



ANNUAL REPORT 1975



THE UNIVERSITY OF TEXAS AT AUSTIN

For Loan Only:
CTR Library

PREFACE

Dr. Thomas W. Kennedy and Dr. W. R. Hudson discuss CATS operations for the coming year.

1974-75* marks another significant year for the Council for Advanced Transportation Studies. We moved into new quarters in Ernest Cockrell, Jr. Hall which make it possible for us to serve our sponsors and our participating faculty members in a much better fashion. Also, during the past year, a number of new faculty members have joined our executive committee.

The year marked development in the academic endeavors of transportation on the campus. The awarding of an ENO Fellowship in the amount of \$7,000 was particularly significant.

Beginning September 1, 1975, Dr. Thomas W. Kennedy will assume the position of Director of Research for CATS while I am on research assignment in Brazil on a significant new project which we have developed in CATS. This effort is concerned with producing and evaluating highway cost relationship models in developing countries for the United Nations, the World Bank, and the Texas Research and Development Foundation. This contract, and other new research, is highlighted herein.

As you read this report, Dr. Kennedy has begun another exciting year with the Council. If you have any questions or suggestions for CATS activities, or concerning this report, please do not hesitate to call Dr. Kennedy or Drs. Betak and Cunningham, who ably serve as Assistant Directors for CATS.



W. R. Hudson
Director

*This year's Annual Report covers the academic year of 1974-75. Future Reports will be based on the academic year.



TABLE OF CONTENTS

PREFACE	1
SUMMARY OF EDUCATIONAL AND RESEARCH OBJECTIVES AND ACCOMPLISHMENTS	3
SELECTED HIGHLIGHTS DURING THE YEAR	5
COUNCIL STAFFING	7
RESEARCH ACTIVITIES	8
Department of Transportation	8
Other Projects	12
ANNOTATED BIBLIOGRAPHY OF PUBLICATIONS 1973-75	18
RESEARCH DEVELOPMENT AND PROPOSALS PENDING	33
MANAGEMENT OF RESEARCH PROGRAM	34
COOPERATIVE INTERACTION AND IMPLEMENTATION WITH GOVERNMENT, INDUSTRY AND EDUCATIONAL INSTITUTIONS	35
IMPLEMENTATION ACTIVITIES	36
GUEST LECTURERS FOR TRANSPORTATION SEMINAR SERIES—VISITORS TO THE COUNCIL	39
Guest Lecturers	40
Program Visitors	41
ACADEMIC PROGRAMS IN TRANSPORTATION	42
PERSONNEL INVOLVEMENT IN CATS	45
Research Staff	48
Administrative Staff	49

SUMMARY OF EDUCATIONAL AND RESEARCH OBJECTIVES AND ACCOMPLISHMENTS

The purpose of the Council for Advanced Transportation Studies, as well as its research and educational goals and accomplishments, is briefly stated as follows:

Mission or Purpose: The Council for Advanced Transportation Studies (CATS) at The University of Texas is a multidisciplinary organization which was formed to carry out research and educational programs in transportation. The program focuses on national, state and local transportation problems and provides an academic background for the development of professional careers in several fields of transportation. The Council provides a forum for faculty and student participation through close working relationships with industry and government agencies having common goals and interests in transportation education and research.

Research Goals and Objectives: The Council conducts multidisciplinary transportation research within The University and serves as a link between The University, industry, other universities and all levels of government for

interaction on transportation problems. The Council maintains awareness of the changing needs of the society by exchanging new transportation ideas with industry and government through meetings, conferences and seminars. A continuous effort is made to identify new transportation research possibilities for The University community, focusing on specific transportation needs to solve human problems.

Significant Research Accomplishments: The Council for Advanced Transportation Studies has in the past two and one-half years, developed the largest, single multidisciplinary Transportation Research Project funded by the Department of Transportation's Office of University Research. The function of the research outlined in this Program is to encourage multidisciplinary teams of researchers to attack transportation problems on a broad front. The University of Texas at Austin, through the Council, has a group of 25 faculty members from 13 disciplines in 11 schools and colleges who have become involved in this particular project.

In addition, five new research efforts have been initiated this past year. One project is the second phase of a research program with the U.S. Forest Service to develop a

Students and Principal Investigators meet to discuss progress on research topics.



system for the management and maintenance of Forest Service roads. Two of the new projects are funded by the University Research Program of the U.S. Department of Transportation. Another of the projects is a three and one-half year effort, funded through the World Bank, to assist Brazil in the development of its highway system. Finally, a program of research has just been initiated with the Texas Governor's Office of Traffic Safety on a wide spectrum of traffic safety-related problems. This latter project, again, exemplifies the broad multidisciplinary thrust of the Council in that it is expected to draw on expertise from across The University to accomplish its objectives.

Finally, four other small research projects, funded by The University through the Council, have been completed this past year. These projects have drawn on five disciplines, plus outside agencies, to treat a diverse set of topics—again, demonstrating the broad multidisciplinary scope of the Council.

Educational Goals and Objectives: The Council coordinates academic programs at the multidisciplinary level, bringing to bear the resources of The University's various Colleges and Schools upon national, state and local transportation problems. This focus provides an academic background for the development of professional careers in several fields of transportation. Multidisciplinary studies in transportation leading to masters and doctorate degrees may be accomplished through several academic programs within The University. Specific degrees in transportation are offered in: (1) The College of Engineering, (2) The College of Business Administration, and (3) The School of Architecture's Graduate Program in Community and Regional Planning. In addition, several other Colleges and Schools of The University offer programs where there is an emphasis on transportation problems, these include, Communications, Education, Law, the Lyndon B. Johnson School of Public Affairs, and Social and Behavioral Sciences. Most of these programs have been in existence for a number of years and they have, on many occasions, cooperated with each other in various educational and research projects as well. In addition, multidisciplinary graduate programs in transportation have been encouraged by some of the present graduate degree structures for a number of years.



Professor W. J. Dunlay, Jr. and students attending a graduate transportation seminar.

Academic programs are tailored to the background and career goals of the individual students. The desire is to meet the educational needs of students with diverse backgrounds desiring to work in transportation-related fields. The Council maintains awareness of the changing needs of the society by exchanging new transportation ideas with industry and government through meetings, conferences and seminars, which are all open to graduate and undergraduate students. A continuous effort is made by the Council to identify new transportation-related education possibilities, focusing on specific transportation needs to solve human problems.

Significant Academic Accomplishments: The Council for Advanced Transportation Studies has catalogued over ninety graduate and undergraduate courses throughout The University which fulfill some interest in transportation. The courses have been compiled and described in a regularly published brochure entitled "Academic Programs in Transportation." The Council has sponsored two University-wide seminars, one undergraduate and one graduate, in transportation. These seminars are open to students throughout The University, and have regularly drawn large numbers of students from diverse backgrounds. The undergraduate seminar is an introductory level course which provides a basic background for students interested in various transportation-related problems. The graduate seminar focuses on specific topics and themes. This seminar utilizes the expertise of many individuals both inside and outside The University. In the past year there have been 22 guest lecturers brought to the campus by the Council.

In addition to these seminars and the brochure, the Council has developed special graduate educational programs for foreign nationals at the request of outside funding agencies. These programs have been designed to offer foreign nationals specialized training in areas relevant to their country's particular transportation problems. The options have ranged from degree-specific courses to non-degree courses with a fixed period of relevant field experience in various modal industries. Likewise, the Council is sponsoring two introductory level courses for the 1975-76 Fall and Spring semesters on Traffic Safety Management. These courses are specifically tailored to meet the needs of the State of Texas' district level representatives of the Governor's Office on Traffic Safety. At the same time, the Council is currently in the process of identifying core courses for specific types of transportation-related educational programs. After completion of this task, materials will be prepared to assist undergraduate and graduate advisors, as well as students, in the process of developing appropriate educational programs which will help the students obtain their educational goals in transportation studies.

Finally, related to all of the above, the Council has actively sought to identify sources of financial aid for students interested in transportation studies. While it has identified many such sources, the most outstanding of these has been the designation of the Council as the administrative body for the prestigious ENO Transportation Foundation Fellowship for graduate studies in Transportation. The Fellowship/Scholarship Committee of the Council, after screening several applicants, has awarded this \$7,000 Fellowship to Mr. Thomas W. Horne, an outstanding graduate student in Civil Engineering. The applicants for this award were drawn from a variety of disciplines both within and without The University. Indicative of the quality of applicants is the fact that the four finalists represented four different disciplines, and each student had a straight A graduate grade point average. Closely related to this type of financial aid to students has been the involvement of over forty graduate and undergraduate students in research projects sponsored through the Council. In addition to the obvious direct training and skills in specific aspects of transportation, 15 graduate theses, dissertations, and professional reports have resulted directly from this student involvement.

SELECTED HIGHLIGHTS DURING THE YEAR

*To date, CATS has published 33 Research Reports, 24 Research Memos, and 3 Miscellaneous publications. During the year 16 papers were published by faculty related to the program, 9 oral presentations were made and 7 theses were produced under CATS sponsorship. A complete list of CATS publications is included herein.

*In October, a conference was jointly sponsored by the Texas Transportation Institute of Texas A&M University and the Council for Advanced Transportation Studies of The University of Texas at Austin. The theme of the conference was the "Long Range Implications of Scarce, Expensive Energy on Transportation." Over 100 people attended the conference. A conference proceedings was published and distributed to various state agencies and organizations. The list of speakers and panelists was especially impressive, with 20 participants from federal, state, regional and local agencies and private organizations. One measure of the significance attached to this conference by non-university individuals is that four U.S. Congressmen attended the sessions, plus the Deputy Director of Research for the National Science Foundation and other similar individuals.

*In December, a two day review session was held on the U.S. Department of Transportation University Research Program Project. This review saw the Assistant Director of the Office of Policy Review, the University Research Program Director, the Texas Project Monitor and two topic monitors interacting with the principal investigators, students, and personnel from outside agencies involved in the UT project, which is focused on the transportation problems in the rural environment. The DOT visitors also met with various University officials and the Council's Executive Committee during this time. The session resulted in an excellent exchange of ideas and information.

*In May, the Council received a contract continuation at \$273,000 from the Department of Transportation for research on "Transportation to Fulfill Human Needs in the Rural/Urban Environment." University contributed funds and services totaled \$54,600.



Professors W. R. Hudson, Thomas W. Kennedy and B. Frank McCullough conduct panel discussion on transportation with various Mexican civil engineers.

*In August, a one day briefing session on "Transportation to Fulfill Human Needs in the Rural/Urban Environment" was held with the sponsor's personnel. The representatives were the Texas Project Monitor and one Topic Monitor. This session included interaction with Principal Investigators, students, and personnel from outside agencies.

Foreign Recognition: During the year several members of the Council were invited to participate in foreign meetings, lectures and seminars.

*In December 1974, Dr. Pat Burnett, Assistant Professor of Geography, presented an invited paper to the Quantitative Commission meetings of the International Geographical Union in Palmerston North, New Zealand. Dr. Burnett also participated in discussions on the format and program for the 1976 IGU Congress to be held in Moscow, Russia.

*In February 1975, Dr. W. R. Hudson visited road research laboratories in England, France, South Africa and Australia to explore the possibility of obtaining personnel

to cooperate with a Brazilian team for the purpose of a three and one-half year study in Brazil.

*In July 1975, a three and one-half year study sponsored by the Brazilian Government, the United Nations Development Program, the International Bank for Reconstruction and Development and the Texas Research and Development Foundation was begun with Dr. Hudson as the Technical Director.

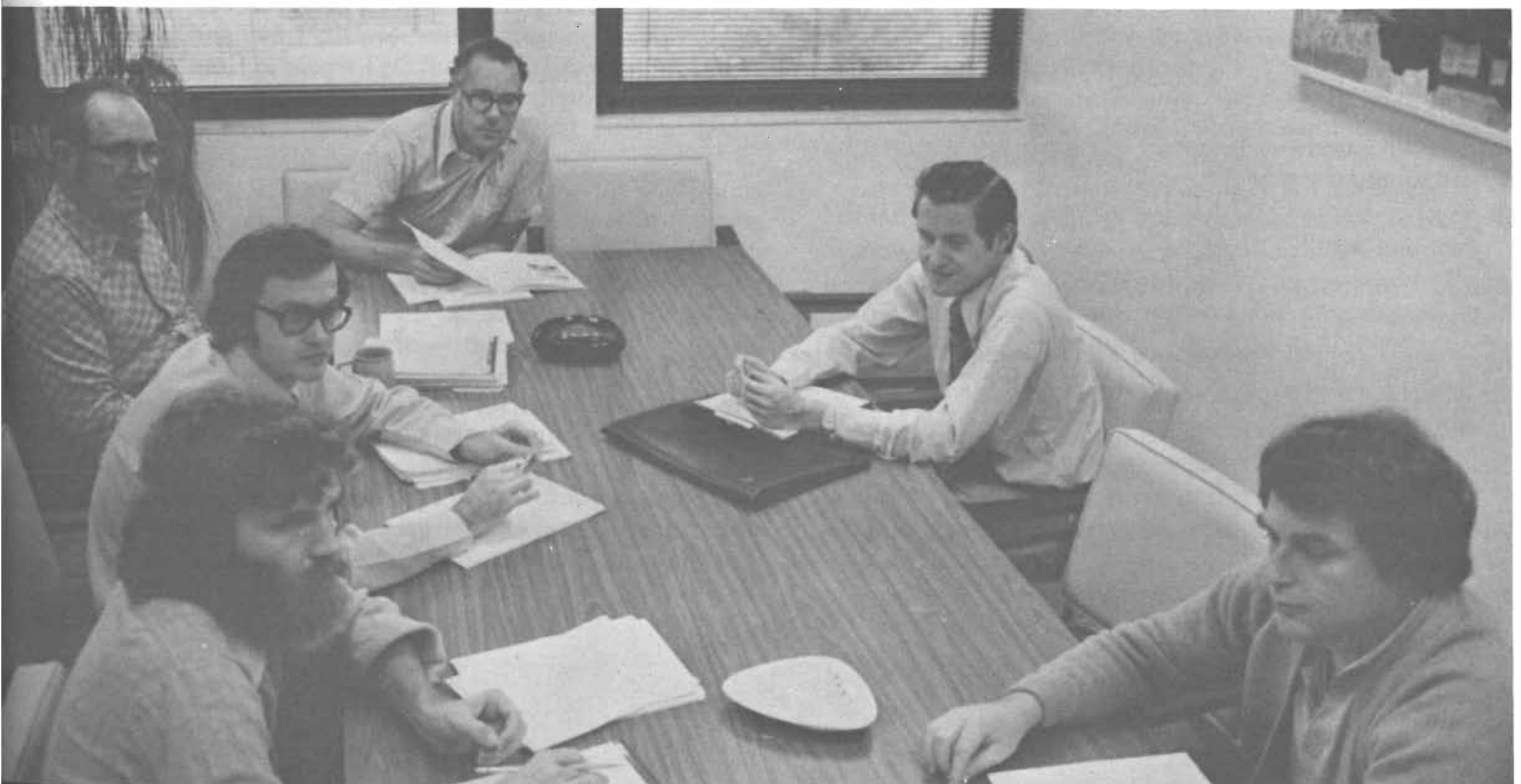
*In August 1975, Professors W. R. Hudson, Thomas W. Kennedy, and B. Frank McCullough conducted the 2nd Annual Transportation Engineering Conference in Puebla, Mexico. They, together with three University of Texas Civil Engineering graduate students—Enrique Jimenez, Felipe Vallejo and Joaquin Vallejo (who assisted in the conference and translated the major papers into Spanish), acquainted Mexican engineers with modern U.S. transportation methods. More than 100 civil engineers from several Mexican states, federal transportation agencies in Mexico and the National University of Mexico-Institute of Engineering attended sessions conducted by Professors Hudson, Kennedy, and McCullough on the design of low-volume roads, rehabilitation of existing pavements, airport design, and the evaluation of pavement materials.

COUNCIL STAFFING

The research sponsored through CATS is presently staffed by full-time faculty members and students and a minimum of non-teaching staff. This is in keeping with the goals and objectives of The University to keep research related closely to academic programs. The project staff reports directly to the Office of the President through the Council's Executive Committee. For the past two and one-half years, Dr. W. R. Hudson has served as Director of Research of CATS. Hudson is a Professor of Civil Engineering, with teaching duties in Transportation. He also has solid administrative ability, as demonstrated by his experience as Associate Dean of Engineering and as Acting Director for the Center for Highway Research. Beginning in September 1975, Dr. Thomas W. Kennedy will serve as Director of Research while Dr. Hudson is on research assignment in Brazil. Dr. Kennedy has previously served as

Assistant Chairman of the Department of Civil Engineering and is an able administrator. He is also a Professor of Civil Engineering. Dr. John Betak is Assistant Director of Research. Betak is a professional planner and geographer with several years experience in teaching, transportation research and research administration. He joined us from a position as Assistant Professor of Geography at McMaster University, Hamilton, Ontario, Canada. Dr. Grover Cunningham joined the Council in November 1974 as Assistant Director of Social Science Research. Cunningham is a psychologist, lawyer, and certified public accountant. He also has several years of experience in research and research administration. Prior to joining us, Dr. Cunningham was president of Evaluation Research Associates, Inc., an Austin-based consulting firm. Dr. David A. Sands joined the Council in August 1975 as assistant director of our Traffic Safety Management program. Prior to coming to CATS Dr. Sands served as Director of the Institute of Alcohol Studies at The University of Texas at Austin and has had extensive experience in public service management. Before returning to The University in 1972 he was Assistant Vice President of Texas Tech School of Medicine. In addition, he has taught graduate level courses at The University of Texas at Austin, the University of Nevada at Las Vegas, and Stanford University.

