

# NCHRP

NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM

# 2003

## Summary of Progress

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NATIONAL  
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## NOTICE TO READERS

On December 31, 1988, a Special Edition of the *Summary of Progress* was published compiling information on all projects initiated under the NCHRP from its inception in 1962 through 1988. Subsequent editions through 1995 updated the *Summary of Progress* series, including only those projects that were active, or for which some kind of activity remained, after January 1, 1989. Beginning in 1996, information about project status was posted on the NCHRP web site.

[www4.national-academies.org/trb/crp.nsf](http://www4.national-academies.org/trb/crp.nsf)

Detailed project write-ups are now available only on the NCHRP web site. To obtain a copy of the *Summary of Progress Through 1988*, refer to the end of this document for ordering information.

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# 2003

## Summary of Progress

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Research Sponsored by the American Association of State Highway and Transportation Officials  
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**TRANSPORTATION RESEARCH BOARD**

WASHINGTON, D.C.  
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## **NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM**

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. More predominantly, however, the need for more efficient, economical, and safer highway transportation and the importance of meshing with other modes and other societal concerns leads to national problems of increasing complexity. A coordinated program of high-quality cooperative research provides a highly effective approach to such problems.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials (AASHTO) initiated in 1962 an objective national highway research program employing modern scientific techniques. AASHTO's program is supported on a continuing basis by funds from participating member states of the Association and receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer AASHTO's research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to its parent organization, the National Academies, a private, nonprofit institution, is an insurance of objectivity; and it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

Research programs are developed annually by AASHTO on the basis of research needs identified by chief administrators of the highway and transportation departments, by committees of AASHTO, and by the Federal Highway Administrator. The programs are then referred for administration through the Transportation Research Board, and research projects addressing the specific needs are defined by the Board on the basis of the AASHTO problem statements. The projects are advertised widely for proposals, and qualified agencies are selected on the basis of research plans offering the greatest probabilities of success. The research is carried out under

contract, and administration and surveillance are responsibilities of a Board-appointed staff.

The needs for highway research are many, and the National Cooperative Highway Research Program is an efficient mechanism for providing timely solutions to problems of mutual concern to many responsible groups. The Program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. William A. Wulf is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. William A. Wulf are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is a division of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's mission is to promote innovation and progress in transportation through research. In an objective and interdisciplinary setting, the Board facilitates the sharing of information on transportation practice and policy by researchers and practitioners; stimulates research and offers research management services that promote technical excellence; provides expert advice on transportation policy and programs; and disseminates research results broadly and encourages their implementation. The Board's varied activities annually engage more than 4,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.  
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## NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

# SUMMARY OF PROGRESS

DECEMBER 31, 2003

### INTRODUCTION

The National Cooperative Highway Research Program (NCHRP) was established in 1962 to provide a continuing program of highway research. It is sponsored by member departments of the American Association of State Highway and Transportation Officials (AASHTO) in cooperation with the Federal Highway Administration (FHWA), U.S. Department of Transportation, and is carried out under a three-way agreement among these agencies and the National Academies. AASHTO annually proposes specific research problems for inclusion in the NCHRP fiscal year activities. At least two-thirds of the member departments must approve the research problems and agree to their financial support before they can be brought into the Program. Following balloting by the member departments, the approved problems are referred to the Academies, where they are reviewed to determine their acceptability to the Academies for administration by the Transportation Research Board (TRB). Each State annually contracts with the Academies to commit a portion of its Federal-Aid Highway State Planning and Research (SPR) funds. In recent years, these funds have made available a cooperative pool of, on average, about \$30 million for NCHRP each year through 2003. Funds available for 2004 are expected to be \$30 to \$33 million.

Each research project in the Program is assigned to a panel made up of persons knowledgeable in the particular problem area. The panel analyzes the problem, outlines the particular project and its objectives, and then prepares a research project statement by which proposals are solicited from qualified research agencies. The panels review the proposals, recommend contract awards, and provide counsel to the NCHRP staff members responsible for surveillance of work under the research contracts. Finally, the panels review final reports for acceptability and for accomplishment of the approved research plan. Currently, there are more than 1,500 members on these panels coming from the States, the District of Columbia, Puerto Rico, and Canada.

A professional staff is assigned to NCHRP by the Board. Project managers with training and experience in the many research areas encompassed by the Program are responsible for administrative and technical surveillance of the contracts. If necessary, frequent meetings involving the staff, panel, and agency personnel are held to review project progress and provide guidance for ongoing work.

Most research findings are published in the NCHRP *Report* series, in the NCHRP *Synthesis* series, as a *Research Results Digest*, on CD-ROMs, or on the NCHRP web site. Each state transportation administrator receives a copy immediately on publication, and as many as 5,000 copies are issued through the TRB Publications Office.

Periodic reports, along with the NCHRP website, are available to the sponsors to provide them with current information on the specifics of technical progress of the projects, as well as the specifics of administrative matters relating to Program operation. This information is supplemented by publication of this annual *Summary of Progress*, which is made available at the end of each year to the sponsors and the public at large.

## **HOW NCHRP PROGRAMS ARE FORMULATED**

NCHRP programs are initiated annually, and there are many steps between initiation and the publication of final reports. Each fiscal year's program must start with the identification of critical problems by state highway and transportation departments, AASHTO committees, and the FHWA.

The many problems (usually exceeding 140) received from these sources each year are screened to determine the following:

- If the proposed problem represents an immediate research need and is of interest to many States.
- If the problem can be handled effectively under a cooperative program.
- If similar efforts are already under way, or if satisfactory answers are already available. In these respects, a search is made of the relevant literature stored in the Board's automated Transportation Research Information Services (TRIS).
- The probability of success.

The technical merits of the problems that survive are evaluated in depth by the AASHTO Standing Committee on Research (SCOR) and the AASHTO Research Advisory Committee (RAC). Final priorities are determined each year at a meeting of SCOR to formulate research programs for NCHRP.

For the Fiscal Year (FY) 2004 program, a single-stage submittal process was pilot-tested and is being used to formulate the FY 2005 program. SCOR evaluated the test at its March 2003 meeting and instructed staff to continue with the single-stage process for subsequent fiscal year programs.

After the program is approved by AASHTO, it is referred to TRB for execution.

## **PROGRAMS RECEIVED TO DATE**

Through most of NCHRP's history, each year's program generally has consisted of from 10 to, more recently, 43 new projects, each with funding usually ranging between \$200,000 and \$500,000 and a number of continuations of projects funded in earlier years. For about 15 years, annual funding for NCHRP remained nearly constant at just

below \$5 million, while, during this period, the purchasing power of the research dollar was severely reduced by inflation. This decline was reversed with enactment of the Surface Transportation Assistance Act of 1982, which resulted in an approximately 50-percent funding increase for NCHRP. The Federal-Aid highway legislation enacted in 1987 had the effect of reducing NCHRP funding by 18 percent to a level of about \$6.8 million. In February 1988, AASHTO approved a new formula for NCHRP contributions (5.5 percent of Federal-Aid Highway SPR apportionments) to restore NCHRP funding to approximately \$8.3 million starting in FY 1989. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 resulted in a funding level of approximately \$17.0 million for NCHRP for fiscal years 1992 through 1997. The Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) of 1998 increased funding by more than 50 percent on average in fiscal years 1998 through 2003. New federal legislation will be required for subsequent fiscal year programs.

In 2003, AASHTO referred the FY 2004 program of research problems to TRB for execution. From all programs through FY 2003, 1007 research contracts have resulted, totaling some \$308.2 million, and the FY 2004 program will increase that number by another 37 new contracts and 21 continuations, for some \$25.3 million. The subject matter of the projects addresses the full spectrum of concern within the highway industry and demonstrates AASHTO's interest in acquiring answers to the many acute problems facing administrators and engineers. The FY 2005 program will be formulated in March 2004 by SCOR. Proposals will be solicited starting in August 2004. AASHTO's initial steps toward development of the FY 2006 research program will be taken in mid 2004.

## **FINANCING THE PROGRAM**

Each year, each State contracts with the National Academies to support the Program. The agreement commits the State to 5.5 percent of its 2-percent Federal-Aid Highway SPR funds. From these contributions, a cooperative pool of about \$30 million is made available, on average, for NCHRP's administrative and contract research operations. A similar amount of money is anticipated for FY 2004. Funds are scheduled to become available such that research can begin near the first of each year; for example, projects in the FY 2004 program are scheduled to begin in early 2004.

## **HOW NCHRP IS ORGANIZED TO ADMINISTER RESEARCH PROGRAMS**

All problems are assigned to specific problem areas within each of the eight broad research fields shown in Figure S-1 and are given related NCHRP project numbers.

Each project is assigned to a panel consisting of outstanding individuals very knowledgeable in the project area who are looked to for technical guidance and counsel throughout the research and reporting phases. A broad search is made for these individuals, and the Board usually receives about four to five times as many nominees as can be used in the available panel positions. The panels are in existence for the life of their projects. Members do not act as consultants or advisors to project investigators; they may not submit proposals for research. All members serve without compensation, and their total yearly contribution to the Program adds up to thousands of staff-days. The

**Figure S-1. NCHRP Classification System**

PROBLEM AREAS	
<p style="text-align: center;"><b>RESEARCH FIELD A</b> ADMINISTRATION</p> <p>2 Economics 11 Law 19 Finance</p>	<p style="text-align: center;"><b>RESEARCH FIELD B</b> TRANSPORTATION PLANNING</p> <p>8 Forecasting 25 Impact Analysis (SEEE*)</p> <p>* Social, Environmental, Economic, Energy</p>
<p style="text-align: center;"><b>RESEARCH FIELD C</b> DESIGN</p> <p>1 Pavements 12 Bridges 15 General Design 16 Roadside Development 22 Vehicle Barrier Systems</p>	<p style="text-align: center;"><b>RESEARCH FIELD D</b> MATERIALS AND CONSTRUCTION</p> <p>4 General Materials 9 Bituminous Materials 10 Specs, Procedures, and Practices 18 Concrete Materials</p>
<p style="text-align: center;"><b>RESEARCH FIELD E</b> SOILS AND GEOLOGY</p> <p>21 Testing and Instrumentation 23 Properties 24 Mechanics and Foundations</p>	<p style="text-align: center;"><b>RESEARCH FIELD F</b> MAINTENANCE</p> <p>6 Snow and Ice Control 13 Equipment 14 Maintenance of Way and Structures</p>
<p style="text-align: center;"><b>RESEARCH FIELD G</b> TRAFFIC</p> <p>3 Operations and Control 5 Illumination and Visibility 7 Traffic Planning 17 Safety</p>	<p style="text-align: center;"><b>SPECIAL PROJECTS</b></p> <p>20 Encompasses all projects not readily identified with other problem areas</p>

panel members are drawn from all walks of professional life, and, as shown in Table S-1, heavy dependence is placed on the States for providing members.

The duties and responsibilities of project panels include the following:

- Defining the scope of problems assigned by AASHTO and drafting project statements requesting proposals for studies,
- Evaluating proposals and making recommendations regarding selection of research agencies,
- Monitoring research progress,
- Providing guidance regarding technical aspects of the research,
- Reviewing and evaluating project reports as to the accomplishment of objectives and suitability for publication, and
- Making recommendations as to whether or not studies should be continued.

## HOW THE PROJECTS ARE PLACED UNDER CONTRACT

NCHRP does not award grants for basic research. Rather, the Program calls for contract research with specific objectives that, if achieved, will result in solutions that are practical and readily usable. As NCHRP gets each year's program under way, the project panels meet to write research project statements based on the research problems referred by AASHTO.

These statements are then issued electronically on the worldwide web. Anyone interested in receiving research project statements must periodically browse the NCHRP web site or register electronically on the same web site ([www4.national-academies.org/trb/crp.nsf](http://www4.national-academies.org/trb/crp.nsf)). Those who have registered electronically receive an e-mail notification of every project statement posting. Because NCHRP operates on a fixed-schedule, proposals must be submitted according to fixed deadlines.

Contracts have been let to agencies headquartered in more than 47 States, the District of Columbia, Canada, and England. The types of agencies selected to conduct NCHRP research are listed in Table S-2. The opportunity to propose is open to anyone possessing extensive, demonstrated capability and experience in the problem area. Because the projects call for practical remedies to pressing operational problems, it is expected that only the highest level of agency capability will be applied in meeting the commitments of the proposal—capability cannot be developed at project expense. Consonant with the goal of providing practical, readily usable solutions to pressing problems, time and experience have led to the development of fairly stringent specifications for proposals and agency attributes that are acceptable to the mission-oriented nature of NCHRP. Proposals must comply with the format in the current brochure, *Information and Instructions for Preparing Proposals*.

The staff and panel members evaluate all proposals in a uniform manner, with primary consideration given to

- The understanding of the problem and the merit of the research plan and approach,

- The experiment design and the promise of fulfilling the objectives of the project statement,
- The qualifications of the principal investigator and of the members of the research team,
- The adequacy of the facilities, and
- The allocation of resources.

**TABLE S-1      Affiliations of Panel Members on Active Projects**

AFFILIATION	NO. OF PANEL MEMBERS*
State agencies	968
Federal agencies	130
Local, transit agencies, MPOs	65
Educational institutions	229
Industry, consultants, and associations	413
All	1,805

\* Does not include liaison representatives.

**TABLE S-2      Agency Distribution of FY '63 Through FY '03 Projects**

TYPE OF AGENCY	CONTRACTS	
	NO.*	%
Educational institutions	361	32.9
Research institutes	73	6.6
Industry, consultants, administrative	614	55.9
Associations	9	0.8
State agency	6	0.5
Federal and governmental agency	36	3.3
All	1,099	100.0

\* Totals do not include the individual topics and tasks for Projects 8-36, 20-5, 20-6, 20-7, 20-30, 20-36, and 20-44.

The proposed budget total is not one of the primary factors because the funds available for research are announced in the project statement. Specific budget items are reviewed

to better determine staff allocations and distribution of resources. When the proposed cost exceeds the funds stated to be available, the proposal is rejected on receipt.

A panel meeting is held to select an agency for each project, and a review is made of all known aspects of performance of the proposers on other research projects under NCHRP or elsewhere. The successful proposals are retained by the panel members for use in monitoring the research. Proposals are considered to be privileged, and the information in them is not released outside TRB. Policy also holds that panel deliberations and meeting notes are privileged.

Following the selection meetings, a list of recommended research agencies is transmitted to AASHTO for its review and approval. Contracts between the Academies and the research agencies are executed, and research is begun. Again, it should be emphasized that NCHRP is a program of contract research—it does not operate on a grant basis. Further, proposals can be received only in response to advertised project statements, because the funds available each year to the Program are earmarked in their entirety for research problems specified by the sponsor—AASHTO.

In order to support AASHTO's interests, needs, and capital investments, a contract is not signed with the selected agency until the staff and project panel are satisfied that the proposed scope of work provides the best probability for success in meeting AASHTO's needs. In the period between agency selection and contract execution, a concerted effort is made to resolve questions and clarify technical issues emanating from the selection process. This action usually results in an addendum to the research plan in the agency's approved proposal; therefore, both the proposal and the addendum are incorporated in the contract as the binding scope of work. Furthermore, soon after contract execution, the agency is required to submit a Working Plan (an amplified version of the research plan), against which project progress is monitored by the staff and project panel.

The policy of NCHRP is to provide a debriefing, if requested, to unsuccessful proposers to indicate the technical areas in which their proposals were judged weak or deficient and how the weaknesses or deficiencies were factors in the proposers not having been selected.

NCHRP projects included in the 42 fiscal year programs conducted to date are listed in Table 1.

## **KEEPING TRACK OF RESEARCH IN PROGRESS**

Once research starts, administrative and technical surveillance of its progress is performed by NCHRP staff, currently consisting of 28 (full-time equivalents)—13 professional and 15 support. In-depth surveillance by project managers with wide-ranging expertise contributes much to the probability of project success and can be one of the most significant of the several elements influencing how well objectives are met. It is recognized, however, that a delicate balance must be maintained in the practical exercise of surveillance. It must be penetrating enough to be effective, but neither so complex nor so burdensome as to distract the researchers from their primary efforts or add unreasonably to the agency's cost of doing business.

In addition to reviewing monthly progress schedules and quarterly progress reports, the project managers maintain frequent telephone and e-mail contacts and periodically visit the research agencies throughout the contract periods. They talk with each principal investigator about the project's status to learn if the research is being pursued in line with the approved research plan, and they provide guidance in all technical and administrative matters. They provide liaison in whatever manner is required to keep their project panels abreast of progress and to acquire panel guidance and counsel in technical matters, particularly as regards the relationships between research objectives and the needs of the practicing engineer. Because the agency's proposal is incorporated in its entirety in the contract, the agency's approved budget is among the items subject to the terms of the agreement. The principal investigator has flexibility in managing the budget up to the point of not materially departing from the approved research plan or exceeding the contract's maximum allowable cost. Major changes to account for promising new leads or unproductive lines of study must be approved in advance by the staff and project panel and are authorized through a contract amendment. Agency invoices are checked monthly by the staff for deviations from the approved budget. Based on all surveillance activities, the staff members prepare progress reports, which are sent to AASHTO's member departments. Finally, the staff and panels evaluate the completed research to determine the degree of technical compliance with the contract so that recommendations for contract close-out can be made.

A point heavily stressed with the research agencies at the time of the first surveillance visit is that they must orient their thinking toward presentation of their research results in a form that is directly usable by practicing engineers. Further, to enable an easy determination of the usefulness of the results to practice, each final report generally includes a "Summary of Findings" and a chapter on "Interpretation, Appraisal, and Application of Results." The detailed research techniques and analyses of interest primarily to researchers are offered in appendixes. Such specification of the style and organization of reports guides the researcher in presenting results so that maximum use by AASHTO's member departments may be obtained.

NCHRP publications consist of the following:

- Project reports in the regular *NCHRP Report* series,
- Reports in the *NCHRP Synthesis of Highway Practice* series,
- *Annual Summary of Progress* through December 31,
- *NCHRP Research Results Digests*,
- *NCHRP Legal Research Digests*,
- NCHRP IDEA Annual Progress Report,
- Semiannual progress reports,
- Published NCHRP reports on the worldwide web,
- Unedited agency reports on the worldwide web, and
- CD-ROMs.

Publications are distributed widely through NCHRP and through the Board's selective distribution process; the print order for reports in the formal NCHRP series ranges from 3,500 to 5,000 copies. In addition to AASHTO and the chief executive officers of state transportation departments, copies automatically go to the following:



- Individual TRB members who have selected publications in the particular subject area of the report,
- About 100 libraries,
- TRB representatives in the State highway and transportation departments,
- Educational institutions,
- Liaison representatives, and
- Appropriate panels and committees.

For each published report, NCHRP staff members write a foreword that (1) identifies the fields of specialty of those individuals likely to be most interested in the results and (2) suggests how the results fit into present knowledge and practice. Furthermore, the Board's Technical Activities Staff members follow the progress of the work and can, therefore, discuss the potential application of research results during their periodic visits to State highway and transportation departments. All published reports are offered for sale through the Board's Publications Office and entered in the National Technical Information Service (NTIS). Since 2001, published reports also have been made available electronically on the worldwide web. All unpublished reports are placed on microfiche or posted on the NCHRP web site for ready availability to interested parties.

## **SYSTEMATIC PLANNING FOR GETTING RESEARCH RESULTS FROM NCHRP PROJECTS INTO PRACTICE**

### **Promoting Useful Results**

As mentioned previously, many activities take place between initiation of research programs and execution of research contracts. Many additional activities occur before formal publication of the final reports is realized. At milestones in the process network reflecting all activities, NCHRP concentrates on the opportunities to increase the probability that useful results will find their way into practice more quickly. Beyond the sponsor's initial contribution of setting the goals for a program of applied research dedicated to solving pressing operational problems, NCHRP tries to further increase the probability by

- Establishing the agency and personnel qualifications that are mandatory if the goals are to be achieved. Emphasis is placed on the importance of a record of successful past performance in endeavors similar to those to be undertaken. Further, it is also stipulated that proposals are not acceptable if they do not contain specific statements as to how the anticipated results can be used to improve practice.
- Making use of panel members, who not only are experts in the particular problem area but who also have a complete understanding of the needs of the practitioners, to define the research problem and its objectives in the form of a precise project statement on which fully responsive research proposals can be based. Experts drawn from the highway and transportation departments play a major role in this task.

- Exercising extreme care in the process of selecting research agencies to ensure not only that the proposed research plan is the best possible in addressing the specifics of the objectives but that it also culminates in the best promise for providing the practitioner with a product that is both usable and readily implementable.
- Establishing—on the basis of staff and project panel review of and suggested modifications to the research plan—a clear meeting of the minds as to what specifically is expected from the project and the researchers in order to meet the needs of the practitioner.
- Acquiring an amplified research plan that is intended to detail comprehensively the approved research plan and to include a specific schedule of events for the major tasks. This document is used by the staff in the day-to-day surveillance of the project's progress and by the project panel as required.
- Carrying out project surveillance sufficient to keeping the research in line with the approved research plan, constantly keeping the researchers aware of the needs of the practitioner, and ensuring that all project developments through final reporting center on these needs.
- Requiring research reports in a format designed specifically to first meet the needs of the busy administrator and the practitioner, and then the needs of other researchers.

### **NCHRP Reporting of Research Results**

In an applied research program such as that of NCHRP, the sponsor rightfully expects not only results that are accurate but also findings that can be readily put into practice. This means that the final research reports must be presented in language understandable to both administrators and engineers and in such format as to permit easy assimilation. Research agencies for NCHRP are required to report their results in a form that succinctly summarizes the findings for the busy administrator and also informs the practitioner of the application of the findings. The detailed research techniques and analyses in which a researcher would be interested are presented in appendixes so that readers do not have struggle to extract the findings. The Program specifies the style and organization of all reports to guide the researchers in their writing so that maximum use by AASHTO's member departments may be obtained.

### **IMPLEMENTING RESEARCH RESULTS**

Over the years, Program staff and various AASHTO committees have worked together to structure the research findings into the best possible form for immediate use by the practitioner. Such joint efforts are highly desirable and represent the ultimate in the steps that the Program can take to facilitate implementation of the findings.

AASHTO has provided NCHRP with frequent opportunities for staff and project researchers to go before the various committees of the Association to present their findings and recommendations directly to the user community.

## **SUMMARY**

NCHRP is a unique contract research effort designed to respond to the needs of State highway and transportation departments through the solution of pressing transportation problems. Although the TRB administers the Program, the research content is solely the prerogative of AASHTO and its member departments. The Program is one of applied (rather than basic) research, and every possible effort is made to help administrators and engineers put the findings to early use. Program policy ensures maximum exposure of the research while in progress in the hope that research results will, in fact, more quickly find their way into practice in the form of policies, procedures, specifications, and standards of state highway and transportation departments.



## **STATUS OF NCHRP PROJECTS**

The following table summarizes the status of all NCHRP projects. Detailed status reports on those projects for which there is any type of contractual activity can be found on the NCHRP website at

**[trb.org/nchrp](http://trb.org/nchrp)**

TABLE 1  
SUMMARY OF STATUS THROUGH DECEMBER 31, 2003, FOR FY 1963 THROUGH FY 2004 PROJECTS

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
<b>AREA ONE: DESIGN—PAVEMENTS</b>						
01-01(01)	Development of Procedures for Comparing the AASHO Road Test Findings with Performance of (1) Existing Pavements and (2) Newly Constructed Experimental Pavements	Highway Research Board	42,800*	3/1/1963	2/29/1964	Completed—Published as NCHRP Reports 2 and 2A
01-01(02)	Guidelines for Extending the Findings of the AASHO Road Test—Implementation Phase	Highway Research Board	11,356*	8/31/1965		Contract cancelled—No report
01-02	Comparison of Different Methods for Evaluating Pavement Conditions	Purdue University	29,957*	2/15/1963	2/28/1965	Completed—Phase I report published as NCHRP Report 7; final report not published; for avail. see Summary of Progress Through 1988
01-03(01)	Factors Influencing Pavement Performance—Regional	Purdue University	45,982*	2/15/1963	9/30/1967	Completed—Published as NCHRP Report 132
01-03(02)	Factors Influencing Pavement Performance—Local	Northwestern University	19,850*	9/1/1963	9/30/1964	Completed—Published as NCHRP Report 22
01-03(03)	Factors Influencing Pavement Performance	University of California	19,800*	4/1/1964	10/31/1965	Completed—Published as NCHRP Report 35
01-04(01)	Extension of Road Test Performance Concepts	Georgia Institute of Technology	10,000*	10/1/1963	9/30/1964	Completed—Published as NCHRP Report 10
01-04(01)A	Extension of Road Test Performance Concepts	Duke University	19,924*	2/1/1965	9/30/1966	Completed—Published as NCHRP Report 97
01-04(02)	Extension of Road Test Performance Concepts	Purdue University	12,243*	2/1/1964	1/31/1966	Completed—Published as NCHRP Report 30
01-05	Detecting Variations in Load-Carrying Capacity of Flexible Pavements	Cornell Aero Lab	49,011*	1/15/1964	7/15/1965	Completed—Published as NCHRP Report 21
01-05(02)	Detecting Seasonal Changes in Load-Carrying Capabilities of Flexible Pavements	Texas A&M University	49,428*	9/1/1966	6/30/1968	Completed—Published as NCHRP Report 76
01-06	Standard Measurements for Satellite Program—Measurement Team	Texas A&M University	61,353*	3/31/1964	1/31/1967	Completed—Published as NCHRP Report 59
01-07	Development of Interim Skid-Resistance Requirements for Highway Pavement Surfaces	Pennsylvania State University	24,815*	6/15/1965	12/15/1966	Completed—Published as NCHRP Report 37
01-08	Factors Involved in the Design of Asphalt Pavement Surfaces	Materials R&D	23,255*	1/1/1965	2/28/1966	Completed—Published as NCHRP Report 39
01-09	Evaluation of Studded Tires	Cornell Aero Lab	24,998*	10/1/1966	6/30/1967	Completed—Published as NCHRP Report 61
01-10	Translating AASHO Road Test Findings—Basic Properties of Pavement Components	Materials R&D	203,094*	9/12/1966	12/31/1970	Completed—Published as NCHRP Reports 139 and 140
01-10A	Systems Approach to Pavement Design—Implementation Phase	Texas A&M University	100,000*	3/1/1972	12/31/1973	Completed—Published as NCHRP Report 160
01-10B	Development of Pavement Structural Subsystems	Woodward-Clyde	447,941*	2/1/1974	7/31/1986	Completed—Published as NCHRP Report 291
01-11	Evaluation of AASHO Interim Guides for Design of Pavement Structures	Materials R&D	83,925*	10/23/1967	4/30/1971	Completed—Published as NCHRP Report 128; Guidelines published by AASHTO

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
01-12	Determination of Pavement Friction Coefficients Required for Driving Tasks	Franklin Institute	309,244*	8/25/1969	6/8/1973	Completed—Published as NCHRP Report 154
01-12(02)	Locked-Wheel Pavement Skid Tester Correlation and Calibration Techniques	Pennsylvania State University	319,000*	9/16/1970	5/15/1973	Completed—Published as NCHRP Report 151
01-12(03)	Requirements for Wear-Resistant and Skid-Resistant Highway Pavement Surfaces	Materials R&D	261,955*	11/1/1971	9/30/1975	Completed—Report not published; summarized in NCHRP Research Results Digest 89; for avail. see Summary of Progress Through 1988
01-12A	Wet-Weather Skidding Accident Reduction at Intersections	Ohio DOT	199,955*	7/1/1975	7/1/1978	Completed—Report not published; for avail. see Summary of Progress Through 1988
01-13	Effects of Studded Tires on Highway Safety	Calspan Corporation	208,898*	4/19/1971	8/20/1974	Completed—Published as NCHRP Report 183
01-13(02)	Effects of Studded Tires on Highway Safety—Non-Winter Driving Conditions	University of Michigan	39,450*	2/15/1972	5/31/1973	Completed—Published as NCHRP Report 176
01-14	Influence of Combined Highway Grade and Horizontal Alignment on Skidding	University of Michigan	69,968*	10/15/1972	1/14/1974	Completed—Published as NCHRP Report 184
01-15	Design of Continuously Reinforced Concrete Pavements for Highways	University of Texas	151,870*	8/1/1972	8/31/1975	Completed—Report not published; summarized in NCHRP Research Results Digest 82; for avail. see Summary of Progress Through 1988
01-16	Evaluation of Winter-Driving Traction Aids	Pennsylvania State University	304,400*	6/3/1974	10/31/1981	Completed—Report not published; summarized in NCHRP Research Results Digest 133; for avail. see Summary of Progress Through 1988
01-17	Guidelines for Recycling Pavement Materials	Texas A&M University	199,470*	11/1/1976	9/30/1979	Completed—Published as NCHRP Report 224
01-18	Calibration and Correlation of Response-Type Road Roughness Measuring Systems	University of Michigan	250,000*	10/1/1977	9/30/1980	Completed—Published as NCHRP Report 228
01-19	Development of a System for Nationwide Evaluation of PCC Pavements	University of Illinois	225,000*	1/23/1978	3/15/1985	Completed—Published as NCHRP Report 277
01-20	Influence of Asphalt Temperature Susceptibility on Pavement Construction and Performance	Texas A&M University	200,000*	5/1/1979	7/16/1984	Completed—Published as NCHRP Reports 268 and 269
01-21	Repair of Joint-Related Distress in Portland Cement Concrete Pavements	University of Illinois	300,000*	5/15/1980	6/28/1985	Completed—Published as NCHRP Report 281
01-22	Shoulder Geometrics and Use Guidelines	Hugh Downs/RK&K	100,000*	9/8/1981	4/7/1983	Completed—Published as NCHRP Report 254
01-23	Pavement Roughness and Rideability	KETRON, Inc.	249,990*	1/4/1982	11/30/1984	Completed—Published as NCHRP Report 275
01-23(02)	Pavement Roughness and Rideability—Field Evaluation	JMJ Research	199,983*	1/6/1986	12/31/1987	Completed—Published as NCHRP Report 308
01-24	Revision of AASHTO Interim Guide for Design of Pavement Structures	Frank McCullough/Fred Finn	0			Conducted under Project 20-07, Task 24

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
01-25	Effects of Heavy Vehicle Characteristics on Pavement Response and Performance	Transportation Research Board	100,000*	6/12/1986	11/30/1987	Completed—Report not published; for avail. see Summary of Progress Through 1988
01-25(01)	Effects of Heavy Vehicle Characteristics on Pavement Response and Performance—Phase II	University of Michigan	400,000*	9/1/1988	12/31/1991	Completed—Published as NCHRP Report 353
01-26	Calibrated Mechanistic Structural Analysis Procedures for Pavements	University of Illinois	499,942	2/6/1987	12/31/1992	Completed—Report not published
01-27	Video Image Processing for Evaluating Pavement Surface Distress	Triple Vision	350,000*	3/1/1989	8/31/1991	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 181
01-28	Laboratory Determination of Resilient Modulus for Flexible Pavement Design	Georgia Institute of Technology	443,433	4/15/1990	7/31/1997	Completed—Agency report available as NCHRP Web Document 14
01-28A	Harmonized Test Methods for Laboratory Determination of Resilient Modulus for Flexible Pavement Design	University of Maryland	101,325	2/1/1998	3/31/2000	Completed—Agency report available for loan
01-29	Improved Surface Drainage of Pavements	Pennsylvania State University	400,000	1/4/1993	4/30/1997	Completed—Agency report available as NCHRP Web Document 16
01-30	Support Under Portland Cement Concrete Pavements	University of Illinois	150,000	1/1/1993	9/30/1994	Completed—Published as NCHRP Report 372
01-31	Smoothness Specifications for Pavements	ERES Consultants	399,980	2/1/1994	12/31/1996	Completed—Agency report available as NCHRP Web Document 1
01-32	Systems for Design of Highway Pavements	ERES Consultants	500,000	2/1/1994	5/30/1997	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 227; available on CRP-CD-11
01-33	Methodology to Improve Pavement-Investment Decisions	Washington State University	499,800	7/1/1995	4/30/1999	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 246
01-34	Performance of Subsurface Pavement Drainage	ERES Consultants	505,070	5/15/1995	4/30/1998	Completed—Summarized in NCHRP Research Results Digest 268
01-34A	Contributions of Pavement Structural Layers to Rutting of Flexible Pavements	Purdue University	149,923	6/18/1999	7/31/2001	Completed—Published as NCHRP Report 468
01-34B	Effectiveness of Subsurface Drainage for HMA and PCC Pavements	Kathleen T. Hall	49,965	4/1/1999	12/31/1999	Completed—Agency report available for loan
01-34C	Effects of Subsurface Drainage on Performance of Asphalt and Concrete Pavements	Kathleen T. Hall	116,924	4/6/2000	3/31/2003	Completed—Published as NCHRP Report 499
01-34D	Effects of Subsurface Drainage on Performance of Asphalt and Concrete Pavements: Further Evaluation and Analysis of LTPP SPS-1 and SPS-2 Field Sections	Kathleen T. Hall, Ph.D., P.E.	230,000	11/18/2002	5/17/2004	Research in progress
01-35	Guidelines for Developing Pavement Performance Trends	Cancelled	0			Project cancelled
01-35A	Guide for Pavement Management	Texas A&M University	197,225	12/1/1997	6/30/2000	Completed—Published by AASHTO



TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
01-36	Determination of Pavement Damage from Super-Single and Singled-Out Dual Truck Tires	University of Nevada - Reno	99,027	11/1/1996	2/23/1998	Contract cancelled
01-37	Development of the 2002 Guide for the Design of New and Rehabilitated Pavement Structures	Nichols Consulting Engineers	325,489	12/20/1996	7/31/1997	Contract cancelled
01-37A	Development of the 2002 Guide for the Design of New and Rehabilitated Pavement Structures: Phase II	ERES Consultants	6,579,080	2/1/1998	2/28/2004	Research in progress
01-38	Guide on Pavement Rehabilitation Strategies	Kathleen T. Hall	100,000	3/1/1999	3/31/2001	Completed—Agency report available as NCHRP Web Document 35
01-39	Traffic Data Collection, Analysis, and Forecasting for Mechanistic Pavement Design	Cambridge Systematics	500,000	8/30/2000	2/29/2004	Research in progress
01-40	Facilitating the Implementation of the 2002 Guide for the Design of New and Rehabilitated Pavement Structures		300,000			In development
01-41	Models for Predicting Reflection Cracking of Hot-Mix Asphalt Concrete Overlays		500,000			In development
01-42	Top-Down Fatigue Cracking of Hot-Mix Asphalt Layers	Advanced Asphalt Technologies, LLC	39,556	8/22/2003	3/21/2004	Research in progress
01-43	Guide for Pavement Friction	ERES Consultants	349,805	6/30/2003	6/30/2005	Research in progress

**AREA TWO: ADMINISTRATION—ECONOMICS**

02-01	Criteria for Highway Benefit Analysis	University of Washington	101,948*	6/1/1963	11/30/1967	Completed—Report not published; for avail. see Summary of Progress Through 1988
02-02	Guidelines for the Determination of Community Consequences	University of Washington	48,873*	7/1/1963	8/31/1964	Completed—Published as NCHRP Report 18
02-03	Analysis of Motor Vehicle Accident Data as Related to Highway Classes and Design Elements	Cornell Aero Lab	155,972*	6/1/1963	8/31/1966	Completed—Published as NCHRP Report 47
02-04	The Value of Highway Travel Time, Comfort, Convenience, and Uniform Driving Speed	Texas A&M University	77,100*	6/1/1963	8/31/1966	Completed—Published as NCHRP Report 33
02-05	Running Cost of Motor Vehicles as Affected by Highway Design and Traffic	Catholic University	101,263*	6/1/1963	12/31/1966	Completed—Published as NCHRP Report 13; Phase II report included in NCHRP Report 111
02-05A	Running Cost of Motor Vehicles as Affected by Highway Design and Traffic	Paul J. Claffey	65,665*	7/1/1967	8/10/1970	Completed—Report included in NCHRP Report 111
02-06	Warranted Levels of Improvement for Local Rural Roads	Stanford University	40,000*	6/1/1963	9/30/1966	Completed—Published as NCHRP Report 63
02-07	Road User Costs in Urban Areas	Catholic University	99,376*	2/1/1964	5/31/1966	Completed—Report included in NCHRP Report 111
02-08	Estimation and Evaluation of Diverted and Generated (Induced) Traffic	Northwestern University	40,000*	5/1/1964	8/31/1966	Completed—Report not published; for avail. see Summary of Progress Through 1988

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
02-09	Effect of Highway Landscape Development on Nearby Property	Franklin Institute	149,103*	11/8/1965	1/31/1968	Completed—Published as NCHRP Report 75
02-10	Future Needs for Oversize-Overweight Permit Operation on State Highways	Jorgensen & Associates	99,655*	11/1/1966	4/30/1968	Completed—Published as NCHRP Report 80
02-11	Summary and Evaluation of Economic Consequences of Highway Improvements	Highway Research Board	110,000*	1/1/1967	7/31/1970	Completed—Published as NCHRP Report 122
02-12	Highway User Economic Analysis	Stanford University	100,069*	4/1/1974	5/31/1977	Completed—Report published by AASHTO
02-13	Multilane Design Alternatives for Improving Suburban Highways	Midwest Research Institute	100,000*	7/18/1983	3/31/1985	Completed—Published as NCHRP Report 282
02-14	Public/Private Partnerships for Financing Highway Improvements	Kimley-Horn & Associates	175,000*	1/1/1986	1/31/1990	Completed—Ph. I report summarized in NCHRP RRD 161 and publ. as NCHRP Report 307; Ph. II report summarized in NCHRP Research Results Digest 179
02-15	Identifying, Measuring, and Evaluating the Benefits of Safety Roadside Rest Areas	KLD Associates	236,560*	1/13/1986	4/30/1989	Completed—Published as NCHRP Report 324
02-16	Relationships Between Vehicle Configurations and Highway Design	TRB Division B & EO	912,000*	3/2/1987	6/30/1990	Completed—Published as TRB Special Report 227
02-17(01)	Methodologies for Evaluating the Effects of Transportation Policies on the Economy	Hickling Corporation	99,145*	9/1/1989	1/31/1991	Completed—Summarized in NCHRP Research Results Digest 200; published as NCHRP Report 342
02-17(02)	Workshop on Research Needs in Transportation and Economic Development	Greenhorne & O'Mara	52,000*	9/1/1989	7/31/1990	Completed—Report not published
02-17(03)	Macroeconomic Analysis of the Linkages Between Transportation Investments and Economic Performance	Johns Hopkins University	250,000	11/1/1991	5/31/1997	Completed—Published as NCHRP Report 389
02-17(03)A	Update and Enhancement of Dataset for Macroeconomic Analysis of Transportation Investments and Economic Performance	Johns Hopkins University	49,990	11/1/1995	12/31/1997	Completed—Summarized in NCHRP Research Results Digest 248
02-17(04)	Measuring the Relationship Between Freight Transportation Services and Industry Productivity	Hickling Lewis Brod	250,000	10/14/1991	5/15/1995	Completed—Report not published
02-17(05)	Impact of Urban Congestion on Business	Cambridge Systematics	170,000	9/15/1991	3/15/1993	Completed—Summarized in NCHRP Research Results Digest 202
02-17(06)	Tourism Travel Contributions to Economic Development	Greenhorne & O'Mara	299,448	2/1/1993	2/28/1997	Completed—Published as NCHRP Report 419; Phase I summarized in NCHRP Research Results Digest 211
02-18	Research Strategies for Improving Highway User Cost-Estimating Methodologies	Hickling Corporation	200,000	1/2/1991	4/30/1994	Completed—Report not published
02-18(02)	Valuation of Travel-Time Savings and Predictability in Congested Conditions for Highway User-Cost Estimation	Hickling Lewis Brod	149,809	2/20/1995	7/31/1997	Completed—Published as NCHRP Report 431

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
02-18(03)	Development of an Innovative Highway User-Cost Estimation Procedure	Hickling Lewis Brod	100,000	11/15/1994	3/30/1997	Completed—Report not published; to be included in Project 02-18(04)
02-18(04)	Development and Demonstration of StratBENCOST Procedure	Hickling Lewis Brod	164,930	12/1/1997	9/30/1999	Completed—Summarized in NCHRP Research Results Digest 252
02-19	Research on the Relationship Between Economic Development and Transportation Development	Hagler Bailly, Inc.	100,000	4/17/1995	4/15/1997	Completed—Published as NCHRP Report 418
02-19(02)	Guidance on Using Existing Analytical Tools for Evaluating Transportation Investments	Hagler Bailly, Inc.	99,990	6/22/1998	8/31/1999	Completed
02-20	Economic Trends and Multimodal Transportation Requirements	Louis Berger Group	249,999	2/15/1995	4/30/1998	Completed—Published as NCHRP Report 421
02-21	Economic Implications of Congestion	Cambridge Systematics	300,000	4/1/1997	3/30/2001	Completed—Published as NCHRP Report 463
02-22	Needs in Communicating the Economic Impacts of Transportation Investment	Hagler Bailly, Inc.	200,000	2/3/1997	3/15/1999	Completed—Published as NCHRP Report 436
02-22(02)	Case Studies on Communicating the Economic Benefits of Transportation Investments	Hagler Bailly, Inc.	100,000	8/18/1999	9/30/2000	Completed
02-23	Development of an Update to the 1977 AASHTO Redbook	ECONorthwest	340,000	5/17/2000	8/31/2003	Completed
<b>AREA THREE: TRAFFIC—OPERATIONS AND CONTROL</b>						
03-01	Development of Criteria for Evaluating Traffic Operations	Cornell Aero Lab	158,878*	2/15/1963	2/28/1966	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-02	Surveillance Methods and Ways and Means of Communicating with Drivers	Cornell Aero Lab	246,756*	2/15/1963	4/30/1966	Completed—Published as NCHRP Reports 9, 28, and 29
03-03	Sensing and Communication Between Vehicles	Ohio State University	163,190*	2/15/1963	11/30/1965	Completed—Published as NCHRP Report 51
03-04	Means of Locating Disabled or Stopped Vehicles and Methods of Communication with a Central Location	Airborne Instruments	127,991*	3/1/1963	12/15/1966	Completed—Published as NCHRP Report 6; Phase II published as NCHRP Report 40
03-05	Improved Criteria for Designing and Timing Traffic Signal Systems	Planning Research Corporation	264,902*	3/1/1963	12/31/1969	Completed—Published as NCHRP Reports 3 and 32; Phase II published as NCHRP Report 73; Phase III published as NCHRP Report 124
03-06	Effect of Regulatory Devices on Intersection Capacity and Operation	De Leuw, Cather	153,175*	4/1/1963	8/15/1966	Completed—Published as NCHRP Reports 11 and 41
03-07	Establishment of Standards for Highway Noise Levels	Bolt, Beranek	572,263*	2/1/1964	11/30/1974	Completed—Published as NCHRP Report 78; Phase II publ. as NCHRP Rpt. 117; Phase III publ. as NCHRP Rpt. 144; Phase IV publ. as NCHRP Rpts. 173 & 174
03-08	Factors Influencing Safety at Highway-Rail Grade Crossings	Voorhees & Associates	91,421*	12/1/1963	1/6/1967	Completed—Published as NCHRP Report 50

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
03-09	Analysis and Projection of Research on Traffic Surveillance, Communication, and Control	Jorgensen & Associates	23,760*	10/15/1966	1/14/1968	Completed—Published as NCHRP Report 84
03-10	Application of Vehicle Operating Characteristics to Geometric Design and Traffic Operations	Cornell Aero Lab	41,520*	1/1/1966	3/10/1967	Completed—Published as NCHRP Report 68
03-11	Optimizing Street Operations Through Traffic Regulations and Control	Peat, Marwick, et al.	258,331*	9/1/1966	9/30/1968	Completed—Published as NCHRP Report 110
03-12	Development of Information Requirements and Transmission Techniques for Highway Users	Airborne Instruments	398,976*	10/1/1966	12/11/1972	Completed—Phase I and II reports included in NCHRP Report 123; Phase III report not published; for avail. see Summary of Progress Through 1988
03-13	Guidelines for Medial and Marginal Access Control of Major Roadways	Texas A&M University	149,293*	9/1/1967	11/30/1969	Completed—Published as NCHRP Report 93
03-14	Optimizing Flow on Existing Street Networks	Edwards & Kelcey, Inc.	990,000*	10/1/1967	1/10/1970	Completed—Published as NCHRP Report 113
03-15	Weaving Area Operations Study	Polytechnic Institute of New York	300,000*	10/1/1969	12/31/1973	Completed—Published as NCHRP Report 159
03-16	Freeway Lane Drops	System Development Corporation	176,604*	11/1/1969	10/31/1973	Completed—Report not published; for avail. see Summary of Progress Through 1988; last phase published as NCHRP Report 175
03-17	Improving Traffic Operations and Safety at Exit Gore Areas	Pennsylvania State University	79,983*	1/1/1971	11/30/1972	Completed—Published as NCHRP Report 145
03-18(01)	Improved Control Logic for Use with Computer-Controlled Traffic	Stanford University	381,660*	7/15/1971	6/30/1977	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-18(02)	Traffic Control in Oversaturated Street Networks	Polytechnic Institute of New York	200,000*	9/1/1971	6/30/1975	Completed—Published as NCHRP Report 194
03-18(03)	Cost-Effectiveness Methodology for Evaluation of Signalized Street Network Surveillance and Control Systems	JHK & Associates	123,267*	5/1/1975	4/15/1977	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-18(04)	Methodology for Performance Evaluation of Signalized Network Control Strategies	Computran	148,705*	7/21/1977	11/20/1980	Completed—Report not published; summarized in NCHRP Research Results Digest 126; for avail. see Summary of Progress Through 1988
03-19	Grade Effects on Traffic Flow Stability and Capacity	Midwest Research Institute	220,443*	9/1/1971	8/31/1974	Completed—Published as NCHRP Report 185
03-20	Traffic Signal Warrants	KLD Associates	201,935*	9/1/1972	12/31/1976	Completed—Report not published; summarized in NCHRP Research Results Digest 78; for avail. see Summary of Progress Through 1988
03-20A	Peak-Hour Traffic Signal Warrants	JHK & Associates	150,000*	6/23/1980	7/31/1982	Completed—Published as NCHRP Report 249

