STORM WATER INVENTORY SYSTEM

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INTRODUCTION

The intent of this report is to provide the reader with information useful for establishing a sewer system inventory and record system in his or her city. The major topic of this report is the collection of data relevant to storm sewers. However, because of the natural progression of Muncie's inventory, emphasis will be given to the collection of data for sanitary and combination sewers. The data concerning sanitary and combination sewers provides the base for the collection of inventory information for the storm sewers and is, thus, vital. With the completion of the information concerning the sanitary and combination sewers, this report will provide a clear picture to the reader of the total inventory collection process. Also, data will be presented that will explain the structural organization of the City of Muncie, its governmental organization of the various concerned departments involved in the study, the rationale and objectives for the study, and the procedures and methods for establishing an inventory system.

To completely understand the inventory process the reader should realize that the data being collected is divided into several areas for ease of management. The inventory data consist of: (1) maps showing the physical location, (2) individual structure sheets explaining information that is unique for each structure, and (3) computerization of data. Each of the above areas will be dealt with in more detail in this report. One must realize that all data cannot be presented here. However, Muncie's needs for the inventory and record system should provide the information needed for a similar system which can be augmented or diminished according to the individual user's needs.

The City of Muncie, Indiana, like many other cities in the country, has been faced with problems that are associated with the collection, transportation, disposal, and maintenance of its sanitary, combination, and storm sewer systems. Of major concern is the city's

great financial liability in cases where property damage and personal injury are incurred. Also of great concern are the problems associated with the engineering work required in evaluating and designing new additions to the present sewer systems. The engineer and his staff, if they are to perform their task of providing cost-effective and adequate service to the public, must have a wealth of accurate and updated information at their disposal.

This information—locations of sanitary, combined, and storm sewers; existing design data; top and invert elevations; locations of service taps; flow measurements for quantity and quality; smoke testing and dye testing results; and a complete inspection sheet for each structure—is vital because the engineer is only using guesswork. However, this guesswork will not provide the taxpayers with the service they expect and deserve. In fact, with the above inventory information, the sanitary district can improve new sewer designs, cleaning and maintenance, sewer billing, location and elimination of illegal taps, and location of point sources of pollutions. It can also provide better conditions for public safety and allow for continued industrial and residential growth.

ORGANIZATION OF COLLECTION AGENCIES

With the need for a comprehensive inventory and record system established, the task of organizing and agreeing upon job responsibilities of each affected department became critical. The common council of the City of Muncie, the commissioners of the Muncie Sanitary District, and the Delaware County Drainage Board are separate governmental agencies that would have existing information and would have need for the sewer system inventory and record information. Because of the separation of powers and responsibilities among these three governmental bodies and because of the overlapping of their boundaries, an internal agreement had to be obtained.

This agreement fixed responsibilities of each agency involving problems associated with open and closed conduit sewer systems. Also, all existing sewer information could be shared among the agencies. The responsibility of collecting the data on closed conduit sanitary, combination, and storm sewers fell upon the commissioners of the Muncie Sanitary District. All other legal requirements for fixing responsibilities for construction and maintenance are presently being discussed.

In 1971 the City of Muncie was directed by the Indiana Stream Pollution Control Board to appear at a hearing held against the Muncie Sanitary District. This hearing prompted the city to begin its

wastewater quality program. The city at this point employed a private consulting firm to perform a detailed study and to prepare a report. And in 1973, on advice of the consulting firm, the city took steps to relieve the overflowing of its combined sewers by building a major interceptor sewer. Also, a major provision of Public Law 92-500 calls for the community to prove beyond question that infiltration does not exist in the system. In fact, "Grants shall not be approved for a treatment works unless the collection system discharging into the works is not subject to excessive infiltration." For instance, the federal government would pay 75% and the state 10% of the total project cost. The remaining 15% would be picked up by the local community.

Since the provisions of Public Law 92-500 stressed that the sanitary district clean up its wastewater systems, additional steps were needed. The sanitary district and its consultant were required to begin studies to determine if excessive inflow/infiltration were present. A sewer system evaluation study was also begun. The sewer system evaluation study was a detailed study designed to locate and evaluate the sewers and to make recommendations for the improvement of the sanitary and combination sewer systems. The results of these two studies played a major part in the reconstruction of the sanitary district's sewage treatment plant from a secondary with clorination treatment plant to a tertiary treatment facility.