Dr. John F. Betak, Professor W. J. Dunlay, Jr., Dr. Grover Cunningham, Professor John Shortreed, Mr. Charles P. Zlatkovich and Professor C. Michael Walton meet to discuss CATS research projects.



The key research team consists of principal investigators from various disciplines as follows:

Dr. C. Michael Walton, Assistant Professor of Civil Engineering-Transportation,
Dr. Ronald Briggs, Assistant Professor of Geography,
Professor Robert Means, Professor of Law,
Professor Richard Dodge, Associate Professor of Architecture-Planning,
Dr. Mark Alpert, Associate Professor of Business-Marketing,
Dr. Stanley Arbingast, Professor of Business Administration-Director, Bureau of Business Research,
Dr. Anthony Healey, Associate Professor of Mechanical Engineering,
Dr. Pat Burnett, Assistant Professor of Geography,
Dr. William Dunlay, Assistant Professor of Civil Engineering,
Mr. Charles P. Zlatkovich, Research Associate, Bureau of Business Research,
Dr. Shane Davies, Associate Professor of Geography,
Dr. Paul Jensen, Associate Professor of Mechanical Engineering,
Dr. James Fitzsimmons, Associate Professor of Management,
Dr. Carol Deets, Associate Professor of Nursing,
Dr. Charles T. Clark, Associate Professor of Business Statistics,
Dr. Ronald Stearman, Professor of Aerospace Engineering and Engineering Mechanics,
Dr. Larry Hoberock, Assistant Professor of Mechanical Engineering,
Dr. C. C. Smith, Assistant Professor of Mechanical Engineering,
Dr. Robert Young, Professor of Psychology,
Dr. Linda L. Golden, Assistant Professor of Marketing Administration,
Dr. John Shortreed, Visiting Associate Professor of Civil Engineering, and
Dr. B. Frank McCullough, Associate Professor of Civil Engineering.

RESEARCH ACTIVITIES

During this past year, the breadth of the research activity has more than doubled in terms of number of projects. The variety of participation across the campus continues to increase.

The major effort of the Council for Advanced Transportation Studies for the 1974-75 year has been the successful continuation of a large research program with the U.S. Department of Transportation.

In addition to the large DOT contract, a number of other research efforts are also being conducted as follows:

- (1) Pavement Management System for Forest Service Roads—W. R. Hudson, Civil Engineering, B. F. McCullough, Civil Engineering
- (2) System Analysis Procedure for Estimating the Capacity of an Airport—B. F. McCullough, Civil Engineering, William Dunlay, Civil Engineering
- (3) Ride Quality Studies on Ground-Based Transportation Systems—A. J. Healey, Mechanical Engineering, Craig C. Smith, Mechanical Engineering
- (4) Brazil Research on the Interrelationships Between Costs of Highway Construction, Maintenance and Utilization—W. R. Hudson, Civil Engineering
- (5) Traffic Safety Management Program—T. W. Kennedy, Civil Engineering, David Sands, CATS

U.S. Department of Transportation Contract "TRANSPORTATION TO FULFILL HUMAN NEEDS IN THE RURAL/URBAN ENVIRONMENT"

Completion: June 1976

Problem Statement: Several areas of the United States can be characterized as rural or sparsely populated in which large, widely spaced urban centers exist. Texas, for example, has an area of 267,000 square miles, 11 million people and contains 25 Standard Metropolitan Statistical Areas (SMSA), with 6 urban areas exceeding 250,000.



Representatives of the Department of Transportation's University Research Program meet with principal investigators, students and personnel from outside agencies to exchange ideas and information relating to the DOT project.

These rural/urban areas include not only the Southwest, but portions of the Southeast, Midwest, and Farwest. These regions face not only the typical problems associated with travel in dense urban areas, but also the problems of intra-rural and inter-urban travel. Thus, the importance of a balanced transportation system takes on special significance in such an environment.

Transportation research and development should be directed toward solving human problems. In the past, new technology has sometimes been applied without adequate consideration of human needs. It is now essential that we carefully consider human needs in the development of transportation systems for the 1970's and 1980's, particularly with regard to personal mobility and the movement of goods and related essential services.

A large, well-directed, multidisciplinary university program can assist with these efforts by bringing together balanced, multidisciplinary teams of faculty and students to study the problems and interact with state and local governments and industry in defining and solving them. The training of college graduates in the transportation field is of crucial importance to this issue.

This project is establishing a broad basis for continuing interaction and research in transportation with industry and federal, state and local government agencies. As outlined above, a general theme has been selected for developing a program of research which will help solve long-range problems, while at the same time providing immediate useful results for the sponsors.

The broad objective of the program is to work with the sponsors and cooperating agencies to solve problems related to human and transportation needs in the rural/urban environment, as typified by the great Southwest. Thus, a variety of research can be accomplished keeping in mind the needs of both the urban

and rural traveling public. In this second year, the program expanded to a group of six objectives as outlined below.

A series of 33 Research Reports, 24 Research Memos and several other documents have been produced by this project. These are summarized in the section on publications.

Access to Essential Services (Topic I) The concern of this topic is with the role of transportation in providing accessibility to essential services, both emergency and ongoing, for the rural and needy populations. Emergency services include fire and police protection and emergency medical assistance. Ongoing services include education, social and rehabilitation services, and health care.

Inequality in the availability of essential services between rural and urban areas is being studied. The inequality is probably a consequence of the inability of the dispersed rural population to generate a tax base or demand concentration sufficient to provide a dense network of facilities. However, transportation techniques must be developed to make essential services readily available to the rural and needy populations.

Existing research is deficient because of its failures to consider the interrelationships of essential services and recognize the complete interdependences between the demand for essential services, the demand for transportation, the location of the population, and the location of service facilities. Present studies have not adequately considered the viability of such innovative approaches as regional service centers or mobile facilities.

The research strategy comprised three major subsections: First, the spatial demand for transportation, as derived from the demand for services themselves, was studied; Second, alternate systems of supply were generated; Third, an evaluatory capability for determining the viability and relative efficiency of alternative supply systems has been developed using cost-benefit and spatial allocation models. Throughout the study, a variety of disciplines have been involved. This topic is now essentially complete.



An intermodal freight terminal in Dallas, Texas.

The Influence on the Rural Environment of Interurban Transportation Systems (Topic II) It is essential to develop a skill in evaluating, and perhaps influencing, the potential for growth and development of rural communities to generate new vitality. This vitality is essential if the flow of residents from rural to urban America is to be checked or reversed.

This research is directed at developing a quantitative model capable of expressing a rural community's potential for growth and development as influenced by the connectiveness of the community to interurban transportation systems.

Using selected communities in Eastern Texas and locally available sources of data, a predictive model relating the variables in three descriptive models will be formed. This model will provide the information necessary to reasonably anticipate the direction of future growth and development.

Research during the first year was comprised of an extensive literature review and data collection on land values, land use, business activity, the transportation system, and other economic and social indicators for a single case study community. The second year's research focused on the formulation of a preliminary hypothesis describing how, and to what extent, changes in the social and political characteristics of a community may interact

with changes in transportation to alter and direct a rural community's opportunity for growth and development. The third year's research is concerned with developing two types of manuals for use by professional planners and local citizenry. These manuals will provide a distillation of the first two years' work, plus a mechanism for assisting both professionals and non-professionals in using the research results. These manuals are being developed in cooperation with the Texas Department of Community Affairs and selected rural communities.

Intermodal Freight Transportation in the Southwest (Topic III-A) The purpose of this topic is to determine ways in which intermodal freight transportation in the Southwest can be improved. During the first year the study focused on the Dallas-Fort Worth Economic Area, designated by the U.S. Office of Business Economics as consisting of 24 counties in Texas and two in Oklahoma. In the second year the study was expanded to include Arkansas, Louisiana, Oklahoma, and Texas, designated as the West South Central states by the U.S. Bureau of Census. In addition to this effort, legal research has been completed on aspects of air and rail transportation in Texas. Specific recommendations have been published regarding improved freight transportation and modernized rail lines. This topic is now complete.

Monitoring the Effects of the Dallas-Fort Worth Regional Airport (Topic III-B) The major goal of this research topic is the development of a detailed plan for monitoring the impacts of a major new transportation facility—the Dallas-Fort Worth Regional Airport. Two types of impacts are of particular interest in this research: (1) impacts on the growth of the Dallas-Fort Worth SMSA, and (2) impacts of the new airport on the transportation patterns in the Dallas-Fort Worth Economic Area and the Southwest.

The first task has two major goals:

- (1) to develop measurement technique which isolate a few key variables describing the effects of airport investment on the SMSA, and to analyze the inter-relationships between the variables over space and time, and
- (2) to develop models of the kinds of conflict which arise between governmental agencies, large corporate industries and residential property owners

over the development of land in the vicinity of the airport, together with models of the decision processes whereby such conflicts are resolved and generate urban growth and change.

The second task is concerned with developing preliminary models for estimating changes in the ground transportation patterns. These models will be made more sophisticated by including:

- (1) changes in ground modal split caused by the new airport location and the availability of new transit facilities such as SURTRAN and/or U-TACV,
- (2) shifts in mode choice between air and ground modes for regional intercity transportation caused by the new airport locations,
- (3) changes in trip generations due to changes in the numbers and types of airline flight schedules available, and
- (4) changes in trip distribution resulting from land-use changes as studied in Task 1 of this research topic.

To complete this topic, these models will be finalized and tested against available data for both major concerns.

Survey of travel at DFW Airport aids in determining the effects of the new facility.



Evaluation of Ride Quality in Multimodal Systems (Topic IV) A great deal of information is needed by way of evaluation to determine what the transportation user likes or dislikes about a particular ride or mode of transport.

Improvement of transportation facilities is necessary for the continued development of any region. A stated goal of the Texas State and Regional Planning Boards is to "develop a balanced transportation system for the regions by combining various modes of travel and technologies for the maximum convenience and efficiency and minimum confusion and congestion in the movement of people and goods."

Movement of people assumes that a system will provide safety and convenience with reasonable comfort. In an area such as the Southwest major centers separated by distances of approximately 200 miles are frequent, and travel times of two hours or more may be expected with new modes of ground transportation. A high-quality ride for that time duration is essential if popular use of any system is to be maintained.

The major objectives of the work described are to: analyze existing ride quality criteria in use for all modes, seek a common basis, and determine if, and to what extent, a common set of criteria can be used for the dual purpose of guideway and vehicle design. These criteria are to be evaluated in relation to the human attitude responses about ride quality. The common set will then be used in studies of TACV and lower speed pneumatic tire vehicle systems so that design criteria may be established for

- (1) pavement or guiding surfaces,
- (2) controlled suspension and steering subsystems, and
- (3) overall system controls.

Research on this topic is continuing under separate contracts.

Human Response in the Evaluation of Modal Choice Decisions (Topic V) Based on an evaluation of existing modes, using key determinant procedures, several types of work are in progress:

- (1) recommendations will be proposed to Austin Transit for implementation into the system,
- (2) further refinement of the measures, key determinant attributes, found during the first two years of study will be made, with special attention given to those attributes which local authorities are interested in acting upon,
- (3) longitudinal studies of changes in attributes toward determinant attributes, transit funding, etc. will be undertaken,
- (4) various analytical procedures (e.g., factor analysis, regression analysis, etc.) will be used to investigate changes in attributes of transportation modes and promotional messages to effect rider and voter responses.

In the third year, this topic focuses on the longitudinal work and evaluates changes (if any) in determinant attributes for mode choice decisions. This work will include the use of various forms of trade-off analysis to ascertain the levels of certain attributes which riders and potential riders are willing to "give up" or trade-off for other attributes.

OTHER PROJECTS

Project: **Pavement Management System for Forest Service Roads**

Co-Principal Investigators: W. R. Hudson, Civil Engineering, B. F. McCullough, Civil Engineering

Graduate Student,

Research Assistant: Enrique Jimenez, Civil Engineering

Computer Programmer,

Research Associate: Grover Cunningham, CATS

Statistician, Research Engineer: Hugh Williamson, CATS

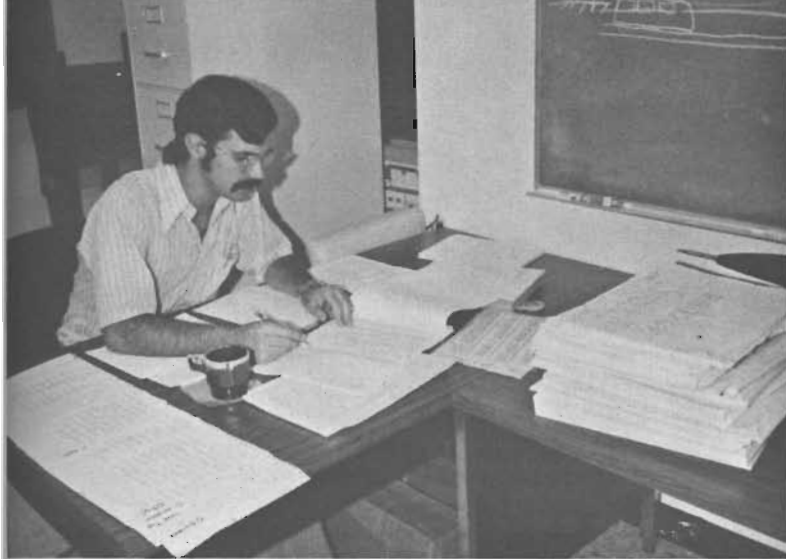
Sponsor: U.S. Forest Service

Completion: August 1976

The National Forest Service maintains over 200,000 miles of roads throughout the United States. These low volume roads—ranging from narrow, unsurfaced roads to two lane asphalt concrete, paved roads—serve as access roads to recreational and timber land areas. In addition to these, another 136,000 miles of Forest Service roads are planned for construction in future years. Because of the difficulty involved in efficiently designing and maintaining road pavements in such an extensive system, the National Forest Service is sponsoring a research project with the objective of developing and implementing a working pavement design and management system for low volume Forest Service Roads.

The first year of this project was devoted to the formulation of a preliminary conceptual system. To do this, it was necessary to study the parameters and constraints involved in the problem. Therefore, a comprehensive literature review to gather necessary background material was initiated and is now complete. In addition to this literature review, extensive interaction between Forest Service personnel and the project staff has been required, in the form of field visits and project conferences to discuss some of the many complexities of the problem. With the synthesis of information the preliminary conceptual system will be developed.

This conceptual system has been accepted by the Forest Service. The program is now entering Phase 2 of the project—the development of the actual pavement design and management system, including mathematical models



Graduate student Thomas G. Caffery analyzes computer output in relation to the preliminary airport system model.

and other information that are needed for optimization. Phase 2 will also include considerable interaction with Forest Service personnel to obtain field input into the various subsystems of the model, which past work in related efforts has shown to be essential. This will then be followed by Phase 3—the preparation of training materials and implementation of the design and management system on a trial basis in selected Forest Service management areas.

The first phase of this project has been presented in Research Report 12, which is abstracted later in this Annual Report.

Project: A Systems Analysis Procedure for Estimating the Capacity of an Airport

Co-Principal Investigators: William J. Dunlay, Jr., Civil Engineering, and B. Frank McCullough, Civil Engineering

Sponsor: Department of Transportation
Completion: June 1976

Past research on airport capacity has focused on the air-side facilities of an airport, in particular, the runways. This research proposes to take a broader "systems" view of the airport capacity problem by investigating the capacities of the other elements of the airport system (e.g., taxiway, gates, passenger lounges, baggage handling, ticketing, parking, access, egress, etc.). In this way the capacities of the various components of the airport system may be brought into balance.

The initial step in this research is to identify the components and boundaries of the airport system. Following this, a precise definition of airport capacity that applies equally well to the airport as a whole and to all of its components will be developed. In conducting this research,

some reliance must be placed on existing models for estimating the capacities of the various airport system components. Minor modifications will be made, however, and preliminary models will be developed for those components for which there are no existing capacity models.

Where appropriate, models will be developed for estimating the capacities of the interfaces between airport system components. The overall system model will be constructed in modular form by integrating the component and interface models. Finally, a sensitivity analysis of the various system components will be performed to aid in the development of an upgraded, second generation model. Through use of the data collected during this research, the estimation models will be both refined and validated, and recommendations for future research will be made. A discussion of current models and methods is contained in Research Memo 24, which is précis later in this Annual Report.

Project: Ride Quality Studies on Ground-Based Transportation Systems

Co-Principal Investigators: Anthony J. Healey, Mechanical Engineering, and Craig C. Smith, Mechanical Engineering

Sponsor: Department of Transportation
Completion: June 1977

The ability to predict the riding quality of any mode of public transportation in its design stages is an important step in determining the general acceptance of the system by the traveling public, and in estimating the overall system cost. An ongoing study presently underway at the Council for Advanced Transportation Studies under Topic IV of the large Department of Transportation project has examined existing ride quality criteria in automobiles. By employing modifications to existing criteria, newly proposed methods have been developed that are able to predict passenger response in automobiles with a high degree of correlation.