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
03-21	Motorist Response to Highway Guide Signing	BioTechnology	272,071*	4/1/1974	1/31/1976	Completed—Report not published; summarized in NCHRP Research Results Digest 91; for avail. see Summary of Progress Through 1988
03-21(02)	Effectiveness of Changeable-Message Displays in Advance of High-Speed Freeway Lane Closures	BioTechnology	170,993*	12/1/1979	8/31/1981	Completed—Published as NCHRP Report 235
03-22	Guidelines for Design and Operation of Ramp Control Systems	Stanford University	199,030*	4/15/1974	12/31/1975	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-22A	Guidelines for Design and Operation of Ramp Control Systems	Texas A&M University	249,538*	2/1/1977	3/31/1981	Completed—Published as NCHRP Report 232
03-23	Guidelines for Uniformity in Traffic Control Signal Design Configurations	KLD Associates	308,779*	4/8/1974	7/28/1977	Completed—Report not published; summarized in NCHRP Research Results Digest 97; for avail. see Summary of Progress Through 1988
03-24	Determine the Luminous Requirements for Retroreflective Highway Signing	University of Michigan	100,000*	9/1/1974	4/30/1977	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-25	Cost and Safety Effectiveness of Highway Design Elements	Jorgensen & Associates	260,576*	7/15/1975	4/16/1978	Completed—Published as NCHRP Report 197
03-26	Investigation of Selected Noise Barrier Acoustical Parameters	Pennsylvania State University	224,494*	12/1/1976	2/28/1980	Completed—Report not published; summarized in NCHRP Research Results Digests 105 and 122; for avail. see Summary of Progress Through 1988
03-27	Guidelines for Selecting Traffic Signal Control at Individual Intersections	Voorhees & Associates	150,000*	11/15/1976	7/31/1979	Completed—Published as NCHRP Report 233
03-28	Development of an Improved Highway Capacity Manual	JHK & Associates	161,000*	12/15/1977	8/15/1979	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-28(02)	Urban Signalized Intersection Capacity	JHK & Associates	331,000*	10/1/1979	8/31/1982	Completed—Results included in Highway Capacity Manual (TRB Special Report 209)
03-28A	Two-Lane, Two-Way Rural Highway Capacity	Texas A&M University	157,492*	5/1/1980	2/28/1983	Completed—Results included in Highway Capacity Manual (TRB Special Report 209)
03-28B	New Highway Capacity Manual	Polytechnic Institute of New York	283,440*	7/1/1982	3/31/1985	Completed—Results included in Highway Capacity Manual (TRB Special Report 209)
03-28C	Effects of Quality of Traffic Signal Progression on Delay	Texas A&M University	164,546*	8/1/1986	7/31/1988	Completed—Published as NCHRP Report 339
03-29	Traffic Signal Display Complexity	Systems Technologies	196,284*	7/1/1983	3/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
03-30	Intersection Channelization	Jack Leisch Associates	130,000*	7/1/1983	5/15/1985	Completed—Published as NCHRP Report 279

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
03-31	Guidelines for Evaluating Alternatives for Replacing a Grade-Separated Rail/Highway Crossing	Ernst & Whinney	200,000*	9/4/1984	2/28/1987	Completed—Published as NCHRP Report 288
03-32	Temporary Pavement Markings for Work Zones	Texas A&M University	164,990*	5/1/1985	2/28/1987	Completed—Summary published in Transportation Research Record 1160
03-33	Capacity and Level-of-Service Procedures for Multilane Rural and Suburban Highways	JHK & Associates	475,132*	6/1/1985	4/30/1990	Completed—Results included in Highway Capacity Manual (TRB Special Report 209)
03-34	The Feasibility of a National Heavy-Vehicle Monitoring System	Arthur D. Little	499,791*	11/1/1985	9/30/1988	Completed—Published as NCHRP Report 303
03-35	Speed-Change Lanes	JHK & Associates	250,000*	6/1/1986	5/31/1989	Completed—Report not published
03-36	Development of a Low-Cost Bridge Weigh-In-Motion System	Bridge Weighing Systems	400,000*	2/16/1987	2/28/1990	Completed—Report not published
03-37	Capacity and Level of Service at Ramp-Freeway Junctions	Polytechnic University	400,000	7/1/1990	12/31/1993	Completed—Results included in Highway Capacity Manual (TRB Special Report 209)
03-37(02)	Capacity and Level of Service at Ramp-Freeway Junctions (Phase II)	Polytechnic University	150,000	9/1/1994	4/30/1996	Completed—Published as NCHRP Report 385
03-38(01)	Assessment of Advanced Technologies for Relieving Urban Traffic Congestion	Castle Rock Consultants	202,666*	7/1/1987	6/30/1991	Completed—Published as NCHRP Report 340
03-38(01)A	A Study to Assess Advanced Vehicle and Highway Technologies	TRB EO	345,000	7/1/1989	3/31/1991	Completed—Published as TRB Special Report 232
03-38(02)	Travel Characteristics of Large-Scale Suburban Activity Centers	JHK & Associates	300,000*	6/1/1987	2/28/1989	Completed—Published as NCHRP Report 323
03-38(03)	Traffic Adaptive Control (Phase 1)—Critical Intersection Control Strategies; (Phase 2)—OPAC Control Strategies	Farradyne Systems	374,829	9/1/1987	3/31/1993	Completed—Report not published
03-38(04)	Traffic Signal Control for Saturated Conditions	KLD Associates	270,000*	10/1/1987	6/4/1992	Completed—Report not published
03-38(05)	Effective Utilization of Street Width	Midwest Research Institute	159,941*	4/1/1988	6/30/1990	Completed—Published as NCHRP Report 330
03-38(06)	Cost Sharing for Transportation Improvements Near Major Suburban Employment Centers	Indiana University	125,000	5/15/1988	2/28/1991	Completed—Report not published
03-38(07)	Access Management Policies and Guidelines for Activity Centers	Metro Transportation Group	224,759	5/15/1989	9/30/1993	Completed—Published as NCHRP Report 348
03-39	Evaluation and Calibration Procedures for Weigh-In-Motion Systems	Texas A&M University	398,500	3/1/1988	12/31/1993	Completed—Report not published
03-39(02)	On-Site Evaluation and Calibration Procedures for Weigh-In-Motion Systems	Washington State University	247,846	3/10/1994	12/9/1995	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 214
03-40	Single Point Urban Interchange Design and Operations Analysis	Texas A&M University	241,037*	5/1/1989	11/30/1991	Completed—Published as NCHRP Report 345
03-41	Procedure for Determining Work Zone Speed Limits	Graham-Migletz	200,000	11/15/1989	5/31/1993	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 192

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
03-41(02)	Effectiveness and Implementability of Procedures for Work Zone Speed Limits	Graham-Migletz	200,000	1/1/1994	3/31/1997	Completed—Report not published
03-42	Determination of Stopping Sight Distances	Texas A&M University	500,000	5/1/1991	11/1/1994	Completed—Published as NCHRP Report 400
03-43	Use of Shoulders and Narrow Lanes to Increase Freeway Capacity	JHK & Associates	300,000	1/15/1991	4/15/1994	Completed—Published as NCHRP Report 369
03-44	Improved Traffic Control Device Design and Placement to Aid the Older Driver	Michigan State University	400,000	4/15/1992	12/31/1996	Completed—Results included in FHWA's Older Driver Handbook
03-45	Speed-Flow Relationships for Basic Freeway Segments	JHK & Associates	350,000	11/1/1992	6/30/1995	Completed—Results included in 1997 Highway Capacity Manual update
03-46	Capacity and Level of Service at Unsignalized Intersections	University of Idaho	412,436	1/1/1993	12/31/1995	Completed—Results included in 1997 Highway Capacity Manual update; agency report available as NCHRP Web Documents 5 and 6
03-47	Capacity Analysis of Interchange Ramp Terminals	Texas A&M University	400,000	1/1/1994	4/30/1997	Completed—Some results included in 2000 Highway Capacity Manual update; agency report available as NCHRP Web Document 12
03-48	Capacity Analysis for Actuated Intersections	University of Florida	250,000	12/15/1993	9/30/1996	Completed—Some results included in 1997 Highway Capacity Manual update; agency report available as NCHRP Web Document 10
03-49	Capacity and Operational Effects of Midblock Left-Turn Lanes	University of Nebraska - Lincoln	300,000	1/1/1994	11/30/1996	Completed—Published as NCHRP Report 395
03-50	Driver Information Overload	Westat, Inc.	299,833	1/3/1994	9/30/1998	Completed—Report not published; to be included in Project 03-50(02)
03-50(02)	Additional Investigations on Driver Information Overload	Westat, Inc.	220,204	10/13/1999	11/15/2002	Completed—Published as NCHRP Report 488
03-51	Communications Mediums for Signal, IVHS, and Freeway Surveillance Systems	Kimley-Horn & Associates	380,000	12/15/1993	4/30/1996	Completed—Agency report available as NCHRP Web Document 2
03-52	Impacts of Access-Management Techniques	Urbitran Associates	399,982	2/27/1995	3/31/1998	Completed—Published as NCHRP Report 420
03-52A	Impacts of Access-Management Techniques	Urbitran Associates	99,232Ret	12/1/1998	3/31/2000	Completed—Summarized in NCHRP Research Results Digest 247; software available on CRP-CD-24
03-53	Development of a HOV Systems Manual	Texas A&M University	250,000	2/20/1995	2/28/1998	Completed—Published as NCHRP Reports 413 and 414
03-54	Uniform Traffic Signal Displays for Protected/Permissive Left-Turn Control	Kittelson & Associates	100,000	1/9/1995	12/31/1996	Completed—Report to be included with Project 03-54(02)
03-54(02)	Evaluation of Traffic Signal Displays for Protected/Permissive Left-Turn Control	Kittelson & Associates	732,618	12/22/1997	7/31/2004	Completed—Published as NCHRP Report 493; results being considered for inclusion in the MUTCD
03-55	A Highway Capacity Manual for the Year 2000	Catalina Engineering	300,000	1/1/1995	10/31/1996	Completed—Report not published

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
03-55(02)	Techniques to Estimate Speeds and Service Volumes for Planning Applications	Dowling Associates	200,000	7/1/1995	9/30/1996	Completed—Published as NCHRP Report 387
03-55(02)A	Planning Applications for the Year 2000 Highway Capacity Manual	Dowling Associates	200,000Ret	7/18/1997	6/17/1999	Completed—Results included in 2000 Highway Capacity Manual; report available on CRP website
03-55(03)	Capacity and Quality of Service for Two-Lane Highways	Midwest Research Institute	599,829Ret	9/15/1995	11/30/1999	Completed—Results included in 2000 Highway Capacity Manual; report available on CRP website
03-55(04)	Performance Measures and Levels of Service in the Year 2000 Highway Capacity Manual	JHK & Associates/TransCore	159,250	1/8/1996	10/31/1997	Completed—Report not published
03-55(05)	Capacity and Quality of Service of Weaving Areas	Viggen Corporation	299,829	12/1/1996	1/31/1999	Inactive—Plan for completion being developed
03-55(06)	Production of the Year 2000 Highway Capacity Manual	Catalina Engineering	1,152,750Ret	10/15/1996	1/31/2001	Completed—Published as 2000 Highway Capacity Manual
03-56	Systemwide Impact of Safety and Traffic Operation Design Decisions for Resurfacing, Restoration, or Rehabilitation (RRR)	Midwest Research Institute	434,874	5/15/1996	9/30/2002	Completed—Published as NCHRP Report 486
03-56(02)	Implementation of the Resurfacing Safety Resource Allocation Program	Midwest Research Institute	75,000	1/31/2003	1/31/2005	Research in progress
03-57	Recommended Traffic Control Devices for Railroad-Highway Grade Crossings	Westat, Inc.	269,837	6/1/1999	12/31/2001	Completed—Published as NCHRP Report 470; results being considered for inclusion in the MUTCD
03-58	Assessing Traffic Control Signal Installations Using Capacity Analysis and Simulation	Texas A&M University	175,000Ret	8/4/1999	6/30/2001	Completed—Published as NCHRP Report 457
03-59	Assessment of Variable Speed Limit Implementation Issues	Northwestern University	549,860	11/9/2000	7/9/2004	Research in progress
03-60	Capacity and Quality of Service of Interchange Ramp Terminals	Pennsylvania State University	299,904	5/30/2001	9/30/2004	Research in progress
03-61	Communicating Changes in Horizontal Alignment	Michigan State University	399,627	5/7/2001	8/31/2004	Research in progress
03-62	Guidelines for Accessible Pedestrian Signals (APS)	University of North Carolina - Chapel Hill	700,000	10/4/2001	10/3/2004	Research in progress
03-63	Assessment of Sharing Information Between Public Safety and Transportation Agencies for Traffic-Incident Management	Mitretek Systems	199,807	11/12/2001	1/30/2004	Research in progress
03-64	Highway Capacity Manual Applications Guide	Kittelson & Associates	273,301	2/13/2002	8/11/2005	Completed—Agency report available on World Wide Web
03-65	Applying Roundabouts in the United States	Kittelson & Associates	699,994	6/5/2002	6/4/2005	Research in progress
03-66	Traffic Signal State Transition Logic Using Enhanced Sensor Information	University of Tennessee	600,000	4/25/2003	5/24/2005	Research in progress
03-67	Expert System for Recommending Speed Limits in Speed Zones	University of North Carolina - Chapel Hill	300,000	9/17/2003	9/16/2005	Research in progress
03-68	Guide to Effective Freeway Performance Measurement	Cambridge Systematics	300,000	10/13/2003	10/12/2005	Research in progress



TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
03-69	Design of Construction Work Zones on High Speed Highways	Pennsylvania State University	499,999	8/6/2003	2/5/2006	Research in progress
03-70	Multimodal Level of Service Analysis for Urban Streets	Dowling Associates	450,000	3/14/2003	12/14/2004	Research in progress
03-71	Improving Pedestrian Safety at Unsignalized Roadway Crossings (TCRP Project D-08)	Texas A&M University	275,000	11/6/2002	11/5/2004	Research in progress
03-72	Lane Widths, Channelized Right Turns, and Right-Turn Deceleration Lanes in Urban and Suburban Areas	Midwest Research Institute	450,000	5/20/2003	5/19/2005	Research in progress
03-73	Separation of Vehicles - CMV Only Lanes		100,000			In development
03-74	Guidelines for Selection of Speed Reduction Treatments at High Speed Intersections		500,000			In development
03-75	Analysis of Freeway Weaving Sections		450,000			In development
03-76A	Highway Traffic Signal Warrant For Intersections Near Highway-Rail Grade Crossings		150,000			In development
03-76B	Low-Cost Active Warning Systems for Highway-Rail Grade Crossings		200,000			In development
03-77	Guide to Contracting Intelligent Transportation System Projects		300,000			In development
03-78	Crossing Treatments at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities		750,000			In development
03-79	Estimating and Measuring Urban Street Traffic Speed and Level-of-Service		625,000			In development

#### AREA FOUR: MATERIALS AND CONSTRUCTION—GENERAL MATERIALS

04-01	Development of Appropriate Methods for Evaluating the Effectiveness of Stabilizing Agents	University of Illinois	114,991*	6/1/1963	10/31/1966	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-02	A Study of Degrading Aggregates in Bases and Subbases with Production of Excessive Amounts of and/or Harmful Types of Fines	Purdue University	63,990*	2/15/1963	11/30/1966	Completed—Published as NCHRP Report 98
04-03(01)	Development of Methods to Identify Aggregate Particles Which Undergo Destructive Volume Changes When Frozen in Concrete	Virginia Polytechnic Institute	43,337*	3/1/1963	3/31/1967	Completed—Published as NCHRP Report 12; Phase II published as NCHRP Report 65
04-03(02)	Development of Methods to Identify Aggregate Particles Which Undergo Destructive Volume Changes When Frozen in Concrete	Pennsylvania State University	106,213*	3/25/1963	8/3/1967	Completed—Published as HRB Special Report 80 and NCHRP Report 15; Phase II published as NCHRP Report 66
04-04	Synthetic Aggregates for Highway Uses	Battelle Memorial Institute	14,790*	3/1/1963	4/15/1964	Completed—Published as NCHRP Report 8
04-05	A Study of the Mechanism Whereby the Strength of Bases and Subbases Is Affected by Frost and Moisture	Michigan Tech University	64,105*	2/15/1963	8/31/1965	Completed—Report not published; for avail. see Summary of Progress Through 1988

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
04-06	Protective Coatings for Highway Structural Steel	Steel Structures Painting Council	25,000*	3/1/1965	11/30/1966	Completed—Published as NCHRP Reports 74, 74A, and 74B
04-07	Fatigue Strength of High-Yield Reinforcing Bars	Portland Cement Association	150,000*	10/1/1967	8/31/1973	Completed—Report included in NCHRP Report 164
04-08	Research Needs Relating to Performance of Aggregates in Highway Construction	Virginia Polytechnic Institute	55,254*	1/1/1968	4/30/1969	Completed—Published as NCHRP Report 100
04-08(02)	Density Standards for Field Compaction of Granular Bases and Subbases	Clemson University	95,248*	4/1/1971	6/30/1973	Completed—Published as NCHRP Report 172
04-08(03)	Predicting Moisture-Induced Damage to Asphaltic Concrete	University of Idaho	261,037*	9/1/1971	1/31/1982	Completed—Published as NCHRP Report 192; Phase II published as NCHRP Report 246
04-08(04)	Predicting Moisture-Induced Damage to Asphaltic Concrete—10-Year Field Evaluation	University of Idaho	24,402*	6/1/1985	1/31/1987	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-09	Evaluation of Preformed Elastomeric Pavement Joint Sealing Systems and Practices	Utah DOT	93,494*	10/1/1968	6/30/1971	Completed—Report included in Phase II report; summarized in NCHRP Research Results Digest 123
04-09(01)	Preformed Elastomeric Pavement Joint Sealing Systems—Field Evaluation Phase	Utah DOT	144,837*	10/1/1972	12/31/1979	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-10	Promising Replacements for Conventional Aggregates for Highway Use	University of Illinois	50,000*	10/15/1969	3/31/1971	Completed—Published as NCHRP Report 135
04-10A	Waste Materials as Potential Replacements for Highway Aggregates	Valley Forge Laboratories	53,663*	9/1/1972	11/30/1973	Completed—Published as NCHRP Report 166
04-11	Buried Plastic Pipe for Drainage of Transportation Facilities	Simpson Gumpertz & Heger, Inc.	200,000*	9/16/1974	1/26/1979	Completed—Published as NCHRP Report 225
04-12	Upgrading of Poor or Marginal Aggregates for PCC and Bituminous Pavements	Pennsylvania State University	149,941*	12/1/1976	5/31/1979	Completed—Published as NCHRP Report 207
04-13	Temporary Pavement Marking Systems	Southwest Research Institute	49,500*	11/1/1976	2/28/1978	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-13A	Temporary Pavement Marking Paint Systems	Georgia Institute of Technology	69,971*	4/1/1978	9/30/1979	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-14	Coating Systems for Painting Old and New Structural Steel	Georgia Institute of Technology	199,302*	1/1/1978	12/31/1981	Completed—Report not published; for avail. see Summary of Progress Through 1988
04-15	Corrosion Protection of Prestressing Systems in Concrete Bridges	Wiss, Janney, Elstner & Associates	249,973*	7/1/1982	11/30/1985	Completed—Published as NCHRP Report 313
04-16	Cost and Service Life of Pavement Markings	Pennsylvania State University	340,327*	10/1/1984	8/30/1990	Completed—Report not published
04-17	Environmental Monitoring and Evaluation of Calcium Magnesium Acetate (CMA)	University of Washington	199,943*	1/7/1985	10/31/1987	Completed—Published as NCHRP Report 305

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
04-18	Design and Evaluation of Large Stone Mixtures	Texas A&M University	299,440	6/1/1992	7/31/1996	Completed—Published as NCHRP Report 386
04-19	Aggregate Tests Related to Asphalt Concrete Performance in Pavements	Auburn University	499,194	2/1/1994	5/31/1997	Completed—Published as NCHRP Report 405
04-19(02)	Validation of Performance-Related Tests of Aggregates for Use in Hot-Mix Asphalt Pavements	Purdue University	399,975	3/16/2000	3/31/2004	Research in progress
04-20	Aggregate Tests Related to Performance of Portland Cement Concrete	Texas A&M University	132,890	3/15/1995	12/31/1996	Contract cancelled
04-20A	State-of-the-Art Report and Plan for Research on Aggregate Tests Related to Performance of Portland Cement Concrete	Consultant: Richard C. Meininger	30,300	5/27/1997	1/31/1998	Completed—Agency report available for loan
04-20B	Aggregate Tests Related to Performance of Portland Cement Concrete Pavements (Phase I)	University of Delaware	19,995	5/3/1999	11/1/1999	Completed
04-20C	Aggregate Tests Related to Performance of Portland Cement Concrete Pavements: State of the Knowledge	Consultant: Dr. Kevin J. Folliard	36,000	4/1/2001	7/31/2002	Completed—Summarized in NCHRP Research Results Digest 281
04-21	Appropriate Use of Waste and Recycled Materials in the Transportation Industry	Chesner Engineering	499,974	6/1/1995	7/15/2000	Completed—Information database available on CRP-CD-5
04-22	Pavement-Marking Materials: Health, Environmental, and Performance Assessment	Research Triangle Institute	199,996	2/1/1995	1/30/1997	Completed—Published as NCHRP Report 392; summarized in NCHRP Research Results Digest 222
04-23	Performance-Related Tests of Aggregates for Use in Unbound Pavement Layers	Applied Research Associates	499,938	5/1/1996	12/31/1999	Completed—Published as NCHRP Report 453
04-24	HDPE Pipe Material Specifications and Design Requirements	Drexel University	130,000	1/1/1997	8/31/1998	Completed—Published as NCHRP Report 429
04-25	Implementation Plan for Automating Highway-Materials Testing	Braun Intertec Corporation	154,960	2/10/1997	2/26/1999	Completed—Published as NCHRP Report 427
04-26	Thermoplastic Drainage Pipe, Design and Testing	Simpson Gumpertz & Heger, Inc.	500,000	6/18/1999	3/31/2004	Research in progress
04-27	Application of Advanced Composites to Highway Infrastructure: Strategic Plan	University of Delaware	224,907	9/12/2000	11/30/2002	Completed—Published as NCHRP Report 503
04-28	Feasibility Study for an All-White Pavement Marking System	Texas A&M University	250,000	5/25/2000	7/15/2002	Completed—Published as NCHRP Report 484
04-29	Selection of Sign Materials to Optimize Performance	University of Iowa	300,000	5/2/2001	3/5/2004	Research in progress
04-30	Test Methods for Characterizing Aggregate Shape, Texture, and Angularity (Phase I)	Washington State University	49,960	7/2/2002	3/31/2003	Completed—Phase I only; research resumed under Project 04-30A
04-30A	Test Methods for Characterizing Aggregate Shape, Texture, and Angularity	Texas A&M University	450,000	8/28/2003	2/27/2005	Research in progress
04-31	Tests of Recycled Aggregates for Use in Unbound Pavement Layers	ERES Consultants	299,999	7/2/2003	7/2/2005	Research in progress

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
<b>AREA FIVE: TRAFFIC—ILLUMINATION AND VISIBILITY</b>						
05-02(01)	Effects of Illumination on Operating Characteristics of Freeways—Traffic Flow, Driver Behavior, and Accidents	Yale University	145,849*	2/15/1963	7/31/1967	Completed—Report included in NCHRP Report 60
05-02(02)	Effects of Illumination on Operating Characteristics of Freeways—Driver Response, Visibility, and Visual Discomfort	Ohio State University	81,187*	2/15/1963	8/31/1965	Completed—Report included in NCHRP Report 60
05-02(03)	Effects of Illumination on Operating Characteristics of Freeways—Driver Discomfort	Institute for Research	37,460*	2/20/1963	2/28/1966	Completed—Report included in NCHRP Report 60
05-03	Visual Information Needed by the Driver at Night	Ohio State University	100,940*	9/1/1964	3/31/1967	Completed—Published as NCHRP Report 99
05-04	Economic Study of Roadway Lighting	Franklin Institute	19,412*	7/20/1964	8/31/1965	Completed—Published as NCHRP Report 20
05-05	Nighttime Use of Highway Pavement Delineation Materials	Southwest Research Institute	150,000*	3/1/1965	9/15/1969	Completed—Published as NCHRP Report 45; Phase II published as NCHRP Report 85
05-05A	Development of Optimum Specifications for Glass Beads in Pavement Markings	Pennsylvania State University	99,350*	5/1/1971	6/30/1973	Completed—Report not published; for avail. see Summary of Progress Through 1988
05-05B	Pavement Marking Systems for Improved Wet-Night Visibility Where Snowplowing Is Prevalent	Texas A&M University	200,000*	9/1/1971	12/31/1974	Completed—Report not published; for avail. see Summary of Progress Through 1988
05-06	Highway Fog	Cornell Aero Lab	99,955*	10/2/1967	4/30/1969	Completed—Published as NCHRP Report 95
05-06A	Highway Fog	Sperry Rand	93,540*	9/1/1970	5/31/1973	Completed—Published as NCHRP Report 171
05-07	Roadway Delineation Systems	Pennsylvania State University	469,526*	10/1/1968	6/30/1971	Completed—Published as NCHRP Report 130
05-08	Warrants for Highway Lighting	Texas A&M University	198,875*	3/16/1970	2/15/1973	Completed—Published as NCHRP Report 152
05-09	Partial Lighting of Interchanges	KETRON, Inc.	199,999*	12/1/1980	1/31/1983	Completed—Published as NCHRP Report 256
05-10	A Mobile System for Measuring Retroreflectance of Traffic Signs	EKTRON Appl Image	480,795*	9/7/1987	12/31/1990	Completed—Report not published
05-11	Implementation Strategies for Sign Retroreflectivity Standards	Bellomo-McGee, Inc.	203,544*	2/15/1989	8/31/1991	Completed—Published as NCHRP Report 346
05-12	Requirements for Application of Light Emitting Diodes (LEDs) to Traffic Control Signals	Lighting Sciences	249,973	2/15/1992	8/15/1994	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 205
05-13	Illumination Guidelines for Nighttime Highway Work	University of Florida	173,979	2/1/1993	6/30/1995	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 216
05-13(02)	Illumination Guidelines for Nighttime Highway Work	University of Florida	199,243	2/1/1996	10/31/1999	Completed—Published as NCHRP Report 498
05-14	Advance Warning Arrow Panel Visibility	Last Resource	275,000	3/1/1993	12/31/1996	Completed—Summarized in NCHRP Research Results Digest 259

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
05-15	Visibility Performance Requirements for Vehicular Traffic Signals	Westat, Inc.	350,000	3/18/1996	12/31/1999	Completed—To be summarized in a NCHRP Research Results Digest
05-16	National Calibration Facility for Retroreflective Traffic Control Materials	National Institute of Standards & Technology	500,000	12/12/2001	6/30/2004	Research in progress
05-17	Safety Evaluation of Permanent Raised Pavement Markers	iTRANS Consulting, Inc.	392,349	12/3/2001	11/30/2003	Completed—Publication decision pending
05-18	Color Effectiveness of Yellow Pavement Marking Materials	University of Iowa	400,000	11/6/2002	11/5/2005	Research in progress
<b>AREA SIX: MAINTENANCE—SNOW AND ICE CONTROL</b>						
06-01	Development of Economical and Effective Chemical Deicing Agents to Minimize Injury to Highway Structures and Vehicles	IIT Research Institute	40,000*	2/15/1963	9/30/1964	Completed—Published as NCHRP Report 19
06-02	Nonchemical Methods for Preventing or Removing Snow and Ice Accumulations on Highway Structures	Jorgensen & Associates	25,000*	2/15/1963	2/29/1964	Completed—Published as NCHRP Report 4
06-03	Development and Evaluation of Protective Coatings to Prevent Deterioration of Concrete Structures by Deicing Agents	Battelle Memorial Institute	58,557*	3/1/1963	2/28/1965	Completed—Published as NCHRP Report 16
06-04	Evaluation and Development of Methods for Reducing Corrosion of Reinforcing Steel	Battelle Memorial Institute	39,330*	3/1/1963	4/30/1965	Completed—Published as NCHRP Report 23
06-05	Study of Physical Factors Influencing Resistance of Concrete to Deicing Agents	University of Illinois	72,500*	3/1/1963	8/31/1965	Completed—Published as NCHRP Report 27
06-06	To Evaluate Existing Methods and/or Develop Improved Methods for the Measurement of Certain Properties of Concrete	Ohio State University	69,393*	3/1/1963	2/28/1966	Completed—Report not published; for avail. see Summary of Progress Through 1988
06-07	Estimation of Disintegration in Concrete Structures	Geotechnics	8,547*	3/1/1963	8/31/1964	Contract cancelled—No report; research resumed under Project 06-07A
06-07A	Estimation of Disintegration in Concrete Structures	IIT Research Institute	44,614*	2/1/1965	7/31/1966	Completed—Report not published; for avail. see Summary of Progress Through 1988
06-08	Evaluation of Methods of Replacement of Deteriorated Concrete in Structures	Tallamy Associates	25,000*	2/15/1963	2/29/1964	Completed—Published as NCHRP Report 1
06-09	Potential Accelerating Effects of Chemical Deicing Damage by Traffic and Other Environmental-Induced Stresses in Concrete Bridge Decks	University of Illinois	200,000*	1/1/1965	6/15/1968	Completed—Published as NCHRP Report 101
06-10	Develop Improved Snow Removal and Ice Control Techniques at Interchanges	Tallamy Associates	95,000*	9/1/1967	9/30/1970	Completed—Published as NCHRP Report 127
06-11	Economic Evaluation of the Effects of Ice and Frost on Bridge Decks	Midwest Research Institute	100,000*	9/1/1970	9/11/1974	Completed—Published as NCHRP Report 182

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
06-12	Improved Visibility for Snow Plowing Operations	Rensselaer Polytechnic Institute	299,581	1/1/1996	12/31/1999	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 250
06-13	Guidelines for Snow and Ice Control Materials and Methods	Midwest Research Institute	748,252	3/2/1998	5/15/2003	Completed—Agency report available for loan
06-14	Feasibility of Using Friction Indicators to Improve Winter Maintenance Operations and Mobility	Virginia Polytechnic Institute	150,000	5/17/2000	8/31/2002	Completed—Agency report available as NCHRP Web Document 53
06-15	Testing and Calibration Methods for RWIS Sensors	SRF Consulting Group, Inc.	299,990	6/20/2003	5/19/2004	Research in progress
06-16	Guidelines for the Selection of Snow and Ice Control Materials To Mitigate Environmental Impacts	Levelton Engineering, Ltd.	249,968	6/2/2003	12/1/2004	Research in progress

### AREA SEVEN: TRAFFIC—TRAFFIC PLANNING

07-01	The Influence of Land Use on Urban Travel Patterns	Louis E. Keefer	129,568*	2/1/1964	9/30/1967	Completed—Published as NCHRP Reports 24 and 62
07-02	Traffic Attraction of Rural Outdoor Recreational Areas	IIT Research Institute	49,496*	2/1/1964	5/31/1966	Completed—Published as NCHRP Report 44
07-03	Weighing Vehicles in Motion	Franklin Institute	73,391*	2/1/1964	8/31/1967	Completed—Published as NCHRP Report 71
07-04	Factors and Trends in Trip Lengths	Voorhees & Associates	150,980*	2/1/1964	1/10/1969	Completed—Published as NCHRP Report 48; Phase II published as NCHRP Report 89
07-05	Predicted Traffic Usage of a Major Highway Facility Versus Actual Usage	Yale University	99,675*	2/1/1964	11/30/1966	Completed—Published as NCHRP Report 58
07-06	Multiple Use of Lands Within Highway Rights-of-Way	Barton-Aschman Associates	24,220*	2/1/1966	2/28/1967	Completed—Published as NCHRP Report 53
07-07	Motorists' Needs and Services on Interstate Highways	Airborne Instruments	99,267*	1/1/1966	12/31/1967	Completed—Published as NCHRP Report 64
07-08	User Cost and Related Consequences of Alternative Levels of Highway Service	Stanford University	99,070*	9/1/1970	4/15/1972	Completed—Published as NCHRP Report 133
07-09	Development of Models for Predicting Weekend Recreational Traffic	Midwest Research Institute	74,983*	9/1/1972	5/15/1974	Completed—Report not published; for avail. see Summary of Progress Through 1988
07-10	Peak-Period Traffic Congestion	Remak/Rosenbloom	49,624*	4/1/1974	3/31/1975	Completed—Published as NCHRP Report 169
07-10(02)	The Institutional Aspects of Implementing Congestion-Reducing Techniques	Remak/Rosenbloom	74,703*	4/1/1975	11/30/1978	Completed—Published as NCHRP Report 205
07-11	Low-Cost TSM Projects—Simplified Procedures for Evaluation and Setting Priorities	Multiplications, Inc.	199,988*	4/6/1981	11/30/1983	Completed—Published as NCHRP Report 263
07-11A	Low-Cost TSM Projects—Simplified Procedures for Evaluation, Phase II	Texas A&M University	150,000*	3/4/1985	8/3/1986	Completed—Published as NCHRP Report 283
07-12	Microcomputer Evaluation of Highway User Benefits	Texas A&M University	200,000	2/1/1989	9/30/1995	Completed—Report released with software through McTrans Center at University of Florida

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
07-12(02)	Metrication and Enhancement of MicroBENCOST Software Package	Texas A&M University	170,000	12/15/1995	6/30/1997	Completed—Summarized in NCHRP Research Results Digest 242
07-13	Quantifying Congestion	Texas A&M University	375,000	3/1/1992	2/28/1997	Completed—Published as NCHRP Report 398
07-14	Guidelines for Cost-Benefit Analysis of Investments in Bicycle Facilities	University of Minnesota	300,000			Research in progress
07-15	Cost Effective Measures and Planning Procedures for Travel Time Variation, Delay and Reliability		300,000			In development
<b>AREA EIGHT: TRANSPORTATION PLANNING—FORECASTING</b>						
08-01	Social and Economic Factors Affecting Travel	Vogt, Ivers	94,558*	2/1/1964	9/23/1966	Completed—Published as NCHRP Report 70
08-02	Factors Influencing Modal Trip Assignment	HT Research Institute	298,033*	2/1/1964	8/31/1966	Completed—Published as NCHRP Report 57
08-03	Individual Preferences for Various Means of Transportation	University of Pennsylvania	63,282*	2/1/1964	3/31/1965	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-04	Criteria for Evaluating Alternative Transportation Plans	Northwestern University	89,900*	2/1/1965	8/1/1967	Completed—Published as NCHRP Report 96
08-04A	Criteria for Evaluating Alternative Transportation Plans	University of Illinois	5,000*	10/14/1968	1/10/1969	Completed—Published as NCHRP Report 96
08-05	Transportation Aspects of Land-Use Controls	Victor Gruen	125,538*	4/1/1965	1/15/1970	Completed—Published as NCHRP Report 31; Phase II published as NCHRP Report 121
08-06	Individual Preferences for Alternative Dwelling Types and Environments	University of North Carolina	99,897*	2/14/1966	3/13/1968	Completed—Published as NCHRP Report 81
08-07	Evaluation of Data Requirements and Collection Techniques for Transportation Planning	Creighton-Hamburg	190,000*	9/13/1968	8/28/1970	Completed—Published as NCHRP Report 120
08-07A	Data Requirements and Transportation Planning Procedures in Small Urban Areas	University of Tennessee	98,005*	6/1/1973	6/14/1975	Completed—Published as NCHRP Report 167
08-08(01)	The Impact of Highways upon Environmental Values (Study Design)	Massachusetts Institute of Technology	29,654*	9/16/1968	3/14/1969	Completed—Study design, not published
08-08(02)	The Impact of Highways upon Environmental Values (Study Design)	Daniel, Mann, Johnson, Mendenhall	28,950*	9/9/1968	3/7/1969	Completed—Study design, not published
08-08(03)	The Impact of Highways upon Environmental Values	Massachusetts Institute of Technology	470,000*	9/15/1969	7/31/1974	Completed—Published as NCHRP Report 156
08-09	Comparative Economic Analysis of Alternative Multimodal Passenger Transportation Systems	Creighton-Hamburg	100,000*	9/1/1971	1/31/1973	Completed—Published as NCHRP Report 146
08-10	Planning and Design Guidelines for Efficient Bus Utilization of Highway Facilities	Wilbur Smith Associates	149,907*	9/1/1971	7/31/1973	Completed—Published as NCHRP Reports 143 and 155

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
08-11	Social, Economic, Environmental Consequences of Not Constructing a Transportation Facility	David A. Crane & Partners, Inc.	364,363*	9/16/1974	11/30/1979	Completed—Phase I report not published; for avail. see Summary of Progress Through 1988; Phase II report published as NCHRP Reports 216 and 217
08-12	Travel Estimation Procedures for Quick Response to Urban Policy Issues	Metropolitan Washington Council of Governments	39,895*	9/3/1974	12/31/1975	Completed—Published as NCHRP Reports 186 and 187
08-12A	Travel Estimation Procedures for Quick Response to Urban Policy Issues	COMSIS Corporation	239,331*	11/1/1975	10/31/1978	Completed—Published as NCHRP Reports 186 and 187
08-13	Disaggregate Travel Demand Models	Charles River Associates	100,000*	9/15/1974	1/31/1976	Completed—Phase I report not published; for avail. see Summary of Progress Through 1988
08-13(02)	Disaggregate Travel Demand Models	Charles River Associates	200,000*	5/1/1976	12/31/1980	Completed—Published as NCHRP Report 253
08-14	New Approaches to Understanding Travel Behavior	Boston College	144,135*	1/1/1975	4/30/1977	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-14A	New Approaches to Understanding Travel Behavior: Phase II	Charles River Associates	221,250*	1/1/1978	6/30/1982	Completed—Published as NCHRP Report 250
08-15	State and Regional Transportation Impact Identification and Measurement	Bigelow-Crain	80,000*	9/1/1974	5/31/1976	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-15A	Economic Impacts of State Transportation Policies and Programs	Reg Sci Research Inst	117,852*	10/1/1977	3/31/1980	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-16	Guidelines for Public Transportation Levels of Service and Evaluation	University of Tennessee	489,952*	1/1/1976	12/31/1980	Completed—Published as NCHRP Reports 208, 209, 210, 211, and 212
08-17	Freight Data Requirements for Statewide Transportation Systems Planning	R. Creighton Associates	231,147*	7/15/1975	2/15/1977	Completed—Published as NCHRP Reports 177 and 178
08-18	Techniques for Evaluating Options in Statewide Transportation Planning/Programming	Planning Envr Int/AMV	300,393*	9/1/1975	6/30/1978	Completed—Published as NCHRP Reports 179 and 199
08-19	The Relationship of Changes in Urban Highway Supply to Vehicle-Miles of Travel	Cambridge Systematics	199,954*	12/1/1976	11/30/1978	Completed—Report not published; summarized in NCHRP Research Results Digest 127; for avail. see Summary of Progress Through 1988
08-20	Improved Methods for Vehicle Counting and Determining Vehicle-Miles of Travel	Hamburg & Associates	200,000*	1/2/1978	7/31/1980	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-21	Guidelines for Use of Vanpools and Carpools as a Transportation System Management Technique	George Washington University	265,486*	3/1/1979	6/30/1981	Completed—Guidelines published as NCHRP Report 241; agency report not published; for avail. see Summary of Progress Through 1988



TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
08-22	Transportation Financing Within the Context of Energy Constraints	System Design Concepts	100,000*	3/26/1979	2/27/1981	Completed—Published as NCHRP Report 231
08-23	Fuel Supply Limitations and Passenger Travel	Charles River Associates	110,000*	4/2/1979	9/1/1980	Completed—Published as NCHRP Report 229
08-24	Forecasting the Basic Inputs to Transportation Planning	Hamburg & Associates	81,000*	1/21/1980	4/30/1982	Completed—Published as NCHRP Report 266
08-24A	Forecasting the Basic Inputs to Transportation Planning at the Zonal Level	COMSIS Corporation	192,444*	4/1/1987	2/28/1990	Completed—Published as NCHRP Report 328
08-25	Intercity Bus Transportation Planning	Peat, Marwick, et al.	200,000*	4/1/1980	1/31/1982	Completed—Report not published; for avail. see Summary of Progress Through 1988
08-26	Development of Highway Traffic Data for Project Planning and Design in Urbanized Areas	JHK & Associates	100,000*	5/15/1981	12/31/1982	Completed—Published as NCHRP Report 255
08-27	Cost-Effectiveness of Transportation Services for Handicapped Persons	University of Tennessee	199,543*	9/1/1981	4/30/1983	Completed—Published as NCHRP Reports 261 and 262
08-28	Strategic Planning and Management for Transportation Agencies	Ernst & Young	180,020*	6/1/1987	6/25/1990	Completed—Published as NCHRP Report 331
08-29	Travel Estimation Techniques for Urban Planning	Barton-Aschman Associates	300,000	2/15/1991	4/29/1994	Completed—Published as NCHRP Report 365
08-29(02)	Travel Estimation Techniques for Urban Planning	Barton-Aschman Associates	47,398	4/1/1995	1/31/1996	Completed—Published as NCHRP Report 365
08-30	Characteristics and Changes in Freight Transportation Demand	Cambridge Systematics	550,000	12/15/1992	2/29/1996	Completed—Published as NCHRP Report 388
08-30A	Freight Capacity	TRB Division B	100,000	11/1/1997	12/31/2001	Completed—Published as TRB Special Report 271
08-31	Long-Term Availability of Multimodal Corridor Capacity	Urban Institute	285,000	1/4/1993	1/1/1996	Completed—Continued as Project 08-31A
08-31A	Long-Term Availability of Multimodal Corridor Capacity	Cambridge Systematics	65,920	7/1/1995	3/31/1996	Completed—Published as NCHRP Report 399
08-32	Workshop on Multimodal Transportation Planning Research Needs	TRB Division D	70,000	3/15/1993	3/14/1994	Completed—Problem statements developed
08-32(01)	Innovative Practices for Multimodal Transportation Planning for Freight and Passengers	Transmanagement, Inc.	140,658	12/1/1994	6/30/1996	Completed—Published as NCHRP Report 404
08-32(02)	Multimodal Transportation: Development of a Performance-Based Planning Process	Cambridge Systematics	250,000	1/1/1995	7/31/1996	Completed—Phase I summarized in NCHRP Research Results Digest 226
08-32(02)A	Multimodal Transportation: Development of a Performance-Based Planning Process	Cambridge Systematics	299,990	4/1/1997	4/30/1999	Completed—Published as NCHRP Report 446
08-32(03)	Integration of Land-Use Planning with Multimodal Transportation Planning	Parsons Brinckerhoff Quade & Douglas	400,000	10/1/1995	12/31/1998	Completed—Published as NCHRP Report 423A
08-32(04)	Developing and Maintaining Partnerships for Multimodal Transportation Planning	Kimley-Horn & Associates	199,950	3/31/1995	6/30/1997	Completed—Published as NCHRP Report 433
08-32(05)	Multimodal Transportation Planning Data	Jack Faucett Associates	350,000	2/1/1995	12/31/1996	Completed—Published as NCHRP Report 401