An agreement between the sanitary district and the consultant was reached about the manner in which the sewer system evaluation study would take place. The sanitary district would send its survey crews into the field ahead of the consultant's, thus, the location of structures that would have been missed due to the cost-effective restraints placed upon the consultant were located. In fact, over 1,500 structures were found that were covered by decades of street paving and would have been considered lost to the consultant. Also, the sanitary district had one of its crew members working along with each of the consultant's survey crews, and at the close of each week the week's field location information was forwarded to the sanitary district's office for mapping. This information was then utilized as the major reference in the location of storm sewers for the inventory.

ESTABLISHMENT OF POTENTIAL USERS

The major objectives of the sanitary district's inventory and record system are many. But who besides the sanitary district will use this inventory information? The major users—the general public, private contractors, plumbers, all municipal engineering departments, other

public utilities, public health departments, taxing and assessment departments, street and highway departments, and water quality control personnel—were contacted and questioned as to what information, relevant to sewers, they could utilize. The most frequent responses are for the physical location of sewer lines, manhole structures, and service connections to homes. However, additional data was useful, and depending on the users' needs at a particular time, would provide an asset to the community.

MEDIA SELECTION

Since the information had several potential users, it became necessary to organize the inventory to include every possible bit of information. The inventory and record system, if it was to be of use, would have to be as versatile as possible. With several forms of media being required to present the data, a highly efficient and well researched management plan had to be developed. Muncie's inventory was then divided into three major media elements. The media included were: (1) maps, which showed physical locations, (2) structure sheets, which stated information that could not be shown on a map, and (3) computerization, which gave the system the speedy ability to store and recall information. The next several paragraphs will explain each media and the information conveyed on each.

Maps

Corporation limits of the city contain 19.3 sq. mi., the sanitary district 27.6 sq. mi., and the county 376 sq. mi. In dealing with such a large area a system had to be developed to allow information to be shown in a manner that would be practical in scale and a workable size. The city, the sanitary district, and the county are typically divided into sections, townships, and ranges. Their divisions are based on the fact that one section usually contains 1 sq. mi. of land or 640 acres. After these sections were surveyed and monuments set, a natural grid system developed. However, this grid system was too large to be practical on paper. With this in mind, the sanitary district decided that quarter sections would allow the information on maps to be shown on a practical scale. In fact, the actual quadrants or grids would be actual surveyed quarter sections and would be shown at a scale of 1 in. = 100 ft. and could be drawn on a sheet of mylar measuring 30 in. x 30 in.

Assigning individual numbers to each quadrant became the next task. With the informational boundaries being confined to the sanitary district, the expansions of future boundaries were taken into con-

sideration in the numbering process. The sanitary district established baselines x and y along section lines to divide the city. The x line was to divide the city into north and south sections, and the y line would divide it into east and west sections. This then divided the city into four sections: (1) northeast, (2) northwest, (3) southeast, and (4) southwest. The individual quarter sections or quadrants were then assigned numbers according to where they were located in reference to the baselines.

The quadrant closest to the x-y baseline would be the lowest number, and according to which direction—east or west—one traveled from the y line, the number would increase. Also, quadrants in rows from the x line, north and south, would be given numbers that varied by a sequence of 20. This allowed up to 20 quadrants in any east-west direction and an unlimited number in the north-south direction. Quadrant numbers now appeared as, for example, NW-83.

Overlay System

With the city divided into quadrants, the detailed information about each quadrant could be processed. With the desire to maintain a system that would be versatile and useful, a series of map overlays for each quadrant was developed. Each quadrant overlay could be placed in any combination the user desired. The information contained on these individual map overlaps was too extensive to be placed on the same map. A one-map situation would result in severe limitations to the usefulness of the information.

Information placed on the map overlays was to be unique and in all cases would match other overlays to allow uniformity. A total of nine different overlays was devised for the mapping system. Each map used alone would not convey much information, but when overlays were combined, the information became more detailed. Thus, when the nine map overlays were completed, prints of them in seven different combinations could be utilized.

By far the most critical overlay map is the aerial map, because it allows the potential users of the system a reference for locating physical objects as they actually appear on the ground. It shows buildings, trees, streets, and other physical features for pin-pointing sewer locations. The aerial maps would then provide the basis for the whole inventory system. With the aerial maps serving in this capacity, they could be used in every overlay combination. Therefore, the need for recent aerial photographs became important.

