost:

\$76,833

The Viability of Value Pricing Demonstrations

Kenneth Small, Institute of Transportation Studies, Irvine

The simulation work is complete, and has led to a paper which has been presented in many venues and has been accepted for publication in Journal of Urban Economics. This work was very successful in explaining how the desirability of road-pricing demonstration projects using "value pricing" depends critically on differences in the value different people place on time savings.

A follow-up paper is in progress summarizing the policy implications of this research for Access Magazine, a publication of University of California Transportation Center aimed at the transportation policy community.

The alternative simulation model using a continuous value of time has also been completed, leading to a working paper. The portion of the research involving empirical measurement of variation in value of time has not been completed, because the Brookings Institution project in which the data was being collected was delayed. This was due to problems getting an adequate response rate. Those data were finally received in November 2000, and analysis of them can now begin.

Papers to date:

Small, Kenneth A., and Jia Yan, "The Value of 'Value Pricing' of Roads: Second-Best Pricing and Product Differentiation", Journal of Urban Economics (forthcoming).

Verhoef, Erik T., and Kenneth A. Small, "Product Differentiation on Roads: Constrained Congestion Pricing with Heterogeneous Users", working paper, Dept. of Economics, Univ. of California at Irvine (revised June 2000).

Small, Kenneth A., "Pitfalls of Road Pricing Demonstrations," working paper, Dept. of Economics, Univ. of California at Irvine, Nov. 2000.

Conferences Attended:

- Transportation Research Board, Washington, DC, Jan. 2000.
- Workshop on The Politics of Pricing, Government Institute for Economic Research, Helsinki, Finland, Aug. 1999.
- Tinbergen Institute (Amsterdam), May 2000.
- Katholieke Universiteit, Leuven (Belgium), May 2000.

Other Accomplishments:

N/A

Percent Complete:

80%

Direct Cost:

\$52,042

Development of Estimation Procedures for Activity-Based Model Forecasting

Will Recker, Institute of Transportation Studies, Irvine

Dataset comprising all members of all households within the Portland activity survey with complete information has been constructed. The dataset is in the form of the required input to the HAPP model, i.e., activity profiles and temporal and spatial constraints. Contingency matrices based on probability distributions of pertinent decision variables contained in the model have been constructed. An algorithm for estimating a distance measure based on the sequence alignment method for comparison of model output to revealed activity patterns has been constructed.

Papers to date:

Recker, W.W. (2000). A Bridge between Travel Demand Modeling and Activity-based Travel Analysis. Transportation Research , Part B: Methodological (forthcoming).

Conferences Attended:

None to date.

Other Accomplishments:

N/A

Percent Complete:

40%

Direct Cost:

\$38,735

Online Versus Rolling Horizon Algorithms for Dynamic Service Fleet Operations

Amelia Regan and Sandra Irani, Civil & Environmental Engineering

We are examining on-line versions of variants of the traveling salesman problem (the Dynamic Traveling Salesman Problem, the Dynamic Traveling Repair Problem, the Probabilistic Traveling Salesman Problem). To date, we have very nice results for the PTSP the DTRP and the DTSP. We have written several papers documenting this research.

Papers to date:

Lu, X, A.C. Regan and S. Irani (2000) An Asymptotically Optimal Algorithm for the Dynamic Traveling Repair Problem, Transportation Science, under review.

Under preparation (all very close to submission):

Irani, S, X. Lu and A.C. Regan (2000), Competitive analysis of algorithms for the Dynamic Traveling Salesman Problem, Proceedings, in preparation for submission to the 2001 meeting of the Symposium on Discrete Algorithms.

Lu, X, S., S Irani, and A.C. Regan (2000) An Algorithm for the Probabilistic Traveling Salesman Problem, in preparation for submission to Transportation Science.

Lu, X. A.C. Regan and S Irani (2000) An examination of heuristics for the Dynamic Traveling Salesman Problem, in preparation for submission to Operations Research Letters.

Lu, X., S Irani and A.C. Regan (2000) Estimation of the Waiting Time in an M/M/1 Queue with Switching Costs, in preparation for submission to the European Journal of Operations Research.

