Street Management Information Systems

A REPORT OF THE
TRANSPORTATION TASK FORCE
OF THE

URBAN CONSORTIUM
FOR TECHNOLOGY INITIATIVES

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The Urban Consortium for Technology Initiatives was formed to pursue technological solutions to pressing urban problems. The Urban Consortium is a coalition of 37 major urban governments, 28 cities and 9 counties, with populations over 500,000. These 37 governments represent over 20% of the nation's population and have a combined purchasing power of over $25 billion.

Formed in 1974, the Urban Consortium represents a unified local government market for new technologies. The Consortium is organized to encourage public and private investment to develop new products or systems which will improve delivery of local public services and provide cost-effective solutions to urban problems. The Consortium also serves as a clearinghouse in the coordination and application of existing technology and information.

To achieve its goal, the Urban Consortium identifies the common needs of its members, establishes priorities, stimulates investment from Federal, private and other sources and then provides on-site technical assistance to assure that solutions will be applied. The work of the Consortium is focused through 10 task forces: Community and Economic Development; Criminal Justice; Environmental Services; Energy; Fire Safety and Disaster Preparedness; Health; Human Resources; Management, Finance and Personnel; Public Works and Public Utilities; and Transportation.

Public Technology, Inc. is the applied science and technology organization of the National League of Cities and the International City Management Association. It is a nonprofit, tax-exempt, public interest organization established in December 1971 by local governments and their public interest groups. Its purpose is to help local governments improve services and cut costs through practical use of applied science and technology. PTI sponsors the nation's largest local government cooperative research, development, and technology transfer program.

PTI's Board of Directors consists of the executive directors of the International City Management Association and the National League of Cities, plus city managers and elected officials from across the United States.

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Prepared by

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to the

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

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PREFACE

This is one of ten bulletins in the fourth series of Information Bulletins produced by the Transportation Task Force of the Urban Consortium for Technology Initiatives. Each bulletin in this series addresses a priority transportation need identified by member jurisdictions of the Urban Consortium. The bulletins are prepared for the Transportation Task Force by the staff of Public Technology, Inc. and its consultants. In 1980, Transportation of Hazardous Materials was identified as a priority need by both the Transportation and the Fire Safety and Disaster Preparedness Task Forces of the Urban Consortium. The Information Bulletin addressing that need was prepared under their joint direction.

Nine newly identified transportation needs are covered in this fourth series of Information Bulletins:

- Economic Impacts of Transportation Restrictions
- Parking and Traffic Enforcement
- Pedestrian Traffic Safety
- School Bus Use for Non-School Transportation
- Street Management Information Systems
- Taxicabs as Public Transit
- Transportation Construction Management
- Transportation of Hazardous Materials
- Transportation System Management, Air Quality, and Energy Conservation

One Information Bulletin covering a need identified in 1979 is being updated and expanded:

- Transportation Energy Contingency Planning

The needs highlighted by Information Bulletins are selected in an annual process of needs identification used by the Urban Consortium. By focusing on the priority needs of member jurisdictions, the Consortium assures that resultant research and development efforts are responsive to local government problems.

Each bulletin provides a nontechnical overview, from the local government perspective, of issues and problems associated with each need. Current research efforts and approaches to the problem are identified. The bulletins are not an in-depth review of the state-of-the art or the state-of-the-practice. Rather, they serve to identify and raise issues and as an information base from which the Transportation Task Force selects topics that require a more substantial research effort.

The Information Bulletins are also useful to those, such as elected officials, for whom transportation is but one of many areas of concern.

The needs selection process used by the Urban Consortium is effective. Priority needs selections have been addressed by subsequent Transportation Task Force projects:

- Five Transit Actions regional meetings were held between January 1979 and May 1979 to address the need for Transit System Productivity. The product of these meetings is a Transit Actions Workbook that features techniques currently being used to improve transit system performance and productivity.

- To facilitate the provision of Transportation for Elderly and Handicapped Persons, five documents were developed: one on local government approaches, a planning checklist, an information sourcebook, a series of case studies, and a chief executive's summary.

- To help improve Center City Circulation, two new projects have been completed. Center City Environment and Circulation: Transportation Innovations in Five European Cities is the second of three volumes showing how cities use transportation and pedestrian improvements to help downtown revitalization. Another project, addressing the coordination of public transportation investments with real estate development culminated in a national conference--the second Joint Development Marketplace in Washington, D.C., in June 1980. The Marketplace was attended by over 500 persons, including exhibitors from cities and counties around the country and representatives of private development and financial organizations.

- A series of documents relating to the need for Transportation Planning and Impact Forecasting Tools has been prepared: (1) a management-level document for local officials describing manual and computer transportation planning tools available from the U.S. Department of Transportation, (2) a series of case studies of local government and transit agency applications of these tools, and (3) a guide describing ways local governments can gain access to these tools. Additional documents are being prepared on how local governments can use U.S. Census information more effectively through these U.S. Department of Transportation computer tools.

- To help meet the need to Accelerate Implementation Procedures, a conference on the Federal-Aid Urban System (FAUS) was held in Baltimore, Maryland, in May 1980, for Federal Highway Region 3. The conference was aimed at developing communication between local, State, and Federal officials to improve implementation of and clear up misunderstandings about the FAUS program.

- To meet the need to promote use of Transportation System Management (TSM) measures, a series of five regional meetings are being held in 1980 to provide local, State, and Federal officials, and representatives of transit agencies and the business community with the opportunity to exchange information about low-cost TSM projects to improve existing transportation systems.

- To facilitate the dissemination of information on local experiences in Parking Management, a technical report describing the state-of-the-art is being prepared.

- A National Transit Pricing Forum was held at Virginia Beach, Virginia, in March 1979 to address the need for more information on Innovative Fares. Much of the Forum was directed to technical advances in areas of pricing research and practice. The proceedings of this conference are available.

- Two projects were undertaken to pursue the need for Taxicabs for Public Transportation. A handbook, Taxicabs and Federal Programs, was prepared, and five regional meetings were held in March and April of 1980. In May 1980 the Transportation Task Force sponsored the National Conference on Taxicab Innovations: Service and Regulations.

Ongoing Task Force Information Dissemination and Technology Sharing needs are currently addressed by a series of SMD Briefs. These one-page reports provide up-to-date information about on-going UMTA Office of Service and Methods Demonstrations projects. In addition, the SMD HOST Program allows transportation officials from selected jurisdictions to visit one of these projects for on-site training.

Additional Technology Sharing occurs through the National Cooperative Transit Research Program (NCTRP) which was organized jointly by Public Technology, Inc., the American Public Transit Association, the Urban Mass Transportation Administration, and the Transportation Research Board to address problems relating to public transportation identified by local and state government and transit administrators.

The support of the U.S. Department of Transportation's Technology Sharing Division in the Office of the Secretary, Federal Highway Administration, National Highway Traffic Safety Administration, and Urban Mass Transportation Administration has been invaluable in the work of the Transportation Task Force of the Urban Consortium and the Public Technology, Inc. staff. The guidance offered by the Task Force members will continue to ensure that the work of the staff will meet the urgent needs identified by members of the Urban Consortium for Technology Initiatives.

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TABLE OF CONTENTS

LIST OF TABLES

Chapter 1

ISSUES AND PROBLEMS

Because urban areas are dynamic, continuously changing environments, local officials have found it almost impossible manually to maintain accurate, up-to-date, and readily accessible maps and records on existing public facilities. This problem is complicated by the enormous quantities of data required by different city departments, interagency needs for the same records, both private and public ownership of municipal services, and increasing demands for public accountability. Recognizing the pressing need to maintain complete and up-to-date information automatically on municipal facilities, the Transportation Task Force of the Urban Consortium this year selected Street Management Information Systems as a priority issue.

As early as 1956 highway engineers began investigating means by which machines could be used to store and retrieve raw engineering data and field records.[1] By the late 1960's the potential use of computers to develop municipal planning aids, public information guides, and management information systems was becoming widely recognized,[2] and today many municipalities have begun automating their records. This Information Bulletin addresses the concerns of these local officials as they consider developing street management information systems. The major issues it discusses are:

- Technological changes.
- Time and costs.
- Interagency coordination.
- Initial data collection.
- Updating, maintenance, and management.

TECHNOLOGICAL CHANGES

The field of computer technology has recently expanded very rapidly. Several years ago, creating a municipal street management information system using sophisticated computer equipment was unheard of. Currently, several different types of computerized information systems are being developed, ranging from the U.S. Census Bureau's Dual Indepen-

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[1]Duane L. Cronk, "Highway Engineers Turn to Machines with a Memory," The Highway Magazine, November, 1956, p. 255-257.

