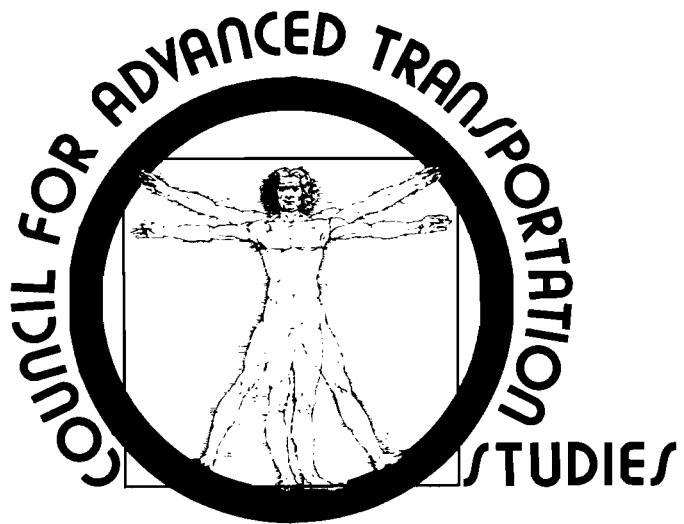


**ANNUAL REPORT
THE COUNCIL FOR
ADVANCED
TRANSPORTATION
STUDIES
1977**

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The University of Texas at Austin

PREFACE

As in previous years, the Council has continued to expand its activities and services to its sponsors, participating faculty, and students. During the 1976-77 academic year, the Council participated in 23 activities which involved a wide spectrum of sponsors. The Council has continued its Traffic Safety Program, its research with the Department of Transportation, the U.S. Forest Service, and the United Nations and World Bank. In addition to these continuing activities, several new programs, services, and activities have been initiated during the year.

The Regional Information Center is now operational and provides faculty and students with rapid access to transportation-related information and publications, a service which greatly enhances the educational and research potential at The University of Texas at Austin. In addition, the Council provided national leadership by conducting and co-sponsoring the "Southwest Conference on Coordinating Mobility Programs for the Transportation Disadvantaged" which was held in San Antonio and attracted participants from 22 states and Puerto Rico. The Council also developed a Driver Education Curriculum for senior high school students, developed and presented a short course on the Use of Statistics for Planners and Managers, and conducted a workshop on Human Services Transportation Planning and Management.

These new activities enhance the total reputation of The University of Texas at Austin as an institution serving the needs of the state, the nation, and local governments.



Dr. Thomas W. Kennedy, Director

Thomas W. Kennedy
THOMAS W. KENNEDY, *Director*

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Summary of Organizational Objectives and Accomplishments

FUNCTIONAL MISSION

Since establishment by the Office of the President in May 1972, the Council for Advanced Transportation Studies has served as a multidisciplinary organization to carry out research and educational programs in transportation. The steadily expanding and increasingly diverse spectrum of programs 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 the private sector and government agencies having common goals and interests in transportation education and research.



Dr. C. Michael Walton, Civil Engineering

OBJECTIVES

The activities and programs of the Council are of a continuing and diverse nature and are in response to the transportation needs of the state, nation, and local communities. The overall objective of the Council is to provide a coordinated program within The University for Research, Education, Information Service, and Public Service focused on transportation and related problems.



RESEARCH

The Council, in continuing to encourage transportation-related research with The University, fulfills four basic roles. First, it acts to identify new transportation research areas. Second, it seeks out faculty expertise to undertake research. Third, it attempts to find external funding to support faculty research in transportation. Finally, it coordinates on-going research within The University.



Graduate student testing for carbon monoxide



Dr. Ruben McDaniels, Management

EDUCATION

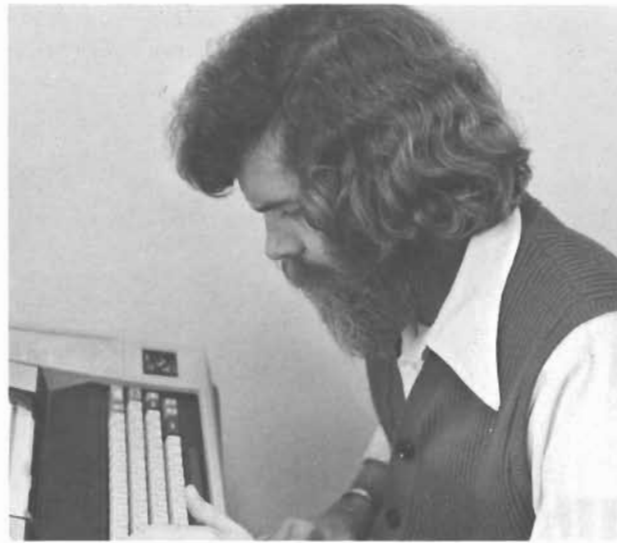
The Council, through its Academic Committee, coordinates the development and teaching of graduate and undergraduate transportation and transportation-related courses at The University of Texas at Austin. "Studies in Transportation," a brochure developed by the Academic Committee, describes degrees, majors, programs, and courses relating to transportation. In addition, the Council conducts short courses, workshops, and conferences on current transportation-related subjects.

INFORMATION SERVICES

The Council is presently developing a Regional Transportation Information System which will provide fast response to informational needs on various aspects of transportation. The system includes a nationwide, computer-accessible information network and a regional transportation library. In addition, a continuous effort is made to disseminate information which is of current interest.

PUBLIC SERVICE

The Council attempts to furnish the expertise of the Council and its associated faculty to the private sector and various public bodies charged with responsibility concerning transportation.



Dr. John F. Betak, Project Director of the Regional Transportation Information System

Activities

The Council's activities have continued to grow and expand as shown in Figures 1, 2, and 3. During 1976-77, 23 projects and activities were sponsored by International, Federal, and State agencies and by private sector organizations. These activities totalled approximately \$750,000 (Figure 3). In addition, a significant amount of time and services were contributed by The University faculty, staff, and officials from the public and private sector. This year Council programs have involved 42 faculty and professional staff, 27 graduate students, 12 undergraduate students, and 7 full-time support staff. (See figures 1 on page 6, 2 on page 7, and 3 on page 8.)

RESEARCH

The Influence on the Rural Environment of Interurban Transportation Systems

Co-Principal Investigators: C. Michael Walton, Civil Engineering
Richard Dodge, Architecture and Planning
John F. Betak, Council for Advanced
Transportation Studies

Sponsor: U.S. Department of Transportation

This project investigated various aspects of the social, economic, and physical impact of interurban transportation on small communities.

A series of research reports were produced on such areas of impact as changes in land values, manufacturing, employment, and perceived utility of alternative transportation systems. The final phase has been primarily concerned with the development of two sets of manuals, one for use by professional planners and one for use by local officials and citizens.