Conferences Attended:

Will attend the 2001 Symposium on Discrete Algorithms, Presented the work at the Spring 2000 meeting of INFORMS.

Other Accomplishments:

N/A

Percent Complete:

60%

Direct Cost:

\$33,157

Projects at the Los Angeles Campus (5)

The Transportation Behavior and Needs of Welfare Recipients

Evelyn Blumenberg, Public Policy and Social Research, Los Angeles

This study applies survey research and data analysis to investigate travel patterns and identify transport needs of welfare recipients. The following work has been undertaken so far this year:

- A contract has been negotiated allowing the research team access to confidential data from which to draw a sample of welfare recipients.
- A survey instrument has been developed and tailored to the project.

We have applied and are waiting for approval from UCLA's human subjects institutional board to administer the survey, and will then administer the survey and analyze the results.

Papers to date:

None currently complete.

Conferences Attended:

None.

Other Accomplishments:

N/A

Percent Complete:

15%

Direct Cost:

\$15,085

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 widespread perception that rapid transit brings increased crime to the areas it serves is a problem for the planning and implementation of new transit system stations. Evidence from Los Angeles indicates fear of crime is one of three reasons cited for non-use of transit stations. Most research on transit crime has focused on heavy rail systems and has examined the underground station environment. There is limited and inconclusive research on crime on and around surface and above-ground stations and very limited understanding of the "journey-to-crime" of potential offenders; we also do not clearly understand how new transit lines affect outlying suburban areas, and how surrounding environments affect station security. While we understand how certain design elements can mitigate crime in underground stations we are not very clear as to which of these elements are relevant for light rail stations. This study will examine the incidence of crime on the Green Line metro stations in Los Angeles to investigate how the introduction of this line has affected crime occurrence in the surrounding communities and how, in turn, characteristics of the immediate station neighborhood affect crime on the station. Using crime statistics, interviews, ridership and environmental data, we will document and evaluate 1) spatial and temporal distribution of crime along the metro line; 2) the impact of socio-demographic and environmental attributes on crime occurrence; 3) the possibility of crime dislocation; and 4) the possibility of transit-related crime in outlying areas.

So far we have completed the following tasks:

- Literature review on transit crime.
- Collection of ridership data for all Green Line stations.
- Collection of crime data by station for all stations for 1998 and 1999.
- Collection of aggregated crime data for Los Angeles County and City and other cities adjacent to the Green Line from 1989-1998.
- Collection of individual crime data for six cities adjacent to the Green Line.
- Processing and geocoding of all crime data collected thus far.

- Compilation of GIS data and maps.
- Compilation of census information for the areas that fall within a 1/2 mile radius around each Green Line station for 1990 and 1996 (block data).
- Compilation of land use and environmental data for the areas that fall within a 1/2 mile radius around each Green Line station--So far we have completed fieldwork for seven out of the fourteen stations.
- Interviews with the captain of the transit division of the Los Angeles Sheriff's Department and MTA officials responsible for security.

Papers to date:

None currently complete.

Conferences Attended:

None to date.

Other Accomplishments:

The editor of the journal Transit Policing has invited us to give him an article that describes the findings of this study. He intends to publish it in the Spring issue of the journal.

Percent Complete:

50%

Direct Cost:

\$49,775

Measuring the Role of Transportation in Facilitating the Welfare-to-Work Transition (Yr. 2)

Paul M. Ong, Public Policy and Social Research, Los Angeles

Anecdotal evidence and preliminary research suggest that transportation services are crucial to helping welfare recipients transition into the labor market; however, empirical research on the relationship between transportation and welfare use is limited. Also, welfare reform since 1996 is creating new conditions that are altering that relationship. To fill the research gap, we use administrative data on the geographic distribution of jobs in low wage firms and measures of access to transportation. This study analyzes employment outcomes as a function of population and labor market characteristics and access to employment, including access to transportation and proximity to licensed child care centers. With a previous grant, agreements with the State of California and the County of Los Angeles established a secured data facility allowing construction of baseline data for Los Angeles, including measures of job access incorporating travel time by public transit and private car. In the current grant we will be updating the Los Angeles data, analyzing the role of transit access on early employment outcomes in Los Angeles, and constructing a baseline data for Alameda County, California. We have modified our schedule in accordance to how quickly we are able to enter into a cooperative agreement with counties. We have been fortunate to have reached such an agreement with Fresno County's Board of Supervisors, so we have increased our activities for Fresno County, California. Given our limited resources, this change has required us to decrease our activities in Alameda County, California, although we continue to work in Alameda County.