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
08-33	Quantifying Air-Quality and Other Benefits and Costs of Transportation Control Measures	Cambridge Systematics	1,014,964	7/1/1995	12/31/1999	Completed—Summarized in NCHRP Research Results Digests 217, 223, and 230; published as NCHRP Report 462 and CRP-CD-15
08-34	Major Investment Studies: Development of a Practitioner's Guidebook for Effective Study Design, Management, and Implementation	Science Applications International Corporation	195,553	3/1/1997	2/28/1999	Completed—Published as NCHRP Report 435
08-35	Incorporating ITS into the Transportation Planning Process	Mitretek Systems	449,999	4/13/1998	6/30/2002	Completed—Publication decision pending
08-36	Research for the AASHTO Standing Committee on Planning	Various	600,000c	5/4/1999		Research in progress; see CRP website for task descriptions and status
08-37	Standardized Procedures for Personal Travel Surveys	Louisiana Transportation Research Council	370,000	3/7/2000	1/31/2004	Research in progress
08-38	Consideration of Environmental Factors in Transportation Systems Planning	Georgia Institute of Technology	250,000	3/19/2001	6/19/2003	Completed—Publication decision pending
08-39	Financing and Improving Land Access to U.S. Intermodal Cargo Hubs	Louis Berger Group	250,000	11/15/2000	2/28/2003	Completed—Published as NCHRP Report 497
08-40	Evaluating Cultural Resource Significance Using Information Technology	URS Corporation	173,997	11/1/2000	1/31/2002	Completed—Report not published; to be included in Project 08-40(02)
08-40(02)	Evaluating Cultural Resource Significance - Implementation Tools	URS Group, Inc.	217,243	1/15/2003	7/15/2004	Research in progress
08-41	Effective Methods for Environmental-Justice Analyses	URS Corporation	499,182	4/24/2001	1/31/2004	Research in progress
08-42	Rail Freight Solutions to Roadway Congestion	Reebie Associates	449,990	7/11/2002	5/10/2004	Research in progress
08-43	Methods for Forecasting Statewide Freight Movements and Related Performance Measures	Cambridge Systematics	499,885	2/7/2002	6/7/2004	Research in progress
08-44	Incorporating Safety into Long-Range Transportation Planning	University of Arizona	500,000	8/8/2002	1/8/2005	Research in progress
08-45	A Collaborative Vision of Mobility: Updating the Toolbox (TCRP Project H-29)	Transmanagement, Inc.	150,000	4/28/2003	4/27/2004	Research in progress
08-46	A Guide for Including Access Management in Transportation Plans	Dye Management Group	225,000	3/31/2003	9/30/2004	Research in progress
08-47	Guidebook for Freight Policy, Planning, and Programming in Small and Mid-Sized Metropolitan Areas	Cambridge Systematics	275,000	8/6/2003	8/5/2005	Research in progress
08-48	Using American Community Survey Data for Transportation Planning	Cambridge Systematics	299,999	8/7/2003	8/6/2005	Research in progress
08-49	Procedures for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction		300,000			In development
08-50	Factors that Support the Planning-Programming Linkage		250,000			In development

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
<b>AREA NINE: MATERIALS AND CONSTRUCTION—BITUMINOUS MATERIALS</b>						
09-01	Asphalt Durability and Its Relation to Pavement Performance	American Oil	100,000*	2/1/1964	4/30/1967	Completed—Published as NCHRP Report 67
09-02	Asphalt Durability and Its Relation to Pavement Performance—Adhesion	Montana College	101,903*	1/1/1965	10/31/1967	Completed—Report not published; for avail. see Summary of Progress Through 1988
09-03	Evaluation of Pavement Joint and Crack Sealing Materials and Practices	Rensselaer Polytechnic Institute	24,996*	6/1/1965	6/30/1966	Completed—Published as NCHRP Report 38
09-04	Minimizing Premature Cracking of Asphaltic Concrete Pavements	Materials R&D	99,560*	11/1/1971	6/30/1973	Completed—Published as NCHRP Report 195
09-04A	Bayesian Analysis Methodology for Verifying Recommendations to Minimize Asphalt Pavement Distress	Woodward-Clyde	204,194*	9/15/1975	11/1/1978	Completed—Published as NCHRP Report 213
09-05	Design of Emulsified Asphalt Paving Mixtures	Asphalt Institute	150,172*	4/1/1980	6/30/1984	Completed—Published as NCHRP Report 259
09-06(01)	Asphalt Aggregate Mixture Analysis System (AAMAS)	Brent Rauhut Engineering	660,017*	1/5/1987	6/4/1990	Completed—Published as NCHRP Report 338
09-06A	Development of Asphalt Aggregate Mixture Analysis System: Phase I	ARE, Inc.	25,000*	6/2/1986	10/2/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
09-06B	Development of Asphalt Aggregate Mixture Analysis System: Phase I	Brent Rauhut Engineering	25,000*	6/2/1986	10/2/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
09-06C	Development of Asphalt Aggregate Mixture Analysis System: Phase I	University of Maryland	24,879*	6/2/1986	10/2/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
09-07	Field Procedures and Equipment to Implement SHRP Asphalt Specifications	Brent Rauhut Engineering	1,150,784	4/1/1993	7/15/1997	Completed—Published as NCHRP Report 409 and available on CRP-CD-1
09-08	Designing Stone Matrix Asphalt Mixtures	Auburn University	995,720	4/1/1994	6/30/1998	Completed—Published as NCHRP Report 425 and available on CRP-CD-1
09-09	Refinement of the Superpave Gyratory Compaction Procedure	Auburn University	499,850	6/1/1996	7/31/1998	Completed—Summarized in NCHRP Research Results Digest 237 and available on CRP-CD-1
09-09(01)	Verification of Gyration Levels in the Ndesign Table	Auburn University	625,447	2/3/2000	10/31/2005	Research in progress
09-10	Superpave Protocols for Modified Asphalt Binders	Asphalt Institute	995,139	4/15/1996	2/15/2001	Completed—Published as NCHRP Report 459 and available on CRP-CD-10
09-10A	Superpave Protocols for Modified Asphalt Binders Implementation	University of Wisconsin - Madison	19,344	6/20/2001	12/31/2002	Completed
09-11	Segregation in Hot-Mix Asphalt Pavements	Auburn University	300,000	6/15/1997	1/14/2000	Completed—Published as NCHRP Report 441 and available on CRP-CD-8
09-12	Incorporation of Reclaimed Asphalt Pavement in the Superpave System	Purdue University	463,514	4/1/1997	9/30/2000	Completed—Published as NCHRP Report 452; summarized in NCHRP Research Results Digest 253; available on CRP-CD-8

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
09-12(01)	Marketing the Use of Reclaimed Asphalt Pavements in the Superpave Mix Design Method	Fugro-BRE, Inc.	57,250	1/8/2001	12/31/2002	Completed—Video and slide presentations available
09-13	Evaluation of Water Sensitivity Tests	University of Nevada - Reno	150,000	11/1/1997	8/31/1999	Completed—Published as NCHRP Report 444 and available on CRP-CD-8
09-14	Investigation of the Restricted Zone in the Superpave Aggregate Gradation Specification	Auburn University	501,678	5/1/1998	7/15/2001	Completed—Published as NCHRP Report 464 and available on CRP-CD-10
09-15	Quality Characteristics and Test Methods for Use in Performance-Related Specifications of Hot-Mix Asphalt Pavements	Fugro-BRE, Inc.	449,995	1/1/1999	1/31/2004	Preliminary Draft Final Report in review
09-16	Relationship Between Superpave Gyrotory Compaction Properties and Permanent Deformation In Service	Asphalt Institute	249,809	5/10/1999	5/15/2002	Completed—Published as NCHRP Report 478
09-16(01)	Validation of NCHRP 09-16 Findings for HMA Quality Control Operations	Asphalt Institute	79,885	11/30/2002	1/31/2004	Research in progress
09-17	Accelerated Laboratory Rutting Tests: Asphalt Pavement Analyzer	Auburn University	369,744	5/19/1999	4/15/2003	Completed—To be published as NCHRP Report 508
09-18	Field Shear Test for Hot Mix Asphalt	Pennsylvania State University	200,000	6/30/1999	10/31/2001	Completed—Summarized in NCHRP Research Results Digest 262
09-18(01)	Validation of Field Shear Test and Indirect Tension Strength Test	Advanced Asphalt Technologies, LLC	18,983	8/8/2002	12/8/2002	Completed
09-19	Superpave Support and Performance Models Management	University of Maryland	2,621,323	5/10/1999	4/30/2004	Research in progress
09-20	Performance-Related Specifications for Hot-Mix Asphalt Construction	Nevada Automotive Test Center	1,500,000	12/31/1998	11/30/2000	Completed—Published as NCHRP Report 455
09-20A	Follow-up to Performance-Related Specifications for Hot-Mix Asphalt Construction	Applied Pavement Technologies	12,225	7/1/2001	12/31/2001	Completed
09-21	Superpave Advisory Structure	TRB Division E	400,000	3/9/1998	3/8/2003	Completed
09-22	Beta Testing and Validation of HMA PRS	Fugro-BRE, Inc.	1,000,000	10/3/2000	12/31/2004	Research in progress
09-23	Environmental Effects in Pavement Mix and Structural Design Systems	Arizona State University	487,234	2/27/2001	12/31/2003	Research in progress
09-24	Validation of a Simple Performance Test Device	Combined	0			Combined with Project 09-19
09-25	Requirements for Voids in Mineral Aggregate for Superpave Mixtures	Advanced Asphalt Technologies, LLC	399,896	4/2/2001	3/31/2004	Research in progress
09-26	Precision Statement for AASHTO T 312	NIST/AASHTO Materials Reference Lab.	409,072	1/23/2001	12/31/2004	Research in progress
09-27	Relationships of HMA In-Place Air Voids, Lift Thickness, and Permeability	Auburn University	350,000	4/19/2001	3/31/2004	Preliminary Draft Final Report in review
09-29	Simple Performance Tester for Superpave Mix Design	Advanced Asphalt Technologies, LLC	850,031	4/2/2001	11/30/2005	Research in progress
09-30	Experimental Plan for Calibration and Validation of HMA Performance Models for Mix and Structural Design	Fugro-BRE, Inc.	200,000	10/15/2001	12/31/2003	Preliminary Draft Final Report in review
09-31	Air Void Requirements for Superpave Mix Design	Advanced Asphalt Technologies, LLC	249,993	10/15/2001	3/31/2004	Research in progress

TABLE 1 (continued)

Project							
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **	
09-32	Evaluation of SST and IDT Testing and Identification of Future Activities		100,000			Combined with Project 09-29	
09-33	A Manual for Hot Mix Asphalt Mix Design		500,000			In development	
09-34	Improved Test Procedure for Determining the Moisture Damage Susceptibility of Bituminous Pavements	Pennsylvania State University	400,000	3/26/2002	3/26/2004	Research in progress	
09-35	Critical Review of Research on Aggregate Properties and Effects on Superpave Designed Mixes	Auburn University	75,000	9/16/2002	1/15/2004	Research in progress	
09-36	Improved Procedure for Laboratory Aging of Asphalt Binders in Pavements	Advanced Asphalt Technologies, LLC	499,921	2/17/2003	8/17/2005	Research in progress	
09-37	Using Surface Energy Measurements To Select Materials for Asphalt Pavements	Texas A&M University	450,000	6/16/2003	12/15/2005	Research in progress	
09-38	Endurance Limit of Hot Mix Asphalt Mixtures to Prevent Fatigue Cracking in Flexible Pavements		750,000			In development	

### AREA TEN: MATERIALS AND CONSTRUCTION—SPECIFICATIONS, PROCEDURES, AND PRACTICES

10-01	Development of Guidelines for Practical and Realistic Construction Specifications	Miller-Warden	25,000*	11/15/1963	11/14/1964	Completed—Published as NCHRP Report 17	
10-02	Evaluation of Construction Control Procedures	Miller-Warden	59,750*	11/4/1963	2/1/1966	Completed—Published as NCHRP Report 34	
10-02A	Evaluation of Construction Control Procedures	Materials R&D	70,945*	7/15/1966	11/14/1967	Completed—Published as NCHRP Report 69	
10-03	Effects of Different Methods of Stockpiling and Handling Aggregates	Miller-Warden	55,000*	10/22/1963	10/16/1965	Completed—Published as NCHRP Report 5; Phase II published as NCHRP Report 46	
10-04	Rapid Test Methods for Field Control of Construction	Clemson University	99,320*	2/1/1964	2/28/1967	Completed—Published as NCHRP Report 103	
10-05	Density and Moisture Content Measurements by Nuclear Methods	Research Triangle Institute	88,636*	1/15/1964	10/7/1966	Completed—Published as NCHRP Report 14; Phase II published as NCHRP Report 43	
10-05A	Optimization of Nuclear Density and Moisture Content Measurement Methods	North Carolina State University	51,214*	2/1/1968	1/31/1970	Completed—Published as NCHRP Report 125	
10-06	Measurement of Pavement Thicknesses by Rapid and Nondestructive Methods	IIT Research Institute	108,821*	2/1/1964	10/31/1966	Completed—Published as NCHRP Report 52	
10-07	Potential Uses of Sonic and Ultrasonic Devices in Highway Construction	Ohio State University	24,310*	2/1/1964	3/31/1965	Completed—Published as NCHRP Report 25	
10-08	Evaluating Procedures for Determining Concrete Pavement Thickness and Reinforcement Position	Pennsylvania DOT	151,982*	3/2/1970	7/31/1973	Completed—Published as NCHRP Report 168	

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
10-09	Criteria for Need of Seal Coats for Bituminous Pavements	University of Minnesota	50,000*	11/1/1969	2/28/1974	Completed—Report not published; summarized in NCHRP Research Results Digest 48; for avail. see Summary of Progress Through 1988
10-10	Acceptance Criteria for Electroslag Weldments in Bridges	US Steel	300,000*	5/1/1974	9/30/1978	Completed—Published as NCHRP Report 201
10-11	Development of a Performance Specification for Bridge Deck Joint-Sealing Systems	Howard, Needles, et al.	29,996*	12/1/1976	4/30/1978	Completed—Published as NCHRP Report 204
10-12	Acceptance of Aggregates Used in Bituminous Paving Mixtures	Texas A&M University	174,411*	9/1/1977	6/30/1981	Completed—Report not published; for avail. see Summary of Progress Through 1988
10-13	Ultrasonic Measurement of Weld Flaw Size	Welding Institute	376,000*	7/1/1979	8/31/1985	Completed—Published as NCHRP Report 242; Phase II report not published; for avail. see Summary of Progress Through 1988
10-14	Locating Voids Beneath Pavement Using Pulsed Electromagnetic Wave Techniques	Georgia Institute of Technology	99,850*	4/2/1979	5/1/1981	Completed—Published as NCHRP Report 237
10-15	Structural Strength Evaluation of Existing Reinforced Concrete Bridges	Eng Computer Corp	225,000*	4/1/1980	4/30/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988; Phase II published as NCHRP Report 292
10-16	Assessment of Deficiencies and Preservation of Bridge Substructures Below the Waterline	Byrd, Tallamy, MacDonald & Lewis	150,000*	2/16/1981	12/1/1982	Completed—Published as NCHRP Report 251
10-17	Use of Antistripping Additives in Asphaltic Concrete Mixtures	David G. Tunnicliff	676,335*	3/1/1981	11/30/1994	Completed—Phase I report published as NCHRP Report 274; Phase II report published as NCHRP Report 373
10-18	Specifying and Obtaining Entrained Air in Concrete	Construction Technology Laboratories/PCA	73,585*	5/4/1981	6/1/1983	Completed—Published as NCHRP Report 258
10-19	Adding Dust Collector Fines to Asphalt Paving Mixtures	Pennsylvania State University	49,926*	3/1/1981	11/30/1982	Completed—Published as NCHRP Report 252
10-20	Elastomeric Bearings Design, Construction, and Materials	University of Washington	374,715*	2/1/1981	5/31/1989	Completed—Summarized in NCHRP RRD 171; publ. as NCHRP Report 248; Ph. II publ. as NCHRP Report 298; Ph. III publ. as NCHRP Report 325
10-20A	High-Load, Multi-Rotational Bridge Bearings: Design, Materials, and Construction	University of Washington	265,398	6/1/1986	12/31/1993	Completed—Published as NCHRP Report 432; supplement available for loan
10-21	Performance of Bridge Deck Concrete Subjected to Traffic-Induced Vibrations During Placement	Transportation Research Board	25,000*	2/1/1980	9/30/1981	Completed—Published as NCHRP Synthesis 86
10-22	The Performance of Weathering Steel in Bridges	Sheladia Associates	195,550*	4/1/1982	8/31/1987	Completed—Phase I published as NCHRP Report 272; Phase II published as NCHRP Report 314

TABLE I (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
10-23	Removal of Lead-Based Bridge Paints	Midwest Research Institute	81,118*	7/1/1982	6/30/1983	Completed—Published as NCHRP Report 265
10-24	Rapid Replacement of PCC Pavement Segments	ARE, Inc.	240,000*	3/15/1982	3/14/1988	Completed—Report not published; summarized in NCHRP Research Results Digest 169; for avail. see Summary of Progress Through 1988
10-25	Measurement of Cement and Water Content of Fresh Concrete	USACE Waterways Experiment Station	148,303*	10/13/1983	9/5/1986	Completed—Published as NCHRP Report 284
10-25A	Instantaneous Determination of Water-Cement Ratio in Fresh Concrete	Wiss, Janney, Elstner & Associates	272,431*	6/1/1985	2/15/1990	Completed—Summarized in NCHRP Research Results Digest 174
10-26	Data Bases for Performance-Related Specifications for Highway Construction	ARE, Inc.	60,000*	6/15/1983	9/14/1984	Completed—Report not published, for avail. see Summary of Progress Through 1988
10-26A	Performance-Related Specifications for Hot-Mix Asphaltic Concrete	Pennsylvania State University	250,000*	1/6/1986	9/30/1989	Completed—Published as NCHRP Report 332
10-27	Determination of Asphaltic Concrete Pavement Structural Properties by Nondestructive Testing	Texas A&M University	449,519*	9/17/1984	8/31/1989	Completed—Published as NCHRP Report 327
10-28	A Method to Determine Deteriorated Areas in Portland Cement Concrete Pavements	Gulf Applied Research	199,784*	11/1/1985	12/31/1987	Completed—Published as NCHRP Report 304
10-29	Anchorage Zone Reinforcement for Post-Tensioned Concrete Girders	University of Texas	489,223*	10/1/1986	9/30/1992	Completed—Published as NCHRP Report 356
10-30(01)	Nondestructive Methods for Field Inspection of Embedded or Encased High Strength Steel Rods and Cables	University of Manchester	25,000*	1/6/1986	9/29/1986	Completed—Report not published, for avail. see Summary of Progress Through 1988
10-30(02)	Nondestructive Methods for Field Inspection of Embedded or Encased High Strength Steel Rods and Cables	Southwest Research Institute	25,000*	1/20/1986	10/3/1986	Completed—Report not published, for avail. see Summary of Progress Through 1988
10-30(03)	Nondestructive Methods for Field Inspection of Embedded or Encased High Strength Steel Rods and Cables	University of Manchester	400,000*	7/1/1987	4/30/1991	Completed—Summarized in NCHRP Research Results Digest 188
10-31	Acceptance Criteria for Steel Bridge Welds	Materials Research Lab	348,350*	1/1/1986	12/31/1989	Completed—Published as NCHRP Report 335
10-32	Durability of In-Place Concrete Containing High-Range Water-Reducing Admixtures	Construction Technology Laboratories/PCA	99,811	1/6/1986	7/5/1987	Completed—Published as NCHRP Report 296
10-32A	Durability Testing of High-Strength Concrete Containing High-Range Water-Reducing Admixtures	Utah State University	249,238	9/1/1987	4/30/1993	Completed—Summarized in NCHRP Research Results Digest 208
10-33	Potential Benefits of Geosynthetics in Flexible Pavement Systems	Georgia Institute of Technology	100,000*	1/6/1986	12/15/1988	Completed—Published as NCHRP Report 315
10-34	Transient Protection, Grounding, and Shielding of Electronic Traffic Control Equipment	Georgia Institute of Technology	339,988	3/1/1986	9/30/1995	Completed—Phase I report published as NCHRP Report 317; Phase II agency report available for loan
10-35	Fatigue Behavior of Welded and Mechanical Splices in Reinforcing Steel	Wiss, Janney, Elstner & Associates	300,000*	11/1/1987	4/30/1991	Completed—Summarized in NCHRP Research Results Digest 197

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
10-36	Evaluation of Weldments Incorporating Backing Materials	Arctec Canada Ltd./Fleet Tech Ltd.	349,475	6/13/1988	9/30/1993	Completed—Agency report available on microfiche
10-37	Performance of Epoxy-Coated Reinforcing Steel in Highway Bridges	Kenneth C. Clear	350,000	5/1/1991	7/31/1994	Completed—Published as NCHRP Report 370
10-37A	Performance of Epoxy-Coated Reinforcing Steel—Laboratory Testing	Florida Atlantic University	66,121	8/1/1994	7/31/1998	Completed—Continued under Project 10-37A(01)
10-37A(01)	Extended Exposure and Monitoring of Epoxy-Coated Reinforced Concrete Test Slabs	Florida Atlantic University	30,000	8/3/1998	12/31/2000	Completed—Agency report available as NCHRP Web Document 36
10-37B	A Protocol for the Evaluation of Existing Bridges Containing Epoxy-Coated Reinforcing Steel	Richard Weyers Consulting	10,000	9/1/1994	12/31/1995	Completed—Report not published; summarized in NCHRP Research Results Digest 215
10-37C	Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement	Concorr, Inc.	354,876	1/1/1996	12/31/2001	Completed—Agency report available as NCHRP Web Document 50
10-38	Fatigue-Resistant Design of Cantilevered Signal, Sign, and Light Supports	Lehigh University	300,000	9/1/1992	5/30/1996	Completed—Published as NCHRP Report 412
10-38(02)	Fatigue-Resistant Design of Cantilevered Signal, Sign, and Light Supports	University of Minnesota	290,000	6/1/1998	1/31/2001	Completed—Published as NCHRP Report 469
10-39	Construction Testing and Inspection Levels	Bergstrahl-Shaw-Newman	140,000	9/1/1992	6/1/1994	Completed—Report available only to sponsors
10-39A	Testing and Inspection Levels for Hot-Mix Asphaltic Concrete Overlays	University of Wisconsin - Madison	259,904	2/1/1996	11/15/1998	Completed—Published as NCHRP Report 447
10-40	Plasma Arc Cutting of Bridge Steels	Edison Welding Institute	268,688	1/18/1993	7/31/1995	Completed—Published as NCHRP Report 384
10-41	Evaluation of Unbonded Portland Cement Concrete Overlays	ERES Consultants	200,000	2/1/1994	8/29/1997	Completed—Published as NCHRP Report 415
10-42	Constructability Review Process for Transportation Facilities	Texas A&M University	300,000	2/15/1994	8/14/1996	Completed—Published as NCHRP Reports 390 and 391
10-43	Moveable Bridge Inspection, Evaluation, and Maintenance	A.G. Lichtenstein & Associates	284,000	2/1/1994	6/30/1997	Completed—Adopted as an AASHTO manual
10-44	Nondestructive Testing to Determine Insitu Material Properties of Pavement Layers	Brent Rauhut Engineering	160,000	4/3/1995	6/30/1997	Completed—Phase I only
10-44A	Determination of Insitu Material Properties of Asphalt Concrete Pavement Layers	Applied Research Associates	299,990	11/1/1997	10/31/2000	Completed—Summarized in NCHRP Research Results Digest 271
10-45	Procedures for Evaluating Corrosion-Inhibiting Admixtures for Structural Concrete	CC Technologies Laboratories, Inc.	274,848	12/1/1995	3/31/1999	Completed—Agency report available as NCHRP Web Document 29
10-46	Corrosion of Steel Piling in Nonmarine Applications	CC Technologies Laboratories, Inc.	299,061	3/20/1995	5/31/1997	Completed—Published as NCHRP Report 408
10-47	Guidelines for Longitudinal Pavement Profile Measurement	University of Michigan	300,000	7/1/1996	2/28/1999	Completed—Published as NCHRP Report 434; summarized in NCHRP Research Results Digest 244
10-48	Assessing Pavement Layer Condition Using Deflection Data	North Carolina State University	360,437	2/1/1997	10/31/2000	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 254



TABLE I (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
10-49	Improved Contracting Methods for Highway Construction Projects	Texas A&M University	312,500	1/1/1997	3/31/2000	Completed—Guide published as NCHRP Report 451
10-50	Strategies for Rehabilitating Rigid Pavements Subjected to High-Traffic Volumes	Nichols Consulting Engineers	72,480	2/24/1997	6/23/1998	Completed—Phase I only; research resumed under Project 10-50A
10-50A	Guidelines for Selecting Strategies for Rehabilitating Rigid Pavements Subjected to High-Traffic Volumes	Texas A&M University	225,000	3/1/1999	2/28/2002	Completed—Agency report available as NCHRP Web Document 45; summarized in NCHRP Research Results Digest 272
10-51	Performance-Related Specifications for Elastomeric Bridge Bearings	University of Texas - Austin	324,918	7/1/1997	6/30/2000	Completed—Published as NCHRP Report 449
10-52	Performance Tests for Modular Bridge Joints	University of Minnesota	362,734	6/1/1998	3/31/2001	Completed—Published as NCHRP Report 467
10-53	Condition Evaluation of Prestressed Steel Strands in Concrete Bridges	Construction Technology Laboratories	387,035	4/1/1997	9/30/1999	Completed—Phase I only; agency report available as NCHRP Web Document 23
10-54	Quality-Based Performance Rating of Contractors for Prequalification and Bidding Purposes	Pennsylvania State University	199,829	3/1/1997	5/11/2001	Completed—Agency report available as NCHRP Web Document 38
10-55	Fiber Reinforced Polymer Composites for Concrete Bridge Deck Reinforcement	Florida Atlantic University	299,994	4/1/1999	9/30/2002	Completed—To be summarized in a NCHRP Research Results Digest
10-56	Accelerated Pavement Testing: Data Guidelines	ERES Consultants	175,000	3/7/2000	10/14/2002	Completed—To be published as NCHRP Report 512
10-57	Structural Safety Evaluation Guidelines For Suspension Bridge Parallel-Wire Cables	Weidlinger Associates	448,752	3/10/2000	12/30/2003	Research in progress
10-57A	Structural Safety Evaluation Guidelines For Suspension Bridge Parallel-Wire Cables	Consultant: Robert Easterling	25,000	10/16/2002	12/31/2003	Completed—To be published as an appendix to Project 10-57 report
10-58	Construction Engineering and Management Research Program	University of Wisconsin	200,000	3/1/2000	10/31/2001	Completed—Agency report available as NCHRP Web Document 51
10-58(01)	Evaluation of the Use of Incentives/Disincentives (ID) to Reduce Time to Complete Highway Construction Projects		70,000			In development
10-58(02)	Using Contractor-Performed Tests in Quality Assurance	Auburn University	298,802	10/24/2003	4/28/2006	Research in progress
10-58(03)	Analysis of Nighttime Construction Activities and Impacts on Safety, Quality, and Productivity		70,000			In development
10-58A	Construction Engineering and Management Research Program (Brochure)	Bergstrahl-Shaw-Newman	12,722	6/20/2002	7/31/2002	Completed—Agency report available at <a href="http://www.transportation.org/committees/construction">http://www.transportation.org/committees/construction</a>
10-59	Construction Specifications for Bonded Repair and Retrofit of Concrete Structures Using FRP Composites	University of Cincinnati	0	5/29/2001	5/28/2003	Contract transferred to North Carolina State University
10-59A	Construction Specifications for Bonded Repair and Retrofit of Concrete Structures Using FRP Composites	North Carolina State University	225,000	10/19/2001	8/30/2004	Phase II research in progress; Phase I report to be published as NCHRP Report 514

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
10-60	Avoiding Delays in the Delivery of Highway Construction Projects	Cancelled	0			Project cancelled
10-61	Best-Value Procurement Methods for Highway Construction Projects	Trauner Consulting Services	299,952	4/1/2002	4/1/2004	Research in progress
10-62	Acceptance Test for Surface Characteristics of Steel Strands Used in Pre-stressed Concrete	Wiss, Janney, Elstner & Associates	500,000	7/25/2003	7/26/2006	Research in progress
10-63	Heat-Straightening Repair of Damaged Steel Bridge Girders: Fatigue and Fracture Performance	Lehigh University	375,000	3/27/2003	3/26/2006	Research in progress
10-64	Field Inspection of In-Service FRP Bridge Decks	Construction Technology Laboratories	299,311	4/16/2003	4/15/2005	Research in progress
10-65	Nondestructive Testing Technology for Quality Control and Acceptance of Flexible Pavement Construction	ERES Consultants	699,995	8/22/2003	2/21/2006	Research in progress
10-66	Predicting In-Service Performance of Flexible Pavements from Accelerated Pavement Testing		450,000			In development
10-67	Texturing of Concrete Pavements		500,000			In development
<b>AREA ELEVEN: ADMINISTRATION—LAW</b>						
11-01	Rules of Compensability and Valuation in Highway Land Acquisition	University of Wisconsin	84,840*	1/1/1965	4/30/1967	Completed—Published as NCHRP Report 104
11-01(01)	Eliminating Enhancement or Diminution Effects on Right-of-Way Valuation	Real Estate Research	5,000*	9/2/1968	2/28/1969	Completed—Published as NCHRP Report 114
11-01(02)	Recognition of Benefits to Remainder Property in Highway Valuation	Montano & Associates	5,000*	10/1/1968	3/31/1969	Completed—Published as NCHRP Report 88
11-01(03)	Taxation Aspects of Right-of-Way Acquisition	University of Tulsa	2,250*	9/16/1968	4/30/1969	Project cancelled—No final report
11-01(04)	Compensation in the Nature of Additives to Market Value	University of Oklahoma	2,500*	12/1/1968	5/31/1969	Completed—Report not published; for avail. see Summary of Progress Through 1988
11-01(05)	Rules of Discovery and Disclosure in Highway Condemnation Proceedings	Long, Mikkelsen	2,500*	9/15/1968	4/14/1969	Completed—Published as NCHRP Report 87
11-01(06)	Valuation and Condemnation Problems of Selected Special Purpose Properties	Edward E. Level	7,500*	9/2/1968	11/28/1969	Completed—Published as NCHRP Report 92
11-01(07)	Valuation and Compensability of Noise, Pollution, and Other Environmental Factors	University of Oklahoma	2,500*	10/1/1968	3/31/1969	Completed—Report not published; for avail. see Summary of Progress Through 1988
11-01(08)	Remainder Damages Caused by Drainage, Runoff, Blasting, and Slides	Harrison Lewis	7,500*	10/15/1968	1/15/1970	Completed—Published as NCHRP Report 134
11-01(09)	Valuation and Condemnation Problems Involving Trade Fixtures	Edward L. Snitzer	5,000*	3/15/1969	12/1/1969	Completed—Published as NCHRP Report 94
11-01(10)	Compensability and Valuation Aspects of Residential Displacement in Highway Programs	Ross, Hardies, et al.	5,000*	3/15/1969	9/15/1969	Completed—Published as NCHRP Report 107

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
11-01(11)	Valuation Elements of Joint Development Projects, Including Air Rights	Real Estate Research	5,000*	2/24/1969	8/25/1969	Completed—Report not published; for avail. see Summary of Progress Through 1988
11-02	Theory and Practice in Inverse Condemnation	Reg & Urban Planning	15,000*	2/1/1965	6/30/1966	Completed—Published as NCHRP Report 72
11-03	Valuation and Legal Implications of Scenic, Conservation, and Roadside Easements	Sutte, Jr. & Associates	25,000*	11/1/1966	12/15/1967	Completed—Published as NCHRP Report 56
11-03(01)	Public Control of Roadside Advertising Signs for Highway Beautification	Sutte, Jr. & Associates	20,000*	10/1/1968	12/31/1969	Completed—Published as NCHRP Report 119
11-03(02)	Public Control of Junkyards for Highway Beautification	Real Estate Research	13,300*	9/2/1968	2/28/1970	Completed—Published as NCHRP Report 112
11-04	Elimination of Wide Divergence in Right-of-Way Valuation	Am Inst Rl Est App	24,959*	7/1/1969	2/28/1971	Completed—Published as NCHRP Report 126
11-05	Valuation of Air Space	Daniel, Mann, Johnson, Mendenhall	49,800*	10/1/1970	5/31/1972	Completed—Published as NCHRP Report 142
11-06	Valuation and Compensability of Noise Pollution	Jack Faucett Associates	94,744*	4/1/1974	7/31/1975	Completed—Report not published; for avail. see Summary of Progress Through 1988
11-07	National Data-Management System for Highway Tort Claims	Pennsylvania State University	290,495	5/1/1997	4/30/2003	Completed—Agency report available as NCHRP Web Document 57

**AREA TWELVE: DESIGN—BRIDGES**

12-01	Deformation of Steel Beams Related to Permitted Highway Bridge Overloads	University of Missouri	50,000*	2/1/1965	6/30/1967	Completed—Report included in Project 12-06 report
12-02	Distribution of Wheel Loads on Highway Bridges	Iowa State University	79,512*	6/1/1966	12/31/1968	Completed—Published as NCHRP Report 83
12-03	Development of Waterproof Roadway Joints for Bridges	Southwest Research Institute	149,895*	12/15/1965	3/14/1969	Completed—Report available only to sponsors; summarized in NCHRP Research Results Digest 14
12-04	Thermal Characteristics of Highway Bridges	Southwest Research Institute	102,400*	12/15/1965	3/31/1968	Completed—Report not published; for avail. see Summary of Progress Through 1988
12-05	Protection of Steel in Prestressed Concrete Bridges	University of Denver	173,255*	9/15/1966	11/15/1968	Completed—Published as NCHRP Report 90
12-06	Prediction of Permanent Camber of Bridges	University of Missouri	82,253*	2/1/1967	4/30/1972	Completed—Report not published; for avail. see Summary of Progress Through 1988
12-07	Effects of Weldments on Fatigue Strength of Steel Beams	Lehigh University	399,023*	10/1/1966	12/31/1972	Completed—Published as NCHRP Report 102; Phase II published as NCHRP Report 147
12-08	Bridge Rail Service Requirements as a Basis for Design Criteria	Texas A&M University	98,546*	3/1/1968	6/30/1971	Completed—Published as NCHRP Report 86; Phase II published as NCHRP Report 149

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
12-09	Elastomeric Bearing Research	Battelle Memorial Institute	84,800*	9/1/1967	1/31/1970	Completed—Published as NCHRP Report 109
12-10	Analysis and Design of Bridge Bents	Portland Cement Association	297,900*	1/1/1970	12/31/1973	Completed—Published as NCHRP Report 163
12-11	Waterproof Membranes for Protection of Concrete Bridge Decks	Materials R&D	303,004*	8/1/1970	9/30/1978	Completed—Published as NCHRP Report 165; Phase II report not published; for avail. see Summary of Progress Through 1988
12-12	Welded Steel Bridge Members Under Variable-Cycle Fatigue Loadings	US Steel	310,000*	10/1/1970	10/31/1975	Completed—Published as NCHRP Report 188
12-13	Cathodic Protection for Reinforced Concrete Bridge Decks	USS Engineering & Consulting	174,601*	10/1/1972	7/31/1974	Completed—Published as NCHRP Report 180
12-13A	Field Evaluation of Galvanic Cathodic Protection for Reinforced Concrete Bridge Decks	Portland Cement Association	74,405*	8/1/1975	5/15/1981	Completed—Published as NCHRP Report 234
12-14	Subcritical Crack Growth in Steel Bridge Members	US Steel	99,923*	10/1/1972	6/30/1974	Completed—Published as NCHRP Report 181
12-15	Detection and Repair of Fatigue Cracking in Highway Bridges	Lehigh University	100,000*	10/1/1972	4/30/1975	Completed—Published as NCHRP Report 206
12-15(02)	Retrofitting Procedures for Fatigue-Damaged Full-Scale Welded Bridge Beams	Lehigh University	150,000*	6/1/1976	11/30/1978	Completed—Published as NCHRP Report 206
12-15(03)	Fatigue Behavior of Full-Scale Welded Bridge Attachments	Lehigh University	125,000*	2/1/1978	7/31/1980	Completed—Published as NCHRP Report 227
12-15(04)	Steel Bridge Members Under Variable-Amplitude, Long-Life Fatigue Loading	Lehigh University	150,000*	4/1/1980	9/30/1983	Completed—Published as NCHRP Report 267
12-15(05)	Fatigue Behavior of Variable-Loaded Bridge Details Near the Fatigue Limit	Lehigh University	399,999*	9/1/1983	12/31/1990	Completed—Interim report published as NCHRP Report 286; final report published as NCHRP Report 354
12-16	Influence of Bridge Deck Repairs on Corrosion of Reinforcing Steel	Battelle Columbus	214,912*	9/1/1974	11/30/1977	Completed—Report not published; summarized in NCHRP Research Results Digest 85; for avail. see Summary of Progress Through 1988
12-17	Evaluation of Repair Techniques for Damaged Steel Bridge Members	Battelle Columbus	49,974*	11/15/1976	4/30/1978	Completed—Report not published; for avail. see Summary of Progress Through 1988
12-17A	Guidelines for Evaluation and Repair of Damaged Steel Bridge Members	Shanafelt/Horn	99,950*	10/1/1981	5/31/1984	Completed—Published as NCHRP Report 271
12-18	Development of an Integrated Bridge Design System	Multiplications, Inc.	224,985*	9/6/1977	12/31/1982	Completed—Report not published; for avail. see Summary of Progress Through 1988
12-18A	Assessment of an Integrated Bridge Design System	Eng Computer Corp	15,000*	2/1/1984	1/3/1986	Completed—Report available only to sponsors
12-19	Cathodic Protection of Concrete Bridge Structures	Corrosion Engineering & Research	250,000*	1/1/1978	12/31/1980	Completed—Report not published; for avail. see Summary of Progress Through 1988
12-19A	Concrete Sealers for Protection of Bridge Structures	Wiss, Janney, Elstner & Associates	99,190*	8/1/1979	12/1/1981	Completed—Published as NCHRP Report 244

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
12-19B	Cathodic Protection of Concrete Bridge Structures	Wiss, Janney, Elstner & Associates	138,900*	11/1/1982	4/30/1985	Completed—Published as NCHRP Report 278
12-20	Bridges on Secondary Highways and Local Roads: Rehabilitation and Replacement	University of Virginia	169,878*	3/1/1978	11/30/1981	Completed—Published as NCHRP Report 222; Phase II published as NCHRP Report 243
12-21	Evaluation of Damage and Methods of Repair for Prestressed Concrete Bridge Members	G. O. Shanafelt	188,454*	4/15/1979	7/8/1985	Completed—Published as NCHRP Report 226; Phase II published as NCHRP Report 280
12-22	Thermal Effects in Concrete Bridge Superstructures	Eng Computer Corp	100,000*	10/1/1981	1/31/1984	Completed—Published as NCHRP Report 276
12-23	Recommended Revisions to the AASHTO Manual for Maintenance Inspection of Bridges	A.G. Lichtenstein & Associates	233,800*	1/3/1989	8/3/1992	Completed—Report distributed to sponsors
12-24	Design of Multi-Beam Precast Bridge Superstructures	University of Washington	149,879*	8/1/1983	5/31/1986	Completed—Published as NCHRP Report 287
12-25	Fatigue and Fracture Evaluation for Rating Riveted Steel Bridges	Lehigh University	199,957*	9/1/1984	9/30/1987	Completed—Published as NCHRP Report 302
12-26	Distribution of Wheel Loads on Highway Bridges	Imbsen & Associates	500,000*	4/15/1985	10/31/1990	Completed—Phase I and II summarized in NCHRP Research Results Digest 187
12-26(02)	Distribution of Wheel Loads on Highway Bridges	Imbsen & Associates	100,000	9/28/1992	12/31/1993	Completed—Agency report available on microfiche
12-27	Welded Repair of Cracks in Steel Bridge Members	Welding Institute	374,575*	10/15/1984	2/28/1989	Completed—Published as NCHRP Report 321
12-28(01)	Load Capacity Evaluation of Existing Bridges	Case Western Reserve University	302,000*	9/1/1985	8/31/1989	Completed—Published as NCHRP Report 301
12-28(02)	Bridge Management Systems	ARE, Inc.	495,000*	6/24/1985	4/30/1990	Completed—Published as NCHRP Report 300; Phase II has no final report
12-28(02)A	Bridge Management Systems Software	National Engineering Technology Corporation	585,000	1/10/1992	12/31/1994	Completed—No report
12-28(02)B	Bridge Management Systems Software	National Engineering Technology Corporation	140,000	8/14/1995	12/31/1996	Completed—No report; software and documentation available
12-28(02)C	Conversion of BRIDGIT Bridge Management Software to Windows	National Engineering Technology Corporation	54,456	1/1/1998	6/30/1998	Completed—No report; software distributed
12-28(03)	Fatigue Evaluation Procedures for Steel Bridges	Case Western Reserve University	200,000*	7/1/1985	9/30/1987	Completed—Published as NCHRP Report 299
12-28(04)	Methods of Strengthening Existing Highway Bridges	Iowa State University	164,985*	7/1/1985	7/31/1987	Completed—Published as NCHRP Report 293
12-28(05)	Standard Methodology for Conducting Condition Surveys of Concrete Bridge Components	New Mexico State University	98,338*	8/1/1985	8/31/1987	Completed—Published as NCHRP Report 312
12-28(06)	Distortion-Induced Fatigue Cracking in Steel Bridges	Lehigh University	250,000*	10/1/1985	11/30/1989	Completed—Published as NCHRP Report 336
12-28(07)	Guidelines for Evaluating Corrosion Effects in Existing Steel Bridges	Modjeski & Masters	298,644*	5/5/1986	11/30/1989	Completed—Published as NCHRP Report 333
12-28(08)	Improving Bridge Load Capacity Estimates by Correlation with Test Data	University of Tennessee	191,024*	2/1/1986	2/19/1988	Completed—Published as NCHRP Report 306
12-28(09)	Methods of Flaw Detection in Concrete Bridge Components	Combined	0			Combined with Project 10-30(03)

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
12-28(10)	Guidelines for Determining Redundancy in Steel Bridges	Lehigh University	299,995*	3/1/1986	5/31/1989	Completed—Published as NCHRP Report 319
12-28(11)	Development of Site-Specific Load Models for Bridge Rating	Imbsen & Associates	200,000*	2/9/1987	3/30/1990	Completed—Report not published
12-28(12)	Inelastic Rating Procedures for Steel Beam and Girder Bridges	University of Minnesota	241,031*	9/1/1987	5/30/1990	Completed—Published as NCHRP Report 352
12-28(13)	Nondestructive Load Testing for Bridge Evaluation and Rating	Raths Raths & Johnson	150,000*	10/4/1987	9/30/1989	Completed—Report not published
12-28(13)A	Bridge Rating Through Nondestructive Load Testing	A.G. Lichtenstein & Associates	227,200*	12/17/1990	2/28/1994	Completed—Summarized in NCHRP Research Results Digest 234
12-29	Design of Simple-Span Precast Prestressed Bridge Girders Made Continuous	Construction Technology Laboratories/PCA	241,993*	8/26/1985	5/31/1988	Completed—Published as NCHRP Report 322
12-30	Fatigue of Cables in Cable-Stayed Bridges	Acer Freeman Fox Ltd.	124,975	1/13/1986	2/12/1989	Completed—Report not published
12-31	Notch Toughness Variability in Bridge Steel Plates	University of Texas	385,000*	9/1/1987	9/1/1992	Completed—Published as NCHRP Report 355
12-32	Evaluation of Bridge Deck Protective Strategies	University of Washington	92,515*	4/1/1986	5/15/1987	Completed—Published as NCHRP Report 297
12-33	Development of a Comprehensive Bridge Specification and Commentary	Modjeski & Masters	1,404,167	7/1/1988	12/31/1995	Completed—Specifications published by AASHTO; summarized in NCHRP Research Results Digest 198; report published as NCHRP Report 368
12-33A	Development of a Comprehensive Bridge Specification and Commentary—Timber Structures and Code Calibration	Sensei Engineers	60,000	9/19/1988	12/31/1991	Completed—No report; See Project 12-33
12-33B	Development of a Comprehensive Bridge Specification and Commentary—Concrete Structures	Imbsen & Associates	125,500*	9/19/1988	3/31/1992	Completed—No report; See Project 12-33
12-33C	Development of a Comprehensive Bridge Specification and Commentary—Soil-Structure Interaction Systems	D'Appolonia	83,832*	7/24/1989	3/31/1992	Completed—No report; See Project 12-33
12-34	Update of AASHTO Standard Specifications for Highway Bridges: Division II—Construction	Imbsen & Associates	200,000*	10/19/1987	10/18/1989	Completed—Report provided to AASHTO
12-35	Recommended Specifications for the Design of Foundations, Retaining Walls, and Substructures	D'Appolonia	99,588*	1/4/1988	7/3/1989	Completed—Report provided to AASHTO
12-36	Redundancy in Highway Bridge Superstructures	City College of New York	200,000	4/8/1991	11/16/1993	Completed—See Project 12-36(02)
12-36(02)	Redundancy in Highway Bridge Superstructures: Phase II	City College of New York	250,000	9/1/1994	5/31/1997	Completed—Published as NCHRP Report 406
12-37	Transverse Cracking in Newly Constructed Bridge Decks	Wiss, Janney, Elstner & Associates	350,000	1/27/1992	3/31/1995	Completed—Published as NCHRP Report 380
12-38	Improved Design Specifications for Horizontally Curved Steel Girder Highway Bridges	Auburn University	378,103	1/1/1993	6/30/1999	Completed—Published as NCHRP Report 424; specification adopted by AASHTO and Appendices D-F published by AASHTO as GHC-4

