

NCHRP
National Cooperative Highway Research Program

RESEARCH RESULTS DIGEST

March 1992

Number 183

These Digests are issued in the interest of providing an early awareness of the research results emanating from projects in the NCHRP. By making these results known as they are developed, it is hoped that the potential users of the research findings will be encouraged toward their early implementation in operating practices. Persons wanting to pursue the project subject matter in greater depth may do so through contact with the Cooperative Research Programs Staff, Transportation Research Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Areas of Interest: 11 administration, 12 planning, 14 finance
16 user needs (01 highway transportation)

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Administration of Highway and Transportation Agencies "Project 20-24 Series"

*An NCHRP digest on the progress of projects emanating from Project 20-24,
"Administration of Highway and Transportation Agencies."*

THE PROBLEM AND ITS SOLUTION

Most research in the National Cooperative Highway Research Program (NCHRP) is designed to solve specific problems experienced by practitioners in the operational and planning functions of state highway departments. Although top management is certainly affected by these problems and benefits from solutions through improved agency performance, this type of research does not necessarily address top management's most immediate needs. Since September 1986 the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research has annually approved the selection of a series of projects to be carried out under NCHRP Project 20-24, "Administration of Highway and Transportation Agencies."

In the past, many chief administrative officers (CAOs) came from the ranks of the state departments of transportation and brought with them many years of technical and political experience in transportation. Recently, however, there has been an increase in the number of CAOs appointed with little or no prior transportation experience. In addition, there has been an increase in the speed of turnover among CAOs. Together, these trends have caused two concerns: it takes longer for the new leadership within a state to become familiar with the many complexities of transportation and, in some cases, by the time new leadership takes on transportation challenges and is

ready to implement innovative programs, that leadership is replaced. These trends, coupled with the continually evolving character of state transportation agencies, require chief administrative officers to deal with a wide range of multimodal issues during their tenure.

Under Project 20-24, an initial study was conducted to identify areas of concern to top management of state departments of transportation. The projects emanating from this study were designed to provide chief administrative officers and top managers with a resource to support their decisions and improve their effectiveness. A panel, consisting of top officials of transportation departments, academicians, and representatives from private industry and government agencies, guided the initial effort and continues to select individual projects to be researched based on the initial study design and other suggestions, such as those from the AASHTO Policy Committee. Once a project is selected it is assigned to a panel of experts in the subject area. The panel further defines the scope, formulates requests for proposals, selects a contractor, and guides the researchers in their efforts.

To date ten projects have been initiated. Four of these have been completed and the others are in progress. Brief synopses are provided here; however, for more information please contact Crawford F. Jencks, Senior Program Officer, NCHRP, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 or (202) 334-2379.

Information compiled by Roberta H. Goetz, Project Assistant, NCHRP

COMPLETED PROJECTS

NCHRP Project 20-24, "Research Program Design - Administration of Highway and Transportation Agencies"

Through surveys and interviews, the contractor, Apogee Research Inc., identified the issues of greatest concern to top managers in state transportation and highway departments. Individual projects were developed to address these issues, and they were then described to provide background information and suggested research plans. All of the projects were classified under one of three categories - resource development, decision support, or financial management. The research is complete, and the principal findings and brief summaries of all the recommended projects were published in NCHRP Research Results Digest 170, "Research Program Design, Administration of Highway and Transportation Agencies." Additional details are available in the unpublished agency final report, entitled "NCHRP Project 20-24, Research Program Design," which is available for purchase (\$15.00) or on a loan basis.

NCHRP Project 20-24(1), "Using Market Research to Improve Management of Transportation Systems"

How market research techniques can be adapted to help guide departments of transportation was the subject of this research. Apogee Research Inc., with the assistance of Gordon S. Black Corporation, conducted the study. The researchers reviewed several aspects of the problem: data collection and analysis procedures, previous transportation applications, and DOT functions amenable to marketing techniques. Detailed explanations of how to obtain and evaluate data are included. The research agency conducted a focus group and a national telephone survey to demonstrate sampling and interviewing procedures as well as the use of various statistical methods. Guidance on potential applications to various functions of publicly funded transportation agencies is also provided. Research is complete, and the final report has been published as NCHRP Report 329, "Using Market Research to Improve Management of Transportation Systems."

NCHRP Project 20-24(2), "Executive Management Information Systems for State Departments of Transportation"

Executive Management Information Systems (EMIS) are relatively new to departments of transportation and, as such, AASHTO requested that

a project be conducted to develop guidelines to assist member departments in the development and implementation of EMIS. The objectives of this project were to develop a prototype to assist DOT executives in understanding what an EMIS can do for their departments and to outline the step-by-step process that would be needed to design, implement, and support EMIS. The contract research agency, Andersen Consulting, worked with an AASHTO task force to develop a guide for implementing executive management information systems in state DOTs. Work is complete, and NCHRP Research Results Digest 173, summarizing the project, is available. The unpublished agency final report, entitled "Guidelines for Establishing Executive Management Information Systems for State Departments of Transportation," is available on a loan basis or for purchase (\$40.00).