Significant milestones include gaining access to a survey of recipients in Alameda County, California, to analyze the relationship between access to cars and employment, and to analyze other transportation issues facing this population. We are in the process of analyzing access to transportation. As noted

above, we also have agreements from the Board of Supervisors to do an analysis in Fresno County, California. Due to a late receipt of funding, we were required to schedule work and student employment until Summer 2000.

Papers to date:

None currently complete.

Conferences Attended:

None.

Other Accomplishments:

N/A

Percent Complete:

50%

Direct Cost:

\$34,823

Evaluating a University Transit Pass Program

Donald Shoup, Institute of Transportation Studies, Los Angeles

UCLA's transit-pass program did not begin until September 2000, so we have just begun to analyze the data for the project. We have done a considerable amount of preparation for the evaluation, however.

Papers to date:

"Unlimited Access," submitted for publication.

Conferences Attended:

Transportation and University Communities Conference Gainesville, Florida, April 1-4 2000

Other Accomplishments:

The main accomplishment was to inaugurate the transit-pass program at UCLA. All UCLA students, staff, and faculty can use their UCLA ID cards as a transit pass on the Santa Monica Municipal Bus Lines. We will analyze the data from the boardings to evaluate the cost-effectiveness of the program in reducing vehicle trips and parking demand on campus.

Percent Complete:

25%

Direct Cost:

\$34,965

Driving for Dollars: How the Politics of Finance Has Shaped the California Highway System

Brian D. Taylor, Urban Planning, Los Angeles

Doctoral student Jeffrey Brown has over the past several months conducted an extensive investigation of the transportation plans prepared for an array of U.S. metropolitan areas between 1900 and 1950. Each of these plans has been summarized and key maps and diagrams have been scanned for later use. Jeffrey and I have discussed each of these plans in considerable detail and have developed an evolutionary typology of the plans to shape their presentation in the manuscript. In addition, Jeffrey has prepared, under my direction, and detailed history of statewide transportation planning efforts in California. Ninety percent of the archival research for this project has now been completed. Jeffrey and I will, over the next several months begin integrating this new material into our manuscript, which is by now in excess of 500 double-spaced pages. We expect to have the manuscript completed for review by the end of the 2001 calendar year.

Papers to date:

"The Evolution of Statewide Transportation Planning in California," paper to be presented at the California Transportation Futures Symposium in Sacramento, California on 1 December 2000.

Conferences Attended:

California Transportation Futures Symposium, Sacramento, CA: Nov/Dec 2000

Other Accomplishments:

N/A

Percent Complete:

67%

Direct Cost:

\$24,589

Projects at the Santa Barbara Campus (1)

GIS-Based Data Handling for Activity Based Modeling

Reginald G. Golledge, Department of Geography, Santa Barbara

This study is evaluating the use of GIS-based data handling for activity based modeling. We have examined the Lexington database, have determined the extent of the data that can be analyzed, and have calculated day by day correlations of activity patterns, grouping functions and activities with similar spatial and temporal occurrence patterns. We have calculated spectral signature for daily and weekly activity patterns, calculated distance traveled to activity source using circular statistics, and conducted discriminant analysis to define different clusters of activities that differentiate daily behavior patterns. So far we have found that the GPS-tracked data show that Monday, Tuesday, and Wednesday produced remarkably similar spatio-temporal patterns, while Fridays were clearly demarcated at hosting different behaviors, different travel times, and different distances traveled.

Papers to date:

Zhou, J. and Golledge, R. A GPS-based Analysis of Household Travel Behavior. Presented at the 39th Annual Meeting of the Western Regional Science Association, Kauai, Hawaii, February 26-March 1, 2000.