Figure: 1
PROJECT FUNDS 1972-77: ALLOCATION AND GROWTH

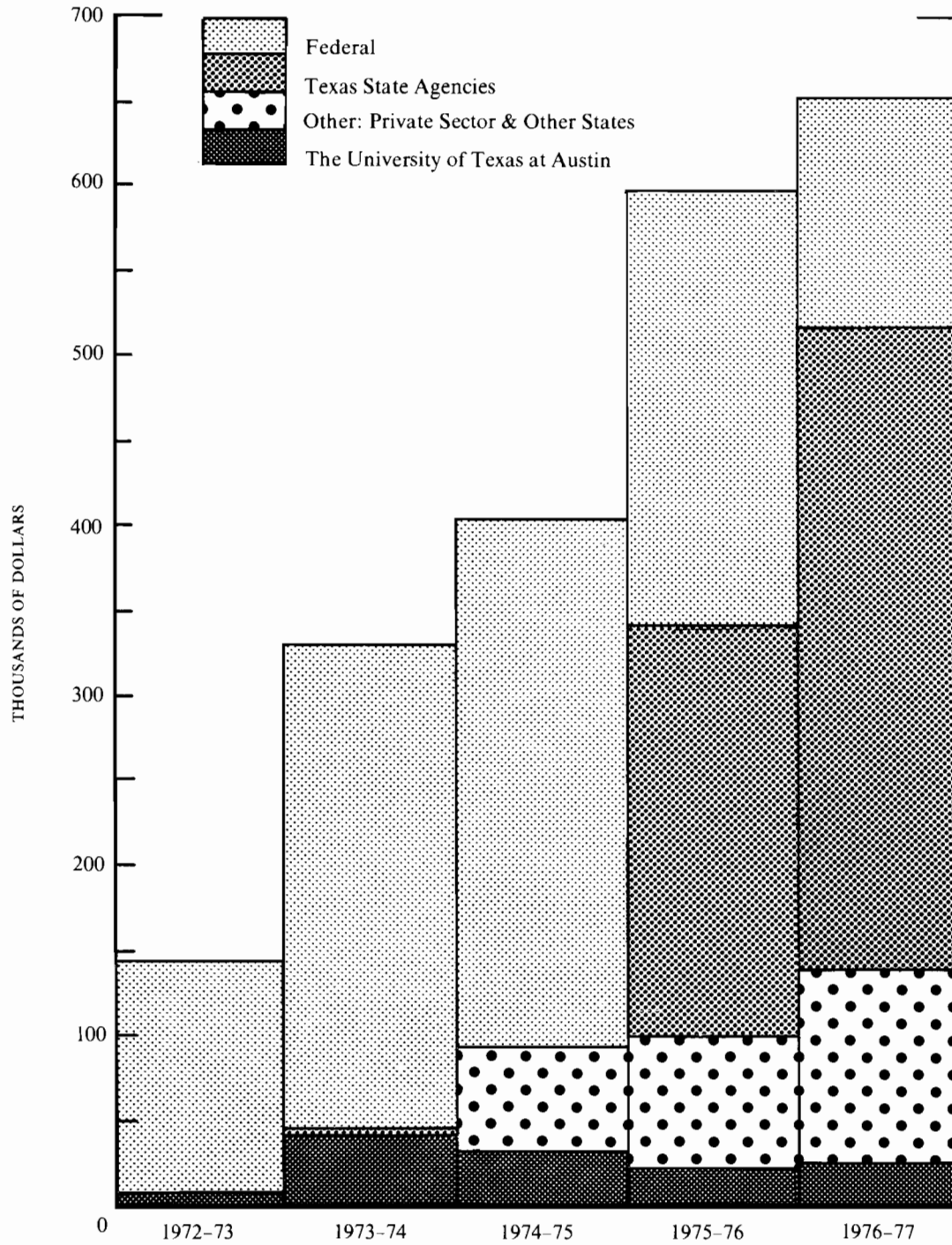


Figure: 2
PROJECTS BY ACADEMIC YEAR

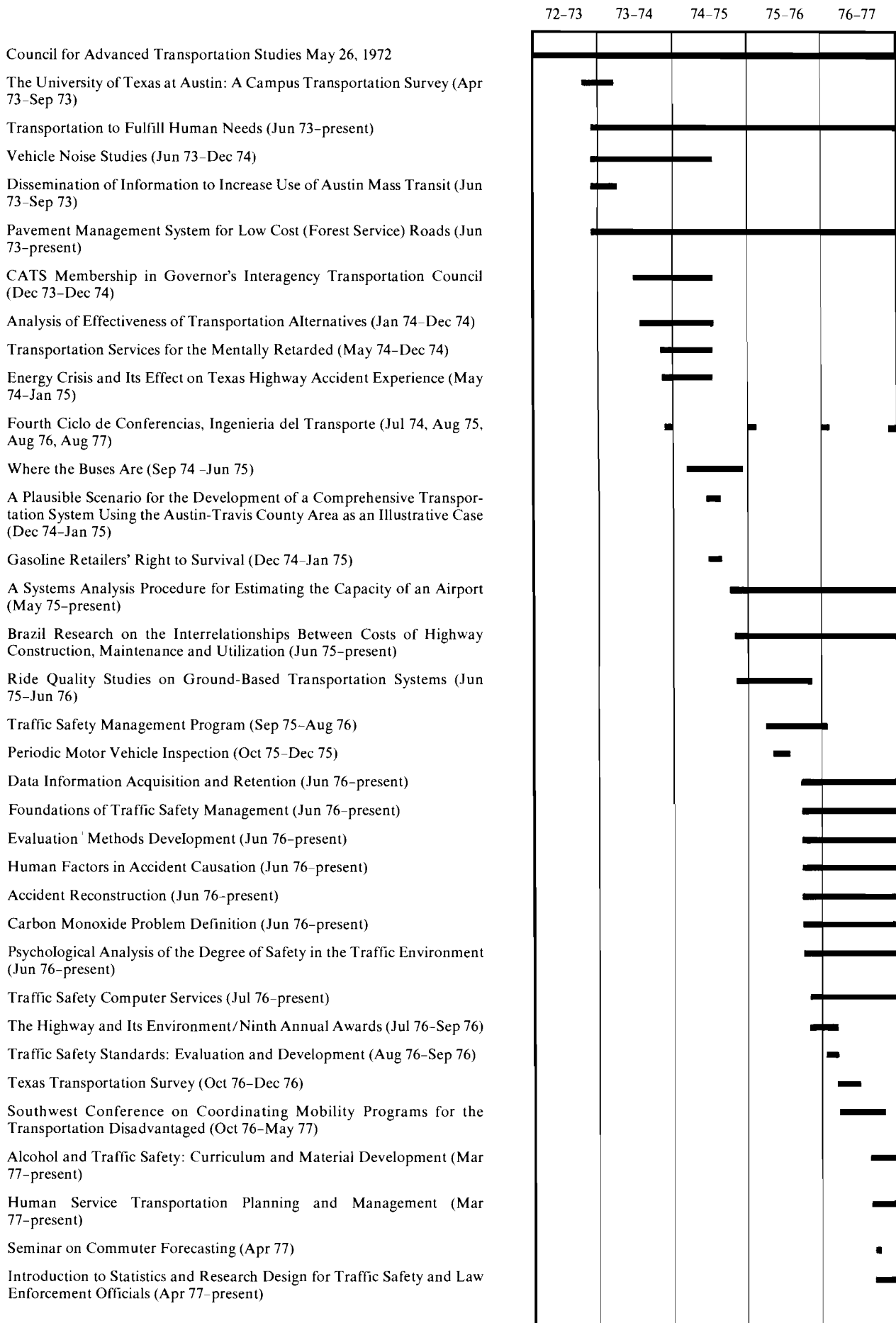


Figure: 3
PROJECTS AND ACTIVITIES OPERATING DURING
1976-77

| Project | Sponsor |
|--|---|
| 1. Transportation to Fulfill Human Needs | U.S. Department of Transportation |
| 2. Pavement Management System for Lost Cost (Forest Service) Roads | U.S. Forest Service |
| 3. A Systems Analysis Procedure for Estimating the Capacity of an Airport | U.S. Department of Transportation |
| 4. Brazil Research on the Interrelationships Between Costs of Highway Construction, Maintenance, and Utilization | International Bank for Reconstruction and Development Government of Brazil United Nations Development Program Texas Research and Development Foundation |
| 5. Data Information Acquisition and Retention | Texas Office of Traffic Safety (TOTS) Texas State Department of Highways and Public Transportation (TSDHPT) |
| 6. Foundations of Traffic Safety Management | TOTS/TSDHPT |
| 7. Evaluation Methods Development | TOTS/TSDHPT |
| 8. Human Factors in Accident Causation | TOTS/TSDHPT |
| 9. Accident Reconstruction | TOTS/TSDHPT |
| 10. Carbon Monoxide Problem Definition | TOTS/TSDHPT |
| 11. Psychological Analysis of Degree of Safety in the Traffic Environment | TOTS/TSDHPT |
| 12. Traffic Safety Computer Services | TOTS/TSDHPT |
| 13. Traffic Safety Standards: Evaluation and Development | TOTS/TSDHPT |
| 14. The Highway and Its Environment/Ninth Annual Awards | Federal Highway Administration U.S. Department of Transportation |
| 15. Contemporary Transportation Issues | Department of Civil Engineering Council for Advanced Transportation Studies |
| 16. Topics in Transportation | General and Comparative Studies Council for Advanced Transportation Studies |
| 17. Texas Transportation Survey | Texas Department of Community Affairs |
| 18. Southwest Conference on Coordinating Mobility Programs for the Transportation Disadvantaged | Texas Department of Community Affairs Texas Department of Public Welfare Council for Advanced Transportation Studies National Council for the Transportation Disadvantaged |
| 19. Fourth Ciclo de Conferencias, Ingenieria del Transporte | State of Puebla, Mexico |
| 20. Alcohol and Traffic Safety: Curriculum and Material Development | Texas Education Agency |
| 21. Human Service Transportation Planning and Management | Coordinating Board, Texas College and University System |
| 22. Seminar on Commuter Forecasting | Federal Aviation Administration |
| 23. Introduction to Statistics and Research Design for Traffic Safety and Law Enforcement Officials | Texas Department of Public Safety |

Human Response in the Evaluation of Modal Choice Decision

Co-Principal Investigators: Mark I. Alpert, Marketing Administration
Linda L. Golden, Marketing Administration
John F. Betak, Council for Advanced Transportation Studies
C. Shane Davies, Geography

Sponsor: U.S. Department of Transportation

Based on an evaluation of existing modes and using key determinant procedures, the work included under this topic has proceeded as follows:

(1) Data have been collected to test the validity of whether changes in attributes or transportation modes and promotional messages affect rider and voter responses. (2) A longitudinal survey of changes in attitude toward determinant attributes, transit funding, etc., has been completed. (3) In addition, surveys were administered to "potential switchers" to mass transit to determine trade-offs in determinant attributes for modal choice decision.

Pavement Management System for Low Cost Forest Service Roads

Co-Principal Investigators: W. Ronald Hudson, Civil Engineering
B. Frank McCullough, Civil Engineering
Freddy L. Roberts, Civil Engineering

Sponsor: U.S. Forest Service

The first year of this project was devoted to the formulation of a preliminary conceptual system. Through the synthesis of information obtained during a comprehensive literature review and contact between Forest Service personnel and the project staff, the preliminary conceptual system was developed. Using the results of the Phase I conceptual study and a pre-existing program, an initial computerized working pavement design and management model was developed during Phase II of the project. Phase III involves the preparation of training materials and implementation of the design and management system on a trial basis in selected Forest Service Management areas. A sensitivity analysis that includes all input variables contained in the Program User's Manual is also being conducted during the two-year third phase.

A Systems Analysis Procedure for Estimating the Capacity of an Airport

Principal Investigator: B. Frank McCullough, Civil Engineering

Sponsor: U.S. Department of Transportation

The initial step of identifying the components and boundaries of an airport system has been completed. Existing definitions of airport capacity have been reviewed and a definition which applies to the airport system as a whole, as well as to the individual components, has been developed. Giving special consideration to passenger behavior, the modeling framework for analyzing overall airport capacity was developed. During the coming year, study will concentrate on refinements of individual component models, a sensitivity analysis of the component models, and a validation of a system capacity model. In conjunction with the modeling concept, selected models were developed or adapted for different components of the airport system. Data collected and analysis procedures have been examined and a preliminary step for implementing the overall capacity model has been considered.

