

These Digests are issued in the interest of providing an early awareness of the research results emanating from projects in the NCHRP. By making these results known as they are developed and prior to publication of the project report in the regular NCHRP series, it is hoped that the potential users of the research findings will be encouraged toward their early implementation in operating practices. Persons wanting to pursue the project subject matter in greater depth may obtain, on a loan basis, an uncorrected draft copy of the agency's report by request to: NCHRP Program Director, Transportation Research Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Continuing Project to Synthesize Information on Highway Problems

see also the annual NCHRP Progress Report, which has abstracts of active synthesis topics

An NCHRP staff digest of the progress and status of NCHRP Project 20-5, "Synthesis of Information Related to Highway Problems," for which the Transportation Research Board is the agency conducting the research. The Principal Investigators responsible for the project are Thomas L. Copas and Herbert A. Pennock, serving under the Special Technical Activities Division of the Board.

Administrators, practicing engineers, and researchers continually face highway problems on which much information already exists, either in documented form or in terms of undocumented experience and practice. Unfortunately, this information is often fragmented, scattered, and undervalued. Often it is unknown to the person normally responsible for making decisions related to the topic. As a consequence, full information on what has been learned about a problem is frequently not brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There exists a vast storehouse of information relating to nearly every subject of concern to highway administrators and engineers. Much of it resulted from research and much from successful application of the ideas of engineers faced with problems in their day-to-day work. Because, there has been no systematic means for bringing such useful information together and making it available to the entire highway community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing study, NCHRP Project 20-5, "Synthesis of Information Related to Highway Problems," which is intended to search out and synthesize useful knowledge from all possible sources and to prepare documented reports on current practices in the subject areas of concern. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*, which collects and assembles the various forms of information into single concise documents pertaining to specific highway problems or sets of closely related problems.

This synthesis series attempts to report on the various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which they are utilized in this fashion will quite logically be tempered by the breadth of the user's knowledge in the particular problem area.

To develop these syntheses in a comprehensive manner and to ensure inclusion of significant knowledge, the Transportation Research Board analyzes available information assembled from numerous sources, including state highway and transportation departments. A panel of experts in the subject area is established to guide the researchers in organizing and evaluating the data collected on each topic and to review the final synthesis report.

For each topic the project objectives are: (1) to locate and assemble documented information; (2) to learn what engineering practice has been used for solving or alleviating the problems; (3) to identify all ongoing research; (4) to

learn what problems remain largely unsolved; (5) to organize, evaluate, and document the useful information that is acquired; (6) to evaluate the effectiveness of the synthesis after it has been in the hands of its users for a period of time.

Each synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that which is now at hand.

The 39 published syntheses of highway practice that have been prepared under this project to date are listed in Table 1. Copies can be obtained from the Publications Office, Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D. C. 20418. A check or money order must accompany orders totaling \$7.50 or less.

Work is currently under way on the 22 topics listed in Table 2. For each topic, a panel consisting of practitioners and researchers aids in the identification of potential writers for the synthesis report, reviews drafts, and assists in the preparation of the final report.

One part of project procedures that is not widely understood is the process for submission and selection of topics. NCHRP Project Committee SP20-5 meets for two days each Fall to select topics for study using funds from the upcoming fiscal year. The membership of this committee is listed in Table 3. Current funding allows for initiation of about 11 or 12 syntheses per year. This number plus some alternate topics are selected by the committee at the Fall meeting. Topics selected for the FY '77 program are listed in Table 4. It is unlikely that those near the bottom of the list of 20 will be studied this year.