[2]American Society of Planning Officials, Threshold of Planning Information Systems, Houston Conference, 1967.

dent Map Encoding (DIME) File[3] systems to more detailed, descriptive systems having mapping capabilities. All of these systems relate data to geographic areas, and the more advanced graphic systems have computerized mapping capabilities that, when displayed on a screen, can be modified, either temporarily or permanently, through interaction with an operator.[4]

Many city and transportation planning offices are currently using local, geographic, census-based information systems for modeling and forecasting future road network conditions.[5] More detailed street facilities, maintenance, and management systems are also being installed, both as stand-alone information, report, and management systems and in combination with visual display equipment.

As these new state-of-the-art systems develop, questions abound over:

- What type and scale of systems to develop?
- What computer capabilities currently exist?
- Whether to separate or integrate hardware and software with existing systems?
- What equipment is available?
- What forms of input, retrieval, and output are desirable?
- What are the costs?

Unfortunately, many of the answers to these issues have not been resolved because municipal experience has been limited, and no system is fully operational. Most street management information system information is currently disseminated by individual salesmen who are most familiar with the capabilities of their own systems. As a result, it is difficult for potential users to make comparative judgments and to identify specific equipment needs, user benefits, time, and costs. Cities using different technologies and equipment should therefore be encouraged to share their recent mistakes, problems, and successes, so other local officials can learn from their experiences.

In general, the need for system flexibility is a major issue. The rapidly changing field of computer technology and equipment and of local

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[3]DIME File--These data files are computer coded maps that contain information about street locations, census tracts, and other geographic elements. DIME Files have been prepared or updated for nearly all urbanized, metropolitan areas having populations over 50,000 in the United States.

[4]Integrated systems typically include: a central processing unit (CPU), teletype and plotter, and work stations, with cursor digitizers and cathode ray tube (CRT).

[5]Highway Research Board, Use of Census Data in Urban Transportation Planning, pp. 34-38.

data needs, users, and uses increases the likelihood that future modification or system expansion will be desirable. It is easier and less costly to modify or build onto an existing system if components are compatible. Jurisdictions can then budget capital equipment purchases, starting with a smaller or less expensive unit and expanding as their needs and budgets increase.

TIME AND COSTS

Many cities have shied away from implementing street management information systems because of the costs and time involved or have put in place only partial systems. To develop a complete data management and graphic information system where users can work with a visual display to add, update, or change information as well as receive hard-copy reports will initially cost approximately $300,000 to $400,000. Annual maintenance costs average $24,000 to $36,000.[6] These figures are based on costs for existing systems in cities ranging in size from large (Chicago, Illinois) to small (Salem, Oregon).

System development costs will, however, vary considerably depending on the need for and methodology of data collection, the availability of a computer facility, the kind and amount of hardware needed, and the extent to which staff experts or consultants are utilized in system development. The New York City Department of Transportation will spend close to $2 million to develop its system. Most of that amount ($1.8 million) will be used for consulting services to develop software, to inventory streets (by photologging), and to computerize and compare to field and office data.

Although capital costs are expected to decrease significantly in coming years, software, maintenance, data capture, input, and update costs are not likely to drop, because these activities are extremely labor intensive.

These activities are also extremely time consuming. Depending on the level of personnel available, cities are currently taking an average of four to five years to develop their base map files.[7] This does not include the length of time it takes to plan, design, and approve a street management information system, nor the time required to select, order, and receive equipment. Maps, records, and plans at varying scales and degrees of cartographic reliability need to be checked, corrected, and correlated to a geobased coordinate system. With few outside sources to tap, most cities have also had to rely on local funds to develop their systems.

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[6]Based on estimated vendor and Austin, Texas; Bellevue, Washington; Chicago, Illinois; Forsyth County, North Carolina; and Salem, Oregon; actual system costs.

[7]Although none of the systems is fully installed, averages are based on Chicago, Illinois; Forsyth County, North Carolina; Hennepin County, Minnesota; Houston, Texas; and San Jose, California; system estimates.

With urban areas facing increasing demands for public services and fiscal constraints pinching budgets, many local officials cannot see how they could ever afford a street management information system. Possibly a more important issue, then, is what are the cost tradeoffs? Despite initial time and cost barriers, cities that are developing these systems expect to:

- eliminate redundant data collection efforts.
- improve accountability and accuracy.
- reduce drafting and labor requirements significantly.
- retrieve information and maps rapidly.
- increase maintenance efficiency.
- improve management capabilities.

INTERAGENCY COORDINATION

In most urban areas a number of agencies are responsible for planning, operating, and regulating public facilities and services. Coordination of the number and variety of agencies that need to be involved and the fact that different departments may have different priorities are issues that city officials considering implementing an information system must confront. Agencies that must be involved may include departments of planning, public works, transportation, traffic, roads or highways, safety, police, fire, water, sewer, and other public utilities. Separate departments may also have responsibility for different municipal, county, regional, special district, or State jurisdictions.[8] Private utility companies also frequently operate and maintain public services. A survey of 222 communities found that, although the number and type of municipal organizations may vary considerably, the average city provides 12 different utility services, with water, sanitary and storm sewers, and traffic signals usually provided by publicly-owned agencies; electric power, telephone, telegraph, cable television, and natural gas typically provided by private companies; and street lighting and police and fire signal systems being either publicly or privately supplied.

While each of these agencies usually maintains its own maps, records, and files on its facilities, it often also needs to know where other facilities are located. For example--

- up-to-date information on traffic sign and signalization location, type, and condition would be useful for completing accident reports, answering legal questions, and responding to public inquiries.

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[8]In 1974, The Advisory Commission on Intergovernmental Relations studied 218 metropolitan transportation areas and found that the average area had 11 urbanized municipalities, 3 counties, 38 special districts, and 4 transportation special districts. See Metropolitan Transportation: Better Planning, Financing, and Implementation, prepared for U.S. DOT, July, 1974.

Table 1

OWNERSHIP OF UTILITIES
(Percent of Responses)

Utilities	In Your Community		Operated and Maintained by:				
			Your	Other		Special District Or	Private
	Yes (1)	No (2)	Municipality (3)	Municipalities (4)	County (5)	Authority (6)	Company(ies) (7)
Underground:							
Water	99		80	6	2	17	18
Sanitary Sewers	96		91	3	6	21	2
Storm Sewers	27		94	0	7	11	0
Combined Sewers	41		88	1	6	11	4
Gas	98		5	2	-	-	94
Steam	18		8	3	3	11	86
Chilled Water	6		-	-	9	18	82
Electric Power	97		15	-	-	10	79
Telephone	98		0	-	-	1	99
Telegraph	67		-	-	-	3	99
Cable TV	51		1	-	-	1	98
Street Lighting	97		51	-	1	5	59
Traffic Signal Cable	92		86	3	8	4	10
Police Signal Cable	53		71	-	1	1	33
Fire Signal Cable	69		77	1	1	1	25
Other (Specify)	5		27	-	9	9	64
Overhead:							
Electric Power	99		14	0	-	8	82
Telephone	99		1	-	-	1	98
Telegraph	67		1	-	-	1	99
Cable TV	51		2	-	-	1	98
Street Lighting Cable	92		42	1	1	5	60
Police Signal Cable	45		65	-	1	3	36
Fire Signal Cable	63		71	-	1	2	31
Traffic Signal	72		81	2	9	1	16
Other (Specify)							

Source: American Public Works Association, Accommodation of Utility Plant Within the Rights of Way of Urban Streets and Highway: State of the Art, p. 53.

- the exchange of location data between utility agencies would minimize underground plant interferences and damages.
- current maps and management plans outlining a city street relocation, repaving, and improvement program could have significant cost-saving impacts on other departments' replacement schedules and plans.

Information transfer problems in cities typically result from the lack of coordination, inadequate communication between departments, proprietary and security concerns, and the difficulty of locating specific pieces of information in specific desired forms.

The Los Angeles Interagency Substructure Committee, formed in 1926 to coordinate utility construction, exemplifies early formal utility coordination efforts.[9] Other examples of utility coordination efforts are the "one-number call before you dig" systems from which information on what is likely to be encountered during excavation can be obtained. These typically are voluntary associations of individual utilites cooperating in their mutual interest. Today, utility coordination efforts, whether they are formal coordinating committees or councils, informal group conferences, individual contacts, or call service programs, have been established in most U.S. cities.

In addition, the Highway Safety Act of 1966 requires each State to monitor accidents on public roads to determine which highway sections have high accident rates and require improvement. As a result, most State highway departments have inventoried and compiled by road segment basic information on local characteristics, accident statistics, and maintenance. Traffic flow densities are also routinely recorded at sample locations. Listings, files, tapes, and programs can often be made available to local agencies.