The present study will extend the above criteria to examine ride quality effects on other types of vehicles which may have significantly different environmental inputs to passenger riding comfort than does the automobile. A major portion of the research will be conducted using the

Dallas/Ft. Worth Airport AIRTRAINS System. Actual field tests will be used in the evaluation of the analytical riding quality prediction techniques.

This study will consist of two separate but closely related projects which will be conducted simultaneously. One project will be the development of dynamic models and simulation techniques which will predict vehicle and/or passenger vibrations appropriate to ride quality for given vehicle inputs (including guideway surface and sidewall roughness, forces exerted on the vehicle by power pickup apparatus, etc.). These models will be useful in understanding the general character of passenger and vehicle vibrations (or ride quality), and also in developing methods of improving ride quality for such systems.

The other project will include obtaining vehicle vertical, lateral, and possibly longitudinal vibrations, and conducting passenger subjective rating sessions. Appropriate filtering and regression techniques will be used to correlate the spectra of the measured vibrations with the subjective ratings, thus extending the ride criterion being developed to include lateral effects.

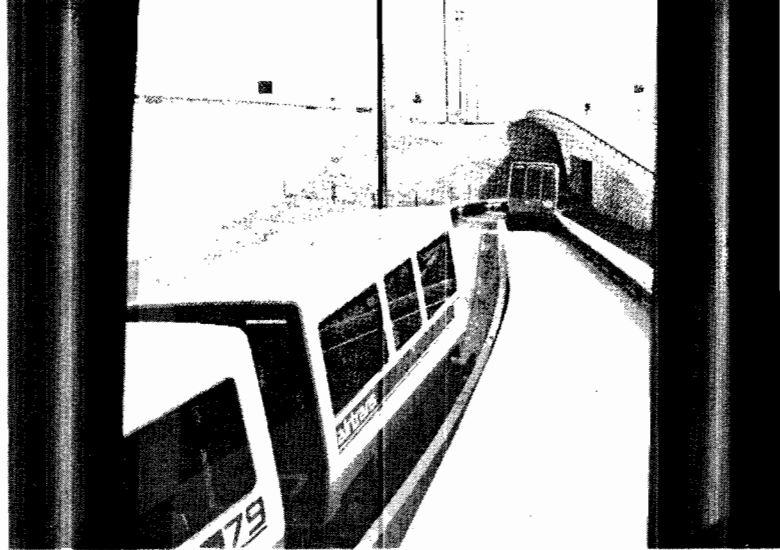
Project: Brazil Research on the Interrelationships Between Costs of Highway Construction, Maintenance and Utilization

Principal Investigator: W. R. Hudson, Director of Research, Council for Advanced Transportation Studies

Sponsors: International Bank for Reconstruction and Development, Government of Brazil, United Nations Development Program and the Texas Research and Development Foundation

Completion: September 1979

This project is part of a continuing large research program by the World Bank, the United Nations and several countries to develop improved highway project planning models for low volume roads in developing countries, taking into account the costs of construction, maintenance and utilization. The program involves the collection and analysis of empirical data on road design, road deterioration, and maintenance cost and road user consequences. The data are to be used in a highway project planning model with the objective of optimizing road



investment, maintenance and road user cost in developing countries. Previous components of the program have included: (1) the development of preliminary models, (2) the collection of empirical data and modification of models in Kenya, and (3) a phase of the study which will begin soon in India. This project or study in Brazil, the largest and final phase of the program, will pull together findings from the previous phases.

The objectives of the study in Brazil are:

- (1) to establish the relationships between vehicle operating costs, road geometric standards and surface conditions for rural roads; included will be an exploratory study on vehicle speed-flow relationships,
- (2) to measure the relationship of road deterioration and maintenance costs as a function of roadbed and surface design standards for rural roads and climatic conditions typical of Brazil,
- (3) to adapt and test the mathematical model developed by MIT and TRRL to a Brazilian computer using parameters developed in (1) and (2) above, and
- (4) to lay the foundation for a continuing capability for applied highway research in Brazil.

Project: Traffic Safety Management Program

Co-Principal Investigators: Thomas W. Kennedy, Civil Engineering and Director of Research, Council for Advanced Transportation Studies, and David A. Sands, Council for Advanced Transportation Studies

Sponsor: Governor of Texas, Office of Traffic Safety

Completion of Initial Phase: August 31, 1976

With encouragement from both faculty and administration, President Ad Interim Lorene Rogers authorized the establishment of a Traffic Safety Management Program within the Council for Advanced Transportation Studies. This office will provide a focal point for expanding educational programs, information collection and dissemination activities, and research projects on traffic safety for The University. Programs, services, and projects will be directed toward local, state, national, and international traffic safety concerns. This is to be an on-going project, with activities during the first year of operation stressing planning and development of the operational capability to provide products and services in the three thrusts of education, information, and research.

Educational programs will include the development and operation of two six-week basic Traffic Safety Management courses, along with several short-term seminars and laboratories. Information services will be planned and initial development will be undertaken toward:

- (1) an information center with catalogued reports, studies, analyses, and publications,
- (2) systems designed and put into operation to evaluate the accuracy, validity, and applicability of documents and materials, and
- (3) initial dissemination procedures and vehicles.

Research and development activities will require the identification of University capability and faculty interest in a broad spectrum of areas where knowledge is not otherwise available or being developed. Selected research activities will be funded and undertaken during the year.

CATS' traffic safety management program is presently being underwritten with state and federal funds through a \$300,200 contract with the Governor of Texas, Office of Traffic Safety.

Project: Analysis of Effectiveness of Transportation Alternatives

Principal Investigator: Sandra Rosenbloom, Community and Regional Planning

Sponsor: Council for Advanced Transportation Studies

Completed: December 1974

In January 1974, at the request of The University of Texas ad hoc Energy Conservation Committee, the Graduate Program in Community and Regional Planning undertook

a survey of the full-time faculty and staff of The University to determine their interest in both carpooling and bus alternatives to their usual mode of home-to-work travel. Over 65% of the slightly under 10,000 persons surveyed returned completed questionnaires. A special program was written to collect and analyze these data. Three separate carpooling matching routines were run for the University community.

The research focused on two problems (1) evaluation of the effectiveness of the carpool matching service, and (2) an analysis of the need for special bus services. The first part is essentially a concern for short-term immediate improvements directly attributable to the matching of interested carpoolers. This study had a three-part design: (1) a "before-and-after" survey of vehicle occupancy and traffic congestion in the immediate University location, (2) a sample survey of those who indicated carpool interest to determine what actually happened to their usual travel patterns, and (3) an investigation of the personal and social constraints inhibiting the use of alternative transportation modes for University personnel.

The second major part of this topic involved a detailed analysis of the questionnaire responses indicating interest in special bus services. Several bus options were investigated, using the survey data to set the parameters, in order to study the effectiveness of proposed systems such as demand-activated transit, subscription home-to-work services, and new bus routing. This work is reported in Research Report 11, an abstract of which is presented in a later section of this Annual Report.



Project: **Transportation Services for the Mentally Retarded**

Co-Principal Investigators: C. Shane Davies, Geography,
and John W. Carley, Austin
State School

Sponsors: Council for Advanced Transportation Studies
and Austin State School

Completed: December 1974

Within the past three years, the traditional concept of habitation for the mentally retarded has been seriously challenged, if not replaced, by the principle of normalization. Representatives from the Texas Department of Mental Health and Mental Retardation, in cooperation with parents and representatives from all agencies serving the mentally retarded in Travis County, conducted a survey to determine the services required to meet the needs of the mentally retarded. This committee endorsed transportation as the priority service due to its interrelatedness with all other proposed and existing services.

This project was concerned with the examination of the factors that influence transportation within the context of normalization as it relates to the mentally retarded in Travis County. The mentally retarded referred to in this project are categorized as those individuals who demonstrate the potential for community living.

Therefore, the intent of this research project is to provide: (1) a detailed delineation of the problems created by the present transportation system, (2) an in-depth literature review to obtain a global frame of reference to the problem, (3) a training curriculum in transportation, and (4) implementation of specific recommendations so that the lives of the retarded will no longer be defined by a transportation system. The results of the study are presented in Research Report 17, which is abstracted later in this Annual Report.

Project: **A Plausible Scenario for the Development of a Comprehensive Transportation System Using the Austin-Travis County Area as an Illustrative Case**

Principal Investigator: Robert Mather, Architecture

Sponsor: Council for Advanced Transportation Studies

Completion: 1975

Since 1971, an economical and comprehensive methodology for understanding the future implications of planning and technological decisions being made or considered in the present has been developed. This work has postulated, in a quantitative and qualitative sense, the performance of the total environment of Austin-Travis County in the mid 21st century. Working backward from this 21st century environment, a plausible scenario of development, involving both the public and private sector of the economy, has been produced.

This topic is translating this material into transportation system terms and then developing this aspect of the project to yield a chart which displays, for the next seventy-five years (more or less), a plausible development sequence for an Austin-Travis County transportation system. The particular focus in this effort is on two facets: (1) human problems and the role of transportation in solving them, and (2) the influence on the environment of both physical and operational changes in transportation. Topics I, II and V of the main Department of Transportation project are providing inputs into this research effort.

Project: **Gasoline Retailers' Right to Survival**

Principal Investigator: James M. Treece, Law

Sponsor: Council for Advanced Transportation Studies

Completion: 1975

This project is concerned with the legal and economic institutions surrounding gasoline retail operations. The following two problems characterize the issues of concern in this project:

(1) The production and transportation to refineries of a scarce resource, petroleum, can be regulated and its refinement controlled by a small number of interdependent firms and regulatory agencies. On the other hand, the task of distributing the end product to consumers, with its attendant risks and small profit margins, can be shifted to small businesses who invest in the property, equipment and personnel needed for the retail function.

(2) The law of franchising permits refiners to induce independent business-persons to invest in the retail outlets without at the same time guaranteeing them the freedom of decision about the products, prices, and services.

Refiners require, and the law permits them to require, heavy dependence from their "independent" co-enterprisers. But when times change, refiners willingly seize upon the label "independent" to terminate trade relationships with their licensee.

Project: The Energy Crisis and Its Effects on Texas' Highway Accident Experience

Co-Principal Investigators: Edward L. Frome, Statistics-Operations Research, and C. Michael Walton, Civil Engineering

Sponsor: Council for Advanced Transportation Studies

Completed: February 1975

There is wide acceptance that the energy crisis, which led to the maximum speed of 55 miles per hour on Texas Highways, has had a significant effect on accident experience. In fact, statements have been made that the number of accidents and fatalities have been greatly reduced.

This topic has investigated the severity of accidents on rural Texas Highways "before" and "after" the change in legal speed limits. Highway accidents are classified as fatal, injury, or property damage only accidents. The study investigated the change in accident severity and types that occurred on specific highway classes, i.e., interstate, primary, secondary, and state system. A regression model was used for this analysis. However, the usual regression techniques were modified under the assumption that accidents are poisson-distributed, with the expected value defined by the regression model. The results are reported in Research Memorandum 12.

Project: Where the Buses Are

Co-Principal Investigators: Wayne Danielson, Dean, College of Communication, Alfred Smith, Director, Center for Communications Research, and Charles Watkins, Research Associate

Sponsor: Council for Advanced Transportation Studies

Completed: 1975

Fuel shortages, urban congestion, and pollution increase the importance of getting the public to use mass transportation. Middle and upper class patrons of public transportation are more likely to be casual users, with an emphasis upon non-peak hour times. It has been observed in studies in Pittsburgh that casual riders need more information about bus schedules than is normally available if they are to use this form of public transportation.

The focus of this topic is to increase the patronage of casual, non-peak hour, middle class riders of buses. In the present stage, the project focuses on a feasibility study designed to test various forms of visual displays in cable television. The series of questions investigated includes:

(1) Should the information on where the buses are be displayed next to the time and temperature information on cable television, or on some separate channel?

(2) If the schedule display is presented with time and temperatures, should it appear at the end of the scan or in the middle?

(3) Which kinds of displays are most effective with middle and upper class patrons?

This task is closely coordinated with Topic V of the DOT project.

The project focused essentially on questions (1) and (2), while question (3) and similar sorts of questions were not addressed because it was discovered that any attempt to compact minimally adequate ride information into the small time frame available for public information would severely tax the information capacity of the channel and the viewer. In addition, the display options investigated proved to have very high costs. Thus, until satisfactory solutions to the cost and channel capacity problems can be discovered, questions regarding ridership and effectiveness of displays cannot be answered.

THE COUNCIL FOR ADVANCED TRANSPORTATION STUDIES THE UNIVERSITY OF TEXAS AT AUSTIN

ANNOTATED BIBLIOGRAPHY OF PUBLICATIONS 1973-75

This Annotated Bibliography is updated semi-annually in the interest of information exchange. Publications of the Council for Advanced Transportation Studies are divided into two basic categories: "Research Reports" and "Research Memoranda." Research Reports embody material which is of lasting value which will not be covered in subsequent reports. Research Memoranda constitute preliminary findings or discussions which are published quickly to form a basis for the input of others, and are of more temporary value. In addition, there are listed Related Journal Articles and Working Papers. Finally, Theses, Dissertations, and Professional Reports are included which have been completed by graduate students, within their respective departments, working on various Topics of our Projects. Each of these are related to work done by the Council.

Information concerning the acquisition of any of these publications may be obtained through our central offices. Please write to:

Publications
Council for Advanced Transportation Studies
The University of Texas at Austin
ECJ 2.6
Austin, Texas 78712

RESEARCH REPORTS

- RR 1⁷ Briggs, Ronald, Wayne T. Enders, James A. Fitzsimmons and Paul Jensen, **Access to Essential Services: Analyzing the Existing System**, April 1974. (DOT-OS-30093 I-1)

This report is a compilation of first year results from a three year research effort entitled, "Access to Essential Services in the Rural/Urban Environment." This report covers problem areas in service availability, a literature overview, the existing system, demand modeling, and data systems.

- RR 2¹ Skorpa, Lidvard, Richard Dodge, C. Michael Walton and John Huddleston, **Transportation Impact Research: A Review of Previous Studies and a Recommended Methodology for the Study of Rural Communities**, March 1974. (DOT-OS-30093 II-1)

In this report the authors briefly define and classify methodologies used in transportation impact studies, summarize in detail previous research findings according to the type of impact investigated, comment on usefulness and limitations of previous studies and propose a strategy for future research.

- RR 3² Skorpa, Lidvard, Richard Dodge and C. Michael Walton, **Land Value Modeling in Rural Communities**, June 1974. (DOT-OS-30093 II-2)

This report develops indices for transportation and community related factors to be used in regression analysis with land value as the dependent variable. The techniques developed are applied to data from Sealy, Texas. It discusses why land values can be used as an indicator of community impact and evaluates a technique for modeling land values in a small town.

¹Document is available to the public through the National Technical Information Service, Springfield, Virginia, 22151.

²Draft version of this report is out of print. A final version is forthcoming.

³These reports are currently out of print. Copies may be obtained at the cost of xeroxing.

⁴Copies of these publications are not kept on hand. Xerox copies may be obtained or requests may also be addressed to the authors if copies are available.

Any document without a symbol is available through the Council's Publications Office.

- RR 4¹ Robinson, Eugene, **An Inventory of Freight Transportation in the Southwest Part I: Major Users of Transportation in the Dallas-Fort Worth Area**, December 1973. (DOT-OS-30093 III-1)
The author measures efficiency of the freight transportation system of the Dallas-Fort Worth areas as to how adequately natural and contrived fluctuations in demand over time are met.
- RR 5¹ Adair, J. Bryan and James S. Wilson, **An Inventory of Freight Transportation in the Southwest Part II: Motor Common Carrier Service in the Dallas-Fort Worth Area**, December 1973. (DOT-OS-30093 III-2)
This report discusses the development of motor freight service in the Dallas-Fort Worth area; inventories common carriers of general freight and specialized truck carrier operations.
- RR 6¹ Adair, J. Bryan, **An Inventory of Freight Transportation in the Southwest Part III: Air Freight Service in the Dallas-Fort Worth Area**, June 1974. (DOT-OS-III-3)
This report focuses on the Dallas-Fort Worth area, a Texas distribution and collection center for freight. During the past ten years air cargo volumes have increased more than would be expected on the basis of population growth alone. This report, along with the previous two in the set will lead to recommendations for improving freight transportation in the Southwest.
- RR 7¹ Chipman, William D., Harry Wolfe and Pat Burnett, **Political Decision Processes, Transportation Investment and Changes in Urban Land Use: A Selective Bibliography With Particular Reference to Airports and Highways**, March 1974. (DOT-OS-30093 IIIB-2)
This bibliography deals with revision and extension of intra-urban location theory explaining how groups and individuals affect change in intra-urban land use in the vicinity of new transportation facilities. Special attention is focused on new airports in rural/urban fringes.
- RR 8³ Wolfe, Harry, **A Preliminary Analysis of the Effects of the Dallas-Fort Worth Regional Airport on Surface Transportation and Land Use**, April 1974. (DOT-OS-30093 IIIB-3)
This report describes some preliminary effects of the Dallas-Fort Worth Regional Airport on the transportation and land use systems of Denton, Dallas, and Tarrant counties in Texas. The first part examines the effect of the airport on the highway network and public transportation. The second deals with the airport's impact on industrial, commercial and residential development.
- RR 9³ Burd, Gene, **Dissemination of Information to Increase Use of Austin Mass Transit: A Preliminary Study**, October 1973.
The relationship of information to mass transit usage in Austin, Texas is the focus of this report. Air pollution and the energy crisis brought buses into the limelight since Austin is primarily an automobile city. Effects of media coverage, public education, special transit services on bus ridership are discussed, and recommendations made on ways to improve bus service in Austin.
- RR 10³ Rosenbloom, Sandra, Jane Sentilles Greig and Lawrence Sullivan Ross, **The University of Texas at Austin: A Campus Transportation Study**, August 1973.
This report describes a study conducted by graduate students in Community and Regional Planning at The University of Texas at Austin to ascertain the circulation patterns and travel habits of the three major activity centers in Austin's central core: the Central Business District, the Capital Complex, and The University of Texas. The interrelationships among the three areas were analyzed and some alternative transportation systems were suggested. This report presents the preliminary analysis of the study.
- RR 11³ Rosenbloom, Sandra and Nancy Shelton Bauer, **Carpool and Bus Matching Programs for the University of Texas at Austin**, September 1974.