Table 1
COMPLETED SYNTHESSES OF HIGHWAY PRACTICE

<u>No. Title, Pages, Price</u>	<u>No. Title, Pages, Price</u>
1. Traffic Control for Freeway Maintenance, 47 pp., \$2.20	22. Maintenance Management of Traffic Signal Equipment and Systems, 41 pp., \$4.00
2. Bridge Approach Design and Construction Practices, 30 pp., \$2.00	23. Getting Research Findings Into Practice, 24 pp., \$3.20
3. Traffic-Safe and Hydraulically Efficient Drainage Practice, 38 pp., \$2.20	24. Minimizing Deicing Chemical Use, 58 pp., \$4.00
4. Concrete Bridge Deck Durability, 28 pp., \$2.20	25. Reconditioning High-Volume Freeways in Urban Areas, 56 pp., \$4.00
5. Scour at Bridge Waterways (out of print)	26. Roadway Design in Seasonal Frost Areas, 104 pp., \$6.00
6. Principles of Project Scheduling and Monitoring, 43 pp., \$2.40	27. PCC Pavements for Low-Volume Roads and City Streets, 31 pp., \$3.60
7. Motorist Aid Systems, 28 pp., \$2.40	28. Partial-Lane Pavement Widening, 30 pp., \$3.20
8. Construction of Embankments (out of print)	29. Treatment of Soft Foundations for Embankments, 25 pp., \$3.20
9. Pavement Rehabilitation - Materials and Techniques, 41 pp., \$2.80	30. Bituminous Emulsions for Highway Pavements, 76 pp., \$4.80
10. Recruiting, Training, and Retaining Maintenance and Equipment Personnel, 35 pp., \$2.80	31. Highway Tunnel Operations, 29 pp., \$3.20
11. Development of Management Capability, 50 pp., \$3.20	32. Effects of Studded Tires, 46 pp., \$4.00
12. Telecommunications Systems for Highway Administration and Operations, 29 pp., \$2.80	33. Acquisition and Use of Geotechnical Information, 40 pp., \$4.00
13. Radio Spectrum Frequency Management, 32 pp., \$2.80	34. Policies for Accommodation of Utilities on Highway Rights-of-Way, 22 pp., \$3.20
14. Skid Resistance, 66 pp., \$4.00	35. Design and Control of Freeway Off-Ramp Terminals, 61 pp., \$4.40
15. Statewide Transportation Planning - Needs and Requirements, 41 pp., \$3.60	36. Instrumentation and Equipment for Testing Highway Materials, Products, and Performance, 70 pp., \$4.80
16. Continuously Reinforced Concrete Pavement, 23 pp., \$2.80	37. Lime-Fly Ash-Stabilized Bases and Subbases, 66 pp., \$4.80
17. Pavement Traffic Marking - Materials and Application Affecting Serviceability, 44 pp., \$3.60	38. Statistically Oriented End-Result Specifications, 40 pp., \$4.00
18. Erosion Control on Highway Construction, 52 pp., \$4.00	39. Transportation Requirements for the Handicapped, Elderly, and Economically Disadvantaged, 54 pp., \$4.40
19. Design, Construction, and Maintenance of PCC Pavement Joints, 40 pp., \$3.60	40. Staffing and Management for Social, Economic, and Environmental Impact Assessment (in publication)
20. Rest Areas, 38 pp., \$3.60	41. Bridge Bearings (in publication)
21. Highway Location Reference Methods, 30 pp., \$3.20	

The following factors are considered in the selection process for synthesis topics:

The problem should be widespread enough to promise broad interest in the synthesis.

The problem should be timely and critical with respect to safety, economic impact, or social impact.

The problem is of interest if current practice is nonuniform or inconsistent from agency to agency, or if the validity of some practices appears to be questionable.

The quality and quantity of useful available information should indicate a need to organize and compress that which has already been learned and written on the topic.

The topic should not be one where ongoing research or other activities in progress might be expected to render the synthesis obsolete shortly after completion.

In each of the past several years there have been about 80 suggested topics for the committee's consideration. Table 5 lists topics considered but not selected for inclusion in the FY '77 program. Candidate topics are suggested by members of the committee based on input from a variety of sources. State highway and transportation department personnel may submit suggestions for synthesis topics directly to the NCHRP Program Director or, if desired, through their State TRB Representative. Topics suggested must be accompanied by a brief scope statement or discussion of the problem.

Table 2

TOPICS BEING STUDIED

<u>No.</u>	<u>Title</u>	<u>No.</u>	<u>Title</u>
5-04	Design of Pile Foundations	8-01	Recycling Materials for Highways
5-07	Effect of Weather on Highway Construction	8-02	Construction Contract Staffing
5-09	Durability of Drainage Pipe	8-03	Design and Use of Highway Shoulders
6-05	Rapid-Setting Materials for Patching of Concrete	8-04	Safe Conduct of Traffic Through Highway Construction and Maintenance Zones
7-01	Consolidation of Concrete (Emphasis on Pavements and Bridge Decks)	8-05	Precast Concrete Elements for Transportation Facilities
7-04	Recording and Reporting Methods for Highway Maintenance Expenditures	8-06	State Highway and Transportation Data Storage and Retrieval Systems
7-05	Energy Effects, Efficiencies, and Prospects for Various Modes of Transportation	8-08	Maintenance Equipment - Management and Selection Systems
7-06	Rehabilitation of PCC Pavement Joints	8-09	Open-Graded Friction Courses
7-07	Priority Programming and Project Selection	8-10	Photologging
7-08	Effect of Bridge Painting Practices on Environment	8-11	Relationship of Asphalt Cement Properties to Pavement Durability
7-09	Bus Transit Service Planning Guides - Routes and Schedules	8-12	Bituminous Patching Mixtures