- Zhou, J. and Golledge, R. An Analysis of Household Travel Behavior Based on GPS. Presented at IATBR Conference, Gold Coast, Australia, July 2000.
- Zhou, J. Analysis of Variability of Weekly Travel Behavior Using GPS-Recorded Data - A thesis submitted for the degree of Master of Arts in Geography by Jianyu (Jack) Zhou

Conferences Attended:

- '39th Annual Meeting of the Western Regional Science Association, Kauai, Hawaii, February 26-March 1, 2000.
- IATBR Conference, Gold Coast, Australia, July 2000.

Other Accomplishments:

N/A

Percent Complete:

80%

Direct Cost:

\$25,552

LIST OF 1999-2000 DISSERTATION GRANTS (9)

Regional Transportation Planning and Finance in the Bay Area: At Cross Purposes?

Todd Goldman

Department of City and Regional Planning, UC Berkeley

Residents of 18 California counties have voted to raise their sales taxes to pay for transportation improvements, raising \$2 billion annually for investments in transportation services and infrastructure in their areas. This model of transportation finance has been hailed as an important step forward for local self-reliance and fiscal accountability. This dissertation will evaluate the accomplishments and implications of five county transportation sales tax programs in the San Francisco Bay Area. It will examine how the expenditure plans were developed, how they differed from existing plans developed by regional agencies, and the degree to which the promises made to voters are being fulfilled. It will also explore the broader significance of this approach to transportation finance, in terms of the results it has produced for spatial and economic equity, shifts in other investment priorities, and the integrity of the metropolitan transportation planning process.

Development of an Activity -Based Microsimulation Model for Generating Synthetic Activity-Travel Patterns

Anup A. Kulkarni

Institute of Transportation Studies, UC Irvine

The focus of this proposal is the development of an activity-travel pattern generator for travel demand forecasting. The proposed research is a necessary step in the development of novel transportation planning methodologies required to address the limitations of current modeling practice in meeting legislative and judicial mandates. The approach outlined builds upon existing research, conducted over two decades at UCI, demonstrating that travel behavior should be viewed holistically using activity-travel patterns, a time-dependent representation of the activities and their attributes in which an individual engages. A microsimulation approach integrated with a geographic information system is advanced to synthesize individual activity-travel patterns for households that are reflective of the available transportation and land use system. By using activity-travel patterns as the basis of the microsimulation, the timing, sequencing, and connections between activities are included in the model where previously they would be lost. The final product of this research will be a prototype modeling system that has the potential to replace some or all aspects of the traditional 'four-step' modeling process. The potential long-term contribution of this proposal towards the development of more accurate planning methods is relevant to the UCTC agenda and the transportation community at large.

Permanent Deformation of Asphalt Concrete Pavements

Fenella Margaret Long

Transportation Engineering, UC Berkeley

Permanent deformation, or rutting, of asphalt concrete pavements is a serious safety issue for road users. Increasing demands are being placed on pavements by the trucking industry from increased axle loads and tire pressures, and from the introduction of larger aircraft. Many of the current mix design procedures for asphalt concrete pavements are unable to adequately prevent rutting under this increased loading. This research will develop an improved mix design procedure for permanent deformation, by defining a constitutive model to describe the mechanical behavior of asphalt concrete under the action of traffic loading. The research will proceed in six phases: investigate material behavior; determine constitutive model; determine input parameters for the constitutive model; implement the constitutive model in finite element program (FEAP); validate the constitutive model; and validate and enhance the current mix design procedure. The first phase involves the detailed analyses of existing laboratory and accelerated pavement test data and further laboratory testing to facilitate definition of the constitutive model. Existing laboratory tests, such as the simple shear test at constant height will be utilized in the research. Implementation of this research will aid in the mitigation of rutting, thereby increasing the life of asphalt concrete pavements.

