GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[X] ORIGINAL [ ] REVISION NO. ____

Project No. E-20-624 (R5906-0A0) GTRC/~~GIT~~ DATE 4 / 4 / 85

Project Director: John Moskaluk School/~~Lab~~ CE

Sponsor: Georgia Department of Transportation

Type Agreement: Task Order #1, under BOA #90

Award Period: From 1/1/85 To ~~1/1/86~~ 4/15/86 (Performance) 4/8/86 ~~1/1/86~~ (Reports)

Sponsor Amount:	This Change	Total to Date
Estimated: $		$ 125,000
Funded: $		$ 125,000

Cost Sharing Amount: $ 12,500 Cost Sharing No: E-20-386

Title: Technology Transfer Program for Local Transportation Agencies

ADMINISTRATIVE DATA — OCA Contact John Schonk x4820

1) Sponsor Technical Contact:

Sam Volo
Georgia Dept. of Transportation
Office of Materials & Research
15 Kennedy Dr.
Forest Park, GA 30050
363-7567

2) Sponsor Admin/Contractual Matters:

Tom Stapler
Georgia Dept. of Transportation
Office of Materials & Research
15 Kennedy Dr.
Forest Park, GA 30050
363-7567

Defense Priority Rating: N/A Military Security Classification: N/A

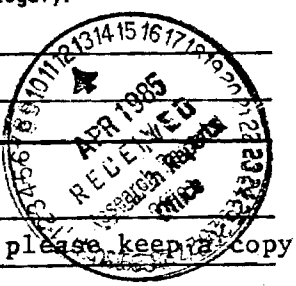
(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached N/A Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. ~~Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.~~

Equipment: Title vests with Sponsor



COMMENTS:

This project is administered under provisions of BOA #90.

NOTE to all on distribution: A full copy of the BOA is attached; please keep a copy on file, no further copies will be distributed on future project.

COPIES TO:

SPONSOR'S I. D. NO. 02.300.000.85.004

Project Director
Research Administrative Network
Research Property Management
Accounting
Procurement/EES Supply Services
Research Security Services
Reports Coordinator (OCA)
Research Communications (2)
GTRC
Library
Project File
Other

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 11/4/86

Project No. E-20-624 School/[illegible] CE

Includes Subproject No.(s) N/A

Project Director(s) John Moskaluk GTRC / [illegible]

Sponsor Georgia Department of Transportation

Title Technology Transfer Program for Local Transportation Agencies

Effective Completion Date: 4/15/86 (Performance) _____ (Reports)

Grant/Contract Closeout Actions Remaining:

Continued by E-20-647.

- [ ] None
- [X] Final Invoice [illegible] with certification -(BOA article III, section D)
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Continues Project No. _____ Continued by Project No. E-20-647

COPIES TO:

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FORM OCA 69.285

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PR no. 1-9

RESEARCH PROJECT PROGRESS REPORT
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

Project No.	Project Title	Report No. 10
RTA-HPR(1)	TECHNOLOGY TRANSFER PROGRAM FOR LOCAL TRANSPORTATION AGENCIES	Report Period from 1 April 1985 to 1 July 1985

Research Agency(s)	Project Director(s)
GEORGIA INSTITUTE OF TECHNOLOGY ATLANTA, GA 30332	M. JOHN MOSKALUK

Starting Date	% Time Expended	Schedule Status	Funding Sources(s)
JANUARY, 1985 Completion Date JANUARY, 1986	33%	☑ On ☐ Ahead ☐ Behind	100% FHWA FUNDING

Funds Authorized	Funds Expended			Fiscal Year Funding		
Total	Total, %		Report Period	Authorized	Expended, %	
$125,000	$43,906	35%	$22,764	$125,000	$43,906	35%

Project Objectives, Status, Progress

Report Date August 28, 1985

PROJECT GOAL: To communicate to local transportation gencies the availability and application of new technology that bridges the gap between research and implementation in the area of roadways, bridges, and transit.

OBJECTIVES:

- To enhance the existing programs of technology services of GDOT and Georgia Tech.
- To improve and further promote communication on technical transportation issues between GDOT/Georgia Tech and the local agencies.
- To help insure that appropriate technology consistent with the needs of the local agencies in mind is made available.
- To encourage implementation of effective procedures, practices, and materials at local levels.

STATUS: The project has been underway for thirty months and it appears that the Georgia Tech Technology Transfer Center is becoming a success. We have been able to reach out to the local agencies with workshops, technical assistance, publications, and with newsletters. The local agencies have indicated, on numerous occasions, that the Center is performing a valuable function especially through the workshops that have been presented.

PROGRESS THIS PERIOD:

Workshops that are currently planned are:

Title	Schedule
Rights-Of-Way Acquisition	8/13/85 to 9/17/85
Risk Management	10/15/85 to 11/19/85
Office Applications Of Micro-Computers	To be scheduled
Roadway Maintenance	Winter 1986

WORK PLANNED FOR NEXT REPORT PERIOD:

The Technology Transfer Center will continue to work with local agencies and finalize the planned seminars.

PROBLEMS: None

M. John Moskaluk, Director
Georgia Tech
Technology Transfer Center

WORK PLAN SCHEDULE

TECHNOLOGY TRANSFER PROGRAM
FOR
LOCAL TRANSPORTATION AGENCIES

Research Tasks	Months of the Year 1 2 3 4 5 6 7 8 9 10 11 12
Task A: Compile & Maintain Mailing List	▬▬▬▬▬▬▬▬
Task B: Publish Quarterly Newsletter	▬▬▬▬▬▬▬▬
Task C: Provide Technology Transfer Materials	AS REQUIRED
Task D: Provide Information Service	AS REQUIRED
Task E: Conduct Seminars and Training Sessions	10 WORKSHOPS REQUIRED PER YEAR
Task F: Project Documentation Quarterly Progress Report Evaluation Report	● ● Q Q Final Report

▭ Approved Schedule ▬ Work Completed Schedule

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PR no. 11

RESEARCH PROJECT PROGRESS REPORT
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

Project No.	Project Title	Report No. 12
RTA-HPR(1)	TECHNOLOGY TRANSFER PROGRAM FOR LOCAL TRANSPORTATION AGENCIES	Report Period from 1 October, 1986 to 31 December, 1986

Research Agency(s)	Project Director(s)
GEORGIA INSTITUTE OF TECHNOLOGY ATLANTA, GA 30332	M. JOHN MOSKALUK

Starting Date	% Time Expended	Schedule Status	Funding Sources(s)
January, 1985 Completion Date January 1986	83%	☒ On ☐ Ahead ☐ Behind	100% FHWA Funding

Funds Authorized	Funds Expended		Fiscal Year Funding	
Total	Total, %	Report Period	Authorized	Expended, %
$125,000	$101,300 81%	$29,120	$125,000	$57,393 46%

Project Objectives, Status, Progress — Report Date January 31, 1986

PROJECT GOAL: To communicate to local transportation gencies the availability and application of new technology that bridges the gap between research and implementation in the area of roadways, bridges, and transit.

OBJECTIVES:

- o To enhance the existing programs of technology services of GDOT and Georgia Tech.
- o To improve and further promote communication on technical transportation issues between GDOT/Georgia Tech and the local agencies.
- o To help insure that appropriate technology consistent with the needs of the local agencies in mind is made available.
- o To encourage implementation of effective procedures, practices, and materials at local levels.

STATUS: The project has been underway for thirty six months and it appears that the Georgia Tech Technology Transfer Center is becoming a success. We have been able to reach out to the local agencies with workshops, technical assistance, publications, and with newsletters. The local agencies have indicated, on numerous occasions, that the Center is performing a valuable function especially through the workshops that have been presented.

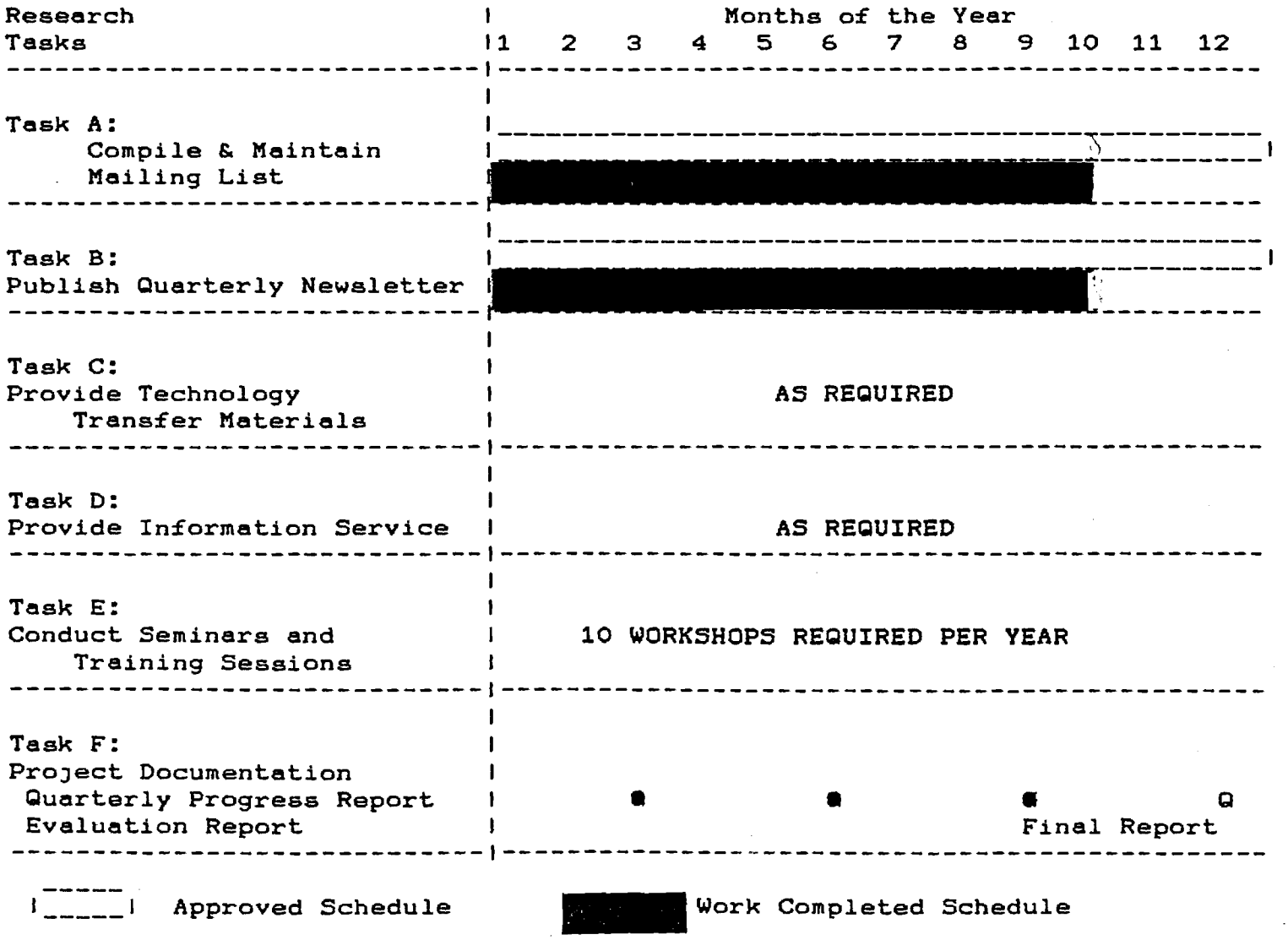
WORK PLANNED FOR NEXT REPORT PERIOD: The Technology Transfer Center will continue to work with local agencies and finalize the planned seminars. In addition, the final report will be completed

PROBLEMS: None

M. John Moskaluk, Director
Georgia Tech
Technology Transfer Center

WORK PLAN SCHEDULE

TECHNOLOGY TRANSFER PROGRAM
FOR
LOCAL TRANSPORTATION AGENCIES



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GEORGIA TECH

TECHNOLOGY TRANSFER CENTER

THIRD YEAR

ANNUAL REPORT

Prepared By:

Georgia Tech

Technology Transfer Center

Submitted To:

Georgia Department of Transportation

Office of Materials and Research

MARCH, 1986

GEORGIA INSTITUTE OF TECHNOLOGY
A UNIT OF THE UNIVERSITY SYSTEM OF GEORGIA
SCHOOL OF CIVIL ENGINEERING
ATLANTA, GEORGIA 30332

GEORGIA TECH

TECHNOLOGY TRANSFER CENTER

ANNUAL REPORT

MARCH, 1986

SCHOOL OF CIVIL ENGINEERING

GEORGIA INSTITUTE OF TECHNOLOGY

ATLANTA, GEORGIA 30332

TABLE OF CONTENTS

INTRODUCTION

The performance of the Georgia Tech Technology Transfer Center remained high during the third year of operations. The Center sponsored several training courses, published four quarterly newsletters, responded to numerous requests for technical information and publications.

This report presents counts and summaries of the units (i.e. publications distributed, workshops conducted, on-site visits, etc.), associated with each activity as maintained by the Center.

BACKGROUND

In Georgia, there are 159 county and 310 city jurisdictions that have been defined as local agencies to participate in the Technology Transfer to Local Transportation Agencies. All of these jurisdictions are included on the Center's mailing list. In fact, many of the agencies are represented on the list by multiple individuals.

There is no standardized form of government for local agencies. For counties, the form can be one commissioner to a board of commissioners. Larger counties have a board of commissioners with 3 to 7 people on the board. Counties may or may not have a county manager. In the case of only one commmissioner, there would be no manager. In fact, this elected official could be the roadway superintendent, the garbage collection crew, as well as the motor grader operator. Small jurisdictions have a rather small agency budget with no budget dedicated to roadway maintenance or operation. Cities operate much like counties. The smaller the city, the smaller the budget, therefore, the smaller

the roadway maintenance crew will be.

The GDOT has divided the State into 7 Districts (Figure 1). Each GDOT District is staffed with a District Engineer, Maintenance Engineer, Construction Engineer, Traffic Engineer and a Training Officer. Within any particular District, there are a number of counties for which the District has GDOT responsibility. In addition, there are District Resident Engineers which have GDOT responsibility for four to five counties. Resident Engineers work on a daily basis with their assigned counties. During the years, a strong working relationship has developed between the local agency staff and the GDOT District Engineers. Much of the technical assistance received by the local agencies occurs because of the omnipresent of the GDOT Engineers working in each District. Scheduled training courses (workshops) are not presented to local agencies by GDOT.

When the Center started its operation, it quickly realized the advantage of using the GDOT relationship with the local jurisdictions as a vehicle to get the Program underway and to began establishing credibility. To this end, the Center has developed a strong working relationship with each District Engineer, GDOT liaison person (Mr. Sam Vollo) and with many other GDOT Engineers. Further, a strong working relationship has been established with the FHWA liaison person (Mr. Grover Bowman) and other FHWA staff.

Center activities are monitored by two committees. These committees are the Technical Advisory Committee and Policy Advisory Committee. The Technical Advisory Committee is composed of Mr.Grover Bowman (FHWA), Mr. Sam Vollo (GDOT) and M. John Moskaluk (Georgia Tech). The prime function of this committee is

to oversee the daily activities of the Center and to provide guidance to the Center Director

The Policy Advisory Committee is composed of Commissioner Thomas Moreland (GDOT), Mr. Thomas Stapler (GDOT), Mr. Louis Papet (FHWA), Dr. Ed Davis (Atlanta University), Mr. Erwin Kee (FHWA Advisory), Mr. Hill Healan (Association County Commissioners), Mr. James Burgess (Georgia Municipal Association), Dr. J. Edmund Fitzgerald (Georgia Tech), and the Technical Advisory Committee. The function of this committee is to provide policy guidance to both the Technical Advisory Committee and to the Center Director. For example, the final decision to conduct a particular workshop rests with the Policy Committee. Further, the committee deals with the broad issues about how the Center conducts its business and determines if a particular issue is worthly of the Center's attention.

Center Staff consists of John M. Moskaluk, Center Director, and two Graduate Students, Wassim Selman and Sashi Amatya.

CENTER ACTIVITIES

The following is a brief description of the third year activities undertaken by the Center.

Mailing List

The mailing list has grown since March 1985 from approximately 1300 to over 1500 addresses. This represents a 15% increase. The Mailing List can be sorted by employee type, agency, and district category.

Included on the Mailing List are Street Superintendents, City and County Engineers, City and County Maintenance Personnel,

Law Enforcement Officials, County Commissioners, Area Planning and Development Commissions (APDC's), State Legislators, City Mayors, County Road Advisors, Georgia District Engineers, Federal Coordinators, Technology Transfer Centers, and others.

The Center has during the past year updated the mailing list after obtaining current directories from the Georgia Municipal Association, Association County Commissioners, Georgia State Capitol, and the Federal Highway Administration.

Publication List

The Microcomputer software for the IBM-PC which was developed by the Center staff to maintain, update, revise, and print the mailing list has been improved to include the Center's publication list. This list currently includes over 200 publications and can be sorted by subject and author.

Workshops

Workshops are the most important service provided by the Center. Therefore, discussions are held before each workshop with local officials, GDOT, FHWA, and others to evaluate topics of potential benefits to local agencies. These discussions, along with summaries of returned questionnaires, provide the Policy Committee with the necessary information to make the final decision on workshop topics. The workshop duration and schedule for all 7 Districts are then selected so that maximum participation can be achieved. Finally, instructors are chosen from GDOT, FHWA, local agencies, or consultants. To date most of the workshop instructors have been GDOT personnel.

The criteria used in making each of the above decisions are shown below:

DECISION	CRITERIA
- Workshop topic	- Potential benefits - Needs - Maximum participation
- Duration	- Maximum participation - efficient coverage
- Schedule	- Maximum participation
- Instructors	- Knowledge of subject - Understanding of local agency needs - Cost

Ten workshop sessions were held during the last year with a total attendance of 516 averaging 52 participants/workshop. The following is a list of the workshops and the corresponding number of participants:

WORKSHOP TITLE	TIMES HELD	PARTICIPANTS
Rights-of-Way Acquisition	7	363
Geotextiles	1	50
Uniform Traffic Control Devices Manual	1	52
Bridge Rehabilitation	1	51

Newsletters (TECH TRANS)

Four quarterly newsletters were published by the center and distributed as shown below:

	COPIES
Spring 1985	1550
Summer 1985	1600
Fall 1985	1600
Winter 1986	1650
Total	6400

The contents of each Newsletter include the following:

o Editor Note: This column is devoted to informing the readers about what is happening at the Center and reporting on past events.

o Articles: Each Newsletter contains two or more articles. Topics for these articles are selected by the season of the year or by what events are occurring in the State.

o Maintenance Tips: Selected maintenance tips are published. Tips are obtained from the State maintenance personnel and from other publications.

o Briefs, Trends, and Facts: On the lighter side, several short news worthy topics are published. Some of the items included under this heading are: historical facts, miscellaneous trends, general transportation related news, financial data, and humorous items.

o Publications: Newly obtained or previously not advertised research reports and articles are listed so that local agencies can obtain a copy by requesting it from the Center.

o Meetings and Seminars: A selective list of upcoming meetings, seminars, or conferences are listed so that the local agencies are aware of future events and can attend if they desire.

The newsletter has given the Center the opportunity to reach out to local officials and announce our services as well as other Rural Technical Assistance Program (RTAP) services which are of great benefit to them.

Publication Distribution

Publications are distributed in two ways. 1) During seminars and workshops, publications related to the subject area are handed out to each of the participants. 2) Publications are sent by request to local officials. The same software used for the mailing list has recently been updated to maintain the Center's publication list in order to speed up the retrieval of information when a request for publication is received.

The Center has during the past year distributed 547 publications. The following is a list of the publications distributed:

- WHAT HAPPENS WHEN YOUR PROPERTY IS NEEDED FOR A FEDERAL - AID PROGRAM-Georgia DOT - 363 Copies.

- BASIC ASPHALT EMULSION MANUAL-Report No. FHWA-IP-79-1 - 7 Copies.

- QUALITY ASSURANCE FOR LOCAL GOVERNMENTS-Report No. FHWA-IP-83-1 - 5 Copies.

- HYDROLOGY-FHWA-IP-84-15 - 11 Copies.

- REFLECTION CRACKING IN BITUMINOUS OVERLAYS ON RIGID PAVEMENTS-Report No. FHWA-TS-84-213 - 3 Copies.

- OPERATIONAL AND PERFORMANCE CHARACTERISTICS OF DRUM MIX PLANTS-Report No.FHWA-TS-84-212 - 7 Copies.

- PRACTICAL GUIDELINES FOR MINIMIZING TORT LIABILITY- NCHRP Report No. 106 - 15 Copies.

- ASPHALT SURFACE TREATMENTS-SPECIFICATIONS- The Asphalt Institute ES-11 - 4 Cpoies.

- ASPHALT SURFACE TREATMENTS-CONSTRUCTION TECHNIQUES- The Ashpalt Institute ES-12 - 4 Copies.

- ENGINEERS POTHOLE REPAIR GUIDE-CREEL 84-1, March 1984 - 17 Copies.

- POTHOLE PRIMER-Special Report 81-21, U.S.Army Corps of Engineers - 12 Copies.

- HANDBOOK OF COMPUTER MODELS FOR TRAFFIC OPERATIONS ANALYSIS -FHWA-TS-82-213 - 7 Copies.

- ROAD SURFACE MANAGEMENT FOR LOCAL GOVERNMENTS- Six Case Studies- U.S. Department of Transportation - 8 Copies.

- FIELD MAINTENANCE MANUAL FOR GEORGIA COUNTIES LOCAL ROADS AND STREETS- Georgia DOT,1975 - 12 Copies.

- RAIL HIGHWAY CROSSING RESOURCE ALLOCATION PROCEDURE USER GUIDE -FHWA-IP-82-7 - 4 Copies.

- UPGRADING DEFFICIENT THROUGH TRUSS BRIDGES- Report No. FHWA/RD-82/041 - 3 Copy.

- DECAY IN WOOD BRIDGES- U.S. Dep. of Agriculture - 7 Copies.

- THE HOLE STORY- APWA,1983 - 9 Copies.

- DRAINAGE OF HIGHWAY PAVEMENTS- FHWA-TS-84-202 - 8 Copies.

- MASTERING TRAFFIC ENGINEERING- Military Traffic Management Command - 6 Copies.

- PAVEMENT AND SHOULDER MAINTENANCE PERFORMANCE GUIDES- Report No. FHWA-TS-84-208 - 10 Copies.
- RISK MANAGEMENT SEMINAR- Alabama Course Notes - 1 Copy.
- TRAFFIC CONTROL FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS- FHWA,1978 - 1 Copy.
- DUST CONTROL ON UNPAVED ROADS- Purdue - 1 Copy.
- ROAD HUMPS FOR THE CONTROL OF VEHICLE SPEEDS- TRRL Report No. 597 - 1 Copy.
- COMPILATION OF STATE LAWS AND REGULATIONS ON MATERIALS AFFECTING RAIL-HIGHWAY CROSSINGS- Association of American Railroads, 1983 - 5 Copies.
- PAYING FOR TRANSPORTATION AT LOCAL LEVEL- 17 Strategies, APWA - 4 Copy.
- ACCIDENT RESEARCH MANUAL- Report NO. FHWA/RD-80/016 - 6 Copies.
- WORK ZONE TRAFFIC CONTROL- Standards and Guidelines,FHWA - 6 Copies.

Technical Assistance

The Center has during the past year responded to 61 requests for technical assistance. Requests for assistance are made during workshops, by telephone, or by mail.

Typical areas of technical assistance provided were in microcomputer applications in transportation, roadway surface treatment, signalized intersection analysis, drainage, highway geometric design, vehicle maintenance, risk management, pavement and roadway maintenance, and traffic control and operations. Responses to these requests were provided by telephone, by mail, or by on-site visits.

In addition to the technical assistance provided in response to the 61 requests made last year, the center assisted Georgia Transit Authorities in their microcomputer operations. This assistance was provided thru several on-site visits made by the Center Director, M. John Moskaluk, to the Cities of Albany,

Savannah, Athens, and Fulton County.

EVALUATION

No telephone survey or mailback questionnaires were used this year for evaluating the services of the Center. The sources for the evaluation are conversations with local officials, experiences by Center staff, and a "bean count" of the services provided by the Center.

The general feeling among local officials in Georgia is that the Center provides needed services. These services allow local agencies to benefit from the latest advances in both technologies and methodologies.

Benefits of the Center's services are not realized by local agencies, until these services had been rendered. Once an agency has taken advantage of a service provided by the Center, it always seeks additional assistance.

In most cases, local officials do not have an opportunity to learn about "better" techniques for conducting their everyday's activities. The Center provides these officials with such opportunity, by reaching out to them through newsletters and training courses. On the whole, the Center has been able to contribute to the betterment of transportation in the State of Georgia.

In terms of the "bean Count" evaluation of the Center, the following was concluded:

Training : The average attendance in workshops and seminars increased from 33 participants in the first two years, to 52 in the third.

Newsletters : The average number of newsletters distributed in the third year was 1600 copies per issue. This represents a 29% increase over the previous year.

Assistance : Twenty six requests for technical assistance were received during the first two years. The number of requests made during the third year was 61. That number represents an increase of approximately 200% over the previous year.

It is expected that more services will be provided by the Center during the next year. The Center is receiving more requests for technical assistance, it is gaining momentum in establishing credibility with local agencies, and it still enjoys an excellent working relationship with FHWA and the Georgia DOT. A lot of work has yet to be completed. The Center is relatively young and is still growing.

APPENDIX A

MAILING LIST

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12 S. MAIN STREET
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LARRY ABERNATHY
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12 S. MAIN ST.
ALPHARETTA, GA 30201

HON. JIMMY PHILLIPS
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STREET SUPERINTENDENT
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HON. DAVID COCHRAN CHM.
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BARNESVILLE, GA 30204

HON. JAMES R. MATTHEWS
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COVINGTON, GA 30209

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HON. MICHAEL DOBBS
DISTRICT 74
125 HARDWICK DR.
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FAIRBURN, GA 30213

HON. BEVERLY ENGRAM
DISTRICT 34
P.O. BOX 367
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200 COURTHOUSE
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COUNTY COURTHOUSE
200 COURTHOUSE SQUARE
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COUNTY COURTHOUSE
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MAYOR TRUITT DAVIS
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COUNTY COURTHOUSE
FRANKLIN, GA 30217

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GRADY BRADSHAW
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MAYOR JOHN CARTER
CITY OF GREENVILLE
548 COURT SQUARE
GREENVILLE, GA 30222

HON. RENDER HILL
DISTRICT 29
P.O. BOX 246
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CO. ROAD SUPERINTENDENT
COURTHOUSE
GRIFFIN, GA 30223

CITY ENGINEER
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GRIFFIN, GA 30223

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DISTRICT 75
150 MEADOWISTA DR
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HON. TOMMY SMITH
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CITY HALL
HOGANSVILLE, GA 30230

HON. CRAWFORD WARE
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P.O. BOX 305
HOGANSVILLE, GA 30230

HON. J. B. WHITE
BUTTS CO. COMM.
COUNTY COURTHOUSE
P.O. BOX 166
JACKSON, GA 30233

HON. C. B. BROWN JR.
MAYOR
P.O. BOX 3838
CITY HALL
JACKSON, GA 30233

HON. BILL JONES
DISTRICT 78
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JONESBORO, GA 30236

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HON. HAWLEY SMITH CHM.
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LAGRANGE, GA 30240

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HARTWELL, GA 30243

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HON. LILLIAN WEBB CHM.
COUNTY COMM.
240 OAK STREET
COUNTY ADM. BLDG.
LAWRENCEVILLE, GA 30245

COUNTY ENGINEER
COUNTY COURTHOUSE
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LAWRENCEVILLE, GA 30245

MARLENE BARTON
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TRAFFIC ENGINEERING
240 OAK STREET
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HON. DONN PEEVY
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P.O. BOX 862
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HON. REX MILLSAPS
DISTRICT 61
P.O. BOX 761
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76 MAIN ST.
CITY HALL
LILBURN, GA 30247

HON. MIKE BARNETT
DISTRICT 59
1472 RIDGEWOOD DR.
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HON. THOMAS WHITE
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404 JAMES ST.
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STREET SUPERINTENDENT
31 HAMPTON ST.
McDONOUGH, GA 30253

CO. ROAD SUPERINTENDENT
COURTHOUSE
McDONOUGH, GA 30253

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HON. JANICE HORTON
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RIVERDALE, GA 30274

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POLICE CHIEF
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RIVERDALE, GA 30274

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RIVERDALE, GA 30274

BOYD COMMINGS
SUP'T OF WATER & SEWER
CITY OF RIVERDALE
6690 CHURCH STREET
RIVERDALE, GA 30274

RICHARD SMITH
SUP'T OF ST. MAINT.
CITY OF RIVERDALE
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THOMASTON, GA 30286

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HON. MARTIN ADAMS
DISTRICT 79
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MAYOR HOMER MURDOCH
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UNION CITY, GA 30291

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LEROY STYNCHCOMBE
SHERIFF
136 PRYOR ST. S.W.
ATLANTA, GA 30303

COUNTY ENGINEER
165 CENTRAL AVE. S.W.
ATLANTA, GA 30303

CLINTON CHAFIN
POLICE CHIEF
183 CENTRAL AVE. S.W.
ATLANTA, GA 30303

HON. MICHAEL LOMAX CHM.
FULTON CO. COMM.
65 CENTRAL AVENUES.W.
409 COURTHOUSE ANNEX
ATLANTA, GA 30303

MORRIS REDDING
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MR. HILL HEALAN
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ASSOC. COUNTY COMM.
134 PEACHTREE STREET
SUITE 1201
ATLANTA, GA 30303

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DISTRICT 39
325 HEALY BLDG.
ATLANTA, GA 30303

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CITY HALL
ATLANTA, GA 30303

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FULTON. CO. LAND DEPT.
WILLIAM OLIVER BLDG.
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ATLANTA, GA 30303

HON. PAUL COVERDELL
DISTRICT 40
2015 PTREE RD. NE
ATLANTA, GA 30309

HON. JULIAN BOND
DISTRICT 39
361 WESTVIEW DR. SW
ATLANTA, GA 30310

HON. TYRONE BROOKS
DISTRICT 34
STA. A P.O. BOX 11185
ATLANTA, GA 30310

HON. DOUGLAS DEAN
DISTRICT 29
356 ARTHUR ST SW
ATLANTA, GA 30310

HON. HORACE TATE
DISTRICT 38
621 LILLA DR. SW
ATLANTA, GA 30310

SPENCE JUNIE JR.
TECHNICIAN I
954 LAURELMONT DR.
ATLANTA, GA 30311

HON. LORENZO BENN
DISTRICT 38
579 FIELDING LA. SW
ATLANTA, GA 30311

HON. BOB HOLMES
DISTRICT 28
2929 LANDRUM DR SW D25
ATLANTA, GA 30311

HON. J. C. DOUGHERTY
DIST 33
15 CHESTNUT ST
ATLANTA, GA 30314

CYNTHIA TEASLEY
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ATLANTA P.W.
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MARSHALL MAHAFFEY
PLANT SUPERINTENDENT
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ATLANTA, GA 30314

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ATLANTA UNIVERSITY
ATLANTA, GA 30314

MARVIN BARBER
ASS'T SUP'T
CITY OF ATLANTA
120 CLAIRE DR. SW
ATLANTA, GA 30315

HON. DAVID SCOTT
DISTRICT 36
130 WENDELL DR. SE
ATLANTA, GA 30315

HON. GEORGANNA SINKFIELD
DISTRICT 37
179 TONAWANDA DR.
ATLANTA, GA 30315

HON. PAUL BOLSTER
DISTRICT 30
1043 ORMEWOOD AVE. SE
ATLANTA, GA 30316

HON. BETTY CLARK
DISTRICT 55
P.O. BOX 17852
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HON. HOSEA WILLIAMS
DISTRICT 54
8 E LAKE DR NE
ATLANTA, GA 30317

CHARLIE REEVES JR.
CREW MAINT. SUPERVISOR
CITY OF ATLANTA
1587 HORTENSE PT. NW
ATLANTA, GA 30318

HON. J. E. MCKINNEY
DISTRICT 35
765 SHORTER TER NW
ATLANTA, GA 30318

HON. MAX DAVIS
DISTRICT 45
1177 W NANCY CR. DR. NE
ATLANTA, GA 30319

HON. JAMES TYSINGER
DISTRICT 41
3781 WATKINS P1 NE
ATLANTA, GA 30319

HON. BARBARA COUCH
DISTRICT 40
2864 W ROXBORO RD NE
ATLANTA, GA 30324

HON. CATHEY STEINBERG
DISTRICT 46
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HON. R.L. ALLGOOD
MAYOR
P.O. BOX 32
CITY HALL
MADISON, GA 30650

