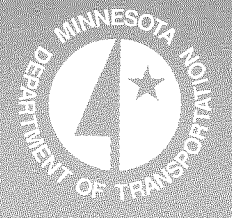
92-04

Research and Development
"Implementing research findings"



Infrastructure Management Software Use in Minnesota

In cooperation with the
Local Road Research Board
"Sponsoring research for county
and municipal roads and streets"

Acknowledgment

This project was funded by the Minnesota Local Road Research Board (LRRB). Legislation creating the Board was passed in 1959. The board appointments are made by the Commissioner of the Minnesota Department of Transportation (Mn/DOT). It includes four county and two city engineers whose terms are set at a maximum of two 3-year positions. Persons serving from Mn/DOT include the Director of the Research Administration Office, the State Aid Engineer, and the Research Administration Engineer, who also serves as secretary. A representative from the University of Minnesota serves as the tenth member.

Monies for LRRB projects come from municipal and county state aid funds (up to 1/4 of one percent). This money is put into a research account and is used for:

- Conducting research for improving the design, construction, maintenance and environmental compatibility of state aid highways.
- Constructing research elements and reconstructing or replacing research elements that fail.
- Conducting a program for the monitoring and implementation of research results.

The program is approved on a calendar year basis by the LRRB Board.

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The purpose of this report is to give an overview of the number of Minnesota agencies that use Infrastructure or Pavement Management software and provide information as to their common components and requirements. Software of this type is used to store and analyze the various components of an agency's infrastructure. This might include such things as streets, highways, bridges, signs, utilities, etc. Most systems of this type are capable of data storage, retrieval, analysis and forecasting or projecting future conditions and need for maintenance.

A Federal Highway Administration policy, issued January 13, 1989, requires all states to have a fully operational Pavement Management System (PMS) within four years of the issuance of the policy. As more and more states implement a PMS, the number of county and city agencies will also likely increase. This report reviews the current status of Minnesota cities and counties in terms of their implementation and use of software of this type.

17. Document Analysis a.Descriptors

infrastructure management software
pavement management software
pavement management system
PMS
IMS
software
infrastructure

b.Identifiers/Open-Ended Terms

c.COSATI Field/Group

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INFRASTRUCTURE MANAGEMENT SOFTWARE USE IN MINNESOTA

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The opinions, findings and conclusions in this publication are those of the author and not necessarily those of the Minnesota Local Road Research Board or the Minnesota Department of Transportation

FOREWORD

The purpose of this report is to review the current status of infrastructure or pavement management software use by Minnesota cities and counties. The report is based largely on a survey conducted during 1991 by the authors. This survey was sent to over 200 Minnesota city and county agencies. The report contains the names and general capabilities of the software which is currently being used by the responding agencies for infrastructure or pavement management.

The authors wish to acknowledge the contributions of the Minnesota city and county engineers and street/highway superintendents for their cooperation in completing the survey which comprises a large portion of this report. Individuals who also helped greatly in the preparation of this report are Anne Mackereth and Sheila Hatchell of the Mn/DOT Information Services Center.

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the information presented. The contents do not necessarily reflect the official views of the Minnesota Local Road Research Board (LRRB) or the Minnesota Department of Transportation (Mn/DOT).

ABSTRACT

The purpose of this report is to give an overview of the number of Minnesota agencies that use Infrastructure or Pavement Management Software and provide information as to their common components and requirements. Software of this type is used to store and analyze the various components of an agency's infrastructure. This might include such things as streets, highways, bridges, signs, utilities, etc. Most systems of this type are capable of data storage, retrieval, analysis and forecasting or projecting future conditions and need for maintenance.

A Federal Highway Administration policy, issued January 13, 1989, requires all states to have a fully operational Pavement Management System (PMS) within four years of the issuance of the policy. As more and more states implement a PMS, the number of county and city agencies will also likely increase. This report gives an overview of the current status of Minnesota cities and counties in terms of their implementation and use of software of this type.

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BACKGROUND

Infrastructure Management Systems (IMS), and particularly Pavement Management Systems (PMS), have become familiar terms in recent years to most people connected with maintaining pavements and the infrastructure. Webster defines Infrastructure as "The underlying foundation or basic framework (as of a system or organization)". The term infrastructure is being used more often than in past years as pavement management systems begin to include other components of the infrastructure such as bridges, signs, utilities, lighting etc. An IMS normally involves a systematic approach for maintaining and rehabilitating an agency's infrastructure.

With the continued growth of the micro-computer industry, computerized IMS and PMS systems are rapidly becoming invaluable tools to cities and counties. The computer enables the user to collect, store and analyze large amounts of data that would have been too cumbersome without computer aid. As a result more data is readily available. This can help determine which components of an agency's infrastructure need maintenance and give insight into what type of maintenance or rehabilitation is most appropriate.

A IMS or PMS can benefit an agency in a number of ways. Some of the potential benefits derived from using a computerized IMS or PMS are:

- It can recommend the proper maintenance at the proper time.
- It can assist with decisions on where to spend limited maintenance funds for the maximum benefit.
- It can aid in presenting the need for maintenance on certain components of the infrastructure to both elected officials and the public.
- It can lead to a better overall quality of your infrastructure.
- It can provide information to constituents concerning when and where maintenance or infrastructure improvements have taken place.