The Analysis of Stop-Start Waves in Congested Freeway Traffic

Michael Mauch

Institute of Transportation Studies, UC Berkeley

The objective of this research is to study start-stop waves (i.e. backward-moving disturbances) that commonly arise in congested freeway traffic. To this end, transformed curves of cumulative vehicle arrivals will be constructed from the vehicle counts measured by closely-spaced loop detectors. Visual inspections of these curves along with a few formalization rules for their interpretation should reveal a number of important wave features. It is expected that these examinations, when repeated at different freeway locations and over multiple observation days, will provide insights into details, such as the traffic conditions that trigger the initiation of stop-start waves, certain characteristic wave features (e.g. wave frequency, duration, amplitude), details of how they propagate through congested traffic and their effects (if any) on freeway bottleneck capacity. Preliminary studies performed to date support this expectation. The findings from this work will provide bases for verifying (or discrediting) existing theories of traffic flow and may even lead to improved theories. These might be especially useful, for example, when estimating engine emissions and fuel consumption resulting from proposed freeway traffic control strategies or design improvements. Moreover, if stop-start waves are found to degrade freeway bottleneck capacity (a present uncertainty), this research would motivate the need for control strategies to suppress them.

Improving Access to Jobs for Welfare Recipients Using "Smart" Ridesharing Services

Alfred David Round

City and Regional Planning, UC Berkeley

The 1996 federal welfare reform act sets strict time limits on eligibility for benefits. Transportation access is often a serious obstacle to employment for many welfare recipients, since most jobs are not easily accessible by public transit and a large proportion of recipients do not have cars. The purpose of this project is to design three "smart" transportation services that provide commute trips for welfare recipients, and to evaluate the cost-effectiveness of these services. The proposed services are "smart" since they are cognizant of home origins, work destinations, and work schedules, as well as the spatial and temporal characteristics of the regional road network. A combination of GIS software and dynamic programming will use this information to generate the routes, schedules, and other service characteristics that will minimize average passenger delay and direct provider costs. The first service uses vans to provide door-to-door service for recipients. The second service uses private cars that are owned by recipients to provide door-to-door service for other recipients as well as themselves. These services will be designed and evaluated for welfare recipients living in West Oakland and in Marin County.

The Accessible City: Employment Opportunities in Time and Space

Lauren Margaret Scott

Joint Geography Doctoral Program at San Diego State, and UC Santa Barbara

Explosive suburban employment growth, declining residential densities, consequent new patterns of cross-commuting, economic restructuring, and rapid developments in transportation and telecommunications technologies are having a dramatic impact on the urban landscape. How are these spatial processes impacting intra-metropolitan accessibility and what are the implications? While the concept of accessibility provides a basis for a variety of urban policy and planning decisions, represents a common focus for a large body of geographic research concerned with urban economic growth, urban spatial structure, and social equity, and serves as a cornerstone in urban economic theory, it remains a difficult concept to operationalize. This research presents an analytical framework for evaluation, representing, and monitoring changing intra-metropolitan accessibility to employment opportunities. More specifically, it (1) determines how accessibility has been defined, modeled, measured, and interpreted; (2) suggests a new approach for evaluating intra-metropolitan accessibility founded on the Couclelis proximal space construct, the Getis/Ord G_i spatial statistic, a level-of-service definition of accessibility, multiple scale analysis, and a multi-dimensional conceptualization of accessibility; and (3) applies this analytical framework, implemented within a GIS environment, to employment data for the Greater Los Angeles region.

Transportation Policy, Firm Inventory Behavior, and Productivity Growth

Chad Shirley

Department of Economics, UC Los Angeles

This project assesses the benefits of transportation policies from responses in firms' inventory and logistics behavior. A theoretical model formally links the cost, speed, and reliability of freight transportation with a firm's cost-minimizing inventory levels and logistics costs. Then, representative product and freight data are used to simulate logistics cost changes with the developed theory. Preliminary results show sizable reductions in logistics costs from a plausible system-wide infrastructure investment, ranging from \$30 billion to \$69 billion annually. The project will also econometrically estimate the relationships between inventory levels and the historical policies of highway infrastructure investment and trucking deregulation using disaggregate census and Federal Highway Administration data. In contrast to previous work on the benefits of transportation infrastructure investment, however, this specification will be informed by a behavioral microeconomic theory. The project will conclude by using the estimated relationship to analyze future transportation policies for their potential to improve industrial productivity.