HON. ROY LAMBERT
DISTRICT 66
P.O. BOX 169
MADISON , GA 30650

CITY ENGINEER
P.O. BOX 725
MONROE, GA 30655

JOHN STONE
GENERAL MAINTENANCE
P.O. BOX 1249
MONROE, GA 30655

CO. ROAD SUPERINTENDENT
COURTHOUSE
MONROE, GA 30655

STAN HUTCHINGS
ASS'T SUPER'T
P.O. BOX 1249
MONROE, GA 30655

HON. BENNIE R. ANDERSON CHM.
WALTON CO. COMM.
COUNTY COURTHOUSE
MONROE, GA 30655

BARNEY MANDERS
MONROE POLICE DEPT.
320 S. BROAD ST.
MONROE, GA 30655

HON. KNOX BELL
MAYOR
P.O. BOX 1249
CITY HALL
MONROE, GA 30655

MICHAEL HEAD
CHIEF OF POLICE
MONROE POLICE DEPT.
P.O. BOX 1249
MONROE, GA 30655

HON. NEAL JACKSON
DISTRICT 65
316 N. BROAD ST.
MONROE, GA 30655

STREET SUPERINTENDENT
770 FRANKLIN SPGS. ST.
ROYSTON, GA 30662

HON. JOHN BEARD
MAYOR
770 FRANKLIN SPRINGS
CITY HALL
ROYSTON, GA 30662

CITY ENGINEER
P.O. BOX 277
RUTLEDGE, GA 30663

HON. BEN STEWART
MAYOR
P.O. BOX 233
CITY HALL
UNION POINT, GA 30669

STREET SUPERINTENDENT
P. O. BOX 9
WASHINGTON, GA 30673

CO. ROAD SUPERINTENDENT
COURTHOUSE
WASHINGTON, GA 30673

HON. BUY BUFORK CHM.
WILKES CO. COMM.
23 EAST COURT STREET
ROOM 201
WASHINGTON, GA 30673

HON. E. B. POPE
MAYOR
P.O. BOX 9
CITY HALL
WASHINGTON, GA 30673

HON. SAM MCGILL
DISTRICT 24
P.O. BOX 520
WASHINGTON, GA 30673

HON. CHOYCE JOHNSON CHM.
OCONEE CO. COMM.
COUNTY COURTHOUSE
WATKINSVILLE, GA 30677

CITY ENGINEER
P.O. BOX 566
WINDER, GA 30680

KEITH WITCHER
WINDER POLICE DEPT.
320 S. BROAD ST.
WINDER, GA 30680

CO. ROAD SUPERINTENDENT
COURTHOUSE
WINDER, GA 30660

CLIFFORD SYKES
WINDER POLICE DEPT.
320 S. BROAD ST.
WINDER, GA 30680

HON. JIM HARWELL CHM.
BARROW CO. COMM.
310 SOUTH BROAD STREET
WINDER, GA 30680

HON. JOHN MOBLEY JR.
MAYOR
P.O. BOX 566
CITY HALL
WINDER, GA 30680

HON. JOHN RUSSELL
DISTRICT 64
P.O. BOX 588
WINDER, GA 30680

EDWIN FLEEMAN
CHIEF OF POLICE
P.O. BOX 191
WINTERVILLE, GA 30683

HELEN WILLIAMS
CITY CLERK
P.O. BOX 306
WINTERVILLE, GA 30683

CITY ENGINEER
P.O. BOX 248
CALHOUN, GA 30701

COUNTY ENGINEER
COURTHOUSE
CALHOUN, GA 30701

HON. HAROLD FAITH CHM.
GORDON CO. COMM.
P.O. BOX 580
CALHOUN, GA 30701

HON. MAX BRANNON
DISTRICT 51
P.O. BOX 1027
CALHOUN, GA 30701

MELVIN GREESON
MEMBER
GORDON CO. BOARD OF COMM
100 COURT STREET
CALHOUN, GA 30701

HON. J. C. MADDOX
DISTRICT 7
ROUTE 1
CALHOUN, GA 30701

CO. ROAD SUPERINTENDENT
COURTHOUSE
CHATSWORTH, GA 30705

STREET SUPERINTENDENT
P.O. BOX 516
CHATSWORTH, GA 30705

HON. KIRBY PATTERSON CHM.
MURRAY CO. COMM.
P.O. BOX 1129
CHATSWORTH, GA 30705

HON. W. FINCHER JR.
DISTRICT 54
P.O. DRAWER 400
CHATWORTH, GA 30705

HON. TOM RAMSEY
DISTRICT 3
P.O. BOX 1130
CHATSWORTH, GA 30705

HON. FRANK PIERCE
MAYOR
P.O. BOX 68
CITY HALL
CHICKAMAUGA, GA 30707

HON. DONALD OLIVER
DISTRICT 1 POST 1
P.O. BOX 386
CHICKAMAUGA, GA 30707

CITY ENGINEER
P.O. BOX 1205
DALTON, GA 30720

COUNTY ENGINEER
COURTHOUSE
DALTON, GA 30720

HON. LEONARD COCHRAM CHM.
WHITFIELD CO. COMM.
P.O. BOX 248
DALTON, GA 30720

HON. JIMMY YOUNG JR.
MAYOR
P.O. BOX 1205
CITY HALL
DALTON, GA 30720

HON. PHILIP FOSTER
DISTRICT 6 POST 2
411 COLLEGE DR.
DALTON, GA 30720

HON. ROGER WILLIAMS
DISTRICT 6 POST 1
132 HUNTINGTON RD
DALTON, GA 30720

MR. GEORGE SUTHERLAND
EXECUTIVE DIRECTOR
NORTH GEORGIA APDC
503 WEST WAUGH STREET
DALTON, GA 30720

HON. FOREST HAYS JR.
DISTRICT 1 POST 2
ROUTE 2
FLINTSTONE, GA 30725

COUNTY ENGINEER
COURTHOUSE
LAFAYETTE, GA 30728

STREET SUPERINTENDENT
P.O. BOX 89
LAFAYETTE, GA 30728

HARRY WAITS
TRAFFIC ENGINEER
DOT
CITY HALL
LAFAYETTE, GA 30728

CHIEF CHARLES RICHARDSON
POLICE CHIEF
CITY HALL
LAFAYETTE, GA 30728

MR. DAVID ALDRICH
CITY MANAGER
CITY HALL
LAFAYETTE, GA 30728

MR. MARTIN SIMMONS
P.O. BOX 445
LAFAYETTE, GA 30728

HON. ROY PARRISH
WALKER CO. COMM.
BOX 445
LAFAYETTE, GA 30728

HON. LYLE JONES
MAYOR
P.O. BOX 89
CITY HALL
LAFAYETTE, GA 30728

HON. JOHN CRAWFORD
DISTRICT 5
ROUTE 1 BOX 518
LYERLY, GA 30730

HON. JAMES MORELAND CHM.
CATOOSA CO. COMM.
P.O. BOX 206
RINGGOLD, GA 30736

CO. ROAD SUPERINTENDENT
206 E. NASHVILLE STREET
RINGGOLD, GA 30736

HON. JOE BARGER
MAYOR
105 MOUNTAIN ST.
CITY HALL
RINGGOLD, GA 30736

HON. ROBERT PETERS
DISTRICT 2
P.O. BOX 550
RINGGOLD, GA 30736

KAREN CAUSBY
EXECUTIVE DIRECTOR
CATOOSA COUNTY
ECONOMIC DEV. COMM.
P. O. BOX 52
RINGGOLD, GA 30736

STREET SUPERINTENDENT
P.O. BOX 159
ROSSVILLE, GA 30741

HON. CHARLES SHERRILL
MAYOR
P.O. BOX 159
CITY HALL
ROSSVILLE, GA 30741

CITY ENGINEER
P.O. BOX 180
SUMMERVILLE, GA 30747

SUZAN SPIVEY
CHATTOOGA COUNTY
CHAMBER OF COMMERCE
108 W. WASHINGTON AVE.
P.O. BOX 217
SUMMERVILLE, GA 30747

HON. WAYNE DENSON CHM.
CHATTOOGA CO. COMM.
P.O. BOX 211
SUMMERVILLE, GA 30747

CO. ROAD SUPERINTENDENT
P.O. BOX 211
SUMMERVILLE, GA 30747

HON. SEWELL CASH
MAYOR
P.O. BOX 180
CITY HALL
SUMMERVILLE, GA 30747

HON. LARRY MOORE CHM.
DADE CO. COMM.
P.O. BOX 613
TRENTON, GA 30752

PRESTON DANIELS
FOREMAN
P.O. BOX 763
TRENTON, GA 30752

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
TRENTON, GA 30752

HON. A. T. LAWSON
MAYOR
BOX 518
CITY HALL
TRENTON, GA 30752

CO. ROAD SUPERINTENDENT
COURTHOUSE
GIBSON, GA 30810

HON. CHARLES ROBERTS CHM.
GLASCOCK CO. COMM.
P.O. BOX 66
GIBSON, GA 30810

HON. LEON DAVIDSON
MAYOR
P.O. BOX 120
CITY HALL
GROVETOWN, GA 30813

CO. ROAD SUPERINTENDENT
COURTHOUSE
LINCOLNTON, GA 30817

HON. WALKER NORMAN CHM.
LINCOLN CO. COMM.
P.O. BOX 340
LINCOLNTON, GA 30817

HON. BEN ROSS
DISTRICT 82
P.O. BOX 245
LINCOLNTON, GA 30817

STREET SUPERINTENDENT
P.O. BOX 953
THOMSON, GA 30824

CO. ROAD SUPERINTENDENT
COURTHOUSE
THOMSON, GA 30824

HON. WILLIAM HAWKINS CHM.
McDUFFIE CO. COMM.
P.O. BOX 28
THOMSON, GA 30824

HON. ROBERT KNOX
MAYOR
P.O. BOX 1017
CITY HALL
THOMSON, GA 30824

HON. WARREN EVANS
DISTRICT 84
P.O. BOX 539
THOMSON, GA 30824

CO. ROAD SUPERINTENDENT
COURTHOUSE
WARRENTON, GA 30828

HON. ALLEN MAY
WARREN CO. COMM.
P.O. BOX 46
WARRENTON, GA 30828

HON. C. E. PHELPS SR.
MAYOR
P.O. BOX 109
CITY HALL
WARRENTON, GA 30828

HON. RAY DELAIGLE CHM.
BURKE CO. COMM.
P.O. BOX 62
WAYNESBORO, GA 30830

CO. ROAD SUPERINTENDENT
P.O. BOX 62
WAYNESBORO, GA 30830

HON. GEORGE DELOACH
MAYOR
628 MYRICK ST.
CITY HALL
WAYNESBORO, GA 30830

STREET SUPERINTENDENT
P.O. BOX 125
WRENS, GA 30833

HON. CHARLES WALKER
DISTRICT 85
1402 12TH ST.
AUGUSTA, GA 30901

DAVID POSS II
AUGUSTA AREA OFFICE
GEORGIA TECH
500 BLDG. SUITE 217
AUGUSTA, GA 30901

COUNTY ENGINEER
CITY-COUNTY BLDG.
AUGUSTA, GA 30902

HON. DAVID SHERROUSE CHM
RICHMOND CO. ADM.
COUNTY/CITY BLDG. Rm 605
AUGUSTA, GA 30902

HON. JIMMY LESTER
DISTRICT 23
985 BROAD ST.
AUGUSTA, GA 30902

CITY ENGINEER
530 GREEN STREET
AUGUSTA, GA 30903

HON. WILLIAM WILLIAMS CHM.
RICHMOND CO. COMM.
COUNTY COURTHOUSE
AUGUSTA, GA 30903

HON. THOMAS F. ALLGOOD
DISTRICT 22
P.O. BOX 1523
AUGUSTA, GA 30903

HON. GEORGE BROWN
DISTRICT 88
P.O. BOX 1114
AUGUSTA, GA 30903

HON. JACK CONNELL
DISTRICT 87
P.O. BOX 308
AUGUSTA, GA 30903

MR. TIM MAUND
EXECUTIVE DIRECTOR
CENT. SAV. RIVER APDC
P.O. BOX 2800
AUGUSTA, GA 30904

HON. MICHAEL PADGETT
DISTRICT 86
ROUTE 1 BOX 5
AUGUSTA, GA 30906

HON. A. R. LANE CHM.
COLUMBIA CO. COMM.
P.O. BOX 11204
MARTINEZ, GA 30907

COUNTY ENGINEER
P.O. BOX 11024
MARTINEZ, GA 30907

HON. WILLIAM JACKSON
DISTRICT 83
3907 WASHINGTON RD.
MARTINEZ, GA 30907

T. R. SWEENEY
CHIEF OF ENG. SERVICES
P.O. BOX 11024
MARTINEZ, GA 30907

MR. DON BARTLES
P.O. BOX 11024
MARTINEZ, GA 30907

MR. LARRY MATTHEWS PE
GDOT ROUTE 2
4260 FRONTAGE ROAD
AUGUSTA, GA 30909

HON. TRAVIS BARNES
DISTRICT 90
407 AUMOND RD.
AUGUSTA, GA 30909

HON. DONALD CHEEKS
DISTRICT 89
714 WESTMINSTER CT.
AUGUSTA, GA 30909

CO. ROAD SUPERINTENDENT
COURTHOUSE
ABBEVILLE, GA 31001

HON. HARRY WALKER CHM.
WILCOX CO. COMM.
COUNTY COURTHOUSE
ABBEVILLE, GA 31001

JOHN NEELY
P.O. BOX 118
BUTLER, GA 31006

COUNTY MANAGER
TAYLOR COUNTY
COUNTY COURTHOUSE
BUTLER, GA 31006

CO. ROAD SUPERINTENDENT
COURTHOUSE
BUTLER, GA 31006

HON. MURRAY JARRELL CHM.
TAYLOR CO. COMM.
COUNTY COURTHOUSE
P. O. BOX 148
BUTLER, GA 31006

HON. JAMES SPILLERS
MAYOR
P.O. BOX 476
CITY HALL
BUTLER, GA 31006

HON. WARD EDWARDS
DISTRICT 112
P.O. BOX 146
BUTLER, GA 31006

MAYOR O. W. KITCHENS
P.O. BOX 36
BYROMBILLE, GA 31007

CITY ENGINEER
P.O. BOX 376
BRYON, GA 31008

MAYOR JAMES WILLIAMS
P.O. BOX 376
BYRON, GA 31008

STREET SUPERINTENDENT
P.O. BOX 6
COCHRAN, GA 31014

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
COCHRAN, GA 31014

HON. CHARLES KILLEBREW
MAYOR
P.O. BOX 8
CITY HALL
COCHRAN, GA 31014

CITY ENGINEER
P.O. BOX 569
CORDELE, GA 31015

HON. W. M. DAVIS JR. CHM.
CRISP CO. COMM.
COUNTY COURTHOUSE
CORDELE, GA 31015

DIRECTOR OF PUBLIC WORKS
COUNTY COURTHOUSE
CORDELE, GA 31015

HON. PERRY CULPEPPER
MAYOR
P.O. BOX 569
CITY HALL
CORDELE, GA 31015

HON. HOWARD RAINEY
DISTRICT 135
913 3RD AVE E
CORDELE, GA 31015

MAYOR CHARLES NORRIS
P.O. BOX 38
CULLODIN, GA 31016

MAYOR H. J. CHANCE
P.O. BOX 157
DANVILLE, GA 31017

HON. KENNITH McNEELY
MAYOR
P.O. BOX 534
CITY HALL
DAVISBORO, GA 31018

PUBLIC WORKS SUPT.
COURTHOUSE
DUBLIN, GA 31021

CITY ENGINEER
P.O. BOX 690
DUBLIN, GA 31021

HON. ALBERT FRANKS
MAYOR
P.O. BOX 630
CITY HALL
DUBLIN, GA 31021

HON. GEORGE GORNTO
MAYOR
119 SOPERTON AVE.
CITY HALL
EAST DUBLIN, GA 31021

HON. DUBOSE PORTER
DISTRICT 119
1701 BELLEVUE RD.
DUBLIN, GA 31021

CO. ROAD SUPERINTENDENT
BOX 564
EASTMAN, GA 31023

HON. GUY TRIPP CHM.
DODGE CO. COMM.
BOX 564
EASTMAN, GA 31023

CO. STREET SUPERINTENDENT
P.O. DRAWER 40
EASTMAN, GA 31023

HON. MARVA McGRIFF
MAYOR
P.O. DRAWER 40
CITY HALL
EASTMAN, GA 31023

HON. TERRY COLEMAN
DISTRICT 118
P.O. BOX 157
EASTMAN, GA 31023

MR. NICKY CABERO
EXECUTIVE DIRECTOR
HEART OF GEORGIA
501 OAK STREET
EASTMAN, GA 31023

CO. ROAD SUPERINTENDENT
COURTHOUSE
EATONTON, GA 31024

HON. ROY VINING JR. CHM.
PUTNUM CO. COMM.
COUNTY COURTHOUSE
EATONTON, GA. 31024

HON. J. P. MARSHALL
MAYOR
P.O. BOX 191
CITY HALL
EATONTON, GA 31024

HON. JESSE COPELAN JR.
DISTRICT 106
P.O. BOX 109
EATONTON, GA 31024

HON. WALKER FOWLER
MAYOR
500 HOUSTON LAKE BLVD.
CITY HALL
CENTERVILLE, GA 31028

CO. ROAD SUPERINTENDENT
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FORSYTH, GA 31029

STREET SUPERINTENDENT
P.O. BOX 676
FORSYTH, GA 31029

HON. LINDA ARTHUR CHWM.
MONROE CO. COMM.
COUNTY COURTHOUSE
FORSYTH, GA 31029

HON. RICHARD TRUITT
MAYOR
P.O. BOX 1447
CITY HALL
FORSYTH, GA 31029

HON. KENNETH WALDREP
DIST 80 87 N LEE ST
P.O. BOX 657
FORSYTH, GA 31029

CO. ROAD SUPERINTENDENT
COURTHOUSE
FORT VALLEY, GA 31030

BRENDA MCGHEE
COORDINATOR
PEACH TRANSIT SYSTEM
310 MILLER STREET
FORT VALLEY, GA 31030

HON. W. L. BROWN CHM.
PEACH CO. COMM.
P.O. BOX 468
FORT VALLEY, GA 31030

HON. C.W. PETERSON
MAYOR
P.O. BOX 956
CITY HALL
FORT VALLEY, GA 31030

HON. ROBERT RAY
DISTRICT 98
ROUTE 1
FORT VALLEY, GA 31030

HON. MICHAEL DENNIS
MAYOR
P.O. BOX 387
CITY HALL
GORDON, GA 31031

HON. KENNETH BIRDSONG
DISTRICT 104
ROUTE 1
GORDON, GA 31031

L. K. LISTON CHM.
JONES CO. COMM.
P.O. BOX 316
GRAY, GA 31032

MAYOR JAMES ROBERTS
P.O. BOX 443
GRAY, GA 31032

CO. ROAD SUPERINTENDENT
COURTHOUSE
GRAY, GA 31032

CO. ROAD SUPERINTENDENT
COURTHOUSE
HAWKENSVILLE, GA 31036

STREET SUPERINTENDENT
315 BROAD STREET
HAWKINSVILLE, GA 31036

HON. J. H. ANDERSON CHM.
PULASKI CO. COMM.
COUNTY COURTHOUSE
HAWKINSVILLE, GA. 31036

HON. LAWRENCE BENNETT
MAYOR
P.O. BOX 95
CITY HALL
HAWKENSVILLE, GA 31036

HON. TRUETTE HOWARD
MAYOR
P.O. BOX 222
CITY HALL
HELENA, GA 31037

RICK DUKE
GTRI
REGIONAL OFFICE
P.O. BOX 4620
DUBLIN, GA 31040

MAYOR J. L. TURNER
P.O. BOX 9
IDEAL, GA 31041

CO. ROAD SUPERINTENDENT
COURTHOUSE
IRWINTON, GA 31042

HON. GUILFORD PAYNE CHM.
WILKINSON CO. COMM.
COUNTY COURTHOUSE
IRWINTON, GA 31042

CO. ROAD SUPERINTENDENT
COURTHOUSE
JEFFERSONVILLE, GA 31044

MAYOR W. E. HANRICK
P.O. BOX 223
JEFFERSONVILLE, GA 31044

HON. MILLARD HENDRICKS CHM.
TWIGGS CO. COMM.
COUNTY COURTHOUSE
JEFFERSONVILLE, GA 31044

HON. DAVID MONCRIEF CHM.
CRAWFORD CO. COMM.
COUNTY COURTHOUSE
KNOXVILLE, GA 31050

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
KNOXVILLE, GA 31052

HON. BILL CUMMINGS
DISTRICT 17
508 MORGAN VALLEY RD.
ROCKMART, GA 31053

CITY ENGINEER
P.O. BOX 157
MCRAE, GA 31055

CO. ROAD SUPERINTENDENT
COURTHOUSE
McRAE, GA 31055

HON. GENE WILLIAMS
TELFAIR CO. COMM.
COUNTY COURTHOUSE
McRAE, GA 31055

HON. CHESTER RYALS JR.
MAYOR
P.O. BOX 157
CITY HALL
MCRAE, GA 31055

HON. RONNIE WALKER
DISTRICT 19
P.O. BOX 461
MCRAE, GA 31055

JOHN GAY
DIRECTOR
DEPT. OF GRANTS & RESOURCES
HOUSTON COUNTY
200 CARL VINSON PKY
WARNER ROBINS, GA 31056

MAYOR SAMUEL HOLLINGSHED
P.O. BOX 63
MARSHALLVILLE, GA 31057

STREET SUPERINTENDENT
P.O. BOX E
MILLEDGEVILLE, GA 31061

T. W. COUCH
ROAD SUPER'T
BALDWIN COUNTY
P.O. BOX 735
MILLEDGEVILLE, GA 31061

CO. ROAD SUPERINTENDENT
COURTHOUSE
MILLEDGEVILLE, GA 31061

HON. SAMMY HALL CHM.
BALDWIN CO. COMM.
COUNTY CRTHSE. Rm. 6
MILLEDGEVILLE, GA 31061

HON. JAMES BAUGH
MAYOR
P.O. BOX 1708
CITY HALL
MILLEDGEVILLE, GA 31061

HON. CULVER KIDD
DISTRICT 25
P.O. BOX 370
MILLEDGEVILLE, GA 31061

HON. BOBBY PARHAM
DISTRICT 105
P.O. BOX 606
MILLEDGEVILLE, GA 31061

MR. JIM GENTRY
EXECUTIVE DIRECTOR
OCONEE APDC
P.O. BOX 707
MILLEDGEVILLE, GA 31061

STREET SUPERINTENDENT
CITY HALL
MONTEZUMA, GA 31063

MAYOR PAT DOZIER
CITY OF MONTEZUMA
SOUTH DOOLY STREET
MONTEZUMA, GA 31063

HON. LEWIS MCKENZIE
DISTRICT 14
P.O. BOX 565
MONTEZUMA, GA 31063

STREET SUPERINTENDENT
P.O. BOX 269
MONTICELLO, GA 31064

CO. ROAD SUPERINTENDENT
COURTHOUSE
MONTICELLO, GA 31064

HON. FRANK ATKINS CHM.
JASPER CO. COMM.
COUNTY COURTHOUSE
MONTICELLO, GA 31064

HON. HENRY HOOPER
MAYOR
115 E. GREENE ST.
CITY HALL
MONTICELLO, GA 31064

CO. ROAD SUPERINTENDENT
COURTHOUSE
OGLETHORPE, GA 31068

MAYOR GERALD BECKUM
P.O. BOX 312
OGLETHORPE, GA 31068

HON. JAMES BENTLEY CHM.
MACON CO. COMM.
COUNTY COURTHOUSE
OGLETHORPE, GA 31068

STREET SUPERINTENDENT
P.O. DRAWER A
PERRY, GA 31069

WAYNE CHAPMAN
TRAFFIC CONTROL
HOUSTON CO. BOARD OF COMM.
2018 KINGS CHAPEL RD.
PERRY, GA 31069

CO. ROAD SUPERINTENDENT
COURTHOUSE
PERRY, GA 31069

HON. LEWIS MEEKS
MAYOR
P.O. BOX A
CITY HALL
PERRY, GA 31069

HON. LARRY WALKER
DISTRICT 115
P.O. BOX 1234
PERRY, GA 31069

MAYOR F. M. LEAPTROT
P.O. BOX 118
PINEHURST, GA 31070

MAYOR WILLIE GAULTNEY
P.O. BOX 386
REYNOLDS, GA 31076

MAYOR JERRY WALKER
P.O. BOX 278
ROBERTA, GA 31078

HON. RALPH SUTTON
MAYOR
P.O. BOX 156
CITY HALL
ROCHELLE, GA 31079

RAY BLOODSWORTH
CHIEF OF POLICE
P.O. BOX 156
ROCHELLE, GA 31079

HON. W. N. HUDSON
DISTRICT 117
ROUTE 1 BOX 29A
ROCHELLE, GA 31079

STREET SUPERINTENDENT
P.O. BOX 71
SANDERSVILLE, GA 31082

CO. ROAD SUPERINTENDENT
COURTHOUSE
SANDERSVILLE, GA 31082

HON. T. M. DUKES CHM
WASHINGTON CO. COMM.
P.O. BOX 71
SANDERSVILLE, GA 31082

HON. JIMMY LORD
DISTRICT 107
P.O. BOX 254
SANDERSVILLE, GA 31082

HON. GEORGE LOTT CHM.
HANCOCK CO. COMM.
P.O. DRAWER I
SPARTA, GA 31087

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
SPARTA, GA 31087

HON. T.M. PATTERSON SR.
MAYOR
P.O. BOX H
CITY HALL
SPARTA, GA 31087

MR. GEORGE LYONS
DISTRICT ENGINEER
GDOT DISTRICT 2
TENNILLE, GA 31089

HON. C.E. BYRNE SR.
MAYOR
P.O. BOX 145
CITY HALL
TENNILLE, GA 31089

HON. IRMA CUMMINGS
MAYOR
P.O. BOX 67
CITY HALL
TOOMBSBORO, GA 31090

HON. RONNIE BRANNON
MAYOR
P.O. BOX 307
CITY HALL
UNADILLA, GA 31091

CO. ROAD SUPERINTENDENT
COURTHOUSE
VIENNA, GA 31092

MAYOR JOHN BRADLEY
CITY OF LILLY
LILLY, GA 31092

DOOLY CO. COMM.
COUNTY COURTHOUSE
P.O. BOX 322
VIENNA, GA 31092

MAYOR HOBBY STRIPLING
P.O. BOX 425
VIENNA, GA 31092

HON. ROGNEY BOWEN
DISTRICT 13
P.O. BOX 417
VIENNA, GA 31092

CITY ENGINEER
P.O. BOX 1488
WARNER ROBINS, GA 31093

HON. TED WADDLE
DISTRICT 113
113 TANGLEWOOD DR.
WARNER ROBINS, GA 31093

JAY WALKER CHM.
HOUSTON CO. COMM.
900 CARL VINSON PKWY
WARNER ROBINS, GA 31093

CO. ROAD SUPERINTENDENT
COURTHOUSE
WRIGHTSVILLE, GA 31096

HON. JOHN POWELL CHM.
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P.O. BOX 269
WRIGHTSVILLE, GA 31096

LAWRENCE RYLE
TRAFFIC ENGINEER
2853 CES/DEEE
ROBINS AFB, GA 31098

HON. ED BARKER
DISTRICT 18
P.O. BOX KK
WARNER ROBINS, GA 31099

HON. RALPH JOHNSON
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CITY OF WARNER ROBINS
P.O. BOX 1488
WARNER ROBINS, GA 31099

HON. ROY WATSON JR.
DISTRICT 114
P.O. BOX 1905
WARNER ROBINS, GA 31099

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MIDDLE GEORGIA APDC
600 GRAND BLDG.
MACON, GA 31201

HON. ROBERT FOUNTAIN CHM.
BIBB CO. ENGINEER
COUNTY CRTHSE. Rm. 406
MACON, GA 31201

HERBERT HOLSTON
AAA DIRECTOR
MIDDLE GEORGIA APDC
600 GRAND BLDG.
MACON, GA 31201

HON. MIKE WOLFE CHM.
LAURENS CO. COMM.
P.O. BOX 2011
DUBLIN, GA 31201

COUNTY ENGINEER
COUNTY COURTHOUSE
ROOM 408
MACON, GA 31201

HON. RICHARD GREENE
DISTRICT 26 SUITE 517
TRUST CO. BANK BLDG.
MACON, GA 31201

HON. FRANK HORNE JR.
DISTRICT 103
850 WALNUT ST.
MACON, GA 31201

HON. DAVID LUCAS
DISTRICT 102
448 WOOLFOLK ST.
MACON, GA 31201

HON. FRANK PINKSTON
DISTRICT 100
852 WALNUT ST.
MACON, GA 31201

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MIDDLE GEORGIA APDC
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MACON, GA 31201

CITY ENGINEER
P.O. BOX 247
MACON, GA 31202

HON. DENMARK GROOVER
DISTRICT 99
P.O. BOX 755
MACON, GA 31202

HON. WILLIAM RANDALL
DISTRICT 101
P.O. BOX 121
MACON, GA 31202

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OLDER AMERICANS COUNCIL OF
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728 WIMBISH ROAD
MACON, GA 31210

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MACON, GA 31298

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P.O. BOX 4708
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P.O. BOX 4708
MACON, GA 31298

HON. W. E. TAYLOR
MAYOR
P.O. BOX 216
CITY HALL
BLOOMINGDALE, GA 31302

L. E. OWENS
CHIEF OF POLICE
CITY OF DARIEN
P.O. BOX 452
DARIEN, GA 31305

CO. ROAD SUPERINTENDENT
COURTHOUSE
DARIEN, GA 31305

HON. R. D. GARDNER CHM.
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P.O. BOX 584
DARIEN, GA 31305

HON. STEWART CARROLL
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CITY HALL
DARIEN, GA 31305

CO. ROAD SUPERINTENDENT
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HINESVILLE, GA 31313

PUBLIC WORKS SUPT.
15 E. SOUTH STREET
HINESVILLE, GA 31313

HON. JAMES FLOYD CHM.
LIBERTY CO. COMM.
COUNTY COURTHOUSE
HINESVILLE, GA 31313

HON. CARL DYKES
MAYOR
115 E. SOUTH ST.
CITY HALL
HINESVILLE, GA 31313

HON. GLENN BRYANT
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HINESVILLE, GA 31313

HON. JOE BROWN
DISTRICT 154
114 N. COMMERCE ST.
HINESVILLE, GA 31313

CO. ROAD SUPERINTENDENT
COURTHOUSE
LUDOWISI, GA 31316

MARY MIDDLETON
LONG COUNTY COMM.
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LUDOWICI, GA 31316

HON. LONNIE SKEENS CHM.
LONG CO. COMM.
COUNTY COURTHOUSE
LUDOWICI, GA 31316

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
PEMBROKE, GA 31321

SAMUEL PARLIN
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PEMBROKE P.D.
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PRATT LOCKWOOD
DIRECTOR
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BRYAN COUNTY
PEMBROKE, GA 31321

HON. CARLTON GILL CHM.
BRYAN CO. COMM.
COUNTY COURTHOUSE BOX 59
RICHMOND HILL, GA 31324

HON. GEORGE SARAF
MAYOR
P.O. BOX 232
CITY HALL
RINCON, GA 31326

HON. CHARLES HOSTI
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CITY HALL
TYBEE ISLAND, GA 31328

CO. ROAD SUPERINTENDENT
COURTHOUSE
SPRINGFIELD, GA 31329

LLOYD FULCHER
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SPRINGFIELD, GA 31329

HON. NOEL CONAWAY CHM.
EFFINGHAM CO. COMM.
COUNTY COURTHOUSE
SPRINGFIELD, GA 31329

BRADWELL USHER
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HON. GEORGE CHANCE JR.
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ROAD SUP'T
MCINTOSH CO.
ROUTE#1
DARIEN, GA 31331

HON. BILL STEPHENSON CHM.
CHATHAM CO. COMM.
COUNTY COURTHOUSE
SAVANNAH, GA 31401

HON. ROY ALLEN
DISTRICT 127
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SAVANNAH, GA 31401

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SAVANNAH, GA 31402

COUNTY ENGINEER
P.O. BOX 8161
SAVANNAH, GA 31402

HON. TOM TRIPLETT
DISTRICT 128
P.O. BOX 9586
SAVANNAH, GA 31402

HON. ALBERT SCOTT
DISTRICT 2
P.O. BOX 1704
SAVANNAH, GA 31402

HON. TOM COLEMAN
DISTRICT 1
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SAVANNAH, GA 31403

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SAVANNAH, GA 31404

HON. DIANE JOHNSON
DISTRICT 123
P.O. BOX 5544
SAVANNAH, GA 31404

HON. DEWAYNE HAMILTON
DISTRICT 124
P.O. BOX 14562
SAVANNAH, GA 31406

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DISTRICT 126
13013 HERMITAGE RD.
SAVANNAH, GA 31406