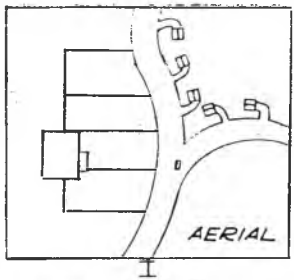
The sanitary district contacted various city and county offices and private consultants to determine if any recent maps were available

and, if not, the expense of obtaining them. Fortunately, the office of the county assessor was undertaking a project to reassess the property tax of the county. To accomplish this reassessment a series of aerials and property ownership maps were prepared in 1974 and 1975. This was fortunate because the expense would have been prohibitive for the sanitary district. Another fortunate event was that the maps were being completed at approximately the same time the inventory study was beginning.

The second overlay map is the quadrant map. This map is valuable in that it contains all the lots; subdivision names; tax numbers; lot dimensions; and the location of section corners, quarter corners, and bench marks. The main use of this map is in computing the assessment costs in locations where new sewers are being constructed for right-of-way purchases and in location of properties during the surveying of land.

The third overlay map is the sewer system evaluation study. This map shows the location of all sanitary and combined sewers and their manhole structures. The location of structures is determined by a reference measurement from the next structure on that line. At any end of a line a reference measurement from a permanent object, such as a building or a center line of a street, would be shown. The size and type of pipe would be shown, as well as what type structure was being shown, such as a diversion structure, force main, or lift station. The type of flow, combination or sanitary, the direction of flow, and the location of any major taps are also shown.

Figure 1. These are examples of the new mylars and the data each mylar includes. The following is an outline for the mylars: I. AERIAL (1" to 100' scale); II. QUAD, A. Lot dimensions, B. Lot numbers, C. Tax numbers, D. Street names, E. Legal boundaries, F. Bench mark locations, G. R. R. names, H. Rivers, Streams, Ditches; III. SEWER SYSTEM EVALUATION STUDY, A. Sanitary sewer locations, B. Reference measurements, C. Major storm sewer locations, D. Pipe diameters, E. Flow direction arrows, F. Diversion chambers, force mains, Lift stations, etc., G. Combination sewers; IV. STORM MYLAR, A. Curb inlet locations, B. Catch basin locations, C. Structure members; V. MANHOLE NUMBERS MYLAR; VI. INVERT/ELEVATIONS MYLAR, A. Rim elevation, B. Sewer locations, C. Slope, D. Flow direction, E. Pipe elevations (invert); VII. TAP LOCATION MYLAR, A. Sewer line locations, B. Tap and house laterals and measurements to them from a manhole; VIII. HOUSE NUMBERS MYLAR; IX. STREET NAMES MYLAR.



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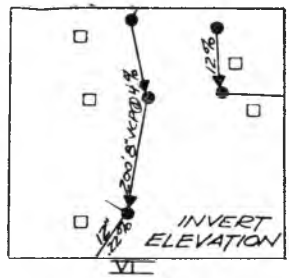

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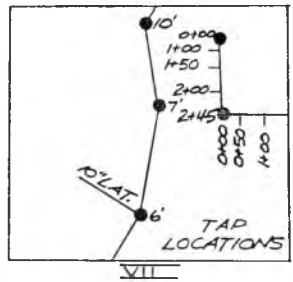
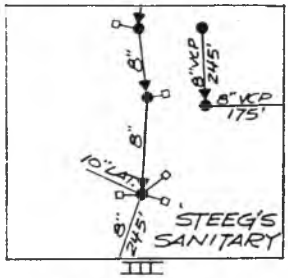
II



VII



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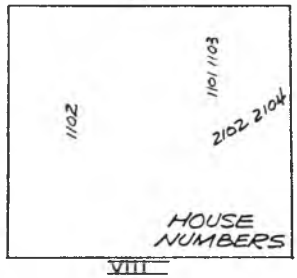

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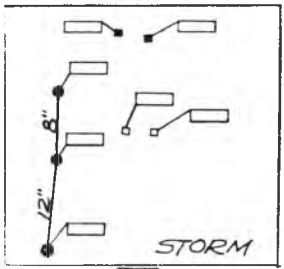

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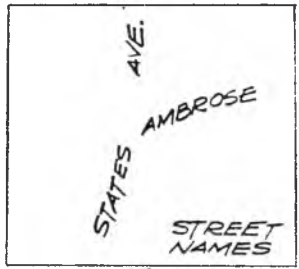

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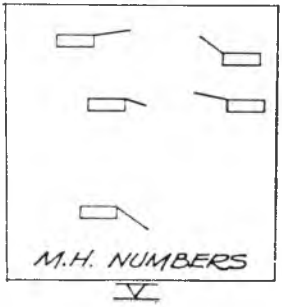


X

Overlay map number four is the structure number map. This map contains only the structure number according to the quadrant in which it is located. For example, if the number were NW-83-2, the number would indicate a reference to a structure information sheet containing detailed information about the structure.