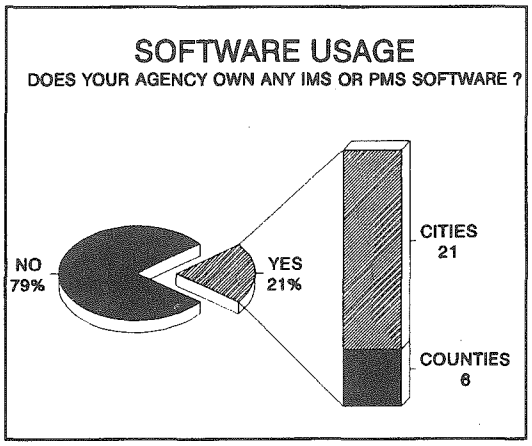
The purpose of this report is not to define what pavement management is about, but rather to evaluate the usage and components of software used for this purpose by Minnesota cities and counties.

RESULTS OF LOCAL ROAD RESEARCH BOARD SURVEY

Recently, a questionnaire was sent out to over 200 city and county agencies concerning their use of infrastructure management software. Responses were received from 130 agencies (50 city, 51 county and 29 unknown agencies). The more meaningful results of the survey are presented below. Cost information is not presented in this report due to large number of software packages that were developed in-house and for which no cost data was provided. Also many of the software packages developed by consultants or vendors contain costs for data collection, entry, reports and presentations. As a result, the cost of the software itself is difficult to determine.

SOFTWARE USAGE

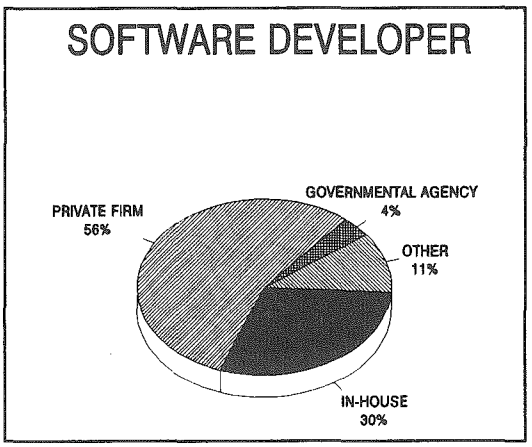
Of the 130 agencies responding to the survey, only 27 (21%) indicated that they currently have IMS or PMS software. In comparison to counties, cities had a significantly higher number of agencies that have a IMS or PMS software. Of those agencies indicating that they have an IMS or PMS, 78% (21) were cities while only 22% (6) were county agencies.



Why so many more cities than counties have a system is unclear. It may have to do with the software systems on the market catering to city needs more so than to counties. Another reason might be greater accountability from citizens at the city level.

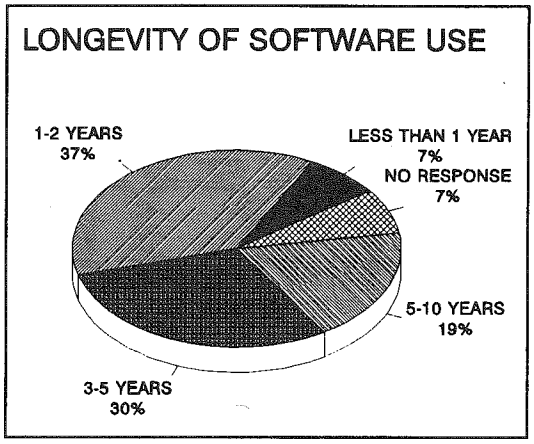
SOFTWARE DEVELOPER

The survey also reveals that five out of the six county agencies (83%) developed their software in-house. This compares with only 3 of the 21 cities (14%) that developed their software in-house. The reason for high percent of the county agencies developing their own software may be due the fact that most counties have a computer or MIS department while most cities don't. This would explain why most cities have used software developed by an outside source. The larger cities may have computer departments, such as the City of St. Paul which has developed it's own system.



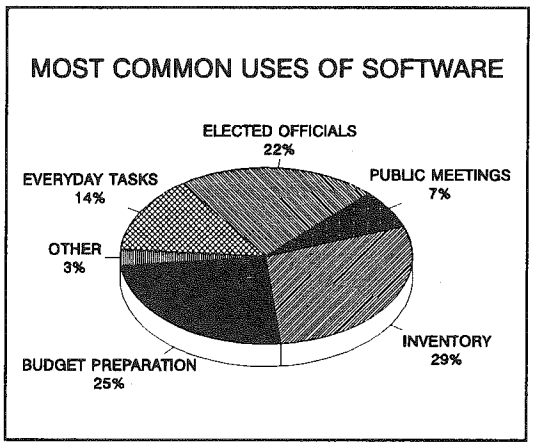
LONGEVITY OF SOFTWARE USE

Most agencies with IMS or PMS software have been using it for less than five years. There is one county and four cities that have been using their software more than five years.