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
12-39	Design Specifications for Debris Forces on Highway Bridges	University of Louisville	474,735	3/1/1993	4/30/2000	Completed—Published as NCHRP Report 445; Task 7 report published as NCHRP Report 417
12-40	Fatigue Criteria for Modular Bridge Expansion Joints	Lehigh University	335,000	1/18/1994	4/30/1997	Completed—Published as NCHRP Report 402
12-41	Rapid Replacement of Bridge Decks	University of Nebraska - Lincoln	499,921	1/1/1994	8/31/1997	Completed—Published as NCHRP Report 407
12-42	LRFD Bridge Design Specifications Support	Modjeski & Masters	922,630	2/1/1995	6/30/2003	Completed—Publication decision pending
12-43	Life-Cycle Cost Analysis for Bridges	National Engineering Technology Corporation	439,691	5/28/1996	3/30/2002	Completed—Published as NCHRP Report 483
12-44	Recommended Specifications for the Design of Movable Highway Bridges	Modjeski & Masters	374,325	7/26/1996	9/30/1999	Completed—Specifications published by AASHTO
12-45	Recommended Specifications for Large-Span Culverts	Simpson Gumpertz & Heger, Inc.	475,000	4/26/1996	11/30/2001	Completed—Published as NCHRP Report 473
12-46	Manual for Condition Evaluation and Load Rating of Highway Bridges Using Load and Resistance Factor Philosophy	A.G. Lichtenstein & Associates	389,187	3/1/1997	9/30/2000	Completed—Report on calibration published as NCHRP Report 454; agency report available as NCHRP Web Document 28
12-47	Redundancy in Highway Bridge Substructures	Imbsen & Associates	250,000	1/1/1998	8/31/2000	Completed—Published as NCHRP Report 458
12-48	Design of Highway Bridges for Extreme Events	City College of New York	350,000	7/15/1998	9/30/2002	Completed—Published as NCHRP Report 489
12-49	Comprehensive Specification for the Seismic Design of Bridges	ATC/MCEER Joint Venture	850,000	8/1/1998	11/30/2001	Completed—Specifications under review by AASHTO; published as NCHRP Report 472
12-50	Bridge Software Validation Guidelines and Examples	Michael Baker, Jr., Inc.	499,948	5/13/1998	6/30/2002	Completed—Published as NCHRP Report 485
12-51	Effect of Truck Weight on Bridge Network Costs	Wayne State University	399,998	12/1/2000	12/31/2002	Completed—Published as NCHRP Report 495
12-52	LRFD Specifications for Horizontally Curved Steel Girder Highway Bridges	Modjeski & Masters	700,000	9/1/1999	9/30/2004	Research in progress
12-53	Connection Between Simple-Span Precast Concrete Girders Made Continuous	University of Cincinnati	300,000	5/1/1999	8/31/2003	Completed—Publication decision pending
12-54	Integral Connections of Modern Steel Bridge Structures	Modjeski & Masters	499,961	7/1/1999	11/30/2003	Research in progress
12-55	Load and Resistance Factors for Earth Pressures on Bridge Substructures and Retaining Walls	D'Appolonia	250,000	4/17/2001	12/31/2003	Research in progress
12-56	Application of the LRFD Bridge Design Specifications to High-Strength Structural Concrete: Shear Provisions	University of Illinois	650,000	7/26/2001	7/25/2004	Research in progress
12-57	Extending Span Ranges of Precast, Prestressed Concrete Girders	Ralph Whitehead Associates, Inc.	240,000	4/30/2001	9/30/2003	Completed—To be published as NCHRP Report 517
12-58	Effective Slab Width for Composite Steel Bridge Members	State University of New York	359,999	7/6/2001	12/31/2003	Research in progress

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
12-59	Design and Construction of Segmental Geosynthetic-Reinforced Soil (GRS) Bridge Abutments for Bridge Support	University of Colorado - Denver	299,998	8/1/2001	6/30/2004	Research in progress
12-60	Transfer and Development Length of Prestressing Strand and Development and Splice Length of Reinforcement in High-Strength Concrete	Purdue University	600,000	4/16/2002	4/15/2005	Research in progress
12-61	Simplified Shear Design of Structural Concrete Members	University of Illinois	250,000	1/7/2003	7/6/2004	Research in progress
12-62	Simplified Live Load Distribution-Factor Equations	BridgeTech, Inc.	249,958	4/8/2003	10/7/2004	Research in progress
12-63	Legal Truck Loads and AASHTO Legal Loads for Posting	Lichtenstein Consulting Engineers, Inc.	500,000	7/1/2003	12/31/2004	Research in progress
12-64	Application of the LRFD Bridge Design Specifications to High-Strength Structural Concrete: Flexure and Compression Provisions	North Carolina State University	600,000	8/15/2003	8/14/2006	Research in progress
12-65	Full-Depth, Precast-Concrete Bridge Deck Panel Systems	George Washington University	399,989	7/7/2003	1/6/2006	Research in progress
12-66	AASHTO LRFD Specifications for Serviceability in the Design of Bridge Foundations		500,000			In development
12-67	Multiple-Objective Optimization for Bridge Management Systems		350,000			In development
12-68	Improved Rotational Limits of Elastomeric Bearings		350,000			In development
12-69	Design and Construction Guidelines for Long-Span Decked Precast, Prestressed Concrete Girder Bridges		500,000			In development
12-70	Seismic Analysis of Retaining Walls, Buried Structures and Embankments		500,000			In development
<b>AREA THIRTEEN: MAINTENANCE—EQUIPMENT</b>						
13-01	Equipment Rental Rates	Ernst & Ernst	22,800*	2/1/1965	1/31/1966	Completed—Published as NCHRP Report 26
13-02	Guidelines for Selection and Application of Warning Lights on Roadway-Operations Equipment		300,000			In development
<b>AREA FOURTEEN: MAINTENANCE—MAINTENANCE OF WAY AND STRUCTURES</b>						
14-01	Upgrading of Unit Maintenance Cost Index and Development of Interstate Maintenance Requirements	Tallamy Associates	205,128*	3/1/1965	3/31/1967	Completed—Published as NCHRP Report 42
14-02	Techniques for Reducing Roadway Occupancy During Routine Maintenance Activities	Byrd, Tallamy, MacDonald & Lewis	200,000*	10/1/1970	3/31/1973	Completed—Published as NCHRP Report 161
14-03	Improved Pavement-Shoulder Joint Design	Georgia Institute of Technology	100,838*	9/11/1972	3/15/1976	Completed—Published as NCHRP Report 202
14-04	Reconditioning Heavy-Duty Freeways in Urban Areas	Texas A&M University	99,665*	4/15/1974	3/24/1976	Completed—Published as NCHRP Report 196
14-05	Maintenance Levels-of-Service Guidelines	Woodward-Clyde	204,200*	1/1/1978	4/30/1980	Completed—Published as NCHRP Report 223



TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
14-05(02)	Maintenance Levels-of-Service Guidelines	Woodward-Clyde	107,950*	9/15/1981	8/31/1984	Completed—Published as NCHRP Report 273
14-06	Evaluating Deferred Maintenance Strategies	ARE, Inc.	325,000*	6/1/1982	12/31/1985	Completed—Published as NCHRP Report 285
14-07	Interactive Microcomputer Network for Innovative Maintenance Operations	Woodward-Clyde	82,819*	9/1/1987	6/30/1991	Completed—Report not published
14-08	Chip Seal Coats for High-Traffic-Volume Asphalt Concrete Pavements	Intermountain Research Foundation	80,078	7/6/1987	10/5/1990	Contract cancelled—Summary to be included in 14-08A report
14-08A	Chip Seal Coats for High-Traffic-Volume Asphalt Concrete Pavements	Asphalt Institute	159,922	1/1/1991	12/31/1992	Completed—Agency report available for loan
14-09	Workshop on Research Needs in the Management of Highway Maintenance	Transportation Research Board	42,000*	6/12/1988	6/15/1988	Completed—Problem statements developed
14-09(01)	Effective Maintenance Budget Strategies	Urban Institute	300,000	11/15/1989	4/30/1994	Completed—Published as NCHRP Report 366
14-09(02)	Incorporation of Maintenance Considerations in Highway Design	Daniel, Mann, Johnson, Mendenhall	168,122*	1/15/1990	2/27/1992	Completed—Published as NCHRP Report 349
14-09(03)	Maintenance Contracting	Bergstrahl-Shaw-Newman	150,000*	3/12/1990	9/11/1991	Completed—Published as NCHRP Report 344
14-09(04)	Role of Highway Maintenance in Integrated Management Systems	Cambridge Systematics	225,000	4/15/1991	7/15/1993	Completed—Published as NCHRP Report 363
14-09(05)	Impacts of Environmental, Health, and Safety Regulations on Highway Maintenance	Auburn University	150,000	5/1/1991	5/31/1993	Completed—Agency report available on microfiche
14-09(06)	Professional Development of Maintenance Engineers and Managers	University of Maryland	174,998	2/1/1991	1/31/1993	Completed—Published as NCHRP Report 360
14-10	Improvements in Data Acquisition Technology for Maintenance Management Systems	Urban Institute	300,000*	5/29/1989	3/31/1993	Completed—Published as NCHRP Report 334; Phase II published as NCHRP Report 361
14-11	Effective Motivation of Highway Maintenance Personnel	Pennsylvania State University	200,000	6/1/1989	11/30/1992	Completed—Report, training manual, and instructor's guide available for loan
14-11(02)	Enhancement to Program for Effective Motivation of Highway Maintenance Personnel	University of Maryland	165,000	5/1/1998	11/15/2000	Completed—Summarized in NCHRP Research Results Digest 257; available on CRP-CD-12
14-12	Highway Maintenance Quality Assurance	ERES Consultants	325,241	3/1/1995	7/31/1998	Completed—Manual published as NCHRP Report 422; agency report available as NCHRP Web Document 8
14-13	Customer-Driven Benchmarking for Highway Maintenance Activities	Booz-Allen & Hamilton	299,819	5/7/1999	3/31/2003	Completed
14-14	Guide for Optimal Timing of Pavement Preventive Maintenance Treatment Applications	Applied Pavement Technologies	312,397	4/10/2000	9/30/2003	Completed—Agency report available for loan
<b>AREA FIFTEEN: DESIGN—GENERAL DESIGN</b>						
15-01	Guardrail Design	Cornell Aero Lab	19,723*	12/15/1965	6/14/1966	Completed—Published as NCHRP Report 36

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
15-01(02)	Guardrail Performance and Design	Southwest Research Institute	380,000*	7/1/1967	12/31/1971	Completed—Published as NCHRP Reports 54 and 115; Phase II published as NCHRP Reports 118 and 129
15-02	Design to Control Erosion in Roadside Drainage Channels	University of Minnesota	97,300*	7/1/1966	6/30/1974	Completed—Phase I report published as NCHRP Report 108; Phase II report not published; for avail. see Summary of Progress Through 1988
15-03	Rational Structural Analysis and Design of Pipe Culverts	Northwestern University	49,937*	10/1/1967	12/31/1968	Completed—Published as NCHRP Report 116
15-04	Estimating Runoff Rates from Small Rural Watersheds	Travelers Research Center	299,902*	9/1/1967	3/16/1970	Completed—Published as NCHRP Report 136
15-05	Dynamic Characteristics of Heavy Highway Vehicles	General Motors Corporation	135,000*	8/15/1967	1/10/1969	Completed—Published as NCHRP Report 105
15-06	Development of Criteria for Safer Luminaire Supports	Texas A&M University	147,254*	9/1/1967	8/31/1968	Completed—Published as NCHRP Report 77
15-07	Flow Modifications by Storage Loss Through Flood Plain Encroachment	Dames & Moore	99,730*	5/1/1980	1/31/1982	Completed—Report not published; for avail. see Summary of Progress Through 1988
15-08	Parameters Affecting Stopping Sight Distance and Vehicle Acceleration/Deceleration Characteristics	University of Michigan	274,482*	5/1/1982	5/31/1984	Completed—Published as NCHRP Report 270
15-09	Encasement of Pipelines Through Highway Roadbeds	Byrd, Tallamy, MacDonald & Lewis	30,000*	10/1/1986	6/30/1988	Completed—Published as NCHRP Report 309
15-10	Development of a Design/Graphics Interface System	C. W. Beilfuss & Assoc	500,000*	8/1/1985	11/30/1988	Completed—Published as NCHRP Report 326
15-11	Computer-Aided Analysis of Highway Encroachments on Mobile Boundary Streams	Simons & Associates	246,945*	7/1/1987	3/31/1990	Completed—Report distributed to sponsors; research continued under Project 15-11A
15-11A	BRI-STARS Maintenance Support and Enhancement	Hydrau Tech	99,827	6/1/1991	11/30/1993	Completed—Summarized in NCHRP Research Results Digest 201
15-12	Roadway Widths for Low Traffic Volume Roads	CH2M Hill	250,000	5/1/1989	10/31/1995	Completed—Published as NCHRP Report 362
15-13	Long-Term Performance of Geosynthetics in Drainage Applications	Drexel University	455,240	4/1/1990	3/31/1993	Completed—Published as NCHRP Report 367
15-14(01)	Intersection Sight Distance	Midwest Research Institute	350,000	6/1/1992	8/31/1996	Completed—Published as NCHRP Report 383
15-14(02)	Median Intersection Design	Midwest Research Institute	350,000	6/1/1992	5/15/1995	Completed—Published as NCHRP Report 375
15-15	Collection and Presentation of Roadway Inventory Data	MCNC	400,000	2/15/1996	5/31/1999	Completed—Published as NCHRP Report 437
15-16	Superelevation Distribution Methods and Transition Designs	University of Nebraska	45,549	2/1/1997	7/31/1997	Research continued under Project 15-16A
15-16A	Superelevation Distribution Methods and Transition Designs	Texas A&M University	154,451Ret	8/1/1997	8/30/1999	Completed—Published as NCHRP Report 439
15-17	Geometric Design Consistency on Higher-Speed, Non-Urban, Two-Lane Roads	Texas A&M University	300,000	6/1/1998	3/31/2003	Completed—Published as NCHRP Report 502

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
15-18	Design Speed and Operating Speed	Texas A&M University	386,826	12/1/1998	7/15/2002	Completed—Published as NCHRP Report 504 and CRP-CD-38
15-19	Application of Context-Sensitive Design Principles	CH2M Hill	125,000Ret	1/7/2000	8/31/2002	Completed—Published as NCHRP Report 480
15-20	Planning, Design, and Operation of Pedestrian Facilities	T.Y. Lin Inter. BASCOR, Inc.	224,089Ret	5/11/1999	2/10/2001	Completed—Results provided to AASHTO
15-21	Review of Truck Characteristics as Factors in Roadway Design	Midwest Research Institute	250,000	12/13/2000	7/31/2003	Completed—To be published as NCHRP Report 505
15-22	Safety Consequences of Flexibility in Highway Design	University of Kentucky	499,407	9/11/2001	11/30/2004	Research in progress
15-23	Recommended Unit Conversions and Updates of the AASHTO Model Drainage Manual (MDM) and Highway Drainage Guidelines (HDG)	Roy Jorgensen Associates, Inc.	278,494	6/11/2001	7/31/2003	Completed—Final report delivered to AASHTO for vie in updating the MDM and HDG
15-24	Hydraulic Loss Coefficients for Culverts	Utah State University	325,000	6/20/2003	12/19/2005	Research in progress
15-25	Alternatives to Design Speed for Selection of Roadway Design Criteria		500,000			In development
15-26	Evaluation of and/or Development of Passing Sight Distance Design Criteria		300,000			In development
15-27	Evaluation of the Impacts of Design Element Trade-Offs in the Design Exception Process		450,000			In development
<b>AREA SIXTEEN: DESIGN—ROADSIDE DEVELOPMENT</b>						
16-01	Effects of Deicing Compounds on Vegetation and Water Supplies	Virginia Polytechnic Institute	217,300*	3/1/1966	4/30/1972	Completed—Published as NCHRP Reports 91 and 170
16-02	Evaluation of Research on Roadside Development	Western States	100,000*	10/1/1967	3/31/1969	Completed—Published as NCHRP Report 137
16-03	Erosion Control During Highway Construction	Utah State University	250,000*	11/1/1973	11/30/1979	Completed—Published as NCHRP Reports 220 and 221
16-04	Design Guidelines for Safe and Aesthetic Roadside Treatments in Urban Areas	Georgia Tech Research Corporation	350,000	10/24/2003	10/23/2005	Research in progress
<b>AREA SEVENTEEN: TRAFFIC—SAFETY</b>						
17-01	Development of Improved Methods for Reduction of Traffic Accidents	Cornell Aero Lab	247,847*	2/1/1966	5/31/1968	Completed—Published as NCHRP Report 79
17-02	Methods for Evaluating Highway Safety Improvements	ORI	29,973*	1/10/1972	6/20/1972	Contract cancelled—No report; research resumed under Project 17-02A
17-02A	Methods for Evaluating Highway Safety Improvements	Jorgensen & Associates	98,403*	2/1/1973	7/31/1974	Completed—Published as NCHRP Report 162
17-03	Application of Traffic Conflicts Analysis at Intersections	Midwest Research Institute	190,000*	12/15/1977	10/31/1979	Completed—Published as NCHRP Report 219
17-04	Evaluation of Traffic Controls for Street and Highway Work Zones	BioTechnology	200,000*	1/2/1978	6/30/1979	Completed—Report included in NCHRP Report 236
17-04(02)	Evaluation of Traffic Cones and Tubes for Street and Highway Work Zones	BioTechnology	125,000*	4/23/1980	9/30/1981	Completed—Published as NCHRP Report 236

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
17-05	Effectiveness of Clear Recovery Zones	Midwest Research Institute	200,000*	4/1/1980	4/30/1982	Completed—Published as NCHRP Report 247
17-06	Service Vehicle Lighting and Traffic Control Systems for Short-Term and Moving Work Zones—Phase I	BioTechnology	85,069*	11/1/1982	7/24/1984	Completed—Research continued under Project 17-06A
17-06A	Service Vehicle Lighting and Traffic Control Systems for Short-Term and Moving Work Zones—Phase II	Transportation Research Corporation	252,277*	1/2/1990	2/28/1990	Completed—Published as NCHRP Report 337
17-07	Guidelines for Converting STOP to YIELD Control at Intersections	Bellomo-McGee, Inc.	200,000*	12/16/1988	5/15/1989	Completed—Published as NCHRP Report 320
17-08	Traffic Barrier and Control Treatments for Restricted Work Zones	Texas A&M University	500,000	6/1/1988	6/30/1993	Completed—Published as NCHRP Report 358
17-09	Effect of Highway Standards on Safety	Bellomo-McGee, Inc.	200,000	2/15/1992	12/31/1994	Completed—Published as NCHRP Report 374
17-09(02)	Impacts of Resurfacing Projects With and Without Additional Safety Improvements	Bellomo-McGee, Inc.	300,000	10/1/1995	2/28/2000	Completed—Summarized in NCHRP Research Results Digest 255
17-10	Structural Supports for Highway Signs, Luminaires, and Traffic Signals	University of Alabama - Birmingham	299,970	2/1/1994	12/1/1997	Completed—Published as NCHRP Report 411; specifications adopted by AASHTO
17-10(02)	Structural Supports for Highway Signs, Luminaires, and Traffic Signals	University of Alabama - Birmingham	369,992	3/10/1999	5/31/2002	Completed—Published as NCHRP Report 494
17-11	Determination of Safe/Cost Effective Roadside Slopes and Associated Clear Distances	Texas A&M University	500,000	3/1/1995	1/31/2004	Research in progress
17-12	Improved Safety Information to Support Highway Design	Northwestern University	199,982	1/30/1995	12/31/1997	Completed—Published as NCHRP Report 430; summarized in NCHRP Research Results Digest 239
17-13	Strategic Plan for Improving Roadside Safety	Transportation Research Board	200,000	4/1/1995	6/30/2000	Completed—Summarized in NCHRP Research Results Digests 220 and 256; agency report available as NCHRP Web Document 33
17-13A	Barrier Runout Length Assessment	Consultant: Richard G. McGinnis/Bucknell Univ.	15,500	5/1/2002	12/31/2003	Research in progress
17-14	Improved Guidelines for Median Safety	Bellomo-McGee, Inc.	565,000Ret	3/1/1997	9/30/2000	Research continued under Project 17-14(02)
17-14(02)	Improved Guidelines for Median Safety	Bellomo-McGee, Inc.	148,500	12/19/2002	6/18/2004	Research in progress
17-15	Accident Mitigation on Congested Rural and Exurban Two- and Three-Lane Highways	Texas A&M University	250,000Ret	4/1/1997	11/30/1999	Completed—Published as NCHRP Report 440
17-16	Accident Warrant for Traffic Signals	Bellomo-McGee, Inc.	385,000	3/1/1997	1/31/2003	Completed—Published as NCHRP Report 491; results being considered for inclusion in the MUTCD
17-17	Development of Guidelines for Nighttime Road Work to Improve Safety and Operations	Last Resource	249,929	1/15/1997	9/30/2000	Completed—Report not published; to be included in Project 17-17(02)

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
17-17(02)	Development of Guidelines for Nighttime Road Work to Improve Safety and Operations	Last Resource	221,989	10/1/2000	3/31/2004	Research in progress; some findings published as NCHRP Reports 475 and 476
17-18	AASHTO Strategic Highway Safety Plan Implementation Support	Northwestern University	49,989	9/15/1998	8/14/1999	Completed—Report not published; information included in Project 17-18(02) write-up on CRP website
17-18(02)	Implementation of the AASHTO Strategic Highway Safety Plan - Website	Texas A&M University	30,992	11/1/2000	5/1/2002	Completed—Website transferred to AASHTO
17-18(03)	Guidance for Implementation of the AASHTO Strategic Highway Safety Plan	CH2M Hill	3,352,724	3/22/2000	5/1/2005	Research in progress
17-18(04)	Highway Safety Manual	Bellomo-McGee, Inc.	200,000	1/4/2001	10/31/2003	Completed—Publication decision pending
17-18(05)	Integrated Management Process to Reduce Highway Injuries and Fatalities Statewide	iTRANS Consulting, Ltd.	268,445	8/28/2001	3/31/2003	Completed—Published as NCHRP Report 501
17-18(05)A	Integrated Safety Management Process—Iowa Technical Support	iTRANS Consulting, Inc.	30,300	5/27/2003	9/26/2003	Completed—Publication decision pending
17-18(05)B	Integrated Safety Management Process—Technical Support	iTRANS Consulting, Inc.	149,983	9/12/2003	9/11/2004	Research in progress
17-18(06)	AASHTO Strategic Highway Safety Plan Case Studies	Transportation Safety Management Systems	25,000	2/1/2001	6/30/2001	Completed—Summarized in NCHRP Research Results Digest 265
17-18(07)	AASHTO Strategic Highway Safety Plan - Technology Transfer Plan	Roy Jorgensen Associates, Inc.	150,000	7/3/2001	12/30/2002	Completed—Report not published
17-18(08)	Comprehensive Human Factors Guidelines for Road Systems	Westat, Inc.	200,000	9/28/2001	3/30/2004	Research in progress
17-18(09)	Coordinated Safety Research Approach	Transportation Research Corp.	49,969	10/23/2001	2/28/2003	Completed—Report not published
17-18(09)A	Coordinated Safety Research Approach	TRB Division A	200,000	5/1/2003	4/30/2005	Research in progress
17-18(09)B	Coordinated Safety Research Approach	TRB Division A	75,000	5/1/2003	4/30/2004	Research in progress
17-18(09)C	Coordinated Safety Research Approach	TRB Division A	50,000	5/1/2003	4/30/2004	Research in progress
17-18(10)	Safe Landscaping Awareness Course/Landscape Architect Training	University of North Carolina - Chapel Hill	38,000	3/21/2003	3/20/2004	Research in progress
17-18(11)	Marketing Plan and Products	Van Ryan Banks, Inc.	100,000	4/15/2003	1/14/2004	Research in progress
17-18(11)A	Publication of Documents	Synergy Incorporated	4,201	5/22/2003	12/31/2003	Completed
17-18(11)B	Publication of Documents	Synergy Incorporated	8,069	5/22/2003	12/31/2003	Completed
17-18(11)C	Publication of Documents	Synergy Incorporated	2,699	8/28/2003	12/31/2003	Completed
17-18(12)	Rewrite of the Unsignalized Intersection Guide for Local Agencies	Consultant: Eugene Wilson	25,000	7/4/2003	11/25/2003	Completed—Publication decision pending
17-18(13)	Integrated Safety Management Process/Safety-Conscious Planning Coordination	TRB Division A	40,000	9/12/2003	6/30/2004	Research in progress
17-19	Implementation of Model Deployment Strategies In AASHTO's Strategic Highway Safety Plan		750,000			Research continued under Project 17-18(03)
17-20	Research for the AASHTO Task Force for Roadside Safety	Various	200,000			Research in progress

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
17-20/Task 01	Publication of the Year 2000 Roadside Design Guide	Trauner Consulting Services	34,999	11/15/2000	11/30/2001	Completed—Final report delivered to AASHTO for view in updating the Year 2000 Roadside Design Guide
17-20/Task 02	Identification of Specific References Used in Developing Criteria and Recommendations in the Roadside Design Guide	Consultant: Kimberly Nystrom	50,000	7/8/2002	12/31/2003	Completed
17-20/Task 03	Research for the AASHTO Task Force for Roadside Safety	University of Nebraska - Lincoln	50,000	10/10/2003	2/9/2005	Research in progress
17-20/Task 04	Safety Evaluation and Crash Testing of Secure Mailboxes	George Washington University	25,000	5/16/2002	2/28/2003	Completed
17-21	Safety of U-Turns at Unsignalized Median Openings	Midwest Research Institute	320,000	11/6/2000	1/30/2004	Research in progress
17-22	Identification of Vehicular Impact Conditions Associated with Serious Ran-Off-Road Crashes	University of Nebraska - Lincoln	499,999	8/15/2001	5/14/2004	Research in progress
17-23	Safety Profile and Other Implications of Changed Speed Limits on High Speed Roads	Charles River Associates	350,000	7/23/2002	7/22/2004	Research in progress
17-24	Use of Event Data Recorder (EDR) Technology for Highway Crash Data Analysis	Rowan University	250,000	5/1/2002	5/1/2004	Research in progress
17-25	Crash Reduction Factors for Traffic Engineering and ITS Improvements	University of North Carolina - Chapel Hill	400,000	8/1/2003	7/31/2005	Research in progress
17-26	Development of Models for Prediction of Expected Safety Performance for Urban and Suburban Arterials	Midwest Research Institute	500,000	6/2/2003	6/1/2005	Research in progress
17-27	Prepare Parts I and II of the Highway Safety Manual		250,000			Contract pending
17-28	Determination of the Safety Impact and Cost-Effectiveness of Pavement Marking Materials and Markers		600,000			In development
17-29	Methodology to Predict the Safety Performance of Rural Multilane Highways		500,000			Contract pending
17-30	Facilitation of Safety Evaluations of Nighttime and Daytime Work Zones		500,000			Contract pending
17-31	Human Factors Guidelines for Road Systems - Phase 2		300,000			On hold pending completion of Project 17-18(08)
<b>AREA EIGHTEEN: MATERIALS AND CONSTRUCTION—CONCRETE MATERIALS</b>						
18-01	Revibration of Retarded Concrete for Continuous Bridge Decks	University of Illinois	103,895*	9/1/1967	12/1/1969	Completed—Published as NCHRP Report 106
18-02	Use of Polymers in Highway Concrete	Lehigh University	300,000*	10/1/1972	9/30/1975	Completed—Published as NCHRP Report 190
18-02(02)	Polymer Concrete in Highway Bridge Decks	Lehigh University	30,000*	1/1/1978	3/15/1979	Completed—Report not published; for avail. see Summary of Progress Through 1988
18-02(03)	Long-Term Rehabilitation of Salt-Contaminated Bridge Decks	Lehigh University	199,900*	5/1/1980	4/29/1983	Completed—Published as NCHRP Report 257

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
18-03	Silica Fume Concrete for Bridge Decks	Construction Technology Laboratories	314,194	3/1/1995	9/30/1997	Completed—Published as NCHRP Report 410
18-04A	Durability of "Early-Opening-to-Traffic" Portland Cement Concrete for Pavement Rehabilitation: Background and Plan for Evaluation	Texas A&M University	42,968	11/15/1997	9/30/1998	Completed—Agency report available for loan
18-04B	Durability of "Early-Opening-to-Traffic" Portland Cement Concrete for Pavement Rehabilitation	Michigan Tech University	349,734	4/3/2000	1/31/2004	Research in progress
18-05	Relationship of Portland Cement Characteristics to Concrete Durability	Pennsylvania State University	400,000	4/7/1997	4/30/2001	Completed—Summarized in NCHRP Research Results Digest 270
18-06	Service Life of Corrosion-Damaged Reinforced Concrete Bridge Superstructure Elements (Phase I)	Michigan State University	19,675	1/4/2000	8/31/2001	Completed—Phase I only; research resumed under Project 18-06A
18-06A	Service Life of Corrosion-Damaged Reinforced Concrete Bridge Superstructure Elements	Concorr, Inc.	350,000	4/10/2001	2/28/2005	Research in progress
18-07	Prestress Losses in Pretensioned High-Strength Concrete Bridge Girders	University of Nebraska - Lincoln	300,000	6/8/1999	8/31/2002	Completed—Published as NCHRP Report 496
18-08	Supplementary Cementitious Materials to Enhance Durability of Concrete Bridge Decks (Phase I)	Purdue University	71,796	8/1/2000	3/31/2002	Terminated
18-08A	Supplementary Cementitious Materials to Enhance Durability of Concrete Bridge Decks	Wiss, Janney, Elstner & Associates	400,000	4/16/2003	7/15/2005	Research in progress
18-09	Guidelines for Reducing Premature Deterioration of Hydraulic Cement Concrete Pavements	Cancelled	0			Project cancelled
18-09A	Guidelines for Reducing Premature Deterioration of Hydraulic Cement Concrete Pavements: Background and Research Plan	Construction Technology Laboratories	50,000	7/7/2000	7/6/2001	Completed
18-10	Procedures for Evaluating Air-Entraining Admixtures for Highway Concrete	Construction Technology Laboratories	75,000	2/28/2002	12/30/2004	Research in progress
18-11	Improved Specifications and Protocols for Acceptance Tests on Processing Additions in Cement Manufacturing	Construction Technology Laboratories	649,924	2/28/2003	2/27/2006	Research in progress
18-12	Self-Consolidating Concrete for Precast, Prestressed Concrete Bridge Elements		450,000			In development
<b>AREA NINETEEN: ADMINISTRATION—FINANCE</b>						
19-01	Budgeting for State Highway Departments	Ernst & Ernst	45,000*	9/5/1967	9/4/1968	Completed—Report not published; summarized in NCHRP Research Results Digest 20
19-02(01)	Develop Performance Budgeting System to Serve Highway Maintenance Management	Booz-Allen & Hamilton	6,000*	9/2/1968	10/31/1968	Completed—Working plan; not published

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
19-02(02)	Develop Performance Budgeting System to Serve Highway Maintenance Management	Ernst & Ernst	6,000*	9/2/1968	10/31/1968	Completed—Working plan; not published
19-02(03)	Develop Performance Budgeting System to Serve Highway Maintenance Management	Jorgensen & Associates	6,000*	9/2/1968	10/31/1968	Completed—Research continued under Project 19-02(04)
19-02(04)	Develop Performance Budgeting System to Serve Highway Maintenance Management	Jorgensen & Associates	220,000*	2/1/1969	11/30/1971	Completed—Published as NCHRP Report 131
19-03	Economic Effects of Changes in Legal Vehicle Weights and Dimensions on Highways	Wilbur Smith Associates	96,728*	9/15/1970	6/14/1972	Completed—Published as NCHRP Report 141
19-04	A Review of DOT Compliance with GASB 34 Requirements	PB Consult, Inc.	324,855	4/24/2002	1/31/2004	Completed—To be published as a NCHRP Report
19-05	Assessing and Mitigating Future Impacts to the Federal Highway Trust Fund such as Alternative Fuel Consumption	Cambridge Systematics	100,000	6/21/2002	7/31/2003	Completed
19-06	Identifying and Quantifying Rates of State Motor Fuel Tax Evasion		400,000			In development

#### AREA TWENTY: SPECIAL PROJECTS

20-01	Highway Research Information Service	Highway Research Board	455,000*	3/16/1964	10/31/1967	Completed—Informal publication only; service implemented
20-02	Research Needs in Highway Transportation	Tallamy/Smith	98,760*	4/1/1966	12/31/1967	Completed—Published as NCHRP Report 55
20-03	Optimizing Freeway Corridor Operation Through Traffic Surveillance, Communication, and Control	Texas A&M University	594,556a	12/15/1966	1/31/1969	Completed—Results summarized in Project 20-03C report
20-03A	Optimizing Freeway Corridor Operation Through Traffic Surveillance, Communication, and Control	University of Michigan	525,631b	11/20/1968	5/31/1971	Completed—Results summarized in Project 20-03C report
20-03B	Optimizing Freeway Corridor Operation Through Traffic Surveillance, Communication, and Control—Summary Reporting	Patrick J. Athol	31,116*	7/1/1972	9/27/1974	Project cancelled—No final report
20-03C	Summary of the Lodge Freeway Research	Asriel Taragin	10,183*	11/15/1975	7/15/1976	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-03D	Summary of All Freeway Surveillance, Communication and Control Experience	Voorhees & Associates	40,000*	5/15/1977	12/31/1978	Completed—Special publication; for avail. see Summary of Progress Through 1988
20-04	Public Preference for Future Individual Transportation	Chilton Research	195,260*	5/2/1967	1/21/1969	Completed—Published as NCHRP Reports 49 and 82
20-04A	Public Preference for Future Individual Transportation	National Analysts	83,911*	5/2/1967	1/2/1968	Completed—Published as NCHRP Reports 49 and 82
20-05	Synthesis of Information Related to Highway Problems	TRB Division B	1,200,000c	12/15/1967		Research in progress; refer to NCHRP Research Results Digest 280 for topic reports published as NCHRP Syntheses



TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
20-06	Legal Problems Arising Out of Highway Programs	TRB Division A	100,000c	11/1/1968		Research in progress; refer to TRB Bookstore, Legal Research Digest; CRP-CD-20, "Tort Liability of Highway Agencies"
20-07	Research for AASHTO Standing Committee on Highways	Various	750,000c	12/2/1968		Research in progress
20-08	Interactive Graphic Systems for Highway Design	Control Data	49,672*	9/1/1970	7/31/1971	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-09	Socioeconomic Consequences of Right-of-Way Acquisition Induced Resident Dislocation	RMC Research Corporation	202,579*	8/1/1972	12/17/1976	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-10	The Benefits of Separating Pedestrians and Vehicles	Stanford University	100,000*	8/26/1974	4/30/1976	Completed—Published as NCHRP Report 189
20-10(02)	The Benefits of Separating Pedestrians and Vehicles	SRI International	100,000*	9/1/1978	7/31/1981	Completed—Published as NCHRP Report 240
20-11	Toward Environmental Benefit/Cost Analysis—Measurement Methodology	Polytechnic Institute of New York	100,000*	9/1/1972	5/31/1974	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-11A	Toward Environmental Benefit/Cost Analysis—Measurement Methodology	Cornell University	27,212*	9/1/1975	11/30/1976	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-11B	Toward Environmental Benefit/Cost Analysis: Energy-Flow Analysis (Manual)	Cornell University	140,450*	1/24/1977	5/4/1979	Completed—Report not published; for avail. see Summary of Progress Through 1988; summarized in NCHRP Research Results Digest 114
20-11C	Toward Environmental Benefit/Cost Methodology: Energy-Flow Analysis (Study Design)	Cannon Group	14,786*	4/1/1977	3/31/1978	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-12	Effects of Air Pollution Regulations on Highway Construction and Maintenance	Howard, Needles, et al.	80,446*	4/1/1974	7/31/1975	Completed—Published as NCHRP Report 191
20-13	Beneficial Environmental Effects Associated with Freeway Construction	Pennsylvania State University	49,965*	9/3/1974	8/2/1975	Completed—Published as NCHRP Report 193
20-14	Monitoring Carbon Monoxide Concentrations in Urban Areas	Tech Service Corporation	99,973*	10/1/1976	3/31/1978	Completed—Published as NCHRP Report 200
20-14A	Statistical Analysis of Ozone Data for Transportation/Air Quality Planning	SRI International	193,907*	9/15/1979	12/18/1981	Completed—Published as NCHRP Report 238
20-15	Ecological Effects of Highway Fills on Wetlands	University of Massachusetts	152,085*	12/1/1976	12/31/1979	Completed—Published as NCHRP Reports 218A and 218B
20-16	State Laws and Regulations on Truck Size, Weight, and Speed	R. J. Hansen Associates	281,975*	10/11/1976	9/1/1978	Completed—Published as NCHRP Report 198
20-17	Statewide Freight Demand Forecasting Procedures	Cambridge Systematics	73,151*	4/1/1979	7/31/1980	Completed—Report not published; for avail. see Summary of Progress Through 1988

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
20-17A	Application of Statewide Freight Demand Forecasting Techniques	R. Creighton Associates	193,500*	6/1/1981	1/31/1984	Completed—Published as NCHRP Report 260
20-18	Evaluation of Highway Air Pollution Dispersion Models	SRI International	207,509*	3/15/1979	2/28/1982	Completed—Published as NCHRP Report 245
20-19	Pedestrian Convenience and Safety on Suburban and Rural Highways	JHK & Associates	160,000*	5/1/1985	12/31/1986	Completed—Published as NCHRP Reports 294A and 294B
20-19(02)	Pedestrian Safety and Convenience on Suburban and Rural Highways—Implementation Phase	JHK & Associates	146,218*	9/1/1987	12/31/1989	Completed—Results incorporated into National Highway Institute courses
20-20	SHRP Pre-Implementation Research	AASHTO	500,000*	10/1/1984	9/30/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(02)	SHRP Overview and Integration Planning	University of Maryland	90,000	3/15/1985	5/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(03)	SHRP Detailed Planning for Research on Asphalt Properties	ARE, Inc.	115,000	3/15/1985	1/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(05)	SHRP Detailed Planning for Research on Maintenance Effectiveness	Texas Research and Development Foundation	90,000	3/15/1985	1/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(06)	SHRP Detailed Planning for Research on Bridge Component Protection	David G. Manning	80,000	3/15/1985	1/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(07)	SHRP Detailed Planning for Research on Cement and Concrete	Construction Technology Laboratories/PCA	75,000	3/15/1985	1/31/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-20(08)	SHRP Detailed Planning for Research on Snow and Ice Removal	USA CRREL	73,781	4/21/1985	2/26/1986	Completed—Report not published; for avail. see Summary of Progress Through 1988
20-21	Development of an Automated Field Survey Data Collection System	ARE, Inc./Cooper Tech	200,000*	2/3/1986	5/5/1987	Completed—Published as NCHRP Report 295
20-22	Factors to be Considered by Highway Agencies in the Identification and Remediation of Hazardous Waste Sites	HMM Associates	148,015*	11/1/1986	7/1/1988	Completed—Published as NCHRP Report 310
20-23	Kinematic Differential GPS Satellite Surveying	GPS Services/National Geodetic Survey	298,793	9/15/1988	9/14/1990	Completed—Report distributed to sponsors; summarized in NCHRP Research Results Digests 185 and 199
20-24	Administration of Highway and Transportation Agencies	Apogee Research	125,000*	5/11/1987	9/30/1988	Completed—Report distributed to sponsors; summarized in NCHRP Research Results Digests 170, 183, and 193
20-24(01)	Using Market Research to Improve the Management of Transportation Systems	Apogee Research	199,923*	10/1/1988	9/30/1989	Completed—Published as NCHRP Report 329

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
20-24(02)	Executive Management Information Systems for State Departments of Transportation	Andersen Consulting	100,000*	5/1/1989	10/4/1989	Completed—Report distributed to sponsors; summarized in NCHRP Research Results Digest 173
20-24(03)	Expanding the Civil Engineering Pool	Pennsylvania State University	298,780	7/1/1990	6/30/1994	Completed—Phases I and II published as NCHRP Report 347; Phase III published as NCHRP Report 347-Part II
20-24(03)A	Civil Engineering Careers in Transportation—Outreach Program	AASHTO	100,000	5/1/1992	8/31/1993	Completed—Summarized in NCHRP Research Results Digest 196, revised
20-24(04)	Senior Executive Service, Participant's Manual	Braun, Johns & Golden	25,000*	1/1/1988	9/30/1991	Completed—Report provided to AASHTO
20-24(05)	Public Outreach in Transportation Management	Frank Wilson & Associates	99,974*	8/1/1991	1/31/1993	Completed—Published as NCHRP Report 364
20-24(06)A	Performance Measures for State Highway and Transportation Agencies	Highway Users Foundation	84,891*	8/1/1991	6/2/1993	Completed—Published as NCHRP Report 357
20-24(06)B	Business Systems Plan for Highway Engineering Information	Prodata, Inc.	149,977	8/26/1991	10/31/1992	Completed—Report not published; agency report available for loan
20-24(06)C	Information Systems for Transportation Agencies	Stone & Webster Transportation Services	185,660	2/15/1995	6/30/1998	Completed—Report distributed to sponsors; agency report available for loan
20-24(07)	Alternatives to the Motor Fuel Tax for Financing Surface Transportation Improvements	Cambridge Systematics	300,000	3/1/1992	10/15/1994	Completed—Published as NCHRP Report 377
20-24(07)A	Alternative Approaches to the Taxation of Heavy Vehicles	Cambridge Systematics	200,000	2/1/1996	10/31/1997	Completed—Published as NCHRP Report 416
20-24(08)	Project 20-24 Series—Revisited	Apogee Research	20,000	4/22/1992	12/31/1994	Completed—Agency report available for loan
20-24(09)	State Departments of Transportation—Strategies for Change	National Academy of Public Administration	279,855	6/15/1993	12/14/1994	Completed—Published as NCHRP Report 371
20-24(10)	Customer-Based Quality in Transportation	Howard/Stein-Hudson Associates	100,000	2/1/1994	3/31/1995	Completed—Published as NCHRP Report 376
20-24(11)	Asset Management Guidance for Transportation Agencies	Cambridge Systematics	664,234	10/19/1999	11/15/2002	Completed—To be published by AASHTO
20-24(12)	Avoiding Delays During the Construction Phase of Highway Projects	Pennsylvania State University	120,592	4/18/2000	12/15/2001	Completed—To be published as NCHRP Report 516
20-24(12)A	Avoiding Delays During the Construction Phase of Highway Projects		250,000			In development
20-24(13)	Innovative Financing Clearinghouse	Parsons Brinckerhoff Quade & Douglas	199,359	8/18/2000	9/14/2002	Completed—Website transferred to AASHTO
20-24(14)	Managing Change in State Departments of Transportation	Various	200,000	11/10/2000	4/15/2001	Completed—Agency report available as NCHRP Web Document 39
20-24(14)A	Innovations In DOT Communications, Image, And Positioning	Howard/Stein-Hudson Associates	25,000	10/26/2000	4/30/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 4
20-24(14)B	Innovations In Partnering And Relationship Building In State DOTs	HDR, Inc.	25,000	10/26/2000	4/30/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 7