HON. BOBBY PHILIPS
DISTRICT 125
9219 MELODY DR.
SAVANNAH, GA 31406

HON. PRESTON EDWARDS JR.
MAYOR
P.O. BOX 4086
CITY HALL
PORT WENTWORTH, GA 31407

HON. RALPH KESSLER
MAYOR
P.O. BOX 7548
CITY HALL
GARDEN CITY, GA 31408

HON. RONALD GINSBERG
DISTRICT 122
P.O. BOX 10105
SAVANNAH, GA 31412

CITY ENGINEER
P.O. BOX 198
WAYCROSS, GA 31501

CO. ROAD SUPERINTENDENT
COURTHOUSE
WAYCROSS, GA 31501

HON. THOMAS GRAY CHM.
WARE CO. COMM.
COUNTY COURTHOUSE
WAYCROSS, GA 31501

HON. TOM CROSBY JR.
DISTRICT 150
705 WACONA DR.
WAYCROSS, GA 31501

HON. HARRY DIXON
DISTRICT 151
1303 CORAL RD.
WAYCROSS, GA 31501

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3243 HARRIS RD.
WAYCROSS, GA 31501

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902 GROVE AVENUE
WAYCROSS, GA 31501

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CITY MANAGER
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WAYCROSS, GA 31501

HON. C. C. McCRAY
MAYOR
P.O. DRAWER 138
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P. W. DIRECTOR
WARE COUNTY
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WAYCROSS, GA 31501

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WAYCROSS, GA 31502

CO. ROAD SUPERINTENDENT
COURTHOUSE
ALMA, GA 31510

HON. CLEON CARVER CHM.
BACON CO. COMM.
COUNTY COURTHOUSE
ALMA, GA 31510

HON. JAMES DEEN
MAYOR
P.O. BOX 429
CITY HALL
ALMA, GA 31510

HON. TOMMY SMITH
DISTRICT 152
ROUTE 1
ALMA, GA 31510

STREET SUPERINTENDENT
P.O. BOX 180
BAXLEY, GA 31513

MARSHA BLISS
ALTAMAHA GA SOUTHERN APDC
P.O. BOX 328
BARLEY, GA 31513

HON. E.F. HUNTER CHM.
APPLING CO. COMM.
COUNTY COURTHOUSE
BAXLEY, GA 31513

HON. WILLIAM T. TURNER
MAYOR
P.O. BOX 180
CITY HALL
BAXLEY, GA 31513

HON. LUNSFORD MOODY
DISTRICT 153 POST 1
P.O. BOX 32
BAXLEY, GA 31513

MR. TED FORTINO
EXECUTIVE DIRECTOR
ALTAMAHA GA.
SOUTHERN APDC
P.O. BOX 328
BAXLEY, GA 31513

CO. ROAD SUPERINTENDENT
COURTHOUSE
BLACKSHEAR, GA 31516

HON. FORREST SWEAT CHM.
PIERCE CO. COMM.
COUNTY COURTHOUSE
BLACKSHEAR, GA 31516

HON. HARRY G. ADAMS
MAYOR
P.O. BOX 268
CITY HALL
BLACKSHEAR, GA 31516

COUNTY ENGINEER
COURTHOUSE
BRUNSWICK, GA 31520

JIMMY HORTON
TRAFFIC SAFETY ENG.
GLYNN CO. P.W.
NORWICH ST. EXT.
BRUNSWICK, GA 31520

HON. JOHN MCCLURD CHM.
GLYNN CO. COMM.
COUNTY COURTHOUSE
BRUNSWICK, GA 31520

V. C. BESSING
GLYNN CO. P.W.
NORWICH ST. EXT.
BRUNSWICK, GA 31520

ROY BROGDON
COUNTY ENGINEER
1803 GLOVCESTER ST.
BRUNSWICK, GA 31520

ED STELLE
COMMUNITY DEVELOPMENT
1803 GLOVCESTER ST.
BRUNSWICK, GA 31520

HON. DEAN AUTEN
DISTRICT 156
628 KING COTTON ROW
BRUNSWICK, GA 31520

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GA. TECH RESEARCH INST.
REGIONAL OFFICE
ZELL BUILDING-OFFICE 5
502 GLOUCESTER STREET
BRUNSWICK, GA 31520

ELLEN CHAMPOUX
PROGRAMS COORDINATOR
VOLUNTEER ASSISTANCE LEAGUE
1326 UNION STREET
BRUNSWICK, GA 31520

HON. SHAW MCVEIGH
DISTRICT 155
3202 BASS ST.
BRUNSWICK, GA 31520

B. E. GRINER
DISTRICT PROGRAM MANAGER
P.O. BOX 1213
BRUNSWICK, GA 31520

MR. JIMMY HORTON
GLENN CO. PUBLIC WORKS
P.O. BOX 873
BRUNSWICK, GA 31520

DICK NEWBERN
COASTAL APDC
P.O. BOX 1917
BRUNSWICK, GA 31521

CHAIRMAN
COUNTY COMMISSION
P.O. BOX 879
BRUNSWICK, GA 31521

COUNTY PLANNING DEPT.
P.O. BOX 1495
BRUNSWICK, GA 31521

CITY ENGINEER
P.O. BOX 550
BRUNSWICK, GA 31521

GERALDINE KENNEDY
SERVICES COORDINATOR
COASTAL GEORGIA APDC
P.O. BOX 1917
BRUNSWICK, GA 31521

HON. ALBERT KNIGHT III
MAYOR
P.O. BOX 550
CITY HALL
BRUNSWICK, GA 31521

BRUCE ELIAS
TRANSPORTATION PLANNER
COASTAL GEORGIA APDC
P.O. BOX 1917
BRUNSWICK, GA 31521

HON. BILL LITTLEFIELD
DISTRICT 6
P.O. BOX 1902
BRUNSWICK, GA 31521

MR. VERNON MARTIN
EXECUTIVE DIRECTOR
COASTAL APDC
P.O. DRAWER 1917
BRUNSWICK, GA 31521

MAREIA TUTTLE
GOLDEN ISLES
BICYCLE CLUB
ROUTE 9 P.O. BOX 287
ST. SIMONS IS., GA 31522

CITY ENGINEER
P.O. BOX 470
DOUGLAS, GA 31533

SHERMAN DUDLEY
SE GEORGIA AREA OFFICE
405 N. PETERSON AVE.
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ASS'T CHIEF OF POLICE
DOUGLAS POLICE DEPT.
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DOUGLAS, GA 31533

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BRANTLEY CO. COMM.
COUNTY COURTHOUSE
NAHUNTA, GA 31533

HON. FRANK JACKSON CHM.
COFFEE CO. COMM.
COUNTY COURTHOUSE
DOUGLAS, GA 31533

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
DOUGLAS, GA 31533

HON. JIM MINIX
MAYOR
P.O. DRAWER 470
CITY HALL
DOUGLAS, GA 31533

HON. JESSE CREWS CHM.
CHARLTON CO. COMM.
100 THIRD STREET
FOLKSTON, GA 31537

WILLIAM CARTER
CHAIRMAN
CHARLTON CO. COMM.
100 3RD STREET
FOLKSTON, GA 31537

COUNTY ENGINEER
100 3RD. STREET
FOLKSTON, GA 31537

CO. ROAD SUPERINTENDENT
COURTHOUSE
HAZLEHURST, GA 31539

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CHIEF OF POLICE
HAZLEHURST P.D.
132 LATIMER ST.
HAZLEHURST, GA 31539

STREET SUPERINTENDENT
P.O. BOX 396
HAZLEHURST, GA 31539

HON. DAN MIMS CHM.
JEFF DAVIS COMM.
COUNTY COURTHOUSE BOX 652
HAZLEHURST, GA 31539

HON. LARRY CONTOS
MAYOR
P.O. BOX 396
CITY HALL
HAZLEHURST, GA 31539

HON. ROGER BYRD
DISTRICT 153 POST 2
302 N. ROGERS ST.
HAZLEHURST, GA 31539

CO. ROAD SUPERINTENDENT
COURTHOUSE
JESUP, GA 31545

MARTHA BURNS
DIRECTOR
WAYNE CO. DAY CARE CENTER
P.O. BOX 1163
JESUP, GA 31545

STREET SUPERINTENDENT
P.O. BOX 427
JESUP, GA 31545

ELIZABETH PEACH
COMMUNITY COORDINATOR
WAYNE CO. CAC
P.O. BOX 53
JESUP, GA 31545

MR. JUAN DURRANCE
DISTRICT ENGINEER
GDOT DISTRICT 5
GENERAL DELIVERY
JESUP, GA 31545

DIXIE EDEN
DIRECTOR
WAYNE CO. SERVICE CTR.
ROUTE 1 BOX 47
JESUP, GA 31545

HON. JOHN TYRE CHM.
WAYNE CO. COMM.
COUNTY COURTHOUSE
JESUP, GA 31545

HON. JERRY McDANIEL
MAYOR
P.O. BOX 427
CITY HALL
JESUP, GA 31545

MR. KENNY GESTON
P.O. BOX 1063
JESUP, GA 31545

CO. ROAD SUPERINTENDENT
COURTHOUSE
HOMER, GA 31547

HON. FRED SUTTON
MAYOR
P.O. BOX 397
CITY HALL
KINGSLAND, GA 31548

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
NAHUNTA, GA 31553

GARY HARRIS
WATER SUP'T
CITY OF NAHUNTA
P.O. BOX 156
NAHUNTA, GA 31553

HON. WARD HERNANDEZ
MAYOR
418 OSBORNE
CITY HALL
ST. MARYS, GA 31558

CITY ENGINEER
418 OSBORNE ST.
SAINT MARYS, GA 31558

HON. JAMES MOORE
DISTRICT 139
ROUTE 2
WEST GREEN, GA 31567

HON. HARRY CALLAHAN CHM.
CAMDEN CO. COMM.
COUNTY COURTHOUSE
WOODBINE, GA 31569

CO. ROAD SUPERINTENDENT
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WOODBINE, GA 31569

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CHIEF DEPUTY
LOWNDES CO. SHERIFF
111 ROSWELL DR.
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VALDOSTA, GA 31601

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2427 WESTWOOD DR.
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COUNTY COURTHOUSE
ADEL, GA 31620

CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
ODELE, GA 31620

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ADEL, GA 31620

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HOMERVILLE, GA 31634

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HOMERVILLE, GA 31634

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HOMERVILLE, GA 31634

HON. CHESTER DAY
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HOMERVILLE, GA 31634

CO. ROAD SUPERINTENDENT
COURTHOUSE
LAKELAND, GA 31635

HON. JIM WHITE CHM.
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COUNTY COURTHOUSE
LAKELAND, GA 31635

HON. JAMES SHAW
MAYOR
202 VALDOSTA ROAD
CITY HALL
LAKELAND, GA 31635

HON. ROBERT PATTEN
DISTRICT 149
ROUTE 1 BOX 180
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GRADY BRYAN JR.
TRAFFIC SIGNAL TECH.
GA. DOT
RT 1 BOX 1
LENOX, GA 31637

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CO. ROAD SUPERINTENDENT
COUNTY COURTHOUSE
NASHVILLE, GA 31639

HON. DEWEY HAND
MAYOR
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NASHVILLE, GA 31639

HON. HANSON CARTER
DISTRICT 146
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HON. ED PERRY
DISTRICT 7
ROUTE 2
NASHVILLE, GA 31639

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PEARSON, GA 31642

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PEARSON, GA 31642

STREET SUPERINTENDENT
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QUITMAN, GA 31643

CO. ROAD SUPERINTENDENT
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QUITMAN, GA 31643

HON. H. C. SCRUGGS CHM.
BROOKS CO. COMM.
COUNTY COURTHOUSE
QUITMAN, GA 31643

HON. WAYNE CARROLL
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CITY HALL
QUITMAN, GA 31643

HON. HENRY REAVES
DISTRICT 147
ROUTE 2
QUITMAN, GA 31643

CO. ROAD SUPERINTENDENT
COURTHOUSE
STATENVILLE, GA 31648

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HON. TOMMY CHAMBLESS
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ALBANY, GA 31702

HON. AL HOLLAWAY
DISTRICT 12
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Agency - 1 Subject - 1 Newsletter - 0

ENGINEERED WOOD TROSSES

- SE TRUSS MAN. ASS. , 1983 28 1
Agency - 13 Subject - 12 Newsletter - 0

EPOXY THERMOPLASTIC (ETP) PAVEMENT MARKING MATERIAL

- FHWA , 1983 2 6
Agency - 6 Subject - 6 Newsletter - 0

EPOXY THERMOPLASTIC TRAFFIC MARKING MATERIAL

- FHWA , 1982 53 1
Agency - 6 Subject - 6 Newsletter - 0

EVALUATION OF SNOWPLOWABLE MARKERS

- UNIV KENTUCKY , 1982 36 3
Agency - 6 Subject - 16 Newsletter - 0

EVALUATION OF STREETER AMET
13 CHANNEL VEHICLE TYPE PROGRAM
- KANSAS DOT, 1985 11 1
Agency - 9 Subject - 12 Newsletter - 0

EVALUATION WORKBOOK FOR PUBLIC SAFETY MANAGERS
- VIRGINIA COMM UNIV , 1982 26 1
Agency - 24 Subject - 2 Newsletter - 0

EXCELLANCE IN HIGHWAY DESIGN

- FHWA , 1984 20 1
Agency - 27 Subject - 6 Newsletter - 0

FEDERALLY COORDINATED PROGRAM OF HIGHWAY RESEARCH AND DEVELOPMENT
- OFFICES OF RES DEV & TECH D.C., 1982 40 3
Agency - 6 Subject - 17 Newsletter - 0

FEDERALLY COORDINATED PROGRAM OF HIGHWAY RESEARCH DEVELOPMENT AND TECHNOLOGY
- OFFICES OF RES DEV & TECH D.C., 1984 400+ 1
Agency - 6 Subject - 17 Newsletter - 0

FEDERAL REGISTER

- DOT , 1980 21 1
Agency - 24 Subject - 17 Newsletter - 0

FIELD EVALUATION OF AN IMPACT TESTING DEVICE FOR MEASURING BASE COURSE STRENGTH
- PURDUE UNIV , 1983 78 1
Agency - 8 Subject - 18 Newsletter - 0

FIELD MAINTENANCE MANUAL FOR GA COUNTIES LOCAL ROADS AND STREETS
- GA TECH , 1975 184+ 1
Agency - 15 Subject - 19 Newsletter - 0

FIELD MANUAL ON DESIGN AND CONSTRUCTION OF SEAL COATS
- US DOT , 1981 84 1
Agency - 24 Subject - 19 Newsletter - 0

FINANCIAL ASSISTANCE GUIDELINES

- FEMA , 1984 150+ 1
Agency - 14 Subject - 8 Newsletter - 0

FLEXIBLE DELINEATOR POST TEST PROCEDURES FHWA-TS-84-225
- FHWA , 1984 85 1
Agency - 6 Subject - 2 Newsletter - 10

FLEXIBLE PAVEMENT MANAGEMENT SYSTEM MICROCOMPUTER PROGRAM BASED ON CALIFORNIA PMS
- CALTRANS , 1981 15+ 1
Agency - 6 Subject - 8 Newsletter - 0

FLEXIBLE PARKING REQUIREMENTS

- PUBLIC TECH INC. D.C., 1982 15+ 1
Agency - 24 Subject - 20 Newsletter - 0

FORT DUQUESNE BRIDGE: FRACTURE ANALYSIS OF FLANGE CORES
- FHWA , 1984 60 1
Agency - 12 Subject - 6 Newsletter - 9

FRONT END LOADERS 2-3 CYD ARTICULATING
RUBBER TIRED 4-WHEEL DRIVE
- PURDUE UNIV , 1983 8 1
Agency - 8 Subject - 11 Newsletter - 0

FUNDAMENTALS OF TRAFFIC ENGINEERING
11TH EDITION
- UNIV OF CALIFORNIA , 1984 200+ 1
Agency - 19 Subject - 10 Newsletter - 0

FUNDAMENTALS OF TRAFFIC ENGINEERING
10TH EDITION
- UNIV OF CALIFORNIA , 1981 200+ 1
Agency - 19 Subject - 10 Newsletter - 0

GASAHOL FACTS ABOUT

- SOLAR ENERGY INF DATA BANK, 1977 5 1
Agency - 24 Subject - 21 Newsletter - 0

GROWTH MANAGEMENT AND TRANSPORTATION

- PUBLIC TECH INC. D.C., 1982 29+ 1
Agency - 24 Subject - 8 Newsletter - 0

GUIDELINES FOR DESIGN OF LOCAL ROADS
AND STREETS
- PENNDOT , 1983 65+ 1
Agency - 16 Subject - 22 Newsletter - 0

GUIDELINES FOR MAKING PEDESTRIAN CROSSING
STRUCTURES ACCESSIBLE
- FHWA , 1984 27 1
Agency - 6 Subject - 23 Newsletter - 0

GUIDE MANUAL RECORDS AND REPORTS
FOR INDIANA COUNTY HIGHWAY DEPARTMENTS
- PURDUE UNIV , 1981 186 1
Agency - 8 Subject - 8 Newsletter - 0

HANDBOOK OF COMPUTER MODELS FOR TRAFFIC
OPERATIONS ANALYSIS
- DIAZ SECKINGER & ASS. INC. TAMPA, 1982 285+ 1
Agency - 6 Subject - 10 Newsletter - 11

HANDBOOK ON DESIGN OF PILES AND DRILLED
SHAFTS UNDER LATERAL LOAD
- UNIV TEXAS , 1984 354+ 2
Agency - 6 Subject - 12 Newsletter - 0

HEX-FOAM G-R-E-A-T SYSTEM
DESIGN AND INSTALLATION MANUAL
- ENERGY ABSORPTION SYSTEMS INC., 1984 50 1
Agency - 23 Subject - 2 Newsletter - 0

HIGHWAY SAFETY OVERVIEWS

- OFF OF HW SAFETY , 1984 43+ 2
Agency - 6 Subject - 2 Newsletter - 0

HIGHWAY STATISTICS 1982

- HW STAT DIV , 1982 181 1
Agency - 6 Subject - 24 Newsletter - 0

HIGHWAY STATISTICS 1983

- HW STAT DIV , 1983 181 1
  Agency - 6 Subject - 24 Newsletter - 0

HOT MIX BITUMINOUS PAVING MATERIAL

- FHWA , 1984 100+ 2
  Agency - 6 Subject - 6 Newsletter - 0

HOT MIX RECYCLING

- KANSAS DOT , 1983 26 1
  Agency - 12 Subject - 6 Newsletter - 0

HOUSING REPLACEMENT AT LAST RESORT

- OFF. OF ROW , 1975 22 1
  Agency - 6 Subject - 22 Newsletter - 2

HYDROLOGY

- FHWA , 1984 342 1
  Agency - 31 Subject - 6 Newsletter - 8

IDENTIFICATION ANALYSIS AND CORRECTION
OF HIGH ACCIDENT LOCATIONS
- MIDWEST RESEARCH INSTITUTE , 1975 134+ 1
  Agency - 6 Subject - 2 Newsletter - 0

IMPROVED FABRICATION AND INSPECTION OF WELDED
CONNECTIONS IN BRIDGE STRUCTURES
- GARD INC., 1984 111 1
  Agency - 12 Subject - 6 Newsletter - 8

IMPROVING SUBDRAINAGE AND SHOULDERS OF
EXISTING PAVEMENTS
- UNIV ILLINOIS , 1982 212+ 2
  Agency - 6 Subject - 13 Newsletter - 4

INFLATION-RESPONSIVE FINANCING FOR STREETS
AND HIGHWAYS
- PUBLIC TECH INC. D. C., 1982 40+ 1
  Agency - 17 Subject - 26 Newsletter - 0

INTERCEPTING DOWNTOWN-BOUND
TRAFFIC
- US DOT , 1982 66 1
  Agency - 24 Subject - 1 Newsletter - 0

JUNKYARDS THE HIGHWAY AND
VISUAL QUALITY
- ORG FOR ENVIO GROWTH INC. WASH DC, 1979 129+ 1
  Agency - 6 Subject - 27 Newsletter - 0

LOCAL FUNDING OPTIONS FOR WISCONSIN URBAN
TRANSITS SYSTEMS
- WIS DOT , 1982 82 1
  Agency - 24 Subject - 2 Newsletter - 0

LOW-VOLUME ROADS: THIRD INTERNATIONAL
CONFERENCE 1983
- TRANS RES BD , 1983 378+ 1
  Agency - 18 Subject - 24 Newsletter - 0

MAINTENANCE OF HIGHWAY SAFETY HARDWARE

- FHWA , 1983 2 4
  Agency - 6 Subject - 19 Newsletter - 0

MAINTENANCE MANAGING THE MAITENANCE FUNCTION
PART C- PREVENTIVE MAINTENANCE
- PLANT ENG LIBRARY , 1981 33 2
  Agency - 6 Subject - 19 Newsletter - 0

MAKING ENERGY REGULATIONS

- US DEPT OF ENERGY , 1979 21 1
  Agency - 24 Subject - 21 Newsletter - 0

MASTERING TRAFFIC ENGINEEERING

- MILITARY TRAFFIC MANAGEMENT COMMAND, 1981 64+ 2
  Agency - 10 Subject - 20 Newsletter - 8

MICROCOMPUTER APPLICATIONS IN TRAFFIC ENGINEERING
AGENCIES
- DIAZ SECKINGER & ASS. INC., 1983 50+ 1
  Agency - 6 Subject - 10 Newsletter - 0

MINOR MAINTENANCE MANUAL FOR
COUNTY BRIDGES
- HERPICC , 1984 55 1
  Agency - 12 Subject - 8 Newsletter - 0

MODEL COUNTY SUBDIVISION REGULATIONS

- PURDUE UNIV , 1983 55+ 2
  Agency - 8 Subject - 28 Newsletter - 0

MOTORIST DIRECTION-FINDING AIDS
RECOVERY FROM FREEWAY EXITING ERRORS
- TURNER-FAIRBANK HW RESEARCH CENTER, 1984 47 2
  Agency - 6 Subject - 10 Newsletter - 10

NATIONAL EXPERIMENTAL AND EVALUATION PROGRAM
FINAL REPORT
- EXPERIMENT PROJECTS PROGRAM , 1984 19 1
  Agency - 17 Subject - 6 Newsletter - 0

NATIONAL EXPERIMENTAL PROJECTS TABULATION

- EXP APP AND EVAL , 1984 456 1
  Agency - 6 Subject - 24 Newsletter - 0

NATIONAL EXPERIMENTAL PROJECTS TABULATION

- EXP APP AND EVAL , 1982 305 1
  Agency - 6 Subject - 24 Newsletter - 0

NATIONAL URBAN MASS TRANSPORTATION STATISTICS

- TRANS SYS CENTER , 1983 34 1
  Agency - 1 Subject - 24 Newsletter - 0

NATIONAL URBAN MASS TRANSPORTATION STATISTICS

- TRANS SYS CENTER , 1982 400+ 1
  Agency - 1 Subject - 24 Newsletter - 0

NATIONAL URBAN MASS TRANSPORTATION STATISTICS

- TRANS SYS CENTER , 1983 500+ 1
  Agency - 1 Subject - 24 Newsletter - 0

NATIONAL WEIGH IN MOTION CONFERENCE

- COLORADO DOT , 1983 400+ 1
  Agency - 4 Subject - 24 Newsletter - 0

NATIONWIDE STANDARDS RESEARCH PROJECT FOR
PUBLICY OWNED ELEMENTARY AND HIGH SCHOOLS
- ORG. FOR ENVIRO. GROWTH INC. WASH DC, 1980 157+ 1
  Agency - 6 Subject - 17 Newsletter - 0

NIGHT VISIBILITY OF OVERHEAD GUIDE SIGNS:
A REVIEW OF THE LITERATURE
- TURNER-FAIRBANK RESEARCH CENTER, 1984 91 2
  Agency - 6 Subject - 10 Newsletter - 10

OPERATION AND PERFORMANCE CHARACTERISTICS
OF DRUM MIX PLANTS
- FHWA , 1984 83+ BOX
  Agency - 6 Subject - 6 Newsletter - 9

OUR NATION'S HIGHWAYS

- FHWA , 1981 23 1
  Agency - 6 Subject - 24 Newsletter - 0

OUTDOOR ADVERTISING CONTROL AND
ACQUISTITION
- FHWA , 1981 23 1
  Agency - 6 Subject - 27 Newsletter - 0

PARATRANSIT FOR THE WORK TRIP:
COMMUTER RIDESHARING
- MULTISYSTEMS INC. MASS, 1982 88 1
  Agency - 24 Subject - 1 Newsletter - 0

PATCHING FLEXIBLE AND RIGID PAVEMENTS

- NY DOT , 1979 20 1
  Agency - 6 Subject - 6 Newsletter - 0

PAVEMENT AND SHOULDER MAINTENANCE
PERFORMANCE GUIDES
- FHWA , 1984 40 1
  Agency - 6 Subject - 6 Newsletter - 8

PAVEMENT CUTS FOR UTILITIES:
A GUIDE FOR THEIR MANAGEMENT
- HERPICC , 1984 25 1
  Agency - 6 Subject - 8 Newsletter - 0

PAVEMENT MAINTENANCE AND REHABILITATION:
TECHNIQUES USING ASPHALT
- UNIV CAL , 1984 88 1
  Agency - 6 Subject - 6 Newsletter - 0

PAVEMENT MANAGEMENT AND REHABILITATION OF
PORTLAND CEMENT CONCRETE PAVEMENTS
- TRANS RES BD , 1981 70 1
  Agency - 18 Subject - 6 Newsletter - 0

PAVEMENT MANAGEMENT REHABILITATION PROGRAMMING:
EIGHT STATES' EXPERIENCES
- FHWA , 1983 76+ 1
Agency - 6 Subject - 6 Newsletter - 0

PAVEMENT PATCHING GUIDELINES

- RESOURCE INTER INC.OHIO, 1983 72 2
Agency - 6 Subject - 6 Newsletter - 0

PHOENIX TRANSIT SUNDAY DAIL-A-RIDE

- CRAIN & ASS. INC. CALF, 1983 28+ 1
Agency - 1 Subject - 1 Newsletter - 0

PLANNING SERVICES FOR TRANSPORTATION-HANDICAPPED
PEOPLE-- DATA COLLECTION MANUAL
- PEAT MARWICK MITCHELL & CO. WASH DC, 1983 200+ 1
Agency - 1 Subject - 1 Newsletter - 0

POPULATION ESTIMATES AND PROJECTIONS

- CENSUS BUREAU , 1979 18 1
Agency - 15 Subject - 24 Newsletter - 0

POTHOLE PRIMER

- CORPS OF ENG. , 1981 23+ BOX
Agency - 21 Subject - 19 Newsletter - 0

POTHOLE PRIMER

- CORPS OF ENG. , 1985 28 BOX
Agency - 21 Subject - 19 Newsletter - 11

PRACTICAL GUIDELINES FOR MINIMIZING TORT
LIABILITY
- TRANS RES BD , 1983 39+ 1
Agency - 18 Subject - 30 Newsletter - 10

PRIORITY ACCESSIBLE NETWORK FOR THE ELDERLY
AND HANDICAPPED PEDESTRIANS IN NEW ORLEANS
- REG TRANS AUTH LA, 1984 68+ 3
Agency - 6 Subject - 23 Newsletter - 0

PRIORITY ACCESSIBLE NETWORK FOR THE ELDERLY
AND HANDICAPPED IN SEATTLE
- CITY OF SEATTLE , 1984 88 3
Agency - 6 Subject - 23 Newsletter - 0

PROCEEDINGS
WORKSHOP IN PAVEMENT REHABILITATION
- FHWA TECH SHARING, 1984 225 1
Agency - 6 Subject - 19 Newsletter - 11

PUBLIC TRANSPORTATION FOR RURAL AND SMALL
URBAN AREAS
- FHWA , 1982 137+ 1
Agency - 6 Subject - 1 Newsletter - 0

QUALITY ASSURANCE FOR SMALL LOCAL
GOVERNMENTS
- BYRD TALLAMY MACDONALD & LEWIS VA, 1983 62+ 2
Agency - 6 Subject - 29 Newsletter - 10

RAIL-HIGHWAY CROSSING RESOURCE
ALLOCATION PROCEDURE USER'S GUIDE
- US DOT , 1982 82+ 1
Agency - 6 Subject - 2 Newsletter - 5

RAISED PAVEMENT MARKERS AT
HAZARDOUS LOCATIONS
- FHWA , 1984 71 1
Agency - 6 Subject - 16 Newsletter - 9

RECENT TRANSPORTATION LITERATURE FOR PLANNING
AND ENGINEERING LIBRARIANS
- VANCE BILB , 1983 43 1
Agency - 24 Subject - 24 Newsletter - 0

REDESIGN AND FIELD OPERATION OF A SELF-PROPELLED
CAVITATING CONCRETE REMOVAL SYSTEM
- FHWA , 1984 43 1
Agency - 14 Subject - 6 Newsletter - 9

REFLECTIVE CRACKING IN BITUMINOUS OVERLAYS
ON RIGID PAVEMENTS
- FHWA FHWA-TS-84-213, 1984 19 9
Agency - 6 Subject - 19 Newsletter - 10

RISK MANAGEMENT SEMINAR

- ALABAMA T2 CENTER, 1984 138 1
Agency - 23 Subject - 30 Newsletter - 0

ROAD HUMPS FOR THE CONTROL
OF VEHICLE SPEEDS
- TRANSPORT AND ROAD RESEARCH LAB, 1973 25 1
Agency - 22 Subject - 24 Newsletter - 0

ROAD SURFACE MANAGEMENT
FOR LOCAL GOVERNMENTS
- US DOT SIX CASE STUDIES, 1985 110 BOX
Agency - 24 Subject - 19 Newsletter - 10

ROADWAY DELINEATION PRACTICES HANDBOOK

- JHK & ASS. SAN FRAN, 1981 109+ 1
Agency - 24 Subject - 16 Newsletter - 0

ROADWAY LIGHTING HANDBOOK

- FHWA , 1983 50 2
Agency - 6 Subject - 22 Newsletter - 5

RURAL COMMUNITIES AND THE
AMERICAN FARM
- OFFICE OF RURAL DEVELOPMENT POLICY, 1984 30 1
Agency - 29 Subject - 10 Newsletter - 0

RURAL PUBLIC TRANSPORTATION
PERFORMANCE EVALUATION GUIDE
- PENN DOT , 1982 75+ 2
Agency - 24 Subject - 8 Newsletter - 0

RURAL TRANSIT: AN ANNOTATED BIBLIOGRAPHY

- UNIV CALF , 1983 31 1
Agency - 24 Subject - 8 Newsletter - 0

SAFETY AND TRAFFIC IMPLEMENTATION DIVISION

- OFF. OF IMPLEMENTATION , 1983 20+ 2
  Agency - 6 Subject - 2 Newsletter - 0

SAFETY DESIGN AND OPERATIONAL
PRACTICES FOR STREETS AND HIGHWAYS
- FHWA , 1980 200+ 1
  Agency - 6 Subject - 2 Newsletter - 0

SCENARIO PLANNING: ENERGY CONSIDERATIONS IN THE
LONG RANGE URBAN TRANSPORTATION PLANNING PROCESS
- BALTIMORE REG PLAN COUNCIL , 1983 220+ 1
  Agency - 24 Subject - 21 Newsletter - 0

SELDOM USED SPECIFICATIONS

- PENN DOT , 1983 30+ 1
  Agency - 16 Subject - 28 Newsletter - 0

SELECTED LIBRARY ACQUISITIONS

- US DOT , 1985 44+ 1
  Agency - 24 Subject - 24 Newsletter - 0

SIGNAL TIMING OPTIMAZATION: A BIBLIOGRAPHY

- UNIV CALF , 1983 10 1
  Agency - 24 Subject - 10 Newsletter - 0

SINGLE AND/OR TANDEM AXLE
DUMP TRUCKS A CHECKLIST
- PURDUE UNIV , 1983 20+ 3
  Agency - 8 Subject - 11 Newsletter - 0

STANDARD SPECIFICATIONS -CONSTRUCTION OF
ROADS AND BRIDGES
- GA DOT , 1983 880 1
  Agency - 15 Subject - 28 Newsletter - 0

STANDARD SPECIFICATIONS 1983 SUPPLEMENT

- GA DOT , 1983 226 1
  Agency - 15 Subject - 28 Newsletter - 0

STATE-OF-THE-ART IN ASPHALT
PAVEMENT SPECIFICATIONS
- SHELADIA ASS. INC., 1984 173 1
  Agency - 6 Subject - 6 Newsletter - 8