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

Principal Investigator: W. Ronald Hudson, Civil Engineering

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

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, road maintenance cost and road user consequences. The results of this three-year program will be used to assist administrators in Brazil and in developing countries throughout the world in making decisions toward optimizing investments. Previous components of the program have included: (1) the development of preliminary models, (2) the collection of empirical data and modification of models developed during a similar study in Kenya, and (3) a study phase completed in India.



Psychological Analysis of Degree of Safety in Traffic Environmental Design

Project Manager: Charles J. Holahan, Psychology

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This project involves an effort to define, operationalize, and measure quantitatively visual distractibility in the traffic environment. Efforts to date, point very strongly to a need for further inquiry in two areas: (1) a specific analysis of visual distractibility in the traffic environment, and (2) the development of an overall model capable of predicting the level of distractibility in particular traffic environment settings.

Human Factors in Accident Causation

Project Managers: Martha S. Williams, Social Work
Robert K. Young, Psychology

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

The main tasks to be accomplished under this project are as follows:

- (1) Develop a method for reliably acquiring new literature on psychological/sociological factors in accidents and compilation of various methods of data collection;
 - (2) Develop a permanent library of said literature to be available through the Council for Advanced Transportation Studies;
 - (3) Make recommendations concerning any significant findings and the suggested areas for research.
- Summaries of this work will be produced in separate booklets by December 1977.

Accident Reconstruction

Project Managers: Walter S. Reed, Mechanical Engineering
Craig C. Smith, Mechanical Engineering

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highway and Public Transportation

The long-range goal of this project is to develop accident simulation techniques to aid policy-makers, designers, and accident investigators in the area of traffic safety. The initiation of a bibliography of significant literature for the assessment of automobile accident causation factors and the evaluation of the use of dynamic modeling and computer simulation of accidents as a method of collecting data about accident causes has been partially completed.

Carbon Monoxide Problem Definition

Project Manager: Freddy L. Roberts, Civil Engineering

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

The major emphasis of study under this project includes a definition of the extent of the carbon monoxide problem in the population of passenger vehicles in the Austin, Texas, area. To simulate this population, representative vehicles were selected from the University of Texas community and tested for generation of carbon monoxide in the passenger compartment during normal operation of the vehicle. Also, countermeasures that may be used by the State to alert the public to identify carbon monoxide risks and methods for avoiding them have been proposed to the Office of Traffic Safety personnel.

Evaluation Methods Development

Project Manager: Byron Hinderer, Council for Advanced Transportation Studies

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This project has as its objective the development of practical methods for evaluating the effectiveness of various traffic safety countermeasures which can be employed by working managers at the state and local levels.

EDUCATION

Contemporary Transportation Issues

Instructors: W. Ronald Hudson, Civil Engineering, Fall 1976
C. Michael Walton, Civil Engineering, Spring 1977

Sponsors: Department of Civil Engineering
Council for Advanced Transportation Studies

The purpose of the transportation seminar (CE 391T and UC 388) conducted each semester is to provide a forum for presenting current issues of major significance facing the transportation sectors of our society and environment. The seminar is structured so as to provide the students with exposure to the thinking of individuals who are engaged in various facets of the transportation profession. The intent is to broaden the student's knowledge and awareness of current issues.

Topics in Transportation

Instructor: David A. Sands, Council for Advanced Transportation Studies, Fall 1976, Spring 1977

Sponsors: Division of General and Comparative Studies
Council for Advanced Transportation Studies

This course (TNS 320) is intended to give a broad overview of the field of transportation. The course is designed to cover transportation modes and alternatives, the current state-of-the-art, and concepts of planning and controlling transportation development from a multidisciplinary standpoint. The seminar gives the student an overview of transportation policy and planning on a state and national level. Students obtain valuable practical experience in solving transportation-related problems through participation in group projects.