TABLE I (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
20-24(14)C	Innovations in Strategic Leadership and Performance Measurement for State DOTs	Consultant: Theodore Poister	25,000	10/26/2000	5/31/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 1
20-24(14)D	Innovations in Private Involvement in Project Delivery	Consultant: Donn Hancher	25,000	10/26/2000	5/31/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 2
20-24(14)E	Innovations In Institutionalizing Systems Operations	Consultant: Philip Tarnoff	25,000	10/26/2000	5/31/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 3
20-24(14)F	Innovations In Workforce Strategies	Texas A&M University	25,000	11/15/2000	5/31/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 5
20-24(14)G	Innovations In Organization Development as a Result of Information Technology	Battelle Columbus	25,000	10/26/2000	4/30/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 6
20-24(14)H	Innovative Finance	Cambridge Systematics	25,000	11/20/2000	5/31/2001	Completed—Agency report available as NCHRP Web Document 39, Scan 8
20-24(14)I	Managing Change in State Departments of Transportation	Consultant: Robert Johns	25,000	10/26/2000	5/31/2001	Completed—No report
20-24(14)J	Managing Change in State Departments of Transportation	Consultant: Stephen Lockwood	25,000	10/31/2000	5/31/2001	Completed—No report
20-24(15)	Scoping a Comprehensive Process to Serve Reauthorization Programs & a Review of the Condition and Performance Reporting Process	Consultant: Alan E. Pisarski	60,000	12/1/2000	12/31/2001	Completed—Report provided to AASHTO
20-24(16)	AASHTO Experience in Transportation Enhancements	Transmanagement, Inc.	38,903	12/15/2000	4/15/2002	Completed—Report sent to AASHTO
20-24(17)	National Conference on Historic Preservation	Transmanagement, Inc.	49,572	6/15/2001	6/15/2003	Completed—Report sent to AASHTO
20-24(18)	Outsourcing of State DOT Delivery of Capital Programs	Science Applications International Corporation	99,992	3/28/2002	4/30/2003	Completed—Agency report to be available as NCHRP Web Document 59
20-24(19)	State DOTs and E-Business	Booz-Allen & Hamilton	150,000	9/26/2003	9/25/2004	Research in progress
20-24(20)	Using Performance Measures to Manage Change in State Departments of Transportation	TransTech Management, Inc.	100,000	4/16/2002	7/31/2003	Completed—Final report published by AASHTO
20-24(21)	Characteristics of the 21st Century Operations-Oriented State DOT	PB Consult, Inc.	100,000	5/29/2002	2/28/2004	Research in progress
20-24(22)	Best Practices in Partnering with Public Resource Agencies	TransTech Management, Inc.	28,000	10/10/2002	6/30/2003	Completed—Brochure published by AASHTO
20-24(23)A	Assessing the Importance of Transportation for Major Industries and Sectors of the U.S. Economy—Agriculture	North Dakota State University	50,000	5/15/2002	11/21/2003	Completed—Report to be available on agency website
20-24(23)B	Assessing the Importance of Transportation for Major Industries and Sectors of the U.S. Economy—International Trade	California State University	49,051	9/15/2002	3/31/2003	Completed—Agency report available at <a href="http://www.mettrans.org/calendar.htm">http://www.mettrans.org/calendar.htm</a>
20-24(23)C	Assessing the Importance of Transportation for Major Industries and Sectors of the U.S. Economy—Congestion	UCLA Foundation	50,000	7/30/2003	12/31/2003	Completed—Agency report available at <a href="http://www.uclaextension.edu/publicpolicy">http://www.uclaextension.edu/publicpolicy</a>

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
20-24(23)D	Assessing the Importance of Transportation for Major Industries and Sectors of the U.S. Economy—Travel, Tourism, and Recreation		50,000			In development
20-24(24)A	Transportation Mobility, Access, and Safety for an Aging Population	Consultant: Jon Burkhardt	15,000	5/23/2003	12/31/2003	Research in progress
20-24(24)B	Transportation Mobility, Access, and Safety for an Aging Population	Consultant: John W. Eberhard	15,000	5/19/2003	12/31/2003	Research in progress
20-24(25)	Improving Project Costing and Incorporation of New Attributes—Highways and Transit	AECOM Consulting Transportation Group	125,000	4/3/2002	7/31/2003	Completed—Final report to be sent to AASHTO
20-24(26)A	Finance Trends—Trends in Non-Federal Funding and Debt	PB Consult, Inc.	100,000	2/28/2002	8/15/2002	Completed—Final report sent to AASHTO
20-24(26)B	Trends in Non-Federal Funding and Debt	Urban Land Institute	75,000	3/4/2002	8/31/2002	Completed—Final report sent to AASHTO
20-24(27)	Expanded State and National Investment Analysis Capability—Highways	Cambridge Systematics	249,776	2/14/2002	2/28/2003	Completed
20-24(28)	Rate of Return From Highway Investment	Delcan, Inc.	99,998	10/15/2002	7/31/2003	Completed
20-24(29)	CEO Peer Exchange Workshop for Strategic Leadership	University of Minnesota	99,335	11/15/2002	11/14/2003	Completed—Agency report available upon request
20-24(30)	Performance Measurement In Context Sensitive Design	TransTech Management, Inc.	100,000	7/2/2003	7/1/2004	Research in progress
20-24(31)	Financial Management for Effective Program Delivery		200,000			In development
20-24(32)	AASHTO CEO Briefing	Tom Warne & Associates, LLC	20,000	4/10/2003	6/4/2003	Completed
20-24(33)A	21st Century Freight Mobility	ICF Consulting, Inc.	80,000	9/12/2003	7/30/2004	Research in progress
20-24(33)B	Transportation, Technology, and the 21st Century Vehicle	Delcan, Inc.	75,000	8/22/2003	6/30/2004	Research in progress
20-24(33)C	Transportation Vision 2010 and Beyond	Tom Warne & Associates, LLC	75,000	9/24/2003	7/31/2004	Research in progress
20-24(34)	Commuting in America III	Consultant: Alan E. Pisarski	100,000			In development
20-25	Training Needs for Highway Construction Personnel	University of Maryland	73,728*	6/15/1989	12/31/1990	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 206
20-25(02)	Training for Highway Construction Personnel	SNI International Resources	224,790	11/1/1991	6/30/1996	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 206
20-25(03)	Development of Training Material for Highway Construction Personnel	SNI International Resources	299,998	4/17/1995	8/7/1997	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 228
20-26	Bond and Insurance Coverages for Highway Construction Contractors	Texas A&M University	99,999*	6/1/1989	9/30/1990	Completed—Published as NCHRP Report 341
20-27	Adaptation of Geographic Information Systems for Transportation	University of Wisconsin	220,000	3/1/1990	6/30/1993	Completed—Published as NCHRP Report 359; summarized in NCHRP Research Results Digests 180 and 191

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
20-27(02)	Development of System and Application Architectures for Geographic Information Systems in Transport	University of Wisconsin - Madison	200,000	4/1/1994	8/31/1997	Completed—Part I report summarized in NCHRP Research Results Digest 218; Part II report summarized in NCHRP Research Results Digest 221
20-27(03)	Guidelines for the Implementation of Multimodal Transportation Location Referencing Systems	University of Wisconsin - Madison	136,000	3/1/1998	4/30/2001	Completed—Published as NCHRP Report 460
20-28	Hazardous Wastes in Highway Rights-of-Way	Transportation Research Board	300,000	4/16/1990	2/1/1992	Completed—Published as NCHRP Report 351
20-29	Development of a Multimodal Framework for Freight Transportation Investment: Consideration of Rail and Highway Trade-Offs	Texas A&M University	150,000	5/15/1992	8/31/1994	Completed—Report not published pending completion of continuation project
20-29(02)	Development of a Computer Model for Multimodal, Multicriteria Transportation Investment Analysis	Texas A&M University	217,500	12/15/1995	5/31/1999	Completed—Summarized in NCHRP Research Results Digest 258
20-30	NCHRP—IDEA Program	TRB Division E	1,000,000c	7/8/1992		Research in progress; see project write-up on CRP website
20-31	Public Policy for Surface Freight Transportation	TRB Division B	200,000	12/1/1992	9/4/1996	Completed—Published as TRB Special Report 246
20-32	Development of a Comprehensive Thesaurus for Transportation Research	CDB Enterprises	225,000	12/1/1993	8/31/1996	Completed—Report not published
20-32(02)	Refinement of Transportation Research Thesaurus and Implementation of Updated TRIS Keyword Index	CDB Enterprises	199,965Ret	12/1/1997	9/30/2000	Completed—Published as NCHRP Report 450 and available on CRP-CD-6
20-33	Facilitating the Implementation of Research Findings	RAND Corporation	499,955	1/22/1993	1/15/1996	Completed—Summarized in NCHRP Research Results Digest 207 and NCHRP Report 382
20-33(02)	The Role of Procurement and Contracting Approaches in Facilitating the Implementation of Research Findings	Trauner Consulting Services	299,993	2/15/1997	12/31/1998	Completed—Published as NCHRP Report 428; summarized in NCHRP Research Results Digest 225
20-34	Developing Measures of Effectiveness for Truck Weight Enforcement Activities	Transportation Research Corporation	499,625	1/1/1994	3/18/1998	Completed—Agency report available as NCHRP Web Document 13; summarized in NCHRP Research Results Digest 229
20-35	Plan for SHRP Follow-Up Studies	TRB Division D	100,000	6/1/1993	9/30/1995	Completed—Agency report available for loan
20-36	Highway Research and Technology—International Information Sharing	TRB Division D	831,000c	1/26/1993		Research in progress
20-36A	Scoping Study for a Joint FHWA/AASHTO Scanning Mission to China	Consultant: Wei-Bin Zhang	5,000	7/1/2003	9/24/2003	Research in progress
20-37	Strategic Direction for the NCHRP and Other AASHTO Research Activities	Apogee Research	243,642	3/1/1994	3/31/1995	Completed—Report not published
20-38	Development of a Manual for State Transportation Research	Consultants: Reilly, Horowitz, Harder	118,000	9/1/1994	6/30/1997	Completed—Agency report available for loan

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
20-39	Improved User Access to TRIS Through the AASHTO VAN	Texas Transportation Institute	35,944	11/1/1994	7/31/1995	Completed—Report provided to AASHTO
20-39(02)	Improved Transportation Research-In-Progress Data System	Texas A&M University	300,367	3/28/2000	11/30/2004	Research in progress
20-40	Conversion of AASHTO Publications to Metric Units	Texas A&M University	1,208,581	11/10/1994	1/31/1999	Completed—Summarized in NCHRP Research Results Digest 240
20-41	Approaches for Increasing Private-Sector Involvement in Highway Innovation Process	TRB Division B	62,500	11/1/1994	6/30/1996	Completed—Published as TRB Special Report 249
20-42	Sustainable Transportation	TRB Division B	150,000	5/1/1994	7/31/1997	Completed—Published as TRB Special Report 251
20-43	Application of CD-ROM Technology for AASHTO Technical Documents	Applied Research Associates	319,936	1/8/1996	9/30/1998	Completed—Results provided to AASHTO
20-44	Accelerating the Application of NCHRP Research Results	TRB Division D	100,000c	8/1/1995		Support for various implementation activities
20-44C	Policy Implications of the Economic Value of Transportation	Apogee Research	25,471	8/1/1996	12/31/1996	Completed—Report sent to AASHTO
20-44D	Recommended Specifications for Modular Bridge Expansion Joints	Consultant: Robert Dexter	10,000	1/1/2002	5/31/2002	Completed—Specifications under review by AASHTO
20-44E	AASHTO CEO Briefing	Tom Warne & Associates, LLC	40,000	12/23/2002	3/31/2003	Completed
20-45	Scientific Approaches for Transportation Research	Georgia Institute of Technology	199,999	3/23/1998	3/31/2001	Completed—Agency report available on CRP-CD-22
20-46	Systems Approach to Evaluating Innovations for Integration into Highway Practice	Worcester Polytechnic Institute	121,866Ret	7/1/1998	6/30/2000	Completed—Published as NCHRP Report 442
20-47	Quality and Accuracy of Positional Data in Transportation	University of Wisconsin	25,000	7/28/1999	7/27/2001	Contract cancelled
20-47(01)	Quality and Accuracy of Positional Data in Transportation	Battelle Columbus	275,000	12/1/2000	6/1/2003	Completed
20-48	Accessibility of Non-English Language Transportation Information	AppTek-L&H	174,228	8/24/1999	11/1/2001	Completed
20-48(01)	Making the Business Case for Translating Non-English Transportation Information	Consultant: John Metcalf	30,000	6/1/2002	3/31/2003	Completed—Published as NCHRP Research Results Digest 279
20-49	Support for LTPP Advisory Structure	TRB Division E	400,000	3/9/1998	3/8/2003	Completed
20-50(01)	LTPP Data Analysis: Data Availability and Facilitation	Consultant: Dr. Alaeddin Mohseni	50,000	2/11/2002	10/31/2002	Completed
20-50(02)	LTPP Data Analysis: Relative Performance of Jointed Plain Concrete Pavements with Sealed and Unsealed Joints	Kathleen T. Hall	74,963	7/29/1999	5/1/2001	Completed—Agency report available as NCHRP Web Document 32
20-50(03/04)	LTPP Data Analysis: Effectiveness of Maintenance and Rehabilitation Options	Kathleen T. Hall	250,000	10/14/1999	3/31/2002	Completed—Agency report available as NCHRP Web Document 47
20-50(05)	LTPP Data Analysis: Variations in Pavement Design Inputs	Consulpav International	249,991	10/13/1999	10/12/2001	Completed—Agency report available as NCHRP Web Document 48
20-50(06)	LTPP Data Analysis: Verification of Pavement Design Values Using Construction Test Data for SPS-1 and SPS-2 Sites	Cancelled	0			Project cancelled

TABLE 1 (continued)

Project							Project Status **
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date		
20-50(07/12)	LTPP Data Analysis: Daily and Seasonal Variations in In Situ Material Properties	University of Tennessee	349,969	2/7/2000	8/31/2003	Completed—Agency report to be available as NCHRP Web Document 60	
20-50(08/13)	LTPP Data Analysis: Factors Affecting Pavement Smoothness	Soil & Materials Engineers, Inc.	199,998	10/25/1999	12/30/2001	Completed—Agency report available as NCHRP Web Document 40; summarized in NCHRP Research Results Digest 264	
20-50(09)	LTPP Data Analysis: Feasibility of Using FWD Deflection Data to Characterize Pavement Construction Quality	Consulpav International	174,996	5/2/2000	6/3/2002	Completed—Agency report available as NCHRP Web Document 52	
20-50(10)	LTPP Data Analysis: Factors Affecting the Performance of Flexible and Rigid Pavements	Arizona State University	46,387	4/17/2000	10/16/2001	Contract terminated—Research continued under Project 20-50(10/16)	
20-50(10/16)	LTPP Data Analysis: Influence of Design and Construction Features on the Response and Performance of New Flexible and Rigid Pavements	Michigan State University	299,301	6/27/2002	6/27/2004	Research in progress	
20-50(11)	LTPP Data Analysis: Significance of Traditional Materials Pay Factors to Pavement Performance	Cancelled	0			Project cancelled	
20-50(14)	LTPP Data Analysis: Significance of "As-Constructed" AC Air Voids to Pavement Performance	Applied Pavement Technologies	100,000	6/5/2000	6/28/2002	Completed—Summarized in NCHRP Research Results Digest 269	
20-50(15)	LTPP Data Analysis: Confidence of WIM Axle Load Data	Cancelled	0			Project cancelled	
20-51(01)	LTPP Product Development: Workshop on Pavement Smoothness	Soil & Materials Engineers, Inc.	56,000	1/24/2000	12/31/2001	Completed—Agency report available as NCHRP Web Document 42	
20-51(02)	LTPP Product Development: PCC Pavement Practice Manual and Workshop	Transferred	100,000			Transferred to FHWA	
20-51(03)	LTPP Product Development: Pavement Smoothness Specification for Approaches to WIM Equipment Sites	Transferred	100,000			Transferred to FHWA	
20-52	TRAC PAC2—A Hands-on Educational Program	Commonwealth of Virginia	350,094	5/30/2000	5/29/2002	Completed—New modules transferred to AASHTO	
20-52(01)	Implementing TRAC PAC2—A Hands-on Educational Program	TransTech Management, Inc.	200,000	2/24/2003	4/1/2004	Research in progress	
20-53	Using Customer Needs to Drive Transportation Decisions	Howard/Stein-Hudson Associates	149,985	5/11/2001	11/30/2002	Completed—Published as NCHRP Report 487	
20-54	Accelerating Opportunities for Innovation in the Highway Industry	TRB Division A/Consultant T. Ferragut	170,000	5/1/2000	8/11/2003	Research in progress	
20-55	TRB Study on Future Surface Transportation Agency Human Resource Needs	TRB Division B	100,000	9/5/2000	3/31/2003	Completed—Published as TRB Special Report 275	
20-56	New Services for AASHTO's World Wide Web Site	Logistics Management Institute	474,144	3/25/2002	10/30/2003	Completed—Report provided to AASHTO	
20-56A	Survey of AASHTO Web Site Users	Penn, Schoen & Berland Associates, Inc.	35,000Ret	8/15/2001	10/31/2001	Completed—Results provided to AASHTO	
20-57	Analytic Tools Supporting Transportation Asset Management	Cambridge Systematics	749,908	4/24/2002	10/23/2004	Research in progress	



TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
20-58	Oversight Panel for F-SHRP Project	TRB Division D—Ann M. Brach & travel	350,000	12/13/2001	12/31/2006	Completed—Summary report to be published as NCHRP Report 510
20-58(01)	Detailed Planning for Research on Accelerating the Renewal of America's Highways	Iowa State University	390,000	5/9/2002	12/31/2003	Completed—Agency report available as F-SHRP Web Document 1
20-58(02)	Detailed Planning for Research on Making a Significant Improvement in Highway Safety	Battelle	289,932	2/25/2002	9/30/2003	Completed—Agency report available as F-SHRP Web Document 2
20-58(03)	Detailed Planning for Research on Providing a Highway System with Reliable Travel Times	Cambridge Systematics	288,652	2/12/2002	9/30/2003	Completed—Agency report available as F-SHRP Web Document 3
20-58(04)	Detailed Planning for Research on Providing Highway Capacity in Support of the Nation's Economic, Environmental, and Social Goals	ICF Consulting, Inc.	290,000	3/1/2002	10/1/2003	Completed—Agency report available as F-SHRP Web Document 4
20-59	Surface Transportation Security Research	Various				In development
20-59(01)	AASHTO Security Research Workshop and Forum	TransTech Management, Inc.	100,000	1/2/2003	4/30/2003	Completed
20-59(02)	Bridge/Tunnel/Highway Infrastructure Vulnerability Workshops	Science Applications International Corporation	277,000	9/10/2002	2/29/2004	Research in progress
20-59(03)	FHWA/AASHTO Blue Ribbon Panel on Bridge and Tunnel Security	Science Applications International Corporation	77,044	10/15/2002	9/18/2003	Completed
20-59(04)	White Paper on Highway Security Issues for Reauthorization	Consultant: Stephen Lockwood	25,000	12/19/2002	5/30/2003	Completed
20-59(05)	National Needs Assessment for Ensuring Transportation Infrastructure Security	Science Applications International Corporation	150,000	5/23/2002	1/31/2003	Completed
20-59(06)	Responding to Threats: A Field Personnel Manual	Science Applications International Corporation	50,000	5/1/2003	12/31/2003	Completed
20-59(06)A	Responding to Threats: A Field Personnel CD ROM Training Course		150,000			Contract pending
20-59(06)B	Enhanced DOT Participation in NTI Train-the-Trainer Workshops for Security Awareness		50,000			In development
20-59(07)	Transportation Security Information Clearinghouse	Premier Technology Group, Inc.	124,950	4/16/2003	4/15/2004	Research in progress
20-59(08)	Emergency Transportation Operations Preparedness and Response Workshop: Adaptations for Rural and International Border Crossing Situations	Science Applications International Corporation	150,000	9/10/2002	12/31/2003	Research in progress
20-59(09)	Methods for Determining Transportation and Economic Consequences of Terrorist Attacks	Science Applications International Corporation	250,000	3/20/2003	4/20/2004	Research in progress
20-59(10)	Secure Communication Infrastructure	McCormick, Taylor and Associates, Inc.	351,000	7/15/2002	12/31/2003	Completed
20-59(11)	Emergency Traffic Operations Management	Science Applications International Corporation	350,000	3/3/2003	6/3/2004	Research in progress
20-59(12)	Follow-up State DOT Transportation Security Survey		5,000			In development

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
20-59(13)A	Follow-up on A Guide to Updating Emergency Response Plans for Terrorist Incidents	Parsons Brinckerhoff Quade & Douglas	6,000	3/26/2003	4/26/2003	Research in progress
20-59(13)B	Follow-up on A Guide to Highway Vulnerability Assessment for Critical Asset Identification and Protection	Science Applications International Corporation	35,000	8/22/2003	8/21/2004	Research in progress
20-59(14)	Support Services to the AASHTO Task Force on Transportation Security	TransTech Management, Inc.	135,000	1/22/2003	4/21/2004	Research in progress
20-59(15)	AASHTO Modifications of Consultant Reports		0			Deferred
20-59(16)	Preparation of Educational Materials		50,000			In development
20-59(17)	AASHTO Guide to Risk Management of Multimodal Transportation Infrastructure		400,000			In development
20-59(18)	Guidelines for Conduct of Emergency Training Drills, Simulations, and Exercises		100,000			In development
20-59(19)	Transportation Response Options: Scenarios of Infectious Disease, Biological Agents, Chemical, Biological, Radiological, or Nuclear Exposure	Science Applications International Corporation	200,000			Research in progress
20-59(20)	Enhanced Communications Interoperability: Assessment of Emerging Voice/Data Integration Tools	Cancelled	0			Project cancelled
20-59(21)	Transportation Agency Continuity of Operations Plans		100,000			In development
20-60	Performance Measures and Targets for Transportation Asset Management	Cambridge Systematics	350,000	7/15/2003	7/15/2005	Research in progress
20-61	Study on Transportation of Radioactive Waste	National Research Council	50,000	3/25/2003	3/24/2005	Research in progress
20-62	Study on Long-Term Viability of Fuel Taxes for Transportation Finance	TRB Division B	100,000			In development
20-63	Performance Measurement Tool Box and Reporting System for Research Programs and Projects		300,000			Contract pending
20-64	XML Standard for Exchange of Transportation Data (Trans-XML)		500,000			In development
20-65	Research for the AASHTO Standing Committee on Public Transportation	Various	300,000	10/27/2003		Five tasks were selected by the project panel. Work on each has been initiated.
20-66	Strategic Plan for Transportation Information Management		250,000	7/1/2002	6/30/2007	TRB Division B policy study pending
<b>AREA TWENTY-ONE: SOILS AND GEOLOGY—TESTING AND INSTRUMENTATION</b>						
21-01	Instrumentation for Measurement of Moisture	Research Triangle Institute	35,027*	8/25/1969	2/24/1971	Completed—Published as NCHRP Report 138
21-02	Instrumentation for Moisture Measurement—Bases, Subgrades, and Earth Materials (Sensor Development)	Southwest Research Institute	64,976*	2/1/1972	1/31/1974	Completed—Report not published; included in Project 21-02(03) report

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
21-02(02)	Instrumentation for Moisture Measurement—Bases, Subgrades, and Earth Materials (Sensor Development)	State University of New York - Buffalo	29,953*	4/1/1972	9/30/1973	Completed—Report not published; included in Project 21-02(03) report
21-02(03)	Instrumentation for Moisture Measurement—Bases, Subgrades, and Earth Materials (Sensor Evaluation)	Southwest Research Institute	154,452*	9/3/1974	12/31/1979	Completed—Report not published; summarized in NCHRP Research Results Digest 121; for avail. see Summary of Progress Through 1988
21-03	Instrumentation for Measuring Scour at Bridge Piers and Abutments	Ayres Associates	915,918	12/4/1989	3/31/1997	Completed—Phase I report summary in NCHRP Research Results Digest 189; no Phase II report; Phase III published as NCHRP Reports 396, 397A, and 397B
21-04	Sealing Geotechnical Exploratory Holes to Protect the Subsurface Environment	Strata Engineering Corporation	344,510	3/1/1991	11/30/1995	Completed—Published as NCHRP Report 378
21-05	Determination of Unknown Subsurface Bridge Foundations	Olson Engineering	350,000	4/27/1992	8/28/1995	Completed—Agency report available for loan; summarized in NCHRP Research Results Digest 213
21-05(02)	Unknown Subsurface Bridge Foundation Testing	Olson Engineering	380,000	2/15/1996	6/30/2001	Completed—Report not published; agency report available for loan
21-06	Corrosion in the Soil Environment: Soil Resistivity and pH Measurements	Corpro Companies, Inc.	599,449	4/3/2000	4/2/2004	Research in progress
21-07	Development of Portable Scour Monitoring Equipment	Ayres Associates	299,938	5/2/2000	12/31/2002	Completed—To be published as NCHRP Report 515
21-08	Assessment of Innovative Load Testing of Deep Foundations	Geosciences Testing & Research, Inc.	200,000	8/23/2000	4/30/2004	Research in progress
<b>AREA TWENTY-TWO: DESIGN—VEHICLE BARRIER SYSTEMS</b>						
22-01	Concepts for Improved Traffic Barrier Systems	Walter W. White	25,000*	10/1/1970	12/31/1971	Completed—Report not published; for avail. see Summary of Progress Through 1988
22-01A	Testing and Evaluation of Bridge Rail Concepts	Texas A&M University	40,000*	3/1/1974	5/30/1975	Completed—Report not published; for avail. see Summary of Progress Through 1988; summarized in NCHRP Research Results Digest 81
22-02	Traffic Barrier Performance and Design	Southwest Research Institute	205,000*	1/1/1972	3/31/1975	Completed—Task 1 reports not publ; summarized in NCHRP Research Results Digests 84 and 102; Task 2 report published as NCHRP Report 153
22-02(02)	Multiple Service Level Highway Bridge Railings—Performance and Design Criteria	Southwest Research Institute	195,000*	8/1/1976	4/30/1979	Completed—Agency reports on Phase I and Phase II available for loan
22-02(03)	Multiple Service Level Highway Bridge Railings—Selection Procedures	Southwest Research Institute	200,000*	1/1/1979	5/31/1981	Completed—Published as NCHRP Report 239

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
22-02(04)	Procedures for Testing Highway Appurtenances	Southwest Research Institute	30,000*	5/1/1979	2/28/1981	Completed—Published as NCHRP Report 230
22-03	Field Evaluation of Vehicle Barrier Systems	Calspan Corporation	25,000*	1/1/1974	2/15/1975	Completed—Report not published; summarized in NCHRP Research Results Digest 76
22-03A	Field Evaluation of Vehicle Barrier Systems	Arthur L. Elliott	10,000*	7/1/1974	12/31/1974	Completed—Report not published; summarized in NCHRP Research Results Digest 76
22-04	Performance of Longitudinal Traffic Barriers	Southwest Research Institute	503,954*	7/1/1983	7/15/1987	Completed—Published as NCHRP Report 289
22-05	Develop Performance Standards & Hardware for Low Service Level Guardrail Systems	Southwest Research Institute	200,000	5/1/1985	3/15/1992	Completed—Research continued under Project 22-05A
22-05A	Warrants for the Installation of Low Service Level Guardrail Systems	Wilbur Smith Associates	100,000*	5/1/1990	1/31/1992	Completed—Agency report and User's Guide available for loan; summarized in NCHRP Research Results Digest 194
22-06	Roadside Safety Design for Small Vehicles	Texas A&M University	350,000*	6/1/1985	11/30/1988	Completed—Published as NCHRP Report 318
22-07	Update of "Recommended Procedures for Safety Performance Evaluation of Highway Appurtenances"	Texas A&M University	200,000*	6/1/1989	8/31/1992	Completed—Published as NCHRP Report 350
22-08	Evaluation of Performance Level Selection Criteria for Bridge Railings	Texas A&M University	200,000	4/15/1989	12/31/1995	Completed—Agency report available for loan
22-09	Improved Procedures for Cost-Effectiveness Analysis of Roadside Safety Features	Texas A&M University	250,000	9/1/1991	10/31/1998	Completed—Report not published; to be included in Project 22-09(02)
22-09(02)	Roadside Safety Analysis Program (RSAP) Enhancement, Update, and Testing	Consultant: King Mak	65,200	6/4/2001	11/30/2002	Completed—Published as NCHRP Report 492
22-09A	Roadside Safety Analysis Program	Consultant: Khasnabis	25,000	4/15/1997	4/30/1998	Completed—Report not published
22-10	Updated Materials for a Traffic Barrier/Small Sign Support Hardware Guide	Momentum Engineering	380,000	1/2/1991	12/31/1996	Completed—Two guides published by AASHTO
22-11	Evaluation of Roadside Features to Accommodate Vans, Mini-Vans, Pickup Trucks, & 4-Wheel Drive Vehicles	Texas A&M University	399,997	6/1/1994	6/30/2001	Completed—Published as NCHRP Report 471
22-12	Guidelines for the Selection, Installation, and Maintenance of Highway Safety Features	Texas A&M University	430,218	6/1/1995	10/31/2000	Completed—Report not published
22-12(02)	Selection Criteria and Guidelines for Highway Safety Features	University of Nebraska	64,592	9/12/2003	7/11/2004	Research in progress
22-13	In-Service Performance Of Traffic Barriers	University of Iowa	520,000	4/1/1996	2/28/1999	Completed—Report not published; to be included in Project 22-13(02)
22-13(02)	Expansion and Analysis of In-Service Barrier Performance Data and Planning for Establishment of a Database	Worcester Polytechnic Institute	280,000	4/1/1999	9/30/2002	Completed—Published as NCHRP Report 490

TABLE 1 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
22-14	Improvement of Procedures for the Safety-Performance Evaluation of Roadside Features	Texas A&M University	250,000	3/1/1997	5/31/2001	Completed—Report not published
22-14(02)	Improvement of Procedures for the Safety-Performance Evaluation of Roadside Features	University of Nebraska	299,987	8/9/2002	2/8/2005	Research in progress
22-15	Improving the Compatibility of Vehicles and Roadside Safety Hardware	George Washington University	300,000	2/8/1999	3/31/2003	Completed—Publication decision pending
22-16	Development and Testing of a New Guardrail System	West Virginia University	200,000	7/16/1999	6/30/2002	Completed—Summarized in NCHRP Research Results Digest 273
22-17	Recommended Guidelines for Curb and Curb-Barrier Combinations	Worcester Polytechnic Institute	500,000	4/19/2000	4/18/2004	Research in progress
22-18	Crashworthy Work-Zone Traffic Control Devices	Texas A&M University	300,000	9/1/2000	3/1/2004	Research in progress
22-19	Aesthetic Concrete Barrier and Bridge Rail Designs	Texas A&M University	579,992	9/1/2002	12/5/2004	Research in progress
22-20	Design of Roadside Barrier Systems Placed on MSE Retaining Walls		500,000			In development
<b>AREA TWENTY-THREE: SOILS AND GEOLOGY—PROPERTIES</b>						
23-00	No Projects	No Projects	0			
<b>AREA TWENTY-FOUR: SOILS AND GEOLOGY—MECHANICS AND FOUNDATIONS</b>						
24-01	Manual on Subsurface Investigations	Haley & Aldrich	75,000*	4/2/1979	12/31/1980	Completed—Report published by AASHTO
24-02	Reinforcement of Earth Slopes and Embankments	Dames & Moore	150,000*	8/22/1983	5/21/1987	Completed—Published as NCHRP Report 290
24-03	Laboratory Evaluation of Piles Installed with Vibratory Drivers	University of Houston	200,000*	1/6/1986	8/31/1988	Completed—Published as NCHRP Report 316
24-04	Load Factor Design Criteria for Highway Structure Foundations	Virginia Polytechnic Institute	459,152*	9/1/1987	2/28/1991	Completed—Published as NCHRP Report 343
24-05	Downdrag on Bitumen-Coated Piles	Texas A&M University	385,000	6/15/1988	8/31/1994	Completed—Published as NCHRP Report 393
24-06	Expert System for Stream Stability and Scour Evaluation	University of Washington	514,931	3/15/1993	6/30/1999	Completed—Published as NCHRP Report 426
24-07	Countermeasures to Protect Bridge Piers from Scour	University of Minnesota	400,000	5/1/1995	10/31/1998	Completed—Agency report available for loan
24-07(02)	Countermeasures to Protect Bridge Piers from Scour	Ayres Associates	450,000	4/1/2001	10/1/2004	Research in progress
24-08	Scour at Bridge Foundations: Research Needs	University of Louisville	166,575	2/1/1995	1/31/1997	Completed—Agency report available for loan
24-09	Static and Dynamic Lateral Loading of Pile Groups	Auburn University	499,962	6/15/1997	12/31/2000	Completed—Published as NCHRP Report 461
24-10	Thermally Sprayed Metallic Coatings to Protect Steel Pilings	Ocean City Research Corporation	300,000	7/2/1999	2/28/2003	Completed—Publication decision pending
24-11	Guidelines for Geofoam Applications in Embankment Projects	University of Illinois	199,979	7/7/1999	8/30/2002	Completed—Publication decision pending
24-11(02)	Guidelines for Geofoam Applications in Embankment Projects		300,000			In development

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
24-12	Controlled Low-Strength Material for Backfill, Utility Bedding, Void Fill, and Bridge Approaches	Delaware Transportation Institute	176,506	9/1/1998	8/31/2001	Completed—Contract transferred to University of Texas
24-12(01)	Controlled Low-Strength Material for Backfill, Utility Bedding, Void Fill, and Bridge Approaches	University of Texas - Austin	279,352	3/10/2000	4/30/2004	Research in progress
24-13	Evaluation of Metal Tensioned Systems in Geotechnical Applications	D'Appolonia	500,000	8/15/1998	3/31/2002	Completed—Published as NCHRP Report 477
24-13(01)	Evaluation of Metal Tensioned Systems in Geotechnical Applications	D'Appolonia Engineering Division	35,600	5/17/2002	10/31/2002	Completed
24-13(02)	Evaluation of Metal Tensioned Systems in Geotechnical Applications	D'Appolonia	2,980	5/21/2003	5/31/2003	Completed
24-13(03)	Evaluation of Metal Tensioned Systems in Geotechnical Applications	D'Appolonia	4,657	8/14/2003	12/31/2003	Research in progress
24-14	Scour at Contracted Bridge Sites	University of Louisville	500,000	3/16/1998	12/31/2003	Research in progress
24-15	Bridge Scour in Cohesive Materials	Texas A&M University	350,000	2/1/1999	11/30/2002	Completed—Publication decision pending
24-15(02)	Abutment Scour in Cohesive Materials		400,000			In development
24-16	Methodology for Predicting Channel Migration	Ayres Associates	549,981	1/11/1999	6/30/2003	Completed—Publication decision pending
24-17	LRFD Deep Foundation Design	University of Massachusetts - Lowell	300,000	5/13/1999	9/30/2002	Completed—To be published as NCHRP Report 507
24-18	Countermeasures to Protect Bridge Abutments from Scour	University of Mississippi	443,198	7/9/2001	8/1/2003	Terminated due to PI relocation
24-18A	Countermeasures to Protect Bridge Abutments from Scour	Michigan Tech University	363,116	8/29/2003	8/28/2005	Research in progress
24-19	Environmentally Sensitive Channel- and Bank-Protection Measures	Salix Applied Earthcare	349,811	5/30/2001	5/30/2004	Research in progress
24-20	Prediction of Scour at Bridge Abutments	University of Iowa	499,768	4/12/2002	10/12/2005	Research in progress
24-21	LRFD Soil Nailing Design and Construction Specifications	GeoSyntec Consultants	200,000	6/20/2003	12/19/2004	Research in progress
24-22	Selecting Backfill Materials for MSE Retaining Walls	Geo Testing Express, Inc.	599,973	7/23/2003	7/24/2007	Research in progress
24-23	Riprap Design Criteria, Specifications, and Quality Control	Ayres Associates	350,000	4/1/2003	9/30/2005	Research in progress
24-24	Criteria For Selecting Numeric Hydraulic Models		175,000			In development
24-25	Procedure for Managing the Risk of Unknown Bridge Foundations		250,000			In development
24-26	Effects of Debris on Pier Scour at Bridges		600,000			In development

### AREA TWENTY-FIVE: TRANSPORTATION PLANNING—IMPACT ANALYSIS

25-01	Effects of Highway Runoff on Wetlands	Rexnord, Inc.	162,189*	2/16/1981	3/16/1984	Completed—Published as NCHRP Report 264
25-02	Predicting Stop-and-Go Traffic Noise Levels	Vanderbilt University	63,145*	1/18/1988	5/31/1989	Completed—Published as NCHRP Report 311
25-03	Guidelines for the Development of Wetland Replacement Areas	URS Consulting	311,102	4/1/1989	9/30/1997	Completed—Published as NCHRP Report 379

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
25-04	Determining Economic Impacts on Adjacent Businesses Due to Restricting Left Turns	Cambridge Systematics	300,000	6/15/1992	3/31/1995	Completed—Summarized in NCHRP Research Results Digest 231
25-05	Remote Sensing and Other Technologies for the Identification and Classification of Wetlands	Normandeau Associates	299,770	6/1/1992	2/21/1996	Completed—Report not published
25-06	Intersection Air Quality Modeling	Systems Applications International	2,630,000	2/1/1993	1/31/2003	Completed—Report distribution pending
25-07	Improving Transportation Data for Mobile Source Emissions Estimates	University of Tennessee	200,000	12/1/1993	10/31/1995	Completed—Published as NCHRP Report 394
25-08	Impact of Highway Capacity Improvements on Air Quality and Energy Consumption	TRB Division B & EO	100,000	3/1/1993	7/30/1995	Completed—Published as TRB Special Report 245
25-09	Environmental Impact of Construction and Repair Materials on Surface and Ground Waters	Oregon State University	1,355,373	3/1/1994	6/30/2000	Completed—Published as NCHRP Reports 443 and 448 and available on CRP-CD-7
25-09(01)	Environmental Impact of Construction and Repair Materials on Surface and Ground Waters— Outreach and Training	Oregon State University	99,989	5/16/2002	3/31/2004	Research in progress
25-10	Estimating the Indirect Effects of Proposed Transportation Projects	Louis Berger & Associates	287,666	12/1/1993	5/31/1996	Completed—Published as NCHRP Report 403
25-10(02)	Continuation Funding for Estimating the Indirect Effects of Proposed Transportation Projects	Louis Berger & Associates	199,265	5/20/1999	5/1/2001	Completed—Published as NCHRP Report 466
25-11	Development of a Modal-Emissions Model	University of California - Riverside	2,342,604	8/15/1995	9/30/2000	Completed—Publication decision pending
25-12	Wet Detention Pond Design for Highway Runoff Pollution Control	Washington State University	580,218	4/15/1996	2/2/2002	Completed—Report not published; agency report available for loan
25-13	Assessments of Impacts of Bridge Deck Runoff Contaminants on Receiving Waters	CH2M Hill	129,556	3/15/1997	12/31/2001	Completed
25-13(02)	Assessments of Impacts of Bridge Deck Runoff Contaminants on Receiving Waters	CH2M Hill	254,280	10/1/1999	12/31/2001	Completed—Published as NCHRP Report 474
25-14	Heavy-Duty Vehicle Emissions	Cambridge Systematics	500,000	12/1/1998	10/31/2002	Completed—Publication decision pending
25-15	Short-Term Monitoring for Compliance with Air Quality Standards	CH2M Hill	200,000	12/1/1998	6/15/2002	Completed—To be published as NCHRP Report 479
25-16	Guidance for Selecting Compensatory Wetland Mitigation Options	A.D. Marble & Co., Inc.	224,784	3/1/1999	7/1/2002	Completed—Published as NCHRP Report 482
25-17	Transportation Effects of the 1997 Changes to the National Ambient Air Quality Standards (NAAQS)	ENVIRON International Corporation	539,995	3/1/1999	11/30/2002	Completed—Publication decision pending
25-18	Particulate Matter (PM <sub>2.5</sub> and PM <sub>10</sub> ) Apportionment for On-Road Mobile Sources	ARCADIS Geraghty & Miller	1,199,986	4/1/1999	3/1/2004	Research in progress
25-19	Evaluation of Methods, Tools, and Techniques to Assess the Social and Economic Effects of Transportation Projects	University of Iowa	199,935	3/29/1999	4/1/2001	Completed—Published as NCHRP Report 456

TABLE 1 (continued)

Project		Research Agency	Contract Amount	Starting Date	Completion Date	Project Status **
No.	Title					
25-20	Management of Runoff from Surface Transportation Facilities—Synthesis and Research Plan	GKY & Associates, Inc	149,889	4/14/1999	3/31/2001	Completed—Agency report available as NCHRP Web Document 37; CD-ROM desk reference available upon request
25-20(01)	Evaluation of Best Management Practices for Highway Runoff Control	Oregon State University	699,826	8/22/2002	5/21/2005	Research in progress
25-20(02)	Identification of Research Needs Related to Highway Runoff Management	Venner Consulting	49,993	4/22/2003	12/31/2003	Research in progress
25-21	Assessment of Short-Term Versus Long-Term Air Quality Effects of Traffic Flow Improvement Projects	Dowling Associates	375,000	10/19/1999	4/30/2003	Completed—Publication decision pending
25-22	Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions	CH2M Hill	179,994	3/10/2000	12/15/2001	Completed—Research results available on CRP-CD-14
25-22(02)	Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions		250,000			In development
25-23	Environmental Information Management and Decision Support System for Transportation	Booz-Allen & Hamilton	248,767	5/19/2000	8/19/2002	Completed—Published as NCHRP Report 481
25-23(02)	Software for an Environmental Information Management and Decision Support System		400,000			In development
25-24	Monitoring, Analyzing, and Reporting on the Environmental Streamlining Pilot Projects	Vanasse Hangen Brustlin, Inc.	299,988	7/13/2001	1/12/2004	Research in progress
25-25	Research for the AASHTO Standing Committee on the Environment: Support for Environmental Streamlining and Environmental Stewardship to Improve Transportation Planning and Project Development	Various	600,000			Research in progress; see CRP website for task descriptions and status
25-26	Development of a Low Impact Development Design and Construction Manual for Transportation Systems		500,000			Contract pending
25-27	Evaluation of the Use and Effectiveness of Wildlife Crossings		500,000			In development

\* Final contract cost

\*\* Information on all projects initiated under the NCHRP from its inception in 1962 through 1988 is included in the Special Edition of Summary of Progress through 1988. Subsequent to 1988, information about project status is available on the NCHRP World Wide Web site at <http://www.trb.org/trb/nchrp>.

a NCHRP funds obligated under the \$314,340 four-way agreement among the National Academy of Sciences, Michigan Department of State Highways, Wayne County, and the City of Detroit.

b NCHRP funds obligated under the \$70,000 five-way agreement among the National Academy of Sciences, Michigan Department of State Highways, Wayne County, the City of Detroit, and the University of Michigan.

c Continuing activity. Amount shown is for latest fiscal year in which funding was provided.