Map overlay number five contains information relevant to the design of the sewer line giving information such as the rim elevation and invert elevation, the slope of the sewer, and the tracing of the sewer system evaluation map showing only the pipes, structures, and flow direction information. This map can be utilized by the designer in his computations for designing extensions to the sewer.

Overlay map number six shows the location of all sewer laterals from the main sewer lines. This map consists of a tracing of the sewer system evaluation study map showing the sewer lines, structures, and flow directions. Also shown is the reference measurement from the nearest manhole structure showing the location of the house laterals. This map is used for informing the public of the location of these laterals enabling them to connect their property into the main sewer system.

The seventh overlay is the house number map. This map contains the house numbers of each home in that quadrant. This serves as a reference map when street addresses are the only information known. Overlay number eight is simply a street name map.

Overlay nine is the storm structure overlay. This may shows the location of storm lines, types of storm structures, and the individual storm structure number. This number, to eliminate confusion between sanitary and combination structure, is shown as follows: NW-S83-2. This number is the reference number to the individual structure sheet containing the detailed data about the structure. The information gathered about the structure, once obtained, can be added to an additional overlay map when desired and thus expand the present nine quadrant overlays.

Alignment of this series of overlays is of the upmost importance, and a system of reference marks was devised to insure alignment. A symbol was placed at the approximate location of the section and quarter section corners. This symbol not only served as an alignment mark, but also as the quadrant's boundary markers. This mark was located on the aerials and quadrant maps as aligned to match all bordering quadrants. The mark was then traced onto the other overlay maps to insure the proper alignment of maps. All other data was spaced, arranged, and traced to insure that as much information as possible would

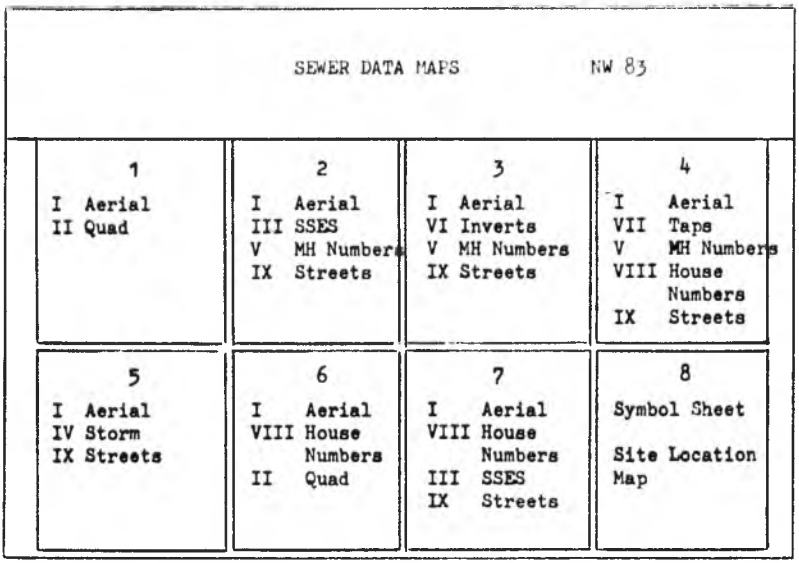


Figure 2. Sample layout of mylars in microfilm format. The Roman numerals indicate the mylars on Figure 1 that are to be overlayed to produce the microfilm blocks shown here.

not fall onto the other data. This system worked well because all overlays would not be used simultaneously but would be used in different combinations.