Foundations of Traffic Safety Management

Instructors: John F. Betak, Council for Advanced Transportation
Barbara J. Chance, Sociology
Gary Hales, Educational Psychology
Linda MacNeilage, Counseling–Psychological Services Center
Reuben McDaniel, Jr., Management
Freddy L. Roberts, Civil Engineering
David A. Sands, Council for Advanced Transportation Studies
Craig C. Smith, Mechanical Engineering
Frank Vasquez, Marketing
C. Michael Walton, Civil Engineering



Dr. Barbara J. Chance, Sociology

Project Manager: Stephen T. Martin, Council for Advanced Transportation Studies

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

During 1975-76 a six-week course (BA 379) entitled "Foundations of Traffic Safety Management," was developed and presented twice. Thirty-nine local Traffic Safety Coordinators and field staff from the Governor's Office of Traffic Safety completed the course, which combined two intensive weeks of resident study with an interim period in which a field assignment was carried out in each participant's regular work setting. This year the Foundations Course was presented for the third time, using the recommendations derived from the evaluation of the first course as a basis for an improved curriculum. As an outgrowth of the Foundations Course, student reference material was prepared which, as the material is refined, will be developed for use as a handbook for Traffic Safety Field Personnel.



Human Service Transportation Planning and Management

Project Director: C. Michael Walton, Civil Engineering

Project Manager: John W. Huddleston, Council for Advanced Transportation Studies

Sponsor: Coordinating Board, Texas College and University System

This five-day short-course is designed to promote understanding and cooperation through the review of basic principles of transportation planning and management and the development of particular skills in planning, accounting, record keeping, and evaluation.

The first offering of this course was attended by fifty transportation program administrators, planners, and providers. Future offerings of the course will take place on a periodic basis.

Introduction to Statistics and Research Design for Traffic Safety and Law Enforcement Officials

Instructor: Freddy L. Roberts, Civil Engineering

Sponsors: Texas Department of Public Safety
Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This short-course was conducted in cooperation with the Department of Public Safety. The 27 participants undertook 12 days of instruction in statistics and research design for traffic safety and law enforcement personnel.

Alcohol and Traffic Safety: Curriculum and Material Development

Project Director: David A. Sands, Council for Advanced Transportation Studies

Sponsor: Texas Education Agency

Under this project a four hour prototype curriculum was developed treating implications of, and means to avoid, driving (or riding with a driver) impaired by alcohol. The curriculum will be included in the State Driver Education Program by the Texas Education Agency. Included in the initial phase of this project, the Council will conduct a workshop to disseminate the new curriculum to forty coordinators from the twenty Regional Education Service Centers.

Fourth Ciclo de Conferencias, Ingenieria del Transporte

Program Coordinators: B. Frank McCullough, Civil Engineering
Thomas W. Kennedy, Civil Engineering; Council for Advanced Transportation Studies

Sponsor: State of Puebla, Mexico

In August 1977, Professors B. Frank McCullough, Thomas W. Kennedy and C. Michael Walton conducted sessions on modern U.S. transportation methods for more than 100 civil engineers from several Mexican states, federal transportation agencies in Mexico, and the National University of Mexico-Institute of Engineering.

INFORMATION SERVICES

Data and Information Acquisition and Retention

Project Director: John F. Betak, Council for Advanced Transportation Studies

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This system will provide fast response to the informational needs of persons concerned with transportation and traffic safety planning, operations, and technology through a nationwide, computer-accessible information network and regional transportation library.

Traffic Safety Computer Services

Project Manager: John F. Betak, Council for Advanced Transportation Studies

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This contract represented a continuation and expansion of support services supplied to the Office of Traffic Safety by the Council utilizing The University of Texas at Austin Computation Center's processing capabilities. The expansion represents additional information and data handling services which will complement the Council for Advanced Transportation Studies' developing traffic safety information and data acquisition efforts.

TRISNET Document Delivery Center

Project Director: John F. Betak, Council for Advanced Transportation Studies

Sponsors: U.S. Department of Transportation
Council for Advanced Transportation Studies

TRIS-ON-LINE is a computerized information-retrieval system of selected references to technical literature and ongoing research. Document Delivery Services are considered to be libraries or document centers that organize and store full-text documents and that provide access to their holdings on a purchase or loan basis.

At present, there are six document delivery services: the U.S. Department of Transportation Library, the Technical Information Center at the Transportation Systems Center, the Institute of Transportation Studies Library at the University of California at Berkeley, the DOT Technical Documentation Center, the Northwestern University Transportation Center Library, and the Council for Advanced Transportation Studies Regional Transportation Information System and Clearinghouse.

Dissemination

Project Manager: Stephen T. Martin, Council for Advanced Transportation Studies

Sponsor: Council for Advanced Transportation Studies

The dissemination system is designed to maintain an extensive mailing list, which will be used to keep interested groups informed of the Council's activities. In addition, brochures, films, and publication catalogues are being developed for public access to the information.

PUBLIC SERVICE

Southwest Conference on Coordinating Mobility for the Transportation Disadvantaged

Project Director: Thomas W. Kennedy, Civil Engineering; Council for Advanced Transportation Studies

Project Manager: John W. Huddleston, Council for Advanced Transportation Studies

Sponsors: Texas Department of Community Affairs
Texas Department of Public Welfare
Council for Advanced Transportation Studies
National Council on the Transportation Disadvantaged

This conference was conducted in San Antonio and assembled experts in the field of transportation planning at the Federal, Regional, State and local level to discuss solutions to providing coordinated mobility programs for the transportation disadvantaged.

The Highway and Its Environment/Ninth Annual Awards

Project Director: John F. Betak, Council for Advanced Transportation Studies

Sponsors: Federal Highway Administration
U.S. Department of Transportation

This contest was designed to give public recognition to agencies, organizations, and business enterprises which have taken action to protect, preserve, or enhance the highway environment.



Dr. Earnest F. Gloyna, Dean, College of Engineering, and Mrs. Lyndon B. Johnson
at *Highway and Its Environment*,/Ninth Annual Awards

Seminar on Commuter Forecasting

Project Director: C. Michael Walton, Civil Engineering

Sponsor: Federal Aviation Administration

Thirty-nine participants from federal and state regulatory agencies were brought together with FAA air transport providers to discuss a new forecasting model designed by the Federal Aeronautics Administration to predict future commuter airlines' passenger and facility utilization.

Traffic Safety Standards: Evaluation and Development

Project Manager: David A. Sands, Council for Advanced Transportation Studies

Sponsors: Texas Office of Traffic Safety
Texas State Department of Highways and Public Transportation

This three day training session was developed to review, evaluate, and recommend modifications of selected National Highway Traffic Safety Administration Traffic Safety Standards.



Mr. Ken Nevil, Administrator, Texas Office of Traffic Safety, State Department of Highways and Public Transportation

Guest Lecturers and Program Visitors

To provide a transportation forum for the students, faculty, and the community, the Council sponsors speakers from many facets of transportation. In addition to faculty, the seminars host national and international speakers from government, industry, and other universities. The following is a list of guest lecturers who participated in the graduate and undergraduate seminars.