Local officials feel these coordination and information sharing efforts are only a partial solution to a much larger problem. This is because utility data bases often do not include information on street and above-ground facilities, and private records are often not available for public users. Futhermore, most State highway data bases are not detailed enough, the geographical scale is too large, and there is no single uniform system for easy transferability. More accurate and up-to-date information is also needed if local managers are to develop effective maintenance and management programs.

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[9]The 54-year old Los Angeles, California, Interagency Substructure Committee membership includes representatives from local government agencies and all utilities, substructure operators, and businesses owning, operating, or regulating facilities within public streets in the Los Angeles Metropolitan Area. City agencies now perform many of the coordination activities, and the Committee acts in an advisory and policy role. Activities include exchanging project information, developing substructure damage prevention programs, initiating or coordinating research studies, and conducting informational workshops.

Similarly, the type and level of detailed data desired by each local agency may vary significantly. For example--

- City public works and utility departments may need to know the exact location and condition of facilities, including detailed data on the type of materials, dimensions (height, width, and length), and the most recent inspection date.
- Tax assessors' offices typically need historical and current ownership data and precise property descriptions.
- Planning departments may desire data on parking availability or schematic maps of street and road networks.

The impetus for developing a street management information system can come from any of these departments. Several cities have found that by developing a system to meet the most detailed user's needs, other more general users' applications are also possible. On the other hand, some cities have designed their initial systems to meet the general users' needs, leaving specific data and applications to the individual agencies.

The greatest obstacles to deciding what kind of street management information system to design have often lain in the conflicting priorities of the multiplicity of agencies involved rather than in a lack of technical information. Frequently these obstacles can be overcome only through changes in existing organizational structures or procedures and strong top-level management commitments. Who sponsors and who implements the street management information system may also ultimately determine which data are collected--a primary concern for other potential users of the information system.

INITIAL DATA COLLECTION

Local officials developing street management information systems must answer at least seven basic questions:

- What information is desired?
- What data are available?
- How accurate and current are the records?
- How is the information stored?
- What additional data need to be collected?
- How should they be collected?
- What forms of retrieval are desired?

As discussed in the previous section, the level of detail, number of data elements, and ultimate use of the information needed by the participating agencies are key issues in determining the information desired. Although an infinite number of items might be desired by municipal departments, the availability of and costs of collecting data must be considered. Overlapping common data items among different agencies is one way of assigning priorities to data elements. This should also enhance the information system's utility to different users.

San Antonio assigned its data elements defined priority levels:

Level I: Attributes considered essential to the system.
Level II: Attributes to be included if they are readily available

or can be economically collected in the course of gathering Level I attributes.

Level III: Attributes to be collected at some future time.[10]

Another strategy, deployed in Houston, is to develop a prototype street management information system in a small test site area to identify and resolve problems before the system is expanded to other areas. Regardless of what strategy is used, local municipalities must decide what data will and will not be included in the initial information system. This raises the issue of data availability.

A mail questionnaire of over 200 municipalities in 1974 found that 99% kept records of publicly-owned structures in public rights-of-way. Despite this, only about one-half considered their records complete and up-to-date, because most municipalities record facilities only when they are constructed (see Table 2). Practically all government agencies kept records in the form of engineering drawings or maps, although some used microfilm and other forms of storage, and a smaller percent had computerized data files.

Table 2

STATUS OF MUNICIPAL RECORDS ON UTILITY LOCATION

(Percent of Responses)

	RECORDS MAINTAINED	STATUS			RECORDS REFLECT AS-BUILT CONDITIONS	
	Yes	Complete and up to date	Fairly Complete and up to date	Some Records	None	Yes	No
Water	95	53	39	5	3	87	13
Sewer	99	59	39	2		95	4
Electric	50	29	30	20	23	56	44
Telephone	45	17	27	26	29	49	50
Gas	51	21	35	23	20	52	47
Others	18	34	23	27	25	67	32

Source: American Public Works Association, Accommodation of Utility Plan Within Public Rights-of-Way of Urban Streets and Highways: State of the Art, p. 64.

Since the survey was made, more cities have automated their records, but local officials all too often find that what actually exists is filed in employees' memories rather than in departmental maps or records.

[10]Texas Transportation Institute, Street Inventory and Management System: System Planning and Design, p. 13.

Unless this knowledge is documented, facilities are re-inventoried, and current and additional data are collected or rechecked for accuracy before records and maps are translated into computer codes and graphic displays, the new system will be of no greater management value to its users than the previous reliance on memory.

A large number of data collection methods and resources are available to update urban area information. These include--

- existing municipal maps and records.
- other jurisdictions' or private company records.
- DIME Files of U.S. Census information.
- aerial photographs.
- manual field inventories or survey data.
- photologging or video system data.
- subsurface facility locational devices.

Advanced technology experiments are underway in Ohio and New York State combining the third generation of the United States' Coast Guard's long range navigation (LORAN-C) system of radio frequency determined coordinates with photologging to give precise, radio determined locations of street signs, fences, signal posts, and potential hazards. Photologging equipment must be carried in a van equipped with a LORAN-C receiver for data collection under this system. No LORAN-C receiver specifically designed for land use is currently manufactured, but it is expected that one will be mass produced and marketed at an estimated cost of $1,000 within three years.

Depending on the size, density, data requirements, and budget of the individual areas, different methods and resources are preferred. Many cities have access to the first four listed items. The high capital equipment costs, intensive labor requirements, and expertise needed to collect additional data through photologging, video, aerial photogrammetry, subsurface locator, or new, experimental techniques, typically require contractor assistance. Contractors can also be used to reduce the data, develop data files, and program and implement management information systems. The City of San Diego and the Federal Highway Administration have compared labor and cost requirements to conduct photologging inventories, and an evaluation of three different data collection methods was made by a consulting firm and submitted to the New York City Department of Transportation. The study compared time and cost for data collection and extraction as performed manually by a two person crew, by photologging with a single crew member driving an instrument-equipped vehicle, and by videologging (with a two person crew and video camera equipped van--crew members recorded details verbally on the videotape). Manual data collection and extraction was found to be the most accurate, most costly, and least cost-effective, except for small systems. Photologging was the technique recommended for use in inventorying more than two information types (signs and roadway conditions, for example).[11]

No studies to compare the cost of systems developed in-house to those developed by outside contractors were found during the course of research for this Information Bulletin.

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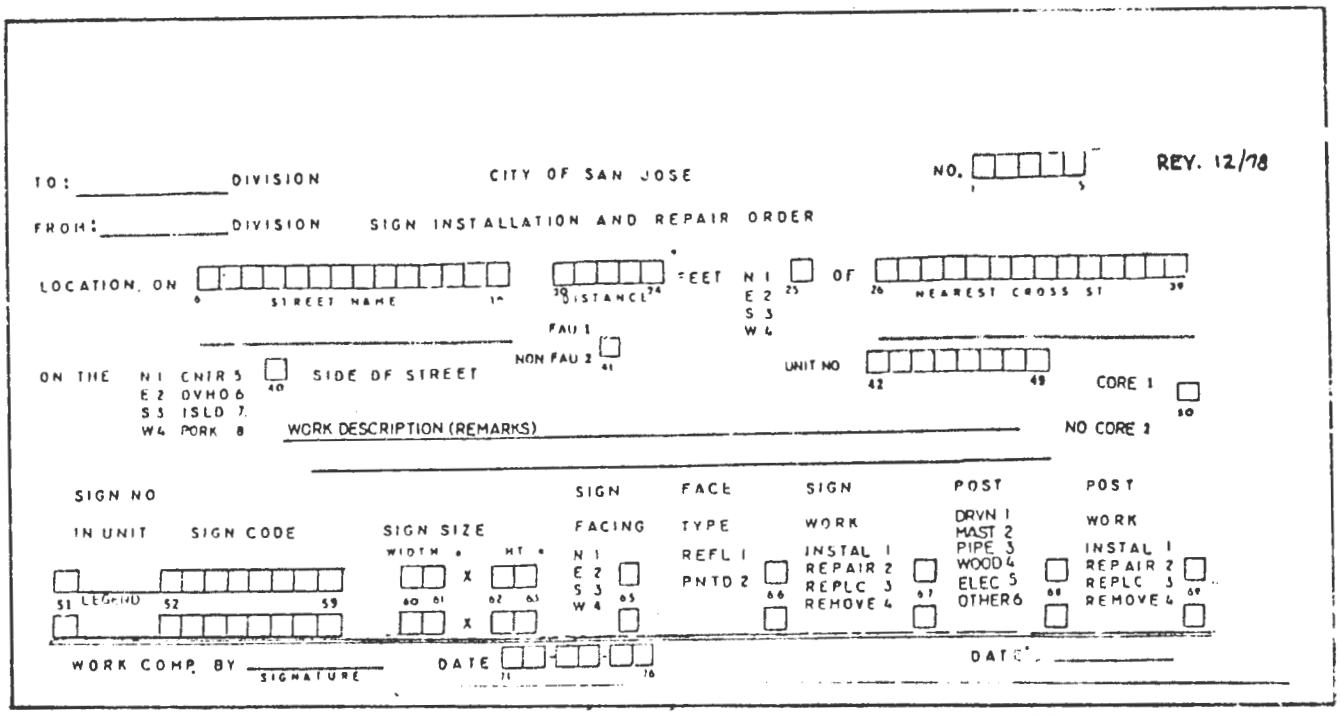
[11]Tapan K. Datta, David M. Litvin, and Mark A. Flak, "A Study of Various Data Collection Techniques for Computerized Information Systems," p. 12.