TABLE 2  
PUBLISHED REPORTS OF THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
*	A Critical Review of Literature Treating Methods of Identifying Aggregates Subject to Destructive Volume Change When Frozen in Concrete and a Proposed Program of Research—Intermediate Report (Proj. 4-3(2)), 81 p., \$1.80	22	Factors Influencing Flexible Pavement Performance (Proj. 1-3(2)), 69 p., \$2.60
1	Evaluation of Methods of Replacement of Deteriorated Concrete in Structures (Proj. 6-8), 56 p., \$2.80	23	Methods for Reducing Corrosion of Reinforcing Steel (Proj. 6-4), 22 p., \$1.40
2	An Introduction to Guidelines for Satellite Studies of Pavement Performance (Proj. 1-1), 19 p., \$1.80	24	Urban Travel Patterns for Airports, Shopping Centers, and Industrial Plants (Proj. 7-1), 116 p., \$5.20
2A	Guidelines for Satellite Studies of Pavement Performance, 85 p.+9 figs., 26 tables, 4 app., \$3.00	25	Potential Uses of Sonic and Ultrasonic Devices in Highway Construction (Proj. 10-7), 48 p., \$2.00
3	Improved Criteria for Traffic Signals at Individual Intersections—Interim Report (Proj. 3-5), 36 p., \$1.60	26	Development of Uniform Procedures for Establishing Construction Equipment Rental Rates (Proj. 13-1), 33 p., \$1.60
4	Non-Chemical Methods of Snow and Ice Control on Highway Structures (Proj. 6-2), 74 p., \$3.20	27	Physical Factors Influencing Resistance of Concrete to Deicing Agents (Proj. 6-5), 41 p., \$2.00
5	Effects of Different Methods of Stockpiling Aggregates—Interim Report (Proj. 10-3), 48 p., \$2.00	28	Surveillance Methods and Ways and Means of Communicating with Drivers (Proj. 3-2), 66 p., \$2.60
6	Means of Locating and Communicating with Disabled Vehicles—Interim Report (Proj. 3-4), 56 p., \$3.20	29	Digital-Computer-Controlled Traffic Signal System for a Small City (Proj. 3-2), 82 p., \$4.00
7	Comparison of Different Methods of Measuring Pavement Condition—Interim Report (Proj. 1-2), 29 p., \$1.80	30	Extension of AASHO Road Test Performance Concepts (Proj. 1-4(2)), 33 p., \$1.60
8	Synthetic Aggregates for Highway Construction (Proj. 4-4), 13 p., \$1.00	31	A Review of Transportation Aspects of Land-Use Control (Proj. 8-5), 41 p., \$2.00
9	Traffic Surveillance and Means of Communicating with Drivers—Interim Report (Proj. 3-2), 28 p., \$1.60	32	Improved Criteria for Traffic Signals at Individual Intersections (Proj. 3-5), 134 p., \$5.00
10	Theoretical Analysis of Structural Behavior of Road Test Flexible Pavements (Proj. 1-4), 31 p., \$2.80	33	Values of Time Savings of Commercial Vehicles (Proj. 2-4), 74 p., \$3.60
11	Effect of Control Devices on Traffic Operations—Interim Report (Proj. 3-6), 107 p., \$5.80	34	Evaluation of Construction Control Procedures—Interim Report (Proj. 10-2), 117 p., \$5.00
12	Identification of Aggregates Causing Poor Concrete Performance When Frozen—Interim Report (Proj. 4-3(1)), 47 p., \$3.00	35	Prediction of Flexible Pavement Deflections from Laboratory Repeated-Load Tests (Proj. 1-3(3)), 117 p., \$5.00
13	Running Cost of Motor Vehicles as Affected by Highway Design—Interim Report (Proj. 2-5), 43 p., \$2.80	36	Highway Guardrails—A Review of Current Practice (Proj. 15-1), 33 p., \$1.60
14	Density and Moisture Content Measurements by Nuclear Methods—Interim Report (Proj. 10-5), 32 p., \$3.00	37	Tentative Skid-Resistance Requirements for Main Rural Highways (Proj. 1-7), 80 p., \$3.60
15	Identification of Concrete Aggregates Exhibiting Frost Susceptibility—Interim Report (Proj. 4-3(2)), 66 p., \$4.00	38	Evaluation of Pavement Joint and Crack Sealing Materials and Practices (Proj. 9-3), 40 p., \$2.00
16	Protective Coatings to Prevent Deterioration of Concrete by Deicing Chemicals (Proj. 6-3), 21 p., \$1.60	39	Factors Involved in the Design of Asphaltic Pavement Surfaces (Proj. 1-8), 112 p., \$5.00
17	Development of Guidelines for Practical and Realistic Construction Specifications (Proj. 10-1), 109 p., \$6.00	40	Means of Locating Disabled or Stopped Vehicles (Proj. 3-4(1)), 40 p., \$2.00
18	Community Consequences of Highway Improvement (Proj. 2-2), 37 p., \$2.80	41	Effect of Control Devices on Traffic Operations (Proj. 3-6), 83 p., \$3.60
19	Economical and Effective Deicing Agents for Use on Highway Structures (Proj. 6-1), 19 p., \$1.20	42	Interstate Highway Maintenance Requirements and Unit Maintenance Expenditure Index (Proj. 14-1), 144 p., \$5.60
20	Economic Study of Roadway Lighting (Proj. 5-4), 77 p., \$3.20	43	Density and Moisture Content Measurements by Nuclear Methods (Proj. 10-5), 38 p., \$2.00
21	Detecting Variations in Load-Carrying Capacity of Flexible Pavements (Proj. 1-5), 30 p., \$1.40	44	Traffic Attraction of Rural Outdoor Recreational Areas (Proj. 7-2), 28 p., \$1.40

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TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
45	Development of Improved Pavement Marking Materials—Laboratory Phase (Proj. 5-5), 24 p., \$1.40	70	Social and Economic Factors Affecting Intercity Travel (Proj. 8-1), 68 p., \$3.00
46	Effects of Different Methods of Stockpiling and Handling Aggregates (Proj. 10-3), 102 p., \$4.60	71	Analytical Study of Weighing Methods for Highway Vehicles in Motion (Proj. 7-3), 63 p., \$2.80
47	Accident Rates as Related to Design Elements of Rural Highways (Proj. 2-3), 173 p., \$6.40	72	Theory and Practice in Inverse Condemnation for Five Representative States (Proj. 11-2), 44 p., \$2.20
48	Factors and Trends in Trip Lengths (Proj. 7-4), 70 p., \$3.20	73	Improved Criteria for Traffic Signal Systems on Urban Arterials (Proj. 3-5), 55 p., \$2.80
49	National Survey of Transportation Attitudes and Behavior—Phase I Summary Report (Proj. 20-4), 71 p., \$3.20	74	Protective Coatings for Highway Structural Steel (Proj. 4-6), 64 p., \$2.80
50	Factors Influencing Safety at Highway-Rail Grade Crossings (Proj. 3-8), 113 p., \$5.20	74A	Protective Coatings for Highway Structural Steel—Literature Survey (Proj. 4-6), 275 p., \$8.00
51	Sensing and Communication Between Vehicles (Proj. 3-3), 105 p., \$5.00	74B	Protective Coatings for Highway Structural Steel—Current Highway Practices (Proj. 4-6), 102 p., \$4.00
52	Measurement of Pavement Thickness by Rapid and Nondestructive Methods (Proj. 10-6), 82 p., \$3.80	75	Effect of Highway Landscape Development on Nearby Property (Proj. 2-9), 82 p., \$3.60
53	Multiple Use of Lands Within Highway Rights-of-Way (Proj. 7-6), 68 p., \$3.20	76	Detecting Seasonal Changes in Load-Carrying Capabilities of Flexible Pavements (Proj. 1-5(2)), 37 p., \$2.00
54	Location, Selection, and Maintenance of Highway Guardrails and Median Barriers (Proj. 15-1(2)), 63 p., \$2.60	77	Development of Design Criteria for Safer Luminaire Supports (Proj. 15-6), 82 p., \$3.80
55	Research Needs in Highway Transportation (Proj. 20-2), 66 p., \$2.80	78	Highway Noise—Measurement, Simulation, and Mixed Reactions (Proj. 3-7), 78 p., \$3.20
56	Scenic Easements—Legal, Administrative, and Valuation Problems and Procedures (Proj. 11-3), 174 p., \$6.40	79	Development of Improved Methods for Reduction of Traffic Accidents (Proj. 17-1), 163 p., \$6.40
57	Factors Influencing Modal Trip Assignment (Proj. 8-2), 78 p., \$3.20	80	Oversize-Overweight Permit Operation on State Highways (Proj. 2-10), 120 p., \$5.20
58	Comparative Analysis of Traffic Assignment Techniques with Actual Highway Use (Proj. 7-5), 85 p., \$3.60	81	Moving Behavior and Residential Choice—A National Survey (Proj. 8-6), 129 p., \$5.60
59	Standard Measurements for Satellite Road Test Program (Proj. 1-6), 78 p., \$3.20	82	National Survey of Transportation Attitudes and Behavior—Phase II Analysis Report (Proj. 20-4), 89 p., \$4.00
60	Effects of Illumination on Operating Characteristics of Freeways (Proj. 5-2), 148 p., \$6.00	83	Distribution of Wheel Loads on Highway Bridges (Proj. 12-2), 56 p., \$2.80
61	Evaluation of Studded Tire-Performance Data and Pavement Wear Measurement (Proj. 1-9), 66 p., \$3.00	84	Analysis and Projection of Research on Traffic Surveillance, Communication, and Control (Proj. 3-9), 48 p., \$2.40
62	Urban Travel Patterns for Hospitals, Universities, Office Buildings and Capitols (Proj. 7-1), 144 p., \$5.60	85	Development of Formed-in-Place Wet Reflective Markers (Proj. 5-5), 28 p., \$1.80
63	Economics of Design Standards for Low-Volume Rural Roads (Proj. 2-6), 93 p., \$4.00	86	Tentative Service Requirements for Bridge Rail Systems (Proj. 12-8), 62 p., \$3.20
64	Motorists' Needs and Services on Interstate Highways (Proj. 7-7), 88 p., \$3.60	87	Rules of Discovery and Disclosure in Highway Condemnation Proceedings (Proj. 11-1(5)), 28 p., \$2.00
65	One-Cycle Slow-Freeze Test for Evaluating Aggregate Performance in Frozen Concrete (Proj. 4-3(1)), 21 p., \$1.40	88	Recognition of Benefits to Remainder Property in Highway Valuation Cases (Proj. 11-1(2)), 24 p., \$2.00
66	Identification of Frost-Susceptible Particles in Concrete Aggregates (Proj. 4-3(2)), 62 p., \$2.80	89	Factors, Trends, and Guidelines Related to Trip Length (Proj. 7-4), 59 p., \$3.20
67	Relation of Asphalt Rheological Properties to Pavement Durability (Proj. 9-1), 45 p., \$2.20	90	Protection of Steel in Prestressed Concrete Bridges (Proj. 12-5), 86 p., \$4.00
68	Application of Vehicle Operating Characteristics to Geometric Design and Traffic Operations (Proj. 3-10), 38 p., \$2.00	91	Effects of Deicing Salts on Water Quality and Biota—Literature Review and Recommended Research (Proj. 16-1), 70 p., \$3.20
69	Evaluation of Construction Control Procedures—Aggregate Gradation Variations and Effects (Proj. 10-2A), 58 p., \$2.80	92	Valuation and Condemnation of Special Purpose Properties (Proj. 11-1(6)), 47 p., \$2.60
		93	Guidelines for Medial and Marginal Access Control on Major Roadways (Proj. 3-13), 147 p., \$6.20
		94	Valuation and Condemnation Problems Involving Trade Fixtures (Proj. 11-1(9)), 22 p., \$1.80

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
95	Highway Fog (Proj. 5-6), 48 p., \$2.40	123	Development of Information Requirements and Transmission Techniques for Highway Users (Proj. 3-12), 239 p., \$9.60
96	Strategies for the Evaluation of Alternative Transportation Plans (Proj. 8-4), 111 p., \$5.40	124	Improved Criteria for Traffic Signal Systems in Urban Networks (Proj. 3-5), 86 p., \$4.80
97	Analysis of Structural Behavior of AASHO Road Test Rigid Pavements (Proj. 1-4(1)A), 35 p., \$2.60	125	Optimization of Density and Moisture Content Measurements by Nuclear Methods (Proj. 10-5A), 86 p., \$4.40
98	Tests for Evaluating Degradation of Base Course Aggregates (Proj. 4-2), 98 p., \$5.00	126	Divergencies in Right-of-Way Valuation (Proj. 11-4), 57 p., \$3.00
99	Visual Requirements in Night Driving (Proj. 5-3), 38 p., \$2.60	127	Snow Removal and Ice Control Techniques at Interchanges (Proj. 6-10), 90 p., \$5.20
100	Research Needs Relating to Performance of Aggregates in Highway Construction (Proj. 4-8), 68 p., \$3.40	128	Evaluation of AASHO Interim Guides for Design of Pavement Structures (Proj. 1-11), 111 p., \$5.60
101	Effect of Stress on Freeze-Thaw Durability of Concrete Bridge Decks (Proj. 6-9), 70 p., \$3.60	129	Guardrail Crash Test Evaluation—New Concepts and End Designs (Proj. 15-1(2)), 89 p., \$4.80
102	Effect of Weldments on the Fatigue Strength of Steel Beams (Proj. 12-7), 114 p., \$5.40	130	Roadway Delineation Systems (Proj. 5-7), 349 p., \$14.00
103	Rapid Test Methods for Field Control of Highway Construction (Proj. 10-4), 89 p., \$5.00	131	Performance Budgeting System for Highway Maintenance Management (Proj. 19-2(4)), 213 p., \$8.40
104	Rules of Compensability and Valuation Evidence for Highway Land Acquisition (Proj. 11-1), 77 p., \$4.40	132	Relationships Between Physiographic Units and Highway Design Factors (Proj. 1-3(1)), 161 p., \$7.20
105	Dynamic Pavement Loads of Heavy Highway Vehicles (Proj. 15-5), 94 p., \$5.00	133	Procedures for Estimating Highway User Costs, Air Pollution, and Noise Effects (Proj. 7-8), 127 p., \$5.60
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107	New Approaches to Compensation for Residential Takings (Proj. 11-1(10)), 27 p., \$2.40	135	Promising Replacements for Conventional Aggregates for Highway Use (Proj. 4-10), 53 p., \$3.60
108	Tentative Design Procedure for Riprap-Lined Channels (Proj. 15-2), 75 p., \$4.00	136	Estimating Peak Runoff Rates from Ungaged Small Rural Watersheds (Proj. 15-4), 85 p., \$4.60
109	Elastomeric Bearing Research (Proj. 12-9), 53 p., \$3.00	137	Roadside Development—Evaluation of Research (Proj. 16-2), 78 p., \$4.20
110	Optimizing Street Operations Through Traffic Regulations and Control (Proj. 3-11), 100 p., \$4.40	138	Instrumentation for Measurement of Moisture—Literature Review and Recommended Research (Proj. 21-1), 60 p., \$4.00
111	Running Costs of Motor Vehicles as Affected by Road Design and Traffic (Proj. 2-5A and 2-7), 97 p., \$5.20	139	Flexible Pavement Design and Management—Systems Formulation (Proj. 1-10), 64 p., \$4.40
112	Junkyard Valuation—Salvage Industry Appraisal Principles Applicable to Highway Beautification (Proj. 11-3(2)), 41 p., \$2.60	140	Flexible Pavement Design and Management—Materials Characterization (Proj. 1-10), 118 p., \$5.60
113	Optimizing Flow on Existing Street Networks (Proj. 3-14), 414 p., \$15.60	141	Changes in Legal Vehicle Weights and Dimensions—Some Economic Effects on Highways (Proj. 19-3), 184 p., \$8.40
114	Effects of Proposed Highway Improvements on Property Values (Proj. 11-1(1)), 42 p., \$2.60	142	Valuation of Air Space (Proj. 11-5), 48 p., \$4.00
115	Guardrail Performance and Design (Proj. 15-1(2)), 70 p., \$3.60	143	Bus Use of Highways—State of the Art (Proj. 8-10), 406 p., \$16.00
116	Structural Analysis and Design of Pipe Culverts (Proj. 15-3), 155 p., \$6.40	144	Highway Noise—A Field Evaluation of Traffic Noise Reduction Measures (Proj. 3-7), 80 p., \$4.40
117	Highway Noise—A Design Guide for Highway Engineers (Proj. 3-7), 79 p., \$4.60	145	Improving Traffic Operations and Safety at Exit Gore Areas (Proj. 3-17), 120 p., \$6.00
118	Location, Selection, and Maintenance of Highway Traffic Barriers (Proj. 15-1(2)), 96 p., \$5.20	146	Alternative Multimodal Passenger Transportation Systems—Comparative Economic Analysis (Proj. 8-9), 68 p., \$4.00
119	Control of Highway Advertising Signs—Some Legal Problems (Proj. 11-3(1)), 72 p., \$3.60	147	Fatigue Strength of Steel Beams with Welded Stiffeners and Attachments (Proj. 12-7), 85 p., \$4.80
120	Data Requirements for Metropolitan Transportation Planning (Proj. 8-7), 90 p., \$4.80		
121	Protection of Highway Utility (Proj. 8-5), 115 p., \$5.60		
122	Summary and Evaluation of Economic Consequences of Highway Improvements (Proj. 2-11), 324 p., \$13.60		

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
148	Roadside Safety Improvement Programs on Freeways—A Cost-Effectiveness Priority Approach (Proj. 20-7), 64 p., \$4.00	175	Freeway Lane Drops (Proj. 3-16), 72 p., \$4.80
149	Bridge Rail Design—Factors, Trends, and Guidelines (Proj. 12-8), 49 p., \$4.00	176	Studded Tires and Highway Safety—Feasibility of Determining Indirect Effects (Proj. 1-13(2)), 42 p., \$4.00
150	Effect of Curb Geometry and Location on Vehicle Behavior (Proj. 20-7), 88 p., \$4.80	177	Freight Data Requirements for Statewide Transportation Systems Planning—Research Report (Proj. 8-17), 196 p., \$8.80
151	Locked-Wheel Pavement Skid Tester Correlation and Calibration Techniques (Proj. 1-12(2)), 100 p., \$6.00	178	Freight Data Requirements for Statewide Transportation Systems Planning—User's Manual (Proj. 8-17), 155 p., \$7.40
152	Warrants for Highway Lighting (Proj. 5-8), 117 p., \$6.40	179	Evaluating Options in Statewide Transportation Planning/Programming—Issues, Techniques, and Their Relationships (Proj. 8-18), 91 p., \$5.60
153	Recommended Procedures for Vehicle Crash Testing of Highway Appurtenances (Proj. 22-2), 19 p., \$3.20	180	Cathodic Protection for Reinforced Concrete Bridge Decks—Laboratory Phase (Proj. 12-13), 135 p., \$7.00
154	Determining Pavement Skid Resistance Requirements at Intersections and Braking Sites (Proj. 1-12), 64 p., \$4.40	181	Subcritical Crack Growth and Fracture of Bridge Steels (Proj. 12-14), 82 p., \$5.60
155	Bus Use of Highways—Planning and Design Guidelines (Proj. 8-10), 161 p., \$7.60	182	Economic Evaluation of Ice and Frost on Bridge Decks (Proj. 6-11), 73 p., \$4.80
156	Transportation Decision-Making—A Guide to Social and Environmental Considerations (Proj. 8-8(3)), 135 p., \$7.20	183	Studded Tires and Highway Safety—An Accident Analysis (Proj. 1-13), 70 p., \$4.80
157	Crash Cushions of Waste Materials (Proj. 20-7), 73 p., \$4.80	184	Influence of Combined Highway Grade and Horizontal Alignment on Skidding (Proj. 1-14), 33 p., \$3.20
158	Selection of Safe Roadside Cross Sections (Proj. 20-7), 57 p., \$4.40	185	Grade Effects on Traffic Flow Stability and Capacity (Proj. 3-19), 110 p., \$6.40
159	Weaving Areas—Design and Analysis (Proj. 3-15), 119 p., \$6.40	186	Travel Estimation Procedures for Quick Response to Urban Policy Issues (Proj. 8-12A), 70 p., \$5.60
160	Flexible Pavement Design and Management—Systems Approach Implementation (Proj. 1-10A), 53 p., \$4.00	187	Quick-Response Urban Travel Estimation Techniques and Transferable Parameters—User's Guide (Proj. 8-12A), 229 p., \$10.20
161	Techniques for Reducing Roadway Occupancy During Routine Maintenance Activities (Proj. 14-2), 55 p., \$4.40	188	Fatigue of Welded Steel Bridge Members Under Variable-Amplitude Loadings (Proj. 12-12), 113 p., \$6.40
162	Methods for Evaluating Highway Safety Improvements (Proj. 17-2A), 150 p., \$7.40	189	Quantifying the Benefits of Separating Pedestrians and Vehicles (Proj. 20-10), 127 p., \$7.00
163	Design of Bent Caps for Concrete Box-Girder Bridges (Proj. 12-10), 124 p., \$6.80	190	Use of Polymers in Highway Concrete (Proj. 18-2), 77 p., \$5.60
164	Fatigue Strength of High-Yield Reinforcing Bars (Proj. 4-7), 90 p., \$5.60	191	Effect of Air Pollution Regulations on Highway Construction and Maintenance (Proj. 20-12), 81 p., \$7.00
165	Waterproof Membranes for Protection of Concrete Bridge Decks—Laboratory Phase (Proj. 12-11), 70 p., \$4.80	192	Predicting Moisture-Induced Damage to Asphaltic Concrete (Proj. 4-8(3)), 46 p., \$5.20
166	Waste Materials as Potential Replacements for Highway Aggregates (Proj. 4-10A), 94 p., \$5.60	193	Beneficial Effects Associated with Freeway Construction—Environmental, Social, and Economic (Proj. 20-13), 110 p., \$7.80
167	Transportation Planning for Small Urban Areas (Proj. 8-7A), 71 p., \$4.80	194	Traffic Control in Oversaturated Street Networks (Proj. 3-18(2)), 152 p., \$9.60
168	Rapid Measurement of Concrete Pavement Thickness and Reinforcement Location—Field Evaluation of Nondestructive Systems (Proj. 10-8), 63 p., \$4.80	195	Minimizing Premature Cracking in Asphaltic Concrete Pavement (Proj. 9-4), 51 p., \$6.00
169	Peak-Period Traffic Congestion—Options for Current Programs (Proj. 7-10), 65 p., \$4.80	196	Reconditioning Heavy-Duty Freeways in Urban Areas (Proj. 14-4), 60 p., \$6.40
170	Effects of Deicing Salts on Plant Biota and Soils—Experimental Phase (Proj. 16-1), 88 p., \$5.60	197	Cost and Safety Effectiveness of Highway Design Elements (Proj. 3-25), 237 p., \$10.60
171	Highway Fog—Visibility Measures and Guidance Systems (Proj. 5-6A), 40 p., \$4.00	198	State Laws and Regulations on Truck Size and Weight (Proj. 20-16), 117 p., \$7.20
172	Density Standards for Field Compaction of Granular Bases and Subbases (Proj. 4-8(2)), 73 p., \$4.80	199	Evaluating Options in Statewide Transportation Planning/Programming—Techniques and Applications (Proj. 8-18), 190 p., \$9.00
173	Highway Noise—Generation and Control (Proj. 3-7), 174 p., \$8.00		
174	Highway Noise—A Design Guide for Prediction and Control (Proj. 3-7), 193 p., \$9.60		

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
200	Monitoring Carbon Monoxide Concentrations in Urban Areas (Proj. 20-14), 41 p., \$5.20	222	Bridges on Secondary Highways and Local Roads—Rehabilitation and Replacement (Proj. 12-20), 132 p., \$9.20
201	Acceptance Criteria for Electroslag Weldments in Bridges (Proj. 10-10), 44 p., \$5.20	223	Maintenance Levels-of-Service Guidelines (Proj. 14-5), 118 p., \$8.80
202	Improved Pavement-Shoulder Joint Design (Proj. 14-3), 103 p., \$7.20	224	Guidelines for Recycling Pavement Materials (Proj. 1-17), 137 p., \$9.20
203	Safety at Narrow Bridge Sites (Proj. 20-7, Task 7), 63 p., \$6.00	225	Plastic Pipe for Subsurface Drainage of Transportation Facilities (Proj. 4-11), 153 p., \$9.60
204	Bridge Deck Joint-Sealing Systems—Evaluation and Performance Specification (Proj. 10-11), 46 p., \$5.60	226	Damage Evaluation and Repair Methods for Prestressed Concrete Bridge Members (Proj. 12-21), 66 p., \$7.20
205	Implementing Packages of Congestion-Reducing Techniques—Strategies for Dealing with Institutional Problems of Cooperative Programs (Proj. 7-10(2)), 128 p., \$7.60	227	Fatigue Behavior of Full-Scale Welded Bridge Attachments (Proj. 12-15(3)), 47 p., \$6.40
206	Detection and Repair of Fatigue Damage in Welded Highway Bridges (Proj. 12-15 & 12-15(2)), 85 p., \$6.80	228	Calibration of Response-Type Road Roughness Measuring Systems (Proj. 1-18), 81 p., \$7.60
207	Upgrading of Low-Quality Aggregates for PCC and Bituminous Pavements (Proj. 4-12), 91 p., \$7.20	229	Methods for Analyzing Fuel Supply Limitation on Passenger Travel (Proj. 8-23), 132 p., \$9.20
208	Market Opportunity Analysis for Short-Range Public Transportation Planning—Procedures for Evaluating Alternative Service Concepts (Proj. 8-16), 80 p., \$6.80	230	Recommended Procedures for the Safety Performance Evaluation of Highway Appurtenances (Proj. 22-2(4)), 42 p., \$6.00
209	Market Opportunity Analysis for Short-Range Public Transportation Planning—Transportation Services for the Transportation Disadvantaged (Proj. 8-16), 52 p., \$6.00	231	State Transportation Finance Within the Context of Energy Constraints (Proj. 8-22), 86 p., \$7.60
210	Market Opportunity Analysis for Short-Range Public Transportation Planning—Economic, Energy, and Environmental Impacts (Proj. 8-16), 45 p., \$6.00	232	Guidelines for Selection of Ramp Control Systems (Proj. 3-22A), 108 p., \$8.40
211	Market Opportunity Analysis for Short-Range Public Transportation Planning—Goals and Policy Development, Institutional Constraints, and Alternative Organizational Arrangements (Proj. 8-16), 161 p., \$9.20	233	Selecting Traffic Signal Control at Individual Intersections (Proj. 3-27), 133 p., \$9.20
212	Market Opportunity Analysis for Short-Range Public Transportation Planning—Method and Demonstration (Proj. 8-16), 132 p., \$10.00	234	Galvanic Cathodic Protection for Reinforced Concrete Bridge Decks—Field Evaluation (Proj. 12-13A), 64 p., \$6.80
*	Freeway Traffic Management (Proj. 20-3D), 68 p., \$4.00	235	Effectiveness of Changeable Message Displays in Advance of High-Speed Freeway Lane Closures (Proj. 3-21(2)), 49 p., \$7.00
213	Bayesian Methodology for Verifying Recommendations to Minimize Asphalt Pavement Distress (Proj. 9-4A), 52 p., \$6.00	236	Evaluation of Traffic Controls for Highway Work Zones (Proj. 17-4, 17-4(2)), 189 p., \$12.00
214	Design and Traffic Control Guidelines for Low-Volume Rural Roads (Proj. 20-7, Task 13), 41 p., \$5.60	237	Locating Voids Beneath Pavement Using Pulsed Electromagnetic Wave Techniques (Proj. 10-14), 40 p., \$6.80
215	Pavement Management System Development (Proj. 20-7, Task 15), 32 p., \$5.20	238	Estimating Exceedances and Design Values from Data Collected by Urban Ozone Monitoring Networks (Proj. 20-14A), 121 p., \$9.60
216	The No-Action Alternative—Research Report (Proj. 811), 72 p., \$6.80	239	Multiple-Service-Level Highway Bridge Railing Selection Procedures (Proj. 22-2(3)), 161 p., \$10.40
217	The No-Action Alternative—Impact Assessment Guidelines (Proj. 8-11), 174 p., \$9.60	240	A Manual to Determine Benefits of Separating Pedestrians and Vehicles (Proj. 20-10(2)), 56 p., \$7.20
218A	Ecological Effects of Highway Fills on Wetlands – Research Report (Proj. 20-15), 34 p., \$5.20	241	Guidelines for Using Vanpools and Carpools as a TSM Technique (Proj. 8-21), 154 p., \$10.40
218B	Ecological Effects of Highway Fills on Wetlands—User's Manual (Proj. 20-15), 99 p., \$7.20	242	Ultrasonic Measurement of Weld Flaw Size (Proj. 10-13), 76 p., \$8.00
219	Application of Traffic Conflict Analyses at Intersections (Proj. 17-3), 109 p., \$7.60	243	Rehabilitation and Replacement of Bridges on Secondary Highways and Local Roads (Proj. 12-20), 46 p., \$6.80
220	Erosion Control During Highway Construction—Research Report (Proj. 16-3), 30 p., \$5.60	244	Concrete Sealers for Protection of Bridge Structures (Proj. 12-19A), 138 p., \$10.00
221	Erosion Control During Highway Construction—Manual on Principles and Practices (Proj. 16-3), 108 p., \$14.40	245	Methodology for Evaluating Highway Air Pollution Dispersion Models (Proj. 20-18), 85 p., \$8.40

\* Special publication

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
246	Predicting Moisture-Induced Damage to Asphaltic Concrete—Field Evaluation (Proj. 4-8(3)) 50 p., \$7.20	272	Performance of Weathering Steel in Bridges (Proj. 10-22), 164 p., \$12.00
247	Effectiveness of Clear Recovery Zones (Proj. 17-5) 68 p., \$7.20	273	Manual for the Selection of Optimal Maintenance Levels of Service (Proj. 14-5(2)), 81 p., \$9.20
248	Elastomeric Bearings Design, Construction, and Materials (Proj. 10-20), 82 p., \$8.40	274	Use of Antistripping Additives in Asphaltic Concrete Mixtures—Laboratory Phase (Proj. 10-17), 50 p., \$7.60
249	Peak-Hour Traffic Signal Warrant (Proj. 3-20A), 71 p., \$7.60	275	Pavement Roughness and Rideability (Proj. 1-23), 69 p., \$8.80
250	New Approaches to Understanding Travel Behavior (Proj. 8-14A), 142 p., \$10.00	276	Thermal Effects in Concrete Bridge Superstructures (Proj. 12-22), 99 p., \$9.60
251	Assessment of Deficiencies and Preservation of Bridge Substructures Below the Waterline (Proj. 10-16), 80 p., \$8.40	277	Portland Cement Concrete Pavement Evaluation System (COPES) (Proj. 1-19), 175 p., \$12.80
252	Adding Dust Collector Fines to Asphalt Paving Mixtures (Proj. 10-19), 90 p., \$8.40	278	Cathodic Protection of Concrete Bridge Substructures (Proj. 12-19B), 60 p., \$8.40
253	Application of Disaggregate Travel Demand Models (Proj. 8-13(2)), 207 p., \$12.40	279	Intersection Channelization Design Guide (Proj. 3-30), 153 p., \$25.00
254	Shoulder Geometrics and Use Guidelines (Proj. 1-22), 71 p., \$7.60	280	Guidelines for Evaluation and Repair of Damaged Prestressed Concrete Bridge Members (Proj. 12-21), 84 p., \$9.20
255	Highway Traffic Data for Urbanized Area Project Planning and Design (Proj. 8-26), 191 p., \$11.60	281	Joint Repair Methods for Portland Cement Concrete Pavements—Design and Construction Guidelines (Proj. 1-21), 83 p., \$9.20
256	Partial Lighting of Interchanges (Proj. 5-9), 81 p., \$8.40	282	Multilane Design Alternatives for Improving Suburban Highways (Proj. 2-13), 71 p., \$8.50
257	Long-Term Rehabilitation of Salt-Contaminated Bridge Decks (Proj. 18-2(3)), 32 p., \$6.40	283	Training Aid for Applying NCHRP Report 263—Simplified Procedures for Evaluating Low-Cost TSM Projects (Proj. 7-11A), 34 p., \$7.20
258	Control of Air Content in Concrete (Proj. 10-18), 84 p., \$8.40	284	Evaluation of Procedures Used to Measure Cement and Water Content in Fresh Concrete (Proj. 10-25), 76 p., \$9.20
259	Design of Emulsified Asphalt Paving Mixtures (Proj. 9-5), 97 p., \$8.80	285	Evaluating Alternative Maintenance Strategies (Proj. 14-6), 86 p., \$10.40
260	Application of Statewide Freight Demand Forecasting Techniques (Proj. 20-17A), 210 p., \$12.80	286	Evaluation of Fatigue Tests and Design Criteria on Welded Details (Proj. 12-15(5)), 66 p., \$8.40
261	Cost-Effectiveness of Transportation Services for Handicapped Persons—Research Report (Proj. 8-27), 130 p., \$9.60	287	Load Distribution and Connection Design for Precast Stemmed Multibeam Bridge Superstructures (Proj. 12-24), 137 p., \$11.80
262	Planning Transportation Services for Handicapped Persons—User's Guide (Proj. 8-27), 74 p., \$8.00	288	Evaluating Grade-Separated Rail-Highway Crossing Alternatives (Proj. 3-31), 87 p., \$10.80
263	Simplified Procedures for Evaluating Low-Cost TSM Projects—User's Manual (Proj. 7-11), 209 p., \$12.80	289	Performance of Longitudinal Traffic Barriers (Proj. 22-4), 169 p., \$13.20
264	Guidelines for the Management of Highway Runoff on Wetlands (Proj. 25-1), 166 p., \$10.80	290	Reinforcement of Earth Slopes and Embankments (Proj. 24-2), 323 p., \$40.00
265	Removal of Lead-Based Bridge Paints (Proj. 10-23), 72 p., \$8.00	291	Development of Pavement Structural Subsystems (Proj. 1-10B), 59 p., \$8.80
266	Forecasting Inputs to Transportation Planning (Proj. 8-24), 117 p., \$9.60	292	Strength Evaluation of Existing Reinforced Concrete Bridges (Proj. 10-15), 133 p., \$14.00
267	Steel Bridge Members Under Variable Amplitude Long Life Fatigue Loading (Proj. 12-15(4)), 26 p., \$6.40	293	Methods of Strengthening Existing Highway Bridges (Proj. 12-28(4)), 114 p., \$12.00
268	Influence of Asphalt Temperature Susceptibility on Pavement Construction and Performance (Proj. 1-20), 62 p., \$7.60	294A	Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas—Research Report (Proj. 20-19), 92 p., \$10.40
269	Paving with Asphalt Cements Produced in the 1980's (Proj. 1-20), 28 p., \$6.40	294B	Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas—State-of-the-Art Report (Proj. 20-19), 165 p., \$12.40
270	Parameters Affecting Stopping Sight Distance (Proj. 15-8), 169 p., \$11.20		
271	Guidelines for Evaluation and Repair of Damaged Steel Bridge Members (Proj. 12-17A), 64 p., \$7.60		

TABLE 2 (continued)

REPORT		REPORT	
NO.	TITLE, TOPIC, PAGES, PRICE	NO.	TITLE, TOPIC, PAGES, PRICE
295	Automated Field Survey Data Collection System (Proj. 20-21), 107 p., \$13.20	321	Welded Repair of Cracks in Steel Bridge Members (Proj. 12-27), 46 p., \$8.00
296	Durability of In-Place Concrete Containing High-Range Water-Reducing Admixtures (Proj. 10-32), 63 p., \$10.40	322	Design of Precast Prestressed Bridge Girders (Proj. 12-29), 97 p., \$11.00
297	Evaluation of Bridge Deck Protective Strategies (Proj. 12-32), 80 p., \$12.00	323	Travel Characteristics at Large-Scale Suburban Activity Centers (Proj. 3-38(2)), 106 p., \$11.00
298	Performance of Elastomeric Bearings (Proj. 10-20), 100 p., \$12.00	324	Evaluation of Safety Roadside Rest Areas (Proj. 2-15), 129 p., \$12.00
299	Fatigue Evaluation Procedures for Steel Bridges (Proj. 12-28(3)), 94 p., \$11.20	325	Low Temperature Behavior and Acceptance Criteria for Elastomeric Bridge Bearings (Proj. 10-20), 69 p., \$9.00
300	Bridge Management Systems (Proj. 12-28(2)), 74 p., \$10.40	326	Development of a Roadway Design/Graphics Interface System (Proj. 15-10), 18 p., \$8.00
301	Load Capacity Evaluation of Existing Bridges (Proj. 12-28(1)), 104 p., \$11.60	327	Determining Asphaltic Concrete Pavement Structural Properties by Nondestructive Testing (Proj. 10-27), 105 p., \$11.00
302	Fatigue and Fracture Evaluation for Rating Riveted Bridges (Proj. 12-25), 86 p., \$11.20	328	Forecasting the Basic Inputs to Transportation Planning at the Zonal Level (Proj. 8-24A) 55 p., \$9.00
303	Feasibility of a National Heavy Vehicle Monitoring System (Proj. 3-34), 68 p., \$10.00	329	Using Market Research to Improve Management of Transportation Systems (Proj. 20-24(1)), 75 p., \$10.00
304	Determining Deteriorated Areas in Portland Cement Concrete Pavements Using Radar and Video Imaging (Proj. 10-28), 107 p., \$14.00	330	Effective Utilization of Street Width on Urban Arterials (Proj. 3-38(5)), 49 p., \$9.00
305	Environmental Monitoring and Evaluation of Calcium Magnesium Acetate (CMA) (Proj. 4-17), 160 p., \$13.60	331	Strategic Planning and Management Guidelines for Transportation Agencies (Proj. 8-28), 49 p., \$9.00
306	Correlation of Bridge Load Capacity Estimates with Test Data (Proj. 12-28(8)), 75 p., \$11.20	332	Framework for Development of Performance-Related Specifications for Hot-Mix Asphaltic Concrete (Proj. 10-26A), 118 p., \$12.00
307	Public and Private Partnerships for Financing Highway Improvements (Proj. 2-14), 83 p., \$11.20	333	Guidelines for Evaluating Corrosion Effects in Existing Steel Bridges (Proj. 12-28(7)), 140 p., \$30.00
308	Pavement Roughness and Rideability—Field Evaluation (Proj. 1-23(2)), 48 p., \$9.00	334	Improvements in Data Acquisition Technology for Maintenance Management Systems (Proj. 14-10), 51 p., \$9.00
309	Protection of Pipelines Through Highway Roadbeds (Proj. 15-9), 21 p., \$8.00	335	Acceptance Criteria for Steel Bridge Welds (Proj. 10-31), 26 p., \$7.00
310	Dealing with Hazardous Waste Sites—A Compendium for Highway Agencies (Proj. 20-22), 107 p., \$12.00	336	Distortion-Induced Fatigue Cracking in Steel Bridges (Proj. 12-28(6)), 43 p., \$10.00
311	Predicting Stop-and-Go Traffic Noise Levels (Proj. 25-2), 97 p., \$11.00	337	Service Vehicle Lighting and Traffic Control Systems for Short Term and Moving Operations (Proj. 17-6A), 56 p., \$10.00
312	Condition Surveys of Concrete Bridge Components—User's Manual (Proj. 12-28(5)), 84 p., \$11.00	338	Asphalt-Aggregate Mixture Analysis System—AAMAS (Proj. 9-6(1)), 185 p., \$20.00
313	Corrosion Protection of Prestressing Systems in Concrete Bridges (Proj. 4-15) 25 p., \$8.00	339	Effects of the Quality of Traffic Signal Progression on Delay (Proj. 3-28C), 100 p., \$11.00
314	Guidelines for the Use of Weathering Steel in Bridges (Proj. 10-22), 98 p., \$16.00	340	Assessment of Advanced Technologies for Relieving Urban Traffic Congestion (Proj. 3-38(1)), 98 pp. \$11.00
315	Potential Benefits of Geosynthetics in Flexible Pavement Systems (Proj. 10-33), 56 p., \$9.00	341	Bond and Insurance Coverages for Highway Construction Contractors (Proj. 20-26), 47 p., \$8.00
316	Laboratory Evaluation of Piles Installed with Vibratory Drivers (Proj. 24-3), 51 p., \$9.00	342	Primer on Transportation, Productivity and Economic Development (Proj. 2-17(1)), 127 p., \$12.00
317	Transient Protection, Grounding, and Shielding of Electronic Traffic Control Equipment (Proj. 10-34), 84 p., \$11.00	343	Manuals for the Design of Bridge Foundations: Shallow Foundations, Driven Piles, Retaining Walls and Abutments, Drilled Shafts, Estimating Tolerable Movements, Load Factor Design Specifications and Commentary (Proj. 24-4), 308 p., \$45.00
318	Roadside Safety Design for Small Vehicles (Proj. 22-6), 70 p., \$10.00	344	Maintenance Contracting (Proj. 14-9(3)), 111 p. \$9.00
319	Recommended Guidelines for Redundancy Design and Rating of Two-Girder Steel Bridges (Proj. 12-28(10)), 142 p., \$13.00		
320	Guidelines for Converting STOP to YIELD Control at Intersections (Proj. 17-7), 49 p., \$9.00		

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
345	Single Point Urban Interchange Design and Operations Analysis (Proj. 3-40), 101 p., \$12.00	369	Use of Shoulders and Narrow Lanes to Increase Freeway Capacity (Proj. 3-43), 78 p., \$25.00
346	Implementation Strategies for Sign Retroreflectivity Standards (Proj. 5-11), 44 p., \$9.00	370	Performance of Epoxy-Coated Reinforcing Steel in Highway Bridges (Proj. 10-37), 154 p., \$31.00
347	Civil Engineering Careers: Awareness, Retention, and Curriculum (Proj. 20-24(3)), 118 p., \$12.00	371	State Departments of Transportation—Strategies for Change (Proj. 20-24(9)), 134 p., \$31.00
347—Part II	Civil Engineering Careers: A User's Guide for Awareness, Retention, and Curriculum Programs (Proj. 20-24(3)), 108 p., \$25.00	372	Support Under Concrete Pavements (Proj. 1-30), 50 p., \$21.00
348	Access Management Guidelines for Activity Centers (Proj. 3-38(7)), 112 p., \$12.00	373	Use of Antistripping Additives in Asphaltic Concrete Mixtures (Proj. 10-17) 52 p., \$21.00
349	Maintenance Considerations in Highway Design (Proj. 14-9(2)), 82 p., \$10.00	374	Effect of Highway Standards on Safety (Proj. 17-9), 82 p., \$25.00
350	Recommended Procedures for the Safety Performance Evaluation of Highway Features (Proj. 22-7), 132 pp., \$13.00	375	Median Intersection Design (Proj. 15-14(2)), 100 p., \$25.00
351	Hazardous Wastes in Highway Rights of Way (Proj. 20-28), 114 p., \$28.00	376	Customer-Based Quality in Transportation (Proj. 20-24(10)), 56 p., \$22.00
352	Inelastic Rating Procedures for Steel Beam and Girder Bridges (Proj. 12-28(12)), 112 p., \$13.00	377	Alternatives to Motor Fuel Taxes for Financing Surface Transportation Improvements (Proj. 20-24(7), 158 p., \$35.00
353	Effects of Heavy-Vehicle Characteristics on Pavement Response and Performance (Proj. 1-25(1)), 126 p., \$15.00	378	Recommended Guidelines for Sealing Geotechnical Exploratory Holes (Proj. 21-4), 50 p., \$20.00
354	Resistance of Welded Details Under Variable Amplitude Long-Life Fatigue Loading (Proj. 12-15(5)), 32 p., \$10.00	379	Guidelines for the Development of Wetland Replacement Areas (Proj. 25-3), 448 p., \$65.00
355	Notch Toughness Variability in Bridge Steel Plates (Proj. 12-31), 62 p., \$21.00	380	Transverse Cracking in Newly Constructed Bridge Decks (Proj. 12-37), 126 p., \$32.00
356	Anchorage Zone Reinforcement for Post-Tensioned Concrete Girders (Proj. 10-29), 204 p., \$41.00	381	Report on the 1995 Scanning Review of European Bridge Structures (Proj. 20-36), 30 p., \$18.00
357	Measuring State Transportation Program Performance (Proj. 20-24(6)A), 96 p., \$24.00	382	Facilitating the Implementation of Research Findings: A Summary Report (Proj. 20-33), 18 p., \$18.00
358	Traffic Barriers and Control Treatments for Restricted Work Zones (Proj. 17-8), 112 p., \$25.00	383	Intersection Sight Distance (Proj. 15-14(1)), 108 p., \$28.00
359	Adaptation of Geographic Information Systems for Transportation (Proj. 20-27), 70 p., \$24.00	384	Plasma Arc Cutting of Bridge Steels (Proj. 10-40), 92 p., \$27.00
360	Professional Development of Maintenance Engineers and Managers (Proj. 14-9(6)), 116 p., \$25.00	385	Comparison of the 1994 <i>Highway Capacity Manual's</i> Ramp Analysis Procedures and the FRESIM Model (Proj. 3-37(2)), 118 p., \$28.00
361	Field Demonstrations of Advanced Data Acquisition Technology for Maintenance Management (Proj. 14-10), 116 p., \$25.00	386	Design and Evaluation of Large-Stone Asphalt Mixes, (Proj. 4-18), 142 p., \$34.00
362	Roadway Widths for Low-Traffic-Volume Roads (Proj. 15-12), 112 p., \$25.00	387	Planning Techniques to Estimate Speeds and Service Volumes for Planning Applications (Proj. 3-55(2)), 146 p., \$34.00
363	Role of Highway Maintenance in Integrated Management Systems (Proj. 14-9(4)), 148 p., \$28.00	388	A Guidebook for Forecasting Freight Transportation Demand (Proj. 8-30), 164 p., \$39.00
364	Public Outreach Handbook for Departments of Transportation (Proj. 20-24(5)), 42 p., \$24.00	389	Macroeconomic Analysis of the Linkages Between Transportation Investments and Economic Performance (Proj. 2-17(3)), 83 p., \$25.00
365	Travel Estimation Techniques for Urban Planning (Proj. 8-29(2)), 170 p., \$41.00	390	Constructibility Review Process for Transportation Facilities (Proj. 10-42), 88 p., \$25.00
366	Guidelines for Effective Maintenance-Budgeting Strategies (Proj. 14-9(1)), 48 p., \$16.00	391	Constructibility Review Process for Transportation Facilities--Workbook (Proj. 10-42), 184 p., \$25.00
367	Long-Term Performance of Geosynthetics in Drainage Applications (Proj. 15-13), 60 p., \$21.00	392	Pavement Marking Materials: Assessing Environment-Friendly Performance (Proj. 4-22), 60 p., \$24.00
368	Calibration of LRFD Bridge Design Code (Proj. 12-33), 210 p., \$53.00.	393	Design and Construction Guidelines for Downdrag on Uncoated and Bitmen-Coated Piles (Proj. 24-5), 118 p., \$29.00
		394	Improving Transportation Data for Mobile Source Emission Estimates (Proj. 25-7), 128 p., \$34.00



TABLE 2 (continued)