GRADUATE TRANSPORTATION SEMINAR LECTURERS

Dr. Sohan Agarwal
Engineers India Limited
Bombay, India

“Design and Installation of Pile Foundation for
Offshore Bombay High-Oil Production Project”

Mr. Russ L. Kaesehagen
Rural Planning Engineer
Main Roads Department
Sidney, Australia

“Planning and Construction of Roads in Rural
Australia”

Mr. Robert P. Neuschel
Director and Senior Partner
McKinsey and Company, Inc.
Chicago, Illinois

“An Overview of the U.S. Transportation System”

Mr. Phil Smith and
Mr. Frank Carmichael
Consulting Engineers
Austin, Texas

“A Study of Transportation-Induced Air Pollution”

Mr. Phillip Wilson
State Planning Engineer
Texas State Department of
Highways and Public Transportation
Austin, Texas

“Planning for Highways and Public Transportation”

Mr. John F. Nixon
Research Engineer
Texas State Department of
Highways and Public Transportation
Austin, Texas

“Research Program Management”

Mr. Bill Brown
Science Policy Analyst
U.S. Department of Transportation
Washington, D.C.

“Federal Transportation Policy Issues”

Dr. Robert Cotgrove
Department of Geography
University of Tasmania
Hobart, Tasmania, Australia

“Impacts of a Major Transportation Disruption on an
Urban Structure: A Case in Hobart, Tasmania”

Mr. Max Ulrich
Director
Austin Transportation Office

“Long-Range Regional Transportation Planning and
Programming Issues for Austin”

Mr. Thomas Golob
Senior Research Economist
General Motors Research Laboratories
Warren, Michigan

“Exploring Uses of Attitudinal Data in Travel
Demand Analyses”

Mr. Glen Ford
Regional Representative
Urban Mass Transportation Administration
U.S. Department of Transportation
Fort Worth, Texas

“Federalism and Urban Mass Transportation”

Mr. John Roark
Director of Transportation
North Central Texas Council of Governments
Arlington, Texas

“Financing of Transportation Systems: The Future of
Regional Transportation Authorities in Texas”

Dr. Robert Herman
Head, Traffic Science Department
General Motors Research Laboratories
Warren, Michigan

“Cars, Drivers and Traffic”

Mr. Barry Goodman
Transit Administrator
Public Transportation Division
Houston, Texas

“Public Transportation in Major Areas”

Mr. Herbert S. Levinson
Senior Vice President
Wilbur Smith & Associates
New Haven, Connecticut

“Bus Transit in Urban Areas”

Mr. Jim Horrell
Project Manager for Coal Slurry
Houston Natural Gas, Houston, Texas
and Mr. Charles Ford
Special Council
Texas Railroad Association
Austin, Texas

“Innovations in Transportation Coal Slurry
Pipelines Issues”

UNDERGRADUATE TRANSPORTATION SEMINAR LECTURERS

Mr. Joel Wooldridge
Director
Capital Area Planning Council
Austin, Texas

“Regional Development and Transportation”
“Comprehensive Planning”

Mr. Joe Gieselman
Steering Committee
Austin Transportation Studies

“The Future Transportation System of the Austin
Urbanized Area”
“Metropolitan Transportation Modeling and
Planning”

Mr. Don Harley
Governor’s Office of Budget
and Planning
Austin, Texas

“Interagency Transportation Coordination at the
State Level”

Mr. Merrill Goodwyn
Aviation Planner
Texas Aeronautics Commission
Austin, Texas

“The Role of Aviation: Present and Future”
“Present Status and Future Projection of Modal
Alternatives: Air”

Mr. Don Dial
Public Transportation Planning Engineer
Texas State Department of Highways
and Public Transportation
Austin, Texas

“Statewide Transportation Planning”
“Present Status and Future Projection of Modal
Alternatives: Highways and Public Transportation”

Mr. Joe Ferran
Industrial Development Specialist
Texas Industrial Commission
Austin, Texas

“Present Status and Future Projection of Modal
Alternatives: Rail, Water, Pipelines”

Program Visitors

In addition to speakers, the Council has had a number of visitors from universities, industry, and government, both from this country and foreign nations. The following were among these transportation program visitors.

I. C. Agrawal, Central Road Research Institute, New Delhi, India
Dave Bean, Gulf Oil Canada Limited, Ontario, Canada
Senator Lloyd Bentsen, Transportation Committee, Washington, D.C.
N. Bhattacharya, Indian Statistical Institute, Calcutta, India
Miguel M. Calderson, Laboratorios Liac, S.A., Mexico
Kenneth E. Cook, National Research Council, Washington, D.C.
Per E. Fossberg, International Bank for Reconstruction and Development, Washington, D.C.
Ralph Haas, University of Waterloo, Ontario, Canada
Robert Herman, General Motors Technical Center, Warren, Michigan
John M. Hooks, U.S. Department of Transportation, Washington, D.C.
David L. Jones, U.S.D.A. Forest Service, San Diego, California
G. A. Kennepohl, Gulf Oil Canada Limited, Sheridan Park, Ontario, Canada
Lidia Kostyniuk, State University of New York at Buffalo, Buffalo, New York
Marc Los, University of Montreal, Montreal, Quebec
Ken Nevil, Texas Office of Traffic Safety, State Department of Highways and Public Transportation, Austin, Texas



Senator Lloyd Bentsen and Dr. Thomas W. Kennedy

Brian Noble, Enterprises Unlimited, San Jose, California
Kuldeep S. Ohbi, International Bank for Reconstruction and Development, Washington, D.C.
Richard H. Pierce, Texas State Department of Highways and Public Transportation
Jose Rivera, Mexican Association of Roads, Mexico City, Mexico
Felix A. Rodriguez, Engineer, Santo Domingo, Dominican Republic
Jose L. Rodriguez, Monterrey, Mexico
A. C. Sarna, Central Road Research Institute, New Delhi, India
Gary Schultz, U.S.D.A. Forest Service, Minneapolis, Minnesota
Helen Shippers, Texas Commission on Alcoholism, Austin, Texas
R. P. Sikka, Ministry of Transport, New Delhi, India
Edward Sullivan, University of California at Berkeley, Berkeley, California
Felipe Vallejo, Regional Association of Roads, State of Puebla, Mexico
Louise Vance, Texas Education Agency, Austin, Texas
W. van Dijk, Shell Oil Company Laboratories, Amsterdam, Holland

Program Management

Originally created by the Office of the President May 26, 1972, the Council reports directly to Vice-President H. Eldon Sutton. As Director, Dr. Thomas W. Kennedy is responsible for the general administration of the total scope of Council programs and projects. Since he continues his teaching and professional research activities, Dr. Kennedy is assisted in his operational management responsibilities by Dr. John F. Betak, Dr. Grover Cunningham, and Dr. David A. Sands who provide administrative support to faculty associates and students associated with the Council.

Three Advisory Committees provide suggestions to the Council. An *Executive Committee of Deans* reviews the Council's programs. A *Traffic Safety Advisory Committee* reviews the Traffic Safety Program and makes recommendations to the Director. The *Academic Committee* assists the Council in coordinating the development and teaching of transportation and transportation-related courses and programs.