UPDATING, MAINTENANCE, AND MANAGEMENT

To maintain an effective street management information system, emphasis must also be directed to updating, maintenance, and management practices. While the establishment of an information base and retrieval system may initially enable management to respond quickly to public inquiries and to pinpoint the exact location of a problem, the new system is doomed to early obsolescence and ultimate failure unless the data are continuously updated. The following exhibit shows one form used to document maintenance repairs as a means of updating existing information.



Source: Department of Public Works. City of San Jose, California.

Documentation procedures must also cover emergency and unscheduled maintenance repairs, and storm or accident damage reports, areas frequently cited as being under-reported.

Cities currently implementing street management information systems feel that once the initial database is geocoded and an agency's data collection and input procedures are standardized, it should be relatively easy to incorporate additional overlays of information or to edit or replace obsolete data. However, these municipalities expect other updating and maintenance issues to arise as their systems develop. Since no comprehensive municipal street management information system has been fully implemented, many updating and maintenance issues still remain unresolved.

Three key questions are not being uniformly answered by each municipality --

- How to design a data retrieval system?
- How to use the system to plan, schedule, and budget maintenance activities?
- When to produce management reports?

Some cities are interested in ranking and cataloging facilities by individual installation dates and history and want to receive information according to maintenance schedules. Other cities are investigating software routines to prepare predefined management reports on a regular basis (e.g., monthly progress reports) or on a special request or one-time basis. Still others want to receive continuous updates. Central to these issues are the type, scope, and detail of information contained in the files, the desired level of management control, and individual user's access to different records.

This raises the issues of system security and backup capabilities. User identification or profiles can protect the time and investment and certain confidential information put into developing the system, while also eliminating potential sponsor fears. But what happens if the system totally fails during an emergency? To date, emergency service departments, such as police, fire, and hospitals, have not been actively involved in developing street management information systems, probably because of this potential fear. But, by building in system redundancies ahead of time, emergency services would have backup information available in the event of system failure.

Chapter 2

CONTACTS AND CURRENT PROGRAMS

CONTACTS

There is no specific Federal program or office directly addressing Street Management Information Systems. Instead, support for various parts of such an information system can be provided by various Federal government offices.

U.S. DEPARTMENT OF TRANSPORTATION

The code following each name is for identification purposes and should be included in all written correspondence.

Federal Highway Administration

Since all Federal highway programs and funds are administered through individual FHWA Regional Offices and State highway or transportation departments, interested parties should contact their FHWA Regional offices for additional information. See Table 3. This contact list is intended only to identify the scope of Federal highway programs.

- Office of Development
  Develops products and programs to improve street maintenance management and addresses subjects ranging from administrative and management procedures to specific maintenance activities.
  Contact: Curt Shufflebarger
  Acting Chief, Implementation Division
  (HDV-20)
  Room 6316
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-9230

- Office of Engineering
  Concerned with relocation and reimbursement of utility lines when highway project interrupts service.
  Contact: James Carney
  Chief, Railroad and Utilities Branch (HNG-14)
  Room 3218
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-0104

Table 3

FHWA REGIONAL OFFICES

Region I	Federal Bldg., Room 729, Clinton Ave. and North Pearl St., Albany, N.Y. 12207, Tel. FTS: 8-562-6476 (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Puerto Rico, and Virgin Islands)
Region III	Federal Office Building, 31 Hopkins Plaza, Room 1633, Baltimore, Maryland 21201, Tel. FTS: 8-922-2361 (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia)
Region IV	Suite 200, 1720 Peachtree Road, N.W., Atlanta, Georgia 30309, Tel. FTS: 8-285-5078 (Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Kentucky, and Tennessee)
Region V	18209 Dixie Highway, Homewood, Illinois 60430, Tel. FTS: 8-370-9300 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin)
Region VI	819 Taylor Street, Forth Worth, Texas 76102, Tel. FTS: 8-334-3232 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)
Region VII	P.O. Box 19715, Kansas City, Missouri 64141, Street Address: 6301 Rockhill Road, Kansas City, Missouri 64131, Tel. FTS: 8-926-7563 (Iowa, Kansas, Missouri, and Nebraska)
Region VIII	P.O. Box 25246, Building 40, Denver Federal Center, Denver, Colorado 80225, Tel. FTS: 8-234-4051 (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming)
Region IX	2 Embarcadero Center, Suite 530, San Francisco, California 94111, Tel. FTS: 8-556-3951 (Arizona, California, Hawaii*, and Nevada)
Region X	Room 412, Mohawk Building, 222 S.W. Morrison Street, Portland, Oregon 97204, Tel. FTS: 8-423-2065 (Alaska, Idaho, Oregon, and Washington)
Region XV	1000 North Glebe Road, Arlington, Virginia 22201, Tel. FTS: 8-557-9070
Region XIX	Regional Office, Region 19, APO Miami 34002, Canal Zone, Tel. FTS: 9-0**52-5415

*Hawaii includes American Samoa and Guam.

**To place calls to overseas areas, Dial 9 (from federal agencies) and 0 for overseas operator--provide operator with country, city, and telephone number.

- Office of Highway Planning
  Manages Highway Planning and Research Program under Title 23, Section 307C. States annually receive funds to study future planning, design, and construction projects ranging from traffic and safety to inventory and mapping. Municipalities can apply to State for funds.
  Contact: Robert B. Puckett
  Chief, Systems and Program Review Branch (HHP-10)
  Room 3300
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-0175

- Office of Highway Safety
  Identified and recommended 18 safety standards, which include developing accident record systems and building files to capture such information, in cooperation with the National Highway Traffic Safety Administration. FHWA's Section 402, State and Community Highway Safety Funds, may be used to finance portions of Street Management Information Systems related to these safety concerns. Funds are administered by each State Governor's Highway Safety Representative (see Table 4).
  Contact: James Rummel
  Chief, Policy Development Branch (HHS-11)
  Room 3413
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-2131

- Office of Traffic Operations
  Studies various photologging and video systems, including their costs, applications, and limitations. Information available upon request.
  Contact: William Baker
  Office of Traffic Operations (HTO-31)
  Room 3103E
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-1993

  Provides technical advice and assistance in using the TRANSYT 7 and 7F computer programs for developing and optimizing traffic signal timing plans. A computer program and documentation are available.
  Contact: H. Milton Heywood
  Chief, Signals and Communications Branch (HTO-22)
  Office of Traffic Operations
  Room 3419
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-0411

Table 4

GOVERNOR'S HIGHWAY SAFETY REPRESENTATIVES

ALABAMA

Bobby Joe Kemp, Director
Highway Department
11 South Union Street
Montgomery, Alabama 36130
(205) 832-5440

ALASKA

William R. Nix, Commissioner
Department of Public Safety
Pouch N
Juneau, Alaska 99801
(907) 465-4300

ARIZONA

Richard Zazueta
Governor's Highway Safety
Representative
2502 East University Drive, Suite 125
Phoenix, Arizona 85034
(602) 273-9955

ARKANSAS

Tom V. Parker, Director
Highway Safety Program
705 South Pulaski Street
Little Rock, Arkansas 72201
(501) 371-1101

CALIFORNIA

Thomas A. Lankard, Director
Office of Traffic Safety
7000 Franklin Boulevard - Suite 330
Sacramento, California 95823
(916) 445-5373

COLORADO

Cordell Smith, Director
Division of Highway Safety
4201 East Arkansas Avenue
Denver, Colorado 80222
(303) 757-9381