STEEL SHEET PILING DESIGN MANUAL

- USS STEEL , 1984 132+ 1
  Agency - 6 Subject - 25 Newsletter - 0

STREET CUTS IN CITY AND COUNTY STREETS

- PURDUE UNIV , 1983 95 2
  Agency - 8 Subject - 22 Newsletter - 0

STREET PATCHING OPERATIONS: FIELD TEST EVALUATION
PROGRAM; UPM COLD PATCH
- PUBLIC TECH WASH DC, 1981 13+ 1
  Agency - 24 Subject - 6 Newsletter - 0

SURVEY OF ALTERNATIVES TO THE USE OF CHLORIDES
FOR HIGHWAY DEICING
- OFF. OF R&D , 1977 20+ 1
Agency - 6 Subject - 16 Newsletter - 0

TAMPA SYMPOSIUM HIGHLIGHTS

- PRICE WILLIAMS AND ASS. INC., 1984 58 1
Agency - 1 Subject - 1 Newsletter - 8

TAXI-BASED SPECIAL TRANSIT SERVICES

- UNIV CALF , 1983 101+ 1
Agency - 24 Subject - 1 Newsletter - 0

TAXI-BASED REGULATORY REVISION IN OAKLAND
AND BERKELY CALF: TWO CASE STUDIES
- CRAIN & ASS. CALF, 1983 58+ 1
Agency - 1 Subject - 1 Newsletter - 0

TECHNIQUES FOR PAVEMENT MANAGEMENT SYSTEM

- UNIV CALF , 1984 40+ 1
Agency - 19 Subject - 8 Newsletter - 0

TEMPORY ASPHALT ISLAND

- FHWA , 1983 4 5
Agency - 6 Subject - 6 Newsletter - 0

TEMPORY ROAD MARKERS MAINTENANCE TROUBLESHOOTER

- UTAH DOT , 1982 7 1
Agency - 6 Subject - 16 Newsletter - 0

THE COLLECTION OF WORK ZONE ACCIDENT DATA

- MIDWEST RES. INST. MISS, 1982 94 1
Agency - 6 Subject - 2 Newsletter - 0

THE ENGINEER'S POTHOLE REPAIR GUIDE

- COLD REGIONS TECH DIGEST, 1984 12 BOX
Agency - 21 Subject - 19 Newsletter - 11

THE ENVIROMENTAL IMPACTS OF BART

- METRO TRANS COMM , 1979 20 1
Agency - 29 Subject - 24 Newsletter - 0

THE EUROPEAN PARATRANSIT
EXPERIENCE
- ECOPLAN INTER. FRANCE, 1981 42+ 1
Agency - 24 Subject - 2 Newsletter - 0

THE HOLE STORY

- AMER PUB WORKS ASS , 1983 20+ 1
Agency - 24 Subject - 6 Newsletter - 0

THE IMPACT OF TRAFFIC
ON RESIDENTIAL AREAS
- US DOT , 1982 34 1
Agency - 24 Subject - 1 Newsletter - 0

THE INTERSTATE HIGHWAY TRADE-IN PROCESS
VOL 1
- POLYTECH INST NY, 1982 25+ 1
Agency - 24 Subject - 22 Newsletter - 0

THE INTERSTATE HIGHWAY TRADE-IN PROCESS
VOL 2
- POLYTECH INST NY, 1982 60+ 1
Agency - 24 Subject - 22 Newsletter - 0

THE PAVEMENT MANAGEMENT SYSTEM OF MARICOPA
COUNTY ARIZONA
- AZ DOT , 1982 13 1
Agency - 24 Subject - 6 Newsletter - 0

THE ROLE OF REHABILITATION IN
TRANSIT FLEET REPLACEMENT
- PUGET SOUND COUN OF GOV , 1983 58+ 1
Agency - 24 Subject - 1 Newsletter - 0

TIEBACKS

- SCHNABEL FOUNDATION CO MARYLAND, 1983 219+ 1
Agency - 6 Subject - 18 Newsletter - 0

TIEBACKS EXECUTIVE SUMMARY

- SCHNABEL FOUNDATION CO MD, 1982 15 1
Agency - 6 Subject - 18 Newsletter - 0

TIME BASED COORDINATION UNIT
SPECIFICATIONS
- STORCH ENGS. CT, 1982 39 1
Agency - 6 Subject - 28 Newsletter - 0

TRAFFIC CONTROL FOR STREET AND HIGHWAY
CONSTRUCTION AND MAINTENANCE OPERATIONS
- BYRD TALLAMY MACDONALD & LEWIS VA, 1978 200+ 1
Agency - 6 Subject - 2 Newsletter - 0

TRAFFIC CONTROLLER SYNCHRONIZER FIELD TEST
EVALUATION
- OFF OF R&D , 1982 20+ 1
Agency - 6 Subject - 10 Newsletter - 0

TRAFFIC ENGINEERING SERVICES FOR SMALL POLITICAL
JURISDICTIONS
- AMER PUB WORKS ASS , 1977 133 1
Agency - 6 Subject - 10 Newsletter - 0

TRAFFIC SIGNAL MAINTENANCE

- GA DOT , 1982 20+ 1
Agency - 15 Subject - 10 Newsletter - 0

TRAFFIC SIGNAL OPTIMIZATION PROGRAMS
-A COMPARISION STUDY
- C CLATERBLOS KANSAS, 1984 54 2
Agency - 6 Subject - 10 Newsletter - 0

TRAFFIC SIGNAL TIMING A BIBLIOGRAPHY

- UNIV OF CALIF , 1983 20 1
Agency - 19 Subject - 10 Newsletter - 0

TRAFFIC SIGNAL TIMING --BEFORE AND AFTER STUDIES: A BIBLIOGRAPHY
- UNIV CALF , 1983 6 1
Agency - 19 Subject - 10 Newsletter - 0

TRAFFIC STRIPE REMOVAL

- FHWA , 1980 60 1
Agency - 6 Subject - 16 Newsletter - 0

TRANSIT MANAGEMENT WORKSHOP

- UNIV WIS , 1982 5 1
Agency - 1 Subject - 1 Newsletter - 0

TRANSIT SUBSIDY ALLOCATION TECHNIQUES

- THE OMEGA GROUP INC. WASH DC, 1983 31+ 1
Agency - 24 Subject - 1 Newsletter - 0

TRANSIT WORKS: 10 RURAL CASE STUDIES

- IND DOT , 1982 100 1
Agency - 24 Subject - 1 Newsletter - 0

TRANSPORTATION ENERGY CONTINGENCY PLANNING: QUANTIFYING THE NEEDS FOR TRANSIT ACTIONS
- NY DOT , 1983 111 1
Agency - 24 Subject - 21 Newsletter - 0

TRANSPORTATION ENERGY PLANNING: TRANSIT FUEL SUPPLIES UNDER DECONTROL
- CABOT CONS GROUP WASH DC, 1982 38 1
Agency - 24 Subject - 21 Newsletter - 0

TRANSPORTATION ENERGY MANAGEMENT: CURRENT TRANSIT OPERATOR ACTIVITIES
- METRO SEATTLE, 1982 24+ 1
Agency - 24 Subject - 21 Newsletter - 0

TRANSPORTATION ENERGY MANAGEMENT: TRANSIT OPERATOR FACILITIES VOL. 1 OFFICE GUIDE
- METRO SEATTLE, 1982 36 1
Agency - 24 Subject - 21 Newsletter - 0

TRANSPORTATION ENERGY MANAGEMENT: TRANSIT OPERATOR FACILITIES VOL. 2 FIELD GUIDE
- METRO SEATTLE, 1982 105 1
Agency - 24 Subject - 21 Newsletter - 0

TRANSPORTATION OF HAZARDOUS MATERIALS

- PUBLIC TECH WASH DC, 1980 50 1
Agency - 17 Subject - 3 Newsletter - 0

TRANSPORTATION NEEDS AND PROGRAMS SUMMARY
- PUBLIC TECH INC., 1982 283 1
Agency - 24 Subject - 4 Newsletter - 0

TRANSPORTATION SYSTEMS MANAGEMENT IMPLEMENTATION AND IMPACTS
- CASE STUDIES US DOT, 1982 300+ 1
Agency - 24 Subject - 1 Newsletter - 0

TRANSPORTATION SYSTEMS MANAGEMENT
IMPLEMENTATION AND IMPACTS
- FINAL REPORT US DOT, 1982 115 1
Agency - 24 Subject - 1 Newsletter - 0

TRANSPORTATION WORKPLACE SURVEY

- NAT ANALYSTS , 1981 300+ 1
Agency - 15 Subject - 4 Newsletter - 0

TRENDS BEFORE THE SAN DIEGO TROLLEY

- SAN DIEGO , 1982 176 1
Agency - 1 Subject - 1 Newsletter - 0

UPGRADING DEFICIENT THROUGH TRUSS BRIDGES

- SHELADIA ASS. MD, 1983 122 2
Agency - 6 Subject - 12 Newsletter - 4

USER-SIDE SUBSIDY PROGRAMS FOR SPECIAL
NEEDS TRANSPORTATION
- UMTA , 1983 97+ 2
Agency - 1 Subject - 1 Newsletter - 0

VALUE ENGINEERING STUDY OF DRAINAGE
MAINTEANCE
- FHWA , 1982 19+ 1
Agency - 6 Subject - 13 Newsletter - 0

VEHICLE MAITENANCE PRACTICES AMONG GRANTEES

- WASH DOT , 1981 27+ 1
Agency - 24 Subject - 1 Newsletter - 0

WAGE SURVEY OF ROAD AND STREET EMPLOYEES
IN INDIANA COUNTIES AND CITIES-1984
- PURDUE UNIV , 1984 34 1
Agency - 8 Subject - 24 Newsletter - 0

WHAT HAPPENS WHEN YOUR PROPERTY IS NEEDED
FOR A FEDERAL-AID HIGHWAY
- GA DOT , 1980 20 1
Agency - 15 Subject - 28 Newsletter - 0

WILDLIFE CONSIDERATIONS IN PLANNING AND
MANAGING HIGHWAY CORRIDORS
- US DEPT OF INTERIOR , 1982 93 1
Agency - 6 Subject - 27 Newsletter - 0

WORK ZONE TRAFFIC CONTROL

- FHWA , 1980 77+ 1
Agency - 6 Subject - 2 Newsletter - 11

WORLD'S FAIR TRANSPORTATION SYSTEM
EVALUATION 1982
- TENN DOT , 1982 174 1
Agency - 1 Subject - 1 Newsletter - 0

YOUR RIGHTS AND BENEFITS
AS A HIGHWAY DISPLACEE
- OFF. OF ROW , 1981 46 1
Agency - 6 Subject - 28 Newsletter - 0

APPENDIX B

RIGHTS-OF-WAY SEMINAR STATISTICS

RIGHTS-OF-WAY ACQUISITION AND RELOCATION SEMINAR

SUMMARY STATISTICS

STATISTICS ON THE COUNTIES AND MUNICIPALITIES REPRESENTED

DISTRICT OFFICE	# OF PARTICIPANTS	# OF CITIES REPRESENTED	# OF COUNTIES REPRESENTED
Gainesville	39	13	10
Tennille	47	18	15
Thomaston	66	12	16
Tifton	62	14	12
Jesup	61	21	16
Cartersville	34	10	8
Atlanta	54	12	6
TOTAL	363	100	83

The following tally is a summary of the 282 returned questionnaires. Copies of the completed questionnaires are available from the Technology Transfer Center upon request.

QUESTION	RESPONSE		
	YES	NO	COMMENTS
1 - Did the seminar speakers present the material in an understandable form?	277	5	
2 - Were you the most appropriate person from your agency to attend?	242	40	
3 - Will the information presented at this seminar be beneficial to your agency?	278	4	

EVALUATION QUESTIONS

Enclosed is a copy of the questions

QUESTION	% WRONG	% RIGHT
1 -	9	91
2 -	3	97
3 -	24	76
4 -	24	76
5 -	3	97
6 -	24	76
7 -	2	98
8 -	2	98
9 -	16	84
10 -	3	97

A - NUMBER OF RESPONSES	B - NUMBER OF MISTAKES	A * B
90	0	0
89	1	89
33	2	66
25	3	75
5	4	20
3	5	15
1	6	6
SUM = 246 RESPONSES		SUM = 271 MISTAKES

AVERAGE NUMBER OF MISTAKES PER RESPONSE = 271/246 = 1.1

APPENDIX C - NEWSLETTERS

TECH TRANS

SCHOOL OF CIVIL ENGINEERING
GEORGIA INSTITUTE OF TECHNOLOGY
A UNIT OF THE UNIVERSITY SYSTEM OF GEORGIA

TECHNOLOGY TRANSFER CENTER VOL 3 NO.1 WINTER 1985

EDITOR'S NOTE

TRAFFIC DATA COLLECTION EQUIPMENT AVAILABLE

As part of the Rural Technical Assistance Program (RTAP), the Georgia Tech's Technology Transfer Center has received a grant from FHWA to purchase traffic data collection equipment for local agency usage. The Center is now in the process of selecting the type and number of traffic counting equipment to be purchased.

If your agency is planning to install a signal, erect a stop sign, or perform any traffic engineering study, you are encouraged to contact the Center and request the necessary traffic data equipment. We will carry the equipment to your location, train you on setting it up, and give you instructions on how to use it. You can keep the equipment for one or two weeks while you collect the data that you wish. We will then return to pick up the equipment and retrieve the collected data.

Georgia Tech has also received third-year funding for the Technology Transfer Program. We hope that your agency will take advantage of the services offered by this Center during the upcoming year. The success of the Center depends on how much use you make of it. If you should have any problem or need any assistance, please do not hesitate to contact us and we will be happy to discuss your problem and do our best to help you.

The Center is currently planning workshops for the upcomimg year. When plans are finalized, you will be informed of the subjects, dates, and locations for each of the workshops.

OVERLAYS FOR PLAIN CONCRETE PAVEMENTS

The rehabilitation of Portland Cement Concrete (PCC) pavements has become a concern to many agencies during the last few years. Resurfacing these pavements is one of the rehabilitation options. There are a number of questions concerning resurfacing plain jointed concrete pavements such as type of overlay, thickness of overlay, repair of the existing pavement, and joint reflection problems. In 1975 the Georgia DOT initiated a research project to determine a cost effective overlay design and treatments for jointed concrete pavements.

Four concrete and 16 asphalt overlay sections were placed on I-85 north of Atlanta in 1975 and 1976, respectively. The traffic on the test area consisted of about 19,000 vehicles per day with approximately 30% heavy trucks. The concrete overlay sections consisted of 3 inch, 4-1/2 inch, 6 inch continuously reinforced concrete (CRC),

OVER

FROM PAGE 1
and 6 inch jointed PCC with 15 ft. and 30 ft. joint spacing. The variables in the asphalt overlay sections were the overlay thickness (2 inch, 4 inch, and 6 inch) and the treatments for reduction of reflective cracking which included two geotextiles and strips of a water-proofing membrane placed over the joints for each overlay thickness. An Arkansas base test section was also included in the experiment. Two control sections were also placed with each overlay thickness with edgedrains being included in one of the control sections.

Performance evaluations were conducted on the test sections on a periodic basis from 1975 to 1984. Deflection measurements were made during the early stages of the project. Visual condition surveys including mapping of reflective cracking and rutting surveys were continued for the 8 year period.

The results of the performance of the test sections are as follows:

Concrete Overlays

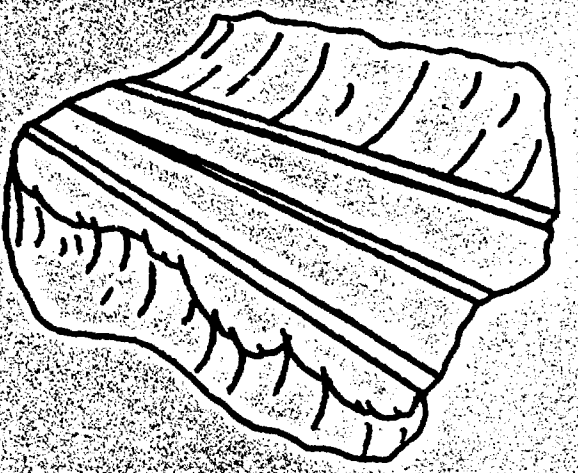
Multiple cracking in the CRC overlay will occur over the existing joints if the existing slabs are not stabilized. All early distress found on the 3 inch CRC section occurred over old joints. The 3 inch CRC section was removed in 1983 due to unsatisfactory performance with multiple transverse cracking occurring over every joint and numerous punch-outs where longitudinal cracking connected the transverse cracks.

The 4-1/2 inch CRC section could give acceptable performance for up to 10 years with some maintenance. It is believed that this design could be used successfully on sections with moderate traffic levels, no major structural problems and proper preparation of the existing pavement.

Both the 6 inch jointed non-reinforced and 6 inch CRC are performing well to date. Transverse cracking that is occurring on the plain overlay section is attributable to problems encountered during construction with the dowel basket assemblies.

Asphalt Overlays

The fabrics and the waterproofing membrane did reduce the rate of reflective cracking in both the 2 inch and 4 inch overlays as compared to the control sections. The rates of cracking are slightly less for the fabric treatments than for the control sections. The best performance with respect to reduction in reflective cracking was obtained with the strips of waterproofing membrane. This material consists of a woven fabric with a rubberized-asphalt backing. When reflective cracking did occur in the asphalt overlay, cracks over joints with the membrane treatments appear to stay tighter than cracks over joints which received no treatment.



Rutting in asphalt overlays over concrete pavements is a major problem in Georgia. It was noted that the rutting in the Arkansas base test section was considerably less than the rutting levels measured in the other test sections. The smaller rut depths can probably be attributed to the presence of the large size aggregates and the ability to absorb the high load induced vertical stresses. No advantage was noted for the Arkansas bases with respect to reducing reflective cracking as compared to the other treatments.

All the aspnalt test sections are still performing well from a serviceability standpoint and the reflective cracking has not yet caused a maintenance problem. Milling of the asphalt surface has been necessary to reduce rutting. The placement of edgedrains along the outside edge of the pavement prior to placing an overlay has not shown any positive effects on the overlay performance. A detrimental effect was noted on the 6 inch asphalt concrete (AC) section where the occurrence of reflective cracking is more severe for the section with edgedrains than for the other control section or the fabric treated sections.

Implementation

As a result of the performance of the test sections, Georgia early on decided to use strips of waterproofing membrane under asphaltic concrete overlays. The purpose is to reduce the rate of reflective cracking and to prevent the intrusion of surface water under the concrete pavement if reflective cracking did occur. It was also noted that proper preparation of the existing concrete pavement must be done including structural repairs and stabilization of slabs with excessive vertical movements at the joints in order to obtain maximum performance of the joint treatments.

A report has been prepared documenting the construction and the performance history of the test sections. The report is currently under review by the Georgia DOT and the Federal Highway Administration and will be available once the review process has been completed. For more information, contact Wouter Gulden at (404) 363-7583 or GIST 227-7583.

From GDOT Research Newsletter, Fall 1984.

* The U.S. highway fatality rate in 1983 was the lowest on record, according to preliminary analysis by the National Highway Traffic Safety Administration. NHTSA reported 2.7 deaths per 100 million vehicle-miles of travel. The fatality rate has declined in most years since 1966 when it peaked at 5.5 deaths per 100 million vehicle-miles.

* Almost $8.5 billion in FY 1985 Federal-aid highway funds were appropriated to the States by the Federal Highway Administration. This figure includes:

Interstate 4R work - $2.758 billion
Primary system - $2.317 billion
Bridges - $1.532 billion
Urban systems - $788 million
Rural secondary system - $640 million
Safety construction - $386 million

* "Pothole patching is done year round in Denver," explains John Mrozek, Denver's Public Works Department Manager. Cold, wet weather accelerates pothole formation, and the "pothole roundup" increases the Public Works Department's awareness of pothole locations so that patching can be accelerated. Special recognition is awarded those who report "stray" potholes on the 24-hour Denver Pothole Hotline. Hotline callers should provide detailed pothole location information. Each pothole reported will be evaluated for severity and repaired on a worst-first basis. Once the pothole has been rounded up and branded with a fresh patch of asphalt, the caller receives a special Denver Pothole Roundup certificate from Mayor Pena and Public Works Manager John Mrozek.

APWA Reporter, Nov. 1984

* In the final days before adjournment, Congress approved a measure that protects local governments and their officials from monetary damages resulting from antitrust suits. Both the Senate and the House unanimously approved the Local Government Antitrust Act of 1984, which extends protection to local governments, school districts or special function government units established by law. The bill also exempts officials and employees of local government as well as private parties acting under the specific direction of a local government. Cases already pending are excluded from protection.

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WINTER POTHOLE PATCHING

Repairing potholes during the winter season is extremely difficult. Problems of weather conditions and wet holes are compounded by the unavailability of hot mix asphaltic patching material. Because plants usually close from mid-November until May, street maintenance personnel are faced with patching potholes with less than desirable cold pre-mix asphatl material.

To fill this critical material need, many small communities are turning to commercial pre-mix patching materials sold in 5-gallon containers. These patching products vary greatly in quality and are extremely expensive. Per ton costs can run as high as $300 to $500.

To reduce the cost, small communities can combine their needs for cold mix patch material and order from a single supplier. Cold mix patch material prepared in a conventional hot mix plant markets for approximately $30 per ton, depending on quantities received.

When purchasing cold mix materials, the street maintenance superintendent should look for these key properties.

Workability. The mixture should be sufficiently workable for placement with shovels, rakes, or other hand tools. It should readily compact by hand tamping, hand or power rolling, or under the action of traffic at temperatures as low as 15°F. The mix should remain workable over a period of at least 6 months in a stockpile.

Stability. The mixture should remain in place when used to patch wet or dry pavements and should be stable under normal traffic loads.

Asphalt Binder. The asphalt binder used in the aggregate mixture should be formulated with characteristics required to produce a mixture with workability, water resistance, compaction, and stability properties mentioned.

Typically, liquid asphalt binders are used for winter patch materials. These binders are formulated with petroleum distillates to prevent freezing of stockpile mixtures. Asphalt contents of cold mix materials are high, averaging 7 percent. The increase in asphalt content for winter materials aids workability, density, and water resistance for cold weather applications. For cold mix materials, both MC and SC cutback asphalts are used. However, Des Moines has been very successful when using emulsified asphalt CMS-2 conforming to ASTM2397.

Aggregate. The aggregate mix formula should be open graded and low in fines. The open gradation will decrease the structural stability, but will greatly increase the winter workability. A well tested gradation exhibiting the necessary characteristics for winter patch material is as follows:

Sieve Size	Percent Passing Min.	Max.
1/2 in.	100	
3/8 in.	90	100
#4	30	65
#8	14	30
#30	6	18
#200	1	5

John Bellizzi, P.E., Director of Public Works, Des Moines. From Roads, Bridges, and Transit Technology News, Local Transportation Information Center, Nebraska Edition, 1984.

HOW TO DRIVE YOUR CITY ATTORNEY CRAZY

It may be that your city attorney is already insane , and you will not require the advice which follows. To determine the sanity of your counselor-at-law, one should carefully observe him/her/it during the next discussion of your city's dog ordinance. After three or four hours of discussion, glance over in his direction and observe the expression on his face. If he appears to be grinning wildly, you can conclude that either he just remembered his compensation is based upon the hours he spends on city business, or he is truly insane.

Assuming that following your investigation you determine that your attorney needs

assistance from you to reach the Land of Eternal Bliss, we offer the following suggestions:

1. If you are holding regular conferences with your attorney, stop doing so at once.
2. Call him/her at least once each day on minor problems.
3. Never accept a statement from his/her secretary that he/she is in conference.
4. Once you have started the attorney on a project, do not inform him/her of changes.
5. Do not tell your lawyer what you are going to do; always tell him/her after it has been done.
6. Always tell the newspaper and TV what you have done and why, before you tell the attorney.
7. Do not keep your files.
8. Always consult other legal sources.
9. Demand his/her opinion at public meetings.
10. Slant the facts.
11. Answer legal questions yourself.

Although the above suggestions are not exclusive (surely you can think of 20 or 30 more), this should allow you to get started. If you keep in mind your goal to drive your attorney insane, you should succeed within six months.

If you need additional information on any of the above suggestions, call us right now.

Note: This article was reprinted from Municipal Maryland.

MAINTENANCE TIPS

UNPAVED SHOULDER REPAIR

RESHAPING SHOULDERS

When rutting, corrugations, or ridges occur on an unpaved shoulder, the reshaping of the shoulder becomes necessary. Ruts, corrugations, and ridges in earth shoulders are caused by erosion/or improper compaction of the shoulder material. These deficiencies are normally found in shoulders with slopes greater than 5:1 and in shoulders that have little or no ground cover to prevent erosion. Corrugations may show up in newly reconditioned shoulders within 6 months after construction. Initial ruts, corrugations, and ridges are not a severe deficiency. However, if they are allowed to remain they will create drainage problems that may result in areas of low shoulder and hazardous driving conditions for vehicles.

Crew required:

Equipment operator	1
Laborers	2
Flagmen	1

Equipment required:

Motor grader	1

Material required:

None

Repair procedure:

1. Place signs and other safety control devices.
2. Remove roadway signs and mailboxes from shoulder to be repaired.
3. Cut high spots with motor grader, pulling material toward the roadway.
4. Blade the material back onto the shoulder making sure all low spots are filled. Make certain the new shoulder is level with the adjacent pavement and sloped toward the ditch to permit drainage of water.
5. Roll with motor grader wheels to compact loose material.
6. Replace signs and mailboxes.
7. Clean up area and remove signs.

RECONDITIONING SHOULDERS

When unpaved shoulders are high, low, or narrow, they should be repaired by reconditioning the shoulder.

High shoulders are those in which the shoulder surface is higher than the adjacent pavement, preventing pavement drainage. They are caused by buildup of vegetation along the shoulder or improper drainage of shoulder allowing the buildup of earth.

A low shoulder is one where the surface of the shoulder is below the surface of the adjoining pavement. It is caused by a build up of the pavement surface and settlement or

erosion of the shoulder. Often pavements are overlaid causing a rise above the shoulder equal to the depth of the overlay. This condition creates a safety hazard for the driver. Low shoulders may also result in wide gaps at the pavement-shoulder joint, allowing water to penetrate into the subgrade and cause edge or alligator cracking.

Narrow shoulders are those which are too narrow to permit a vehicle from pilling completely clear of the roadway (less than 8 feet wide). Most narrow shoulders are the result of insufficient width of right-of-way at time of construction or decrease of shoulder width due to widening of the pavement. Narrow shoulder can also result from inadequate side ditch design leading to erosion of the shoulder. Narrow shoulders are not a serious deficiency as long as a minimum shoulder width of 4 feet is maintained at all times and areas 8 feet wide are provided at intervals of every one-half to one mile.

Crew required:

Equipment operators	2
Truck drivers	2-4
Laborers	2
Flagmen	2

Equipment required:

Dump trucks	2-4
Roller	1
Motor grader	1
Front end loader	1

Material required:

Gravel or imported borrow

Repair procedure:

1. Place signs and other safety devices.
2. Remove roadway signs and mailboxes on shoulder.
3. Cut shoulder wedge approximately 4 inches deep at pavement edge and slope to desired shoulder width (8 foot minimum if right-of-way available, 4 foot absolute minimum).
4. Work material cut from shoulder back into wedge. If additional material is required, spread material from truck and work in with motor grader. If excess material at shoulder, remove and haul away.
5. Shape shoulder with motor grader to conform with roadway and slope toward ditch.
6. Roll as required for proper compaction.
7. Replace roadway signs and mailboxes.
8. Clean up area and remove signs.

HANDLE COMPLAINTS EFFECTIVELY

You are part of the 'frontline troops'--possibly the only personal contact citizens will ever have with the government. Citizens may have a low opinion of government employees and government in general. When they have a problem and no one will fix it, by the time they get to you, they are apt to be hostile--your skill in handling their problem may confirm and change their perception of their local government.

Defusing the Confrontation

1. Greet the complainant with a smile and a friendly handshake.

2. Tell the citizen as quickly as possible that you want to work with him or her to solve the problem. This will move the conversation onto a constructive basis and away from anti-government or individual attacks.

3. Ask the complainant to move with you to a quiet location where you can talk uninterrupted.

4. Ask the complainant to tell you about the problem.

5. Listen to what the complainant has to say. By listening--not just hearing--you begin to put the complainant's problem into perspective and questions start to formulate in your mind.

6. Do not interrupt the complainant at this point. Mentally set a reasonable time limit and let the complainant tell his or her whole story wihout interruption. Anything you say while the citizen is venting may just provoke more anger.

7. Note your body language--hands loose or folded, not crossed over chest; body leaning a little forward.

8. Compensate for mental lag time: people talk at 150-200 words per minute; you think at 600-800 words per minute. Use the time constructively. Ask youself: (a) What is the main point? (b) What is the evidence? (c) Is this reasonable to me? (d) Is complainant giving source of information? (e) Are there alternatives? (f) Is this consistent with my past experience?

9. Be aware of filtering and distortion. (a) Don't discount bits of information. (b) Don't magnify beyond the speaker's intent. This is most likely to happen when the person talking is threatening or hostile. (c) Don't attach additional information or meaning to what the speaker has said.

10. Watch for signs that the complainant is winding down.

Taking Charge

1. Express your concern and your understanding of the complainant's frustration. Tell him or her you are sorry he or she has this problem. State that you will work with them toward a solution.

2. As the person calms, begin to ask questions. This will force the complainant to organize his or her thoughts, put you in control, and give you information you nee to address the problem.

3. Be sure you ask the six questions every good investigator asks--who, what, when, where, why, how.

4. Use active listening skills and give the complainant time to fully respond to each of your questions. Paraphrase his or her statements, asking "Is that right?" or "Is that correct?" and give the complainant opportunity to respond. When you and the complainant have agreed on a definition of the problem, ask what he or she seeks in terms of a solution. Paraphrase again to be sure you understand.

Do not make any commitment or promise at this point.

Do not make any statement about fault.

Do not agree with complainant about the cause of the problem or any responsibility for its remedy.

You have reached an agreement on the complainant's perception of the problem and what he or she thinks the solution should be.

Closing the Discussion

1. Tell the complainant you need either to research the problem further or to discuss the problem with your boss or staff.

2. Do tell the complainant a time when he or she will hear back from you. Then CALL BACK even if you have not yet reached a decision. Failure to call back typically results in the complainant seeking help further up the chain of command, and then you will be complained about along with the original problem.

What to Say When the Answer is 'No'

1. In person, in a letter or on the phone, state what the problem and request were.

2. State specifically the research you did and the law, administrative guideline, policy, procedure or budget constraint that was the basis for your negative decision. Do not apologize for the rules.

3. Do tell the complainant of any appeal process available. Do state that you are sorry you could not help and that you wish you could have.

4. If the complainant wants to talk to the boss, refer him or her graciously.

5. Recognize that saying 'no' to a citizen is one of the hardest jobs that you have.

Give yourself a pat on the back for a job professional and well done. Recognize that you cannot 'win them all,' and that you are not expected to win them all.

CONTINUED PAGE 11 COL.2

PUBLICATIONS

TAMPA SYMPOSIUM HIGHLIGHTS
UTPS Technical Briefs
November 1984

Includes highlights of the UTPS Users' Forum held in Tampa, Florida May 29 to June 1, 1984. This document is a record of the discussions which were not limited to just UTPS related matters, but also covered such topics as microcomputer usage and organizational responsibilities. The first section gives the reader an overview of Florida's own planning philosophy. The second section is more technical and deals with both microcomputer and UTPS programs. The third and final section is composed of discussions of administrative and organizational concerns.

Three new documents related to topics discussed at this forum are available from UMTA's office of Technical Assistance. They are:

1. Addressing Organizational issues; Microcomputer selected readings, Volume 3; September 1984.

2. Software and Source Book; Microcomputers in Transportation; February 1985.

3. UTPS Highway Network Development Guide; January 1983.

To obtain any of these reports, send a self-addressed gummed label to:

UMTA Support Group
c/o Price, Williams & Associates
962 Wayne Avenue, Suite 500
Silver Spring, MD 20910

PROCEEDINGS OF THE TRI-REGIONAL PAVEMENT REHABILITATION CONFERENCE

On May 14-15, 1984, the FHWA and State highway agencies in regions 4, 6, and 7 sponsored a pavement rehabilitation conference in Oklahoma City, Oklahoma. The program featured presentations and workshops on the total distress and rehabilitation program for both concrete and asphalt pavements. A concrete pavement rehabilitation field demonstration showed joint surface repair, underseal ing, full and partial depth slab repairs, slab replacement and surface grinding. The conference also included a demonstration of automated pavement data collection equipment and a discussion of State pavement evaluation techniques. For a copy of the proceedings, contact Mr. Randy McDonald, FHWA, 819 Taylor Street, Fort Worth, Texas 76102, or call (817) 334-4356.

The following publications are available through the National Technical Information Service, Springfield, Virginia 22161.