REPORT		REPORT	
NO.	TITLE, TOPIC, PAGES, PRICE	NO.	TITLE, TOPIC, PAGES, PRICE
395	Capacity and Operation Effects of Midblock Left-Turn Lanes (Proj. 3-49), 135 p., \$34.00	420	Impacts of Access Management Techniques (Proj. 3-52), 157 p., \$42.00
396	Instrumentation for Measuring Scour at Bridge Piers and Abutments (Proj. 21-3), 110 p., \$29.00	421	Economic Trends and Multimodal Transportation Requirements (Proj. 2-20), 197 p., \$53.00
397A	Sonar Scour Monitor: Installation, Operation, and Fabrication Manual (Proj. 21-3), 38 p., \$20.00	422	Maintenance QA Program Implementation Manual (Proj. 14-12), 117 p., \$31.00
397B	Magnetic Sliding Collar Scour Monitor: Installation, Operation, and Fabrication Manual (Proj. 21-3), 40 p., \$20.00	423A	Land Use Impacts of Transportation: A Guidebook (Proj. 8-32(3)), 165 p., \$42.00
398	Quantifying Congestion (Proj. 7-13), Vol. 1, 102 p., \$28.00; Vol. 2, 104 p., \$28.00	424	Improved Design Specifications for Horizontally Curved Steel Girder Highway Bridges (Proj. 12-38), 130 p., \$37.00
399	Long-Term Availability of Multimodal Corridor Capacity (Proj. 8-31A), 196 p., \$51.00	425	Designing Stone Matrix Asphalt Mixtures for Rut-Resistant Pavements (Proj. 9-8), 99 p., \$27.00
400	Determination of Stopping Sight Distances (Proj. 3-42), 122 p., \$30.00	426	CAESAR: An Expert System for Evaluation of Scour and Stream Stability (Proj. 24-6), 24 p., \$21.00
401	Guidance Manual for Managing Transportation Planning Data (Proj. 8-32(5)), 32 p., \$20.00	427	Implementation Plan for Automating Highway-Materials Testing (Proj. 4-25), 49 p., \$24.00
402	Fatigue Design of Modular Bridge Expansion Joints (Proj. 12-40), 122 p., \$30.00	428	Guidebook to Highway Contracting for Innovation: The Role of Procurement and Contracting Approaches in Facilitating the Implementation of Research Findings (Proj. 20-33(2)), 46 p., \$22.00
403	Guidance for Estimating the Indirect Effects of Proposed Transportation Projects (Proj. 25-10), 209 p., \$51.00	429	HDPE Pipe: Recommended Material Specifications and Design Requirements (Proj. 4-24), 49 p., \$24.00
404	Innovative Practices for Multimodal Transportation Planning for Freight and Passengers (Proj. 8-32(1)), 67 p., \$26.00	430	Improved Safety Information to Support Highway Design (Proj. 17-12), 172 p., \$44.00
405	Aggregate Tests Related to Asphalt Concrete Performance in Pavements (Proj. 4-19), 103 p., \$29.00	431	Valuation of Travel-Time Savings and Predictability in Congested Conditions for Highway User-Cost Estimation (Proj. 2-18(2)), 74 p., \$27.00
406	Redundancy in Highway Bridge Superstructures (Proj. 12-36(2)), 44 p., \$23.00	432	High-Load Multi-Rotational Bridge Bearings (Proj. 10-20A), 400 p., \$77.00
407	Rapid Replacement of Bridge Decks (Proj. 12-41), 52 p., \$23.00	433	Guidelines for Developing and Maintaining Successful Partnerships for Multimodal Transportation Projects (Proj. 8-32(4)), 26 p., \$21.00
408	Corrosion of Steel Piling in Nonmarine Applications (Proj. 10-46), 204 p., \$51.00	434	Guidelines for Longitudinal Pavement Profile Measurement (Proj. 10-47), 75 p., \$30.00
409	Quality Control and Acceptance of Superpave-Designed Hot Mix Asphalt (Proj. 9-7), 209 p., \$51.00	435	Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making (Proj. 8-34), 252 p., \$64.00
410	Silica Fume Concrete for Bridge Decks (Proj. 18-3), 110 p., \$30.00	436	Guidance for Communicating the Economic Impacts of Transportation Investments (Proj. 2-22), 140 p., \$38.00
411	Structural Supports for Highway Signs, Luminaires, and Traffic Signals (Proj. 17-10), 114 p., \$30.00	437	Collection and Presentation of Roadway Inventory Data (Proj. 15-15), 75 p., \$28.00
412	Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports (Proj. 10-38), 246 p., \$62.00	438	Recommended LRFD Specifications for Plastic Pipe and Culverts (Proj. 20-07(89)), 63 p., \$27.00
413	Development of an <i>HOV Systems Manual</i> (Proj. 3-53), 45 p., \$21.00	439	Superelevation Distribution Methods and Transition Designs (Proj. 15-16A), 167 p., \$43.00
414	HOV Systems Manual (Proj. 3-53), 811 p., \$75.00	440	Accident Mitigation Guide for Congested Rural Two-Lane Highways (Proj. 17-15), 164 p., \$43.00
415	Evaluation of Unbonded Portland Cement Concrete Overlays (Proj. 10-41), 82 p., \$28.00	441	Segregation in Hot-Mix Asphalt Pavements (Proj. 9-11), 95 p., \$31.00
416	Alternative Approaches to the Taxation of Heavy Vehicles (Proj. 20-24(7)A), 132 p., \$36.00	442	Systems Approach to Evaluating Innovations for Integration into Highway Practice (Proj. 20-46), 123 p., \$32.00
417	Highway Infrastructure Damage Caused by the 1993 Upper Mississippi River Basin Flooding (Proj. 12-39), 161 p., \$41.00		
418	Research on the Relationship Between Economic Development and Transportation Investment (Proj. 2-19), 63 p., \$25.00		
419	Tourism Travel and Transportation System Development (Proj. 2-17(6)), 66 p., \$26.00		

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
443	<i>Primer</i> Environmental Impact of Construction and Repair Materials on Surface and Ground Waters (Proj. B25-9), 17 p., \$21.00.	465	Simple Performance Test for Superpave Mix Design (Proj. 9-19), 105 p., \$17.00.
444	Compatibility of a Test for Moisture-Induced Damage with Superpave Volumetric Mix Design (Proj. 9-13), 96 p., \$31.00.	466	Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects (Proj. 25-10(2)), 99 p., \$17.00.
445	Debris Forces on Highway Bridges (Proj. 12-39), 85 p., \$30.00.	467	Performance Testing for Modular Bridge Joint Systems (Proj. 10-52), 84 p., \$17.00.
446	A Guidebook for Performance-Based Transportation Planning (Proj. B8-32(2)A), 106 p., \$32.00.	468	Contribution of Pavement Structural Layers to Rutting of Hot-Mix Asphalt Pavements (Proj. 1-34A), 157 p., \$24.00.
447	Testing and Inspection Levels for Hot-Mix Asphaltic Concrete Overlays (Proj. D10-39A), 128 p., \$40.00.	469	Fatigue-Resistant Design of Cantilevered Signal, Sign, and Light Supports (Proj. 10-38(2)), 269 p., \$36.00.
448	Environmental Impact of Construction and Repair Materials on Surface and Ground Waters (Proj. 25-9), 128 p., \$34.00.	470	Traffic Control Devices for Passive Railroad-Highway Grade Crossings (Proj. 3-57), 62 p., \$15.00.
449	Elastomeric Bridge Bearings: Recommended Test Methods (Proj. 10-51), 117 p., \$34.00.	471	Evaluation of Roadside Features to Accommodate Vans, Minivans, Pickup Trucks, and 4-Wheel Drive Vehicles (Proj. 22-11), 94 p., \$17.00.
450	Transportation Research Thesaurus and User's Guide (Proj. 20-32(2)), 60 p., \$28.00.	472	Comprehensive Specification for the Seismic Design of Bridges (Proj. 12-49), 48 p., \$17.00.
451	Guidelines for Warranty, Multi-Parameter, and Best Value Contracting (Proj. 10-49), 168 p., \$46.00.	473	Recommended Specification for Large-Span Culverts (Proj. 12-45), 148 p., \$21.00.
452	Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Technician's Manual (Proj. 9-12), 49 p., \$26.00.	474	Assessment of Impacts of Bridge-Deck Runoff Contaminants in Receiving Waters (Proj. 25-13), 2 Volumes: Volume 1-70 p., Volume 2-294 p., \$24.00.
453	Performance-Related Tests of Aggregates for Use in Unbound Pavement Layers, Aggregates/Unbound Pavement (Proj. 4-23), 55 p., \$26.00.	475	A Procedure for Assessing & Planning Nighttime Highway Construction and Maintenance (Proj. 17-17(2)), 48 p., \$15.00.
454	Calibration of Load Factors for LRFR Bridge Evaluation (Proj. 12-46), 56 p., \$28.00.	476	Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction, (Proj. 17-17(2)), 120 p., \$18.00.
455	Recommended Performance-Related Specification for Hot-Mix Asphalt Construction: Results of the WesTrack Project (Proj. 9-20), 500 p., \$35.00.	477	Recommended Practice for Evaluation of Metal-Tensioned Systems in Geotechnical Applications (Proj. 24-13), 124 p., \$34.00.
456	Guidebook for Assessing the Social and Economic Effects of Transportation Projects (Proj. 25-19), 242 p., \$63.00.	478	Relationship of Superpave Gyrotory Compaction Properties to HMA Rutting Behavior (Proj. 9-16), 60 p., \$15.00.
457	Assessing Traffic Control Signal Installations Using Capacity Analysis and Simulation (Proj. 3-58), 131 p., \$40.00.	479	Short-Term Monitoring for Compliance with Air Quality Standards (Proj. 9-16), 62 p., \$17.00, in press.
458	Redundancy in Highway Bridge Substructures (Proj. 12-47), 98 p., \$33.00.	480	A Guide to Best Practices for Context Sensitive Solutions (Proj. 15-19), 125 p., \$18.00.
459	Characterization of Modified Asphalt Binders in Superpave Mix Design, Superpave Protocols for Modified Asphalt Binders (Proj. 9-10), 169 p., \$46.00.	481	EIM & DSS Implementation Handbook (Proj. 25-23), 153 p., \$23.00.
460	Guidelines for Implementation of Multimodal Transportation Location Referencing Systems (Proj. 20-27(3)), 82 p., \$32.00.	482	Guidance for Selecting Compensatory Wetlands Mitigation Options (Proj. 25-16), 47 p., \$15.00.
461	Static and Dynamic Lateral Loading of Pile Groups (Proj. 24-9), 117 p., \$34.00.	483	Life-Cycle Cost Analysis for Bridges (Proj. 12-43), 96 p., \$33.00.
462	Quantifying Air Quality and Other Benefits and Costs of Transportation Control Measures (Proj. 8-33), 61 p., \$28.00.	484	Feasibility Study for an All-White Pavement Marking System (Proj. 4-28), 95 p., \$17.00.
463	Economic Implications of Congestion (Proj. 2-21), 70 p., \$29.00.	485	Bridge Software: Validation Guidelines & Examples (Proj. 12-50), 265 p., \$40.00.
464	The Restricted Zone in the Superpave Aggregate Gradation Specification (Proj. 9-14), 67 p., \$29.00.	486	Systemwide Impact of Safety and Traffic Operations Design Decisions for 3R Projects (Proj. 3-56), 136 p., \$33.00.
		487	Using Customer Needs to Drive Transportation Decisions (Proj. 20-53), 105 p., \$18.00.

TABLE 2 (continued)

NO.	REPORT TITLE, TOPIC, PAGES, PRICE	NO.	REPORT TITLE, TOPIC, PAGES, PRICE
488	Additional Investigations on Driver Information Overload (Proj. 3-50(2)), 108 p., \$22.00.	508	Accelerated Laboratory Rutting Tests: Evaluation of the Asphalt Pavement Analyzer (Proj. 9-17), 105 p., \$21.00.
489	Design of Highway Bridges for Extreme Events (Proj. 12-48), 174 p., \$35.00.	509	Equipment for Collecting Traffic Load Data (Proj. 1-39), in editing.
490	In-Service Performance of Barrier Systems (Proj. 22-13[2]), 196 p., \$26.00.	510	Interim Planning for a Future SHRP (Proj. 20-58), 96 p., \$20.00.
491	Crash Experience Warrant for Traffic Signals (Proj. 17-16), 50 p., \$19.00.	511	Guide for Customer-Driven Benchmarking of Maintenance Activities (Proj. 14-13), in editing.
492	Roadside Safety Analysis Program (RSAP)—Engineer's Manual (Proj. 22-09(2)), 66 p., \$30.00.	512	Accelerated Pavement Testing: Data Guidelines (Proj. 10-56), in production.
493	Evaluation of Traffic Signal Displays for Protected/Permissive Left-Turn Control (Proj. 3-54), 84 p., \$31.00.	513	Simple Performance Tester for Superpave Mix Design (Proj. 9-29), 160 p., \$24.00.
494	Structural Supports for Highway Signs, Luminaires, and Traffic Signals (Proj. 17-10(2)), 50 p., \$19.00.	514	Bonded Repair and Retrofit of Concrete Structures Using FRP Composites: Recommended Construction Specifications and Process Control Manual (Proj. 10-59A), in typesetting
495	Effect of Truck Weight on Bridge Network Costs (Proj. 12-51), + CD-37, 186 p., \$35.00.	515	Portable Scour Monitoring Equipment (Proj. 21-07), in typesetting
496	Prestress Losses in Pretensioned High-Strength Concrete Bridge Girders (Proj. 18-7), 72 p., \$20.00.	516	Avoiding Delays During the Construction Phase of Highway Projects (Proj. 20-24(12)), in editing
497	Financing and Improving Land Access to U.S. Intermodal Cargo Hubs (Proj. 8-39), 150 p., \$24.00.	517	Extending Span Ranges of Precast, Prestressed Concrete Girders (Proj. 12-57), in editing
498	Illumination Guidelines for Nighttime Highway Work (Proj. 5-13(2)), in editing,		
499	Effects of Subsurface Drainage on Performance of Asphalt and Concrete Pavements (Proj. 1-34C), 52 p., \$19.00.		
500	Guidance for Implementation of the AASHTO Strategic Highway Safety Plan (Proj. 17-18(3)) <ul style="list-style-type: none"> <li>• Volume 1: A Guide for Addressing Aggressive-Driving Collisions, 62 p., \$19.00</li> <li>• Volume 2: A Guide for Addressing Collisions Involving Unlicensed Drivers and Drivers with Suspended or Revoked Licenses, 74 p., \$20.00;</li> <li>• Volume 3: A Guide for Addressing Collisions with Trees in Hazardous Locations, 63 p., \$19.00</li> <li>• Volume 4: A Guide for Addressing Head-On Collisions, 65 p., \$21.00</li> <li>• Volume 5: A Guide for Addressing Unsignalized Intersection Collisions, 157 p., \$24.00</li> <li>• Volume 6: A Guide for Addressing Run-Off-Road Collisions, 105 p., \$21.00</li> </ul>		
501	Integrated Safety Management Process (+ diskette) (Proj. 17-18(5)), 158 p., \$29.00.		
502	Geometric Design Consistency on High-Speed Rural Two-Lane Roadways (Proj. 15-17), 81 p., \$20.00.		
503	Application of Fiber Reinforced Composites to Highway Infrastructure (Proj. 4-27), 88 p., \$20.00.		
504	Design Speed and Operating Speed (Proj. 15-18), + CD-38, 94 p., \$31.00.		
505	Review of Truck Characteristics as Factors in Roadway Design (Proj. 15-21), + Diskette, 183 p., \$30.00.		
506	Quality and Accuracy of Positional Data in Transportation (Proj. 20-47(1)), + CD-41, 100 p., \$31.00.		
507	LRFD Deep Foundation Design (Proj. 24-17), + CD-39, in editing.		

TABLE 3  
PUBLISHED SYNTHESSES OF THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
1	Traffic Control for Freeway Maintenance (Topic 1), 47 p., \$2.20	30	Bituminous Emulsions for Highway Pavements (Topic 6-10), 76 p., \$4.80
2	Bridge Approach Design and Construction Practices (Topic 2), 30 p., \$2.00	31	Highway Tunnel Operations (Topic 5-08), 29 p., \$3.20
3	Traffic-Safe and Hydraulically Efficient Drainage Practice (Topic 4), 38 p., \$2.20	32	Effects of Studded Tires (Topic 5-13), 46 p., \$4.00
4	Concrete Bridge Deck Durability (Topic 3), 28 p., \$2.20	33	Acquisition and Use of Geotechnical Information (Topic 5-03), 40 p., \$4.00
5	Scour at Bridge Waterways (Topic 5), 37 p., \$2.40	34	Policies for Accommodation of Utilities on Highway Rights-of-Way (Topic 6-03), 22 p., \$3.20
6	Principles of Project Scheduling and Monitoring (Topic 6), 43 p., \$2.40	35	Design and Control of Freeway Off-Ramp Terminals (Topic 5-02), 61 p., \$4.40
7	Motorist Aid Systems (Topic 3-01), 28 p., \$2.40	36	Instrumentation and Equipment for Testing Highway Materials, Products, and Performance (Topic 6-01), 70 p., \$4.80
8	Construction of Embankments (Topic 9), 38 p., \$2.40	37	Lime-Fly Ash-Stabilized Bases and Subbases (Topic 6-06), 66 p., \$4.80
9	Pavement Rehabilitation—Materials and Techniques (Topic 8), 41 p., \$2.80	38	Statistically Oriented End-Result Specifications (Topic 6-02), 40 p., \$4.00
10	Recruiting, Training, and Retaining Maintenance and Equipment Personnel (Topic 10), 35 p., \$2.80	39	Transportation Requirements for the Handicapped, Elderly, and Economically Disadvantaged (Topic 6-07), 54 p., \$4.40
11	Development of Management Capability (Topic 12), 50 p., \$3.20	40	Staffing and Management for Social, Economic, and Environmental Impact Assessments (Topic 7-02), 43 p., \$4.00
12	Telecommunications Systems for Highway Administration and Operations (Topic 3-03), 29 p., \$2.80	41	Bridge Bearings (Topic 6-09), 62 p., \$4.80
13	Radio Spectrum Frequency Management (Topic 3-03), 32 p., \$2.80	42	Design of Pile Foundations (Topic 5-04), 68 p., \$4.80
14	Skid Resistance (Topic 7), 66 p., \$4.00	43	Energy Effects, Efficiencies, and Prospects for Various Modes of Transportation (Topic 7-05), 57 p., \$4.80
15	Statewide Transportation Planning—Needs and Requirements (Topic 3-02), 41 p., \$3.60	44	Consolidation of Concrete for Pavements, Bridge Decks, and Overlays (Topic 7-01), 61 p., \$4.80
16	Continuously Reinforced Concrete Pavement (Topic 3-08), 23 p., \$2.80	45	Rapid-Setting Materials for Patching of Concrete (Topic 6-05), 13 p., \$2.40
17	Pavement Traffic Marking—Materials and Application Affecting Serviceability (Topic 3-05), 44 p., \$3.60	46	Recording and Reporting Methods for Highway Maintenance Expenditures (Topic 7-04), 35 p., \$3.60
18	Erosion Control on Highway Construction (Topic 4-01), 52 p., \$4.00	47	Effect of Weather on Highway Construction (Topic 5-07), 29 p., \$3.20
19	Design, Construction, and Maintenance of PCC Pavement Joints (Topic 3-04), 40 p., \$3.60	48	Priority Programming and Project Selection (Topic 7-07), 31 p., \$3.20
20	Rest Areas (Topic 4-04), 38 p., \$3.60	49	Open-Graded Friction Courses for Highways (Topic 8-09), 50 p., \$4.00
21	Highway Location Reference Methods (Topic 4-06), 30 p., \$3.20	50	Durability of Drainage Pipe (Topic 5-09), 37 p., \$3.60
22	Maintenance Management of Traffic Signal Equipment and Systems (Topic 4-03), 41 p., \$4.00	51	Construction Contract Staffing (Topic 8-02), 62 p., \$6.00
23	Getting Research Findings into Practice (Topic 11), 24 p., \$3.20	52	Management and Selection Systems for Highway Maintenance Equipment (Topic 8-08), 17 p., \$4.40
24	Minimizing Deicing Chemical Use (Topic 4-02), 58 p., \$4.00	53	Precast Concrete Elements for Transportation Facilities (Topic 8-05), 48 p., \$5.60
25	Reconditioning High-Volume Freeways in Urban Areas (Topic 5-01), 56 p., \$4.00	54	Recycling Materials for Highways (Topic 8-01), 53 p., \$5.60
26	Roadway Design in Seasonal Frost Areas (Topic 3-07), 104 p., \$6.00	55	Storage and Retrieval Systems for Highway and Transportation Data (Topic 8-06), 30 p., \$4.80
27	PCC Pavements for Low-Volume Roads and City Streets (Topic 5-06), 31 p., \$3.60	56	Joint-Related Distress in PCC Pavement—Cause, Prevention and Rehabilitation (Topic 7-06), 36 p., \$5.20
28	Partial-Lane Pavement Widening (Topic 5-05), 30 p., \$3.20		
29	Treatment of Soft Foundations for Highway Embankments (Topic 4-09), 25 p., \$3.20		

NOTE: Some publications may be out of print and are available only in microfiche from the Transportation Research Board. See final page of this document for ordering information.

TABLE 3 (continued)

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
57	Durability of Concrete Bridge Decks (Topic 9-01), 61 p., \$6.00	88	Underwater Inspection and Repairs of Bridge Substructures (Topic 10-08), 77 p., \$7.60
58	Consequences of Deferred Maintenance (Topic 10-01), 24 p., \$4.40	89	Geotechnical Instrumentation for Monitoring Field Performance (Topic 11-06), 46 p., \$6.80
59	Relationship of Asphalt Cement Properties to Pavement Durability (Topic 8-11), 43 p., \$5.60	90	New-Product Evaluation Procedures (Topic 12-12), 34 pp., \$6.80
60	Failure and Repair of Continuously Reinforced Concrete Pavement (Topic 9-08), 42 p., \$5.60	91	Highway Accident Analysis Systems (Topic 12-03), 69 pp., \$7.60
61	Changeable Message Signs (Topic 9-03), 37 p., \$5.60	92	Minimizing Reflection Cracking of Pavement Overlays (Topic 11-04), 38 pp., \$6.80
62	State Resources for Financing Transportation Programs (Topic 9-09), 34 p., \$5.20	93	Coordination of Transportation System Management and Land Use Management (Topic 12-08), 38 pp. \$6.80
63	Design and Use of Highway Shoulders (Topic 8-03), 26 p., \$4.80	94	Photologging (Topic 8-10), 38 p., \$6.80
64	Bituminous Patching Mixtures (Topic 8-12), 26 p., \$4.80	95	Statewide Transportation Planning (Topic 13-05), 54 p., \$7.20
65	Quality Assurance (Topic 9-05), 42 p., \$5.60	96	Pavement Subsurface Drainage Systems (Topic 11-07), 38 p., \$6.80
66	Glare Screen Guidelines (Topic 9-11), 17 p., \$4.40	97	Transit Ownership/Operation Options for Small Urban and Rural Areas (Topic 13-06), 28 p., \$6.40
67	Bridge Drainage Systems (Topic 10-06), 44 p., \$5.60	98	Resealing Joints and Cracks in Rigid and Flexible Pavements (Topic 12-04), 62 p., \$7.20
68	Motor Vehicle Size and Weight Regulations, Enforcement, and Permit Operations (Topic 10-04), 45 p., \$6.00	99	Resurfacing with Portland Cement Concrete (Topic 13-04), 90 p., \$8.40
69	Bus Route and Schedule Planning Guidelines (Topic 7-09), 99 p., \$8.00	100	Managing State Highway Finance (Topic 13-03), 23 p., \$6.40
70	Design of Sedimentation Basins (Topic 9-10), 54 p., \$6.80	101	Historic Bridges: Criteria for Decision Making (Topic 13-11), 84 p., \$8.00
71	Direction Finding from Arterials to Destinations (Topic 9-07), 50 p., \$6.40	102	Material Certification and Material-Certification Effectiveness (Topic 14-05), 24 p., \$6.00
72	Transportation Needs Studies and Financial Constraints (Topic 11-01), 54 p., \$6.80	103	Risk Assessment Process for Hazardous Materials Transportation (Topic 13-10), 36 p., \$6.40
73	Alternative Work Schedules: Impacts on Transportation (Topic 9-06), 54 p., \$6.80	104	Criteria for Use of Asphalt Friction Surfaces (Topic 14-08), 41 p., \$6.80
74	State Transit-Management Assistance to Local Communities (Topic 10-11), 35 p., \$6.00	105	Construction Contract Claims: Causes and Methods of Settlement (Topic 13-01), 58 p., \$7.20
75	Transit Boards—Composition, Roles, and Procedures (Topic 11-09), 24 p., \$6.20	106	Practical Guidelines for Minimizing Tort Liability (Topic 14-01), 40 p., \$6.80
76	Collection and Use of Pavement Condition Data (Topic 10-05), 74 p., \$8.00	107	Shallow Foundations for Highway Structures (Topic 12-06), 38 p., \$6.80
77	Evaluation of Pavement Maintenance Strategies (Topic 11-08), 56 p., \$7.40	108	Bridge Weight Limit Posting Practice (Topic 13-08), 30 p., \$6.40
78	Value Engineering in Preconstruction and Construction (Topic 11-02, 03), 23 p., \$6.40	109	Highway Uses of Epoxy with Concrete (Topic 14-12), 68 p., \$8.80
79	Contract Time Determination (Topic 11-10), 45 p., \$7.20	110	Maintenance Management Systems (Topic 14-06), 49 p., \$8.00
80	Formulating and Justifying Highway Maintenance Budgets (Topic 10-03), 49 p., \$7.20	111	Distribution of Wheel Loads on Highway Bridges (Topic 14-22), 21 p., \$7.20
81	Experiences in Transportation System Management (Topic 11-14), 88 p., \$8.40	112	Cost Effectiveness of Hot-Dip Galvanizing for Exposed Steel (Topic 15-19), 28 p., \$7.20
82	Criteria for Evaluation of Truck Weight Enforcement Programs (Topic 12-02), 74 p., \$7.20	113	Administration of Research, Development, and Implementation Activities in Highway Agencies (Topic 14-11), 49 p., \$8.00
83	Bus Transit Accessibility for the Handicapped in Urban Areas (Topic 11-13), 73 p., \$7.60	114	Management of Traffic Signal Maintenance (Topic 14-02), 133 p., \$10.80
84	Evaluation Criteria and Priority Setting for State Highway Programs (Topic 12-01), 32 p. \$6.40		
85	Energy Involved in Construction Materials and Procedures (Topic 12-09), 34 p., \$6.40		
86	Effects of Traffic-Induced Vibrations on Bridge-Deck Repairs (Topic 10-21), 40 p., \$6.80		
87	Highway Noise Barriers (Topic 12-07), 82 p., \$7.20		

TABLE 3 (continued)

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
115	Reducing Construction Conflicts Between Highways and Utilities (Topic 14-03), 72 p., \$8.80	143	Uniformity Efforts in Oversize/Overweight Permits (Topic 19-02), 79 p., \$10.00
116	Asphalt Overlay Design Procedures (Topic 14-04), 66 p., \$8.40	144	Breaking/Cracking and Seating Concrete Pavements (Topic 17-09), 39 p., \$8.00
117	Toll Highway Financing (Topic 15-01), 29 p., \$7.20	145	Staffing Considerations in Construction Engineering Management (Topic 17-13), 42 p., \$8.00
118	Detecting Defects and Deterioration in Highway Structures (Topic 15-03), 52 p., \$8.00	146	Use of Consultants for Construction Engineering and Inspection (Topic 18-01), 64 p., \$9.00
119	Prefabricated Bridge Elements and Systems (Topic 15-10), 75 p., \$8.80	147	Treatment of Problem Foundations for Highway Embankments (Topic 18-04), 72 p., \$9.00
120	Professional Resource Management and Forecasting (Topic 15-08), 14 p., \$6.80	148	Indicators of Quality in Maintenance (Topic 18-12), 114 p., \$11.00
121	Energy Conservation in Transportation (Topic 14-09), 25 p., \$7.20	149	Partnerships for Innovation: Private-Sector Contributions to Innovation in the Highway Industry (Topic 19-23), 45 p., \$8.00
122	Life-Cycle Cost Analysis of Pavements (Topic 15-07), 136 p., \$10.80	150	Technology Transfer in Selected Highway Agencies (Topic 19-08), 38 p., \$8.00
123	Bridge Designs to Reduce and Facilitate Maintenance Repairs (Topic 12-11), 65 p., \$8.40	151	Process for Recapitalizing Highway Transportation Systems (Topic 19-06), 43 p., \$8.00
124	Use of Weigh-In-Motion Systems for Data Collection and Enforcement (Topic 16-02), 34 p., \$7.60	152	Compaction of Asphalt Pavement (Topic 19-04), 42 p., \$8.00
125	Maintenance Activities Accomplished by Contract (Topic 14-07), 42 p., \$8.00	153	Evolution and Benefits of Preventive Maintenance (Topic 18-11), 69 p., \$9.00
126	Equipment for Obtaining Pavement Condition and Traffic Loading Data (Topic 15-04), 117 p., \$11.20	154	Recycling of Portland Cement Concrete Pavements (Topic 17-06), 46 p., \$8.00
127	Use of Fly Ash in Concrete (Topic 16-07), 66 p., \$8.40	155	Sign Evaluation and Replacement Programs: Policies and Criteria for Freeways and Expressways (Topic 19-07), 37 p., \$8.00
128	Methods of Identifying Hazardous Highway Elements (Topic 15-06), 80 p., \$10.00	156	Freeway Incident Management (Topic 18-08), 23 p., \$7.00
129	Freezing and Thawing Resistance of High-Strength Concrete (Topic 16-05), 31 p., \$7.60	157	Maintenance Management of Street and Highway Signs (Topic 16-03), 134 p., \$12.00
130	Traffic Data Collection and Analysis: Methods and Procedures (Topic 15-11), 58 p., \$8.40	158	Wet Pavement Safety Programs (Topic 16-06), 54 p., \$8.00
131	Effects of Permit and Illegal Overloads on Pavements (Topic 15-05), 99 p., \$10.40	159	Design and Construction of Bridge Approaches (Topic 18-03), 45 p., \$8.00
132	System-Wide Safety Improvements: An Approach to Safety Consistency (Topic 17-01), 20 p., \$6.80	160	Cold-Recycled Bituminous Concrete Using Bituminous Materials (Topic 18-09), 105 p., \$11.00
133	Integrated Highway Information Systems (Topic 17-02), 31 p., \$7.60	161	Computer-Aided Design and Drafting Systems (Topic 19-01), 24 p., \$7.00
134	D-Cracking of Concrete Pavements (Topic 17-08), 33 p., \$7.60	162	Signing Policies, Procedures, Practices, and Fees for Logo and Tourist-Oriented Directional Signing (Topic 20-03), 41 p., \$8.00
135	Pavement Management Practices (Topic 17-10), 139 p., \$12.40	163	Innovative Strategies for Upgrading Personnel in State Transportation Departments (Topic 18-02), 35 p., \$7.00
136	Protective Coatings for Bridge Steel (Topic 15-09), 107 p., \$11.00	164	Measure to Curtail State Fuel Tax Evasion (Topic 20-02), 14 p., \$7.00
137	Negotiating and Contracting for Professional Engineering Services (Topic 18-05), 75 p., \$10.00	165	Transportation Telecommunications (Topic 19-10), 92 p., \$10.00
138	Pavement Markings Materials and Application for Extended Service Life (Topic 18-06), 45 p., \$8.00	166	Traffic Signal Control Equipment: State of the Art (Topic 20-08), 43 p., \$8.00
139	Pedestrians and Traffic-Control Measures (Topic 17-11), 75 p., \$9.00	167	Measurements, Specifications, and Achievement of Smoothness for Pavement Construction (Topic 19-12), 34 p., \$8.00
140	Durability of Prestressed Concrete Highway Structures (Topic 15-02), 65 p., \$9.00	168	Contract Management Systems (Topic 18-10), 74 p., \$9.00
141	Bridge Deck Joints (Topic 16-10), 66 p., \$9.00		
142	Methods of Cost-Effectiveness Analysis for Highway Projects (Topic 13-02), 22 p., \$7.00		

TABLE 3 (continued)

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
169	Removing Concrete from Bridges (Topic 20-07), 42 p., \$8.00	198	Uses of Recycled Rubber Tires in Highways (Topic 22-02), 162 p., \$23.00
170	Managing Urban Freeway Maintenance (Topic 16-09), 26 p., \$7.00	199	Recycling and Use of Waste Materials and By-Products in Highway Construction (Topic 22-10), 84 p., \$20.00
171	Fabrics in Asphalt Overlays and Pavement Maintenance (Topic 20-01), 72 p., \$9.00	200	Underwater Bridge Maintenance and Repair (Topic 22-04), 54 p., \$16.00
172	Signal Timing Improvement Practices (Topic 19-03), 88 p., \$11.00	201	Multimodal Evaluation in Passenger Transportation (Topic 23-04), 57 p., \$15.00
173	Short-Term Maintenance Systems (Topic 20-5), 44 p., \$8.00	202	Severity Indices for Roadside Features (Topic 23-09), 54 p., \$12.00
174	Stormwater Management for Transportation Facilities (Topic 13-07), 82 p., \$9.00	203	Current Practices in Determining Pavement Condition (Topic 22-07), 57 p., \$15.00
175	Moisture Damage in Asphalt Concrete (Topic 19-09), 90 p., \$10.00	204	Portland Cement Concrete Resurfacing (Topic 23-10), 56 p., \$15.00
176	Bridge Paint: Removal, Containment, and Disposal (Topic 20-09), 60 p., \$9.00	205	Performance and Operational Experience of Crash Cushions (Topic 24-03), 74 p., \$16.00
177	Freeway Corridor Management (Topic 18-07), 64 p., \$9.00	206	Highway Tort Liability Management Programs (Topic 20-22), 40 p., \$11.00
178	Truck Escape Ramps (Topic 21-12), 56 p., \$9.00	207	Managing Roadway Snow and Ice Control Operations (Topic 23-03), 85 p., \$19.00
179	Latex-Modified Mortars and Concertos (Topic 20-12), 58 p., \$9.00	208	Development and Implementation of TCP for Highway Work Zones (Topic 21-08), 48 p., \$12.00
180	Performance Characteristics of Open-Graded Friction Courses (Topic 20-01), 44 p., \$8.00	209	Sealers for Portland Cement Concrete Highway Facilities (Topic 24-12), 68 p., \$16.00
181	In-Service Experience with Traffic Noise Barriers (Topic 20-11), 62 p., \$8.00	210	Road Pricing for Congestion Management: A Survey of International Practice (Topic 24-02), 65 p., \$15.00
182	Performance and Operational Experience of Truck-Mounted Attenuates (Topic 22-01), 54 p., \$9.00	211	Design, Construction, and Maintenance of PCC Pavement Joints (Topic 17-05), 50 p., \$12.00
183	Knowledge Based Expert Systems in Transportation (Topic 22-09), 52 p., \$9.00	212	Performance-Related Specification for Highway Construction and Rehabilitation (Topic 23-05), 48 p., \$14.00
184	Disposal of Roadside Litter Mixtures (Topic 22-08), 52 p., \$12.00	213	Effective Use of Park-and-Ride Facilities (Topic 23-13), 45 p., \$11.00
185	Preferential Lane Treatments for High-Occupancy Vehicles (Topic 21-02), 80 p., \$10.00	214	Resolution of Disputes to Avoid Construction Claims (Topic 24-01), 39 p.,
186	Supplemental Advance Warning Devices (Topic 21-09), 84 p., \$19.00	215	Determination of Contract Time for Highway Construction Projects (Topic 24-04), 43 p., \$11.00
187	Rapid Test Methods for Asphalt Concrete and Portland Cement Concrete (Topic 23-02), 48 p., \$10.00	216	Implementation of Technology from Abroad (Topic 24-11), 44 p., \$11.00
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189	Pavement Structural Design Practices (Topic 21-13), 46 p., \$11.00	218	Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances (Topic 20-7/Task 94), 93 p., \$30.00
190	Criteria for Qualifying Contractors for Bidding Purposes (Topic 21-14), 40 p., \$11.00	219	Photographic Enforcement of Traffic Laws (Topic 22-11), 67 p., \$18.00
191	Use of Rumble Strips to Enhance Safety (Topic 22-13), 80 p., \$19.00	220	Waterproofing Membranes for Concrete Bridge Decks (Topic 25-09), 69 p., \$18.00
192	Accident Data Quality (Topic 23-01), 48 p., \$11.00	221	Assessing the Effects of Highway-Widening Improvements on Urban and Suburban Areas (Topic 24-13), 43 p., \$13.00
193	Hot In-Place Recycling of Asphalt Concrete (Topic 21-10), 69 p., \$16.00	222	Pavement Management Methodologies to Select Projects and Recommend Preservation Treatments (Topic 24-05), 96 p., \$22.00
194	Electronic Toll and Traffic Management (ETTM) Systems (Topic 24-06), 64 p., \$15.00	223	Cost-Effective Preventive Pavement Maintenance (Topic 25-10), 103 p., \$22.00
195	Use of Warranties in Road Construction (Topic 23-07), 65 p., \$15.00		
196	Highway Maintenance Procedures Dealing with Hazardous Material Incidents (Topic 21-11), 60 p., \$15.00		
197	Corridor Preservation (Topic 23-06), 43 p., \$11.00		

TABLE 3 (continued)

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
224	Longitudinal Occupancy of Controlled Access Right-of-Way by Utilities (Topic 24-08), 39 p., \$13.00	252	Response of Small Urbanized Area MPOs to ISTEA (Topic 27-10), 35 p., \$16.00
225	Left-Turn Treatments at Intersections (Topic 24-08), 86 p., \$22.00	253	Dynamic Effects of Pile Installation on Adjacent Structures (Topic 25-16), 86 p., \$24.00
226	Remediation of Petroleum-Contaminated Soils (Topic 26-01), 88 p., \$22.00	254	Service Life of Drainage Pipe (Topic 25-21), 39 p., \$16.00
227	Collecting and Managing Cost Data for Bridge Management Systems (Topic 25-06), 49 p., \$15.00	255	Ground Penetrating Radar for Evaluating Subsurface Conditions for Transportation Facilities (Topic 26-08), 37 p., \$16.00
228	Reduced Visibility Due to Fog on the Highway (Topic 23-12), 51 p., \$15.00	256	Submittal of Bid Proposals in Electronic Format (Topic 28-07), 26 p., \$15.00
229	Applications of 3-D and 4-D Visualization Technology in Transportation (Topic 25-01), 73 p., \$19.00	257	Maintenance Issues and Alternate Corrosion Protection Methods for Exposed Bridge Steel (Topic 26-12), 90 p., \$25.00
230	Freight Transportation Planning in the Public Sector (Topic 25-02), 47 p., \$15.00	258	Applications of GPS for Surveying and Other Positioning Needs in Departments of Transportation (Topic 27-16), 46 p., \$17.00
231	Managing Contract Research Programs (Topic 25-14) 92 p., \$23.00	259	Management of Surface Transportation Systems (Topic 25-12), 26 p., \$15.00
232	Variability in Highway Pavement Construction (Topic 26-02), 38 p., \$14.00	260	Thin-Surfaced Pavements (Topic 27-08), 112 p., \$26.00
233	Land Development Regulations that Promote Access Management (Topic 26-06), 45 p., \$14.00	261	Criteria for Highway Routing of Hazardous Materials (Topic 27-02), 38 p., \$16.00
234	Settlement of Bridge Approaches (The Bump at the End of the Bridge) (Topic 26-07), 57 p., \$15.00	262	Tolling Practices for Highway Facilities (Topic 28-11), 54 p., \$23.00
235	Application of Full-Scale Accelerated Pavement Testing (Topic 26-07), 110 p., \$23.00	263	State DOT Management and Techniques for Materials and Construction Acceptance (Topic 27-05), 51 p., \$23.00
236	Methods for Household Travel Surveys (Topic 26-03), 57 p., \$15.00	264	Modern Roundabout Practice in the United States (Topic 28-09), 73 p., \$21.00
237	Changeable Message Signs (Topic 23-11), 57 p., \$19.00	265	Managing Product Liability to Achieve Highway Innovations (Topic 27-07), 54 p., \$23.00
238	Performance Measurement in State Departments of Transportation (Topic 25-15), 69 p., \$20.00	266	Dynamic Impact Factors for Bridges (Topic 28-05), 60 p., \$26.00
239	Pavement Subsurface Drainage Systems (Topic 25-07), 44 p., \$15.00	267	Transportation Development Process (Topic 26-11), 48 p., \$24.00
240	Toll Plaza Design (Topic 25-11), 113 p., \$25.00	268	Relationship Between Pavement Surface Texture and Highway Traffic Noise (Topic 26-05), 85p., \$29.00
241	Truck Operating Characteristics (Topic 22-12), 62 p., \$20.00	269	Road User and Mitigation Costs in Highway Pavement Projects (Topic 27-12), 47 p., \$24.00
242	Trenchless Installation of Conduits Beneath Roadways (Topic 27-01), 76 p., \$23.00	270	Transportation Management Center Functions (Topic 28-10), 68 p., \$27.00
243	Methods for Capital Programming and Project Selection (Topic 27-09), 85 p., \$23.00	271	Traffic Signal Operations Near Highway-Rail Grade Crossings (Topic 28-12), 90 p., \$30.00
244	Guardrail and Median Barrier Crashworthiness (Topic 25-04), 160 p., \$27.00	272	Best Management Practices for Environmental Issues Related to Highway and Street Maintenance (Topic 28-01), 103 p., \$30.00
245	Traffic Signal Control Systems Maintenance Management Practices (Topic 27-11), 63 p., \$19.00	273	Project Development Methodologies for Reconstruction of Urban Freeways and Expressways (Topic 28-03), 45 p., \$22.00
246	Outsourcing of State Highway Facilities and Services (Topic 27-06), 69 p., \$20.00	274	Methods to Achieve Rut-Resistant Durable Asphalt Pavements (Topic 28-06), 61 p., \$26.00
247	Stabilization of Existing Subgrades to Improve Constructibility During Interstate Pavement Reconstruction (Topic 27-03), 75 p., \$20.00	275	Historic Highway Bridge Preservation Practices (Topic 28-08), 58 p., \$26.00
248	Evaluating and Measuring the Effectiveness of Training (Topic 26-09), 28 p., \$15.00	276	Geotechnical Related Development and Implementation of LRFD Methods (Topic 28-02), 69 p., \$27.00
249	Methods for Increasing Live Load Capacity of Existing Highway Bridges (Topic 27-04), 66 p., \$21.00		
250	Highway-Rail Crossing Surfaces (Topic 26-04), 56 p., \$20.00		
251	Lead-Based Paint Removal for Steel Highway Bridges (Topic 28-04), 115 p., \$26.00		



TABLE 3 (continued)