CONNECTICUT

Norman C. Booth
Governor's Highway Safety
Representative
Department of Transportation
24 Wolcott Hill Road
Wethersfield, Connecticut
06109

DELAWARE

Franklin P. Fountain
Acting Governor's Highway
Safety Representative
9 East Loockerman Street
Dover, Delaware 19901
(302) 674-1738

DISTRICT OF COLUMBIA

Thomas Downs, Director
D.C. Department of Transportation
415 12th Street, N.W.
Washington, D.C. 20004
(202) 727-5847

FLORIDA

John Burke, Director
Division of Public Safety
Planning and Assistance
Carlton Building - Room 530
Tallahassee, Florida 32304
(904) 488-6001

GEORGIA

Carlton Fisher, Director
Office of Highway Safety
2175 Northlake Parkway
Building 4, Suite 144
Tucker, Georgia 30084
(404) 393-7480

GOVERNOR'S HIGHWAY SAFETY REPRESENTATIVES (cont'd)

HAWAII

Dr. Ryokichi Higashionna
Governor's Highway Safety
Representative
869 Punchbowl Street
Honolulu, Hawaii 96813
(808) 548-4655

IDAHO

Darrell V. Manning, Director
Department of Transportation
Box 7129
Boise, Idaho 83707
(208) 384-3699

ILLINOIS

Karsten J. Vieg, Director
Division of Transportation Safety
2300 South Dirksen Parkway
Springfield, Illinois 62764
(217) 782-4972

INDIANA

James T. Smith
Governor's Representative for
Highway Safety
State Capitol - Room 210
Indianapolis, Indiana 46204
(317) 232-4578

IOWA

Robert F. Tyson, Director
Office for Planning and Programming
523 East 12th Street
Des Moines, Iowa 50319
(515) 281-5888

KANSAS

John B. Kemp, Secretary
Department of Transportation
State Office Building
Topeka, Kansas 66612
(913) 296-3461

KENTUCKY

Frank R. Metts, Secretary
Department of Transportation
State Office Building - 10th Floor
Frankfort, Kentucky 40601
(502) 564-4890

LOUISIANA

Stephen M. Young
Executive Director
Louisiana Highway Safety
Commission
P.O. Box 44061, Capitol Station
Baton Rouge, Louisiana 70804
(504) 342-5460

MAINE

Daniel Webster, Jr.
Governor's Highway Safety
Representative
Transportation Building
Augusta, Maine 04330
(207) 289-2551

MARYLAND

James J. O'Donnell
Secretary of Transportation
P.O. Box 8755
Baltimore-Washington Interna-
tional Airport
Baltimore, Maryland 21240
(301) 787-7397

MASSACHUSETTS

Raymond H. Graves, Jr.
Director
100 Charles River
Boston, Massachusetts 02114
(617) 727-5074

GOVERNOR'S HIGHWAY SAFETY REPRESENTATIVES (cont'd)

MICHIGAN

Philip W. Haseltine
Executive Director
Office of Highway Safety Planning
7150 Harris Drive
Lansing, Michigan 48913
(517) 322-1941

MINNESOTA

John P. Sopsic, Commissioner
Department of Public Safety
Transportation Building
Saint Paul, Minnesota 55155
(612) 296-6642

MISSISSIPPI

Roy Thigpen, Director
Governor's Highway Safety Program
510 George Street, Suite 240
Jackson, Mississippi 39201
(601) 354-6892

MISSOURI

F.M. Wilson, Director
Department of Public Safety
P.O. Box 749
Jefferson City, Missouri 65101
(314) 751-4905

MONTANA

Albert E. Goke, Administrator
Highway Traffic Safety Division
Department of Community Affairs
Capitol Station
Helena, Montana 59601
(406) 449-3412

NEBRASKA

Harry B. Peterson, Director
Department of Motor Vehicles
State Office Building
State House Station 94789
Lincoln, Nebraska 68509
(402) 471-2281

NEVADA

S. Barton Jacka
Governor's Highway Safety
Representative
1923 North Carson Street
Carson City, Nevada 89701
(702) 885-5375

NEW HAMPSHIRE

John B. McDuffie, Coordinator
Highway Safety Agency
117 Manchester Street
Concord, New Hampshire 03301

NEW JERSEY

Joan A. Wiskowski, Director
Division of Motor Vehicles
25 South Montgomery Street
Trenton, New Jersey 08666
(609) 292-4570

NEW MEXICO

Ruben Miera, Secretary
Department of Transportation
P.E.R.A. Building - Room 220
P.O. Box 1028
Santa Fe, New Mexico 87503
(505) 827-2045

NEW YORK

James P. Melton, Commissioner
Department of Motor Vehicles
The Governor Nelson A. Rockefeller
Empire State Plaza
Albany, New York 12228
(518) 474-3135

NORTH CAROLINA

Thomas W. Bradshaw, Jr., Secretary
Department of Transportation
1 Wilmington Street
Raleigh, North Carolina 27611
(919) 733-2520

GOVERNOR'S HIGHWAY SAFETY REPRESENTATIVES (cont'd)

NORTH DAKOTA

Walter R. Hjelle, Commissioner
Highway Department
Capitol Grounds
Bismarck, North Dakota 58505
(701) 224-2581

OHIO

Earl H. Reich
Director of Highway Safety
240 South Parsons Street
Columbus, Ohio 43205
(614) 466-2550

OKLAHOMA

Ralph W. Graves
Governor's Highway Safety
Representative
Room G-80, Jim Thorpe Building
Oklahoma City, Oklahoma 73105
(405) 521-3314

OREGON

Gil W. Bellamy
Governor's Highway Safety
Representative
430 Summer Street, N.E.
Salem, Oregon 97310
(503) 378-3670

PENNSYLVANIA

John J. Zogby, Deputy Secretary
Department of Transportation
1200 Transportation and Safety
Building
Harrisburg, Pennsylvania 17120
(717) 787-5574

PUERTO RICO

Dr. Rafael Faria Gonzalez
Secretary of Transportation and
Public Works
Box 8218
Santurce, Puerto Rico 00910

RHODE ISLAND

Wendall J. Flanders
Governor's Highway Safety
Representative
State Office Building - Smith
Street
Providence, Rhode Island 02903
(401) 277-2481

SOUTH CAROLINA

Lee M. Thomas
Division of Public Safety Programs
Edgar A. Brown State Office
Building
1205 Pendleton Street, Room 401
Columbia, South Carolina 29201
(803) 758-3573

SOUTH DAKOTA

Robert Clark, Director
Division of Highway Safety
Department of Public Safety
118 West Capitol Avenue
Pierre, South Dakota 57501
(605) 773-4124

TENNESSEE

Larry M. Ellis, Coordinator
Governor's Highway Safety Program
301 Seventh Avenue, North
Nashville, Tennessee 37219
(615) 741-2580

TEXAS

Mark G. Goode
Director
Department of Highways and
Public Transportation
11th and Brazos Streets
Austin, Texas 78701
(512) 475-3525

GOVERNOR'S HIGHWAY SAFETY REPRESENTATIVES (cont'd)

UTAH

Larry Lunnen, Commissioner
Department of Public Safety
317 State Office Building
Salt Lake City, Utah 84114
(801) 533-4900

VERMONT

Ronald E. Crisman
Secretary of Transportation
133 State Street
Montpelier, Vermont 05602
(802) 828-2657

VIRGINIA

John T. Hanna, Director
Department of Transportation Safety
300 Turner Road
Richmond, Virginia 23225
(804) 276-9600, Ext. 20

WASHINGTON

Walter Black, Jr., Director
Traffic Safety Commission
P.O. Box 1399
Olympia, Washington 98504
(206) 753-6538

WEST VIRGINIA

Richard F. Carvell
Governor's Highway Safety
Representative
Charleston, West Virginia 25305
(304) 348-8814

WISCONSIN

Lowell B. Jackson, Secretary
Department of Transportation
4802 Sheboygan Avenue
Madison, Wisconsin 53702
(608) 266-0402

WYOMING

Jim H. Adsit, Director
Governor's Office of Highway
Safety
720 West 18th Street
Cheyenne, Wyoming 82002
(307) 777-7497

VIRGIN ISLANDS

Raymond A. Moorhead
Governor's Highway Safety
Representative
P.O. Box 1847
Fredricksted, St. Croix
Virgin Islands 00840
(809) 772-3025

Urban Mass Transportation Administration

- Office of Planning Methods and Support
  Researches, develops, and disseminates analytical techniques and case studies that can support street management information systems in relation to transportation planning. Of special interest is the capability for detailed street segment and system mapping and for linking and identifying points in the system. A systematic, updatable inventory of street facilities and underground utilities could then be related to transportation planning tools.
  Contact: Robert B. Dial
  Director, Office of Planning Methods
  and Support (UPM-20)
  Room 9307
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-9271