RAISE PAVEMENT MARKERS AT HAZARDOUS LOCATIONS
Report No. FHWA-TS-84-215
December 1985

In an effort to evaluate the effectiveness of the raised pavement markers at hazardous locations, the Office of Implementation of the Federal Highway Administration initiated a field evaluation study. This Tech Share report summarizes the results of this study plus a similar HPR study conducted by the Connecticut Department of Transportation. The general consensus was that the use of raised pavement markers at hazardous locations did enhance the delineation and improve the overall safety. At some test sites there was a noticeable increase in the number of accidents and an improvement in the driver operating parameters (speed, lateral placement, etc.). However, at other locations the results were statistically insignificant. Although the use of raised pavement markers provides a valuable guidance system, it should not be construed as a "cure-all" for reducing the potential hazards at all locations.

IMPROVED FABRICATION AND INSPECTION OF WELDED CONNECTIONS IN BRIDGE STRUCTURES
Report Number FHWA/RD-83/006

This 111-page report consists of two parts: Part A describes the optimization and the application of acoustic emission monitoring to the in-process detection, loca-

tion, and characterization of flaws in welded connections for highway bridges. The microprocessor-based acoustic emission monitoring system developed by GARD, Inc. was fabricated and tested in the laboratory on various intentionally induced flaws, in welds which simulated typical highway bridge welded connections. These tests demonstrated the effectiveness of the method, allowed acoustic emission signal processing parameters to be optimized for typical bridge welds, and acoustic emission monitoring application guidelines to be developed. In addition, the Acoustic Emission Weld Monitor was given a brief evaluation in a bridge fabrication shop. Part B contains the results of various property evaluations using steels commonly employed in bridge construction. A variety of welding techniques were considered.

STATE-OF-THE-ART IN ASPHALT PAVEMENT SPECIFICATIONS

Report Number FHWA/RD-84/075

A comprehensive research and development program was begun to use statistical methods for quality assurance in highway construction. The effort since has resulted in quality control and acceptance plans which are used in specifications to some degree by more than 30 States. This report describes performance-related specifications based on distress modes and contributing factors. The report also summarizes the problem of reflective cracking, its contributing factors, and methods of overlay design and special treatments to prevent or minimize this form of distress condition.

OTPA PUBLICATIONS

The documents listed below are some of U.S. DOT Office of Technology and Planning assistance (OTPA) publications which should be of particular interest to rural and spacialized operators.

The 6th National Conference on Rural Public Transportation, November 1983. Summarizes all of the sessions and workshops of the conference and provides the text of papers actually presented, together with a complete list of conference participants.

The role of Rehabilitation in Transit Fleet Replacement, March 1983. Prepared originally by the Puget Sound Council og Governments, it describes how life-cycle costing techniques can help choose between rehabilitation of older vehicles or procurement of new ones in transit and paratransit operations.

Transportation for Elderly Americans: Issues and Options in the Decade of the 1980's, April 1983. Overview of the demographic and economic trends which will affect the planning of rural and specialized systems in the near future.

To obtain copies of the above reports, send a self-addressed mailing label to Office of Technology and Planning Assistance, (I-30), c/o Office of Intergovernmental affairs, 400 7th Street, SW, Room 9402, Washington, DC 20590.

Available free from the Technology Transfer Center:

PAVEMENT AND SHOULDER MAINTENANCE PERFORMANCE GUIDES

Report No. FHWA-TS-84-208

August 1984

Two Technology Transfer workshops on the maintenance of shoulders and pavements were hosted by the Region 8 Office of the Federal Highway Administration. This document includes performance guides developed in those workshops for seven maintenance activities. Each guide outlines the procedures, expected performance, equipment, materials, crew sizes, and productivity levels for each item of work. The guides will be useful to both State and local maintenance personnel as a handy state of the art reference.

PRACTICAL GUIDELINES FOR MINIMIZING TORT LIABILITY

Transportation Research Board

December 1983

This document reports on various practices, making specific recommendations where appropriate. It will be of special interest to transportation administrators;

designers; construction, operations, and maintenance engineers; attorneys; and others concerned with minimizing tort liability. Guidelines are presented for reducing the risk of legal liability in transportation activities. Discussions of the following topics are included:

- Legal duty and liability
- Reducing the risk of liability: Pre-accident actions
- Reducing the risk of liability: Post-accident actions
- Preparation for trial
- Developing an effective loss-mitigation program
- Action guidelines for minimizing tort liability

MASTERING TRAFFIC ENGINEERING
MTMC Pamphlet 55-16 Volume III

The need to reduce rush-hour traffic congestion on Department of Defense installation roadways has been apparent for some time. A more recent and, at this time, more critical need is to conserve energy. Therefore, the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) has prepared a 3 volume pamphlet. This volume presents ways to clear up common traffic bottlenecks that result in wasted gasoline. Planners and engineers must see this report if they like to reduce traffic congestion and gasoline consumption by getting the maximum service from existing roadways.

HYDROLOGY
Report Number FHWA-IP-84-15

This manual provides a synthesis of practical hydrologic methods and techniques to assist the highway engineer in the analysis and design of highway drainage structures. The manual begins with a discussion of descriptive hydrology, the surface runoff process and hydrologic data with emphasis given to the highway stream-crossing problem. Some of other topics covered are:

- Frequency distributions for estimating peak flows
- USGS regional regression equations
- Techniques for developing design storms and design hydrographs
- The Muskingum method for routing of hydrographs in channels.

CONFERENCES SEMINARS WORKSHOPS

NORTH AMERICAN PAVEMENT MANAGEMENT CONFERENCE
March 18-21, 1985
Toronto, Canada

This 4-day conference is sponsored by the Ontario Ministry of Transportation and Communications (MTC) and the U.S. Federal Highway Administration (FHWA), in cooperation with the American Association of State Highway and Transportation Officials (AASHTO), Transportation Research Board (TRB), and Roads and Transportation Association of Canada (RTAC).

More than ever, wise investment decisions concerning the road system will be crucial to the future of highway transportation on the North American continent. The conference will emphasise practical applications of pavement management systems. Each session and workshop will endeavor to focus on: What the future issues are, how various concepts and methodologies can be applied within organizations, how change can be implemented incrementally, and what research and development initiatives are required.

Any questions concerning the conference may be addressed to: Dr. R. K. Kher, Ministry of Transportation and Communications, 1201 Wilson Avenue, 4th floor, West Tower Downsview, Ontario, Canada M3M 1J8, Telephone (416) 248-3066.

NATIONAL CONFERENCE ON MICROCOMPUTERS IN URBAN TRANSPORTATION
June 19-21, 1985 San Diego, CA

The National Conference on Microcom-

puters in Urban Transportation will feature presentations, panel discussions and exhibits on microcomputer activities which are presently in use or being considered in the urban transportation environment. The focus is on applications which will provide insights to others addressing similar problems in urban transportation.

The conference is organized into six major themes:

1. Microcomputer Implementation/ Management Issues
2. General Urban Transportation Applications
3. Traffic Engineering
4. Public Transportation
5. Urban TransportationPlanning
6. Transportation System Construction Design and Maintenance

Sessions have been structured to cover general subjects of widespread transferability across the entire urban transportation community (such as budgeting, personnel management, system procurement and installation), as well as applications of transferability to more limited segments of the industry, such as traffic engineering, public transport, transportation planning, transportation design and construction. Concurrent with the presentation sessions, individuals and organizations will be demonstrating their products and services in an exhibit area located adjacent to the presentation rooms.

For more information and registration forms, contact the National Conference on Microcomputers in Urban Transportation, c/o Elizabeth Yee, ASCE, 345 East 47th Street, New York, NY 10017-2398.

THIRD INTERNATIONAL CONFERENCE ON CONCRETE PAVEMENT DESIGN AND REHABILITATION

April 23-25, 1985 West Lafayette, IN

Held at the School of Civil Engineering of Purdue University, the conference will present the latest information on the economical and practical aspects of the design, performance, evaluation, structural rehabilitation and reconstruction of portland cement concrete pavements. Topic coverage will include highways, streets and airports; recent research will also be discussed.

The registration fee for the conference is $125.00 and will cover lunches, breaks, the banquet,and the conference proceedings. For more information on the conference contact Dr. Donn Hancher or Dr. Charles Scholar, Co-Chairmen, Third International Conference on Concrete Pavement Design and Rehabilitation, Civil Engineering Building, Purdue University, West Lafayette, Indiana 47907; Phone: (317) 494-2239.

REHABILITATION OF EXISTING BRIDGES

February 26-28, Forest Park, GA

The Technology Transfer Center at Georgia Tech and the Georgia Department of Transportation (GDOT) invite you to attend a free of charge workshop on the Rehabilitation of Existing Bridges.

Presented once in each FHWA region, the workshop is primarily for local personnel responsible for bridges on secondary highways and local roads.

The workshop will be held February 26-28, 1985 at the GDOT Materials and Research Laboratory. For hotel accommodation, contact the "Days Inn at the Farmers Market" at 488 Frontage road, Forest Park, Ga 30050, Phone (404) 363-0800. Rates start at $21.95 for single bedrooms. Do not forget to refer to the Bridge Rehabilitation workshop when making reservations.

If you wish to attend this workshop, please call the Technology Transfer Center as soon as possible - spaces are limited.

FROM PAGE 7

In summary, there will always be complaints. Handling complaints in a positive, constructive manner can improve the public's image of government, your work environment and agency productivity, and it will reduce stress for you and your employees.

Reprinted form Northwest Technology Transfer Center Bulletin, Winter 1985.

NEED ASSISTANCE?

NEED PUBLICATIONS?

NEED ANYTHING?

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TECHNOLOGY TRANSFER CENTER VOL 3 NO. 2 SPRING 1985

EDITOR'S NOTE

The Technology Transfer Center has ordered traffic data collection equipment to be used by local agencies in Georgia. The equipment, ordered from Streeter Amet, includes 25 data collectors that have the capability of collecting data on traffic volume, vehicle velocity, vehicle type and directional volume. The equipment is not difficult to operate and should be available for use soon. You will be trained on the use and handling of the equipment when it is delivered to you. You will also be assisted in selecting locations for data collection. If you need more information on this loan program or if you need to use data collection equipment, please call us at (404) 894-2360 or 1-800-282-1275.

The Center is planning a Roadway Maintenance workshop to be held by request from local agencies. When the course is ready, you will be notified so that you may request to hold one at your location. Neighboring counties and cities will be invited to attend.

Finally, workshops in Tort Liability, Office Applications in Microcomputers, and City Street Maintenance are also under preparation.

- At the recent annual meeting of the American Association of State Highway and Transportation Officials (AASHTO), Mr. Lester P. Lamm, Deputy Federal Highway Administrator, received the George S. Bartlett Award for 1984. The Bartlett award is the highest honor the highway community can bestow upon an individual for outstanding service on behalf of America's highway transportation system.

Established in 1931 to honor the memory of America's highway advocate George S. Bartlett, the award is sponsered jointly by AASHTO, the American Road and Transportation Builders Association (ARTBA), and the Transportation Research Board (TRB) of the Natinal Research Council.

- During the same meeting, Richard P. Braum, Commissioner of the Minnesota Department of Transportation, was elected president of AASHTO. Braum , who has been with the

Continued Page 5 Col. 2

CONTROL OF SIX COMPACTION VARIABLES

Six primary asphalt compaction variables can be controlled during the rolling process:

1 - Roller speed
2 - Number of roller passes
3 - Rolling zone
4 - Roller pattern for all rollers
5 - Vibration frequency
6 - Vibration amplitude for vibratory rollers

ROLLER SPEED

The faster the roller passes over a particular point in the new asphalt surface, the less time the weight of the roller "dwells" on that point. This in turn means that less compactive effort is applied to the mixture.

Typically 2.5 miles per hour is accepted as the maximum speed that a roller should travel. Varying the speed of the compaction equipment merely causes variations in density.

NUMBER OF ROLLER PASSES

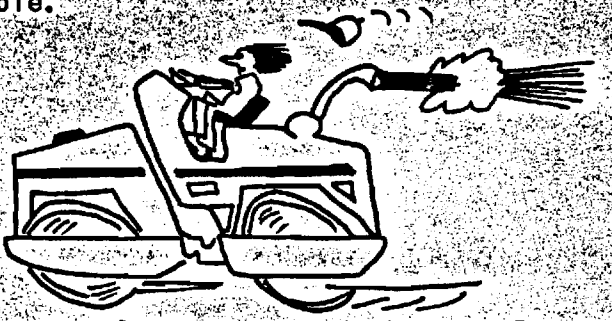
To gain the target air void content in an asphalt mixture. It is necessary to roll over each point in the pavement mat a certain number of times. The actual number of passes depends on many variables. The type of compaction equipment is one very important consideration. Three-wheel steel rollers have different compaction capabilities than tandem steel-wheel rollers, than pneumatic tire rollers, than single or double-drum vibratory rollers.

To determine the minimum number of roller passes needed to achieve proper density levels, a test strip should be constructed at the start of any major paving project. In addition, roller passes should be distributed uniformly over the width and the length of the mat.

ROLLING ZONE

Compaction must be achieved while the asphalt cement viscosity in the mix is low enough to allow for reorientation of the aggregate particles under the action of the rollers. In other words, the mat must be hot for effective compaction.

Most engineers feel that the proper level of air voids must be obtained before the mix cools from laydown temperature to 175 F. To achieve this, the rolling zone-the distance the breakdown roller operates behind the paver-should be as short as possible.



SLOWER SPEEDS ACHIEVE GREATER DENSITY

ROLLER PATTERNS

Numerous compaction studies have shown that the middle of the paver pass width typically receives more compaction than the edges of the pavement.

If an adequate number of roller passes are provided on each edge of the lane being compacted, the density level in the center of the mat will always be more than enough to meet specifications. Roller patterns should be structured to assure proper compaction of the outside portion of each paver pass-the center will take care of itself.

For each roller employed on a project, the mat width can be divided by the width of the compaction rolls to determine the number of passes needed to cover each transverse joint in the surface. A tandem roller, 4.5 feet wide, would need to make at least three passes over a 12-foot-wide mat. A 5.5-foot-wide vibratory roller would also have to travel three times up or back to get full-width coverage.

VIBRATORY FREQUENCY

Frequency is measured as vibrations per minute (vpm). Most vibratory rollers have a range of frequencies available to the operator. With very few exceptions, the maximum frequency setting available should

be used. This rule of thumb allows for more compaction to be exerted by a given roller. Rarely should vibratory rollers be operated at a frequency setting under 2,000 vpm.

VIBRATION AMPLITUDE

The amplitude setting is important in obtaining the required density level as quickly and efficiently as possible.

Basically, the amplitude (impact height) used depends on the asphalt mix characteristics and on mat thickness. Greater compaction, or greater amplitude setting, is needed when a) the asphalt cement used in the mix is of higher viscosity or lower penetration; b) an angular or crushed aggregate is used in the mix; c) a coarse gradation is used rather than a fine gradation; d) a larger top size coarse aggregate is used in the mix; and e) a stiffer mix is produced--one containing a higher mineral filler content.

Layer thickness also determines the right amplitude setting. Thick lifts require greater amplitude than thin lifts. A high amplitude setting on a thin lift (less than 2 inches) will typically cause the vibratory roller to bounce, making it extremely difficult to obtain desired air void content levels.

For asphalt layers less than 1.5 inches thick, the vibratory roller should be operated in a static mode, without vibration. This prevents unnecessary crushing of the aggregate in the mix.

SUMMARY

To obtain the desired level of pavement density, a contractor can control four primary variables: roller speed, number of roller passes, rolling zone, and roller pattern. In addition, when vibratory rollers are used, two more factors come into play: vibration frequency and vibration amplitude.

All six variables must be recognized, understood, and continually monitored before the maximum compaction can be achieved with maximum efficiency.

Material for this article was obtained from an article by James A. Scherocman, P.E. that appeared in Better Roads, February 1985.

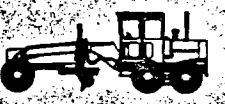
MODIFIED JERSEY BARRIER

The New York State Department of Transportation (NYDOT) has developed an improved method to protect motorists from collisions with roadside bridge piers. Ordinarily the state relies on guardrails to protect motorists from roadside hazards; however, in the case of massive fixed objects like bridge piers located close to the pavement, the guardrail protection is not sufficient to cushion the errant vehicle and gradually return it to the roadway.

A modified Jersey Barrier has been developed by NYDOT researchers as a low cost method. The solution was simply to extend a guardrail tube across the face of the jersey barrier past the bridge piers. The six-inch-square steel tube engages the side of the vehicle in severe impacts, which prevents the barrier from lifting the vehicle to contact the piers. The vehicle is still lifted up the sloped face of the barrier, but will not hit the immovable piers. The department has performed a number of tests to ensure safe performances of such devices.

It is anticipated that the new barrier system will see widespread use on older roadways as a multi-billion dollar effort begins to rebuild the state's transportation infrastructure.

IMPROVING



LONG TERM ASPHALT CONCRETE DURABILITY

As the highway reconstruction program gains national momentum the rush to lay new surfaces will effect the price of asphalt. Asphalt is cost sensitive to supply/demand, perhaps even more so than many other construction materials. Taking shortage factors into consideration, it is safe to assume that asphalt prices will continue to escalate. This will be in addition to expected long range increases in the price of all petroleum derived materials.

Improved refinery techniques and new innovative catalyst chemistry will allow the refinery to crack the heavy residual distillates that are now a major source of asphalt into higher profit products. Gasoline consumption will probably remain static as the more fuel efficient automobiles offset the projected national mileage increase of 2% per year. This will greatly influence the economics of refinery operations and could require that asphalt be manufactured as a more expensive primary product.

All factors considered it would be wise for all road building people to remind themselves and alert cost conscious government officials that the days of "cheap asphalt" are over.

This fact should not encourage you to rush to substitute other construction materials for asphalt. Asphalt is a very desirable road building material that has a good history behind it, and substitute materials will also experience major cost pressures. Ninety-three percent of the paved roads in the U.S. are asphalt. Asphalt lends itself to chemical improvement.

With the asphalt enhancement technique described in this article, the road building advantages of asphalt will be greatly enhanced, and its advantages over other road construction materials increased. You can use this advantage to lay the groundwork in your towns that will offset the very high future costs of road building and maintenance.

The best way to offset high future costs will involve upgrading and building more durable road surfaces today. Asphalt enhancement field tests have shown that specific additives extend the service life of asphalt when the asphalt is used with aggregate or by itself as a crack/joint sealer. These asphalt enhancers, while of course being more expensive, will more than justify their costs through more durable road surfaces and fewer maintenance repairs.

The burden will more clearly fall on the engineering and maintenance people to develop and communicate strong cost/performance arguments to support the higher initial raw material costs of asphalt enhancers in light of the longer term but very substantial savings that the town or state will realize. Road material choices must be made on a cost-performance basis in the same manner that any good business decision is made.

For good reason goverment decisions have recently become more cost/performance orientated. Proposals that would not have been listened to previously are now very carefully studied by the better financial people before monies are allocated. Highway departments are now more able to choose the more expensive materials options if they develop a clear cost/performance argument. This is good business and the towns that elect to proceed on this basis will reap the future benefits of lower road costs while inflation cannibalizes neighboring towns road maintenance budgets. If you believe as I do that road building raw material costs will continue to increase at a faster rate than inflation, and if you believe that labor costs are going to continue to escalate a minimum of 4 to 5% a year, the time has come to "bite the bullet" and specify road building materials on a cost/performance basis rather than "let's use the cheapest asphalt we can buy" basis.

The cost/performance basis of selecting improved materials requires a level of expertise among highway people that will allow them to properly argue for higher cost raw materials and an ability to show the return on the "investment."

How would you approach your officials to request 50% more raw material funds necessary to build a town road surface that will last at least twice as long as a standard non-modified asphalt surface and require one-third the maintenance attention and cost during its life span?

Assume a standard road project will cost your town a total of $100,000 and the standard raw materials will be 40% of that cost ($40,000). The cost of asphalt enhancers can increase the raw material costs by about 50% or $20,000. Therefore, a road with enhanced asphalt will cost $120,000 or 20% higher. Assume the expected road life of a standard road is 15 years and the modified road is conservatively projected out to 25 years (it should last longer). After 15 years your town will be digging up and replacing the unmodified $100,000 road for a cost of $317,216 (based on a cumulative inflation rate of 8%/year) while the road that cost about $20,000 more will still have many years life left in it. In financial terms that $20,000 investment for improved asphalt technology has delayed a town (or state) expenditure of $317,216 for at least 10 years. You can now take that $317,216 that you would be spending and invest it at 10%/year so when the time comes to replace the enhanced road (10 years later), the 10% accumulated interest on the $317,216 saved will be $505,560. That's quite a return on the initial $20,000 investment!!!

Of course, you will have to sit down with your engineering people and your cost people and develop numbers and projections that you feel comfortable with.

Among the many asphalt additives tested, rubber has been evaluated more extensively than most other additives and in numerous applications has been found to be very useful. Work with rubberized asphalt goes back many years and even includes road surfaces in Holland which were noted to have not been as seriously damaged by the invading German tanks as the non-modified asphalt road surfaces.

Work on rubberized asphalt continued and included work in virtually very state in the country. Its success and heavy usage is now apparent in areas of the country that experience very hot temperatures (i.e., Arizona). Northern states have been slow in recognizing the many advantages of rubberized asphalt, not the least of which is greatly improved low temperature flexibility and crack resistance.

The real world of today requires all the improvements we can apply to asphalt; the higher costs of these asphalt modifiers will be justified as the improved performance of the road surface becomes apparent through its lower maintenance costs and its longer life.

As you seek information regarding rubber modification of asphalt, please be aware that a very substantial data base already exists on this subject. You, as a person responsible for key decisions, should set up your own economic criteria and your own experimental pavements using the advice of knowledgeable experts so as to gain a hands on feel of rubberized asphalt.

Beware of the "snake oil peddler." This subject should be handled on its excellent technical merits and does not need any trickery to justify its usefulness.

From Technology Transfer, The University of Connecticut.

From Page 1

department since 1948, has been its head since 1979.

- According to the Highway Users Federation's annual state legislative forecast, 41 states plus the District of Columbia are expected to consider seat belt use laws in 1985. Only six states--Hawaii, Kentucky, Nevada, South Carolina, Utah and Wyoming--are not expected to take up the issue in 1985. Legislation to strengthen existing child restraint laws is slated for consideration in 15 states.

MAINTENANCE TIPS

DITCH REPAIR

CUTTING DITCHES WITH MOTOR GRADER

Ditches with steep grades or side slopes less than 3:1 are easily eroded and should be reshaped to ensure efficiency.

The principal causes of ditch erosion are steep side slopes and/or flow line gradients. The result is slope dederioration which may cut back the shoulder width. Ditch erosion can carry away soil around culverts and headwalls.

The severity of ditch erosion is minimal when detected early. If not corrected it will eventually result in shoulder deterioration and cause erosion around drainage structures.

The proper method for repairing of ditches requiring reshaping is with the use of a motor grader.

Crew required:

Equipment operators	2
Truck drivers	2
Flagmen	2

Equipment required:

Motor grader	1
Dump trucks	2
Front end loader	1

Material required:

None

Repair procedure:

1 - Place signs and other safety devices.
2 - Set blade on motor grader to proper slope.
3 - Cut ditch to proper depth and slope with motor grader. Work back slope first and then front slope, pulling excess material toward shoulder.
4 - Windrow excess material on shoulder. Assure proper shoulder height and slope.
5 - Clean around culverts and pipes by hand, backfill and compact as required to assure total coverage of pipe.
6 - Load excess material into trucks with front end loader (or belt loader). Haul to designated dumping site.
7 - Clean up area and remove signs.

CLEANING DITCHES WITH GRADALL

Ditches and culverts that fill up with sediment and debris inhibit proper drainage and cause rerouting of water.

Improperly designed side ditches many times allow residue or debris to settle out of runoff water. This is most often found in ditches with gentle slopes and in small culverts that trap the debris.

If ditches are cleaned on a continual basis, they do not present severe problems. If the debris is allowed to accumulate, the water may cut a new path and cause shoulder or pavement damage. The proper method of maintaining ditches in need of cleaning is to use a motor grader or gradall.

Crew required:

Equipment operator	1
Truck driver	2
Laborers	2
Flagmen	2

Equipment required:

Dump trucks	2
Gradall	1

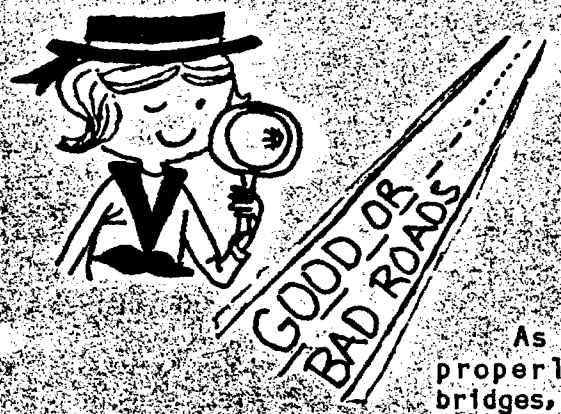
Material required:

None

Repair procedure:

1 - Place signs and other safety devices.
2 - Remove debris with gradall and load into trucks. Haul to designated disposal site.
3 - Re-establish ditch flow line with gradall.
4 - Clean area around culverts by hand. Remove all debris and backfill around pipe as required.
5 - Clean up area and remove signs.

RULES FOR GOOD ROADS



When properly built, roads could easily be maintained. To build a good road, certain rules should be followed. We shall call these rules the "TEN COMMANDMENTS FOR GOOD ROADS."

1 - Get WATER away from the road
2 - Build on a FIRM FOUNDATION
3 - Use the BEST SOILS available
4 - COMPACT soils well
5 - Design for WINTER MAINTENANCE
6 - Design for traffic loads and volumes
7 - Pave only those roads that are ready
8 - Build from the bottom up
9 - Protect your investment
10- Keep good RECORDS

CONSEQUENCES OF BAD ROADS

As a direct result of the failure to properly maintain existing roads and bridges, the nation may incur the following:

- Construction costs may as much as 160 percent higher if road improvements are put off rather than completed when the need arises.

- The nation consumes an additional 2-5 billion gallons of gasoline each year because of poor road conditions.

- By 1995, if road deterioration continues at the present rate, it will result in a 3.2 percent loss in the GNP, and 8 percent increase in the consumer price index, a 2.2 percent decline in employment, and a 5.9 percent decline in desposable income.

From Technology Transfer Quarterly, Florida A&M, Volume 1 No. 1.

REPLACING STOP SIGNS WITH YIELD SIGNS

Studies have shown that replacing STOP signs with YIELD signs can, in many instances, result in significant advantages without a change in the relative safety of the intersection. These advantages include: general improvement in traffic flow, a reduction in noise and air pollution, decreased fuel consumption, and, in some cases, a reduction in accidents.

There are of course some intersections where STOP signs are appropriate. The Manual on Uniform Traffic Control Devices lists four conditions where STOP signs may be warranted:

1 - At the intersection of a less important road with a main road where application of the normal right-of-way rule is unduly hazardous.

2 - On a street entering a through highway or street.

3 - At an unsignalized intersection in a signalized area.

4 - At other intersections where a combination of high speed, restricted view, and serious accident record indicates a need for control by the STOP sign.

If an intersection does not meet these conditions, a YIELD sign would probably be more effective. The Traffic Control Devices Handbook presents a graphical method for determining if a YIELD sign would be more appropriate. This method is based on sight distance and the Critical Approach Speed (CAS). Generally, a road with CAS of greater than 10 MPH would be controlled with a YIELD sign; a road with a CAS of 10 MPH or less with a STOP sign.

From Rural Technical Assistance Program Newsletter, Oklahoma State University, December, 1984.

PUBLICATIONS

AVAILABLE FREE
FROM
THE TECHNOLOGY TRANSFER CENTER

A basic Asphalt Emulsion Manual - Volume 1
FHWA-IP-79-1

This manual has the primary purpose of providing a basic understanding of asphalt emulsions to those who work with the product. It is intended to be useful in choosing the emulsion that best fits a project's specific conditions, and it should be most helpful in evaluating pavement systems for construction and maintenance.

The manual explains the general characteristics of asphalt emulsions and their uses. A thorough study of the manual should enable one to recommend where, when, and how emulsions should be used. It also should aid in the solving of problems that may arise on projects in which emulsions are used.

Operational and Performance Characteristics of Drum Mix Plants
FHWA-TS-84-212

This report gives a comparison of the long-term performance of mixtures produced by drum mix and conventional batch plants. Design, production, construction, and performance data were gathered on asphalt concrete pavement produced by both drum mix and conventional plants in seven states. An evaluation of the production data was performed to detect differences. Additional long-term performance and distress comparisons of variations in production details of drum mix plants were made to define specific operational guidelines. The report presents the findings of these evaluations and comparisons.

Chemical Composition of Asphalt as Related to Asphalt Durability
FHWA/RD-84/047

This report is a concise treatment of literature relating asphalt chemical composition to durability. Two major chemical factors affecting asphalt durability are defined: 1) compatibility of the interacting asphalt components; and 2) resistance to change from oxidative aging. The identification and characterization of the interacting chemical-functional types normally present in asphalt, or formed on oxidative aging, afford a fundamental approach to composition-property-performance relationships of both asphalts and asphalt-aggregate mixtures.

Redesign and Field Operation of a Self-Propelled Cavitating Concrete Removal System

This report presents an in-depth discussion of the significant elements of a program to redesign, build and demonstrate a self-propelled CONCAVER concrete removal system. The system utilized water cavitation erosion technology. Separate sections of the report include a cost analysis and system comparison and the conclusions and recommendations that resulted from the program.

Case Studies Using EAROMAR
FHWA-TS-84-219

EAROMAR (Economic Analysis of Roadway Occupancy for Maintenance and Rehabilitation) is a computerized model developed to encompass flexible, rigid and composite pavements. It is a tool to use to perform economic analysis of pavement construction, maintenence and rehabilitation.

This report is one of a set of five documenting the use of the EAROMAR system. It presents a case study of the system's applications to a pavement investment and rehabilitation problem, and presents an

analysis of the sensitivity of results to changes in several key aspects of the problem. The case study investigates five pavement options, ranging from doing nothing to construction of a "perfect" pavement.

Fort Duquesne Bridge: Fracture Analysis of Flange Cores
FHWA-TS-84-210

Using core speciments taken from the cracked welds and flange plate of Fort Duquesne bridge, Pittsburgh, Pennsylvania, FHWA initialized a materials testing program to: 1) verify the plane-strain facture toughness of the 2.5 inch thick A-517 steel; 2) determine the susceptibility of the 2.5 inch thick A-517 steel to lamellar tearing; and 3) confirm the existence of toe cracking and lamellar tearing by metallographic examination.

This report contains the results of the testing program which could be of particular interest to bridge engineers.

TRB PUBLICATIONS

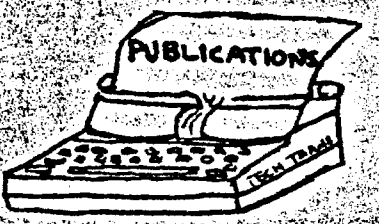
TRANSPORTATION PLANNING FOR SMALL AND MEDIUM SIZED CITIES

The staff of the Transportation Research Board has screened existing literature that will be of particular interest to you in dealing with transportation planning issues for small and medium sized communities. The following publications are available from the Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, DC 20418.