This paper describes a study done for the President's ad hoc Energy Conservation Committee which provided assistance in the development of effective contingency plans and meaning for transportation alternatives for University personnel. A program was designed for the administration of a carpool and bus matching survey and program and the results are presented in this paper.

- RR 12³ Hudson, W. R. and Thomas G. McGarragh, **A Pavement Design and Management System for Forest Service Roads: A Conceptual Study**, July 1974.

This paper is the final report for Phase I of a projected three-phase study being conducted for the Forest Service by the Council for Advanced Transportation Studies. The purpose of the project is to develop and implement a pavement design and management system for low-volume roads, in particular, Forest Service Roads.

- RR 13 Bolding, Randall, Anthony Healey and Ronald Stearman, **Measurement of Roadway Roughness and Motion Spectra for the Automobile Highway System**, December 1974.

The present study is designed to support an overall program for the evaluation and establishment of ride quality criterion in transportation systems. This investigation, which is restricted to the automobile, outlines the procedures and equipment employed to measure, record and analyze automotive vibrations and highway or roadway roughness.

- RR 14 Healey, Anthony J., Craig C. Smith, Ronald O. Stearman and Edward Nathman, **Dynamic Modelling for Automobile Acceleration Response and Ride Quality Over Rough Roadways**, December 1974.

This research report evaluates vibration acceptance criteria for use in both vehicle systems design and guideway specification as the first part of a study of automobile riding quality.

- RR 15 Dunlay, William J., Thomas Caffery, Lyndon Henry and Douglas Wiersig, **A Survey of Ground Transportation Patterns at the Dallas-Fort Worth Regional Airport**, August 1975.

This report describes a survey of ground transportation to and from the Dallas-Fort Worth Regional Airport (DFW) conducted on May 16 and 20, 1975, in furtherance of developing an analysis of the impact of DFW on ground transportation in the area. Data requirements were designed so as to develop comparisons between phenomena at DFW and those at the previous airport, Love Field, and to explore relationships between air and ground traffic. This effort will facilitate drawing conclusions as to the impact on ground transportation of relocating a major or regional air facility, as well as suggest means of enhancing the future airport planning process.

- RR 16 Healey, Anthony J. and Robert Young, **Subjective Rating of Automobile Riding Quality**. Forthcoming.

- RR 17 Davies, C. Shane and John W. Carley, **The Transportation Problems of the Mentally Retarded**, December 1974.

This study identifies the travel problems experienced by the educable retarded and the instruction necessary for improving their mobility and environmental awareness.

- RR 18¹ Burnett, Pat, John Betak, David Chang, Wayne Enders and Jose Montemayor, **Transportation-Related Constructs of Activity Spaces of Small Town Residents**, December 1974.

This report is an initial step in the attempt to develop a model for predicting how different groups in small urban areas will respond to proposed or actual changes in the interurban transportation system.

- RR 19 Alpert, Mark I. and Shane Davies, **Marketing of Public Transportation: Method and Application**, January 1975.

This report presents a methodology for determining community desires and attitudes concerning transportation mode selection and design, with an emphasis on improving and marketing public transportation modes.

- RR 20 Matthews, Ronald T., **The Problems of Implementing a 911 Emergency Telephone Number System in a Rural Region**, February 1975.

A "911 system" is a system which uses the telephone number "911" to summon emergency services. The concept of one universal emergency number to call a centralized reporting center where the appropriate emergency service may be dispatched has great intuitive appeal. Using the Capital Area Planning Council (CAPCO) region as an example of a typical rural area, the problems of implementing a 911 system are explored.

- RR 21 Wilson, James, **A Consideration of the Impact of Motor Common Carrier Service on the Development of Rural Central Texas**.

A predominantly rural area in Central Texas is surveyed to determine the impact of motor common carrier service on the region's development. Using the *Directory of Texas Manufacturers, 1973* as a universe, a sample of 84 manufacturers in the ten-county area was given a survey which was designed to determine the extent to which manufacturers based their location decision on the availability of adequate motor common carrier service.

- RR 22 Davies, Shane and Mark I. Alpert, **Modal Choice and the Value of Passenger Travel Time Literature: A Selective Bibliography**.

Why people choose a particular mode and how this decision is affected by quality and cost variations are of interest to transportation planners. Most of the literature on modal split models has addressed the question of preferences indirectly, by focusing on the decision to use one mode of transportation rather than another. This bibliography lists books and

articles related to predicting passenger allocation among competing modes and to the estimates of the value of travel time savings.

- RR 23 Gorse, Mary Lee, **Forecast of Truckload Freight of Class I Motor Carriers of Property in the Southwestern Region to 1990**, March 1975.

In this report truckload revenue freight of Class I common and contract motor carriers of property operating in intercity service in the Southwestern Region has been forecast to 1990 using multiple regression analysis.

- RR 24 Williams, David L., **Forecast of Revenue Freight Carried by Rail in Texas to 1990**, April 1975.

Revenue tons of freight carried by rail in Texas have been forecast to 1990 using multiple regression analysis and trend analysis. Data were gathered on the dependent variable (revenue tons of freight carried by rail in Texas) and on twenty-nine independent variables (economic indicators of the Texas economy) for the base period 1950 to 1972.

- RR 25 Goltra, Deborah, **Forecast of Air Cargo Originations in Arkansas, Louisiana, and Oklahoma to 1990**, April 1975.

Air cargo originations for the states of Arkansas, Louisiana, and Oklahoma have been forecast to 1990 using a combination of trend analysis and multiple regression analysis. A forecasting equation has been chosen for each state based on all the statistical evidence available. Trend forecasts of the air cargo originations base period data for each state were also calculated and compared to their respective regression forecast.

- RR 26 Zlatkovich, Charles P., Mary L. Gorse, Edward N. Kasparik and Dianne Y. Priddy, **Inventory of Freight Transportation in the Southwest/Part IV: Rail Service in the Dallas-Fort Worth Area**, April 1975.

This report provides an inventory of railroad facilities and services in the Dallas-Fort Worth economic area, as delineated by the Department of Commerce. The 26-county Dallas-Fort

Worth area is served by eight major railroad systems and contains approximately 2,200 miles of railroad line.

- RR 27 Dudley, Stuart Metz, **Forecast of Waterborne Commerce Handled by Texas Ports to 1990**, April 1975.

Waterborne commerce handled by Texas ports has been forecast to 1990 using multiple regression analysis and trend analysis. Data were gathered on the dependent variable (waterborne commerce) and on twenty-four independent variables (economic indicators of the Texas economy) for the base period 1950 to 1972. Missing values from time series data were estimated by curve fitting techniques to known data points. Trend forecasts of the waterborne commerce base period data were also calculated and compared with the multiple regression forecast.

- RR 28 Briggs, Ronald, Kelly Hamby and David Venhuizen, **Pupil Transportation in Texas**, July 1975.

This report describes and analyzes the system characteristics and operating costs of a sample of school district pupil transportation systems in Texas. A model for predicting operating costs is developed, and a formula, along with sample legislation is proposed for allocating state monies to local school districts for pupil transportation.

- RR 29 Shortreed, John, **Transit Demand Models for Medium-Sized Cities**.

Forthcoming.

- RR 30 Healey, Anthony J., **Passenger Response to Random Vibration in Transportation Vehicles**, June 1975.

This report deals with a survey of available literature dealing with the effects of random vibration. Narrow-band assumptions reducing to the use of well-known sinusoidal comfort criteria have been used in the past but recent research is being aimed at the assessment of the broad-band cases.

- RR 31 Gorse, Mary L., Dianne Y. Priddy and Deborah J. Goltra, **Forecast of Refinery Receipts of Domestic Crude Oil From Pipelines in the West South Central States**, April 1975.

Refinery receipts of domestic crude oil from pipelines in the West South Central States have been forecast in this report to 1990. Multiple regression analysis was used in the forecast. Data were gathered on the dependent variable and on twenty-two independent variables (economic indicators for the region) for the base period 1957 to 1972. Trend forecasts for refinery receipts of domestic crude oil from pipelines in the West South Central States were also calculated and compared with the multiple regression forecast.

- RR 32 Kasparik, Edward Norman, **A Feasibility Study of Rail Piggyback Service Between Dallas-Fort Worth and San Antonio**, April 1975.

The feasibility of utilizing rail piggyback for merchandise freight moving between these Texas cities is examined. Intensive motor carrier service dominates the freight market along this route. The rail network is extensive but only minimally utilized. A concept of "mimi-piggy"—short, fast, unitized, nonstop all-piggyback trains—is offered as an intermodal option that uses motor carriers and railroads in the particular roles for which they are best suited.

- RR 33 Gregory, Carl, **Towards Computer Simulation of Political Models of Urban Land Use Change**, August 1975.

The model of land use decision-making to be simulated assumes that the leaders of dominant and subdominant social groups interact in a "decision-making group" according to each leader's role perception, risk-taking propensity, and personality characteristics. A computer simulation model of leader interactions and decision outcomes requires that a consistent set of "rules of behavior" be derived from the statements postulated by the various sources. This report describes the development of a methodology to design such a model.

RESEARCH MEMORANDA

- RM 1³ Davies, C. Shane, Mark Alpert and W. Ronald Hudson, **Human Response in the Evaluation of Modal Choice Decisions**, April 1973.

This memo describes proposed research which will attempt to evaluate existing modes of transportation mixes available for urban/rural travel in terms of current user/non-user perceptions for each mode.

- RM 2³ Briggs, Ronald, Charlotte Clarke, James Fitzsimmons and Paul Jensen, **Access to Essential Services**, April 1973.

This memo describes proposed research concerned with the contribution transportation systems can make to the provision of essential services in rural areas.

- RM 3³ Wooldridge, D. W., A. J. Healey and R. O. Stearman, **Psychological and Physiological Responses to Stimulation**, August 1973.

A major impediment in the design of transportation systems is the opinion that the passenger has about her/his ride comfort. This Research Memo discusses the passenger's neurological response to stimulation.

- RM 4³ Zlatkovich, Charles P., **An Intermodal Transportation System for the Southwest: A Preliminary Proposal**, September 1973.

This research memorandum presents a concept involving use of highway transportation for local pickup and delivery of freight integrated with rail transportation for the heavy line-haul movements.

- RM 5³ Davies, Shane, Mark Alpert, Harry Wolfe and Rebecca Gonzalez, **Passenger Travel Patterns and Mode Selection**, October 1973.

This research memorandum assesses on a limited scale the present patterns of modal travel choice available to passengers in Texas as a preliminary step for structuring a balanced transportation network.

- Rm 6³ Davies, Shane and Mark Alpert, **Segmenting a Transportation Market by Determinant Attributes of Modal Choice**, October 1973.

This research memorandum discusses the background rationale for designing transportation systems to suit user's needs. It also describes the methodology being used to assess these needs in the survey area, and relate them to characteristics and attitudes of key public groups.

- RM 7³ Zlatkovich, Charles P., **The Interstate Rail System: A Proposal**, December 1973.

This memo describes the possible development of a nationwide network of modernized rail lines somewhat similar to the Interstate Highway System.

- RM 8³ Shanahan, Bruce, Ronald Stearman and Anthony Healey, **Literature Survey on Passenger and Seat Modeling for the Evaluation of Ride Quality**, November 1973.

A brief discussion of the various inputs that affect ride quality and the need for ride quality criteria is given.

- RM 9³ Briggs, Ronald and James Fitzsimmons, **The Definition of Essential Services and the Identification of Key Problem Areas**, January 1974.

This research memo provides a conceptual basis for defining accessibility problems of the rural population with respect to goods and services and delimits subsets from the total which might be termed essential. Differences in usage and supply system characteristics between functional and dysfunctional population are presented as accounting for present problems in the availability of certain types of goods and services.

- RM 10³ Adair, J. Bryan, **A Procedure for Calculating Great Circle Distances Between Geographic Locations**, March 1974.

This memo describes a computer program and associated procedures presenting a relatively simple means for figuring great circle distances between points for which geographic coordinates are known.

- RM 11³ Hunter, Graham, Richard Dodge and C. Michael Walton, **MAPRINT: A Computer**

Program for Analyzing Changing Locations of Non-Residential Activities, March 1974.

This memorandum describes an analytical tool developed as part of the larger research effort entitled, "The Influence on the Rural Environment of Interurban Transportation Systems" to reflect changing spatial relationships between all non-residential activity and the transportation systems upon which they depend.

- RM 12³ Frome, E. L. and C. Michael Walton, **A Method for Assessing the Impact of the Energy Crisis on Highway Accidents in Texas**, February 1975.

The purpose of this research was to determine what in fact could be determined or stated about the imposition of a 55 mph speed limit and the resultant accident reduction. A preliminary investigation indicated that it was indeed a very complex issue. This report is the result of extensive investigation into this issue.

- RM 13 Means, Robert C. and Barry Chasnoff, **State Regulation of Air Transportation in Texas**, April 1974.

The subject of this research memorandum is concerned with aeronautics regulation by a state commission as a third alternative to regulation by a Civil Aeronautics Board and freedom from regulatory controls. This is a preliminary study of this third alternative as it developed in Texas.

- RM 14³ Zlatkovich, Charles P., S. Michael Dildine, Eugene Robinson, James S. Wilson and J. Bryan Adair, **Transportation Atlas of the Southwest**, June 1974.

This publication provides information on the existing transportation system of the Southwest through the use of maps, charts and tables. The atlas was prepared as part of an inventory and evaluation of transportation facilities, services and practices in the Southwest to be used in developing recommendations for the improvement of freight transportation.

- RM 15 Chipman, W. D., **Local Governmental Decisions and Land-Use Change: An Introductory Bibliography**, May 1974.

This bibliography is an attempt to begin the research leading to a viable theory of the interaction between governmental decision making and locational choice in order to better understand the process of land use change.

- RM 16 Dildine, Michael, **An Analysis of the Truck Inventory and Use Survey Data for the West South Central States**, July 1974.

This memo is a comparison of data drawn from the 1972 Census of Transportation Report for Texas, Louisiana, Oklahoma and Arkansas as to truck ownership and use.

- RM 17 Dunlay, William J. and Lyndon Henry, **Towards Estimating the Impact of the Dallas-Fort Worth Regional Airport on Ground Transportation Patterns**, September 1974.

This project is a policy oriented study of the impact of the Dallas-Fort Worth Regional Airport on ground transportation in the Dallas-Fort Worth Area. The focus of the study is to isolate changes in ground transportation patterns that can be attributed to the new regional airport. This research is directed toward producing results and developing a methodology that can be applied to evaluating the impact of other major new regional airports.

- RM 18 Shanahan, Bruce, Ronald Stearman and Anthony Healey, **The Attainment of Riding Comfort for a Tracked Air-Cushion Vehicle Through the Use of an Active Aerodynamic Suspension**, September 1974.

This memo studies the feasibility of controlling high speed ground transportation systems through the use of active lifting surfaces. Various control laws are assumed and vehicle and passenger response studied. An optimal solution to the classic regulator problem was found.

- RM 19 Means, Robert, Ronald Briggs, John E. Nelson and Alan J. Thiemann, **Legal Obstacles to the Use of Texas School Buses for Public Transportation**, January 1975.