Table 3

NCHRP PROJECT COMMITTEE SP20-5

Chairman
Ray R. Biege, Jr.
Kansas Department of Transportation

Verdi Adam
Louisiana Dept. of Highways

Thomas H. May
Pennsylvania Dept. of Transportation

Jack Freidenrich
New Jersey Dept. of Transportation

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Edward A. Mueller
Jacksonville Transportation Authority

Edward J. Heinen
Minnesota Dept. of Highways

Rex C. Leathers
Federal Highway Administration

Bryant Mather
USAE Waterways Experiment Station

Roy C. Edgerton
Transportation Research Board

Interested parties may obtain copies of a compilation of scope statements for all topics considered for study in Project 20-5 in the FY '77 program from Mr. L. M. MacGregor, Administrative Engineer, NCHRP, Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D. C. 20418 at a cost of \$4.00. A check or money order must accompany orders totaling \$7.50 or less; remittance should be made payable to "Transportation Research Board."

Table 6 contains an index to published syntheses and topics now under study as well as those expected to be started through 1977.

The NCHRP Projects Engineer responsible for Project 20-5 is Robert J. Reilly, who can be reached at (202) 389-6741.

Table 4
SYNTHESIS TOPICS SELECTED FOR THE FY '77 PROGRAM

<u>No.</u>	<u>Title</u>	<u>No.</u>	<u>Title</u>
9-01	Bridge Deck Durability	9-12	Welding Practices in Fabrication and Their Inspection
9-02	Vehicle Sizes and Weights vs. Long-Term Pavement and Bridge Deterioration	9-13	Rapid Testing
9-03	Variable Message Signs	9-14	Environmental Monitoring (Air, Water, Noise)
9-04	Use of Prefabricated Bridge Systems	9-15	Prestressed Concrete
9-05	Relation Between Control Tests and Performance	9-16	State and Local Resources for Financing Highway Transportation Activities
9-06	Synthesis of Experience: Work Schedule Changes	9-17	Automation of Geodetic Ground Control Used for Photogrammetric Mapping
9-07	Motorist Information Systems for Trip Planning and Direction Finding	9-18	Roadway Pavement Wear and Repaving Techniques in Tunnels
9-08	The Nature of Failure and the Repair of Continuously Reinforced Concrete Pavement	9-19	Pipe Joints
9-09	Alternative Methods of Taxing Motor Fuel	9-20	Warrants for Medians on Arterial Highways and Streets
9-10	Design of Sediment Basins		
9-11	Design and Cost Guidelines for Median Glare Screen		