TRB Special Report #187, Transportation Planning for Small and Medium Sized Communities - Proceedings of a workshop: Includes material on public transit, forecasting, management information systems, traffic operations and planning, surveillance and socioeconomic forecasting, system planning, and plan implementation.
(1978, 100 pp., $5.60)

NCHRP Report #187, Quick Response Urban Travel Estimation Techniques and Transferable Parameters User's Guide: Provides simplified manual techniques for the four-step transportation planning process. The manual methods are suitable for for each aspect of travel demand forecasting, regional sketch planning, and specific problem applications.
(1978, 229 pp., $10.20)

NCHRP Report #186, Travel Estimation Procedures for Quick Response to Urban Policy Issues: A companion document to #187, this report describes and evaluates more manual and computer methodologies that are available.
(1978, 70 pp., $5.60)



TRB Special Report #201, Travel Analysis Methods for the 1980's: The report emphasizes level of planning and analysis methods that are better, simpler, less cumbersome, and less costly.
(1983, 203 pp., $24.80)

TR Circular #283, Synthesis of Practice Planning for Small and Medium Sized Communities: Presents 26 case studies that are a part of a follow-up project resulting from the December 1978 Sarasota Conference.
(1984, 29 pp., $4.00)

TRR #730, Issues in Transportation Planning for Small and Medium Sized Communities: Topics covered include trip tables from link volumes, demand estimation model for transit route and system planning, simulation of travel patterns, and land-use allocation model.
(1979, 38 pp., $3.00)

NCHRP Report #262, Planning Transportation Services for Handicapped Persons, User's Guide: This guide provides planners with guidelines that will permit them to identify cost-effective solutions to the problems of providing for the transportation needs of the handicapped.
(1983, 74 pp., $8.00)

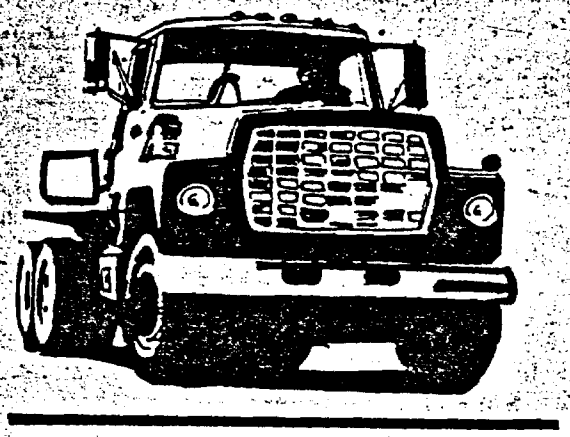
Continued Page 11 Col. 2

CONFERENCES - COURSES - SEMINARS

SECOND NATIONAL CONFERENCE
ON
WEIGH-IN-MOTION
TECHNOLOGY AND APPLICATIONS
Atlanta, Georgia - May 20-24, 1985

Sponsored by the Georgia Department of Transportation, in cooperation with the Federal Highway Administration, The conference will be held in Atlanta, Georgia from May 20 to May 24, 1985.

Recent Weigh-In-Motion (WIM) technology, an increase in states conducting investigations, and subsequent requests emphasized the need for this meeting. This forum will provide a unique opportunity to meet with the various manufacturers, researchers and current and potential users.



You and/or your representative will be able to obtain the critical information needed in evaluating specific WIM systems suitable for your operational needs from this conference.

The practical applications of WIM technology will be concentrated on and accentuated during the course of this conference. You are encouraged to bring specific questions and problems to be addressed by the speakers, other participants with WIM experience, and WIM company representatives.

A detailed agenda is being prepared by the Department of Transportation in cooperation with the Federal Highway Administration. To receive the agenda and registration information, please contact Georgia DOT, Attn. Permits and Enforcements, No. 2 Capitol Square, Atlanta, GA 30334.

If you should need additional information, please feel free to call either Rick Deaver (404/363-7583) or Ken Copeland (404/656-5435 or 5331).

THE ENGINEER AS MANAGER
Atlanta, Georgia June 3-4, 1985

Sponsored by the Battele Memorial Institute, this two-day seminar is a practical program for first and second level technical managers who are responsible for the supervision of engineers, scientists and support personnel.

Attendees will typically be engaged in research, design and development of products, processes, or components; direction of engineering service functions such as test engineering, drafting and logistics; or product engineering, construction engineering and industrial engineering. The seminar will be of equal interest to those in the private and public sectors.

The subjects to be covered are:

- The characteristics of managing
- Developing a management style
- Organizational concepts
- Establishing a good communications environment
- Planning and controlling work tasks
- Managing and the personal computer

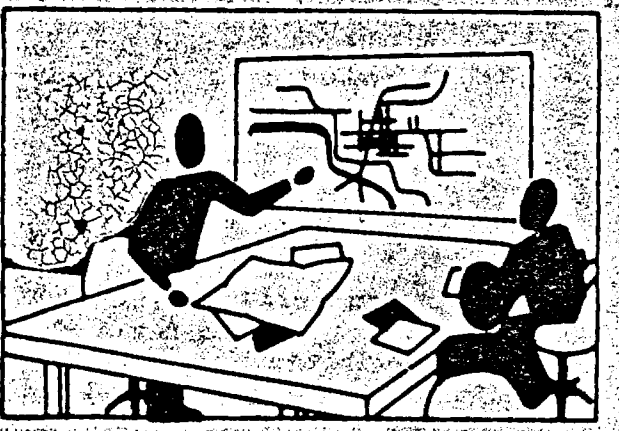
Course fee is $595 and should be paid in advance. Fee includes the course text, conference materials, luncheons and coffee breaks. For reservations, call 206/527-0542 or toll free 1-800-426-6762.

ANNUAL CONVENTION
OF
THE AMERICAN SOCIETY OF HIGHWAY ENGINEERS
King of Prussia, PA - May 16-19, 1985

The 23rd Annual Convention of the American Society of Highway Engineers will be held in King of Prussia, PA on May 16-19, 1985. For information on the conference, call Donald Flint at (215) 964-6538.

From Page 9

TRB Special Report #172, Transportation System Management: This report covers a conference that was structured to address three objectives: To provide the latest information on DOT policies and requirements, to provide experiences with the actual implementation of TSM actions, and to examine the emphasis of the regulations on a regional or metropolitan planning perspective.
(1977, 163 pp., $6.80)



NCHRP Synthesis #93, Coordination of Transportation System Menagement and Land Use: This report analyses the interaction of transportation systems management and land use management techniques for various environments and applications.
(1982, 38 pp., $6.80)

NCHRP Report #263, Simplified Procedures for Evaluating Low-Cost TSM Projects - User's Manual: This user's manual includes information on a new approach for the implementation of TSM projects, TSM screening aids, impact estimation and analysis aids, and additional planning and evaluation aids. It also presents five case studies demonstrating the recommended approach.
(1983, 209 pp., $12.80)

TRR #842, Transportation Planning Analysis Used in Small and Medium Sized Cities: Four very useful papers are presented in this report: 1) Evaluating Plan Alternatives: Energy, Safety and Air Pollution; 2) Mobile Source Emissions and Energy Analysis at an Isolated Intersection; 3) Improved Demand Estimation for Rural Work Trips; and 4) Synthesized Thru-Trip Table for Small Urban Areas.
(1982, 21 pp., $4.20)

NEED ASSISTANCE?

NEED PUBLICATIONS?

NEED ANYTHING?

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TECHNOLOGY TRANSFER CENTER VOL.3 NO.3 SUMMER 1985

EDITOR'S NOTE

Local government officials and administrators are charged with protecting the public and providing services in a variety of areas, including transportation. The goal of transportation services should be the safe and efficient movement of people and goods. Local governments are no longer shielded from lawsuits by the umbrella of sovereign immunity. One of the major sources of liability is from traffic accidents alleged to have been caused by negligence in building or maintaining highways or traffic control devices.

The Georgia tech Technology Transfer Center, realizing the increasing problems associated with law suits brought against local governments, wishes to emphasize the subject of tort liability in this issue of TechTrans. In addition, A tort liability seminar sponsored by this Center in cooperation with the Georgia Department of Transportation and the Federal Highway Administration, is planned for the upcoming Fall Quarter. Covering current State and Federal laws regarding tort liability to assist participants in understanding their responsibilities and liabilities, The seminar will be held in all seven Georgia District Offices. You will be informed of the schedule as it becomes available.

- Mr. Jerry Griffin was named by the Georgia Development Authority (GDA) as the first permanent Executive Director of the Governor's Environmental Facilities Program to assist local communities with water and sewer facilities needed for the continued economic growth. Twenty million dollars was appropriated to GDA by the General Assembly at the request of Governor Joe Frank Harris. The money will be used for low-interest loans to local communities to construct needed water and sewer facilities while still maintaining affordable utility rates.

- UMTA is making one million dollars available for 10 research projects studying transportation technology and innovative techniques. Three of the projects will focus on the use of methanol fuel. Other

Continued on page 7

PRACTICAL TIPS FOR REDUCING AGENCY TORT LIABILITY

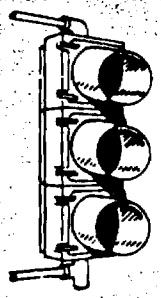
1 - There should be a clear definition and understanding of the duties, responsibi-lities and authority of the agency, its subunits, and each individual in the organization.

2 - Officials and employees should clearly understand and subsequently perform their general duties in a satisfactory manner.

3 - Decisions concerning professional plans or programs, such as the physical and geometric design of traffic facilities and the application of traffic control control devices and regulations, should either be made by competent professionals or be based on the advice of such persons.

4 - Public highway agencies should establish and maintain adequate record systems to provide current facts about existing conditions. These systems include:

* Traffic accident records and procedures for identifying high-accident locations.
* Inventory procedures which will provide reasonably current in-formation about the physical features and conditions of existing transportation facilities (i.e., photo logging and con-dition ratings) and traffic control devices (location, model and/or type and size, date ins-talled or repaired, condition, function, reliability and ope-rational criteria).



5 - A system of regular inspection should be established and maintained on a continuing basis. These inspections should cover the physical conditions of facifacilities and traffic control devices. Traffic signals should be checked at a maximum of six-month intervals. Traffic signs should be inspected at least twice annually under both day and night condi-tions, especially in inclement weather. Traffic markings should be checked as needed but special attention should be paid in late winter and early spring. Temporary traffic control devices (such as those placed in construction and maintenance areas) should be checked on a daily basis, including workdays, weekends and holidays. More frequent inspections should be made in major work areas. A chain of command should be established for the inspection process so that changing conditions can be anticipated, present and potential defects can be reported, and prompt action can be taken on those reports. An extremely helpful type of inspection is periodic trips made by the traffic engineer and traffic enforcement counterpart. Another source of inspection capability is to develop awareness and a sense of responsibility on the part of all agency employees, including nontechnical staff, so that they will be constantly on the lookout for vandalized or malfunctioning traffic control devices or other hazardous conditions.

6 - An established procedure for the handling of complaints and reports should be developed and maintained with one person or one office being designated to receive and record all such reports and take appropriate action. Effective handling of complaints has legal as well as public relations benefits.

7 - Complete and current maintenance records can provide information about type and character of repair or replacement activity including what trouble was found, what repairs were made, and what materials were used.

8 - All designs of facilities or traffic control devices should be in accordance with currently adopted policies, guidelines, standards and manual specifications. Geometric designs should be predicated on criteria well above the established minimum standards. Field conditions should be correlated with traffic controls (i.e., having a 55 mph

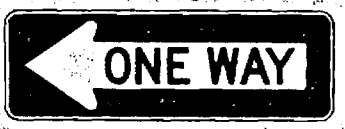
speed limit on a road which has stopping sight distance for a maximum of 35 mph is unsafe and irresponsible).

9 - Standards of performance should be adopted in the areas of design, construction, operations and maintenance.

10 - Rational procedures for determining improvement priorities and programming should be established and followed. Nor-mally this will include a consideration of the cost effectiveness of various alternatives.

11 - There should be design and operational reviews both before and after any facility or traffic control change is made. Both the basic design and the traffic control elements should be checked in the field. Reviewers should be alert for changing conditions such as increased traffic movements, changes in vehicle type,etc. There should be inspections of active and completed projects.

12 - All agency employees should be impressed with the importance of reasonable care in the fulfillment of their individual duties as well as the overall group mis-sion.



13 - Beware of false economy. The foolish cutting of necessary expenditures in order to appear fiscally responsible to the taxpayers inevitably leads to careless and negligent work.

14 - Provide liability insurance against claims.

From an article published in the University of Connecticut Technology Transfer Newsletter, Vol 2, No. 1, Winter 1984.

TRAFFIC SIGNS - TIPS

Recent court cases in which judgements went against the local governmental jurisdiction have pointed up the importance of maintaining traffic signs. To reduce drivers' risks and your liability, take a look at your policy of maintaining highway signs under your jurisdiction.

Traffic signs on less traveled roads are often targets for vandalism. Recent studies report that each year one out of every 10 traffic signs is defaced, destroyed, or stolen. Vandalized traffic signs deny motorists critical information necessary for safe driving and increase the potential for severe and often tragic accidents and tort liability. Destruction of traffic signs by rifle or pistol fire and shotgun blasts is common in rural areas. Many vandals consider removal of traffic signs a harmless prank, but theft of regulatory signs, particularly stop signs, produces a dangerous situation, especially for motorists not familiar with the area. Highway agencies should maintain an inventory and regular inspection schedule to note missing or damaged signs.

Signs should be inspected for visibility and reflective qualities both at night and during the day. Be sure trees and brush do not obscure highway signs.

Consistency in the use of highway signs is of primary importance. Drivers need to know what to expect.

From Milepost '85,Texas Transportation Technology Transfer, Winter 1985.

GEORGIA TECH

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KEEPING UP WITH CHANGES IN GOVERNMENTAL LIABILITY

It is difficult for those in responsible positions to keep up with changing interpretations and rulings about traffic accident liability. Court rulings, changes in administrative regulations, new developments in traffic safety research, and scholarly meetings of professional technical organizations all represent sources of information which might have substantial impact on policies of local transportation agencies.

One legal publication which might help keep up with changes in local governmental traffic accident liability is the American Trial Lawyers Association's Law Reporter. One of its sections is entitled "Government," and contains traffic cases mixed with other types of suits. Local officials would benefit by spending a few minutes reviewing these articles each month.

The TRANSAFETY Reporter has just been introduced and appears to be an excellent source of information. It is a monthly newsletter for attorneys, highway departments and those who are the targets of traffic suits. The Reporter summarizes recent suits, and explains things like what constitutes a hazard, what can be done to abate the problem, whether there are easy remedies, etc. Research, litigation and technical reports are summarized in monthly issues for a subscription price of about $150.00 per year. The parent organization, TRANSAFETY, will also issue periodic special reports on particular topics like barriers, signs, etc. The TRANSAFETY Reporter could be the single most important periodical for those interested in reducing liability exposure for local entities. For more information, contact:

TRANSAFETY
2020 K Street N.W.
Washington, D.C. 20006
Telephone (202) 331-7924

One publication that frequently contains useful information is the Highway & Vehicle Safety Report. Subscriptions cost approximately $120 per year and may be obtained from:

Mr. Paul Stamler, Editor
Highway & Vehicle Safety Report
P.O. Box 3367 - S.C. Station
297 Main Street
Branford, Connecticut 06405

There are other organizations that monitor legal occurences. For example, the Verdict Report is a weekly four-page newsletter (by Jury Verdict Research Service, Cleveland, Ohio, telephone (800) 321-6910) which specializes in injury cases. They prepare summaries with docket numbers, attorney's names, verdicts and expectancies. For example, they report on governmental bodies as dependents, broken down into various categories such as: range of injuries, range of financial awards or out of court settlements, verdict expectancy for different situations, recovery rates, psychological factors affecting juries, etc.

This service would appear to be very helpful for local entities preparing to defend negligence suits. It might also be useful in deciding which hazards represent the greatest risks to a local municipality.

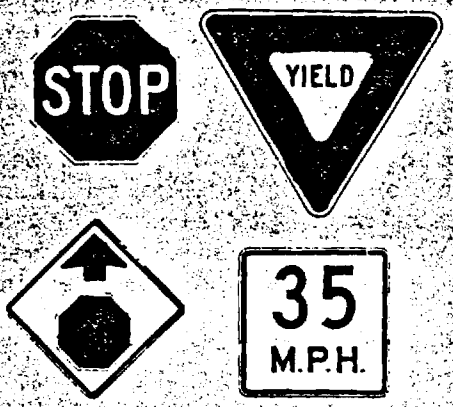
The public official who is concerned about the possibility of traffic-related suits should establish a regular program of reviewing new information. If possible, the entity's attorney should recommend the materials for the program.

DRUNK DRIVERS

In Finland, England and Sweden, convicted drunk drivers are automatically jailed for approximately one year. The names of convicted drunk drivers in Australia are published in local newspapers. South Africans are given ten-year prison sentences, a fine of $10,000, or both. In Turkey, drunk drivers are taken 20 miles from town and forced to walk back under escort. A second conviction of drunk driving in Bulgaria is punished by execution.

From APWA Newsletter, May 1984.

TOO MANY SIGNS LEAD TO A LIABILITY PROBLEM



Allegations of negligence against an Iowa county have typically involved failure to use one or more traffic signs that allegedly were needed. However, the message afforded by at least one recent case is that a county can also be found negligent for using too many signs.

The incident giving rise to this lawsuit occurred when an automobile traveling south on a gravel road proceeded from a stop sign directly into the path of a motorcyle approaching from the west on a paved county road.

The driver of the automobile claimed that her view of the oncoming motorcycle was restricted by the presence of three signs to her right that were placed on the north shoulder of the paved road. A No Passing Zone pennant was located approximately 55 feet to her right and 13.5 feet from the edge of the pavement. Thirty-three feet farther west was a curve warning sign located 10.1 feet from the edge of the pavement. A route marker was 21.5 feet farther west and was placed 7.6 feet from the roadway edge. The two roads intersected at an angle of approximately 77 degrees.

Testimony at the trial indicated that, with the driver in a particular position, the three signs aligned in a manner that restricted the view of a portion of the paved road to the west. Assuming that the approaching vehicle was proceeding at average highway speeds, the actual sight restriction lasted for approximately one second at a point when the approaching vehicle was about 350 feet from the intersection.

The trial in this case reportedly resulted in a five-figure judgment against the county that controlled the roads.

Although the culpability of the county in this case may be questioned, the county's position would have been more defensible if the guidelines for the position of signs contained in the Traffic Control Devices Handbook had been followed.

The Handbook suggests spacing signs for different purposes a minimum of 200 feet apart, if possible, in this case, it was possible to relocate both the curve warning sign and the route marker farther west to more closely approach the desired 200 foot longitudinal spacing. Further, if all signs had been placed at the recommended lateral spacing of 12 feet from the edge of the pavement, they would not have aligned with each other in a way that produced a sight restriction on the traveled portion of the approaching roadway.

A review of Section 2C-1 of the Handbook is suggested for those readers who are responsible for the placement of highway signs.

R. L. Carstens, professor of civil engineering, ISU

HIGH-ACCIDENT INTERSECTION - LEADS TO LARGE JUDGMENT

A right-angle collision occured at an urban intersection after a southbound vehicle failed to stop for a stop sign. The eastbound driver sustained permanently paralyzing injuries, and lawsuits were filed against both the city and the state as a result of the accident.

Ten allegations of negligence were entered against the defendants; however, the one that developed as the central issue was the specific claim that the city and state were negligent " . . . in failing to take corrective action to eliminate a hazardous condition existing at the intersection . . . when it knew or should have known that a hazardous condition then and there existed."

Over

From page 5

Two separate trials took place. In the litigation against the city, a district court jury ruled in favor of the city. However, in a second trial, in which the state was the defendant, the court declared negligence and handed down a $1,2000,000 judgment against the state.

The court's decision was based on the fact that 26 other accidents had been recorded at this intersection during the four years preceding the collision. About 60 percent of these involved vehicles from the north that either ran the stop sign or failed to yield from a stop. According to the court, the accident rate of over 4.0 accidents per million entering vehicles should have caused the state to take corrective action. However, there was no evidence that either the city or the state had been more than casually aware that a serious problem existed at this intersection.

The judge also noted thatthe availability of a computerized accident record system (ALAS) enables government entities to identify high-accident locations and take the necessary corrective measures.

This case clearly demonstrates that it is the responsibility of highway officials to be aware of high-accident locations and to study those sites that are so identified. ALAS printouts provide the basic tool for this process, and responsible officials should establish a practice of regularly seeking this data concerning highways within their jurisdiction.

A statistical method for identifying high accident locations has been well documented, but is not widely understood or used. As a rough rule-of-thumb, if the number of accidents exceeds the value of U as calculated by the following equation (for entering volumes up to 10,000 vehicles per day), an intersection might be considered as a high-accident lcoation and subject to further study:

$$U = 0.1E^{0.6},$$

where U = number of accidents in 3 years and E = number of vehicles per day entering the intersection.

R.L. Carstens, professor of civil engineering, ISU.

LOSS OF SIGN'S REFLECTIVITY CAUSES FATALITIES, LAWSUIT

A collision occurred at night at an intersection of a paved county road and a primary highway when a passenger car failed to stop at a stop sign and struck a semi. The driver of the passenger car was not familiar with the road. Both occupants of the passenger car were fatally injured.

A lawsuit was filed naming both the county and the state as defendants. The plaintfifs alleged that the county was negligent because the intersection was not lighted, there were no rumble strips and flashing beacons, and the stop ahead sign was not sufficiently reflective. The negligence of the state was alleged because of insufficient warning of the presence of the intersection. Both defendants were also alleged to be negligent because the terrain restricted sight distance in the quadrant of concern such that approaching vehicles were not visible until they were relatively close to the intersection.

There was considerable testimony during the discovery process indicating that the stop ahead sign was severely weathered and essentially retained no reflectivity. This became the principal issue in the case.

In the out-of-court settlement, the county made a substantial payment, with the state adding a token payment to settle the suit.

This case exemplifies a problem that is occurring with increasing frequency--the continuing use of highway signs that have lost their reflective qualities. Signs in place need to be inspected by highway agencies on a regular schedule, at night and during the day.

R. L. Carstens, professor of civil engineering, ISU

From page 1

interesting projects include the development of specifications for improved bus lifts in New York and a crime watch program in conjunction with a cab company in northwest Indiana. "The program," says UMTA Administrator Ralph Stanley, "is useful because it moves new ideas from the planning stages into actual use."

- Over 200 people from Canada, the United States, and 12 other countries participated in the North American Pavement Management Conference last March. The participants included representatives from 26 State highway departments, local governments, national and international government agencies, consultants, and researchers. The conference was successful in attracting numerous presentations on pavement management through effective decision making.

- In its ruling in the case of Town of Hallie v. City of Eau Claire, the Supreme Court found that city activities which are authorized by state law are immune from law suits charging violation of federal antitrust laws, even in the absence of active supervision by state governments. Specifically, the Court held that the City of Eau Claire could not be sued by four neighboring communities for monopolizing sewege-treatment services in the area.

- The top ten public works leaders of this year were recently selected by a panel of judges. The ten selected leaders are:

Allen A. Alsing, Director of Public Works, Ashland, Oregon.
William Amundsom, Director of Public Works, Sioux City, Iowa.
James Casey, Director of Engineering and Development, San Diego, California.
R. Terry Holzworth, Director, Salt Lake County Flood Control, Salt Lake City, Utah.
Leon Lancaster, Director of Public Works, Clovis, California.
William Marrazzo, Water Commissioner, Philadelphia, Pennsylvania.
Commodore Benjamin F. Montoya, Commanding Officer, U.S. Naval Facilities Engineering Command, Western Division, San Bruno, California.
Allen Sander, Director of Public Works, Arlington heights, Illinois.
Donald Vonnahme, Director, Illinois Department of Transportation, Division of Water Resources, Springfield, Illinois.
Robert Welin, Commissioner of Operations, Calgary, Alberta.

LAWSUIT'S MESSAGE:

MAINTAIN LOW-LEVEL ROADS

A dirt road with a recorded volume of three vehicles per day, was the location of a single-vehicle accident that resulted in a lawsuit against a county. The accident involved a 350 cc motorcycle operated by a frequent traveler on the road.

The accident occurred in May following unusually heavy rains that caused water to flow across the road and erode the dirt surface. One depression was 12 to 15 inches wide and as much as 3 to 4 inches deep across the full width of the road. The depression caused the motorcycle to spill, injuring the operator.

Testimony in trial indicated that the ditches on this road were usually filled and probably had never been cleaned out. The road surface, which was bladed infrequently, probably had not yet been graded for spring since maintenance efforts concentrated on granular-surfaced roads carrying high traffic volumes.

An out-of-state expert testified for the plaintiff, citing that loose-surfaced roads should be bladed to provide a crown of 1/2 inch per foot. Jurors were made aware of the pronounced differences between the road in question and a road maintained to textbook conditions.

The jury found that the county was 40 percent negligent and returned a judgment in six figures against the county.

R. L. Carstens, professor of civil engineering, ISU.

PUBLICATIONS

NEW PUBLICATIONS

ROAD SURFACE MANAGEMENT FOR LOCAL GOVERNMENTS - SIX CASE STUDIES
Report No. DOT-I-85-06

As part of the Rural Technical Assistance Program (RTAP), the Federal Highway Administration (FHWA) initiated a project entitled "Road Surface Management for Local Governments." This project involves assembling a synopsis of road surface management practices among local governments, the development of training materials, and the conduct of a training course on the same subject.

The purpose of this report is to identify areas where current road surface management practices might be improved, with the emphasis on building upon features of current practices rather than advocating the implementation of dramatically different and sophisticated systems. Six local governments were selected as case studies and visited to document good examples of road surface management practices and intergovernmental cooperation. These case studies are offered in the hope that some of the practices discussed will serve as examples for other local governments to use in improving their own surface management practices.

- Available from the Technology Sharing Program, Office of the Secretary of Transportation, Washington, D.C. 20590

NIGHT VISIBILITY OF OVERHEAD GUIDE SIGNS: A REVIEW OF THE LITERATURE
Report No. FHWA/RD-84/087

Within recent years, an increased interest has been shown in lowering guide sign costs by eliminating illumination and using non-reflective sign backgrounds. Questions have been raised concerning the effectiveness and safety of such signing innovations. It is also a question whether such signing treatments should be sanctioned in the Manual on Uniform Traffic Control Devices.

This report considers the adequacy of the proposed guide sign configurations in light of findings in scientific and technical literature.

- Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161

FLEXIBLE DELINEATOR POST TEST PROCEDURES
Report No. FHWA-TS-84-225

Delineation of the roadway by the use of post-mounted roadside delineation devices has greatly improved the driver's identification of general roadway direction and has improved traffic safety when standard paint markings are obscured by snow or water. Flexible nonmetallic posts are gaining favor as delineator posts because, unlike steel U-channel posts which were originally used, the flexible posts cause less vehicle damage when impacted and recover from the impact rather than yielding and requiring replacement.

This report provides a test plan developed to evaluate samples of identified delineator posts. It also contains testing results of various posts. The posts tested were of two general material types: 1) a composite of fiber and resin, and 2) thermoplastic.

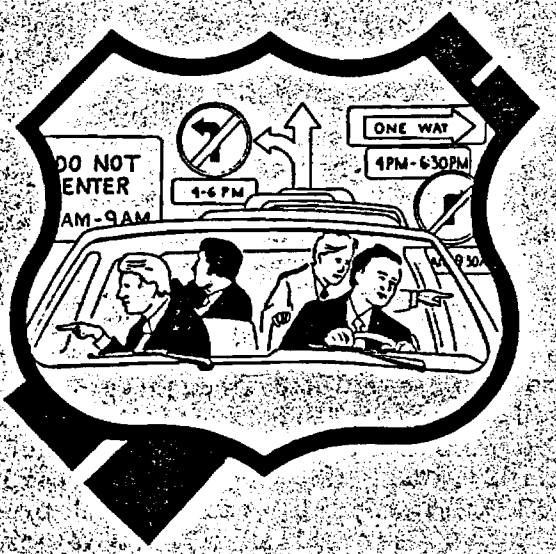
- Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161

MOTORIST DIRECTION-FINDING AIDS: RECOVERY FROM FREEWAY EXITING ERRORS
Report No. FHWA/RD-82/098

Two controlled field experiments were conducted to investigate driver direction-finding performance following a missed exit error on a freeway. The effectiveness of road maps, an interactive phone information center, and a schematic map generated by a simulated computerized information center were studied. It was found that unaided motorists have considerable difficulty in recovering from the missed exit error. Use

of road maps increased route-finding efficiency. However, a significant proportion of the drivers could not or would not use available maps. The sophisticated navigational aids were the most effective in improving direction-finding performance. This report contains the findings of the two experiments.

- Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161



AVAILABLE FREE FROM

THE GEORGIA TECH TECHNOLOGY TRANSFER CENTER

QUALITY ASSURANCE FOR LOCAL GOVERNMENTS
Report No. FHWA-IP-83-1

This manual contains a program for improved highway construction management and a program for highway quality control and testing for use by local government units. It is designed for local government agencies desiring to implement or expand a quality assurance program.

REFLECTIVE CRACKING IN BITUMINOUS OVERLAYS ON RIGID PAVEMENTS
Report No. FHWA-TS-84-213

A variety of different methods for eliminating reflective cracking in asphalt overlays on concrete pavements have been investigated during the last 30 years. These methods aimed at reducing stress concentrations in the overlay caused by horizontal and vertical movement at transverse joints in concrete pavements. In general, the results varied considerably within and between methods.

This document reports on the findings of a New York Department of Transportation project that attempted to solve this problem by trying a number of different approaches. The report summarizes the results of over 20 years of testing reflection crack-retarding methods, and updates the performance of several test pavements discussed in other reports. It also reviews surveys to substantiate the causes and extent of this cracking experienced in New York, as well as the theories behind each preventive method.

PRACTICAL GUIDELINES FOR MINIMIZING TORT LIABILITY
Transportation Research Board
December 1983

This document reports on various practices, making specific recommendations where appropriate. It should be of special interest to transportation administrators; designers; construction, operations, and maintenance engineers; attorneys; and others concerned with minimizing tort liability. Guidelines are presented for reducing the risk of legal liability in transportation activities. Discussions of the following topics are included:

- Legal duty and liability
- Reducing the risk of liability: Pre-accident actions
- Reducing the risk of liability: Post-accident actions
- Preparation for trial
- Developing an effective loss-mitigation program
- Action guidelines for minimizing tort liability

WORKSHOPS...CONFERENCES...SEMINARS

PORTLAND CEMENT ASSOCIATION COURSES

The following Portland Cement Association (PCA) Technical Training Programs will be held in the Fall of 1985 at the PCA's Cement and Concrete Center, Stockie, Ill. For more information on any of the courses, contact the registrar, Educational Services Department, Portland Cement Association, 5420 Old Orchard Road, Stockie, Ill. 60077. Tel: 312/966-6200.

BASIC CONCRETE AND RELATED FIELD PRACTICE
November 11-15, 1985
Registration fee: $900

This course is designed to enhance product knowledge of ready mix producers, contractors, inspection and testing organizations, material suppliers, sales firms, and city, state, county, and federal agencies. The five-day class will cover materials, and principals of quality concrete and construction. In laboratory sessions, mix design problems will be worked out and verified with test specimens, and finishing practices will be demonstrated. A special session will cover the mixing and transporting of ready mixed concrete. Sessions will be conducted by persons familiar with field problems to insure discussions relevant to current construction practices.

ADVANCED CONCRETE TECHNOLOGY
December 2-6, 1985
Registration fee: $900

Designed for individuals who have a basic background in concrete, this advanced class will cover concrete materials, including lightweight concrete, curing requirements, and factors causing concrete strength variations. The class will cast specimens for later verification, determine in-situ strength of concrete, and perform standard tests for qualifying cement, aggregates, and admixtures used in the production and control of concrete.

CONTROLLING CONCRETE QUALITY IN PRODUCTION AND CONSTRUCTION
October 28-31, 1985
Registration fee: $800

Employees of cement, aggregate and admixture suppliers, ready-mixed concrete producers, or anyone who needs to be certified as a Concrete Field Testing Technician-Grade I will benefit from the course. Classroom work will cover materials, specifications, and requirements for concrete inspection and testing of concrete before, during, and after placement.

TROUBLESHOOTING CONCRETE FIELD PROBLEMS
November 18-22, 1985
Registration fee: $975

This course is designed for those responsible for handling field problems for contractors, precasters, inspection and testing agencies, architects, and federal, state, county and city engineering departments. The class will focus on identifying and discussing problems of durability, ready mix concrete production and transportation, admixture use, concrete placement, fabrication and construction and precast prestressed concrete structures, slabs on grade, quality control procedures, strength test evaluation, repair and maintenance of concrete surfaces and structures, and ways to determine in-place concrete strengths.

7TH NATIONAL RURAL PUBLIC TRANSPORTATION CONFERENCE
September 8-12, 1985

Sponsored by the National Research Council, Transportation Research Board, this 5-day conference will be held in Holidome Conference Center, Lawrence, Kansas. For information contact: Rich Garrity 919/828-8844 or Pam Ward 515/683-0695.

RIGHTS-OF-WAY ACQUISITION AND RELOCATION SEMINAR

Georgia Tech Technology Transfer Center invites you to participate in the Rights-Of-Way (ROW) Acquisition and Relocation Seminar to be held in all 7 Georgia Districts according to the schedule shown below. Sponsored in cooperation with the Georgia Department of Transportation and the Federal Highway Administration, the one-day seminar will cover the recently changed Federal ROW acquisition regulations, appraisal and relocation information, data reporting standards, and uneconomic remnants. Each of these subject areas has significant importance and must be followed when land is acquired.

For registration, please contact your District Office at the address or phone number shown below.