This memorandum discusses in detail the implications of three types of regulation. Effects

- of the Texas Education Code, Certification, and Safety Regulations are each discussed in turn.
- RM 20 Briggs, Ronald and David Vehuizen, **Pupil Transportation: A Cost Analysis and Predictive Model**, April 1975.
- In July of 1973 the Governor's Office of Educational Research and Planning of the State of Texas was established by Governor Briscoe. Its primary purpose was to develop a comprehensive school finance plan for Texas. In the area of transportation, the Council for Advanced Transportation Studies at The University of Texas at Austin was utilized. To eliminate duplication, a joint research effort on pupil transportation was formulated between the Governor's Office and Topic I, "Access to Essential Services," of the Council's Department of Transportation Contract. This Research Memorandum reports some of the results of this research effort.
- RM 21³ Linehan, Ronald, C. Michael Walton and Richard Dodge, **Variables in Rural Plan Location: A Case Study of Sealy, Texas**, February 1975.
- This is the twenty-first in a series of research memos describing activities and findings as part of the work accomplished under the research project entitled "Transportation to Fulfill Human Needs in the Rural/Urban Environment." It represents the first phase of an effort to define the most important factors determining individual location in rural areas, especially those factors related to transportation. Based on a review of location theory and a case study of four industries in one rural community, this study lays the foundation for an expanded effort to examine locational factors on a regional basis.
- RM 22 Sparks, John, Carl Gregory and Jose Montemayor, **A Description of the Application of Factor Analysis to Land Use Change in Metropolitan Areas**, December 1974.
- The present investigation describes how factor analysis may be used to investigate land use change by census tract following a major change in transportation. This report concerns the first of three research stages, a factor analysis of land use before major transportation investment in 1960.
- RM 23 Gorse, Mary Lee Metzger, **A Forecast of Air Cargo Originations in Texas to 1990**, November 1974.
- Air cargo originations in Texas have been forecasted to 1990 using two approaches: multiple regression analysis and trend analysis. A "best" forecast has been selected, based on all the statistical evidence available, which is a set of nine economic indicators.
- RM 24 Park, Chang-Ho, Edward V. Chambers, III and William J. Dunlay, Jr., **A Systems Analysis Procedure for Estimating the Capacity of an Airport: A Selected Bibliography**, August 1975.
- The objective of this research project is to develop a systems analysis procedure for estimating airport capacity in which the capacities of the individual components of an airport are evaluated and compared. This bibliography includes all references pertinent to the research objective.

RELATED JOURNAL ARTICLES AND PAPERS

- 14 Burnett, P., "Disaggregate Behavioral Models of Travel Decisions Other Than Mode Choice: A Review and Contribution to Spatial Choice Theory," in P. Stopher and A. Meyburg, (eds.) **Issues on Behavioral Demand Modeling and the Valuation of Time**, Washington, D.C., Transportation Research Board, forthcoming. Also in P. Stopher and A. Meyburg, (eds.) **Issues in Behavioral Demand Modeling and the Valuation of Time, Final Report 70**, U.S. Department of Transportation, Federal Highway Administration, November 1973, Vol 2, pp. 189-205.
- This paper attempts to extend work on disaggregate behavioral modeling of traveling decisions by a collation and review of literature of intra-urban travel decisions other than mode

choice, with applications in trip generation, distribution and route assignment. This paper also attempts to focus attention on salient features of spatial choice models and outlines research problems and strategy.

- 2⁴ Burnett, Pat, "A Bernoulli Model of Destination Choice," **Transportation Research Record No. 527**, Transportation Research Board, January 1974, pp. 33-45.

This paper explores an alternative approach to the complexity of destination and the difficulty of developing a single model of a heterogeneous population group. A simple Bernoulli model is developed to describe this process.

- 3⁴ Hudson, W. R. and C. Michael Walton, "Transportation to Fulfill Human Needs in the Rural/Urban Environment," presented to the 1974 Automotive Engineering Congress and Exposition, Society of Automotive Engineers, February 27, 1974.

This paper presents background and discusses the initial funding on a multidisciplinary program sponsored by the U.S. Department of Transportation, University Research Program. The program has two major thrusts: (1) human factors and needs must be considered in planning, developing, and constructing transportation systems; and (2) transportation can help to preserve, restore, and reinforce any symbiotic relationship and balance that may exist between rural and urban life.

- 4⁴ Walton, C. Michael and W. R. Hudson, "Transportation Education: A Multidisciplinary Approach," presented to Ohio State University, 1974.

This paper describes the multidisciplinary transportation programs at the University of Texas with particular attention to the involvement of the Department of Civil Engineering.

- 5⁴ Bolding, R., A. Healey and R. Stearman, "Measurement of Roadway Roughness and Motion Spectra for the Automobile Highway System," May 1974.

This paper was designed to support an overall program for the evaluation and establishment of ride quality criteria in transportation systems. The investigation covers measurements, recordings, and analysis of automobile vibrations and highway or roadway roughness using various areas in Texas.

- 6⁴ Enders, Wayne T., Patricia M. Poston and Ronald Briggs, "Access to Essential Services in Rural/Urban Environment: A Selected Interdisciplinary Bibliography," Council for Planning Librarians, Exchange Bibliography, June 1974.

The main purpose of the literature search was to create a basis from which sound recommendation could be offered for improving the accessibility of essential services to residents of rural areas. The search focused on improving access to the more immediate human needs related to physical, social, and psychological health.

- 7⁴ Burnett, P., William D. Chipman and Harry P. Wolfe, "Political Decision Processes, Transportation Investment and Changes in Urban Land Use: A Selective Bibliography with particular reference to Airports and Highways," Council of Planning Librarians, Exchange Bibliography, August 1974.

This bibliography assists with revision and extension of intra-urban location theory explaining how groups and individuals affect change intra-urban land use in the vicinity of new transportation facilities. Special attention is focused on new airports in rural/urban fringes.

- 8⁴ Alpert, Mark I. and C. Shane Davies, "Segmentation of a Transportation Market by Determinant Attitudes," presented to the American Psychological Association Convention, New Orleans, Louisiana, September 2, 1974.

The objectives of this research were to develop a method for identifying the transportation features or attributes that determine modal choices for specified trip purposes; to estimate the percentage of people now using private

cars who would be quite likely to switch to a public transportation system if it were improved to suit their needs; to evaluate the attributes of existing low-density modes and high-density transportation modes; to indicate appropriate promotional messages to appeal to these potential riders; and to survey both the general adult community and a designated "leadersgroup" for their attitudes towards public transportation.

- 9⁴ Alpert, Mark I. and C. Shane Davies, "A Decision Sciences Approach to the Marketing of Public Transportation," presented at the meeting of the American Institute for Decision Sciences and published in the **Proceedings of the American Institute for Decision Sciences**, Fall 1974.

This paper discusses a stratified random sample of adults surveyed concerning numerous attitudes and characteristics useful in designing and marketing public transportation.

- 10⁴ Healey, A. J., R. O. Stearman and C. C. Smith, "Automobile Riding Quality with Real Highway Roughness," AIAA No. 74-1301, presented at **American Institute of Aeronautics and Astronautics Life Sciences and Systems Conference**, Dallas, Texas, November 1974.

This paper describes vehicle modelling and random acceleration response prediction work of a broad transportation research topic. The research topic deals with the elevation of riding quality through correlation between subjective feeling responses of a rating panel with objective measures of the vehicle accelerations.

- 11⁴ Davies, Shane and Mark I. Alpert, "Modal Choice Models: Introduction and Selected Bibliography," Council for Planning Librarians, Exchange Bibliography, November 1974.

This research is related to an understanding of how people choose their mode of transportation in cities. Modal split models are utilized because they are characterized by pre-distribution models.

- 12⁴ Burnett, Pat, "Decision Processes and Innovations: A Transportation Example," **Economic Geography**, Vol. 51, No. 3, July 1975, pp. 278-289.

This paper attempts to develop a methodology for addressing further work in spatial and temporal properties of innovation diffusion, with particular attention to the diffusion of new kinds of links for transportation networks (e.g., highways).

- 13⁴ Burnett, Pat, Wayne Enders, David Chang, John Betak and Jose Montemajor, "Transportation-Related Constructs of Urban Activity Spaces," **Proceedings**, Association of American Geographers, Vol. 7, 1975, pp. 39-45.

This paper discusses the nature of the space which people in small urban areas use for recurrent activities. An alternative cognitive definition is proposed. Recent modifications of Kelly's Personal Construct Theory and elicitation procedures are used to demonstrate the richness of the cognitive definition of place. It is suggested how elicited transportation-related constructs of places can be utilized to develop improved models of behavior within urban activity spaces.

- 14⁴ Burnett, Pat, "Mathematical Models of Movement Within Urban Spatial Structures," Invited paper presented at the **Commission on Quantitative Methods Meeting, International Geographical Union**, Palmerston North, New Zealand, December 4-7, 1974.

To date, formal mathematical models have not been specified and tested which formulate *first* how different individuals behave in adaptive ways over time in destination and route selection, and *second* how predictions about aggregate movement can be derived from adaptive postulates about different persons. This paper therefore specifies and tests two first order (place loyal, last place loyal) Markov models for heterogeneous individuals and population groups.

- 15⁴ Burnett, Pat, "Toward Dynamic Models of Travel Behavior and Point Patterns of Traveller Origins," **Economic Geography**, forthcoming.
This paper describes mathematically how the distribution of travellers around a single destination point changes over time. It then goes on to show how this could be related to a linear learning process, whereby travellers come to learn the location and other characteristics of the destination, and switch to using it or not using it on a regular basis.
- 16⁴ Shanahan, Bruce G., Nazim Nathoo, Ronald O. Stearman and Anthony Healey, "Optimal Control Laws for Suppressing Responses of High-Speed Tracked Air-Cushion Vehicles," prepared for **International Conference on High Speed Ground Transportation**, January 1975.
This paper presents a study of feasibility of controlling high speed ground transportation systems responses through the use of active suspension systems in the form of lifting surfaces.
- 17⁴ Burnett, Pat, "Tests of a Linear Learning Model of Destination Choice: Applications to Shopping Travel by Heterogeneous Population Groups," **Geografiska Annaler**, Forthcoming.
Many models of travel behavior are concerned with explaining how and why an individual distributes trips from a given origin over a set of possible destinations, for a recurrent activity. Models of the individual's destination choice behavior for non-work kinds of trips are of great practical concern. The main aim of this paper is therefore to develop and test a disaggregate model of destination choice, with particular reference to shopping behavior.
- 18⁴ Haynes, Kingsley and Gerald White, "A Deterministic Model of Innovation Diffusion with Physical Analog," prepared for presentation at the Western Regional Science Meetings, Long Beach, California, February 1974.
This study tries to build a deterministic formulation for the spread of an innovation over space and time in a rural area, when decision-making is the critical step controlling the over-all diffusion process.
- 19⁴ Briggs, Ronald and David L. Huff, "Bibliography: Consumer Spatial Behavior and Environmental Structure," **MAN-ENVIRONMENT SYSTEMS**, Vol. 3, No. 5, September 1973.
Concern in this present bibliography is with one type of spatial behavior, namely, movement by individuals between locations within the city. The relationship between this type of spatial behavior and urban structure is typically examined in terms of the specific purpose for the person-movement. This bibliography continues that approach, concentrating upon the spatial behavior of consumers in their procurement of retail goods and services. The literature is drawn from a wide range of fields including geography, economics, sociology, psychology, planning and marketing.
- 20⁴ Briggs, Ronald, "A Model to Relate the Size of the Central Business District to the Population of the City," **Geographical Analysis**, 5, 1974, 305-323.
A set of dynamic models of CBD growth are developed. They hypothesize that growth rates depend upon the population growth rate together with the increasing unwillingness of people to travel to the city center as city size increases. The models are tested using retail sales data for the United States. Results of these tests and their implications are discussed.
- 21⁴ Fitzsimmons, James A., "Implications of a Service Economy," prepared for the Proceedings of the Fifth Annual AIDS Conference, Boston, Massachusetts, February 1974.
This paper discusses the implications of a service economy and the role of operations management.
- 22⁴ Smith, C. C. and D. N. Wormley, "Response of Continuous Periodically Supported Guideway Beams to Traveling Vehicle Loads," presented at the Winter Annual Meeting of the American

Society of Mechanical Engineers, New York, N.Y., November 17-22, 1974.

The response of continuous span periodically supported guideway beams to traveling vehicle loads is determined using the Fourier transform techniques and is discussed in this report.

- 23⁴ Smith, C. C., A. J. Gilchrist, and D. N. Wormley, "Multiple and Continuous Guideway-Vehicle Dynamic Performance," presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, New York, N.Y., November 17-22, 1974.

Analyses are developed to determine the dynamic performance of vehicles interacting with single, multiple, and continuous span elevated structures. Operating conditions in which multispan resonant conditions occur are identified, and the resulting resonant amplitudes computed.

- 24⁴ Burnett, Pat and Donna Prestwood, "The Development of Disaggregate Trip Distribution Models," presented at 2nd International Conference on Disaggregate Behavior, Ashville, N.C., May 1975.

This paper reviews recent work concerning the disaggregate modelling of trip distribution or destination choice. It is confined to a discussion of the movement of individuals or population groups within the city, since most work since 1973 has either implicitly or explicitly focussed on this topic. The aim of this paper is to classify current work, to assess underlying models and methodologies, and to point to directions for further research.

- 25⁴ Zlatkovich, Charles P., "The Interstate Rail System," to be presented at the Transportation Research Forum meeting in Toronto, November 1975.

This paper proposes the development of an Interstate Rail System, similar in scope and function to the Interstate Highway System, consisting of selected segments of the existing railroad network. The paper describes the concept of the proposal and the problems that it is

designed to solve. Possible methods of implementation of the proposal are described. The paper includes a methodology for the selection of Interstate Rail System routes and an example system consisting of 39,331 route miles.

- 26⁴ Zlatkovich, Charles P., "An Evaluation of Rail Passenger Service Participation in Major Travel Markets," June 1974.

The purpose of this paper is to evaluate the existing rail passenger service route system in the United States. The basis for evaluation is the extent to which the existing rail passenger service routes serve known domestic intercity passenger travel markets.

- 27⁴ Briggs, Ronald and David Venhuizen, "Characteristics and Costs of Pupil Transportation," **Traffic Quarterly**, forthcoming.

Characteristics and costs of 49 school district transportation systems are described and analyzed on the basis of the types of communities which they serve. A model for predicting operating costs is presented and compared with other models for predicting transit system costs.

- 28⁴ Briggs, Ronald, "Designing Transportation Systems for Low Density Rural Regions," paper presented at the annual meetings, Association of American Geographers, Milwaukee, Wisconsin, April 1975.

This paper describes our experience in the design of transportation systems for low density rural areas in Texas. The systems discussed represent attempts to blend the court-mandated transportation with the demonstration program of the Federal Government.

- 29⁴ Means, Robert and Barry Chasnoff, "State Regulation of Air Transportation: The Texas Aeronautics Commission," **Texas Law Review**, Volume 53, Number 4, May 1975.

Regulation of commercial aviation, perhaps more than that of any other industry, is

predominantly national regulation. The states are, however, permitted a role in the economic regulation of air carriers. In a few states regulatory commissions actively exercise one or more of the powers associated with economic regulation: setting fares, certificating new service, and controlling the abandonment of old. This article deals with one such agency, the Texas Aeronautics Commission, focusing on (1) the limits of TAC's legal power, (2) describing the principal actors in the regulatory process, and (3) the purposes served by TAC regulation.

WORKING PAPERS AND REPORTS

- 1.⁴ Doughty, Robin, **Bird Hazards to Aircraft: Competition for Space**, November 1973.

This paper describes the characteristics of bird collisions with aircraft. Attitudes toward birds have changed from affection to hostility since damage from birds can be costly to equipment and endanger human and animal life. Current attempts to minimize these dangers and the outlook for air space are also discussed in the report.

- 2.⁴ Cooper, Hal B.H., Jr., **Environmental and Energy Impacts of Coal Energy Transshipment Through Railroad Electrification**, April 1975.

Environmental and energy impacts of long distance coal transshipment by railroad electrification have been made and compared to diesel railroads, coal slurry pipelines and direct power transmission. Capital and operating energy and material requirements for electrified railroad hauling of coal have been developed to forecast potential air pollution, water pollution and noise pollution impacts in comparison to alternative modes. Air pollutant emission factors, waste heat discharges, and water consumption requirements have been developed for electrified railroads in comparison to other modes.

- 3.⁴ Briggs, Ronald, **Designing Transportation Systems for Low Density Rural Regions**, April 1975.

This paper describes our experience in the design of transportation systems for low density rural areas in Texas. The systems discussed represent attempts to blend the court-mandated transportation with the demonstration program of the Federal Government.

RELATED GRADUATE THESES AND DISSERTATIONS

- 1.⁴ McGarragh, Thomas G., **A Pavement Design and Management System for Forest Service Roads—A Conceptual Study**, July 1974. (MS in Civil Engineering)

This thesis describes Phase I of a projected three-phase study being conducted for the Forest Service. The purpose of the project is to develop and implement a pavement design and management system for low-volume roads, in particular, Forest Service roads.

- 2.⁴ Zaniewski, John P., **Airport Capacity Analysis—A Systems Approach**, July 1974. (MS in Civil Engineering)

This thesis describes existing quantitative models for analysis of the capacity of various components of the airport system. Procedures for utilizing these models are also discussed. Recommendations are made concerning possible modifications of existing models, and priorities for these modifications are assigned according to the necessity for improvement.

- 3.⁴ Matthews, Ronald T., **911 Emergency Telephone Number System—A Proposal for the Capital Area Planning Council**, June 1974. (MBA-Management)

The purpose of this thesis is to provide CAPCO planners and governmental officials with a better understanding of 911 systems, indicating a

framework for detailed future studies and offering a proposal for a system that would effectively serve CAPCO's 450,000 residents. The report contains a 911 system that is potentially most beneficial for a predominantly urban environment.

- 4.⁴ Shanahan, Bruce Gene, **The Attainment of Riding Comfort for a Tracked Air-Cushion Vehicle Through the Use of an Active Aerodynamic Suspension**, January 1975. (MS in Aerospace Engineering)

The feasibility of controlling high speed ground transportation systems through the use of active lifting surfaces was studied. Aerodynamically three dimensional canards are employed to control the pitch and plunge steady-state response of the vehicle and passenger to harmonic guideway excitations. Various control laws are assumed and vehicle and passenger responses studied.