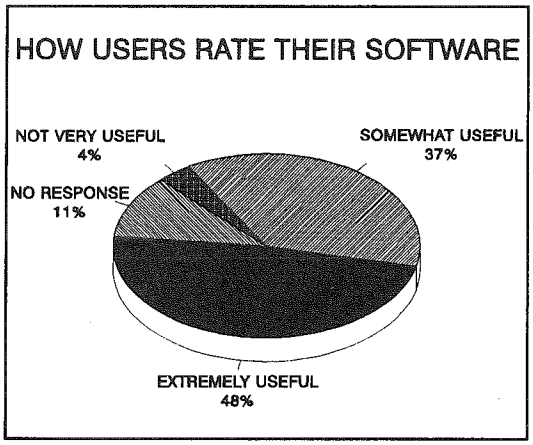
MOST COMMON USES OF SOFTWARE

The three most common uses of the software according to the respondents are maintaining an inventory of the infrastructure, preparation of capital improvement programs and supporting recommendations to city councils and county boards.



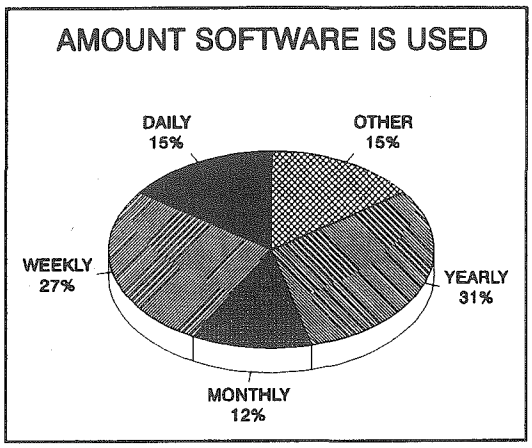
USEFULNESS OF THE SOFTWARE

The agencies were asked how useful they considered their software to be. Slightly more than half, 48 percent, said they felt their software was extremely useful, 37 percent said their software was somewhat useful and one city indicated that their software was not very useful.



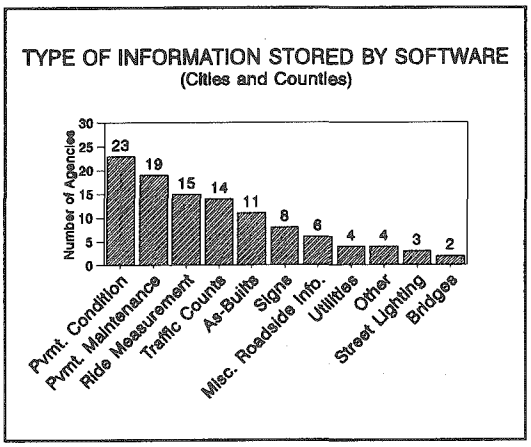
AMOUNT OF SOFTWARE USAGE

The frequency with which each agency uses their software varies. The survey did not reveal any single frequency that stood out among the rest. The most common responses to software usage were weekly and yearly.



TYPE OF INFORMATION STORED BY SOFTWARE

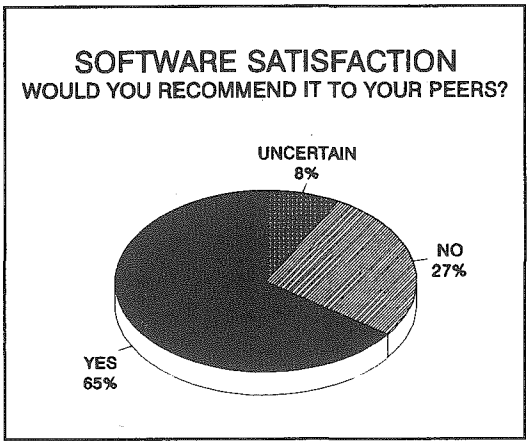
The survey shows that the most common types of information stored by the IMS and PMS software are pavement condition and pavement maintenance data. Street lighting and bridge information are stored by the least number of agencies.



SOFTWARE SATISFACTION

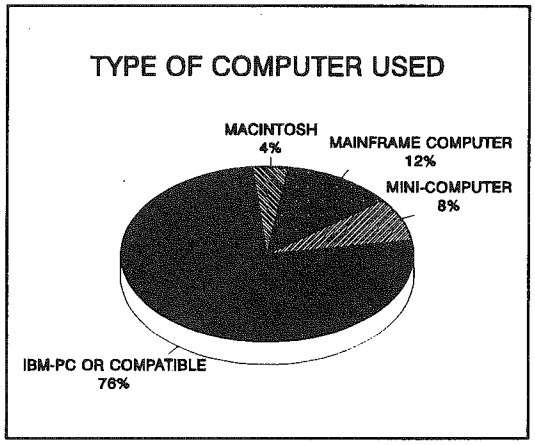
The agencies were asked if they would recommend their software to their peers. As can be seen, most agencies said yes. However, four of the seven agencies that developed their software in-house said they would not recommend it to other agencies.

The main reason given for not recommending a software package was that it was cumbersome or not user-friendly.