ACTIVE PROJECTS

NCHRP Project 20-24(3), "Expanding the Civil Engineering Pool"

The Pennsylvania Transportation Institute (PTI) at The Pennsylvania State University has recently completed the first two phases of a three-phase project. The overall objective of the project grew to include recommendations on various implementable actions that will improve upon not only the number of civil engineers interested in transportation careers, but also the quality of those engineers and the recognition of the increasingly diverse demographics of our population.

Under the first phase, PTI catalogued and described existing techniques that are now being used to promote among students an awareness of civil engineering career options as well as those techniques that provide an awareness for mathematics and science studies. Programs designed to improve upon employee shortages in other professions were studied to benefit from any similarities in the problem and its solution. Also under this phase, 17 focus groups at 4 locations were conducted with students, teachers, parents, and counselors. The purpose of the focus groups was to gain insight into attitudes on civil engineering as a profession and career option.

Under the second phase and based on the results of Phase I, PTI recommended a series of actions that span kindergarten through college. Acknowledging other programs to promote mathematics and science, the degree to which these recommended actions stress civil engineering as a career option increases as the level of education increases. These various actions have been categorized under three themes: Awareness, Retention, and Curriculum, and are now referred to as

the ARC model. The agency's final reports on Phases I and II have been submitted and are awaiting publication and distribution.

Additional research under a third phase is also planned to further advance various actions of the ARC model with more specific instruction on application and implementation.

NCHRP Project 20-24(3)A, "Civil Engineering Careers in Transportation - Outreach Program"

In addition to the research just described under Project 20-24(3), the NCHRP is aware of a unique opportunity to advance specific portions of the ARC model with the actual development, application, and evaluation of prototype material. A pilot program has recently been created by the American Association of State Highway and Transportation Officials (AASHTO), with principal funding from the Federal Highway Administration, although several other organizations are also providing financial support or making in-kind service contributions. This pilot program, which is a possible delivery mechanism for the prototype material, is called the TRAC (Transportation and Civil Engineering) Careers Center. TRAC will be engaged in various outreach activities over the next two years.

Consequently, the NCHRP has requested a proposal to develop prototype material for the TRAC Careers Center. The specific objective will be to develop prototype material for TRAC, and recommend suitable delivery mechanisms and evaluation criteria.

NCHRP Project 20-24(4), "Senior Executive Support Program Participant's Manual"

Turnover among chief administrative officers (CAOs) of transportation agencies occurs frequently. At the same time, there has been an increase in the number of CAOs appointed with limited transportation experience. As a result, it has become important to establish better orientation programs for new CAOs. A senior executive support group comprised of current and past CAOs may offer management support to new CAOs through face-to-face visits or other means. Senior executives, acting as mentors or advisors, may help new CAOs to quickly orient themselves to their positions, thus eliminating the costly delays of a protracted transition and learning period.

The objective of this project was to develop an instructional manual for use by potential program participants. The manual was designed to assist and prepare the executive participant for subsequent interactions with new CAOs. In addition to the manual, the contractor provided guidance on how to match senior executives with CAOs based on such

possible factors as experience, age, region of country, and type of organization. The final report has been submitted by the consultants, Mr. Richard Braun, Mr. Robert Johns, and Dr. Herb Golden. A camera-ready copy of the report has been given to AASHTO for its use. It is also expected that a summary of the findings will be published in the Research Results Digest series.

NCHRP Project 20-24(5), "Public Outreach in Transportation Management"

Many transportation departments are concerned that the public is relatively uninformed about such issues as how transportation facilities and services are financed, how they are provided, how well they function, and, in general, the importance of an effective transportation system. This limited understanding complicates the process of consensus building in the provision and operation of the transportation system. First, it is vital to understand what the public thinks about how transportation is provided and what their feelings are regarding the adequacy of the system and how best to improve it; and, second, to develop and implement techniques for communicating the needed information to fill the identified gaps.

The objectives of this research are to recommend to state transportation departments programs and techniques to better inform the public of transportation issues and to demonstrate, by example, the effectiveness of public outreach communication techniques and programs. Work began on August 1, 1991, by Frank Wilson & Associates, Inc., and will be completed on January 31, 1993.

NCHRP Project 20-24(6)A, "Performance Measures Used by State Highway and Transportation Agencies"

Chief administrative officers of state highway and transportation agencies must manage vast organizations with numerous functions and departments. In order to do this effectively, a CAO must know how well the agency is currently performing as a whole and within each department. Agency-performance information is a powerful analytical tool for assisting CAOs in tracking their agency's performance over time and, perhaps, for generally comparing their state to others.