- 5.⁴ Skorpa, Lidvard, **A Modelling Technique of Land Values in a Rural Community: A Case Study**, August 1974. (MS in Civil Engineering)

This thesis concentrates on the impact of land values. It discusses why land values can be used as an indicator of community impact and evaluates a technique for modelling land values in a rural community. The technique is used in a case study of Sealy, Texas.

- 6.⁴ Hunter, Graham C., **Rural Communities and Inter-Urban Transportation Systems: A Study of the Stages of Interaction**, August 1974. (Master of Architecture)

This thesis presents a preliminary model for understanding the impact of the development of an element in an inter-urban transportation system on the social and political structure of a rural community and a case study of one such community.

- 7.⁴ Wilson, James S., **A Consideration of the Impact of Motor Common Carrier Service on the Development of Rural Central Texas**, December 1974. (Master of Business Administration)

The objective of this study is to consider the impact of a particular mode of freight transportation on a small, predominantly rural area as a measured factor in the area's economic development.

- 8.⁴ Gorse, Mary Lee, **A Forecast of Air Cargo Originations to 1990**, January 1975. (Professional Report-Master of Business Administration)

The objective of this report is to forecast air cargo originations to 1990 by using multiple regression analysis and trend analysis. As a result, a predictor equation was formulated.

- 9.⁴ Kester, Rodger, **Multidimensional Scaling as Applied to Transportation Preferences in the Austin SMSA**, January 1975. (Master of Arts-Geography)

This analysis first demonstrates how the technique of multidimensional scaling can be applied to the measurement and evaluation of various transportation situations, and second how it can be used to test hypotheses about the desirability of different transportation situations. This technique has not been widely used and the issues are important to transportation.

- 10.⁴ Leonard, William Albert, **An Ecological Analysis of Urban Mortality**, January 1975. (Master of Arts-Geography)

The objective of this study is to determine the causes and effects of urban mortality. Rates, predictions, geographic variations, excess mortality are all analyzed. The concept of an ecological complex is also explored.

- 11.⁴ Brown, David L., **Computer Augmented Graphics as an Aid to Management Decision Making**, August 1974. (Professional Report-MBA-Management)

The objective of this report is to study the nature of the possible uses of computer augmented graphics in a manner that would be of aid to management decision makers. Emphasis is given to the term "decision makers."

Lt. Governor William P. Hobby addresses the CATS-Texas A&M joint conference.



- 12.⁴ Lindstrom, Frank V., **Cost Data for Health Services Planning**, May 1975. (Professional Report-MBA-Management)

The research for this report represents a small portion of study conducted by the Council for Advanced Transportation Studies, for the U.S. Department of Transportation. Cost data presented in the report are an input to a multi-facility location model designed to assist local or regional planners to improve access to essential services such as medical care. Two problems encountered in the report are (1) the issue of whether economics of scale exist in the health service industry, and (2) the valuation of time in monetary terms.

- 13.⁴ Linehan, Ronald, **A Multivariate Analysis of Transportation Infrastructure and Manufacturing Growth in a Rural Area**, August 1975. (Master of Science in Community and Regional Planning)

The goal of this project is to present and test a manufacturing growth model which incorporates transportation variables derived from the concept of regional infrastructure. The measures of growth are fluctuations in manufacturing employment in towns in a rural region. The results may hopefully prove valuable in assessing the benefits of proposed transportation links at the level of regional planning.

- 14.⁴ Pen-Mu Kao, Mike, **Vehicle Ride Quality Simulation—FFT vs. Time Domain**, May, 1975. (Master of Science in Mechanical Engineering)

This work mainly addresses those aspects of the task dealing with computation of the response of the vehicle model. Two inherently different methods are compared. The first of these methods relies on the knowledge of a roughness profile for vehicle excitation followed by time domain simulation of the vehicle body acceleration response. The second of these converts the roughness profile into the frequency domain and uses frequency domain analysis techniques.

- 15.⁴ Williamson, Hugh J., **A Study of the Relationships Between Various Classes of Road-Surface Roughness and Human Ratings of Riding Quality**, August, 1975. (Ph.D. in Mechanical Engineering)

In this study, statistical relationships between each of several classes of road roughness and human panel ratings of riding quality are developed. For this purpose, the roughness is categorized through digital filtering methods on the basis of wavelength. Longitudinal transverse surface effects are also studied. Multiple regression analysis is used to relate the panel ratings to roughness as a whole and to the individual types of roughness. By using the models so developed, one can obtain for any given road section a measure of riding quality corresponding to each set of important aspects of roughness. Use of the models is demonstrated by analyzing the roughness of an illustrative road section just before, just after, and a year after an overlay.

Proceedings of joint conference held in October, 1974 on "Long Range Implications of Scarce, Expensive Energy on Transportation."

This is a proceedings of a conference sponsored by the Council for Advanced Transportation Studies of The University of Texas at Austin and the Texas Transportation Institute of Texas A&M University. This Proceedings helps to convey the wide range of topics covered. Such notable speakers as Congressmen Pickle and Teague, Lt. Governor Hobby, Land Commissioner Armstrong, and members of trucking, railway and teaching concerns from across the nation came together to make the conference a success.

Copies of this Proceedings are available to interested persons for \$10 per copy. If interested, please write to

Publications

Council for Advanced Transportation Studies

The University of Texas at Austin

ECJ 2.6

Austin, Texas 78712

RESEARCH DEVELOPMENT AND PROPOSALS PENDING

The Council for Advanced Transportation Studies regularly monitors information sources to determine potential state or national sponsors for transportation research.

The Council has worked during the past year to identify sponsors for transportation research interests of The University community. During the year we have catalogued over fifty responses to potential transportation research interests of faculty and circulated approximately fifty-two requests for proposals. Of the requests, the following research proposals were submitted through the Council to the sponsoring agency.

A pavement design and management system for forest service roads—Forest Service

Environmental and energy impact assessment of railroad electrification—Department of Transportation

Transportation system design for offshore supertanker terminals—Department of Transportation

Ride quality studies on ground-base transportation systems—Department of Transportation

A systems analysis procedure for estimating the capacity of an airport—Department of Transportation

Urban mode shifts—Federal Energy Administration

A proposal for a carpooling impacts study—Federal Energy Administration

Statement of capabilities for policy oriented transportation energy conservation research—Federal Energy Administration

Statement of capabilities—Department of Transportation—Transportation Systems Center

Scenarios for alternate roles of the federal government in transportation—Department of Transportation

Statement of capabilities for assessing various effects of alternative metropolitan area development patterns—Council on Environmental Quality—Executive Office of the President

Brazil research on the interrelationships between costs of highway construction, maintenance and utilization—International Bank for Reconstruction and Development

A proposal to develop a program on traffic safety management—State of Texas

Proposal for training program for Pakistan railway's staff—International Bank for Reconstruction and Development

A proposal to evaluate the economic and social costs of no public transportation service—Texas Mass Transportation Commission

Evaluation of the feasibility of combining school bus and public transit service in Texas—Texas Mass Transportation Commission

In response to information disseminated by the Council, the following proposals were submitted during the period of September 1974 to September 1975 by other Departments of The University of Texas at Austin.

Theoretical and Experimental Modeling of Airport Approach and Landing Problems—Electrical Engineering Department—Department of Transportation

Radial Freeways and the Growth of Office Space in Central Cities—Bureau of Business Research—Federal Highway Administration

The Relationship of Transportation Facilities to the Provision of Social and Economic Services in Rural Areas—School of Architecture—Community and Regional Planning—Department of Transportation

Shane Davies, John Betak, Pat Burnett and Barbara Chance meet to discuss a research proposal.



MANAGEMENT OF RESEARCH PROGRAM

Sponsors often express concern that appropriate management be provided for multidisciplinary activities. It is clear that if management is ineffective, there is little chance for success of a program. However, if the program is structured too tightly, the persons from each discipline may lose their identity and their tie to expertise in their own area.

A workable structure has been developed at The University of Texas at Austin in the Council for Advanced Transportation Studies. The Council, headed by Dr. Lymon C. Reese, reports directly to the Executive Vice-President of The University. The Council is governed by an Executive Committee of Deans as follows:

Dr. Lymon C. Reese, Chairman,
Dean Charles M. Burnette, Architecture,
Dean Wayne Danielson, Communications,
Dean Paul Olum, Natural Sciences,
Dean Earnest F. Gloyna, Engineering,
Dean William Cannon, Lyndon B. Johnson School of
Public Affairs,
Dean Ernest E. Smith, Law,
Dean George Kozmetsky, Business Administration,
Dean J. W. McKie, Social and Behavioral Sciences,
Acting Dean Elspeth D. Rostow, General and Comparative Studies,
Dean Stanley Werbow, Humanities, and
Dr. W. R. Hudson, Director of Research, CATS.

Research management is handled through the Council. Thus, accomplishments of a faculty member in any discipline are quickly recognized by her/his Dean as a member of the Executive Committee and this information, along with the individual's teaching and departmental research activities, can be used directly to justify promotions, raises, and other rewards. Therefore, CATS provides not only coordinated control for the research

program, but also a close tie for each active researcher to her/his Department and Dean.

A Budget Advisory Committee has been appointed by the President of The University to set overall policy, advise the Director of Research and the research group on their activities as needed, and assist the CATS Executive Committee coordinating these activities with all phases of The University, as required by the multidisciplinary nature of the work. The committee members are:

Dr. W. R. Hudson, CATS, Chairman,
Dr. Stanley Arbingast, Bureau of Business Research,
Mr. George R. Blitch, Office of Research Management,
Dr. C. Shane Davies, Geography,
Mr. Hudson Matlock, Civil Engineering, and
Dr. Lymon C. Reese, ex officio.

COOPERATIVE INTERACTION AND IMPLEMENTATION WITH GOVERNMENT, INDUSTRY AND EDUCATIONAL INSTITUTIONS

The Council for Advanced Transportation Studies has established a broad base of cooperation with a growing number of governmental offices, industries and other educational institutions. Two examples of the cooperative activities are: 1) Dr. C. Michael Walton, one of the DOT project principal investigators, is the CATS representative on the Governor's State Transportation Coordination Council; and 2) the joint Transportation Coordinating Committee with Texas A&M University. This latter committee was jointly established by the presidents of the two universities to improve coordination on transportation activities between the universities. The committee sponsored a statewide conference on Texas' transportation/energy problems held in October 1974.

A representative list of governmental agencies, industries and educational institutions that are cooperating in our research activities is given below, along with implementation activities and interaction in the form of conferences, briefings, speakers and visitors to the Council for Advanced Transportation Studies.

Milton Rube of the City of Austin Planning Department came to CATS to discuss the possibility of fixed transportation systems for the City of Austin.



STATE OF TEXAS COOPERATING AGENCIES

- Governor's Office
 - Planning and Coordination
 - Comprehensive Health Planning
 - Rural Development Commission
 - Assistant for Educational Affairs
 - Information Services
 - Health and Human Resources Council
 - Traffic Safety

- Aeronautics Council

- State Department of Highways and Public Transportation

- Industrial Commission

- Railroad Commission

- Community Affairs

OTHER STATE COOPERATING AGENCIES

- Louisiana Department of Public Works

- Louisiana Highway Department

- Oklahoma Corporation Commission

- Oklahoma Department of Highways

COOPERATING REGIONAL ACTIVITIES

- Alamo Council of Governments

- Capital Area Planning Council

- Dallas-Fort Worth Regional Airport Board

- North Central Texas Council of Governments

- North Central Texas Commission

- The Council for South Texas Economic Progress

COOPERATING CITIES-CHAMBERS OF COMMERCE

- Dallas Chamber of Commerce

- Fort Worth Chamber of Commerce

- Sealy-City and Businesses

- Austin Chamber of Commerce

- Austin City Planning Department

- Austin Urban Transportation Department

- Austin Committee on Transportation

COOPERATING INDUSTRIES

- LTV, Ground Transportation Division

Missouri Pacific Railroad
BRH Mobility Services Company
Long-Oliver-O'Dwyer Electric, Inc.
McKinsey and Company
Engineering Foundation, Industrial Associates Program
AMF, Inc.
Airline Pilots Association

COOPERATING EDUCATIONAL INSTITUTIONS

Texas A&M University
Huston-Tillotson College
University of Texas at Arlington
University of Texas at San Antonio Medical School
Louisiana State University

IMPLEMENTATION ACTIVITIES

One of the desired goals of the Council's research activities is the implementation and communication of on-going research with government, industry and other universities. Outlined below are some of the areas and levels of activity that research teams have engaged in during the past year.

Topic I: Access to Essential Services

(1) **Governor's Office.** As part of the identification of the existing service supply system, an examination of school buses available in the study region was initiated. At the same time, an extensive study by the State of Texas Governor's Office of Educational Research and Planning was being undertaken on the state's role in financing education. One aspect of this study was state aid for student transportation. Recognizing a commonality of interest, a joint program culminating in an interagency contract for this area was initiated by the U.T. team and the Governor's office to examine the extent to which students are transported, the cost of bus operation, and the

relationship of these factors to the characteristics of the school district. Paramount in the thinking of both the U.T. research team and the Governor's Office was the possibility of using school buses for purposes other than student transportation, particularly for providing transportation to essential services other than education.

(2) **Capital Area Planning Council.** Drs. Ronald Briggs, James Fitzsimmons, and Carol Deets, Principal Investigators for the Topic "Access to Essential Services", are active members of the CAPCO Health Advisory Committee that is currently in the process of developing the regional health plan. Illustrative of this involvement are the following activities:

- (a) The researchers have been identifying the structure of the system and its parameters. The values of these parameters have been supplied by the CAPCO residents through their Health Advisory Committee representatives. This preliminary system structuring ensures that alternative supply systems may be comparable for evaluation and that all relevant issues are considered (e.g., service area, manpower, facilities, financial sources, transportation, etc.).
- (b) With full involvement of the Health Advisory Committee, the team has been obtaining ideas as to types of systems which might be feasible for implementation in the CAPCO region. This Community involvement at the initial level of the system development and specification should insure that workable systems are being considered for further evaluation, and not just some academic utopia. Such systems are also more likely to be implemented because of their acceptance by the local community through continued involvement in the systems' development.
- (3) (a) Mr. Ronald Matthews completed an M.B.A. thesis on a 911 Emergency telephone service for the CAPCO Region.
- (b) Mr. Wayne Enders, a PhD candidate in Geography, is currently investigating the relationship between perceived needs and travel in the CAPCO region.



Lyndon Henry, graduate student in Community and Regional Planning and Executive Director of the Texas Association for Public Transportation, discusses mass transportation issues.

Topic II: The Influence on the Rural Environment of Interurban Transportation Systems

Contact has been maintained with local and state governments, in particular with the State Department of Highways and Public Transportation concerning upcoming public hearings. Coordination with the Texas Department of Community Affairs has been initiated.

Topic III-A: Improvement of Intermodal Freight Transportation in the Southwest

A major midwestern railroad is currently considering a plan to implement a rail-highway intermodal service similar to the system proposed in the Research Memorandum entitled, "An Intermodal Transportation System for the Southwest: A Preliminary Proposal."

Topic III-B: Monitoring the Effects of the Dallas-Fort Worth Regional Airport

Some 50 major decisionmakers in government and industry in the Dallas-Fort Worth Area are being interviewed. An exchange agreement has been arranged with them to provide them copies of all project reports in return for information on their decision processes. This

agreement seems to be providing useful information to these bodies, since the Dallas Chamber of Commerce wishes to publish and distribute copies of the CATS report entitled, "A Preliminary Analysis of the Effects of the Dallas-Fort Worth Regional Airport on Surface Transportation and Land Use", by Mr. Harry Wolfe, at their expense.

Preliminary analysis of the flight and passenger data suggests that feedback to agencies such as the FAA and CAB will result in improved data collection techniques.

Topic IV: Evaluation of Ride Quality in Multimodal Systems

A very good interaction has continued between our project and both the Center for Highway Research and the State Department of Highways and Public Transportation.

Other specific interaction has occurred with the National Aeronautics and Space Administration at the Langley Research Center who have loaned us a three-axis accelerometer and are interested in our vehicle acceleration results.

Informal discussions with LTV (Ground Transportation Division) have helped them in their awareness of ride quality criteria and human response measurement techniques.

Topic V: Human Response in the Evaluation of Modal Choice Decisions

The close cooperation between this study and various state and local agencies, developed early in the program, has been maintained. This has led to the utilization of our research findings by such groups as: Amtrak Agents-Southwest; the Mayor, City, City Counselors, and City Planners of Austin, Texas; and the Governor's Office, State of Texas. Also associated with this topic has been the development of an interagency contract with the Austin State School to study the travel requirements of the mentally retarded.

Other Conferences and Meetings: Various members of the Council's research team attended transportation related meetings and conferences during this time period. Many were invited to present papers. These meetings serve to broaden the scope and perspectives of the Council's research. The following are illustrative of the wide range of topics covered.

Mark Alpert, "Segmentation of a Transportation Market by Determinant Attitudes," presented to the American Psychological Association Convention, New Orleans, Louisiana, with C. Shane Davies.

———"A Decision Sciences Approach to the Marketing of Public Transportation," presented at the meeting of the American Institute for Decision Sciences and published in the **Proceedings of the American Institute for Decision Sciences**, with C. Shane Davies.