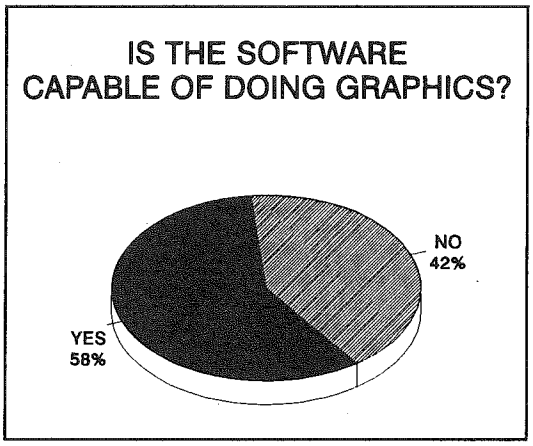
TYPE OF COMPUTER USED

As can be seen from the adjacent figure, the most common type of computer responding agencies have the IMS or PMS software installed on is an IBM PC or compatible computer. The most common computer configuration used by the responding agencies is an IBM PC or equivalent, with a minimum of 640K RAM, 10MB hard disk, printer and monitor.



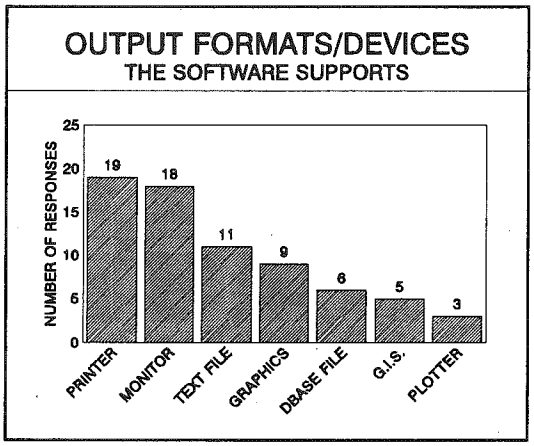
GRAPHICS CAPABILITIES

Most of the IMS and PMS software packages can either produce graphics directly or indirectly through the creation of text files that can be imported by graphics software.



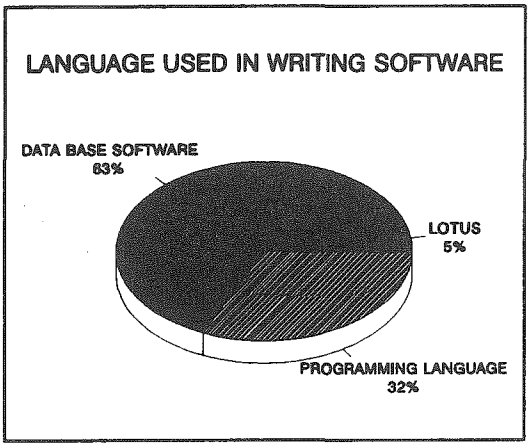
OUTPUT FORMATS/DEVICES

Most of the software packages can produce output from the database to both the printer and monitor. Some can also produce the data in other formats or to other devices as indicated in the adjacent figure.



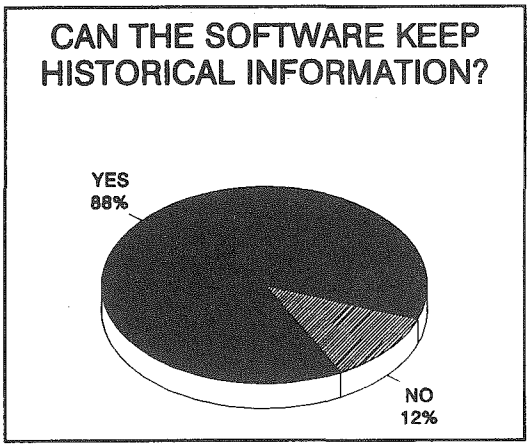
SOFTWARE SOURCE CODE

As expected, most of the IMS and PMS software packages were developed using a packaged database software such as Dbase, Paradox or Rbase. Other types of source code mentioned are programming languages such as Fortran or Pascal and spreadsheet applications using Lotus 1-2-3.



HISTORICAL INFORMATION

Most of the software packages can store historical information such as pavement condition, maintenance and traffic data. This historical information is valuable to detect trends or maintain records of previous work. It is strongly recommended that historical information be part of any IMS or PMS system.



INFRASTRUCTURE/PAVEMENT MANAGEMENT SOFTWARE SOURCES

During the review of the various references, several software packages were identified along with their developer. These are presented below.

COMPANY OR SOFTWARE DEVELOPER	LOCATION	SOFTWARE NAME
Austin Research Engineers, Inc. (ARE)	Austin, TX	
* Bernhard, Eisenbraun and Associates	Yankton, SD	RoadPro
* Braun Intertec Pavement, Inc.	St. Paul, MN	PMP
* BRW Engineers, Inc.	Minneapolis, MN	
* Carter Associates	San Diego, CA	CAI/PMS
Design Logic		C.H.R.I.S.
Donahue & Associates, Inc.	Schaumberg, IL	
* Harris & Associates, Inc.	Concord, CA	PMI
INFRACON	Arlington Heights, IL	
Infrastructure Management Services (IMS)	Arlington Heights, IL	
Iowa State University	Ames, IA	ISU Pavement System
* Joseph E. Bonadiman & Associates	San Bernadino, CA	CivilCADD
* Local Government Information Services (LOGIS)	Brooklyn Center, MN	Street Inventory
MHM Associates	South Bend, IN	
* Pavement Management Systems (PMS)	Cambridge, Ontario	
Public Works Software, Inc.	Newington, CT	IMS II
* Short-Elliot-Hendrickson, Inc.	St. Paul, MN	PAVEMENT MANAGER
* Tele-Terminals		Street Inventory Sub-System
* USACERL/Corps of Engineers	Washington, D.C.	PAVER

* Indicates a consultant or developer whose product is being used by one of the survey respondents.