The members of the Executive Committee are:

Harold Box, Dean of School of Architecture
Wayne Danielson, Dean of School of Communications
Earnest F. Gloyna, Dean of College of Engineering
Robert D. King, Dean of College of Social and Behavioral Sciences
George Kozmetsky, Dean of College of Business Administration
Lymon C. Reese, Associate Dean, College of Engineering
Elspeth D. Rostow, Dean of L.B.J. School of Public Affairs
A. R. Schrank, Dean of College of Natural Sciences
Ernest E. Smith, Dean of School of Law
James A. Hitt, Acting Dean of General and Comparative Studies
Stanley Werbow, Dean of College of Humanities

The members of the Traffic Safety Advisory Committee are:

John F. Betak, ex-officio, Council for Advanced Transportation Studies
Grover Cunningham, ex-officio, Council for Advanced Transportation Studies
Charles J. Holahan, Psychology
Peter John, Mathematics
Thomas W. Kennedy, Chairman; Director, Council for Advanced Transportation Studies
David A. Sands, ex-officio, Council for Advanced Transportation Studies
Gerhard M. Williams, Jr., L.B.J. School of Public Affairs
C. Michael Walton, Civil Engineering



Dr. H. Eldon Sutton, Vice-President for Research and Dr. Thomas W. Kennedy, Director

The members of the Academic Committee are:

J. Wes Barnes, Mechanical Engineering
John F. Betak, Council for Advanced Transportation Studies
Alan Black, Architecture and Planning
K. Patricia Burnett, Geography
Barbara J. Chance, Sociology
Hal Cooper, Civil Engineering
Linda L. Golden, Marketing Administration
Thomas W. Kennedy, Director, Council for Advanced Transportation Studies
Randall W. Kirk, Management
David A. Sands, Council for Advanced Transportation Studies
Gerhard M. Williams, L.B.J. School of Public Affairs
Martha S. Williams, Social Work
C. Michael Walton, Civil Engineering

Personnel Involvement

As clearly mandated by the goals and objectives of the Council in terms of its multidisciplinary approach to transportation, a broad cross section of the wealth of expertise resident in The University has been continuously involved in Council programs and activities. Since its creation in May 1972, over 80 faculty from 22 departments of 11 colleges and schools, have been actively involved as Faculty Associates of the Council. During 1976-77 alone, 45 faculty and professional staff from 11 departments of 10 colleges and schools have participated in Council programs.

A major area of concern of the Council is the development of graduate students who will enter the transportation profession with skills to assist in the solution of transportation problems in their various fields of expertise. In 1976-77, 27 graduate students from 11 departments of 7 schools have been involved in Council projects.

Undergraduate students have also made a significant contribution with approximately 50 involved in Council programs up through 1975-76 and an additional 12 participating in 1976-77, most of whom were provided financial support by the Council.

FACULTY

Faculty involvement in the Council for Advanced Transportation Studies has been as follows:

Mark I. Alpert, Professor, Marketing Administration
J. Wes Barnes, Assistant Professor, Mechanical Engineering
Michael Benedikt, Assistant Professor, Architecture
Alan Black, Assistant Professor, Architecture and Planning
Harold Box, Dean, School of Architecture
Ronald Briggs, Assistant Professor, Geography, University of Texas at Dallas
K. Patricia Burnett, Assistant Professor, Geography
Barbara J. Chance, Assistant Professor, Sociology
Hal Cooper, Assistant Professor, Civil Engineering
Wayne Danielson, Dean, School of Communications
C. Shane Davies, Associate Professor, Geography
Richard Dodge, Associate Dean of Architecture, Architecture and Planning
Earnest F. Gloyna, Dean, College of Engineering

Linda L. Golden, Assistant Professor, Marketing Administration
 James A. Hitt, Acting Dean, Division of General and Comparative Studies
 Charles J. Holahan, Assistant Professor, Psychology
 W. Ronald Hudson, Professor, Civil Engineering
 Peter John, Professor, Mathematics
 Thomas W. Kennedy, Director; Professor, Civil Engineering
 Robert D. King, Dean, College of Social and Behavioral Sciences
 Randall W. Kirk, Lecturer, Management
 Darwin Klingman, Professor, Computer Sciences
 George Kozmetsky, Dean, College of Business Administration
 Linda MacNeilage, Counseling Coordinator, Counseling and Psychology Service Center
 B. Frank McCullough, Professor, Civil Engineering
 Reuben McDaniel, Jr., Associate Professor, Management
 Robert Pollard, Assistant Professor, Economics
 Walter S. Reed, Assistant Professor, Mechanical Engineering
 Lymon C. Reese, Associate Dean, College of Engineering
 Freddy L. Roberts, Visiting Associate Professor, Civil Engineering
 Sandra Rosenbloom, Assistant Professor, Architecture and Planning
 Elspeth D. Rostow, Dean, LBJ School of Public Affairs
 A. R. Schrank, Dean, College of Natural Sciences
 Craig C. Smith, Assistant Professor, Mechanical Engineering
 C. Michael Walton, Associate Professor, Civil Engineering
 Stanley Werbow, Dean, College of Humanities
 Gerhard M. Williams, Assistant Professor, LBJ School of Public Affairs
 Martha S. Williams, Professor, School of Social Work
 Robert K. Young, Professor, Psychology

PROFESSIONAL STAFF

Thomas W. Kennedy, Director; Professor, Civil Engineering
 John F. Betak, Assistant Director; Lecturer, Management
 Grover Cunningham, Assistant Director
 David A. Sands, Assistant Director; Lecturer, Management
 Delbert Ervin, Information Center Coordinator
 Byron Hinderer, Research Engineer Associate
 John W. Huddleston, Research Associate
 Stephen T. Martin, Education and Dissemination Coordinator
 Marion McCord, Information Writer/Editor



Graduate students at computer terminal

GRADUATE STUDENTS

Rita Allison, Office Administration, Business
 Behrooz Badiozammini, B.S., Civil Engineering
 Carol Beckham, B.A., Library Science
 Michael Campbell, M.A., Psychology
 Thomas J. Carmichael, B.S., Civil Engineering
 Edward V. Chambers, B.S., Civil Engineering
 Tommy R. Chmores, B.S., Civil Engineering
 Ralph Culler, B.A., M.A., Psychology
 Michael Daley, M.A., Psychology
 Jose Diaz, B.S., Civil Engineering

Robin Embry, M.A., Mechanical Engineering
 Hal Fitzpatrick, M.S., Civil Engineering
 Larry Freeman, B.A., Civil Engineering
 Nicholas Gualda, M.S., Civil Engineering
 Gary Hales, M.A., Educational Psychology
 Stephen Horton, B.S., M.B.A., Business
 Rajesh Kapadia, M.S.E.E., Business Administration
 Yoon Kwak, M.S., Mechanical Engineering
 Sheila Mills, M.S., Education
 Ellen Kay Schauer, M.S.W., Social Work
 Maitree Srinarawat, M.A., Engineering
 Roldolfo Tellez, B.S., Civil Engineering
 S. Konrad Tzend, M.S., Mechanical Engineering
 Deborah P. Valentine, M.S., Social Work
 Jhirasak Vathana, M.S., Civil Engineering
 Patricia Vines, B.A., Community and Regional Planning
 Frank Vasquez, B.A., Business



UNDERGRADUATE STUDENTS

Ramiro Burr, Journalism, Communications
 Leslie Bubak, Petroleum Engineering
 Sherri Evans, Psychology
 Carlos Gonzalez, Accounting, Business
 Leigh Anne Grover, Government
 Emmanuel Jacobs, Marketing, Business
 L. D. Marschall, Computer Planning
 Thomas Mellett, Classics, Humanities
 Larry Mitschke, Civil Engineering
 Hal Mullins, Civil Engineering
 Amadeo Saenz, Civil Engineering
 Judy Spalding, Journalism, Communications

SUPPORT STAFF

Nancy Webster, Administrative Secretary
 Linda Harding, Accounting Clerk
 Sandy Bannister, Senior Secretary
 Mary Morando, Senior Secretary
 Diana Schaefer, Senior Secretary
 Cynthia Walters, Senior Secretary
 Diane Morris, Secretary

Publications

RESEARCH REPORTS

Briggs, Ronald, *Characteristics of Local Passenger Transportation in Texas*, January 1977. RR 45.