Research and Special Programs Administration

- Transportation Programs Bureau
  Researches techniques for using LORAN coordinates to locate accident or emergency sites. Studies possible applications to street management problems as well as vehicle emergencies.
  Contact: Capt. Walter Kohl
  Manager, LORAN-C Applications (DPB-6)
  Room 8117
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-9520

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

- Office of Block Grant Assistance
  Administers programs under Title I of the Housing and Community Development Act of 1974, which is concerned with providing planning, capital, and operating assistance, to improve low and moderate income areas. Street and underground improvement projects are eligible activities, excluding routine maintenance.
  Contact: Field Offices (see Table 5)
  or
  James Broughman
  Director, Entitlement Cities Division
  Office of Block Grant Assistance
  U.S. Department of Housing and Urban Development
  Room 7282
  451 Seventh Street, S.W.
  Washington, D.C. 20410
  (202) 755-9267

Table 5

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT FIELD OFFICES

Region I	Boston, Massachusetts, Area Office, Bulfinch Building, 15 New Chardon Street, Boston, Massachusetts 02114 (617-223-4111).
	Hartford, Connecticut, Area Office, 1 Financing Plaza, Hartford, Connecticut 06103 (203-244-3638).
Region II	Buffalo, New York, Area Office, Statler Building, Suite 800, 107 Delaware Avenue, Buffalo, New York 14202 (716-855-5755).
	Newark, New Jersey, Area Office, Gateway 1 Building, Raymond Plaza, Newark, New Jersey 17102 (201-645-3010).
	New York, New York, Area Office, 666 Fifth Avenue, New York, New York 10019 (212-399-5290).
	San Juan, Puerto Rico, Caribbean Area Office, Federico Degetau Federal Building, U.S. Courthouse, Room 428, Carlos E. Chardon Avenue, Halo Rey, Puerto Rico 00918 (809-753-4201).
Region III	Pittsburgh, Pennsylvania, Area Office, Two Allegheny Center, Pittsburgh, Pennsylvania 15212 (412-644-2802)
	Washington, D.C., Area Office, Universal North Building, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009 (202-673-5837).
	Baltimore, Maryland, Area Office, Two Hopkins Plaza, Baltimore, Maryland 21203 (301-962-2121).
	Philadelphia, Pennsylvania, Area Office, Curtis Building, 625 Walnut Street, Philadelphia, Pennsylvania 19106 (215-597-2645).
	Richmond, Virginia, Area Office, 701 East Franklin Street, Richmond, Virginia 23219 (804-782-2721).
Region IV	Atlanta, Georgia, Area Office, 230 Peachtree Street, N.W. Atlanta, Georgia 30303 (404-221-4576).
	Birmingham, Alabama, Area Office, Daniel Building, 15 South 20th Street, Birmingham, Alabama 35233 (205-245-1617)
	Louisville, Kentucky, Area Office, Children's Hospital Foundation Building, 601 South Floyd Street, Louisville, Kentucky 40201 (502-582-5251).
	Jackson, Mississippi, Area Office, 101c Third Floor, Jackson Mall Avenue West, Jackson, Mississippi 39213 (601-969-4703).

Greensboro, North Carolina, Area Office, 415 North Edgeworth Street, Greensboro, North Carolina 27401 (919-378-5363).

Columbia, South Carolina, Area Office, 1801 Main Street, Jefferson Square, Columbia, South Carolina 29201 (803-765-5591).

Knoxville, Tennessee, Area Office, One Northshore Building, 1111 Northshore Drive, Knoxville, Tennessee 37919 (615-637-9300).

Jacksonville, Florida, Area Office, Peninsula Plaza, 661 Riverside Avenue, Jacksonville, Florida 32204 (904-791-2626).

Region V — Detroit, Michigan, Area Office, Patrick V. McNamara Federal Building, 477 Michigan Avenue, Detroit, Michigan 48226 (313-226-7900).

Chicago, Illinois, Area Office, 1 North Dearborn Street, Chicago, Illinois 60602 (312-353-7660).

Indianapolis, Indiana, Area Office, 151 North Delaware Street, Indianapolis, Indiana 46207 (317-269-6303).

Minneapolis-St. Paul, Minnesota, Area Office, 6400 France Avenue, South Minneapolis, Minnesota 55435 (612-725-4701).

Columbus, Ohio, Area Office, 200 North High Street, Columbus, Ohio 43215 (614-469-7345).

Milwaukee, Wisconsin, Area Office, 744 North Fourth Street, Milwaukee, Wisconsin 53203 (414-291-1493).

Region VI — Dallas, Texas, Area Office, 2001 Bryan Tower, Fourth Floor, Dallas, Texas 75201 (214-749-1601).

San Antonio, Texas, Area Office, 410 South Main Avenue, San Antonio, Texas 78285 (512-229-6800).

Little Rock, Arkansas, Area Office, 1 Union National Plaza, Suite 1400, Little Rock, Arkansas 72201 (501-378-5401).

New Orleans, Louisiana, Area Office, Plaza Tower, 1001 Howard Avenue, New Orleans, Louisiana 70113 (504-589-2063).

Oklahoma City, Oklahoma, Area Office, 200 N.W. 5th Street, Oklahoma City, Oklahoma 73102 (405-231-4891).

Region VII — Kansas City, Kansas, Area Office, 2 Gateway Center, Fourth and State Streets, Kansas City, Kansas 66117 (816-374-4355).

Omaha, Nebraska, Area Office, Univac Building, 7100 West Center Road, Omaha, Nebraska 68106 (402-221-9301).

St. Louis, Missouri, Area Office, 210 North 12th Street, St. Louis, Missouri 63101 (314-425-4761).

Region VIII	(Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming), - Executive Towers, 1405 Curtis Street, Denver, Colorado 80202 (303-837-4513).
Region IX	Honolulu, Hawaii, Area Office, 300 Ala Moana Boulevard, Room 3318, Honolulu, Hawaii 96850 (808-546-2136).
	San Francisco, California, Area Office, 1 Embarcadero Center, Suite 1600, San Francisco, California 94111 (415-556-2238).
	Los Angeles, California, Area Office, 2500 Wilshire Boulevard, Los Angeles, California 90057 (213-688-5973).
Region X	Seattle, Washington, Arcade Plaza Bldg., 1321 Second Ave., Seattle, Washington (206-442-5414/7456).
	Anchorage, Alaska, 334 W. 5th Ave., Anchorage, Alaska, 99501 (907-271-4170).
	Portland, Oregon (Oregon and Idaho), Cascade Building, 520 S.W. 6th Avenue, Portland, Oregon, 97204 (503-221-2561).

U.S. DEPARTMENT OF COMMERCE

- U.S. Bureau of the Census
  Developed GBF/DIME/ADMATCH files using Census statistics to support local planning, information, and management systems. ACG, DIME, and ADMATCH are programs for constructing address network and data files. ACG elements include:
  - segment names.
  - address range.
  - ZIP codes.
  - geographic codes.

  DIME orients these segments, adds intersections, and ties the data elements together; ADMATCH is used to geocode these data. Geocoding is a process of locating things to geographic areas in hierachical sequence, such as census block, census tract, or city. Recently developed and conducted a case study in Washington, D.C., of ARITHMICON, a computer graphics system to facilitate rapid, efficient, and accurate building, editing, and updating of DIME data base using computer terminal keyboard. These can be geocoded and integrated with other Street Management Information System files.

  Contact: Marvin White or Pat Griffin
  Statistical Research Division
  U.S. Bureau of the Census
  Washington, D.C. 20233
  (202) 763-7134

CURRENT PROGRAMS

Federal Programs

- FHWA is currently studying Maintenance Research Needs. During 1980 regional meetings were held in Atlanta, San Francisco, Hartford, and Springfield to bring Federal, State, county, local, and private representatives together. During these sessions the need for improved street management and information systems and better dissemination of existing experience were noted.

  Contact: Larry Klockenteger
  Office of Development (HDV-22)
  Federal Highway Administration
  400 Seventh Street, S.W.
  Washington, D.C. 20590
  (202) 426-9223

State Programs

- The Federal Highway Safety Act of 1966 requires each State to monitor accidents to determine roads needing improvement. As part of this effort, practically all (46 out of 50) State highway departments have conducted road inventories, identified accident locations, and developed maintenance management programs on different types and sections of roadway, level of use, and maintenance requirements. Although no uniform system exists, most are automated and have significant data retrieval capabilities.