Algorithms and Strategies for Dynamic Carrier Fleet Operations: Applications to Intermodal Freight Operations

Xiubin Wang

Institute of Transportation Studies, UC Irvine

The purpose of the project is to develop efficient routing and scheduling techniques for real-time application in dynamic, time-constrained fleet operations. The application area of primary interest here is the assignment of trucking vehicles in and around intermodal facilities. Local vehicle routing and scheduling problems with time window constraints have received relatively little attention before now. Problems faced by individual companies tended to be either fairly small or fairly static, allowing dispatchers to develop assignments relatively easily or to make small changes to assignments developed over time. However, a sharp increase in intermodal freight movements coupled with an increase in just in time freight shipments has led to the need for computer based routing and scheduling models to more efficiently manage the movement of drivers and goods. This problem is strongly connected to more general vehicle routing and dynamic vehicle allocation problems, but has some additional, unexplored features. The theme of the dissertation will be to explore the nature of this specific problem, to develop efficient methods to solve this problem and to examine its connection to related work in the literature.

Effect of Transportation Infrastructure on Proximate Commercial Property Values: An Hedonic Price Model

Rachel R. Weinberger

Department of City and Regional Planning, UC Berkeley

This dissertation analyzes the costs and benefits, as reflected in land value, accruing to owners of commercial private property in the vicinity of the relatively new light rail system in Santa Clara County. The California Supreme Court has recently ruled that benefits of public works projects, accruing to private property owners, may be considered in the calculus of damage assessment in a case of eminent domain. The need, therefore, of understanding the effect of light rail (LRT) on adjacent property value has taken on a new importance. Using hedonic price models, I demonstrate that property values within a certain distance of rail stations on the Santa Clara LRT system command higher rents than other properties in the county. Furthermore, beyond that distance, no statistically significant relationship between distance to rail and rental rates is observed. Hedonic models have been used to study the effects of rail investments on residential property, but there is a paucity of research on the 'other half' of the problem. This will be the most comprehensive study to date of LRT effects on commercial property.

FUNDING SOURCES AND EXPENDITURES

1999-2000 funding sources for the University of California Transportation Center were \$890,000 from the US DOT matched dollar-for-dollar by \$890,000 from the California Department of Transportation. Additional contributions not counted in this total include unbilled faculty and student time devoted to research projects, UC waiver of overhead on state funds, and most UC administrative services.

Approximately one-third of total revenues were spent on scholarships and fellowships with about the same amount spent on student salaries. Faculty salaries accounted for another 11 percent of the total. About nine percent of UCTC revenues were spent on administration including the Director's salary. The remaining funds were devoted to travel and expenses for research and conferences, with a small amount (3.61%) for university overhead.

Figure 1 illustrates revenues and Figure 2 illustrates expenditures for 1999-2000.