SUMMARY

Initially, the goal of this report was twofold. The first goal was to review the current status of infrastructure and pavement management software use in Minnesota. The second phase was to review and critique some of the more commonly used software packages. Due to the small number of agencies that said they have an IMS or PMS software package as well as the small number of agencies using a particular software package, it was felt that phase two would not be particularly valuable. Reviewing a package that only one or two agencies in the entire state said they use did not seem warranted. If in the future more agencies are using certain software packages, this part of the report might be more meaningful.

Some of the more meaningful statistics revealed by the survey are:

- Only 27 of the 130 responding agencies (21%) currently have an IMS or PMS
- Of those 27 agencies, six are counties and twenty-one are cities.
- Five of the six county agencies with a system (83%) said their software was developed in-house, while only three of the 21 cities with a system (14%) developed their system in-house.
- Six agencies indicated that they use the software package developed by Braun Intertec Pavement, two agencies use the software developed by Short-Elliot-Hendrickson and no other software developer or consultant was used by more than one agency.
- Most agencies feel their software is extremely useful and would recommend it to their peers.
- Most of the software packages that would not be recommended were developed in-house by the responding agency.
- The most common types of information stored by the IMS and PMS packages are pavement condition and maintenance. Eighty-five percent of the agencies with a system collect and store pavement condition information, seventy percent collect historical pavement maintenance information.
- Most agencies said they feel their system is more of a management tool as opposed to being an inventory tool.
- The number one use of the IMS and PMS systems was maintaining an inventory of the infrastructure system, followed by capital improvement program preparation.

No cost information was available for in-house systems. As a result of this and the fact that many other systems had data collection and analysis included in the cost reported, no system costs are presented in this report.

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APPENDIX A
COMPARISON OF SOFTWARE FEATURES

The following tables provide for comparisons of the various software packages being used by Minnesota cities and counties. The data was provided by the agency, not the developer, and as a result may or may not accurately reflect all of the possible features of a particular package.

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	BIG STONE COUNTY IN-HOUSE	CITY OF BUFFALO IN-HOUSE	BRW	CAI/PMS	CALTRANS FLEXIBLE PAVEMENT MANAGEMENT SYSTEM	CIVILCADD	MARSHALL COUNTY IN-HOUSE	CITY OF MOUNDS VIEW IN-HOUSE	PAVER	PAVEMENT MANAGEMENT
GENERAL INFORMATION										
SOFTWARE DEVELOPED BY:	BIG STONE COUNTY	CITY OF BUFFALO	BRW ENGINEERS INC.	CARTER ASSOCIATES	UNIVERSITY OF FLORIDA McTRANS CENTER	BONADIMAN & ASSOCIATES	MARSHALL COUNTY	CITY OF MOUNDS VIEW	U.S. ARMY CORPS OF ENGINEERS	PAVEMENT MANAGEMENT SYSTEMS
NUMBER OF USERS IN THE SURVEY:	1	1	1	1	1	1	1	1	1	1
LENGTH OF USE:										
LESS THEN ONE YEAR	☐	☐	☐	☐	■	☐	☐	☐	☐	☐
1 TO 2 YEARS	■	☐	☐	■	☐	☐	■	☐	☐	☐
3 TO 5 YEARS	☐	■	■	☐	☐	☐	☐	■	☐	■
5 TO 10 YEARS	☐	☐	☐	☐	☐	■	☐	☐	■	☐
HOW OFTEN SOFTWARE IS USED:										
DAILY	☐	☐	☐	☐	☐	■	☐	☐	☐	☐
WEEKLY	■	☐	☐	☐	☐	☐	☐	☐	■	☐
MONTHLY	☐	☐	☐	■	☐	☐	■	☐	☐	■
YEARLY	☐	■	☐	☐	■	☐	☐	■	☐	☐
LESS THEN ONCE A YEAR	☐	☐	■	☐	☐	☐	☐	☐	☐	☐
LEVEL OF COMPUTER USER REQUIRED:										
NOVICE	☐	■	■	■	☐	■	■	■	☐	☐
EXPERIENCED	■	☐	☐	☐	■	☐	☐	☐	■	■
ADVANCED	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
COMPUTER HARDWARE AND SOFTWARE										
SOFTWARE RUNNING ON:										
IBM PC OR COMPATIBLE	☐	☐	■	■	■	☐	■	■	■	■
MINI-COMPUTER	☐	■	☐	☐	☐	☐	☐	☐	☐	☐
MAINFRAME COMPUTER	☐	☐	☐	☐	☐	■	☐	☐	☐	☐
MACINTOSH	■	☐	☐	☐	☐	☐	☐	☐	☐	☐
RUNNING ON NETWORK	■	☐	☐	☐	☐	■	☐	☐	☐	☐
SOFTWARE MULTI USER	■	☐	☐	☐	■	■	☐	☐	■	☐
SOFTWARE CAPABLE OF GRAPHICS	■	☐	☐	☐	☐	■	■	■	■	☐
EXPORT DATA TO GRAPHICS SOFTWARE	N/A	✓	☐	✓	✓	N/A	N/A	N/A	N/A	■
SOFTWARE LANGUAGE:										
DATA BASE SOFTWARE	■	☐	■	■	☐	☐	■	■	☐	■
PROGRAMING LANGUAGE	☐	☐	☐	☐	■	■	☐	☐	■	☐
SPREADSHEET SOFTWARE	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
CAN DATA AND REPORTS BE MODIFIED	■	■	■	☐	■	■	■	■	■	■
OUTPUT FORMATS:										
PRINTER	■	■	■	■	■	■	■	■	■	■
SCREEN	■	■	■	■	■	■	■	■	■	■
TEXT FILE	■	☐	☐	☐	☐	■	■	■	☐	☐
DBASE FORMAT FILE	☐	☐	☐	☐	☐	☐	☐	■	■	■
GRAPHICS	■	☐	☐	■	☐	■	■	☐	■	☐
COMPUTER MAPPING OR G.I.S.	■	☐	☐	■	☐	☐	☐	☐	☐	☐
MULTIPLE YEARS OF INFORMATION ?	■	■	☐	☐	■	■	■	■	■	■