Local governments may prepare requests for funding under this act to develop street management information systems related to safety. Local programs must be approved by the State Governor's Highway Safety Representative. For a complete list of the Governor's Highway Safety Representatives, see p. 16. Development of New York City's computerized street information system is being funded from this source.

Five States, Arkansas, California, Idaho, Kentucky, and New Mexico, have developed Fleet Equipment Management Systems to determine the amount of equipment and cost for different roadway maintenance operations. Type of equipment, level of use, labor, and costs are documented. For more information contact individual State highway departments.

Local Programs

- At the local level a variety of street management information systems currently exist. The following list provides basic background information and contacts for some of the more successful and advanced technology computer-based systems in operation.

- Austin, Texas, is developing a comprehensive street and underground facilities inventory through its engineering, water, wastewater, and electric departments. Approximately one-tenth of the initial data has been stored, using photogrammetric methods and interactive graphic equipment. Income from sale of maps to the public, other city departments, utility companies, and developers is used to defray project costs. Future plans include incorporating information from the planning, building inspection, and tax departments.
  Contact: Henry Mecredy
  Supervisor, Computer Graphics
  Engineering Department
  City of Austin
  P.O. Box 1088
  Austin, TX 78767
  (512) 477-6511

- Bellevue, Washington, was conducting a basic street and parcel inventory when it decided to capitalize on this investment and combine it with aerial photgraphs to identify all street facilities. The equipment was installed in September, 1979, and the City Departments of Planning, Public Works, and Information Services are primarily interested in planning, management, and future projection capabilities. The State of Washington's Traffic Records Reporting System will also be added.

Contacts: Robert Parks
Director of Information Services
P.O. Box 1768
Bellevue, WA 98009
(206) 453-2984

Richard Brown
Chief Surveyor
Public Works Department
P.O. Box 1768
Bellevue, WA 98009
(206) 455-6971

- Chicago, Illinois, is developing a Mapping and Graphics Information System by coordinating different agency efforts through a central data processing center. The Planning Department, using DIME File technology, is digitizing existing maps to the block level. The Department of Public Works, Central Mapping Agency, is building an interactive mapfile from 1800 current basemaps, aerial photos, and a horizontal control network system. When this initial system is complete, the Departments of Streets and Sanitation, Water, Sewers, and Engineering will add their data.
  Contact: William Iler
  Principal System Engineer
  City of Chicago Data Center
  CL-54 Daley Center
  Chicago, IL 60602
  (312) 744-8165

- Dade County, Florida, is developing a computerized traffic sign inventory, maintenance, and work analysis program to provide accurate and current sign information for budget purposes, citizen inquiries, and legal requests. Approximately 300,000 traffic signs are being coded by intersection, with type, height, location, color, maintenance, and jurisdiction information recorded.
  Contact: Kevin A. MacNaughton or
  Miles E. Moss, Safety Projects Engineer
  Department of Traffic and Transportation
  Koger Executive Center
  8675 N.W. 53rd Street
  Miami, FL 33166
  (305) 592-0350

- Forsyth County, North Carolina, is currently developing a land records-based information system to consolidate most city and county government records into a single, accurate, and current data base. Each land parcel is being checked, plotted, and linked to property attribute data through the Tax Assessor's and Collector's, Registrar's, Planning and Zoning, and Building Inspector's offices. This project started in 1975, and the first township should be completed by 1981. Information from the Public Safety, Public Works, Engineer, Water, and Health Departments will be integrated as future overlays.
  Contact: John W. Jones
  Director of Data Processing Department
  601 Hall of Justice
  Winston-Salem, NC 27101
  (919) 727-2597

- Hennepin County and the City of Minneapolis, Minnesota, Departments of Transportation, Public Works, Energy and Environment, and Law Enforcement are working on a jointly sponsored Planning System (MAPS). Initiated in 1970 and in operation since 1974, MAPS contains basic data on public street and underground facilities, parcel boundaries, crime, accident, and fire information and can generate engineering maps and management plans. Users can access information and maps by cathode ray tube (CRT) terminals, microfilm, or hard copies. Local private utility companies are now adding information on some of their facilities to this system to determine what the costs and benefits would be.
  Contact: Al Azemove
  Manager Systems & Data Processing
  Hennepin County Bureau of Public Service
  320 Washington Ave. South
  Hopkins, MN 55343
  (612) 935-3381

- Houston, Texas, began developing a geo-based mapping coordinate system in 1966. Evolving from this, the Metropolitan Common Data Base (METROCOM) system is now tying city facility and utility geographic location and information to an interactive graphics system. An index of the entire City of Houston, containing the freeway system, major and minor arterial streets, major drainage elements, corporate boundaries, principal railroads, and other landmark features is METROCOM's base system. Site specific parcel data, public water, wastewater, and storm sewer system information is approximately 50% complete. Traffic signs, signalization, and private utility information may be added in the future.
  Contact: Jim Sullivan
  Director, Department of Public Works
  Houston, TX
  (713) 222-3422

- Maricopa County, Arizona, has developed a computer-based road inventory system. Files are maintained with information on road mileage by type, construction, and condition; right-of-way; structures (e.g., pipes, ditches, bridges) and their condition; and maintenance work (e.g., grading, sweeping, ditch cleaning, surface treatments, repairs) including what was done, when, and at what cost. Separate traffic sign, traffic accident, intersection striping, flood control, and earth and soil information files are maintained for other divisions in the Highway and Public Works Department.
  Contact: Roberta Blanchette
  Data Processing Manager
  Maricopa County Highway Department
  3325 West Durango
  Phoenix, AZ 85009
  (602) 262-3615

- Milwaukee, Wisconsin, is using Community Development funds to support the data management and mapping requirements of several agencies through its central information systems section. This system was initiated in 1977 by the Engineering Department's need for detailed maps. More general planning applications will also be possible.

Contact: William Huxhold
Project Director
Policy Development Information Systems Section
200 East Wells Street
Milwaukee, WI 53202
(414) 278-3877

- New York City, New York is developing a computerized street information system to incude software, a photolog inventory of all streets within the city, extraction of photolog data, computerized field and office data, and comparative field and office data. The system currently being developed will not have mapping capabilities. All information will be presented in word message format. The DIME file has been used as the basis for the data file to make possible upgrading to a mapping format when the City develops base maps and additional software. The Department of Transportation will utilize its existing main computer system for this program.

  Contact: Sheldon Fialkoff
  Director, Office of Transportation Programming
  New York City Department of Transportation
  Bureau of Transportation Planning and Research
  40 Worth Street
  New York, NY 10013
  (212) 566-3960

- Salem, Oregon's, Community Development and Engineering Departments, in cooperation with the Marion County Tax Assessor's Office, are sponsoring a Geographic Land and Data System (GLADS). Equipment was installed in April, 1980, and city, street, parcel, and facility records and maps are now being catalogued. GLADS database will eventually encompass the entire 1100 square-mile county.

  Contact: Jack Herring
  GLADS Project Management Analyst
  Office of Community Development
  555 Liberty St., S.E.
  Salem, OR 97301
  (503) 588-6511

- San Antonio, Texas', Department of Public Works, in conjunction with Bexar County Metropolitan Planning Organization, is developing a Street Inventory and Management System. The detailed design study has been completed and the project consultant is now collecting data and geocoding information for input to the computer.

  Contact: Frank Kiolbassa
  Director of Public Works
  City of San Antonio
  P.O. Box 9066
  San Antonio, TX 78285
  (512) 299-8022

- San Jose, California, began inventorying all street surface facilities by photologging to develop a traffic sign, striping, marking roadway condition, and signal databank in 1978. It is currently operating as a traffic control, safety, maintenance, and management system; and city maintenance records are used to update this base information. Future plans include adding an accident reporting feature. Underground facilities are also being geocoded onto an interactive graphic system. When complete, street surface and underground information system. When complete, street surface and underground information systems can be integrated.

  Contact: Jim Kennedy
  Transportation Safety Coordinator
  801 N. 1st Street
  Room 340
  San Jose, CA 95110
  (408) 277-5341

ASSOCIATION PROGRAMS AND CONTACTS

The American Public Works Association (APWA) is sponsoring a Computer Assisted Mapping and Records Activity System (CAMRAS) Project through its Research Foundation and Utility Location and Coordination Council (ULCC). The CAMRAS project is intended "to develop, promulgate, and implement procedures and standards for jointly funded and shared use, computer assisted, geo-based location record systems and to assist in the initiation, development, testing and operation of a working system at a size and scope to provide a wide range of measureable and user-oriented data, accomplished through a CAMRAS-type implementation at a test site location." As indicated by the following list of projects, various cities, utility companies, and computer system vendors are cooperating in these efforts.