SYNTHESIS OF HIGHWAY PRACTICE		SYNTHESIS OF HIGHWAY PRACTICE	
NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE	NO.	TITLE, PROJECT 20-5, TOPIC, PAGES, PRICE
277	Consultants for DOT Preconstruction Engineering Work (Topic 29-06), 115 p., \$31.00	303	Assessment and Rehabilitation of Existing Culverts (Topic 31-03), 74 p., \$15.00
278	Measuring In Situ Mechanical Properties of Pavement Subgrade Soils (Topic 29-08), 73 p., \$27.00	304	Driveway Regulation Practices (Topic 32-05), 77 p., \$16.00
279	Roadway Incident Diversion Practices (Topic 29-02), 84 p., \$29.00	305	Interaction Between Roadways and Wildlife Ecology (Topic 32-11), 78 p., \$16.00
280	Seven Keys to Building a Robust Research Program (Topic 29-01), 64 p., \$26.00	306	Long-Term Pavement Marking Practices (Topic 31-07), 154 p., \$19.00
281	Operational Impacts of Median Width on Larger Vehicles (Topic 29-05), 68 p., \$28.00	307	Systems Engineering Processes for Developing Traffic Signal Systems (Topic 30-01), 87 p., \$17.00
282	Project Management Information Systems (Topic 29-04), 37 p., \$22.00	308	Owner-Controlled Insurance Programs (Topic 32-12), 133 p., \$19.00
283	Fleet Management and Selection Systems for Highway Maintenance Equipment (Topic 29-07), 33 p., \$22.00	309	Transportation Planning and Management for Special Events (Topic 32-09), 71 p., \$16.00
284	Performance Survey on Open-Graded Friction Course Mixes (Topic 29-03), 38 p., \$22.00	310	Impact of Red Light Camera Enforcement on Crash Experience (Topic 32-03), 57 p., \$15.00
285	Maintenance of Highway Edgedrains (Topic 30-10), 62 p., \$27.00	311	Performance Measures of Operational Effectiveness for Highway Segments and Systems (Topic 32-07), 59 p., \$15.00
286	Multimodal Aspects of Statewide Transportation Planning (Topic 30-02), 58 p., \$27.00	312	Facilitating Partnerships in Transportation Research (Topic 31-06), 76 p., \$16.00
287	Sleep Deprivation Countermeasures for Motorist Safety (Topic 30-06), 92 p., \$31.00	313	State DOT Outsourcing and Private-Sector Utilization (Topic 34-15), 42 p., \$14.00
288	Data Sharing and Data Partnerships for Highways (Topic 30-07), 31 p., \$22.00	314	Strategies for Managing Increasing Truck Traffic (Topic 32-02), 83 p., \$16.00
289	Corridor Management (Topic 30-03), 58 p., \$27.00	315	Compensation for Contractors' Home Office Overhead (Topic 32-10), 47 p., \$15.00
290	Procedures for Assessing Economic Development Impacts from Transportation Investments (Topic 30-05), 76 p., \$28.00	316	Design Exception Practices (Topic 33-01), 82 p., \$16.00
291	Evaluation of Pavement Friction Characteristics (Topic 30-11), 66 p., \$28.00	317	Dealing with Truck Parking Demands (Topic 32-01), 37 p., \$14.00
292	Innovative Practices to Reduce Delivery Time for Right-of-Way in Project Development (Topic 30-04), 73 p., \$28.00	318	Safe and Quick Clearance of Traffic Incidents, 143 p., \$19.00
293	Reducing and Mitigating the Impacts of Lane Occupancy During Construction and Maintenance (Topic 30-12), 60 p., \$27.00	319	Bridge Deck Joint Performance, 46 p., \$15.00
294	Configuration Management in Transportation Management Systems (Topic 31-10), 44 p., \$23.00	320	Integrating Freight Facilities and Operations with Community Goals, 58 p., \$15.00
295	Statistical Methods in Highway Safety Analysis (Topic 31-02), 75 p., \$29.00	321	Roadway Safety Tools for Local Agencies, 166 p., \$20.00
296	Impact of New Information and Communication Technologies on Transportation Agencies (Topic 31-08), 57 p., \$28.00	322	Safety Management Systems, 42 p., \$14.00
297	Building Effective Relationships Between Central Cities and Regional, State, and Federal Agencies (Topic 31-11), 69 p., \$29.00	323	Recruiting and Retaining Individuals in Transportation Agencies, 59 p., \$15.00
298	Truck Trip Generation Data (Topic 31-09), 81 p., \$32.00	324	Prefabricated Bridge Element and Systems to Limit Traffic Disruption During Construction, 48 p., \$15.00
299	Recent Geometric Design Research for Improved Safety and Operations (Topic 31-01), 134 p., \$40.00	325	Significant Findings from Full-Scale/Accelerated Pavement Testing, in editing
300	Performance Measures for Research, Development, and Technology Programs (Topic 31-04), 97 p., \$33.00		
301	Collecting, Processing, and Integrating GPS Data into GIS (Topic 31-05), 65 p., \$15.00		
302	Mitigation of Ecological Impacts (Topic 31-12), 100 p., \$17.00		

TABLE 4  
NCHRP RESEARCH RESULTS DIGESTS<sup>a</sup>

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
3	20-6	Relocation Assistance Under Chapter Five of the 1968 Federal-Aid Highway Act, 18 p., \$1.00
6	20-6	Standing to Sue for Purposes of Securing Judicial Review of Exercise of Administrative Discretion in Route Location of Federal-Aid Highways, 9 p., \$1.00
11	20-6	Valuation Changes Resulting from Influence of Public Improvements, 25 p., \$1.00
14	12-3	Waterproof Expansion Joints for Bridges, 3 p., \$1.00
19	20-6	Advance Acquisition Under the Federal-Aid Highway Act of 1968, 21 p., \$1.00
20	19-1	Budgeting for State Highway Departments, 4 p., \$1.00
22	20-6	Valuation in Eminent Domain as Affected by Zoning, 19 p., \$1.00
25	20-6	Federal Environmental Legislation and Regulations as Affecting Highways, 35 p., \$1.00
31	20-6	Proposed Legislation to Authorize Joint Development of Highway Rights-of-Way, 12 p., \$1.00
32	20-6	Changes in Existing State Law Required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 13 p., \$1.00
39	20-6	Legal Effect of Representations as to Subsurface Conditions, 17 p., \$1.00
40	20-6	Appeal Bodies for Highway Relocation Assistance, 16 p., \$1.00
41	20-6	Trial Strategy and Techniques to Exclude Noncompensable Damages and Improper Valuation Methods in Eminent Domain Cases, 24 p., \$1.00
42	20-6	Supplemental Condemnation: A Discussion of the Principles of Excess and Substitute Condemnation, 20 p., \$1.00
45	20-6	Exclusion of Increase or Decrease in Value Caused by Public Improvement for Which Lands Are Condemned, 24 p., \$1.00
47	20-6	Trial Strategy and Techniques Using the Comparable Sales Approach to Valuation, 13 p., \$1.00
48	10-9	Surface Condition Rating System for Bituminous Pavements, 24 p., \$1.50
54	20-6	Trial Strategy and Techniques Using the Income Approach to Valuation, 31 p., \$1.00
55	20-7	Side-Friction Factors in the Design of Highway Curves (Task 4), 9 p., \$1.00
67	15-2	Field Evaluation of Tentative Design Procedure for Riprap-Lined Channels, 4 p., \$1.00
68	20-6	The Meaning of Highway Purpose, 15 p., \$1.00
76	22-3, 3A	Field Evaluation of Vehicle Barrier System, 3 p., \$1.00
77	20-7	Earth-Berm Vehicle Deflector (Task 3), 3 p., \$1.00
78	3-20	Traffic Signal Warrants—A Bibliography, 42 p., \$1.00
79	20-6	Personal Liability of State Highway Department Officers and Employees, 22 p., \$3.00
80	20-6	Liability of State Highway Departments for Design, Construction, and Maintenance Defects, 49 p., \$5.00
81	22-1A	Crash Testing and Evaluation of Attenuating Bridge Railing System, 10 p., \$1.00
82	1-15	Design of Continuously Reinforced Concrete Pavements for Highways, 12 p., \$1.00
83	20-6	Liability of State and Local Governments for Snow and Ice Control, 16 p., \$3.00
84	22-2	Breakaway Cable Terminals for Guardrails and Median Barriers, 18 p., \$1.00
85	12-16	Bridge Deck Repairs, 22 p., \$1.00
89	1-12(3)	Guidelines for Skid-Resistant Highway Pavement Surfaces, 12 p., \$1.00
91	3-21	Motorist Response to Guide Signing, 9 p., \$1.00
95	20-6	Legal Implications of Regulations Aimed at Reducing Wet-Weather Skidding Accidents on Highways, 31 p., \$3.00
97	3-23	Guidelines for Uniformity in Traffic Control Signal Design Configurations, 8 p., \$1.00
99	20-6	Liability of the State for Highway Traffic Noise, 14 p., \$3.00
100	20-5	Safe Conduct of Traffic Through Highway Construction and Maintenance Zones, 5 p., \$1.00
102	22-2	Modified Breakaway Cable Terminals for Guardrails and Median Barriers, 13 p., \$1.00
103	20-6	Payment of Attorney Fees in Eminent Domain and Environmental Litigation, 24 p., \$3.00
105	3-26	Selected Acoustical Parameters of Highway Noise Barriers, 8 p., \$1.00
106	20-5	Use of Waste Materials in Highway Construction and Maintenance, 2 p., \$1.00
108	20-6	Trial Strategy and Techniques in Highway Contract Litigation, 31 p., \$3.00
109	20-6	Control of Conflicts of Interest in Highway Construction Contract Administration, 56 p., \$3.00
110	20-6	Liability of State and Local Governments for Negligence Arising out of the Installation and Maintenance of Warning Signs, Traffic Lights, and Pavement Markings, 14 p., \$3.00
111	20-6	Trial Aids in Highway Condemnation Cases, 11 p., \$3.00
112	20-6	Legal Implications of Control of Access to Uncontrolled-Access Highways, 22 p., \$3.00
113	20-6	Right to Compensation in Eminent Domain for Abrogation of Restrictive Covenants, 12 p., \$3.00
114	20-11	Energy Analysis Methodology for Assessing Environmental Impacts, 7 p., \$1.00

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<sup>b</sup> Progress reports are superseded annually.

NA: Not applicable

TABLE 4 (continued)

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
115	Var.	NCHRP Research on the Durability of Reinforced Concrete Bridge Components, 6 p., \$1.00
116	20-6	Payments to Public Utilities for Relocation of Facilities in Highway Rights-of-Way, 35 p., \$3.00
119	20-6	Recovery of Condemnation Blight Under Inverse Law, 11 p., \$3.00
121	21-2(3)	Development and Field Evaluation of Prototype Soil Moisture Sensors, 3 p., \$1.00
122	3-26	Noise Barrier Acoustical Parameters—Experimental Results, 5 p., \$1.00
123	4-9	Evaluation of Preformed Elastomeric Pavement Joint Sealing Systems, 7 p., \$1.00
126	3-18(4)	Performance Evaluation of Signalized Network Control Strategies, 4 p., \$1.00
127	8-19	The Vehicle-Miles of Travel—Urban Highway Supply Relationship, 7 p., \$1.00
129	20-6	Legal Implications of Highway Department's Failure to Comply with Design, Safety, or Maintenance Guidelines, 17 p., \$3.00
133	1-16	Evaluation of Winter-Driving Traction Aids, 7 p., \$1.00
134	20-6	Procedural Aspects of Inverse Condemnation—Title on Interest Acquired by Transportation and Other Public Agencies, 13 p., \$3.00
135	20-6	Liability of the State for Injury-Producing Defects in Highway Surface, 14 p., \$3.00
136	20-6	State Highway Programs Versus the Spending Powers of Congress, 18 p., \$3.00
137	20-6	The Effects of Federal and State Public Information Acts on Highway and Transportation Department Activities, 23 p., \$3.00
138	20-6	Legal Aspects of Historic Preservation in Highway Programs, 27 p., \$3.00
141	20-6	Liability of State Highway Departments for Defects in Design, Construction, and Maintenance of Bridges, 20 p., \$3.00
145	20-6	First Amendment Aspects of Control of Outdoor Advertising, 31 p., \$5.00
146	20-6	Minority and Disadvantaged Business Enterprise Requirements in Public Contracting, 31 p., \$5.00
147	20-6	Mineral Rights in Rights-of-Way: Acquisition, Valuations, and Disposition, 15 p., \$5.00
149	20-6	Exaction of Right-of-Way by Exercise of Police Power, 13 p., \$5.00
150	20-6	Planning and Precondemnation Activities as Constituting a Taking Under Inverse Law, 14 p., \$5.00
151	20-6	Liability of State for Injury or Damage Occurring in Motor Vehicle Accident Caused by Trees, Shrubbery, or Other Vegetative Obstruction Located in Right-of-Way or Growing on Adjacent Private Property, 20 p., \$5.00
152	20-6	Enforceability of the Requirement of Notice in Highway Construction Contracts, 17 p., \$5.00
153	20-6	Liability of the State for Injuries Caused by Obstruction or Defects in Highway Shoulder or Berm, 19 p., \$5.00
154	20-6	Trial Strategy and Techniques in Enforcing Laws Relating to Truck Weights and Sizes, 35 p., \$5.00
157	20-6	Supplement to Licensing and Qualification of Bidders in Selected Studies in Highway Law, 19 p., \$5.00
158	20-6	Legal Procedural Issues Related to Relocation Assistance, 25 p., \$5.00
160	20-6	Acquisition of Uneconomic Remnants Under 23 U.S.C. 109(f), 13 p., \$5.00
161	2-14	Public and Private Partnerships for Financing Highway Improvements, 34 p., \$5.00
163	20-6	Supplement to Competitive Bidding and Award of Construction Contracts in <i>Selected Studies in Highway Law</i> , 32 p., \$6.00
164	20-6	Rights of Abutting Property Owner Upon Conversion of Uncontrolled-Access Road into Limited-Access Highway, 14 p., \$6.00
165	20-6	Legal Techniques for Reserving Right-of-Way for Future Projects Including Corridor Protection, 44 p., \$6.00
167 <sup>b</sup>	Var.	NCHRP Research on Bridge Engineering, 8 p., \$3.00
169	10-24	Rapid Replacement of Portland Cement Concrete Pavement Segments, 11 p., \$4.00
170	20-24	Research Program Design Administration of Highway and Transportation Agencies, 5 p., \$3.00
171	10-20	Pot Bearings and PTFE Surfaces, 14 p., \$4.00
173	20-24(2)	Guidelines for Establishing Executive Management Information Systems for State Departments of Transportation, 7 p., \$4.00
174	10-25A	Determination of Water-Cement Ratio in Fresh Concrete, 4 p., \$4.00
175	Var.	NCHRP Research on Construction Engineering, 7 p., \$4.00
177	Var.	NCHRP Research on Maintenance Engineering, 7 p., \$4.00
178	4-16	Service Life and Cost of Pavement Marking Materials, 16 p., \$4.00
179	2-14	Financing Highway Improvements Through Public and Private Partnerships, 7 p., \$4.00
180	20-27	Implementation of Geographic Information Systems (GIS) in State DOTs, 31 p., \$6.00
181	1-27	Video Image Processing for Evaluating Pavement Surface Distress, 4 p., \$4.00
182 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$4.00
183	20-24	Administration of Highway and Transportation Agencies "Project 20-24 Series," 6 p., \$4.00
184	Var.	NCHRP Research on Pavements, 8 p., \$4.00

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<sup>b</sup> Progress reports are superseded annually.

NA: Not applicable

TABLE 4 (continued)

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
185	20-23	NCHRP Supports Advances in Differential GPS Satellite Surveying, 4 p., \$4.00
186	20-7	Data Interchange Standards for Bridge Management Systems and Integrated Highway Information Systems, 20 p., \$6.00
187	12-26	Distribution of Wheel Loads on Highway Bridges, 32 p., \$6.00
188	10-30(3)	Ultrasonic Nondestructive Testing for Deterioration of High-Strength Steel Components Embedded in Concrete, 4 p., \$4.00
189	21-3	Instrumentation for Measuring Scour at Bridge Piers and Abutments, 8 p., \$4.00
190 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$4.00
191	20-27	Management Guide for Implementation of Geographic Information Systems (GIS) in State DOTs, 48 p., \$8.00
192	3-41	Procedures for Determining Work Zone Speed Limits, 48p., \$8.00
193	20-24	Administration of Highway and Transportation Agencies "Project 20-24 Series," 8 p., \$6.00
194	22-5A	Low-Service-Level Guardrail Systems, 14 p., \$8.00
195 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$6.00
196	20-24(3)A	A Unique, Hands-on Educational Program for High School Mathematics and Science Classes, 6 p., \$4.00
196	20-24(3)A	A Unique, Hands-on Educational Program for High School Mathematics and Science Classes, 6 p., \$4.00 (Revised)
197	10-35	Fatigue Behavior of Welded and Mechanical Splices in Reinforcing Steel, 12 p., \$8.00
198	12-33	Development of Comprehensive Bridge Specifications and Commentary, 26 p., \$15.00
199	20-23	Rapid Static Surveying Using the Global Positioning System, 6 p., \$4.00
200	2-17(1)	Objectives and Decision Criteria for Infrastructure Investment, 20 p., \$8.00
201	15-11A, 11	BRI-STARS (BRIdge Stream Tube Model for Alluvial River Simulation), 4 p., \$4.00
202	2-17(5)	Congestion Impacts on Business and Strategies to Mitigate Them, 12 p., \$8.00
203 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$6.00
204	20-36	Winter Maintenance Technology and Practices—Learning from Abroad, 16 p., \$8.00
205	5-12	Requirements for Application of Light Emitting Diodes (LEDs) to Traffic Control Signals, 12 p., \$8.00
206	20-25(2)	Training for Highway Construction Personnel, 6 p., \$6.00
207	20-33	On the Implementation of Research Findings in Surface Transportation, 8 p., \$6.00
208	10-32A	Durability Testing of High-Strength Concrete Containing High-Range, Water-Reducing Admixtures, 10 p., \$6.00
209 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$6.00
210	20-5	Effects of Highway Bypasses on Rural Communities and Small Urban Areas, 22 p., \$13.00
211	2-17(6)	Current State Practices in the Transportation-Tourism Interface, 10 p., \$6.00
212 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 8 p., \$6.00
213	21-5	Nondestructive Testing of Unknown Subsurface Bridge Foundations—Results of NCHRP Project 21-5, 42 p., \$14.00
214	3-39(2)	On-Site Evaluation and Calibration Procedures for Weigh-In-Motion Systems, 4 p., \$13.00
215	10-37B	Protocol for In-Service Evaluation of Bridges with Epoxy-Coated Reinforcing Steel, 4 p., \$13.00
216	5-13	Illumination Guidelines for Nighttime Highway Work, 8 p., \$13.00
217	8-33	Relationships Between Implemented Transportation Control Measures and Measured Pollutant Levels, 12 p., \$14.00
218	20-27(2)	A Generic Data Model for Linear Referencing System, 28 p., \$14.00
219 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 9 p., \$14.00
220	17-13	Strategies for Improving Roadside Safety, 8 p., \$15.00
221	20-27(2)	Development of System and Application Architectures for Geographic Information Systems in Transportation, 34 p., \$15.00
222	4-22	Pavement Marking Assessment System (PAMAS), 11 p., \$15.00
223	8-33	Development of an Improved Framework for the Analysis of Air Quality and Other Benefits and Costs of Transportation Control Measures, 15 p., \$15.00
224 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 9 p., \$14.00
225	20-33(2)	Putting Research into Practice: A Synopsis of Successful Strategies and Case Histories, 16 p., \$15.00
226	8-32(2)	Multimodal Transportation: Development of a Performance-Based Planning Process, 16 p., \$15.00
227	1-32	Systems for Design of Highway Pavements, 4 p., \$15.00
228	20-25(3)	Development of Training Material for Highway Construction Personnel, 4 p., \$15.00
229	20-34	Developing Measures of Effectiveness for Truck Weight Enforcement Activities, 14 p., \$15.00

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<sup>b</sup> Progress reports are superseded annually.

NA: Not applicable

TABLE 4 (continued)

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
230	8-33	Review of Travel Assumptions Employed in Emission Factor Models, 23 p., \$15.00
231	25-4	Economic Effects of Restricting Left Turns, 14 p., \$15.00
232	20-36	Report on the 1997 Review of Asian Bridge Structures, 45 p., \$16.00
233	NA	Summary of Economic Development Research Projects, 13 p., \$15.00
234	12-28(13)A	Manual for Bridge Rating Through Load Testing, 146 p., \$29.00
235	25-13	Assessment of Impacts of Bridge Deck Runoff Contaminants on Receiving Waters, 32 p., \$16.00
236	20-36	Emerging Models for Delivering Transportation Programs and Services: A Report of the Transportation Agency Organization and Management Scan Tour, 49 p., \$17.00
237	9-9	Superpave Gyrotory Compaction Guidelines, 5 p., \$15.00
238	20-36	Report on the 1998 Scanning Review of European Winter Service Technology, 33 p., \$16.00
239	17-12	Improved Safety Information for Highway Design, 9 p., \$15.00
240	20-40	Conversion of AASHTO Documents to Metric Units, 24 p., \$15.00
241	20-36	1998 Scanning Review of European Practice for Bridge Scour and Stream Instability Countermeasures, 36 p., \$16.00
242	7-12(2)	Metrication and Enhancement of MicroBENCOST Software Package, 5 p., \$15.00
243	1-29	Proposed Design Guidelines for Reducing Hydroplaning on New and Rehabilitated Pavements, 25 p., \$15.00
244	10-47	Operational Guidelines for Longitudinal Pavement Profile Measurement, 14 p., \$15.00
245 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 10 p., \$15.00
246	1-33	Methodology for Pavement-Investment Decisions, 6 p., \$16.00
247	3-52A	The Relationship Between Access Density and Accident Rates: Comparisons of <i>NCHRP Report 420</i> and Minnesota Data, 11 p., \$16.00
248	2-17(3)A	Updated and Enhanced Database for Macroeconomic Analysis of Transportation Investments and Economic Performance, 5 p., \$16.00
249 <sup>b</sup>	20-5	Continuing Project to Synthesize Information on Highway Problems, 10 p., \$16.00
250	6-12	Improved Visibility for Snowplowing Operations, 4 p., \$16.00
251	25-16	Guidance for Selecting Compensatory Wetland Mitigation Options, 16 p., \$16.00
252	2-18(4)	Development and Demonstration of StratBENCOST Procedure, 6 p., \$10.00
253	9-12	Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Guidelines, 17 p., \$16.00
254	10-48	Assessing Pavement Layer Condition Using Deflection Data, 3 p., \$10.00
255	17-9(2)	Impacts of Resurfacing Projects With and Without Additional Safety Improvements, 15 p., \$10.00
256	17-13	Strategic Plan for Improving Roadside Safety, 3 p., \$10.00
257	14-11 (2)	Effective Motivation of Highway Maintenance Personnel: Tools for Peak Performance, 3 p., \$10.00
258	20-29 (2)	Development of a Computer Model for Multimodal, Multicriteria Transportation Investment Analysis, 4 p., \$10.00
259	5-14	Guidelines for the Effective Use and Procurement of Advanced Warning Arrow Panels, 25 p., \$16.00
260	20-5	Continuing Project to Synthesize Information on Highway Problems, 10 p., \$10.00
261	8-37	The Case for Standardizing Household Travel Surveys, 13 p., \$10.00
262	9-18	Field Shear Test for Hot Mix Asphalt, 14 p., \$10.00
264	20-50 (8/13)	LTPP Data Analysis: Factors Affecting Pavement Smoothness, 5 p., \$10.00
265	17-18 (6)	AASHTO Strategic Highway Safety Plan—Case Studies, 18 p., \$15.00
266	20-24 (11)	Asset Management Guidance for Transportation Agencies, 3 p., \$10.00
267	20-48	Utility of Machine Translation Software, 11 p., \$10.00
268	1-34	Performance of Pavement Subsurface Drainage, 15 p., \$10.00
269	20-50(14)	Significance of "As-Constructed" HMA Air Voids to Pavement Performance from an Analysis of LTPP Data, 21 p., \$15.00
270	18-5	Relationship of Portland Cement Characteristics to Concrete Durability, 4 p., \$10.00
271	10-44 (A)	A Process for Selecting Strategies for Rehabilitation of Rigid Pavements, 4 p., \$10.00
272	10-50A	A Process for Selecting Strategies for Rehabilitation of Rigid Pavements, 4 p., \$10
273	22-16	Development of an Improved Roadside Barrier System—Phase I, 23 p., \$10
274	20-5 (30-9)	Quality Assurance of Structural Materials, 32 p., \$10
275	20-7 (139)	Application of European 2+1 Roadway Designs, 31 p., \$10

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NA: Not applicable

TABLE 4 (continued)

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
277	8-40	Review and Improvement of Existing Processes and Procedures for Evaluating Cultural Resource Significance, 10 p., \$10
278	3-62	Accessible Pedestrian Signals: Synthesis and Guide to Best Practice, 22 p., \$10
279	20-48(1)	Making the Business Case for Translating Non-English Transportation Information, 40 p., \$10
280	20-6	Continuing Project to Synthesize Information on Highway Problems, 12 p., \$10
281	4-20C	Aggregate Tests for Portland Cement Concrete Pavements: Review and Recommendations, 28 p., \$10
282	10-55	Fiber Reinforced Polymer Composites for Concrete Bridge Deck Reinforcement, 4 p., \$10
283	9-30	Jackknife Testing—An Experimental Approach to Refine Model Calibration and Validation, 12 p., \$10
284	9-30	Refining the Calibration and Validation of Hot Mix Asphalt Performance Models: An Experimental Plan and Database, 20 p., \$10

<sup>a</sup> See Table 1 for project titles. All items listed are final publications except where noted. Numbers missing from the series have been superseded by a later publication. See final page of this document for ordering information.

<sup>b</sup> Progress reports are superseded annually.

NA: Not applicable

TABLE 5  
NCHRP LEGAL RESEARCH DIGESTS<sup>a</sup>

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
2	20-6	Supplement to Liability of State Highway Departments for Design, Construction, and Maintenance Defects, 20 p., \$6.00
3	20-6	Supplement to Liability of State and Local Governments for Negligence Arising Out of the Installation and Maintenance of Warning Signs, Traffic Lights, and Pavement Markings, 10 p., \$3.00
4	20-6	Supplement to Personal Liability of State Highway Department Officers and Employees, 9 p., \$3.00
5	20-6	Supplement to Labor Standards in Federal-Aid Highway Construction Contracts, 20 p., \$6.00
6	20-6	Impact of the Discretionary Function Exception on Tort Liability of State Highway Departments, 25 p., \$6.00
7	20-6	Liability of Public Agencies Arising Out of Rejection of Bids and Misaward of Contracts, 17 p., \$6.00
8	20-6	Continuing Project on Legal Problems Arising Out of Highway Programs, 11 p., \$6.00
9	20-6	Supplement to Liability of State and Local Governments for Snow and Ice Control, 11 p., \$6.00
10	20-6	Supplement to Liability of the State for Injury-Producing Defects in Highway Surface, 10 p., \$6.00
11	20-6	Impact of 42 U.S.C. Section 1983 (Civil Rights Act) on Highway Departments, Personnel, and Officials, 21 p., \$6.00
12	20-6	Suspension, Debarment, and Disqualification of Highway Construction Contractors, 27 p., \$6.00
13	20-6	Civil RICO (Racketeer Influenced and Corrupt Organizations Act) Applications in the Highway Construction Industry, 28 p., \$6.00
14	20-6	Supplement to Liability of State Highway Departments for Defects in Design, Construction, and Maintenance of Bridges, 12 p., \$6.00
15	20-6	The Application of NEPA (National Environmental Policy Act) to Federal Highway Projects, 22 p., \$6.00
16	20-6	Supplement to Payment of Attorney Fees in Eminent Domain and Environmental Litigation, 17 p., \$6.00
17	20-6	Public Duty Defense to Tort Liability, 20 p., \$6.00
18	20-6	Supplement to Planning and Precondemnation Activities as Constituting a Taking Under Inverse Law 10 p., \$6.00
19	20-6	Continuing Project on Legal Problems Arising Out of Highway Programs, 11 p., \$6.00
20	20-6	Supplement to Legal Aspects of Historic Preservation in Highway and Transportation Programs, 39 p., \$6.00
21	20-6	Supplement to Liability of the State for Highway Traffic Noise, 8 p., \$6.00
22	20-6	Authority of State Departments of Transportation to Mitigate the Environmental Impact of Transportation Projects, 12 p., \$6.00
23	20-6	Supplement to Valuation Changes Resulting from Influence of Public Improvements, 24 p., \$6.00
24	20-6	Continuing Project on Legal Problems Arising Out of Highway Programs, 8 p., \$6.00
25	20-6	Minority and Disadvantaged Business Enterprise Requirements in Public Contracting, 28 p., \$6.00
26	20-6	Legal Implications of Highway Department's Failure to Comply with Design, Safety, or Maintenance Guidelines, 12 p., \$6.00
27	20-6	Liability of the State for Injury or Damage Occurring in Motor Vehicle Accident Caused by Trees, Shrubbery, or Other Vegetative Obstruction Located in Right-of-Way or Growing on Adjacent Private Property, 12 p., \$6.00
28	20-6	Preventing and Defending Against Highway Construction Claims: The Use of Changed or Differing Site Condition Clauses and New York State's Use of Exculpatory Contract Provisions and No Claims Clauses, 52 p., \$8.00
29	20-6	Highways and the Environment: Resource Protection and the Federal Highway Program, 46 p., \$8.00
30	20-6	Legal Issues Relating to the Acquisition of Right of Way and the Construction and Operation of Highways over Indian Lands, 26 p., \$8.00
31	20-6	Federal Air Quality Laws Governing State and Regional Transportation Planning, 32 p., \$8.00
32	20-6	Federalism and the Intermodal Surface Transportation Efficiency Act of 1991, 24 p., \$8.00
33	20-6	Freedom of Information Acts Federal Data Collections, and Disclosure Statutes Applicable to Highway Projects and the Discovery Process, 28 p., \$8.00
34	20-6	Transportation Agencies as Potentially Responsible Parties at Hazardous Waste Sites, 32 p., \$8.00
35 <sup>b</sup>	20-6	Continuing Project on Legal Problems Arising Out of Highway Programs, 8 p., \$6.00
36	20-6	Photographic Traffic Law Enforcement, 43 p., \$15.00
37	20-6	Indemnification and Insurance Requirements for Design Consultants and Contractors on Highway Projects, 25 p., \$14.00
38	20-6	Risk Management for Transportation Programs Employing Written Guidelines as Design and Performance Standards, 21 p., \$14.00
39	20-6	Liability of Contractors to State Transportation Departments for Latent Defects in Construction after Project Acceptance, 14 p., \$14.00
40	20-6	Liability of Highway Departments for Damages Caused by Stormwater Runoff, 22 p., \$15.00

<sup>a</sup> Supplements and new papers will be published in an Addendum to the 4-volume *Selected Studies in Highway Law*.

<sup>b</sup> Progress reports are superseded annually.

TABLE 5 (continued)

DIGEST NO.	PROJECT NO.	TITLE, PAGES, PRICE
41	20-6	Application of Outdoor Advertising Controls on Indian Land, 30 p., \$15.00
42	20-6	Enforcement of Environmental Mitigation Commitments in Transportation Projects: A Survey of Federal and State Practice, 18 p., \$15.00
43	20-6	Application of the Fourth Amendment to the Inspection of Commercial Motor Vehicles and Drivers, 32 p., \$17.00
44	20-6	Reexamination of the Line Between Governmental Exercise of the Police Power and Eminent Domain, 63 p., \$21.00.
45	20-6	State's Immunity from Suit in Federal and State Court, 24 p., \$17.00.
46	20-6	Drug and Alcohol Testing—A Survey of Labor-Management Relations, 61 p., \$22.00.
47	20-6	Judicial Enforcement of Variable Speed Limits, 25 p., \$15.00.
48	20-6	Civil Rights in Transportation Projects, 24 p. \$10.00.

<sup>a</sup> Supplements and new papers will be published in an Addendum to the 4-volume *Selected Studies in Highway Law*.

<sup>b</sup> Progress reports are superseded annually.



TABLE 6  
NCHRP WORLD WIDE WEB DOCUMENTS\*

DOCUMENT NO.	PROJECT NO.	TITLE, PAGES
1	1-31	Smoothness Specifications for Pavements—Contractor's Final Report; 540 p.
2	3-51	Communications Mediums for Intelligent Transportation Systems—Contractor's Appendix A; 540 p.
3	8-32(5)	Multimodal Transportation Planning Data—Contractor's Final Report; 192 p.
4	8-32(5)	Multimodal Transportation Planning Data—Compendium to Contractor's Final Report; 236 p.
5	3-46	Capacity and Level of Service at Unsignalized Intersections. Volume 1, Two-Way Stop-Controlled Intersections—Contractor's Final Report; 134p.
6	3-46	Capacity and Level of Service at Unsignalized Intersections. Volume 2, All-Way, Stop-Controlled Intersections—Contractor's Final Report; 72 p.
7		Summary of Progress Through 1998; 244 p.
8	14-12	Highway Maintenance Quality Assurance—Contractor's Final Report; 222 p.
9	8-32(1)	Innovative Practices for Multimodal Planning for Freight and Passengers—Project Bibliography; 166 p.
10	3-48	Capacity Analysis for Actuated Intersections—Contractor's Final Report; 208 p.
11	20-5	NCHRP Synthesis 257—Appendix C; 78 p.
12	3-47	Capacity Analysis of Interchange Ramp Terminals—Contractor's Final Report; 356 p.
13	20-34	Developing Measures of Effectiveness for Truck Weight Enforcement Activities—Contractor's Final Report; 278 p.
14	1-28	Laboratory Determination of Resilient Modulus for Flexible Pavement Design—Contractor's Final Report; 463 p.
15	20-7/Task92	Durability of Precast Segmental Bridges—Contractor's Final Report; 45p.
16	1-29	Improved Surface Drainage of Pavements—Contractor's Final Report; 225 p.
17	20-24(7)A	Alternative Approaches to the Taxation of Heavy Vehicles—Contractor's Applications Manual; 85 p.
18	2-17(6)	Tourism Travel Contributions to Economic Development—Volume II of Contractor's Final Report (Supporting Materials and References); 108 p.
19	4-24	HDPE Pipe: Recommended Material Specifications and Design Requirements—Contractor's Final Report; 272 p.
20	20-7/100	Safety Appraisal of Suspension Bridge Main Cables—Workshop Final Report; 37 p.
21	8-32(4)	Volume II: Case Studies of Multimodal Partnerships—Contractor's Final Report; 200 p.
22	8-32(4)	Volume III: Research Report: Developing and Maintaining Partnerships for Multimodal Transportation Planning—Contractor's Final Report; 88 p.
23	10-53	Nondestructive Methods for Condition Evaluation of Prestressing Steel Strands in Concrete Bridges; 81 p.
24	20-7/Task99	LRFD Design Criteria for Cotton Duck Pad Bridge Bearing; 43 p.
25	20-7/Task90	TRAC PAC: The Next Generation; 249 p.
26	8-32(2)A	Multimodal Transportation: Development of a Performance-Based Planning Process; 320 p.
27	24-13	Evaluation of Metal-Tensioned Systems in Geotechnical Applications, Phase I, 215 p.
28	12-46	Manual for Condition Evaluation and Load Rating of Highway Bridges Using Load and Resistance Factor Philosophy, 65 p.
29	10-45	Procedures for Evaluating Corrosion-Inhibiting Admixtures for Structural Concrete, 216 p.
30	9-12	Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method, 461 p.
31	25-19	Assessing the Social and Economic Effects of Transportation Projects, 109 p.
32	20-50(2)	LTPP Data Analysis: Relative Performance of Jointed Plain Concrete Pavements with Sealed and Unsealed Joints, 103 p.
33	17-33	Strategic Plan for Improving Roadside Safety, 113 p.
34	9-09(1)	Literature Review: Verification of Gyration Levels in the Superpave Ndesign Table, 83 p.
35	1-38	Rehabilitation Strategies for Highway Pavements, 310 p.
36	10-37A(1)	Extended Exposure and Monitoring of Epoxy-Coated Reinforced Concrete Test Slabs, 49 p.
37	25-20	Management of Runoff from Surface Transportation Facilities—Synthesis and Research Plan, 65 p.
38	10-54	Quality-Based Performance Rating of Contractors for Prequalification and Bidding Purposes, 220 p.
39	20-24(14)	Managing Change in State Departments of Transportation: Scan 2 of 8: Innovations in Private Involvement in Project Delivery, 494 p.
40	20-50(8/13)	LTPP Data Analysis: Factors Affecting Pavement Smoothness, 299 p.
41	SP20-24[11]	Phase I Report: Task 1 of 3: Synthesis of Asset Management, 84 p., Task 2 of 3: Asset Management Framework, 155 p., Task 3 of 3: Recommended Research Program, 68 p.
42	20-51[1]	Issues in Pavement Smoothness: A Summary Report, 200 p.
43	25-10[2]	Guidance for Estimating the Indirect Effects of Proposed Transportation Projects: PowerPoint Presentation, 230 p.
44	12-45	Design Examples for Large-Span Culverts: Supporting Material for <i>NCHRP Report 473</i> , 60 p.
45	10-50A	A Process for Selecting Strategies for Rehabilitation of Rigid Pavements, 129 p.

TABLE 6 (continued)

DOCUMENT NO.	PROJECT NO.	TITLE, PAGES
46	20-7/133	Improved Live Load Deflection Criteria for Steel Bridges, 140 p.
47	20-50[3/4]	LTPP Data Analysis: Effectiveness of Maintenance and Rehabilitation Options, 332 p.
48	20-50[5]	LTPP Data Analysis: Variations in Pavement Design Inputs, 265 p.
49	SP20-52	TRAC PAC 2—A Hands-On Educational Program, 69 p.
50	10-37C	Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement, 192 p.
51	10-58	Construction Engineering and Management Research Program, 300 p.
52	20-50(9)	LTPP Data Analysis: Feasibility of Using FWD Deflection Data to Characterize Pavement Construction Quality, 78 p.
53	6-14	Feasibility of Using Friction Indicators to Improve Winter Maintenance Operations and Mobility, 180 p.
54	9-26	Precision Estimates of Selected Volumetric Properties of HMA Using Non-Absorptive Aggregate, 65 p.
55	25-23	Environmental Information Management and Decision Support System Implementation Handbook—Appendixes B through F, 79 p.
56	9-18	Sensitivity Evaluation of Field Shear Test Using Improved Protocol and Indirect Tension Strength Test, 33 p.
57	11-7	Development and Evaluation of a National Data-Management System for Highway Tort Claims, 103 p.
58	14-13	Research for Customer-Driven Benchmarking of Maintenance Activities, 99 p.
59	20-24(18)	Outsourcing of State DOT Capital Program Delivery Functions, 62 p.
60	20-50(7/12)	LTPP Data Analysis: Daily and Seasonal Variations in In Situ Material Properties, 707 p.

\*See NCHRP homepage <http://www4.trb.org/trb/crp.nsf>

TABLE 7  
CRP CD-ROMs (produced for both the NCHRP and TCRP programs)

CD-ROM NO.	PROJECT NO.	TITLE
<b>CRP-CD-1</b>	NCHRP 9-7, 9-8, 9-9	Bituminous Materials Research Series
<b>CRP-CD-2</b>	TCRP A-15	Transit Capacity and Quality of Service Manual: First Edition
<b>CRP-CD-3</b>	TCRP D-5	Performance of Direct-Fixation Track Software: Design Guidelines and Software
<b>CRP-CD-4</b>	TCRP C-11	Alternative-Fuel Transit Bus Hazard Assessment Model
<b>CRP-CD-5</b>	NCHRP 4-21	Appropriate Use of Waste and Recycled Materials in the Transportation Industry—An Information Database
<b>CRP-CD-6</b>	NCHRP 20-32(2)	Transportation Research Thesaurus
<b>CRP-CD-7</b>	NCHRP 25-9	Environmental Impact of Construction and Repair Materials
<b>CRP-CD-8</b>	NCHRP 9-11, 9-12, 9-13	Bituminous Materials Research Series II
<b>CRP-CD-9</b>	NCHRP 9-20	Recommended Performance-Related Specification for Hot-Mix Asphalt Construction: Results of the WesTrack Project (in production at FHWA)
<b>CRP-CD-10</b>	NCHRP 9-10, 9-14, 9-19	Bituminous Materials Research Series III
<b>CRP-CD-11</b>	NCHRP 1-32	Pavement Design Tools (Contractor's CD)
<b>CRP-CD-12</b>	NCHRP 14-11(2)	Tools for Peak Performance (Contractor's CD)
<b>CRP-CD-13</b>	TCRP G-03	Transit Risk Manager for Bus Services (Contractor's CD)
<b>CRP-CD-14</b>	NCHRP 25-22	Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions
<b>CRP-CD-15</b>	NCHRP 8-33	Supporting Materials for NCHRP Report 462: Quantifying Air-Quality and Other Benefits and Costs of Transportation Control Measures
<b>CRP-CD-16</b>	TCRP B-16	Multimedia Presentation: Role of Private-for-Hire Vehicle Industry in Public Transit (for TCRP Report 75)
<b>CRP-CD-17</b>	TCRP B-15	Supporting Material for TCRP Report 73: Characteristics of Urban Travel Demand
<b>CRP-CD-18</b>	TCRP H-19	Estimating and Presenting the Benefits and Costs of Public Transit Projects: Guidebook for Practitioners
<b>CRP-CD-19</b>	TCRP A-24	A Toolkit for Self-Service Barrier-Free Fare Collection (for TCRP Report 80)
<b>CRP-CD-20</b>	NCHRP 20-6 and TCRP J-5	Selected Studies in Transportation Law: Volumes 1–6: Vol. 3: Environmental Law and Transportation (20-6) Vol. 4: Tort Liability of Highway Agencies (20-6) Vol. 6: Transit Labor 13[c] Decisions (J-5)
<b>CRP-CD-21</b>	TCRP F-10	Toolbox for Transit Operator Fatigue (for TCRP Report 81)
<b>CRP-CD-22</b>	NCHRP 20-45	Scientific Approaches to Transportation Research
<b>CRP-CD-23</b>	NCHRP 15-19	A Guide to Best Practices for Achieving Context Sensitive Solutions (for NCHRP Report 480)
<b>CRP-CD-24</b>	NCHRP 3-52A	Impact Calculator: Impacts of Access Management Techniques

**TABLE 7**  
**CRP CD-ROMs (produced for both the NCHRP and TCRP programs)**

CD-ROM NO.	PROJECT NO.	TITLE
<b>CRP-CD-25</b>	TCRP G-6	TCRP Report 88: A Guidebook for Developing a Transit Performance-Measurement System and Supplementary Material
<b>CRP-CD-26</b>	NCHRP 12-43	BLCCA Software, Guidance Manual, User Manual, and Appendixes to NCHRP Report 483
<b>CRP-CD-27</b>	TCRP J-9(6)	TCRP Report 84, Vol. 3: Using the Internet for Transit Training and Certification
<b>CRP-CD-28</b>	NCHRP 3-56	RSRAP Software, NCHRP Report 486, and Supplementary Material
<b>CRP-CD-29 A&amp;B</b>	NCHRP 12-50	NCHRP Report 485: Supporting Software—Subdomain Data, Common Tables, and Data Viewer; Volumes 1 & 2
<b>CRP-CD-30</b>	NCHRP 12-48	Appendixes for NCHRP Report 489: Design of Highway Bridges for Extreme Events
<b>CRP-CD-31</b>	TCRP A-23	Bus Rapid Transit: Case Studies for TCRP Report 90
<b>CRP-CD-32</b>	NCHRP 25-6	Intersection Air Quality Model (Contractor's CD)
<b>CRP-CD-33</b>	NCHRP 22-9(2)	NCHRP Report 492 Supplementary Material: RSAP Program and User's Manual
<b>CRP-CD-34</b>	TCRP J-9(4)	TCRP Report 84, Vol. 4: Advanced Features of Transit Websites
<b>CRP-CD-35</b>	NCHRP 3-54(2)	NCHRP Report 493 Supplementary Material: Working Papers
<b>CRP-CD-36</b>	NCHRP 3-50(2)	Driver Information Load (DIL) Program and User Manual (for NCHRP Report 488)
<b>CRP-CD-37</b>	NCHRP 12-51	CARRIS Software Module and User's Guide (for NCHRP Report 495)
<b>CRP-CD-38</b>	NCHRP 15-18	Appendix material for NCHRP Report 504
<b>CRP-CD-39</b>	NCHRP 24-17	Appendix material for NCHRP Report 507 (in production)
<b>CRP-CD-40</b>	TCRP B-23	Software for TCRP Report 98, Requirements for Demand Responsive Services
<b>CRP-CD-41</b>	NCHRP 20-47(1)-23	Software for NCHRP Report 506, Positional Data in Transportation
<b>CRP-CD-42</b>	TCRP A-15A	TCRP Report 100 (TCQSM) + Supplemental Material

\*This list includes CD-ROMs produced for both the NCHRP and the TCRP programs.

## HOW TO ORDER PUBLICATIONS AND OTHER MATERIALS

### **Items for Sale**

1. NCHRP Series Reports, Syntheses, Research Results Digests, and Legal Research Digests (see Tables 2, 3, 4, and 5 for prices).
2. Research agencies' final reports (see project summaries for prices).
3. Microfiche (\$8.00 per report). Price may change without notice. See latest *Summary of Progress* for current cost.
4. Other TRB publications.

A check or money order, payable to *Transportation Research Board*, must accompany all orders regardless of amount involved. Payment may be made by check or money order (payable to Transportation Research Board) or by VISA, MasterCard, or American Express only if more than \$10.00. Only charge-card orders will be accepted by telephone (202/334-3213) or fax (202/334-2519). Be sure to include expiration date. Mail orders to the following address:

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### **Items for Loan**

1. Some research agencies' final reports, manuals, videotapes, etc., are identified in the project summaries and are available on a loan basis upon written request to: *Cooperative Research Programs, 2101 Constitution Avenue, NW, Washington, DC 20418*
2. Loan requests for films and tapes should be directed to:

*TRB Audio-Visual Library  
Transportation Research Board  
2101 Constitution Avenue, NW  
Washington, DC 20418*

Mailing and handling charges may be assessed, especially where 1st-class delivery is requested; an invoice will accompany the loaned item.

### ***Summary of Progress Through 1988—Special Edition***

Printed copies are available, free of all charges, by ordering directly from *Cooperative Research Programs, Transportation Research Board, 2101 Constitution Avenue, NW, Washington, DC, 20418*.

This document also can be viewed as *NCHRP Web Document 7*. See the Cooperative Research Programs' homepage ([www.trb.org/nchrp](http://www.trb.org/nchrp)) and click on Web Documents.