RIGHTS-OF-WAY ACQUISITION AND RELOCATION SEMINAR

GEORGIA DISTRICT OFFICES - AUGUST AND SEPTEMBER, 1985

GDOT District Office	ROW Seminar Date
Jesup - District 5 Mr. Juan Durrance, District Engineer, GDOT District 5, General Delivery, Jesup, GA 31545 Tel: 912/427-9081	August 13, 1985
Tifton - District 4 Mr. Don Watson, District Engineer, GDOT District 4, 710 West 2nd. St., Tifton, GA 31793-5301 Tel: 912/386-3287	August 15, 1985
Thomaston - District 3 Mr. Bobby Melton, District Engineer, GDOT District 3, P.O. Box 711, Thomaston, GA 30286 Tel: 404/647-8921	August 27, 1985
Tennille - District 2 Mr. George Lyons, District Engineer, GDOT District 2, Tennille, GA 31089 Tel: 912/552-7311	August 29, 1985
Gainesville - District 1 Mr. Lewis Canup, District Engineer, GDOT District 1, P.O. Box 1057, Gainesville, GA 30503 Tel: 404/532-5536	September 10, 1985
Cartersville - District 6 Mr. Felton Rutledge, District Engineer, GDOT District 6, U.S. 41 South, Cartersville, GA 30120 Tel: 404/382-3120	September 12, 1985
Atlanta - District 7 Mr. Cecil Pearce, District Engineer, GDOT District 7, 5025 New Peachtree Rd., Chamblee, GA 30341 Tel: 404/393-7033	September 17, 1985

$250,000 JUDGMENT AGAINST COUNTY: DIAGNOSING WHAT WENT WRONG

When an 18-year old male driver failed to steer around a sharp turn on a loose surfaced county road, his 1969 Chevrolet crashed into the ditch. Both he and his companion were injured. Fortunately, the injuries were not serious enough to result in any permanent disability to either occupant of the car.

At a subsequent trial, the county concerned was alleged to be negligent and was sued for damages. The following facts were brought out at the trial:

* The vehicle driver had failed to notice the reverse turn sign located approximately 1,000 feet before the turn.
* There was no large arrow sign or advisory speed plate in use at this location.
* After leaving a primary highway in traveling to the accident location, the driver had encountered 12 curve or turn signs in 8.7 miles of travel on loose surface roads. Advisory speed plates were in use with two of these signs. A large arrow sign was used at one location in that 8.7 miles, but it faced drivers traveling in the opposite direction.

After hearing the case, a jury awared the two plaintiffs a total of about $250,000. Although it is not always possible to determine why a jury decides the way it does, this jury probably was telling traffic engineers that consistency in the use of signs is of primary importance. Perhaps not using some types of warning signs is better than inconsistent usage.

R.L. Carstens, professor of civil engineering, ISU.

M. JOHN MOSKALUK
TECHNOLOGY TRANSFER
SCHOOL OF CIVIL ENGINEERING
GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

TECH TRANS

SCHOOL OF CIVIL ENGINEERING
GEORGIA INSTITUTE OF TECHNOLOGY
A UNIT OF THE UNIVERSITY SYSTEM OF GEORGIA

TECHNOLOGY TRANSFER CENTER VOL. 3 NO. 4 FALL 1985

EDITOR'S NOTE

Seven sessions of the Rights-Of-Way Acquisition and Relocation seminar were completed during August and September with a total of 363 participants. The Georgia Tech Technology Transfer Center would like to express appretiation to all participants. Special thanks and acknowledgements for a job well done goes to the seminar instructors, Mr. Steve Swit and Mr. Bob Chappel of the Federal Highway Administration's Division Office and Mrs. Gerry Smith, Mr. Larry Clark, and Mr. Homer Borders of the Georgia Department of Transportation. Their instructional enthusiasm and dedication helped make this course a great success.

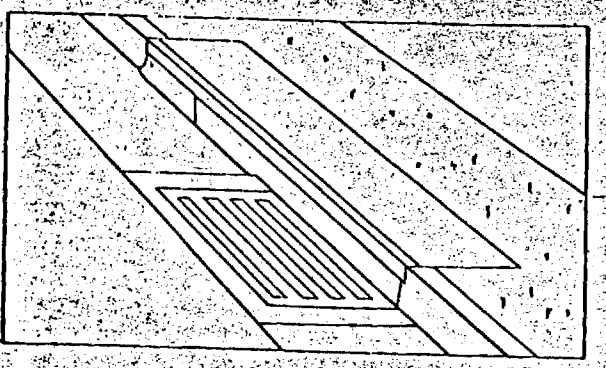
Other T2 courses are planned for the next few months. Announcements for these courses are on page 10 of this newsletter.

Special note should be taken of the planned Risk Management course. We urge you to participate in that course which will assist you in protecting your local agency from tort liability law suits. If you are considering the introduction of microcomputers to your agency, take note of the Office Applications of Microcomputers workshop to be held during the month of November.

We have received 25 traffic data recorders and four data collectors for use by local agencies. At this moment there are 10 agencies on our waiting list. If your agency wishes to be placed on the waiting list for use of the data recorders, please contact the Center.

DRAINAGE CONSIDERATIONS

by John M. Mason, Jr., Ph.D., P.E.
Assistant Professor of Civil Engineering
Texas A&M University



Stormwater runoff requires that some type of drainage facility be constructed to collect, direct, transport and, perhaps, store excess rainfall. Drainage design is often low priority in maintenance operations because of the numerous more noticeable problems that must be addressed. Generally, drainage is not identified by citizens as a major problem . . . until the next severe rainstorm.

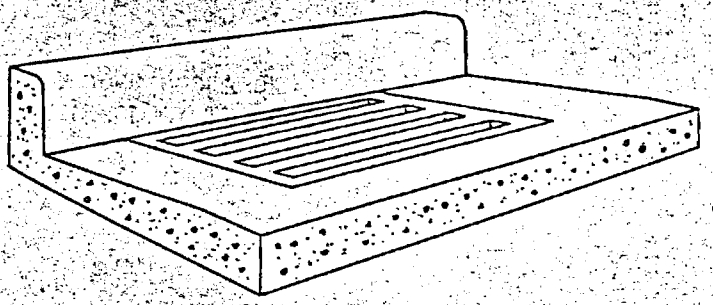
Roadway design, construction and maintenance each requires that drainage

OVER

FROM PAGE 1

facilities be given primary consideration to protect long-term investments in the roadway surface and adjacent rights-of-way. Among the many things that have changed in dealing with drainage is the belief that runoff should be directed (as quickly as possible) to its downstream point; that is, design or construct a pipe, culvert or ditch that will carry an estimated design flow in the most economical fashion. Unfortunately, this practice has led to numerous flooding problems for downstream property owners and municipalities. Potential liability for both public and private entities has altered the way agencies must deal with stormwater runoff.

Today, a public agency must consider storm runoff (drainage) as part of a stormwater management program that addresses general administrative issues, subdivision regulation and flood control. No absolute policy has yet evolved that is panacea for localized drainage problems. Instead, a comprehensive program, aimed at limiting nuisance flooding problems and reducing the damage from severe flood events, has been adopted by many local municipalities.



Good stormwater management programs focus on preventing future increases in peak runoff rates on small drainage reaches (branches) in order to minimize the effect of development on larger downstream rivers. Both remedial actions (improving ditches, channels and culverts) and preventative programs (floodplain storage and major stream modifications) should be carefully considered for compatibility of the area's needs and effects on the entire watershed. Quick-fix, site specific bandages may eventually aggravate, rather than alleviate, drainage problems.

An area that is receiving much attention in the courtrooms of our country is tort liability. This particular area of law (tort law) is a private or civil wrong that results in injury or loss. The most common of all tort cases is the failure to use reasonable care in maintaining the road system in a safe condition. Poor drainage structures (oversized or undersized), or uncontrolled peak discharge rates, have been cited by the courts as a potential liability of public entities. Local governments need to take steps toward reducing their risk in dealing with ongoing regional development to limit their exposure to liability.

Some cities have adopted ordinances to require storm runoff from newly developed sites to be held to the discharge rates of the undeveloped condition. Careful planning and locating of holding ponds (detention/retention basins) are necessary to achieve proper downstream flood control. Arbitrarily placed detention basins may adversely impact downstream receiving channels by discharging their flow at improper times. Occasionally regional facilities have been planned to control future development discharge rates. These larger retention facilities may have dual usage as recreation facilities which are generally aesthetic.

Whether detention is considered necessary or not, drainage designs should weigh the alternatives of various methods to control stormwater discharge. Very often, roadway fills and embankments create natural berms to pond runoff. Roadway culverts can be easily sized or modified to regulate the discharge and provide reasonable protection to adjacent land owners or downstream municipalities.

A key element in current and future drainage design is the willingness of local agencies to "manage" stormwater and control its adverse impacts on others. Cooperation between developers and local governments will ensure the safe and efficient use of drainage facilities throughout their jurisdiction.

From Milepost '85, Texas Transportation Technology Transfer, Summer 1985.

MICROCOMPUTERS IN TRANSPORTATION ENGINEERING

by Dr. Charles W. Schwartz
Department of Civil Engineering
University of Maryland

Recent technological advances in small, inexpensive, and powerful computer equipment, "microcomputers," are revolutionizing the transportation profession. Computational tasks previously possible only on large and expensive centralized mainframe computers can today be performed quickly and easily on small, self-contained machines located on the individual engineer's desk. Computer costs have plummeted to levels affordable by even the smallest engineering firms and agencies. Applications of this new computer technology abound in all areas of transportation.

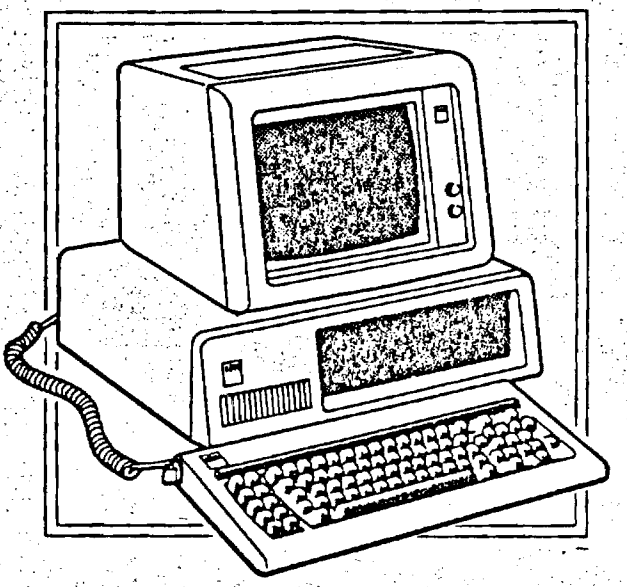
HARDWARE

Microcomputer components can be divided into two major categories: hardware and software. Hardware consists of all the electrical and mechanical components of the system, while software consists of the programs that make the hardware function.

The microprocessor, or "brain" of the microcomputer, contains the logic circuitry required for performing computations and other system functions. Advances in microprocessor technology have produced three distinct generations of microcomputers. Popular examples of each of these are the Apple II (first generation), IBM PC (second generation), and the newly-released IBM AT (third generation). Each new generation has brought increased computational speed and capacity at only a slight increase in hardware cost. Nevertheless, earlier generation machines continue to remain popular because of their large base of available software.

A microcomputer may also contain one or more auxiliary microprocessors dedicated to specialized functions. For example, an optional numeric co-processor is often employed to speed the arithmetic calculations encountered in many engineering programs.

Random access memory (RAM) is required for the temporary storage of program instructions and data during program execution. RAM memeory is measured in thousands of bytes (kilobytes, or simply K); one byte of RAM is sufficient, for example, for storing one text character. Typical RAM limits are 64K for first general computers, 640K for second generation, and several million bytes for third generation systems. Many popular commercial programs for second and third generation microcomputers require a minimum RAM size of 256K.



Magnetic disks are used for the permanent storage of programs and data; the hardware used to transfer information to and from the disk is termed a disk drive. Flexible or "floppy" disks are the most common storage medium. Typical second generation microcomputers can store 360K of information on one flexible disk. When full, a flexible disk can be removed from the drive and a new, empty disk inserted in its place. "Hard" disks (sometimes called "Winchester" disks) are faster and higher capacity (10 million bytes or more) alternatives to flexible disks; however, hard disks are permanently mounted in their drives. Hard disks are particularly useful for storing large programs (e.g., Fortran compilers) or very large data sets.

OVER

FROM PAGE 3

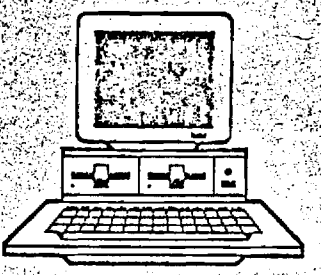
The primary input and output devices for all microcomputers are a keyboard and a cathode ray tube (CRT) display termed a monitor. Monitors are available in monochrome and color varieties. Monochrome monitors sacrifice color for better resolution (e.g., clearer text characters). Both types of monitors can display graphics in addition to text, provided that the appropriate special circuitry is included in the microcomputer.

Although the above items comprise the major hardware components, most microcomputer systems also include some additional accessories. A printer is required to obtain a paper copy of output. Dot matrix printers provide good draft-quality text printing and graphics output; letter quality printers, which are generally slower and more expensive, provide high-quality text printing but lack graphics capabilities. Digitizing tablets and plotters provide additional graphics input and output capabilities. A modem permits data communications via telephone lines between a microcomputer and a remote computer facility. Input/output ports are required to connect these peripheral devices to the microcomputer.

SOFTWARE

Microcomputer software can be divided into three major categories. The operating system software is the most fundamental; the operating system, which is usually supplied with the hardware, controls the overall operation of the microcomputer system. For example, the operating system permits the user to run programs, store data on disk, and access peripheral devices such as printers. Although no formal standards exist for operating systems, CP/M and MS-DOS are by far the most common choices for first and second generation microcomputers, respectively. (MS-DOS and UNIX are the early leaders for third generation operating systems.) Programming language software consists of the language interpreters and compilers required for engineering program development. A wide range of languages are available for microcomputers, with BASIC and FORTRAN the most popular for engineering programming.

The last and largest category is applications software, i.e., specific problem-solving programs. Popular applications software includes programs for word processing, data base management, spread sheet analysis, and graphics. Engineering planning, analysis, and design programs also fall into the applications software category.



Since not all software will run on all hardware, compatibility is a major concern when selecting a microcomputer system. One approach to this problem is to determine software requirements first and then obtain compatible hardware. An alternate approach is to select hardware for which a large base of software is already available; software can then be purchased in stages as specific needs become known. (This latter approach is in large part responsible for the great popularity of Apple II and IBM PC microcomputer.) Most commercially available software is copyrighted and licensed to a single microcomputer; thus, firms or agencies with multiple systems are legally required to purchase multiple copies of licensed software (quantity discounts can sometimes be negotiated with the software vendor). Some software is also copy-protected to prevent unauthorized duplication.

APPLICATIONS

Microcomputer applications in transportation engineering span a very broad range. Some of the more common areas include basic office automation (word processing, electronic filing and mail, management information and control) and engineering project management (estimating, scheduling, cost control). Particular transportation engineering analysis and design applications include:

- Capacity analysis (roads, intersections, signal timing)
- Demand forecasting models
- Surveying

- Geometrical design (route alignments, earthwork volume calculations)
- Network analysis
- Operations analysis (route planning and scheduling)
- Pavement design and evaluation
- Structural and foundation analysis and design (bridges, elevated facilities)
- Automated data collection (traffic surveys)

Many of the computer programs for performing these tasks can be obtained from commercial or government sources. Special applications may require in-house program development or conversion of existing mainframe computer programs.

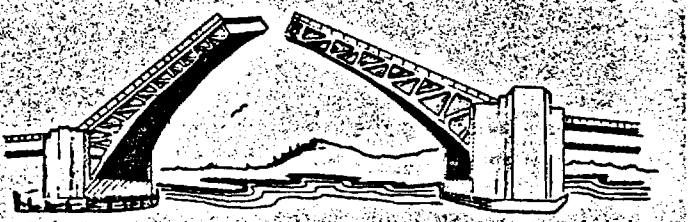
From Technotes, University of Maryland Technology Transfer Center, Spring 1985.

ACKNOWLEDGMENT

The Technology Transfer (T^2) Program is a nationwide effort financed joints by the Federal Highway Administration and individual State Departments of Transportation. Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation, to local and county highway and transportation personnel.

The T^2 Center at (Georgia Tech) is sponsored by the Georgia Department of Transportation and provides information and counsel to more than 500 municipalities and counties in our state. This newsletter is designed to keep you informed about new publications, new techniques, and new training opportunities that may be helpful to you and your community. Individuals wishing to receive future copies of this newsletter at no cost may send their requests to Mr. John Moskaluk, School of Civil Engineering, Georgia Tech, Atlanta, Georgia 30332.

SAFER BRIDGE RAILS



The "Executive Summary," Volume 1 of the four volume report Safer Bridge Rails, describes the research undertaken to develop guidelines to improve the safety characteristics of current bridge rails, built to meet the specifications of the American Association of State Highway and Transportation Officials (AASHTO). The research included a series of 60 mi/h (97 km/h) impacts into five selected rail systems and a rigid wall. These tests involved a range of vehicles from an 1,800 lb. (0.8 Mg) subcompact automobile to 32,000 lb. (14.5 Mg) bus impacting the barrier at various angles of impact to simulate various run-off-the-road conditions.

The design guidelines developed are an improvement upon those of an earlier National Cooperative Highway Research Program Report 230 (NCHRP 230). The measured results of an experimental impact may not match the effects of a "real" impact; however, these guidelines can be confidently used to design safer bridge rails.

A limited number of copies are available from Mr. R. S. Byington, Director, Office of Safety and Traffic Operations R&D, Federal Highway Administration, HSR-30, 6300 Georgetown Pike, McLean, Virginia 22101. This report and Volumes 2, 3, and 4 are available for purchase from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161.

MAINTENANCE TIPS

BRIDGE CURB AND RAILING REPAIR

Damage to bridge curb and railing could be the result of any accident or deterioration which decreases their effectiveness. Curb and railing damage may create a severe safety hazard, particularly if the railing is completely torn away. If not repaired, further deterioration may ultimately cause considerable damage and result in extensive repairs. The proper repair method for bridge curb and railing is shown below.

CREW REQUIRED:

Skilled Laborers	2
Laborers	2
Flagmen	2

EQUIPMENT REQUIRED:

Tool Truck	1
Flat Dump Truck	1
Portable Concrete Mixer or Portable Welder	1

MATERIAL REQUIRED:

Cement/Sand/Aggregate (as required)
Plywood
Metal Hand Rail (as required)

REPAIR PROCEDURE:

1 - Place signs and other safety devices.
2 - Remove damaged material and clean area.
3 - If metal rail--weld new rail into position.
If concrete--place forms. Install reinforcing steel and pour concrete. Cover with wet burlap.
4 - Cure and remove forms. Rub concrete surface.
5 - Clean up site and remove signs.

DECK REPAIR

Any damage to concrete bridge decks such as cracking, scaling or spalling of the concrete is referred to as deck damage. Damage to concrete bridge decks is caused by weathering, improper construction, lack of expansion joints, and/or inferior materials. Normally deck damage occurs in new bridges within a year of construction, in bridges subject to extreme temperature change and freezing, or where de-icing chemicals are used.

FIG. 1

Deck damage is not severe as long as it is limited to isolated areas. If large areas of the bridge deck show signs of damage, then the deck should be repaired as soon as weather permits to prevent further deterioration and to provide a good riding surface. Crack filling with asphalt is one technique for repairing bridge decks.

CREW REQUIRED:

Laborers	2
Flagmen	2
Truck Driver	1

EQUIPMENT REQUIRED:

Asphalt Kettle	1
Air Compressor	1
Dump Truck	1

MATERIAL REQUIRED:

Liquid Asphalt
Sand

REPAIR PROCEDURE:

1 - Place signs and other safety control devices.
2 - Clean out crack with stiff broom and compressed air.
3 - Fill crack with liquid asphalt using a pouring pot and a squeegee. Do not overfill and cause excess asphalt on surrounding pavement.
4 - Sprinkle surface with dry sand to prevent pick-up by traffic, Fig 1.
5 - Clean up area and remove signs.

NEWS BRIEFS

- Secretary of Transportation Elizabeth H. Dole has announced the appointment of 14 members to serve on the Department of Transportation's newly created Commercial Motor Vehicle Safety Regulatory Review Panel. "This blue-ribbon panel will spearhead our review of state truck safety laws and regulations, and is a major element of our nationwide effort to increase safety on our highways," Secretary Dole said. Appointees on the panel were selected from recommendations provided by the Senate Committee on Commerce, Science and Transportation and the House Committee on Public Works and Transportation.

- Another safety program announced by Secretary Dole is the "Railroad Crossing Corridor Improvements". This demonstration project will help states improve motorists' safety at thousands of low-volume railroad-highway grade crossings throughout the United States. It is a joint effort between the Federal Highway Administration (FHWA) and the Federal Railroad Administration and will be administered by FHWA's Demonstration Projects Division.

- Mr. Lester P. Lamm, Deputy Federal Highway Administrator, has been appointed to the Board of Directors of the International Road Federation (IRF). The IRF's main purpose is to encourage better road and transportation system worldwide.

- Hearings on infrastructure needs and the role of the Federal Government are planned for this Fall. Various hearings in several locations will be conducted by the House Public Works and Transportation Committee to solicit local views. A new national infrastructure bill will be developed based on the results of these hearings.

- A recent study by a committee of the Transportation Research Board indicated that one-third of all professional engineers working for state and county transportation departments are expected to retire during the next five years. The retirement of these employees may cause shortage of qualified transportation professionals unless steps are taken to improve productivity and recruitment efforts. In order to improve productivity, the report recommends increased training of mid-level professionals, using computer in design, maintenance, and other applications to increase efficiency.

- The National Stone Association (NSA) has contributed $10,000 to the Georgia Tech Foundation to aid in the purchase of testing equipment for the evaluation of stress-strain behavior for a wide range of granular materials and loading conditions. The computer-controlled, fully automatic stress path testing equipment (triaxial cell and consolidometer) will be capable of handling a six-inch diameter sample to study absolute relationships for rutting and resilient properties of crushed stone and other materials.

GEORGIA TECH

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SCHOOL OF CIVIL ENGINEERING

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1-800-282-1275

DIRECTOR : M. JOHN MOSKALUK

EDITOR : WASSIM SELMAN

SECRETARY: LINDA LASALATA

PUBLICATIONS

AVAILABLE FREE FROM

THE TECHNOLOGY TRANSFER CENTER

HANDBOOK OF COMPUTER MODELS FOR TRAFFIC OPERATIONS ANALYSIS

FHWA-TS-82-213

The use of computer models for analyzing traffic operational problems and evaluating proposed improvements is one of the newest araea of the foeld of traffic engineering. Consequently, many practicing engineers are not familiar with the concept, use, and application and/or the availability of these models. Yet, it is apparent that urban traffic engineers expend a considerable portion of their time in developing and evaluating alternative improvements relative to traffic operational problems, primarily signal systems, and that the use of these models could significantly benefit them.

This Handbook of Computer Models for Traffic Operations Analysis has been prepared to inform the practicing traffic engineer of the computer models which are available for developing and evaluating practical, day-to-day, transportation management problems. This handbook provides sufficient information to permit the reader to understand the practical applications of the more significant models and to select those models which would be most beneficial considering the capability of available personnel and equipment. Models described in the handbook are:

- SOAP (Intersection Optimization Model)
- TEXAS (Intersection Simulation Model)
- PASSER II (Arterial Optimization Model)
- PASSER III (Diomond Interchange Optimization Model)
- SUB (Arterial Bus Simulation Model)
- TRANSYT-7F (Network Optimization Model)
- SIGOP III (Network Optimization Model)
- NETSIM (Network Simulation Model)
- PRIFRE (Freeway Simulation Model)
- FREQ3CP (Freeway Optimization Model)

POTHOLE PRIMER - A PUBLIC ADMINISTRATOR'S GUIDE TO UNDERSTANDING AND MANAGING THE POTHOLE PROBLEM

U.S. Army Corps of Engineers
CRREL No. 81-21, September 1981

This is a revised version of the Pothole Primer published in 1981. It was prepared for the specific purpose of assisting elected officials and non-engineering administrators of cities, towns and counties in understanding and managing their pothole problems in asphalt pavements. This booklet, as the title suggests, is a primer on the subject and only highlights the major causes and general solutions. Many factors contribute to the increase in pothole occurrence. These factors are consolidated in this publication into eleven managerable categories so that readers could focus on each separately. The categories are:

1 - Financing.
2 - Traffic growth.
3 - Safety, legal and public relations aspects.
4 - Weather.
5 - Identifying and cataloging causes.
6 - Drainage.
7 - Preventive maintenance programs and pavement inventories.
8 - Utility cut control.
9 - Pothole patching procedures.
10 - Special focus on intersections and utility castings.
11 - Training and education.

THE ENGINEER'S POTHOLE REPAIR GUIDE

U.S. Army Corps of Engineers
CRREL No. 84-1, March 1984

Similar to the "Pothole Primer" in concept, this Engineer's Pothole Repair Guide is intended for highway engineers, superintendents, and maintenance managers.

Many highway engineers agree that expedient techniques for pothole patching are little more than exercises in futility. Nevertheless, proponents of such procedures claim that more permanent repairs are not cost effective, because maintenance personnel must spend too much time preparing the hole, compacting the mix, etc. In terms of dollars spent, this logic simply does not hold up. If a pothole is not permanently patched the first time, subsequent trips must be made to refill the hole. Each time the same pothole is patched, its expense to the agency increases.

Subjects covered in this twelve page guide are pothole causes and development, materials for patching, tacking material, sealing materials, patching equipment, repair procedures and pavement management.

PROCEEDINGS
WORKSHOP IN PAVEMENT REHABILITATION
Report No. FHWA-TS-84-224

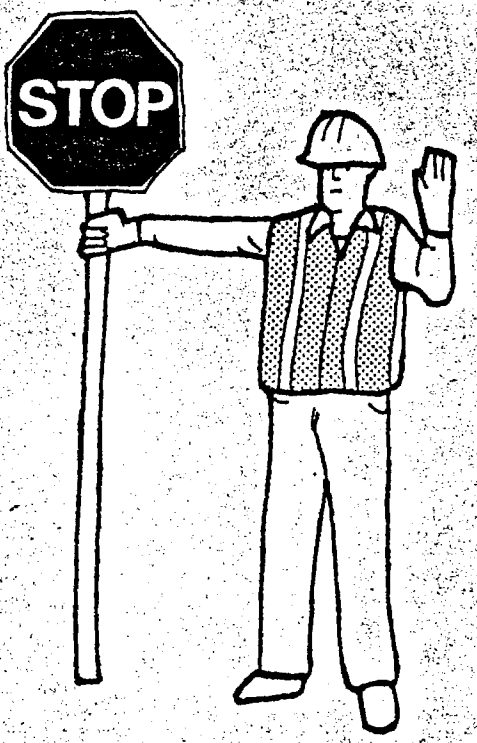
Of the 49 papers presented at this Workshop, 47 are reproduced in this report. The workshop was held in Salt Lake City, UTAH, September 17-20, 1984, and was attended by over 135 people from National, State, and local Governments, as well as industry and academia.

These proceedings cover most aspects of Asphalt Concrete Pavement and Portland Cement Concrete Pavement Rehabilitation including Recycling, Overlay Design, Relief Joints, Load Transfer and Drainage. Life Cycle costs, traffic loading, traffic control and maintenance were addressed. In addition, National Rehabilitation Policies, Perspectives of Industry, and ongoing research were discussed.

- Available from the National Technical Information Service, 5258 Port Royal Road, Springfield, Virginia, 22161

WORK ZONE TRAFFIC CONTROL - STANDARDS AND GUIDELINES
FHWA, 1980

Part VI of the Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD) is reproduced here as a



separate publication to meet the special demand for uniform standards for traffic control during construction and manintenance operations on streets and highways in the United States. The standards contained in this publication are applicable to all public roads regardless of type or class or agency having jurisdiction in accordance with title 23, U.S. Code, Sections 109(b), 109(d), and 402(a) and Highway Safety Program Standard 13, "Traffic Engineering Services."

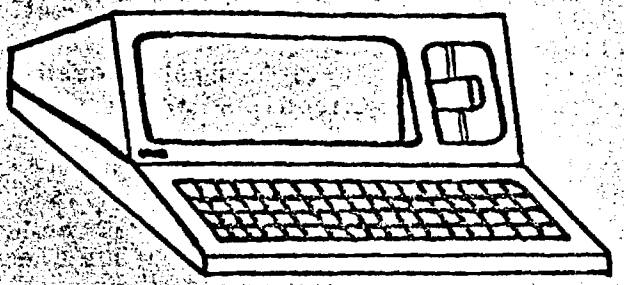
The need for standard controls is especially acute during roadway construction, maintenance, and utility (work zone) operations. Abnormal conditions are the rule, and therefore, traffic is particularly dependent on design, placement, and uniformity of traffic control devices to direct and guide it safely and efficiently through what would otherwise be hazardous areas. The constantly shifting and changing nature of work zone activity on or adjacent to the roadway requires frequent readjustments of traffic control devices in order to handle new situations.

SEMINARS AND WORKSHOPS

TECHNOLOGY TRANSFER COURSES

The following technology transfer courses will be held at the Georgia Department of Transportation (GDOT) District Offices on the dates shown below.

OFFICE APPLICATIONS OF MICROCOMPUTERS



This two-day microcomputer office applications course is designed to give the user hands-on-training. It includes an introduction to microcomputers, word processing on the microcomputer, and spreadsheet development. If you are considering introducing a microcomputer to your agency, we urge you to participate in this workshop. Contact your GDOT District Office to reserve your reservation. Workshop capacity is limited to 30 participants.

WORKSHOP LOCATION	DATE
JESUP (DIST. #5)	NOVEMBER 4-5, 1985
TIFTON (DIST. #4)	NOVEMBER 7-8, 1985
TENNILLE (DIST. #2)	NOVEMBER 12-13, 1985
THOMASTON (DIST. #3)	NOVEMBER 14-15, 1985
GAINESVILLE (DIST. #1)	NOVEMBER 18-19, 1985
CARTERSVILLE (DIST. #6)	NOVEMBER 21-22, 1985

RISK MANAGEMENT

What does tort liability mean to your local agency?

How could it affect you or/and your agency?

How can you protect yourself from negligence?

Answers to these and other questions will be discussed in this one-day risk management course. Do not miss an opportunity to participate in this course. Make plans now for you and others in your agency to attend. Contact your GDOT District Office for registration.

WORKSHOP LOCATION	DATE
JESUP (DIST. #5)	DECEMBER 11, 1985
TIFTON (DIST. #4)	DECEMBER 12, 1985
THOMASTON (DIST. #3)	JANUARY 7, 1986
TENNILLE (DIST. #2)	JANUARY 9, 1986
GAINESVILLE (DIST. #1)	JANUARY 14, 1986
CARTERSVILLE (DIST. #6)	JANUARY 16, 1986
ATLANTA (DIST. #7)	JANUARY 28, 1986

TRANSPORTATION RESOURCE MANAGEMENT FOR LOCAL ELECTED OFFICIALS

FEBRUARY 4-5, 1986

This two-day workshop has been specifically developed for elected officials of rural counties and small municipalities who have responsibilities for local road, bridge, and/or public transportation programs. Its purpose is to help such elected officials better understand the transportation management issues and techniques that they should consider and may choose to implement when improving their local trans-

portation programs and managing their resources. The workshop has been developed through the Rural Technical Assistance Program, sponsored by the Federal Highway Administration. It is restricted to elected officials and will be held in the Atlanta area. A location within the Atlanta area has yet to be selected. You will be notified as soon as the course location becomes known. If you should have any questions, please contact the Technology Transfer Center.

TENTH NATIONAL CONFERENCE ON SPECIALIZED TRANSPORTATION
Sarasote, Florida - November 18-20, 1985

Pre-Conference Technology Sharing Program on November 16-17. Fee is yet undetermined. The Conference is sponsored by Florida State University and partially funded by Florida Department of Transportation. For more information, contact Professor William Bell, 10 National Conference, 648 Bellamy Bldg., Florida State University, Tallahassee, Florida 32306; (904) 644-6874.

APWA EQUIPMENT SHOW
Macon, Georgia - February 11, 1986

On Tuesday, February 11. 1986, the Georgia Chapter, American Public Works Association will sponsor its annual Equipment Show. The show will be held at the Macon Coliseum in Macon, Georgia from 9 AM. to 5 PM. No registration fee and lunch will be available for only $3.00. Employees, managers, engineers, and administrators from local and state governments and contractors are invited to attend.