Table 5
OTHER TOPICS CONSIDERED FOR INCLUSION
IN THE FY '77 PROGRAM

<u>No.</u>	<u>Title</u>	<u>No.</u>	<u>Title</u>
RESEARCH FIELD A: ADMINISTRATION		RESEARCH FIELD D: MATERIALS AND CONSTRUCTION	
A 3	Effects of Truck Design Changes on Federal and State Highway Use Taxes	D 1	Construction Engineering Cost Accounting and Reporting
A 4	Diesel Fuel Tax Evasion and Enforcement		
A 7	Functional Replacement: State-of-the-Art		
A 8	The Federal-Aid Highway Beautification Program: An Identification and Evaluation of Alternative Approaches	RESEARCH FIELD E: SOILS AND GEOLOGY	
A 9	Impact of Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 on the Acquisition of Rights-of-Way for Federally Assisted Highway Projects by Small Cities and Counties	E 1	Use of the Penetrometer in the U. S. A.
		E 2	Construction Procedures for Sinking Caissons
		E 3	Underwater Inspection of Bridge Foundations
		E 4	Earth Pressures on Retaining Structures
		E 5	Retaining Wall Visual Quality
RESEARCH FIELD B: TRANSPORTATION PLANNING		RESEARCH FIELD G: TRAFFIC	
B 1	User-Oriented Attitude-Behavior Planning Procedures for Transportation System Management Actions	G 1	Development of Traffic Data Base
B 2	Guide to Bicycle Planning on an Area-Wide Basis	G 2	Warrants for Spacing, Selection, and Design of Interchanges
B 4	Airport Access	G 3	Signal Controlled Intersections - Number, Type, and Location
RESEARCH FIELD C: DESIGN		G 4	Measurement of Delayed Signalized Intersections
C 2	Bridge Deck Design	G10	Methods for Informing Users of a Change to the Metric System
C 3	Load Distribution on Bridges	G11	Shoulder Delineation Methods
C 4	Highway Bridge Load Distribution Design Criteria	G12	Future Effects of Low Acceleration Vehicles on Traffic Operations
C 5	Design for Highway Bridge Impact	G13	Flashing Beacon Applications
C 6	Load Strain Histories	G14	Cost of Highway Traffic Accidents
C 7	Structural Steels for Highway Bridges, Including Cables	G17	Pedestrian Conflicts Associated with "Right Turn on Red" Law
C 8	Overload Capability of Existing Structures Related to Fatigue and Fracture	G18	Noise Impact Studies
C 9	Effect of Toughness on the Fatigue Life of Fracture-Critical Bridge Members	G19	The Effect of Terrain and Appurtenances on Propagation of Sound
C10	The Charpy V-Notch Impact Test Specimen Modified by Fatigue Precracking	SPECIAL PROJECTS	
C11	Testing for Weld Heat-Affected Zone Toughness	SP1	Archeological and Paleontological Salvage Projects
C13	Fatigue Strength of Anchorage of Reinforcing Steel Bars	SP3	Interactive Computer Graphics - Present Use and Prospects
C16	Earthquake Design for Bridge Structures	SP4	Recording and Staffing Requirements for Supervision of Tunnel Construction
C17	The Effect of Vibrations Caused by Highway Use	SP6	Operating Practices and Experience with Restricting Dangerous Cargo in Tunnels
C18	Bridge Pier Support	SP7	Fire Fighting in Tunnels
C23	Quality of Highway Stormwater Runoff		
C24	Estimated Floods for the Design of Transportation Structures		
C25	A Comprehensive Design Procedure for Design of Riprap Bank Protection		
C26	Pavement Performance and Serviceability		
C27	Experience with Dynaflect Measurements		
C29	Relieving Rigid Pavement Pressures at Bridge Abutments		

TABLE 6

INDEX TO SYNTHESSES AND STUDIES*

- Aid to motorists 7
- Asphalt
 - cement 8-11
 - emulsions 30
 - patching 8-12
 - pavements 30, 8-09, 8-11
- Bases 37
- Bearings for bridges 41
- Bituminous emulsions 30
- Bituminous patching 8-12
- Bituminous pavements 30, 8-09, 8-11
- Bridges
 - approaches 2
 - bearings 41
 - concrete decks 4, 9-01
 - construction 7-01, 8-05
 - painting effects 7-08
 - patching 6-05
 - precast concrete 8-05
 - prefabricated 8-05, 9-04
 - scour 5
 - welding 9-12
- Bus transit planning 7-09
- Changeable message signs 9-03
- Communications 7, 12, 13, 9-07
- Computers 8-06
- Concrete
 - bridge decks 4, 9-01
 - consolidation 7-01
 - patching 6-05
 - pavements 16, 19, 27, 6-05, 7-06, 9-08
 - precast 8-05
- Consolidation of concrete 7-01
- Construction
 - bases and subbases 37
 - bituminous pavements 30
 - bridge approaches 2
 - bridge decks 4, 7-01, 9-01
 - concrete pavements 16, 19, 27, 7-01
 - embankments 8
 - erosion control 18
 - management 8-02
 - pavements 16, 19, 27, 30, 7-01
 - recycling 8-01
 - specifications 38
 - staffing 8-02
 - testing 9-05
 - traffic control 8-04
 - weather 5-07
 - welding 9-12
- Continuously reinforced pavements 16, 9-08
- Culverts
 - durability 5-09
 - inlets 3
- Data systems 8-06
- Deicing chemical use 24
- Design
 - bituminous pavements 30
 - bridge approaches 2
 - bridge bearings 41
 - concrete pavements 16, 19, 27
 - frost 26
 - pavements 16, 19, 26, 27, 30
 - pile foundations 5-04
 - roadways 26
 - shoulders 8-03
- Disadvantaged, transportation for 39
- Drainage 9-10
- Drainage durability 5-09
- Drainage structures 3
- Elderly, transportation for 39
- Embankments 8
- Emulsions 30
- End-result specifications 38
- Energy
 - bituminous emulsions 30
 - transportation use 7-05
- Equipment
 - management 8-08
 - procurement 8-08
 - selection 8-08
- Field testing equipment 36
- Fly ash 37
- Foundations
 - embankments 8, 29
 - pile 5-04
 - soft strata 29
- Freeways
 - maintenance 1, 25
 - off-ramps 35
 - repair 25
- Friction courses 8-09
- Frost susceptibility 26
- Fuel taxes 9-09
- Geotechnical data 33
- Geotechnical exploration 33
- Glare screen 9-11
- Handicapped, transportation for 39
- Information for motorists 7, 9-07
- Joints, concrete pavement 19, 7-06
- Laboratory testing equipment 36
- Lime-fly ash 37
- Loads, increased 9-02
- Location reference methods 21
- Low-volume pavements 27
- Maintenance
 - bituminous pavements 30, 8-12
 - concrete pavements 29, 6-05, 7-06, 9-08
 - equipment 8-08
 - freeways 1, 25
 - management 10, 22, 7-04, 8-08
 - pavements 9, 19, 25, 30, 6-05, 7-06, 8-12, 9-08