Overlay Combinations

There are a total of seven map overlay combinations to be used. Combination number one consists of aerial and quadrant overlays. Combination number two combines the aerial map, sewer system evaluation study, manhole numbers and street names. The third combination uses the aerial, invert elevations, manhole numbers, and street names. Combination number four is the aerial, tap locations, manhole numbers, house numbers, and street names. The fifth combination consists of the aerial, storm, and street name overlays. The sixth contains, again, the aerial, house numbers, and the quadrant map. The seventh and last combination uses the aerial, house numbers, sewer system evaluation study, and the street name overlays. These seven different combinations provide the system with the versatility necessary to meet the varied needs of the users.

STORM SEWER INVENTORY

Since the reader has been given the concepts and rationale used in establishing the mapping system in Muncie, the report can now progress to a more detailed explanation of the storm sewer inventory. The collection of data for the storm sewer inventory was divided into three elements. The first consisted of the physical collection of field data. Secondly, the actual in-house processing of the field data was completed. And third, the conversion of the raw data into established computer operations then took place.

Physical Collection and Processing of Data

Physical collection of data involves the location, assessment of the structural condition, and inspection of all pipes and exterior condition of the storm structures. Survey crews were given an in-

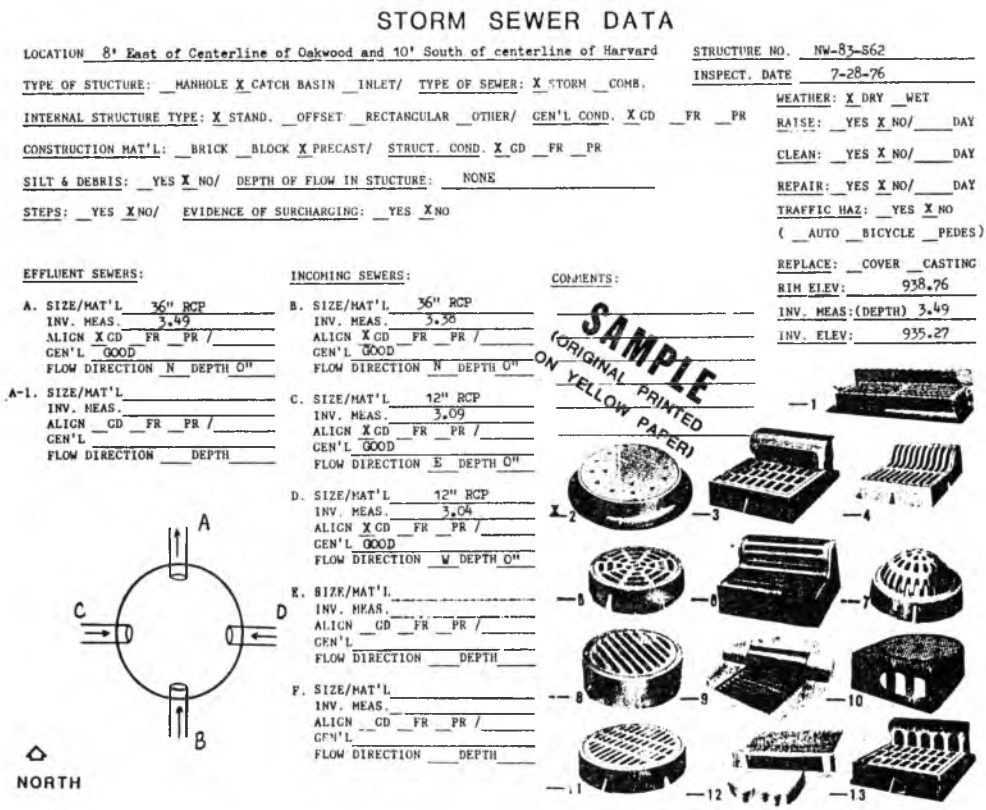
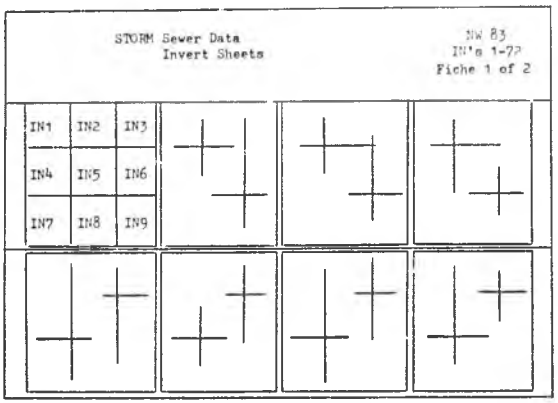


Figure 3. Sample storm sewer data sheet.