This report inventories and analyzes the characteristics of local passenger transportation in the state, with special emphasis on the transportation disadvantaged. The document is intended to be a resource tool for all persons concerned with transportation for the disadvantaged in the State of Texas.

Dunlay, William J., Jr., Lyndon Henry, Thomas G. Caffery, Douglas W. Wiersig, and Waldo Zambrano, *Monitoring the Effects of the Dallas/Fort Worth Regional Airport—Volume I: Ground Transportation*, December 1976. RR 36.

This report presents new conceptual and methodological approaches to developing models to interrelate airline schedules, airport-based employee work-shift schedules, and airport access ground traffic volumes in any time period for a given report. The results of a survey of ground travel at the Dallas/Fort Worth Regional Airport are presented and analyzed. Specific ground transportation impacts of the installation of this relatively new airport are assessed.

Hales, Gary D., Martha S. Williams, and Robert K. Young, *Alcohol Countermeasures*, May 1977. RR 50.

This report describes the results of a literature review of current materials treating methods to reduce the number of fatalities and injuries attributed in some manner to alcohol. The report is designed to be used, together with related reports, as an educational resource.

Hales, Gary D., Martha S. Williams, and Robert K. Young, *Seat Belts: Safety Ignored*, June 1977. RR 52.

This report surveys scientific research as related to seat belts. The efficacy of seat belts, effectiveness of public education campaigns on seat belts, international belt use, and alternatives to seat belts are all reviewed.

Holahan, Charles J., *Effects of Visual Distraction on Reaction Time in a Simulated Traffic Environment*, March 1977. RR 47.

This study investigates the relationship between visual distractors and traffic accidents. The three dimensions which are investigated are: (a) number of distractors, (b) color of distractors, and (c) location of distractors, on the perception of a target stimulus. Reaction time was the response measure. Analysis of variance showed that all three dimensions have a significant effect on reaction time, with location having the greatest effect.

Park, Chang-Ho and William J. Dunlay, Jr., *A Tandem-Queue Algorithm for Evaluating Overall Airport Capacity*, February 1977. RR 44.

In this work, results obtained in the first year on developing an analytical model of an airport system, which can be used to evaluate overall airport capacity, are reported. A working definition of an airport system and a discussion of system components are presented. A review of available capacity models, and a discussion and definition of ancillary activities on flow patterns of people within an airport terminal is presented and analyzed.

Roberts, Freddy L., B. Frank McCullough, Hugh J. Williamson, and William R. Wallin, *A Pavement Design and Management System for Forest Service Roads—A Working Model*, February 1977. RR 43.

This report describes changes to the preexisting program and the other models developed and employed in the current effort to develop and implement a pavement design and management system for low-cost, low-volume roads for the U.S. Forest Service. The models included in the system are described and three example problems are included along with a complete discussion of the inputs required and solutions obtained from each. A copy of the current Low-Volume Roads User's Manual is included.

Smith, Craig C., *Lateral Steering Dynamics Model for the Dallas/Fort Worth AIRTRANS*, December 1976. RR 41.

The Dallas/Fort Worth AIRTRANS system is a "first kind" of new transportation system and is interesting not only in its own right but as a prototype for possible future systems. In this work, a dynamic model is developed which characterizes the principal lateral steering dynamics effects of the AIRTRANS vehicle. Simplified models developed therein are also appropriate for use in relating guideway sidewall roughness to ride quality for possible future automatically steered rubber-tired vehicles.

Valentine, Deborah, Martha Williams, and Robert K. Young, *Age-Related Factors in Driving Safety*. July 1977. RR 53.

It appears that the driver under age 30 is overrepresented in the total evidences of vehicular accidents and traffic violations. This report describes the results of a literature review of current materials treating those factors related to age which affect driving safety. The report is designed to be used as an educational resource.

Valentine, Deborah, Martha Williams, and Robert K. Young, *Drugs and Their Effect on Driving Performance*. May 1977. RR 51.

This report surveys scientific research conducted on the effects of drugs on driving ability. Research has been divided into two sections: one dealing with the psychotropic drugs and other dealing with "street drugs." The first section deals with the effects that major and minor tranquilizers, anti-depressant drugs and other prescription drugs have on traffic safety. The section on "street drugs" deals with the relationship between marijuana and the hallucinogen drugs and accident causation.

Valentine, Deborah, Martha Williams, and Robert K. Young, *Personality Factors in Accident Causation*, March 1977. RR 48.

This report reviews the literature on the association of personality traits and accidents. The personality of the accident repeater is reviewed. In general, aggression seems to be a critical link between alcoholism, depression, patterns of reaction to stress, the theory of the accident process, suicide and accidents. Rather than view an accident as an isolated event, researchers now propose that accidents are preceded by a number of often recognizable signs which indicate stress, anxiety, and conflict.

Young, Robert K., Deborah Valentine, and Martha Williams, *Alcohol and Accidents*, March 1977. RR 49.

The relationship between drinking and driving is a complex one. In general, the probability of a crash increases as BAC increases. Alcohol is particularly detrimental for the inexperienced driver as well as for the driver in unfamiliar territory. This report is a literature review and covers research of three major types: research on the physiological effects of alcohol, laboratory and simulation studies of alcohol as it affects driver skills, and epidemiological studies of accidents in fields which may be alcohol-related.

TEXTS AND HANDBOOKS

Huddleston, John, Marion McCord, and Peter Canga, *Southwest Conference on Coordinating Mobility Programs for the Transportation Disadvantaged: Handbook*, February 1977. TH 1.

The Handbook was designed to serve as a guide to the conference sessions and to provide supplemental material, information on program development sessions, and a glossary and bibliography. The Handbook is available in xeroxed form.

Council for Advanced Transportation Studies, *Foundations of Traffic Safety Management: Handbook*, April 1977. TH 2.

This Handbook was designed to serve as the curriculum textbook for the Foundations of Traffic Safety Management program. It is intended to be retained by students of the course for use as a reference book following completion of the course. Distribution is limited to those who participate in the course.

Hinderer, Byron, *Statistical Handbook for Non-Statisticians in the Traffic Safety and Law Enforcement Field*, April 1977. TH 3.

This Handbook was designed to be used as a text for the course entitled "Introduction to Statistics and Research Design for Traffic Safety and Law Enforcement Officials." Distribution is limited to those who participated in the course.

Council for Advanced Transportation Studies, *Human Services Transportation Planning and Management: A Five-Day Short Course—Glossary and Bibliography*, August 1977. TH 4.

The Glossary and Bibliography was developed as a reference tool to be used by participants of a five-day short course entitled, "Human Services Transportation Planning and Management," and is meant to provide general assistance concerning the literature and terminology associated with human service transportation planning and management. Distribution is limited to participants in the Human Services Transportation Planning and Management course.

Ervin, Delbert, Leigh Anne Grover, Gary Hales, John Huddleston, Stephen T. Martin, Marion McCord, and David A. Sands, *Drinking and Driving: The Alcohol and Traffic Safety Unit for Driver Education—Curriculum and Materials*, September 1977. TH 5.

This curriculum was developed in cooperation with the Texas Education Agency and the Texas Office of Traffic Safety as part of a project on alcohol and traffic safety. Distribution is limited to Texas Educational Service Center personnel and designees of the Texas Education Agency.

MANUALS

Council for Advanced Transportation Studies, *Design and Management System—User's Manual*, March 1977. M 1.

This manual describes the inputs to LVR, a computer program which can be used to compute the most economical designs for an asphaltic concrete or aggregate-surfaced road which meets certain requirements specified by the user. Distribution is limited to designees of the U.S. Forest Service.