*Simple numbers represent published syntheses; hyphenated numbers represent studies in progress.

- personnel 10
 - records 7-04
 - recycling 8-01
 - reporting 7-04
 - rest areas 20
 - traffic control 1, 25, 8-04
 - traffic signals 22
 - tunnels 31
- Management
- construction 8-02
 - data 8-06
 - maintenance 10, 22, 7-04, 8-08
 - personnel 11
 - S.E.E. assessments 40
 - training 11

Materials testing equipment 36

Median glare screen 9-11

Mileposts 21

Monitoring of projects 6

Motorist aid systems 7

Motorist information 9-07

Off-ramps 35

Open-graded surfaces 8-09

Overlays 9, 8-09

Painting effects 7-08

Patching 9, 6-05, 8-12

Pavements

- asphalt 30, 8-09, 8-11
- bases 37
- bituminous 30, 8-09; 8-11
- concrete 16, 19, 27, 7-01, 7-06, 9-08
- construction 16, 19, 27, 30, 7-01
- CRCP 16, 9-08
- distress 9
- durability 8-11, 9-02
- frost design 26
- joints 19, 7-06
- loads 9-02
- low-volume 27
- patching 9, 6-05, 8-12
- rehabilitation 9, 25
- skid resistance 14
- striping 17
- studded tires 32
- widening 28

Personnel training 10, 11

Photologging 8-10

Pile foundations 5-04

Pipe durability 5-09

Planning

- statewide transportation 15
- transit 7-09, 9-06
- transportation 9-06

Poor, transportation for 39

Pozzolans 37

Precast concrete 8-05

Prefabricated bridges 9-04

Priority programming 7-07

Programming 7-07

Project scheduling 6

Radio communications 12, 13

Radio frequency management 13

Recycling highway materials 8-01

Reference methods 21

Reference posts 21

Reflection cracking 9

Rehabilitation

- freeways 25
- pavements 9, 7-06

Research implementation 23

Rest areas 20

Right-of-way, utilities 8-01

Scheduling of projects 6

Scour 5

Sediment basins 18, 9-10

Shoulders 8-03

Signs, variable message 9-03

Skid resistance 14

Snow and ice control 24

Soft foundations 29

Soil erosion 18

Specifications 38

Spectrum management 13

Stabilization of bases 37

Staffing

- construction 8-02
- maintenance 10
- S.E.E. assessments 40

Statewide transportation planning 15

Statistical specifications 38

Stream scour 5

Striping 17

Structures (see bridges)

Structures, precast 8-05

Studded tires 32

Subbases 37

Subsurface information 33

Surface courses 8-09

Taxes, fuel 9-09

Telecommunications 12

Telephones 12

Testing, construction 9-05

Testing equipment 36

Traffic control

- construction 8-04
- devices 9-03
- maintenance 1, 8-04
- ramps 35

Traffic marking 17

Traffic paint 17

Traffic safety 1, 3, 32, 35, 8-04, 9-11

Traffic signal maintenance 22

Training of personnel 10, 11

Transit planning 7-09, 9-06

Transportation planning 15, 9-06

Truck weights and sizes 9-02

Tunnels

- maintenance 31
- operation 31

Urban freeway reconditioning 25

Utilities 34

Variable message signs 9-03

Vibration of concrete 7-01

Weather 5-07

Welding 9-12

Widening of pavements 28

Work schedules 9-06

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