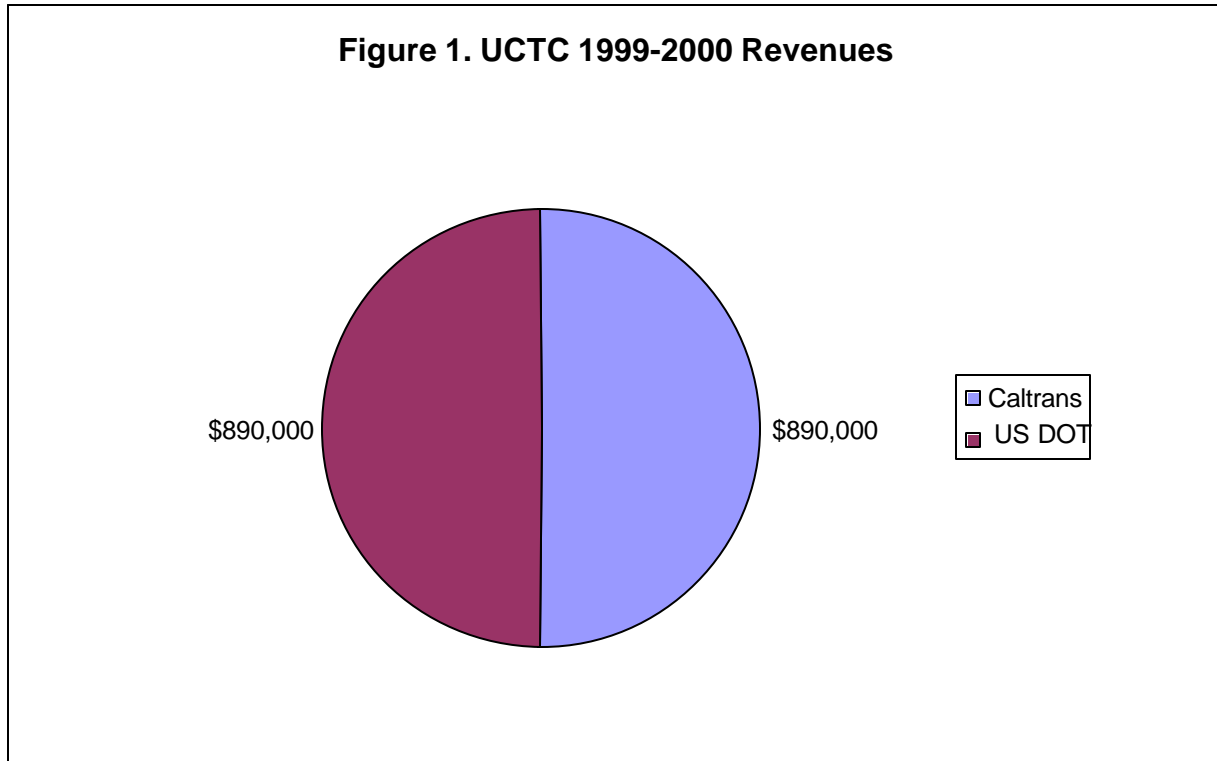
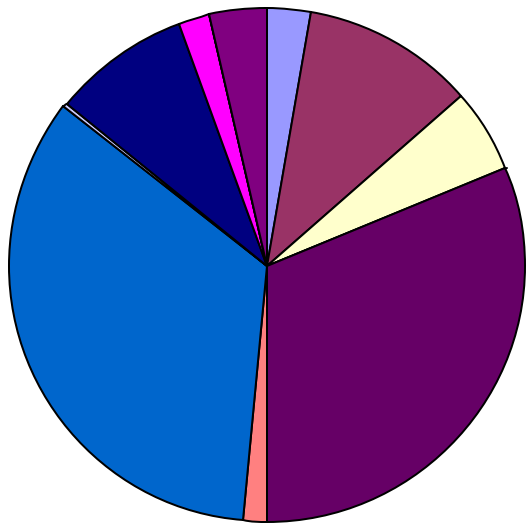


Figure 2. UCTC 1999-2000 Expenditures



- Center Director Salary
- Faculty Salaries
- Administrative Staff Salaries
- Student Salaries
- Staff Benefits
- Scholarships
- Permanent Equipment
- Expendable Property & Supplies
- Domestic Travel
- Facilities & Administrative (Indirect) Costs

Appendix 1. Glossary

ACCESS - the research magazine published by the University of California
CAD- computer-aided design
CALTRANS- the California Department of Transportation
CMA- Congestion Management Agency, special-purpose county-level organizations in California
EPA- the Environmental Protection Agency
FHWA- the Federal Highway Administration of the US Department of Transportation
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
GSR- graduate student researcher
IGS- the Institute of Governmental Studies at UC Berkeley
IITPS- the Norman Y. Mineta International Institute for Transportation Policy Studies at San Jose State University
ISTEA- the Intermodal Surface Transportation Efficiency Act
ITS - the Institute of Transportation Studies at the UC Berkeley, UC Davis, UC Irvine, and UCLA
IURD - the Institute of Urban and Regional Development at UC Berkeley
METTRANS- the Center for Metropolitan Transportation Studies at the University of Southern California
MPO- Metropolitan Planning Organization
NSF- National Science Foundation
OECD- the Organization for Economic Cooperation and Development
PATH- Program for Advanced Transit and Highways
PI- Principal Investigator
21- the Transportation Efficiency Act for the 21st Century
TRB- the Transportation Research Board
UC- the University of California, a nine-campus public institution
UC BERKELEY- the Berkeley campus of the University of California
UC DAVIS- the Davis campus of the University of California
UC IRVINE- the Irvine campus of the University of California
UCLA- the Los Angeles 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