Three papers on development of the CAMRAS project were issued in 1979 (see Bibliography) and three papers on User Guides for Procurement, Analysis, and Test Site Experiences will be issued in late 1980.

Contact: George Hinkel
American Public Works Association
1314 East 60th Street
Chicago, IL
(312) 947-2544

The National Computer Graphics Association, Inc., is an organization of computer graphics users, managers, and vendors seeking to disseminate information on and increase the use of computer graphics applications. During their annual conference in June 1980, separate sessions on "Computer Graphics and Public Works Systems," "Computer Aided Transportation Planning and Design," and "Interactive Graphics Maintains DIME Systems" were held. Additional conferences sponsored by the Special Interest Group on Graphics of the Association for Computer Machinery (SIGGRAPH '80), featuring state-of-the-art software and hardware emphasizing Research and Development, and the Harvard Conference featuring

management geographically-oriented information, were held during the Summer of 1980.

Contact: Jack Barrett
Public Technology, Inc.
1301 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 626-2425

"Terrascan", an all-purpose underground pipe locator, is being developed by Public Technology, Inc., in cooperation with Microwave Associates, Inc. This 2-3 dimensional radar reading tool can be operated by one trained person, to indicate location, size, and type of material. Prototype models were built in 1977 and field-tested in 1978. Terrascan design is being refined based on results of testing.

Contact: Public Technology, Inc.
1301 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Attn.: Terrascan
(202) 626-2400

A number of U.S. and Canadian cities are using the Uniform Fire Incident Reporting System (UFIRS), a computerized information system, to make scheduling, resource allocation, and other fire department managerial decisions. This system analyzes local fire problems using uniform reporting practices and data classifications compatible with State and national data banks. Manuals and further information is available.

Contact: National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210
(617) 482-8755

Chapter 3

ANNOTATED BIBLIOGRAPHY

This bibliography lists selected recent materials that directly address local issues or are of interest to local officials.

American Public Works Association. Accommodation of Utility Plant Within the Rights-of-Way of Urban Streets and Highways: State-of-the-Art Report and Manual of Improved Practice Report. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1974.

State-of-the-art report summarizes findings from extensive mail survey and on-site interviews concerning local agency utility location background and programs. Manual recommends ways for accommodating utility facilities within urban rights-of-way, which include complementing cooperative and coordinated record systems among all utilities. Reports can be used to assist local officials in working with utility companies to understand and improve local policies and practices.

American Public Works Association. CAMRAS MANUAL. Chicago: 1979. Part 1: Schechter, Bernard, et al, "Aerial Photography for Photogrammetric Mapping;" Part 2: Bennetson, A.V., "Procurement Specification for an Interactive Graphics System;" Part 3: Gross, Arthur G., "File Format for Data Exchange Between Graphic Data Bases."

Computer Assisted Mapping and Records Activity System (CAMRAS). Manual covers the first three items necessary for developing such systems. These items include: procurement guides and performance specifications for acquiring aerial photographic displays and a computer graphics system, and information for transferring data bases between incompatible systems. Aerial photos are used for triangulation and map compilation, the computer system stores and allows updating of descriptive and graphic street management information, and data transfers allow greater flexibility in use.

American Society of Civil Engineers. "Making Maps on a Computer - City and Utilities Team Up in a Pioneer Effort." Civil Engineering. (February 1979).

Article describes and answers questions on the city-utility joint computer mapping project in Burnaby, British Columbia. Institutional issues, technological concerns, timetables, costs, benefits, and U.S. applications are cited.

American Society of Planning Officials. Threshold of Planning Information Systems. (Selected papers presented at ADP workshops at ASPO national conference). Houston: 1967.

Report contains twelve papers presented at four workshops on 1) Threshold of Planning Information Systems; 2) Explorations in Municipal Information Systems Research; 3) Geographic Implications of Urban Information Systems; and 4) Data Processing for Planning. Although considerable technological advances have occurred since these papers were issued, the basic planning, development, and implementation issues and problems discussed are still revelant.

Biles, Stephen, and Richard Kerbel. A Training Manual for Setting Street Maintenance Priorities. Prepared for the Texas Innovation Group and Reprinted by the Technology Sharing Division, U.S. Department of Transportation. Washington, D.C.: 1979.

Manual outlines step-by-step procedures for inventorying city streets, ranking streets' maintenance needs, and setting priorities for maintenance. Designed to be used by cities interested in training staff to implement such programs, the manual is divided into five sections: 1) Purpose and Introduction; 2) Preparing to Survey; 3) Doing the Survey; 4) Analyzing the Survey Results; and 5) Developing Possible Applications and Recommendations. Detailed checklists, photographs of different street conditions, and sample data collection and summary forms are also included.

Datta, Tapan K., David M. Litvin, and Mark A. Flak. "A Study of Various Data Collection Techniques for Computerized Information Systems." Paper prepared for the 59th Annual Meeting of the Transportation Research Board. Washington, D.C.: January, 1980.

Gehrer, Claus D. "Utilizing Geographic Basefiles for Transportation Analysis: A Network Basefile System." Seattle: University of Washington, 1977.

Paper assumes existence of geographic basefile information system and interactive graphic capability that have been developed locally. Ways of further developing this basefile and graphic system to produce network models for use in transportation planning tools, such as Urban Transportation Planning System, are outlined.

Highway Research Board. Use of Census Data in Urban Transportation Planning. Highway Research Board Special Report, No. 121. Washington, D.C.: 1971.

Report includes selected papers on data requirements, available census data, geographic coding capabilities, modelling and planning and data limitations based on 1970 Census statistics. Elements include the Address Coding Guide (ACG), Dual Independent Map Encoding (DIME) Files and Address Matching (ADMATCH). Computer Systems and potential applications are discussed.

Institute of Transportation Engineers. Photologging as a Tool for the Transportation Engineer (Papers presented at ITE Seminar). Toronto: 1979.

Articles and papers presented by industry representatives, contractors, and Federal, State, and local officials on various photologging techniques, equipment, applications, costs, and benefits. Material was developed for one-day seminar and is geared to local and county engineers interested in photologging.

Jenik, E.C. "Computerized Mapping and Record Systems for Utilties". Basking Ridge, New Jersey: American Telephone and Telegraph Company, 1977.

This paper highlights the private utility company perspective. The difficulties of manually maintaining outside-plant-location records, tools, maps, and labor are discussed, and computer map-based information systems are described as an efficient way of providing utility database system requirements. Support for the CAMRAS project and joint-use municipal map based-systems is encouraged.

Kuykendall, Richard C. "Need for and Application of Utility-Transportation Coordination". Chicago: American Public Works Association, 1976.

Paper identifies problems in coordinating local essential utility and transportation groups and services. It describes how the APWA Utility Location and Coordination Council was organized and has brought a large number and variety of representatives together to develop future local interrelated utility-transportation activities and programs.

Strange, K.B., and S.E. Mangum. "Data Management for a Metroplex." Houston, Texas: Turner, Collie, and Braden, Inc., 1980.

Paper briefly discusses the background, design, data structure, and computer system structure, and provides a general overview of Houston's METROCOM system.

Texas Transportation Institute. Street Inventory and Management System 2 vols. Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration and Urban Mass Transportation Administration. Washington, D.C.: 1979. Report I: System Planning and Design, February, 1979. Report II: System Development, December, 1979.

These two reports outline the planning, design, and development steps necessary for a computerized street inventory and maintenance management system for the MPO in Bexar County and the City of San Antonio's Department of Public Works. Results of surveys of existing systems, databases, and computerized output are included, and a local pilot study and plans for city and county-wide implementation are described.

Transportation Research Board. Application of Computer and Interactive Graphics. Washington, D.C.: 1979.

Report contains four papers prepared for the Transportation Systems Planning and Administration Group. Of particular relevance is a paper on "Improved Highway Safety through Interactive Graphics" developed by NYDOT. Paper describes a data base containing highway information and accident data developed on a "link-node" coding scheme which permits information to be accessed, summarized, or analyzed and produced accident-site location maps using interactive graphic techniques.

U.S. Department of Transportation, Federal Highway Administration, Office of Research and Development, Implementation Division. A User's Manual for A Management Control System for Street Maintenance. Washington, D.C.: 1977.

Manual presents system for planning, scheduling, and measuring results of work expended in street maintenance activities. It was designed to be used by local maintenance management personnel. Maintenance standards, work schedules, and implementation strategies are outlined using several case study examples. Manual was developed at the Center for Local Government Technology, Oklahoma State University.

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