Sample Layout
For Invert Sheets
on Micro-fiche

Each Micro-fiche card has a Title Head with a card designation (STORM Sewer Data, Invert Sheets), Quad Number (NW 83), and number of inlets (IN's 1-72) on that particular card. Each film block contains detailed information on 9 inlets and there are 8 blocks per card. For a total of 72 inlets per card. Each of the 9 documents per block (or frame) has detailed information on the design and function of a specific inlet. The attached sheet shows the layout of this new Invert Sheet.

Figure 4. Storm sewer data sheets in microfilm format.

ventory inspection sheet on which they described the above conditions in detail.

An important aspect of the crews inspection was that of assessing the safety of the structures and identifying any hazard presented and stating the immediacy of the need for repair. Crews also noted any structures in need of cleaning. In-house preparation of the field data is the second major element involved in the storm sewer inventory. The in-house processing of the field data involved the drawing of the data onto the overlay mylar and the checking of the inspection sheets to insure their completeness.

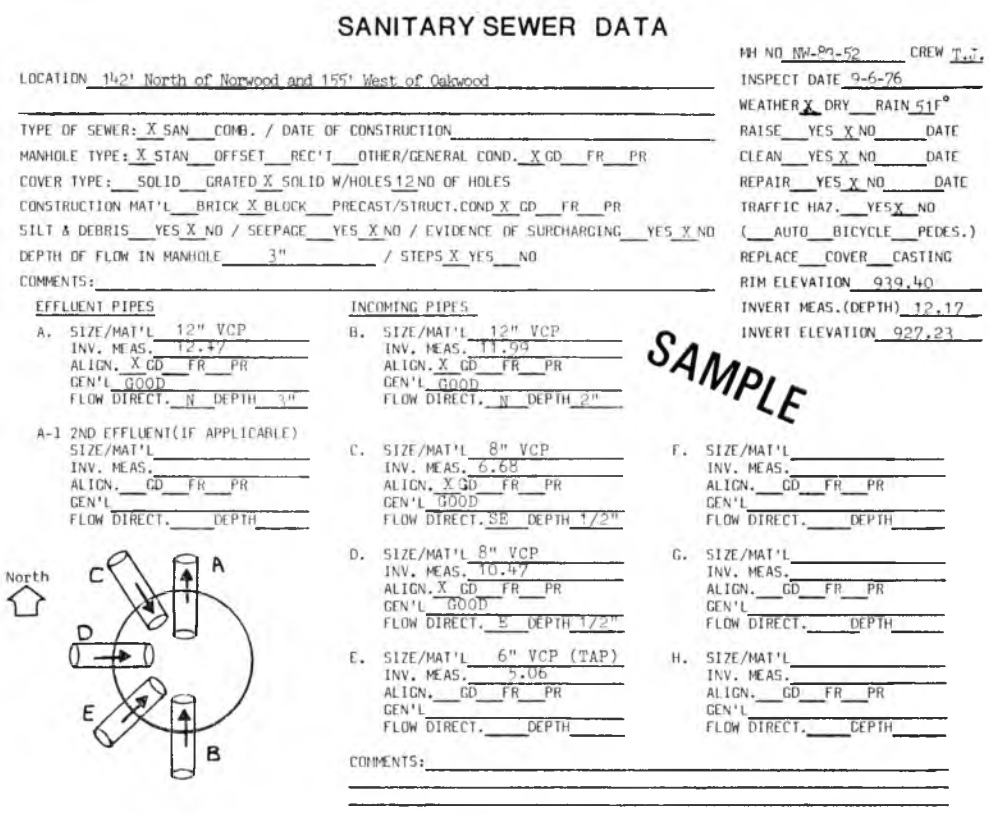
Computerization

The third element of the inventory was the conversion of the raw individual inspection sheets into a system that could categorize each structure according to its needs. This rapid recall capability could only be accomplished through computerization. Computerization allowed the sanitary district to recall in a matter of seconds each structure throughout the city needing cleaning. It also served as an engineering tool in evaluating the total systems effectiveness in removal of surface water.

Another major reason for computerization is that the U.S. Commerce Department's Bureau of Census established in the 1970 census

certain Standard Metropolitan Areas (SMA), one of which was Muncie. This SMA means that a Geographic Base (DIME) File was established for the bureau to obtain the 1970 census. The GBF-DIME is a computerized system which established certain points of reference. The points formed a grid pattern, usually coinciding with a city block, and considerable information was established about the area, such as the number of persons in the block, the average family income, and the average property value. Since the federal government already uses this system, the sanitary district felt that this would be the most economical and least complex system to use in conjunction with the one already established by the federal government.