Ervin, Delbert (compiler), *Department of Public Safety Accident Tapes, 1970: Data Coding Manual*, September 1977. M 2.

This manual is one of a series of data coding manuals developed as part of an ongoing project to provide information on traffic safety matters within a five state region including Texas, Louisiana, Arkansas, Oklahoma, and New Mexico. These manuals provide information necessary to use the applicable traffic accident data sets and are available through the Regional Transportation Information System at the Council for Advanced Transportation Studies.

Ervin, Delbert (compiler), *Department of Public Safety Accident Tapes, 1971-1974: Data Coding Manual*, September 1977. M 3.

This manual is one of a series of data coding manuals developed as part of an ongoing project to provide information on traffic safety matters within a five state region including Texas, Louisiana, Arkansas, Oklahoma, and New Mexico. These manuals provide information necessary to use the applicable traffic accident data sets and are available through the Regional Transportation Information System at the Council for Advanced Transportation Studies.

Ervin, Delbert (compiler), *Department of Public Safety Accident Tapes, 1975 + : Data Coding Manual*, September 1977. M 4.

This manual is one of a series of data coding manuals developed as part of an ongoing project to provide information on traffic safety matters within a five state region including Texas, Louisiana, Arkansas, Oklahoma and New Mexico. These manuals provide information necessary to use the applicable traffic accident data sets and are available through the Regional Transportation Information System at the Council for Advanced Transportation Studies.

Ervin, Delbert, *Texas Office of Traffic Safety Accident Tapes, 1970+ : Data Coding Manual*, September 1977. M 5.

This manual is one of a series of data coding manuals developed as part of an ongoing project to provide information on traffic safety matters within a five state region including Texas, Louisiana, Arkansas, Oklahoma and New Mexico. These manuals provide information necessary to use the applicable traffic accident data sets and are available through the Regional Transportation Information System at the Council for Advanced Transportation Studies.

Williams, Martha S. and Robert R. Young (compilers), *Directory of Safety Professionals*, August 1977. M6.

The Directory contains listings for traffic safety professionals in the United States and in other nations. This publication is available through the Council for Advanced Transportation Studies publications office.

RELATED JOURNAL ARTICLES AND PAPERS

Numerous journal articles and papers have been published during the academic year 1976-77. Works illustrative of the types and breadth of papers are shown below.

Alpert, Mark I., and Robert A. Peterson, "Automobile Purchasing Behavior During the Energy Crisis," *American Institute for Decision Sciences Proceedings*, 6 (November 1976), p. 120. AP 52.

Alpert, Mark I., and Linda Golden, "Market Segmentation for Public Transportation: An Empirical Approach," *Southwestern Marketing Association Proceedings*, February 1977, p. 41. AP 53.

Burnett, Patricia, "Urban Land Use Decisionmaking: A Microstructural Approach," presented at Regional Science Association Meetings, Toronto, Canada, November 1977. AP 49.

Huddleston, John, "The Need for a National Policy on Mobility," presented before the Joint Annual Conference of the Texas Chapter of the American Institute of Planners and the Texas City Planners' Association, Corpus Christi, Texas, May 14, 1977. AP 50.

Huddleston, John, "The Interlocal Agreement: An Alternative to the Regional Transit Authority," presented at the Second Annual National Rural Public Transportation Conference, State College, Pennsylvania, June 1-3, 1977. AP 51.

Huddleston, John and C. Michael Walton, "Interurban Transportation Policy and the Rural Community," *Transportation Research Record No. 617*, September 1977. AP 60.

Hudson, W. Ronald, "A Low-Volume Road Management System Concept," published in the *Proceedings, Australian Workshop on Low Cost Road, Rail, and Reclamation Work*, The University of South Wales, Australia, September 1976. AP 55.

Hudson, W. Ronald, "Research on Low-Volume Roads—The Brazil Highway Cost Study," published in the *Proceedings, Australian Workshop on Low Cost Road, Rail, and Reclamation Work*, The University of New South Wales, Australia, September 1976. AP 54.

Hudson, W. Ronald, "Research Project in Brazil May Be Model for Developing Countries," *Transportation Research News*, 70 (May–June 1977), p. 6. AP 56.

Hudson, W. Ronald, "The Importance of Rational and Compatible Pavement Roughness Measurements or a Generalized Roughness Index for Worldwide Use," working paper prepared for the World Bank, July 1977. AP 57.

Linehan, Ronald and C. Michael Walton, "Interurban Transportation Networks and Rural Economic Development," *Transportation Research Record* 617, September 1977. AP 61.

Smith, Craig C. and Y. K. Kwak, "Identification of the Dynamic Characteristics of a Bench-Type Automotive Seat for the Evaluation of Ride Quality," accepted for publication by *ASME Transactions, Journal of Dynamic Systems, Measurement and Control*. Forthcoming Spring 1978. AP 58.

Smith, Craig C., "On Using the ISO Standard to Evaluate the Ride Quality of Broad-Band Vibration Spectra in Transportation Vehicles," *ASME Transactions, Journal of Dynamic Systems, Measurement and Control*, December 1976, pp. 440–443. AP 48.

Smith, Craig C., D. Y. McGehee, and A. J. Healey, "The Predication of Passenger Riding Comfort from Acceleration Data," accepted for publication to *ASME Transactions, Journal of Dynamic Systems, Measurement and Control*. Forthcoming 1978. AP 59.

RELATED GRADUATE THESIS AND DISSERTATIONS

Pak Chong Tsao, Stephen, *Lateral Steering Dynamics of an Automated Guideway Transit Vehicle*, May 1977. (Master of Science in Mechanical Engineering) TD 20.

Park, Chang-Ho, *A Tandem Queue Algorithm for Evaluating Overall Airport Capacity*, February 1977. (Ph.D. in Civil Engineering) TD 19.

Santos, Mario Luis F., *Ride Sharing Measures to Reduce Peak-Period Congestion*, December 1976. (Master of Science in Civil Engineering) TD 22.

Sayyari, Abdulla Ibrahim, *Evaluation of the Impacts of Major Transportation Facilities on Small Communities: A Delphic Approach*, December 1976. (Ph.D. in Civil Engineering) TD 21.

Zlatkovich, Charles Philip, *A Proposal for the Development of an Interstate Rail System*, December 1976. (Ph.D. in Business Administration) TD 23.

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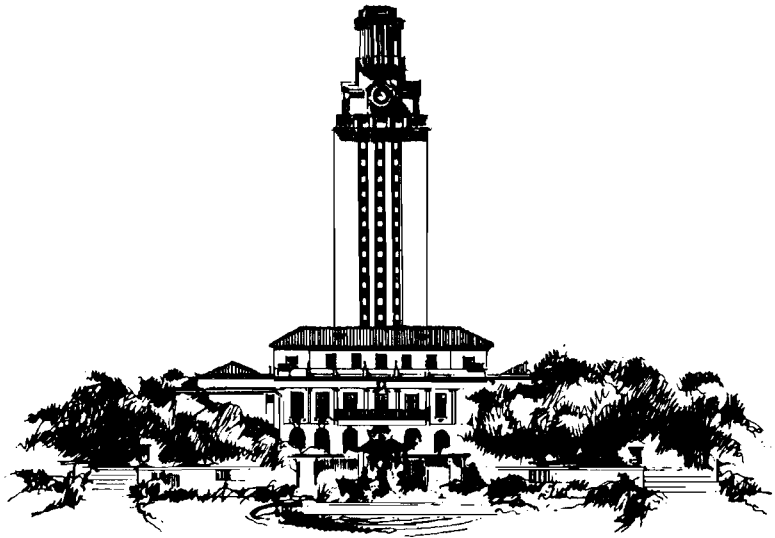
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