■ = YES ☐ = NO ✓ = NOT ANSWERED

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	PAVEMENT MANAGER	PMI	PMP	POLK COUNTY IN-HOUSE	RAMSEY COUNTY IN-HOUSE	ROADPRO	CITY OF ST. PAUL IN-HOUSE	STREET INVENTORY	STREET INVENTORY SUB-SYSTEM	WRIGHT COUNTY HIGHWAY MANAGEMENT SYSTEM
GENERAL INFORMATION										
SOFTWARE DEVELOPED BY:	SHORT, ELLIOT HENDRICKSON INC.	HARRIS & ASSOCIATES	BRAUN INTERTEC PAVEMENT INC.	POLK COUNTY	RAMSEY COUNTY	BERNHARD, EISENBRAUN, AND ASSOCIATES	CITY OF SAINT PAUL	LOGIS	TELE-TERMINALS	WRIGHT COUNTY
NUMBER OF USERS IN THE SURVEY:	2	1	6	1	1	1	1	1	1	1
LENGTH OF USE:										
LESS THEN ONE YEAR	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
1 TO 2 YEARS	■	■	■	■	☐	■	☐	☐	☐	☐
3 TO 5 YEARS	☐	☐	■	☐	☐	☐	■	■	☐	☐
5 TO 10 YEARS	☐	☐	■	☐	■	☐	☐	☐	■	☐
HOW OFTEN SOFTWARE IS USED:										
DAILY	☐	☐	■	☐	☐	■	☐	■	☐	☐
WEEKLY	☐	☐	■	■	■	☐	■	☐	☐	☐
MONTHLY	■	☐	■	☐	☐	☐	☐	☐	☐	☐
YEARLY	☐	■	■	☐	☐	☐	☐	☐	■	☐
LESS THEN ONCE A YEAR	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
LEVEL OF COMPUTER USER REQUIRED:										
NOVICE	☐	■	☐	☐	☐	☐	☐	☐	■	■
EXPERIENCED	■	☐	■	■	■	■	■	■	☐	☐
ADVANCED	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
COMPUTER HARDWARE AND SOFTWARE										
SOFTWARE RUNNING ON:										
IBM PC OR COMPATIBLE	■	■	■	■	■	■	☐	☐	☐	■
MINI-COMPUTER	☐	☐	☐	☐	☐	☐	■	☐	☐	☐
MAINFRAME COMPUTER	☐	☐	☐	☐	☐	☐	☐	■	■	☐
MACINTOSH	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
RUNNING ON NETWORK	☐	☐	■	■	☐	☐	■	■	☐	☐
SOFTWARE MULTI USER	☐	☐	☐	☐	☐	■	■	■	☐	✓
SOFTWARE CAPABLE OF GRAPHICS	■	☐	☐	■	■	■	■	☐	☐	☐
EXPORT DATA TO GRAPHICS SOFTWARE	N/A	✓	■	N/A	N/A	N/A	N/A	☐	☐	✓
SOFTWARE LANGUAGE:										
DATA BASE SOFTWARE	■	■	☐	☐	☐	■	■	☐	☐	■
PROGRAMING LANGUAGE	☐	☐	■	☐	☐	☐	☐	■	■	☐
SPREADSHEET SOFTWARE	☐	☐	☐	■	■	☐	☐	☐	☐	☐
CAN DATA AND REPORTS BE MODIFIED	■	☐	■	■	■	■	■	■	■	■
OUTPUT FORMATS:										
PRINTER	■	■	■	■	■	■	■	☐	■	■
SCREEN	■	■	■	■	■	■	■	☐	■	■
TEXT FILE	■	■	■	■	☐	☐	■	☐	☐	☐
DBASE FORMAT FILE	■	■	■	☐	☐	☐	☐	☐	☐	■
GRAPHICS	■	☐	■	■	■	■	■	☐	☐	☐
COMPUTER MAPPING OR G.I.S.	☐	☐	☐	☐	☐	■	■	☐	☐	☐
MULTIPLE YEARS OF INFORMATION ?	■	■	■	■	■	■	■	■	■	■