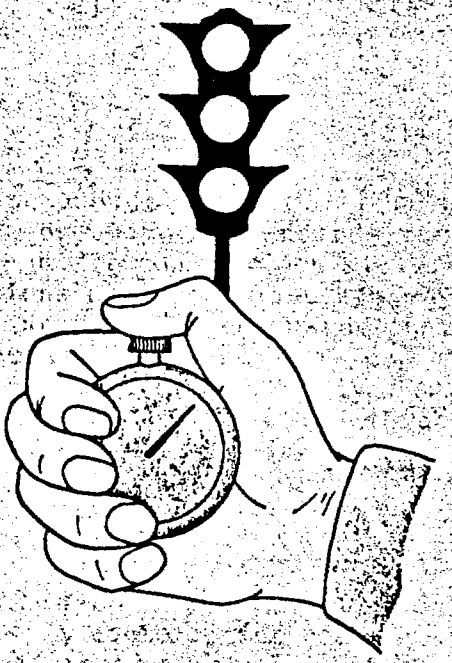
WORLD OF CONCRETE' 86
Atlanta, Georgia - February 16-20

Known as the International Exposition and Conference on Construction with Concrete, this one-week long event will include exhibits, seminars, demonstrations and a film festival. It will be held in the Georgia World Congress Center February 16-20, 1986. For pre-registration call 1-800-323-3550.

TRAFFIC SIGNAL WORKSHOPS

The following two Traffic Signal Workshops will be held at the Traffic Signal Laboratory of the School of Civil Engineering - Georgia Institute of Technology, Atlanta. Dr. Peter S. Parsonson, Ph.D., P.E., a professor at Georgia Tech, will direct the workshops assisted by Mr. Joe Thomas, Chief, City of Atlanta Traffic Engineering Division.

This series of workshops is open to nationwide enrollment and aimed at professional engineers and signal-design technicians.



TRAFFIC SIGNAL OPERATIONS AT LOCAL INTERSECTIONS
FEBRUARY 3-7, 1986.

Covers the application of pretimed, semi-actuated, basic full-actuated, and density controllers at individual intersections, as well as loop-occupancy controllers and their long-loop presence detectors. The course explores phase capacity, phase sequencing, and interval timing. It also focuses on the relationship between detector location and controller operation. Detector

OVER

FROM PAGE 11

hardware will be discussed and demonstrated, and special attention will be given to the design and installation of loop detectors.

Preemption, signal warrants, benefit analysis, microprocessors, NEMA specifications, conflict monitors and overlap cards are among the many other topics. Written work problems will supplement the lectures, demonstrations and films; eight hours of hands-on workshop sessions are scheduled over the five-day course.

TRAFFIC SIGNAL OPERATION IN COORDINATED SYSTEMS
MARCH 17-21, 1986.

Begins with the construction of time-space diagrams, manually and by computers, for preferencial and balanced flows, and then proceeds to the methods for implementing these time-space relationships on the street by means of various types of controllers, coordination units of computer software. After the treatment of the coordination of pretimed controllers, attention turns to synchrolizers and the concept of the background cycle as the foundation for learning the operation of advanced traffic-adjusted systems. Other topics include system features of NEMA controllers, before and after studies of effectiveness, communication-system technology, sensor location, zone delineation, and others.

There will be six hours of hands-on workshop sessions, supplemented by several written work problems, two field trips, and several films. Also each participant receives a computer solution of the optimal timing of an arterial of his or her own.

REGISTRATION

The fee for each course is $550. This amount includes all necessary classroom materials. For registration information write to: Department of Continuing Education, Georgia Institute of Technology, Atlanta, Georgia 30332-0385. Telephone, 404/894-2400

M. JOHN MOSKALUK
TECHNOLOGY TRANSFER
SCHOOL OF CIVIL ENGINEERING
GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

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GEORGIA INSTITUTE OF TECHNOLOGY
A UNIT OF THE UNIVERSITY SYSTEM OF GEORGIA

TECHNOLOGY TRANSFER CENTER VOL. 4 NO. 1 WINTER 1986

RESEARCH FACILITIES AT THE TURNER-FAIRBANK HIGHWAY RESEARCH CENTER

The next time you are in Washington, D.C., you are invited to visit the Federal Highway Administration's (FHWA) research laboratories at the Turner-Fairbank Highway Research Center (TFHRC). TFHRC is located approximately nine miles (15 km) north of the city on the George Washington Parkway.

The laboratories at TFHRC are used for in-house studies of chronic highway problems, quick response to emergency problems, and development of staff capabilities. These indoor and outdoor laboratories provide significant support to the five major research categories--highway operations, pavement technology, safety, traffic operations, and structures and hydraulics.

The laboratories in the Fairbank Building are:

- Aerodynamics Laboratory. The George S. Vincent Memorial Wind Tunnel has been modified to test scale models of suspension and cable-stayed bridges under controlled laminar or turbulent flow conditions. Through the use of the wind tunnel, researchers can check new designs of suspended bridges as well as investigate the aerodynamic behavior of existing long span bridges.

- Bituminous Mixtures Laboratory. The laboratory is used to perform and determine suitability of mix designs for asphalt concrete using various mixing and compaction procedures; analyze in service asphalt concrete pavements by extraction, recovery tests, and other measurement methods; evaluate the water damage susceptibility of asphalt-aggregate combinations; and determine the effectiveness of various laboratory testing procedures and their relations to field performance.

- Chemistry Laboratory Complex. This complex consists of the Chemistry; Spectroscopy and Chromatography; Paint and Coatings; Electron Microscopy; and Asphalt Testing Laboratories, which are dedicated to staff research and providing solutions to unique technical problems submitted on a quick-response basis by state highway agencies and FHWA field and headquarters units.

- Concrete Technology Laboratory. In this laboratory, reinforced concrete bridge corrosion problems are researched, test samples are made for a unique outdoor bridge deck exposure site, and special concrete mixture designs are tested.

The laboraties in the Turner Building are:

CONTINUED ON PAGE 6

EDITOR'S NOTE

This is the first TechTrans issue of 1986, and as you probably have noticed its color has changed. TechTrans will keep this color throughout 1986.

During the past year, the Georgia Tech Technology Transfer Center conducted various workshops, responded to numerous requests for technical assistance, and distributed over 6,000 newsletters. We hope that 1986 will be a more productive year for the Center and for your agency.

The following is a summary of the Center activities during 1985.

WORKSHOPS

Title	Participants
Rights-Of-Way Acquisition	363
Hydraulics	31
Geotextiles	50
Uniform Traffic Control Devices Manual	52
Bridge Rehabilitation	51
Total Participants =	547

TECHNICAL ASSISTANCE

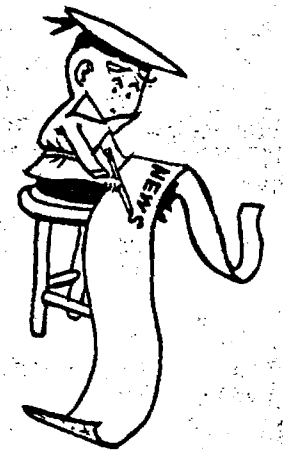
The Center responded to 29 requests for technical assistance.

NEWSLETTERS

	Copies Distributed
Winter 1985	1500
Spring 1985	1550
Summer 1985	1600
Fall 1985	1600

TRAFFIC DATA COLLECTION EQUIPMENT

Agency	Number of Recorders	Counts
Clayton County	8	64
City of Carrollton	8	41
City of Decatur	2	11
City of Dalton	7	19
City of Waycross	5	9
Total Counts =		144



NEWS BRIEFS

- The 1985 American Public Works Association's (APWA) Distinguished Service Award went to Ray Barnhart, Administrator, Federal Highway Administration. Barnhart is the fifth person to receive this award since its first presentation in 1972.

- According to the Federal Highway Administration (FHWA), the nation's highway system will require $16.5 billion a year through the turn of the century to maintain 1983 road conditions. The figures do not include additional $10 billion a year for bridge repairs.

- The Road Information Program (TRIP) estimates that driving over bad roads costs the average driver an extra $210 annually. This is equivalent to a total additional cost exceeding $30 billion a year. Wasted fuel accounts for approximately 78 percent of the additional cost.

- The latest technology in road testing is a machine that uses laser to measure the roughness, ruts, cracks, surface texture, and cross frofiles of pavements. This Swedish-built machine uses two microcomputers to record data as minute as cracks a tenth the width of a fingernail. Used in Oakland, California to test 822 miles of streets, the machine has saved the city over $300,000.

- Three communities, two in Virginia and one in California, received Grand Awards from the American Automobile Association (AAA) for their efforts in Pedestrian Protection. The AAA Grand Award was given to Henrico County and the city of Marion, Virginia, and to the city of San Jose, California.

MAINTENANCE TIPS

ABUTMENT REPAIR

Abutment repair is needed when cracks occur at abutments, endwalls, wingwalls, and/or retaining walls. These cracks are the result of base settlement, improper construction techniques, and/or weather deterioration. They are found in bridges with heavy loads or within a year after construction of a new structure.

Abutment cracking is not a severe problem when it is properly repaired and maintained. If not repaired, structural failure may occur, forcing closure of the bridge and extensive structural repairs. The repair method is outlined below.

CREW REQUIRED

Skilled laborers	2
Laborers	3
Flagmen	2

EQUIPMENT REQUIRED

Tool truck	1
Dump truck	1
Portable concrete mixer	1
Air compressor	1

MATERIAL REQUIRED

Cement/sand/aggregate
Lumber

REPAIR PROCEDURE

1. Place signs and other safety devices.
2. Remove material from around section to be repaired.
3. Apply bonding agent (neet cement can be used).
4. Replace deteriorated section with concrete.
5. Cure and rub new concrete.
6. Clean up area and remove signs.

STRUCTURAL PAINTING

Structural painting is needed when there is bridge deterioration due to lack of painting or general unsightliness due to vandalism.

Steel structural members of bridges should be painted every 6-8 years to prevent deterioration and ultimate structural failure. Intermittent painting may be required to correct damage caused by vandalism. While lack of painting over periods exceeding 8 years may create a deficiency, damage by vandalism does not lead to a severe deficiency.

The proper method of painting bridge structures is described below.

CREW REQUIRED

Sandblast operator	1
Painters	2
Laborers	2
Flagmen	2

EQUIPMENT REQUIRED

Stake truck	1
Dump truck	1
Air compressor	1
Sandblaster	1
Paint sprayers	1

MATERIAL REQUIRED

Sand
Paint

REPAIR PROCEDURE

1. Place signs and other safety devices.
2. Position scaffold.
3. Sandblast only area that can be primed on same day.
4. Apply primer.
5. Allow drying time. Apply finish coat.
6. Remove scaffold and clean up.

MICROCOMPUTERS, MODEMS HELP ELIMINATE TRAFFIC JAMS

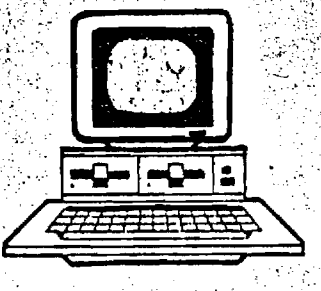
Microcomputers and modems can improve traffic flow and reduce congestion for motorists nationwide. For example, one closed-loop system, using a microcomputer and a modem, helps monitor traffic flow at key intersections. When traffic patterns change because of rush hour or other reasons, the system changes the timing of traffic signals to accommodate the increased traffic. The signals can be changed automatically according to either the time of day or the amount of traffic passing through the intersection. Signals can also be set manually by means of the microcomputer from a central location.

The system saves motorists the time and frustration of traffic jams and helps regional planning by giving officials information on traffic growth and problems.

The system is composed of three elements: local signal controllers, on-street "masters," and a centrally located Apple IIe microcomputer. The local signal controllers are linked with the "master" by two pairs of dedicated cable while masters communicate with the central microcomputer using a Hayes Micromodem IIe over standard dial-up lines.

The local signal controllers use up to eight sensors embedded in the roadway to detect the volume and speed of traffic. The information is transmitted to a master, which then changes the timing of traffic lights to maintain traffic flow. The timings are set from a library of 60 traffic patterns based on the time of day and sensor data.

The master continually monitors up to 30 local controllers to ensure that they are working properly and that traffic is moving well. Whenever a traffic signal goes out or other malfunctions occur, an error message is sent through the modem to the microcomputer in the central office. In many cases, the traffic engineers can correct the malfunction by sending a signal back to the master. If the controller still does not work, maintenance personnel can be sent to the scene. In the meantime, faulty traffic signals automatically begin flashing.



Gwinnett County, a suburb northeast of Atlanta, has supplemented the fail-safe mechanism with a device that "pages" a repairman. When a local controller fails, the modem dials a paging service, which then relays a 10-digit code to a technician. The code tells the technician both the location and cause of the problem, according to James Gawlas, traffic signal engineer for the county.

"The use of computers to control traffic flow is not new," says Joe Thomas, chief traffic engineer for the city of Atlanta. "What's new is the use of a microcomputer and a modem to do a job that used to be done by a mainframe.

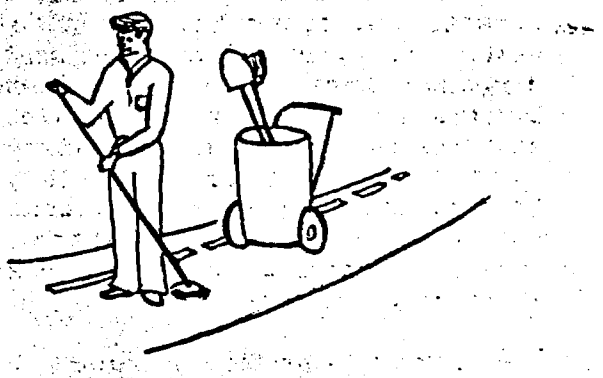
In Atlanta, the closed-loop system is currently installed at Hartsfield International Airport and in the Cleveland Avenue neighborhood. The system was installed at the Atlanta airport to accommodate both the unpredictable nature of peak air travel arrivals and departures and employee shift changes resulting from round-the-clock operations. Atlanta is also planning to install another system in the northern part of the city.

The system was first installed in Atlanta in February, 1984, and has been working well, Thomas reports. "At first we had doubts whether the system could withstand the rigors of operating on the street," he said. "In the summer, temperatures inside the master control box hit 130°F and fall to -8°F in the winter. But we've never had a failure with the modem and are extremely pleased with its performance."

From "Better Roads," September 1985.

HOW CLEAN ARE YOUR STREETS?

by Al Sanders
Street Cleaning Administrator
City of Savannah, Georgia



How do you determine if your streets are clean? At the 91st Annual APWA Congress in Los Angeles, this question was raised in a meeting involving contractors and city officials. One official said "they are clean if I say they are clean." Another stated that street cleanliness was measured by the number of complaints they received. Some felt that the frequency with which the streets are swept determined the cleanliness. It is difficult to measure street cleanliness. The fact that leaves have fallen or mud and sand have washed into the streets or litter is up to the curb tops is fairly obvious, but does little to determine the cleanliness level or to compare the cleanliness of one section of town to others. When Savannah decided they wanted an equal level of street cleanliness through the city, it was apparent that some reliable measure had to be devised to quantify those levels. Savannah's Equal Cleanliness System has been in operation for three years and the rating of the cleanliness level of streets is the key to success.

Savannah is divided into Planning Units for purposes of comparing cleanliness levels in different parts of the city. Every curbed and paved street within each of the 28 planning units is scheduled for sweeping on a weekly, bi-weekly, or monthly day-time schedule or a weekly, twice a week, or four times a week night-time schedule. The schedules are set up according to predicted need in order to achieve equal cleanliness. The schedules are rewritten if one area of town is rated lower than the others.

The rating system is complex and time consuming, but necessary if equal levels of cleanliness is to be obtained. A separate schedule is written annually so that every curbed and paved street is rated once during the year. Four days a week, the day-time supervisor rates approximate ten streets. The rater has pictures and descriptions of cleanliness levels with zero as the worst and four as the best. Except when the supervisor is sick or on vacation, no one else rates the streets. Each street is rated halfway between the time it was last swept and the time it is scheduled to be swept next. Representative streets from all planning units are rated each quarter and trends are plotted to determine which areas need more or less attention.

The goal is to have all the curbed and paved streets in each Planning Unit at the 3.0 level. Special attention is given to neighborhoods with ratings significantly below 3.0, and sweeping frequencies are changed if they remain low.

Changes in schedules are not made based on any one quarterly rating. The ratings fluctuate in a fairly predictable pattern throughout the year depending on rainfall patterns, wind patterns, and leaf fall patterns. Neighborhoods that are being monitored are compared during the same quarter of two successive years, since the conditions are assumed to be similar.

Whenever unpredictable rainfall patterns are encountered, it is extremely difficult to make a statistical determination of the cause of a low quarterly rating in any given neighborhood. During period of unseasonable heavy rain and wind, all neighborhoods fall below the predicted rating for that quarter.

The leaf fall pattern varies from year to year. If we have heavy winds when the leaves first start to fall, they pile up deep and are extremely difficult to sweep up. The result is low ratings for a short

CONTINUED ON PAGE 8 COL. 1

FROM PAGE 1

- Environmental Instrumentation Laboratory. Designed to operate in conjunction with a mobile field measuring laboratory, the laboratory serves principally to develop instrumentation systems for traffic noise research and analysis of field data using noise simulation models and desktop computer systems.

- Human Factors Laboratory. Fundamental studies conducted in this laboratory evaluate the potential effectiveness of new or modified traffic control devices through improvements in conspicuity, legibility, and message identification and comprehension.

- Highway Driving Simulator (HYSIM) Laboratory. HYSIM, a first generation, fully interactive research simulator, is used to evaluate drivers' reactions to new or modified highway signs, signals, markings, or other traffic control devices; measure driver performance in various roadway situations and environmental conditions; and review the relative effectiveness of developmental traffic control systems.

- Highway Electronics Laboratory. This laboratory is used to conduct staff studies and provide electronic support to the Offices of RD&T and other elements of FHWA; to develop prototype traffic control devices; and to design, fabricate, and maintain specialized instrumentation systems for other laboratories at the TFHRC.

- Hydraulics Laboratory. A 6-ft x 70-ft (1.8 m x 12.3 m) tilting flume with a 15-ft^3/s (0.42 m^3/s) flow capacity is used for scale modeling of highway drainage design problems associated with large drainage structures and culverts, storm water runoff from highways or adjacent watersheds, and streambed stability near bridge piers.

- Pavement Performance Laboratory. Evaluations of both pavement material components and full-scale pavement sections are conducted in this laboratory to verify design procedures and develop predictive design equations.

- Roadside Safety Library (RSL). This data library serves as a central clearinghouse for all analysis, design, and testing information related to highway safety appurtenances.

- Structures Laboratory. This laboratory permits environmentally controlled static and dynamic load experiments of large-scale bridge models or full-scale bridge sections or components to identify and solve serviceability and load capacity problems of highway bridges and to evaluate new concepts for inspecting, strengthening, and rehabilitating bridges and increasing their load capacity.

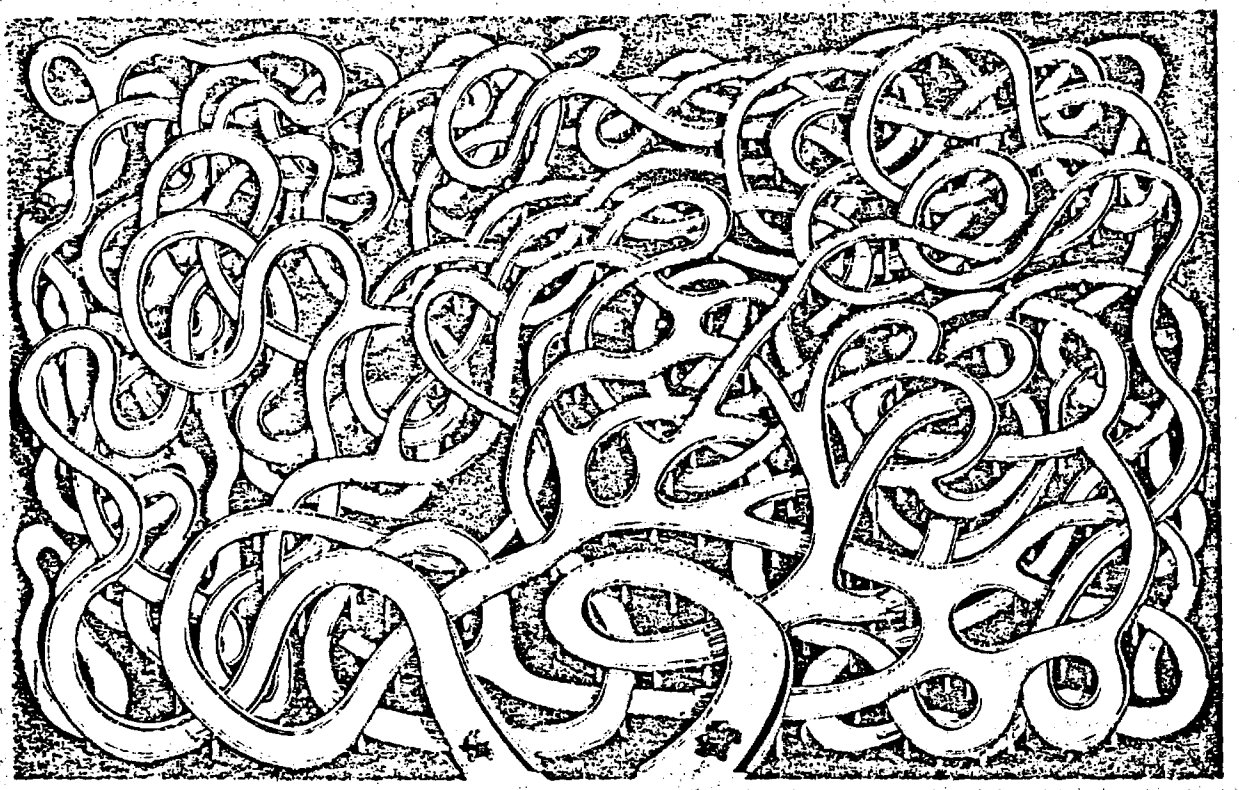
The outdoor laboratories are:

- Bridge Foundation Test Facility. This is a foundations testing facility for evaluating new design and construction concepts for spread footings and pile foundations.

- Federal Outdoor Impact Laboratory (FOIL). This specialized crash impact testing facility is used for inexpensive physical testing of sign and luminaire supports using a reusable "bogie" test vehicle.

- Pavement Test Facility. This facility is for accelerated mechanical testing of pavements to determine their field performance.

In addition, TFHRC houses the following general support facilities: the RD&T Computer Center; a mechanical design and fabrication shop; the RD&T Report Center; the Technical Reference Section; a vehicle preparation area in which vehicle data collection instrumentation systems or special test vehicles are developed, calibrated, and maintained; and the Technology Laboratory to determine better methods for timely technology transfer and to establish improved methods for using microcomputer technology and communicating new technology to field users.



THE FREEWAY

This interchange was designed by a new computer with a fail-safe program. Can you find your way through it WITHOUT a computer?

TRAFFIC ENGINEERING SERVICES FOR SMALL POLITICAL JURISDICTIONS

The report, Traffic Engineering Services for Small Political Jurisdictions, describes several ways in which smaller jurisdictions, less than 50,000 population, can obtain traffic engineering services. The more beneficial and productive methods for obtaining these needed services are:

1. Increasing emphasis on training programs for in-house staff.
2. Increasing emphasis on the use of in-house traffic engineering technicians, supplemented by outside professional level traffic engineers.
3. Using regional or "circuit" traffic engineers who serve a number of jurisdictions on a part-time or as-needed basis, and who may be funded by a consortium of local jurisdictions, or by any combination of funding sources.
4. Using traffic engineers employed by larger jurisdictions and State agencies by formal contract or other type of agreement.
5. Using private traffic engineering firms on an as-needed basis.
6. Using college and university traffic engineering professionals.
7. Using automobile associations, insurance companies, service clubs, and the media to gain support of the citizenry for improved services.
8. Seeking an exchange of ideas and possible solutions to problems by attending professional association meetings, seminars, and workshops.

A copy of this report, FHWA-RD-IP-77-6, may be obtained from this Technology Transfer Center. Additional information about the findings of this report may be obtained from Mr. Howard H. Bissell, Traffic Safety Research Division, HSR-30, 6300 Georgetown Pike, McLean, Virginia 22101; Mr. Bissell's telephone number is (703) 285-2428.

GEORGIA TECH

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period of time. A steady leaf fall over a long period results in low ratings over the entire period.

In analyzing the results of the ratings, it is important to look for trends over a long period of time. The need for change in a particular neighborhood that is rated low every quarter is easy to recognize. The neighborhoods that get statistically close to 3.0 must be closely monitored and the seasonal variations considered before schedule changes are made.

In order for a rating system to work, every paved and curbed street must be scheduled for sweeping and must be swept when it is scheduled. This can only be accomplished if the department responsible for sweeping has enough personnel and equipment to meet the schedules every single sweeping day. The cooperation of the Maintenance Department is essential. Sweepers must receive priority maintenance. They must be repaired as soon as they break down, even if the repairs must be made on weekends. The parts historically required to keep sweepers operating must be purchased and stocked locally.

How clean are your streets? Do you have a way to measure the levels of cleanliness and document the results? Are steps taken to increase sweeping in areas that do not meet the minimum standards? Is your city willing to invest the money required to attain a high level of cleanliness in all areas of the city? If equal levels of cleanliness are important in your city, all of these questions need to be addressed and answered. Savannah is committed to equal cleanliness at a high level, and the rating system current in use is the key to successful acocmplishment of our goal.

From "Urban Georgia," November 1985.

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pretimed controllers, attention turns to synchrolizers and the concept of the background cycle as the foundation for learning the operation of advanced traffic-adjusted systems. Other topics include system features of NEMA controllers, before and after studies of effectiveness, communication-system technology, sensor location, zone delineation, and others.

There will be six hours of hands-on workshop sessions, supplemented by several written work problems, two field trips, and several films. Also each participant receives a computer solution of the optimal timing of an arterial of his or her own.

REGISTRATION

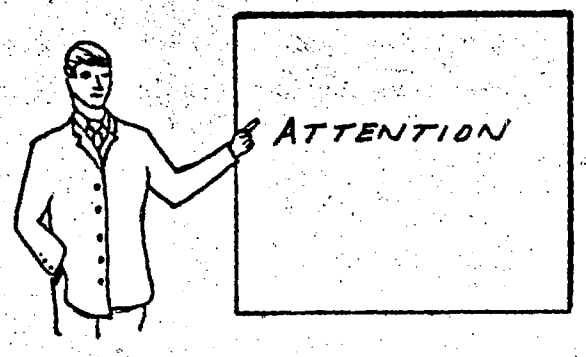
The fee for the course is $550. This amount includes all necessary classroom materials. For registration information write to: Department of Continuing Education, Georgia Institute of Technology, Atlanta, Georgia 30332-0385. Telephone, 404/894-2400

ACKNOWLEDGMENT

The Technology Transfer (T^2) Program is a nationwide effort financed joints by the Federal Highway Administration and individual State Departments of Transportation. Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation, to local and county highway and transportation personnel.

The T^2 Center at (Georgia Tech) is sponsored by the Georgia Department of Transportation and provides information and counsel to more than 500 municipalities and counties in our state. This newsletter is designed to keep you informed about new publications, new techniques, and new training opportunities that may be helpful to you and your community. Individuals wishing to receive future copies of this newsletter at no cost may send their requests to Mr. John Moskaluk, School of Civil Engineering, Georgia Tech, Atlanta, Georgia 30332.

WORKSHOPS...CONFERENCES...SEMINARS



PORTLAND CEMENT ASSOCIATION COURSE

Troubleshooting Concrete Field Problems
April 7-11, 1986
Skokie, Illinois

Cement and concrete industry customers and technical problem-solving personnel will benefit from this Portland Cement Association class.

The course is designed especially for those responsible for handling field problems for contractors, precasters, inspection and testing agencies, architects, and federal, state, county and city engineering departments. It will focus on identifying and discussing problems of durability, ready mix concrete production and transportaion, admixture use, concrete placement, fabrication and construction and precast prestressed concrete structures, slabs on grade, quality control procedures, strength test evaluation, repair and maintenance of concrete surfaces and structures, and ways to determine in-place concrete strengths.

The five-day course will be conducted at the Portland Cement Association Cement and Concrete Center, Skokie, Illinois. Enrollment is limited to 28 to assure individual attention. The registration fee is $975.

For more information, contact the registrar, Educational Services Department, Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60077 - Telephone (312) 966-6200.

"The Fourth International Conference on Low-Volume Roads"
August 16-20, 1987
Ithaca, New York

This five-day conference provides an opportunity for the exchange of up-to-date information on research that is applicable to the problems of low-volume roads. The conference is sponsored by the Transportation research Board (TRB), National Research Council and is held once every four years. The previous conference was held in Tempe, Arizona and was attended by over 185 people, representing nearly all of the states in the U.S. plus 20 foreign countries.

A meeting announcement and a call for papers will be published before the end of the year. If you are not a member of TRB, but you would like to receive the meeting announcement, write to Neil Hawks, Transportation Board, 2101 Constitution Avenue N.W., Washington, DC 20418 - Telephone (202) 334-2957.

TRAFFIC SIGNAL OPERATION IN COORDINATED SYSTEMS
March 17-21, 1986.
Atlanta, Georgia

This Workshop will be held at the Traffic Signal Laboratory of the School of Civil Engineering - Georgia Institute of Technology, Atlanta. Dr. Peter S. Parsonson, Ph.D., P.E., a professor at Georgia Tech, will direct the workshop assisted by Mr. Joe Thomas, Chief, City of Atlanta Traffic Engineering Division.

The workshop is open to nationwide enrollment and aimed at professional engineers and signal-design technicians. It begins with the construction of time-space diagrams, manually and by computers, for preferencial and balanced flows, and then proceeds to the methods for implementing these time-space relationships on the street by means of various types of controllers, coordination units of computer software. After the treatment of the coordination of

CONTINUED ON PAGE 8 COL. 2

AVAILABLE FREE FROM THE TECHNOLOGY TRANSFER CENTER

The following publications are available free from the Georgia Tech Technology Transfer Center. If you would like to have any of these publications, please let us know. You can call the Center at (404) 894-2360 or 1-800-282-1275.

TITLE	PUBLISHER	NO. OF COPIES
Manual on Collecting Work Zone Accident Data	FHWA, 1982	38
Synthesis of Safety Research Related to Traffic Control and Roadway Elements Brochure	FHWA, 1982	25
Upgrading Deficient Through Truss Bridges	FHWA, 1982	6
Rail-Highway Crossing Resource Allocation Procedure Users Guide	FHWA, 1982	6
Field Maintenance Manual for Georgia Counties Local Roads and Streets	Georgia Tech, 1975	8
The Hole Story	APWA, 1983	17
Decay in Wood Bridges: Inspection and Preventive and Remedial Maintenance	U.S. Dept. of Agriculture, 1983	13
Our Nations Highways- Selected Facts and Figures	FHWA, 1981	150
UMTA Technical Assistance- A Guide for Users	UMTA, 1984	17
Pothole Primer, Special Report	U.S. Corps of Engineers, 1985	200
Guidelines for Making Pedestrian Crossing Structures Accessible	FHWA, 1984	4
Hydrology	FHWA, 1984	7
Highway Safety Overviews	FHWA, 1984	2

TITLE	PUBLISHER	NO. OF COPIES
A Procedure for Determining Frequencies to Inspect and Repair Highway Safety Hardware	FHWA,1983	4
Georgia Truck Weight Laws and Traffic Control Workshop	Georgia Department of Transportation	117
Practical Guidelines for Minimizing Tort Liability	NCHRP 106, 1983	20
Synthesis of Safety Research Related to Traffic Control and Roadway Elements		
Volume 1	FHWA, 1982	9
Volume 2	FHWA, 1982	9
Compilation of State Laws and Regulation on Materials Affecting Rail-Highway Crossings	Association of American RailRoads, 1983	14
Paying for Transportation at Local Level: 17 Strategies	APWA	50
Value Engineering Contract Provisions on Federal-Aid Highway Construction Projects	FHWA, 1984	5
PROCEEDINGS: Fourth Annual Pedestrian Conference	FHWA, 1984	6
Operation and Performance of Drum Mix Plants	FHWA, 1984	4
Accident Research Manual	FHWA, 1980	13
A Basic Asphalt Emulsion Manual	The Asphalt Institute, 1980	30
Quality Assurance for Local Governments	FHWA, 1983	25
Handbook of Computer Models for Traffic Operation Analysis	FHWA, 1982	11
Road Surface Management for Local Governments	U.S. DOT	20
Mastering Traffic Engineering	Military Traffic Management Command, 1981	3
Pavement and Shoulder Maintenance Performance Guides	FHWA, 1984	23

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TITLE	PUBLISHER	NO. OF COPIES
Reflective Cracking on Bituminous Overlays on Rigid Pavements	FHWA, 1984	7
The Engineers Pothole Repair Guide	U.S. Corps of Engineers, 1984	10
Drainage of Highway Pavements	FHWA, 1984	3
Priority Accessible Network for the Elderly and Handicapped Pedestrians in New Orleans	FHWA, 1984	4
Work Zone Traffic Control	FHWA, 1980	32

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