Stanley Arbingast, Attended the Meeting of the Travel Research Association in Williamsburg, Virginia.

———Attended Transportation Research Forum Annual Meeting in San Francisco, California.

John Betak, "Transportation-Related Constructs of Urban Activity Spaces," presented at the Association of American Geographers Milwaukee Meetings, with Pat Burnett, Wayne Enders, David Chang, and Jose Montemayor.

———Attended Transportation Research Forum Annual Meeting in San Francisco, California, and met with persons from industry and universities interested in Joint Projects on Transportation.

———Attended Policy Workshop on Regulation of Transportation sponsored by the U.S. Department of Transportation, Washington, D.C.

Pat Burnett, "Transportation-Related Constructs of Urban Activity Spaces," presented at the Association of American Geographers Milwaukee Meetings, with Wayne Enders, David Chang, John Betak, and Jose Montemayor.

———"Mathematical Models of Movement within Urban Spatial Structures," presented at the **Commission on Quantitative Methods Meeting, International Geographical Union**, Palmerston North, New Zealand.

———"The Development of Disaggregate Trip Distribution Models," presented at the 2nd International Conference on Behavioral Travel Demand, Asheville, North Carolina, with Donna Prestwood.

———Attended Transportation Research Forum Annual Meeting in San Francisco, California.

Ronald Briggs, "Designing Transportation Systems for Low Density Rural Regions," presented at the Annual

Meetings of the Association of American Geographers, Milwaukee, Wisconsin.

Grover Cunningham, Attended Department of Transportation, Office of University Research, 4th Policy Workshop on The Role of Government in Research and Development and their Implementation, Washington, D.C.

W. J. Dunlay, Attended Transportation Research Board Annual Meeting, Washington, D.C.

Edward Frome, "The Equivalence of Iterative Weighted Least Squares and Maximum Likelihood Estimation in the Exponential Family," presented at the Joint Annual Meeting of the American Statistical Association, Institute of Mathematical Statistics and Biometrics Society, Atlanta, Georgia.

Kingsley Haynes, "A Deterministic Model of Innovation Diffusion with Physical Analog," presented at the Western Region Science Meetings, Long Beach, California, with Gerald White.

A. J. Healey, "Automobile Riding Quality with Real Highway Roughness," presented at the American Institute of Aeronautics and Astronautics Life Sciences and Systems Specialist Conference, Dallas-Fort Worth, Texas, with R. O. Stearman and C. C. Smith.

———Attended Department of Transportation, Office of University Research 4th Policy Workshop on The Role of Government in Research and Development and their Implementation, Washington, D.C.

John Shortreed, Attended Transportation Research Board Annual Meeting, Washington, D.C.

C. C. Smith, "Multiple and Continuous Guideway-Vehicle Dynamic Performance," presented at the Winter Annual Meeting, American Society of Mechanical Engineers, New York, N.Y., with A. J. Gilchrist and D. N. Wormley.

C. Michael Walton, "The Effect of Intercity Transportation Systems on Small Urban Areas," presented at the Texas Section, ASCE Urban Planning and Development Technical Group Fall Meeting, Amarillo, Texas.

———"Formulation of Land Use and Urban Growth Policies," presented at the ASCE Specialty Conference, Washington, D.C.

-----"Influence of Interurban Transportation Systems on Rural Communities," prepared for 3rd Intersociety Conference on Transportation, Atlanta, Georgia, with John Huddleston and Ronald Linehan.

-----Participation in Capital Area Planning Council Transportation Meetings and Governor's Interagency Transportation Council Quarterly Meetings.

-----Attended Transportation Research Board Annual Meeting, Washington, D.C.

C. P. Zlatkovich, Travel Research Association annual meeting, Williamsburg, Virginia.

-----Policy Workshop on Regulation of Transportation sponsored by U.S. Department of Transportation, Washington, D.C.

-----Annual Transportation Conference, Texas Transportation Institute, College Station, Texas.

-----National Rail Planning Conference, New Orleans, Louisiana

-----Transportation Research Forum annual meeting, San Francisco, California.

W. R. Hudson, traveled extensively during the last year to bring in many new ideas concerning transportation from across the nation and around the world. Much time was spent with the World Bank and the International Bank for Reconstruction and Development in Washington, D.C. planning a large research project in Brazil.

-----took an around the world trip in March, 1975 sponsored by the World Bank to discuss with others the Council's research, attend meetings, etc. to bring new ideas into our research.

-----attended transportation policy workshops in Washington and meetings held by the American Society of Civil Engineers on transportation related subjects.

-----attended a workshop on Low-Volume Roads held in Boise, Idaho sponsored by the Forest Service.

-----attended the Transportation Research Board Annual Meeting, Washington, D.C.

-----attended the Department of Transportation, Office of University Research 4th Policy Workshop on The Role of Government in Research and Development and Their Implementation, Washington, D.C.

GUEST LECTURERS FOR TRANSPORTATION SEMINAR SERIES— VISITORS TO THE COUNCIL

To provide a transportation forum for the students, faculty and the community, the Council sponsors a transportation seminar each semester which invites speakers from many facets of transportation. In addition to faculty and student presentations, the seminar hosts national and international speakers from government, industry and other universities.

The Council's growing reputation in multidisciplinary transportation research has generated many visitors to the campus during the past year who have brought a broad range of interaction concerned with transportation problems, as well as the management of multidisciplinary research activities.

The following is a list of seminar speakers and program visitors.



Mr. Paul E. Irick of the National Research Council informs CATS researchers on the uses of TRISNET, a Transportation Research Information Service.



Mr. Thomas Till, Special Assistant to the Railroad Administrator at the Department of Transportation presents views on transportation policy.

DATE	SPEAKER	TOPIC
September 16, 1974	Mr. John Staha, Transportation Co-ordinator, Division of Planning and Coordination, Office of the Governor	"Transportation Policy Formulation for the State of Texas"
September 30, 1974	Mr. Walter Wendlandt, Director of Transportation, Texas State Railroad Commission	"The Role of the Texas Railroad Commission in the State Transportation Policy and Programs"
October 7, 1974	Mr. Marcus L. Yancey, Jr., Assistant State Highway Engineer, Texas Highway Department	"Future for Transportation"
October 21, 1974	Mr. John J. Conrado, Division Engineer, Federal Highway Administration	"Federal Highway Administration's Role in Transportation"
November 4, 1974	Mr. Joe Ternus, Director of Urban Transportation, Austin, Texas	"The Role of Cities in State Transportation Policy Formulation"
November 11, 1974	Mr. Charles Murphy, Executive Director, Texas Aeronautics Commission	"The Impact of the Texas Aeronautics Commission on Texas Transportation Policies"
November 18, 1974	Mr. Roy Bayless, Director of Aviation, Austin Municipal Airport	"The Airport Manager's View"
November 25, 1974	Honorable James E. Nugent, Chairman, House Transportation Committee, Texas State House of Representatives	"Transportation in Texas: Where Are We Going"
December 2, 1974	Mr. Lyndon Henry, Executive Director, Texas Association for Public Transportation	"Developing a State Action Program for Mass Transportation"
January 27, 1975	Dr. John Shortreed, Visiting Professor of Transportation, University of Waterloo, Canada	"Programming Investment for Statewide Transportation Systems"
February 10, 1975	Mr. Robert P. Neuschel, McKinsey & Company, Inc.	"Worsening Crisis of the Railroads"
February 17, 1975	Dr. James C. Miller III, Council of Economic Advisors, Executive Office of the President	"Current Issues in Transportation Regulations"
February 24, 1975	Mr. Milton Rube, Planning Department, City of Austin	"Fixed Facility Transportation Systems: Impact on Urban Form in Austin"
March 3, 1975	Dr. Grover Cunningham, Assistant Director, Council for Advanced Transportation Studies	"Development of Behavioral Measures"
March 10, 1975	Dr. Gerhard M. Williams, Jr., Assistant Professor, Lyndon B. Johnson School of Public Affairs	"Subsidized Highway Mayhem: Traffic Safety in a Transportation Policy Context"
March 17, 1975	Mr. Thomas Till, Special Assistant to the Railroad Administrator, DOT	"Perspectives on Transportation Policy"
March 31, 1975	Dr. Hal B.H. Cooper, Jr., Assistant Professor of Civil Engineering, University of Texas	"Environmental and Energy Considerations in Railroad Electrification"
April 7, 1975	Dr. Barbara Chance, Assistant Professor of Sociology, University of Texas	"Sociological Aspects of Transportation"
April 14, 1975	Mr. Rex Leathers, Director of the Office of Development, DOT, Federal Highway Administration	"FHWA Implementation of Research"
April 21, 1975	Mr. Paul E. Irick, Assistant Director for Special Projects, National Research Council, Transportation Research Board	"TRISNET, A Developing Network of Transportation Research Information Services"
April 28, 1975	Mr. John E. Hirten, Deputy Administrator, Urban Mass Transportation Administration, Department of Transportation	"Evolving Federal Transportation Policy"
May 14, 1975	Dr. John Shortreed, Visiting Professor of Transportation, University of Waterloo, Canada	"A Transit Demand Model"

Jean Gottman, Head of the Geography Department at Oxford University visits the Council.

PROGRAM VISITORS

In addition to speakers, we have had a number of visitors to the Council from Universities, industry and government, both from this country and foreign nations.

Olle Anderson, Swedish Road and Traffic Research Institute, Stockholm, Sweden

Virgil L. Anderson, Statistics Department, Purdue University

Joseph Brew, Transportation Research Board, Washington, D.C.

Joop Brouwers, Delft, Holland, State Road Lab

William F. Brown, OST, Department of Transportation, Washington, D.C.

Ricardo Dobson, Federal Highway Administration, Washington, D.C.

Ewen Duncan, B.S. Bergman and Partners, Durban, South Africa

Peter Elsenaar, Delft, Holland, State Road Lab

Marc Good, State Department of Highways and Public Transportation

Mark Goode, Dallas, Texas

Jean Gottmann, School of Geography, University of Oxford, England

Kelley Hamby, Governor's Office of Education

Richard Hannon, Department of Transportation, Washington, D.C.

Erling K. Hansen, Norwegian Road Research Laboratory, Norway

Dr. James C. Miller, III of the Council for Economic Advisors discusses transportation regulation issues with CATS personnel.



Donald Harley, Governor's Office, Planning Coordination

Manfred Hausman, New South Wales Institute of Technology, Australia

Roy B. Hindle, National Roads Department, Pietermaritzburg, South Africa

Eric Hirst, Federal Energy Administration, Washington, D.C.

Talbot S. Huff and wife, Austin, Texas

Paul Irick, Transportation Research Board, Washington, D.C.

Steve James, TDCA

C. Phillip Johnson, Austin, Texas

George H. Kellersmann, Chief Engineer Public Works, Amsterdam, Holland

J. W. Kliukenberg, Shell Research, Amsterdam, Holland

Aad T. Klomp, Shell Laboratories, Amsterdam, Holland

R. L. Lewis, State Department of Highways and Public Transportation

Daniel L'Huillier, Director, Centre de Recherche d'Economie des Transports, Aix-en-Provence, France

Theodore C. Lustosa, Brasilia, Brazil

Jose Martinez, Capital Area Planning Council, Austin, Texas

Robert C. McWherter, LTV Aerospace Corp., Dallas, Texas and wife, Marianna

Malcom F. Mitchell, Department of Transportation, Pretoria, South Africa

Robert P. Neuschel, McKinsey and Company, Chicago, Illinois

Antonio G. N. Novaes, School of Engineering, University of Sao Paulo

James E. Nugent, Texas State House of Representatives

Byron Nupp, U.S. Department of Transportation, Washington, D.C.



Kathy O'Leary, Department of Transportation,
Washington, D.C.

Eddie Otte, National Institute of Road Research,
Pretoria, South Africa

Douglas Plautz, Ministerio Transportes, Brazil

N. B. Robinson, Jeffares and Green Consulting
Engineers, Pietermaritzburg, South Africa

Milton L. Rube, City of Austin

Scott Rutherford, De Leuw, Cather & Co., Washington,
D.C.

Jan S. Sipkema, Director of Heijmans Inc.

R. V. J. Smith, National Roads Department, Pietermaritz-
burg, South Africa

John Staha, Governor's Office, State of Texas

Rudy Steck, Hanover University, Hanover, Germany

Leonard Stern, Forest Service

Thomas A. Till, Federal Railroad Administration,
Washington, D.C.

Peter Van de Loo, Shell Laboratories, Amsterdam, Hol-
land

Harro E. Van Der Most, Chairman of the Committee and
Director of the Laboratory of the Dutch Cement In-
dustry

Jan J. M. Van Der Vring, Scientific Officer of Stichting
Studie Centrum Wegenbouw

W. Visser, Shell Research, Amsterdam, Holland

Ray Weil, Department of Transportation, Washington,
D.C.

Walter Wendlandt, Attorney-at-Law, Austin, Texas

Kor Wester, Arnhem, Holland

Sheila Widnall, U.S. Department of Transportation,
Washington, D.C.

Phillip Wilson, State Department of Highways and
Public Transportation

Marcus L. Yancey, Jr., Austin, Texas, State Department
of Highways and Public Transportation

ACADEMIC PROGRAMS IN TRANSPORTATION

The Council for Advanced Transportation Studies coordinates academic research programs at the multidisciplinary level, bringing to bear the resources of The University's various Colleges and Schools upon national, state, and local transportation problems. This provides an academic background for the development for professional careers in several fields of transportation. Six Schools and Colleges of The University of Texas at Austin and a number of other divisions have on-going programs in Transportation and in Transportation-related fields. Some of these programs have been in existence for many years and have historically cooperated with each other in various educational and research projects. In addition, multidisciplinary graduate programs in Transportation have been available in some of the present graduate degree structures for a number of years. Specific degrees in Transportation are offered in: (1) The College of Engineering, (2) The College of Business Administration, (3) The School of Architecture's Graduate Program in Community and Regional Planning. In addition to these degree-related programs, several other Colleges, Schools, or divisions have transportation-related emphases. These include Communications, Education, Law, the Lyndon B. Johnson School of Public Affairs, and Social and Behavioral Sciences. In all of these programs, the particular academic programs are designed to meet the educational needs of students with diverse backgrounds desiring to work in transportation-related fields.

The academic programs currently available within the University provide all the elements necessary for the synthesis of truly multidisciplinary formal graduate and undergraduate degree programs in transportation. The Council is charged with the task of working out the details for formalizing these programs. The present curricula provide a firm foundation for the development of multidisciplinary transportation programs, and the present faculty have much experience in the teaching of transportation and transportation-related courses.

To help develop this coordinative program in Transportation Studies, the Council prepares, on a regular basis, a

brochure entitled "Academic Programs in Transportation." This brochure lists the various courses which are directly or indirectly related to transportation, and which are currently offered on the UT campus. At present, there are over ninety such courses offered within the University. In addition, the Council encourages the development of courses in various departments throughout the University which are tied to transportation. Illustrative of this is the offering of a new Transportation course in Geography for this coming Spring, which will be open to undergraduate students from across the University.

The Council has also sponsored two University-wide Transportation Seminars. One is an undergraduate course intended to provide the student with an overview of transportation problems and phenomena. The second course is a graduate seminar which covers a wide range of transportation policy issues. Both courses have drawn significant numbers of students from across the University.

In addition to these "conventional" courses and programs, the Council, in response to requests from outside funding agencies, has developed specialized training programs in various transportation areas. These specialized programs have been based on both degree and non-degree requirements of the funding agencies. Illustrative of such activities is the development of special training programs for foreign nationals tied directly to their transportation needs in their countries. Closer to home, in response to the state of Texas' requirements, the Council is sponsoring two courses for the fifty field representatives of the Governor's Office of Traffic Safety. These will be offered in the Fall and Spring semesters of 1975-76, and will provide an introduction to Traffic Safety Management for individuals currently working in this field. At the present time, the Council is also identifying other courses which may provide the foci for transportation emphases in both "conventional" and "non-conventional" studies in Transportation.

To illustrate the type of "conventional" degree programs available in Transportation at The University of Texas at Austin, the following brief descriptions of the three specific degree programs are given:

The College of Engineering: The College of Engineering academic programs in Transportation are concentrated in

the Department of Aerospace Engineering and Engineering Mechanics, Civil Engineering, and Mechanical Engineering. There are also a number of transportation courses being offered by other departments within the College. The current degree programs in engineering provide sufficient flexibility to allow undergraduate transportation programs at the present time in both Aerospace Engineering and Civil Engineering. In addition, transportation-related block options are available in Mechanical Engineering.

The Department of Aerospace Engineering and Engineering Mechanics offers eleven undergraduate courses and nine graduate courses in transportation-related subjects, from Structural Analysis of Submersible Vehicles to Transportation Simulation. The Department of Civil Engineering offers twelve undergraduate courses and nineteen graduate courses, treating topics from Traffic Control to Airport Design and Operation. The Department of Mechanical Engineering offers twelve undergraduate and twelve graduate courses, covering Engineering Acoustics to Operations Research.

The College of Business Administration: Academic programs with specific concentration in transportation leading to the BBA, MBA, Ph.D. degrees are offered through the Department of Management in the College of Business Administration. Undergraduate courses in Transportation Systems and Services, Mass Transportation and Logistics, and Transportation Regulation and Policy are regularly offered. Graduate seminars and transportation problems and special studies in transportation are also offered. A number of other courses in the College of Business Administration frequently involve such transportation-related subjects as Labor Relations, Resources and International Business, Production Management and Marketing Administration.