■ = YES ☐ = NO ✓ = NOT ANSWERED

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	BIG STONE COUNTY IN-HOUSE	CITY OF BUFFALO IN-HOUSE	BRW	CAI/PMS	CALTRANS FLEXIBLE PAVEMENT MANAGEMENT SYSTEM	CIVILCADD	MARSHALL COUNTY IN-HOUSE	CITY OF MOUNDS VIEW IN-HOUSE	PAVER	PAVEMENT MANAGEMENT
HARDWARE REQUIRED:										
RAM:										
640 K	☐	✓	■	■	■	☐	■	■	■	✓
1 MB	■		☐	☐	☐	☐	☐	☐	☐	
2 MB OR MORE	☐		☐	☐	☐	■	☐	☐	☐	
HARD DISK:										
10 MB	■	■	■	■	☐	☐	■	■	■	☐
20 MB	☐	☐	☐	☐	■	☐	☐	☐	☐	■
30-40 MB	☐	☐	☐	☐	☐	■	☐	☐	☐	☐
PRINTER TYPE:										
LASER	■	■	■	■	■	■	■	■	■	■
DOT MATRIX	■	■	■	■	■	■	■	■	■	■
MONITOR TYPE:										
VGA	☐	✓	☐	☐	☐	■	☐	☐	■	☐
EGA	☐		☐	☐	☐	■	☐	☐	☐	☐
CGA	☐		☐	☐	☐	■	☐	☐	☐	■
MONOCHROME	☐		■	■	■	■	■	■	☐	☐
PLOTTER	■		☐	☐	☐	■	☐	☐	■	☐
SOFTWARE USAGE										
TYPE OF INFORMATION STORED:										
PAVEMENT CONDITION INFORMATION	■	■	■	■	■	☐	■	■	■	■
TRAFFIC COUNT INFORMATION	■	☐	☐	☐	■	☐	☐	☐	■	■
PAVEMENT MAINTENANCE INFORMATION	■	■	☐	■	■	☐	☐	■	■	■
RIDEABILITY (ROUGHNESS) INFORMATION	☐	☐	■	■	■	☐	■	☐	■	■
AS BUILT INFORMATION	■	☐	☐	☐	☐	☐	■	☐	■	☐
UTILITY INFORMATION	☐	☐	☐	☐	☐	■	☐	☐	☐	☐
SIGN INFORMATION	■	☐	☐	■	☐	☐	■	■	☐	☐
BRIDGE INFORMATION	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
STREET LIGHTS	☐	☐	☐	■	☐	☐	☐	☐	☐	☐
MISCELLANEOUS ROADSIDE INFORMATION	■	☐	☐	☐	☐	☐	☐	☐	■	☐
OTHER	☐	☐	☐	☐	☐	■	☐	■	☐	☐

■ = YES ☐ = NO ✓ = NOT ANSWERED

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	PAVEMENT MANAGER	PMI	PMP	POLK COUNTY IN-HOUSE	RAMSEY COUNTY IN-HOUSE	ROADPRO	CITY OF ST. PAUL IN-HOUSE	STREET INVENTORY	STREET INVENTORY SUB-SYSTEM	WRIGHT COUNTY HIGHWAY MANAGEMENT SYSTEM
HARDWARE REQUIRED:										
RAM:										
640 K	✓	■	■	■	□	■	✓	✓	■	■
1 MB		□	□	□	■	□			□	□
2 MB OR MORE		□	□	□	□	□			□	□
HARD DISK:										
10 MB	✓	□	■	■	□	■	✓	✓	■	■
20 MB		■	□	□	■	□			□	□
30-40 MB		□	□	□	□	□			□	□
PRINTER TYPE:										
LASER	■	■	■	■	■	■	✓	✓	□	□
DOT MATRIX	■	■	■	■	■	■			■	■
MONITOR TYPE:										
VGA	✓	□	■	■	■	■	✓	✓	□	□
EGA		□	■	□	□	□			■	□
CGA		□	■	□	□	□			□	□
MONOCHROME		■	■	□	□	□			□	□
PLOTTER		□	□	■	□	□			□	□
SOFTWARE USAGE										
TYPE OF INFORMATION STORED:										
PAVEMENT CONDITION INFORMATION	■	■	■	■	■	■	■	■	■	□
TRAFFIC COUNT INFORMATION	□	■	■	■	■	■	■	■	□	□
PAVEMENT MAINTENANCE INFORMATION	■	■	■	■	■	■	□	■	■	□
RIDEABILITY (ROUGHNESS) INFORMATION	■	■	■	■	■	■	□	□	■	□
AS BUILT INFORMATION	■	■	■	■	□	■	□	■	□	□
UTILITY INFORMATION	□	□	■	□	□	■	□	□	□	□
SIGN INFORMATION	□	□	□	□	□	■	■	■	□	■
BRIDGE INFORMATION	□	□	□	□	□	■	■	□	□	□
STREET LIGHTS	□	□	□	□	□	□	■	■	□	□
MISCELLANEOUS ROADSIDE INFORMATION	□	□	■	□	■	■	■	■	□	□
OTHER	□	□	□	□	■	■	□	□	□	□