The objective of this project is to produce a compendium of performance measures and indicators to assist state highway and transportation departments and their CAOs in evaluating and continuously improving the operational performance of their agencies. This compendium will include performance measures and indicators most commonly used by individual states and provide a recommended composite list of measures and indicators with synthesized definitions that could be acceptable to a

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large number of states. Work began on August 1, 1991, by the Highway Users Federation for Safety and Mobility and work is expected to be completed by May 31, 1992.

NCHRP Project 20-24(6)B, "Business Systems Plan for Highway Engineering Information"

The American Association of State Highway and Transportation Officials and its member departments have traditionally developed information and engineering systems supported by computer software and equipment on a bottom-up, project-by-project basis and in the absence of a business systems plan. As information systems grow in this manner, the ability to share data and logically integrate systems becomes impaired, and modifications are expensive. In recognition of this problem, the management of transportation information needs to be analyzed using a top-down approach that recognizes all business areas of state DOTs. Because highway engineering is the traditional emphasis of state departments of transportation, this project will concentrate on the highway engineering system (HES) of transportation departments. A business systems plan for the HES will show where AASHTO's in-house information-systems efforts could complement member department's information-systems efforts and, thus, avoid duplicative, expensive development activities. Accordingly, the specific objectives of this study are to define business areas for typical state transportation departments and to develop a business systems plan for support of all engineering functions necessary for the design and construction of highway projects. Work began on August 26, 1991, by PRODATA, Inc., and will be completed on May 25, 1992.

NCHRP Project 20-24(7), "Alternatives to Motor Fuel Taxes for Financing Surface Transportation Improvements"

Current revenue sources for providing, maintaining, and operating an effective surface transportation system are inadequate to meet present and projected needs. Petroleum-based motor-fuel taxes have not kept pace with either needs or inflation. Until recently, the taxation of motor fuels was a reliable, economical, and popular method. These revenues have been used by federal and state governments in dedicated accounts to fund transportation improvements and to produce a reliable flow of funds. Now, many factors are reducing the effectiveness of motor fuel taxes as the primary financing mechanism for highway and other surface transportation improvements.

Motor fuel taxes are used increasingly to implement national policies on energy issues, environmental concerns, and for budget-deficit reduction. State and local governments are having to assume increasing responsibilities for funding the surface transportation system. These trends will require that innovative approaches be taken to ensure adequate funding, using new technologies and ideas to provide opportunities for new pricing and financing mechanisms.

The objective of this research is to identify and evaluate alternatives to the traditional motor-fuel tax as a principal method for financing the surface transportation system. Alternatives will be evaluated within the context of a range of possible, future scenarios. The research will also consider the role of the user-pay principle in financing the surface transportation system and give attention to financing mechanisms at all levels of government. Research began on March 1, 1992, by Cambridge Systematics, Inc., and will be completed by December 31, 1993.

SUMMARY OF STATUS

See attached table for a summary of the status of the foregoing projects in the NCHRP Project 20-24 series.

Summary of Status

Project Number	Title	Research Agency	Contract Amount	Start Date	Completion Date	Project Status
20-24	Research Program Design - Administration of Highway and Transportation Agencies	Apogee Research Inc.	\$125,000	5/11/87	9/30/88	Completed - NCHRP Research Results Digest 170
20-24(1)	Using Market Research to Improve the Management of Transportation Systems	Apogee Research Inc.	\$200,000	10/1/88	9/30/89	Completed - NCHRP Report 329
20-24(2)	Executive Management Information Systems for State Departments of Transportation	Andersen Consulting Inc.	\$100,000	5/1/89	10/14/89	Completed - Summary in NCHRP Research Results Digest 173
20-24(3)	Expanding the Civil Engineering Pool	The Pennsylvania State University	\$300,000	7/1/90	10/30/91	Phases I and II complete. Reports in review stage. Phase III pending.
20-24(3)A	Civil Engineering Careers in Transportation - Outreach Program		\$100,000	Contract Pending		
20-24(4)	Senior Executive Support Program Participant's Manual	Braun, Johns & Golden	\$ 25,000	7/1/90	4/30/91	AASHTO furnished camera-ready copy of final report, summary to be published in NCHRP Research Results Digest series
20-24(5)	Public Outreach in Transportation Management	Frank Wilson & Associates, Inc.	\$ 99,973.90	8/1/91	1/31/93	Research in progress
20-24(6)A	Performance Measures Used by State Highway and Transportation Agencies	Highway Users Federation for Safety and Mobility	\$ 49,786	8/1/91	4/30/92	Research in progress
20-24(6)B	Business Systems Plan for Highway Engineering Information	PRODATA, Inc.	\$149,977	8/26/91	5/25/92	Research in progress
20-24(7)	Alternatives to Motor Fuel Taxes for Financing Surface Transportation Improvements	Cambridge Systematics, Inc.	\$300,000	3/1/92	12/31/93	Research in progress