The School of Architecture's Graduate Program in Community and Regional Planning: The School of Architecture offers academic programs at both the undergraduate and graduate levels. Because of the influence of transportation on Architecture, the School of Architecture has increased its emphasis on transportation and its effects. In recent years, students and faculty in the School of Architecture have participated in the design process of a



Involvement on the Shuttle Bus Committee at The University draws students and faculty from various disciplines across campus.

number of facilities which involve transportation structures, and the emphasis on transportation has increased steadily.

The graduate program in Community and Regional Planning has taken particular interest in transportation as a major influence on community and regional form and as a basic component of the planning process. The program offers a number of courses and seminars related to transportation, including a multidisciplinary seminar offered by faculty members of the graduate program in Community and Regional Planning and in the College of Business Administration. This seminar has focused its attention on the economic aspects of urban transportation.

In addition to these efforts, the Council has concerned itself with identifying sources of financial assistance for students interested in pursuing transportation studies. Generally, this assistance is divided into three categories: (1) Research Assistantships, (2) University Fellowships, and (3) other Fellowships. Research Assistantships provide an opportunity for graduate students to work on research projects supervised by the faculty. Stipends vary with the applicants' qualifications and duties. Amounts currently range from \$3,800 to \$5,000 per year for half-time research duties. Research Assistants generally are not required to pay non-resident tuition. University Fellowships are awarded to a select group of graduate students and pay from \$2,400 to \$2,800 per year (including tuition and required fees), plus \$500 annually for each dependent. The awards are based on a University-wide competition, with no fixed number in any one department. Students who receive these Fellowships are expected to carry a full academic load. A variety of other Fellowship support is available in transportation. In particular, in recent years our students have been very successful in obtaining Fellowships in Transportation Planning Research and Highway Safety from the National Highway Institute and the Institute of Traffic Engineers. Engineering Foundation Fellowships are also available. Most recently, the Council

has been assigned to administer the prestigious ENO Transportation Foundation Fellowship in Transportation Studies.

In terms of research related work, over forty graduate and undergraduate students have been involved in various projects sponsored through the Council this past year. In addition to providing the students with specialized skills and training in specific areas of transportation, this involvement in the research projects has resulted in 15 graduate theses, dissertations, and professional reports. Thus, this side of the academic program in Transportation at The University of Texas is clearly very important.

Finally, it should be pointed out that over thirty faculty are directly involved in research projects sponsored through the Council. These faculty, in addition to conducting their research, utilize their research findings and their interest in transportation problems in teaching courses within their respective departments. Thus, The University of Texas at Austin, through its Council for Advanced Transportation Studies, offers a wide range of academic programs in transportation. This includes both graduate and undergraduate programs, as well as non-degree programs in specialized areas.

Students work closely with principal investigators to define research goals and objectives.



PERSONNEL INVOLVEMENT IN CATS

FACULTY

During the past year, faculty involvement in the Council for Advanced Transportation Studies has been as follows:

Charles Burnette, Dean of School of Architecture, CATS Executive Committee,

William Cannon, Dean, Lyndon B. Johnson School of Public Affairs, CATS Executive Committee,

Wayne Danielson, Dean of School of Communications, CATS Executive Committee,

Earnest F. Gloyna, Dean of College of Engineering, CATS Executive Committee,

W. R. Hudson, Civil Engineering, Director of Council for Advanced Transportation Studies, Budget Advisory Committee (Chairman), CATS Executive Committee (ex officio),

George Kozmetsky, Dean of College of Business Administration, CATS Executive Committee,

James W. McKie, Dean of College of Social and Behavioral Sciences, CATS Executive Committee,

Paul Olum, Dean of College of Natural Sciences, CATS Executive Committee,

Lymon C. Reese, Civil Engineering, CATS Executive Committee (Chairman), Budget Advisory Committee (ex officio),

Elsbeth D. Rostow, Acting Dean of General and Comparative Studies, CATS Executive Committee,

Ernest E. Smith, Dean, School of Law, CATS Executive Committee,

Stanley Werbow, Dean of College of Humanities, CATS Executive Committee,

Stanley Arbingast, Bureau of Business Research, Budget Advisory Committee, Corresponding Principal Investigator, DOT Operating Committee,



Dr. W. R. Hudson, Dean Earnest F. Gloyna, and Dr. C. Michael Walton take a moment to inform Representative James E. Nugent about the Council's activities.

George R. Blitch, Office of Research Management, Budget Advisory Committee,

C. Shane Davies, Corresponding Principal Investigator, Budget Advisory Committee, DOT Operating Committee,

Hudson Matlock, Chairman, Civil Engineering, Budget Advisory Committee,

Ronald Briggs, Geography, Corresponding Principal Investigator, DOT Operating Committee,

Patricia Burnett, Geography, Corresponding Principal Investigator, DOT Operating Committee,

Richard Dodge, Architecture, Corresponding Principal Investigator, DOT Operating Committee,

William J. Dunlay, Jr., Civil Engineering, Corresponding Principal Investigator, DOT Operating Committee,

Anthony Healey, Mechanical Engineering, DOT Operating Committee,

Thomas W. Kennedy, Civil Engineering, DOT Operating Committee, Faculty Associate,

C. Michael Walton, Civil Engineering, Principal Investigator, CATS Executive Secretary, DOT Operating Committee,

Mark Alpert, Marketing, Principal Investigator,

Barbara J. Chance, Sociology, Principal Investigator,

Charles Clark, Business, Principal Investigator,

Hal B. H. Cooper, Civil Engineering, Environmental Health Engineering Laboratories, Principal Investigator,

Carol Deets, Nursing, Principal Investigator,

James Fitzsimmons, Management, Principal Investigator,

Edward L. Frome, General Business, Principal Investigator,

John Gallery, Architecture, Associate Dean, Principal Investigator,

Linda Golden, Marketing Administration, Principal Investigator,

Richard Hannon of the Department of Transportation meeting with principal investigator John Shortreed.



Elmer Hixson, Electrical Engineering, Principal Investigator,
 Larry Hoberock, Mechanical Engineering, Principal Investigator,
 Paul Jensen, Mechanical Engineering, Principal Investigator,
 Robert G. Mather, Architecture, Principal Investigator,
 B. Franklin McCullough, Civil Engineering, Principal Investigator,
 Robert Means, Law, Principal Investigator,
 Sandra Rosenbloom, Community and Regional Planning, Principal Investigator,
 John Shortreed, Civil Engineering, Principal Investigator,
 Craig C. Smith, Mechanical Engineering, Principal Investigator,
 Ronald Stearman, Aerospace Engineering, Principal Investigator,
 James M. Treece, Law, Principal Investigator,
 Gerhard Williams, Lyndon B. Johnson School of Public Affairs, Principal Investigator,
 Robert Young, Psychology, Principal Investigator,
 Peter R. Antoniewicz, Physics, Faculty Associate,
 J. W. Barnes, Mechanical Engineering, Faculty Associate,
 Marlan Blissett, Lyndon B. Johnson School of Public Affairs, Faculty Associate,
 Charles M. Bonjean, Sociology, Faculty Associate,
 Stan Burnham, Regional Medical Program, Faculty Associate,
 Charles C. Cleland, Special Education and Educational Psychology, Faculty Associate,
 Peter Oakley Coltman, Community and Regional Planning, Faculty Associate,
 Robin Doughty, Geography, Faculty Associate,
 Richard Furlong, Civil Engineering, Faculty Associate,
 Carl E. Hansen, Special Education, Faculty Associate,

Niles M. Hansen, Economics, Director, Center for Economic Development, Faculty Associate,
 James E. Hartling, Community and Regional Planning, Faculty Associate,
 Kingsley Haynes, Lyndon B. Johnson School of Public Affairs, Faculty Associate,
 Tom Hill, Associate Director for Operations, Center for Energy Studies, Faculty Associate,
 Charles J. Holahan, Psychology, Faculty Associate,
 James Holmes, Engineering Graphics, Faculty Associate,
 D. M. Huffman, Management, Faculty Associate,
 Kenneth H. Jehn, Meteorology, Faculty Associate,
 Terry Kahn, Architecture and Planning, Faculty Associate,
 Clyde E. Lee, Civil Engineering, Director, Center for Highway Research, Faculty Associate,
 William G. Lesso, Mechanical Engineering, Faculty Associate,
 Paul Liberty, Associate Director, Measurement and Evaluation Center, Faculty Associate,
 Bassett Maguire, Jr., Department of Zoology, Faculty Associate,
 Robert L. Marion, Education, Faculty Associate,
 Jay Nematollahi, Pharmaceutical Chemistry, Faculty Associate,
 Sheldon R. Olson, Sociology, Faculty Associate,
 Reynall Parkins, Architecture and Planning, Faculty Associate,
 Dudley Poston, Sociology, Faculty Associate,
 Milton E. Schoeman, Management, Faculty Associate,
 Richard L. Schott, Government, Faculty Associate,
 Albert Shapero, Management, Faculty Associate,
 Henry Steiner, Management, Faculty Associate,
 John H. Vanston, Mechanical Engineering, Associate Director, Center for Energy Studies, Faculty Associate,
 T. Demetri Vocalis, Health Education, Faculty Associate,
 Baxter Womack, Electrical Engineering, Faculty Associate,
 Herbert H. Woodson, Electrical Engineering, Director, Center for Energy Studies, Faculty Associate,
 C. D. Zinn, Mechanical Engineering, Faculty Associate.

Barbara Chance, Assistant Professor of Sociology, informs students of some of the sociological aspects of transportation.



GRADUATE STUDENTS

A major area of concern of the Council is the development of graduate students who will enter the work force with skills to assist in the solution of transportation problems in their various fields of endeavor. During the past year, forty graduate students worked for the Council. The following is a list of students who are continuing research and education from FY 74-75.

Gary M. Alletag, B.B.A., Topic V, Law
 Kevin Thomas Bowman, B.A., Topic I, Geography
 James Brooks, B.A., Topic V, Educational Psychology
 Tom Caffery, B.S.C.E., Airport Capacity, Civil Engineering
 Mallory J. Campbell, B.S., Topic V, Marketing
 Edward Vincent Chambers, III, B.S.C.E., Airport Capacity, Civil Engineering
 Tommy Chmores, B.S.C.E., Airport Capacity, Civil Engineering
 Patrick Collins, B.A., Topic I, Geography
 Chang-Yi David Chang, M.A., Topic IIIB, Geography
 Bruce Robert Coulombe, B.S., Topic IIIA, Law
 Gordon Derr, B.S.C.E., Topic II, Civil Engineering
 S. Michael Dildine, B.S., Topic IIIA, Business Administration
 Wayne T. Enders, M.A., Topics I, II, V, Geography
 Arthur R. Friedman, B.A., Topic IIIB, Anthropology
 Carl Gregory, B.A., Topic IIIB, Community and Regional Planning
 Dennis Harner, B.A., M.A., Topic I, Geography
 Karen Haynes, A.B., M.S.W., Topic I, Social Work
 Lyndon Henry, B.S., Topic IIIB, Community and Regional Planning
 Thomas Horne, B.S., Topic II, Civil Engineering
 Larry Irvin, 5th Year Senior, Topic V, Pharmacy
 Enrique Cano Jimenez, B.S., Forest Service, Civil Engineering, Community and Regional Planning
 Edward N. Kasparik, B.A., Topic IIIA, Community and Regional Planning

Japhet S. Law, B.S., M.S., Topic IV, Mechanical Engineering
 William A. Leonard, B.A., M.A., Topic V, Geography
 Ronald Linehan, B.A., Topic II, Community and Regional Planning
 Jose de Jesus Montemayor, M.S.E.E., Topic IIIB, Electrical Engineering
 William Russel Murray, B.S., Ride Quality, Mechanical Engineering
 Nazim S. Nathoo, B.S., M.S., Topic IV, Mechanical Engineering
 Chang-Ho Park, M.S., Airport Capacity, Civil Engineering
 Francis Parker, P.A., Topic V, Humanities-Classics
 William F. Perrin, B.B.A., Topic I, Business
 Donna Prestwood, B.A., Topic IIIB, Geography
 Shirley Selz, B.A., Forest Service, Law
 John P. Sparks, B.A., Topic IIIB, Community and Regional Planning
 Beverly Spikes, B.B.A., Topic V, Marketing
 David Stamman, M.A., Topic IV, Psychology
 Michael Lee Stewart, M.A., Topic IV, Psychology
 James Story, B.B.A., Topic IIIB, Geography
 Steven Tsao, B.S., Ride Quality, Mechanical Engineering
 Patricia Vines, B.S., Topic I, Community and Regional Planning
 Douglas Wiersig, B.S., Topic IIIB, Civil Engineering
 James Scott Wilkinson, 5th Year Senior, Topic II, Architecture

Graduate students David Chang, Donna Prestwood, and Thomas Caffery have an opportunity to talk with Richard Hannon, Topic III Monitor from the Department of Transportation.



The following graduate students have completed degree programs while working for the Council for Advanced Transportation Studies. These students are now employed in industry and government.

David Brown, MBA, Business Administration, Exxon Corporation, Baytown, Texas.

Mary Lee Gorse, MBA, Business Administration, Bureau of Business Research, The University of Texas at Austin.

Mike Pen-Mu Kao, MSME, Mechanical Engineering, Engineer, Texas Instruments, Dallas, Texas.

Rodger Kester, MA, Geography, Transportation Planner, Missouri State Highway Department, Jefferson City, Missouri

Frank V. Lindstrom, MBA, Management, U.S. Army, Ft. Hood, Texas

Ron Linehan, MS, Community and Regional Planning, Council for Advanced Transportation Studies, The University of Texas.

David McGehee, MS, Mechanical Engineering, Engineer, General Dynamics, Ft. Worth, Texas.

Bruce Shanahan, MSME, Mechanical Engineering, Engineer, McDonnell Douglas Aircraft, California.

Hugh J. Williamson, M.A., Ph.D., Mechanical Engineering, Council for Advanced Transportation Studies, The University of Texas.

Jim Wilson, MBA, Business Administration, Assistant-to-the Vice-President for Business Affairs, Shuttle Bus Operation, The University of Texas.

RESEARCH STAFF

The research staff is comprised of full time staff members, as well as graduate and undergraduate students. They are as follows:

FULL TIME STAFF

John Betak, Assistant Director

Grover Cunningham, Social Science Research Associate V

John Huddleston, Social Science Research Associate III

Steve Linder, Research Engineering Associate II

David A. Sands, Social Science Research Associate V

Charles P. Zlatkovich, Social Science Research Associate V

GRADUATE STUDENTS

Mike Demming, Social Science Research Assistant III

Mary Lee Gorse, Social Science Research Associate II, Topic IIIA

William Leonard, Social Science Research Associate, Topic I

Ronald Linehan, Social Science Research Associate, Topic II

Hugh J. Williamson, Research Engineering Associate

UNDERGRADUATE STUDENTS

Dilia Camacho, Social Science Research Assistant II, Topic I

Pablo Celaya, Social Science Research Assistant II, Topic V

Jacquelin Lazarus, Social Science Research Assistant II, Topic V

Michael Lewis, Social Science Research Assistant, Topic V

Leon McAulay, Social Science Research Assistant, Topic I

Edna Olivo, Social Science Research Assistant II, Topic II

Michael Poer, Social Science Research Assistant II

Steve Allen Ramsey, Lab Research Assistant II, Airport Capacity

Rodney Sawyer, Social Science Research Assistant II, Topic V

ADMINISTRATIVE STAFF

The major research efforts of the faculty and graduate students of the Council are largely supported by part-time staff and a small number of full-time administrative staff. Some of the Council's staff personnel are derived from the student body. This employment provides opportunities for financial assistance to education in many disciplines in the University. These are indicated by an asterisk.

Joan Cantu, Draftsperson

Rosie Cantu, Clerk Typist*

Susanne Doell, Secretary

Florence Escott, Secretary, Topic IIIA

Barbara Garrett, Secretary

Karen Marie Michaud, Secretary

Marina Palmer, Senior Secretary, Topic V

Patricia Davis Rein, Senior Secretary, Publications

Diana Schaefer, Senior Secretary, Topic II

Josephine Sosa, Clerk Typist*

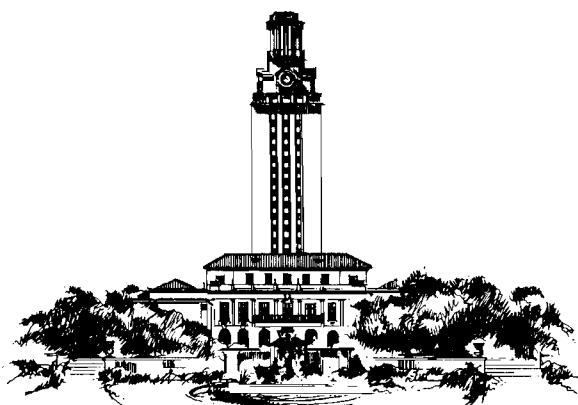
Janette Scott, Senior Secretary, Topic I

Rita Tamayo, Senior Secretary, Topic IIIB

Colleen Trlica, Senior Secretary



L041442



**Council for Advanced Transportation Studies
THE UNIVERSITY OF TEXAS AT AUSTIN**