■ = YES □ = NO ✓ = NOT ANSWERED

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	BIG STONE COUNTY IN-HOUSE	CITY OF BUFFALO IN-HOUSE	BRW	CAI/PMS	CALTRANS FLEXIBLE PAVEMENT MANAGEMENT SYSTEM	CIVILCADD	MARSHALL COUNTY IN-HOUSE	CITY OF MOUNDS VIEW IN-HOUSE	PAVER	PAVEMENT MANAGEMENT
SOFTWARE PRIMARILY USED FOR:										
EVERY DAY TASKS	☐	☐	☐	☐	☐	☐	☐	☐	■	☐
RECOMENDATIONS TO CITY COUNCIL/COUNTY BOARD	☐	■	☐	■	■	☐	☐	■	■	■
PRESENTATIONS TO PUBLIC	☐	☐	☐	☐	■	☐	☐	☐	■	☐
INVENTORY OF INFRASTRUCTURE	■	■	☐	■	■	☐	☐	■	■	☐
PREPARE CAPITOL IMPROVEMENT PROGRAMS	☐	☐	■	■	■	☐	■	■	■	☐
LAW SUITS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
DESIGN	☐	☐	☐	☐	☐	■	☐	☐	☐	☐
PRIMARY USAGE:										
INVENTORY TOOL	■	☐	■	☐	☐	☐	☐	■	☐	☐
MANAGEMENT TOOL	☐	■	☐	■	■	■	■	☐	■	■
SYSTEM RESIDES IN:										
ENGINEERING DEPARTMENT	■	☐	■	■	■	☐	■	■	☐	■
STREET/MAINTENANCE DEPARTMENT	☐	☐	☐	☐	☐	☐	☐	☐	■	☐
OTHER	☐	■	☐	☐	☐	■	☐	☐	☐	☐
RECOMENDATIONS										
DO YOU FIND SOFTWARE TO BE:										
EXTREMELY USEFUL	☐	☐	☐	☐	☐	■	■	■	■	■
SOMEWHAT USEFUL	■	■	☐	■	■	☐	☐	☐	☐	☐
NOT VERY USEFUL	☐	☐	■	☐	☐	☐	☐	☐	☐	☐
WOULD YOU RECOMMEND SOFTWARE TO PEERS	■	☐	☐	■	■	■	■	☐	■	■

■ = YES ☐ = NO ✓ = NOT ANSWERED

INFRASTRUCTURE MANAGEMENT SOFTWARE: SUMMARY OF FEATURES

SOFTWARE NAME	PAVEMENT MANAGER	PMI	PMP	POLK COUNTY IN-HOUSE	RAMSEY COUNTY IN-HOUSE	ROADPRO	CITY OF ST. PAUL IN-HOUSE	STREET INVENTORY	STREET INVENTORY SUB-SYSTEM	WRIGHT COUNTY HIGHWAY MANAGEMENT SYSTEM
SOFTWARE PRIMARILY USED FOR:										
EVERY DAY TASKS	■	□	■	■	□	□	□	■	□	■
RECOMENDATIONS TO CITY COUNCIL/COUNTY BOARD	■	■	■	■	□	■	□	□	□	■
PRESENTATIONS TO PUBLIC	■	□	■	□	□	■	□	□	□	□
INVENTORY OF INFRASTRUCTURE	■	□	■	■	□	■	■	■	■	■
PREPARE CAPITOL IMPROVEMENT PROGRAMS	■	■	■	■	■	■	□	□	□	■
LAW SUITS	□	□	□	□	□	□	□	□	□	■
DESIGN	□	□	□	□	□	□	□	□	□	□
PRIMARY USAGE:										
INVENTORY TOOL	■	□	■	□	□	□	■	■	■	■
MANAGEMENT TOOL	■	■	■	■	■	■	□	□	□	□
SYSTEM RESIDES IN:										
ENGINEERING DEPARTMENT	■	■	■	■	□	■	□	■	■	■
STREET/MAINTENANCE DEPARTMENT	□	□	■	□	■	□	□	■	□	□
OTHER	□	□	□	□	□	□	■	■	□	□
RECOMENDATIONS										
DO YOU FIND SOFTWARE TO BE:										
EXTREMELY USEFUL	□	□	■	■	■	■	□	□	□	□
SOMEWHAT USEFUL	■	■	□	□	□	□	■	■	■	□
NOT VERY USEFUL	□	□	□	□	□	□	□	□	□	□
WOULD YOU RECOMMEND SOFTWARE TO PEERS	■	■	■	□	■	■	□	■	□	■

■ = YES □ = NO ✓ = NOT ANSWERED