Although computerization gave the inventory system the capability of recall and record in a speedy manner, it did not eliminate the total paper size of the inventory. With a total of approximately 11,000 individual invert sheets and 1350 sheets of mylar, a problem developed


SANITARY SEWER DATA

MH NO. NW-83-52 CREW T.J.

LOCATION 142' North of Norwood and 155' West of Oakwood

INSPECT DATE 9-6-76

WEATHER X DRY RAIN 51F°

TYPE OF SEWER: X SAN COMB. / DATE OF CONSTRUCTION

RAISE YES X NO DATE

MANHOLE TYPE: X STAN OFFSET REC'T OTHER/GENERAL COND. X GD FR PR

CLEAN YES X NO DATE

COVER TYPE: SOLID GRATED X SOLID W/HOLES 12 NO OF HOLES

REPAIR YES X NO DATE

CONSTRUCTION MAT'L BRICK X BLOCK PRECAST/STRUCT.COND X GD FR PR

TRAFFIC HAZ. YES X NO

SILT & DEBRIS YES X NO / SEEPAGE YES X NO / EVIDENCE OF SURCHARGING YES X NO

(AUTO BICYCLE PEDES.)

DEPTH OF FLOW IN MANHOLE 3" / STEPS X YES NO

REPLACE COVER CASTING

COMMENTS:

RIM ELEVATION 939.40

INVERT MEAS.(DEPTH) 12.17

INVERT ELEVATION 927.23

EFFLUENT PIPES

A. SIZE/MAT'L 12" VCP
INV. MEAS. 12.47
ALIGN. X GD FR PR
GEN'L GOOD
FLOW DIRECT. N DEPTH 3"

A-1 2ND EFFLUENT(IF APPLICABLE)
SIZE/MAT'L
INV. MEAS.
ALIGN. GD FR PR
GEN'L
FLOW DIRECT. DEPTH

INCOMING PIPES

B. SIZE/MAT'L 12" VCP
INV. MEAS. 11.99
ALIGN. X GD FR PR
GEN'L GOOD
FLOW DIRECT. N DEPTH 2"

C. SIZE/MAT'L 8" VCP
INV. MEAS. 6.68
ALIGN. X GD FR PR
GEN'L GOOD
FLOW DIRECT. SE DEPTH 1/2"

D. SIZE/MAT'L 8" VCP
INV. MEAS. 10.47
ALIGN. X GD FR PR
GEN'L GOOD
FLOW DIRECT. E DEPTH 1/2"

E. SIZE/MAT'L 6" VCP (TAP)
INV. MEAS. 5.06
ALIGN. GD FR PR
GEN'L
FLOW DIRECT. DEPTH

F. SIZE/MAT'L
INV. MEAS.
ALIGN. GD FR PR
GEN'L
FLOW DIRECT. DEPTH

G. SIZE/MAT'L
INV. MEAS.
ALIGN. GD FR PR
GEN'L
FLOW DIRECT. DEPTH

H. SIZE/MAT'L
INV. MEAS.
ALIGN. GD FR PR
GEN'L
FLOW DIRECT. DEPTH

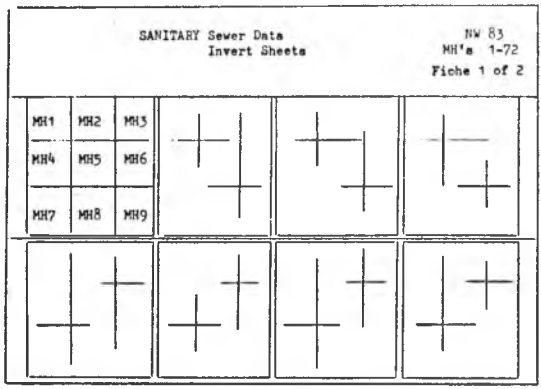
SAMPLE

North

A
B
C
D
E

COMMENTS:

Figure 5. Sanitary sewer data sheet.



Sample Layout
For Invert Sheets
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Each Micro-fiche card has a Title Head with a card designation (SANITARY Sewer Data, Invert Sheets), Quad Number (NW 83), and number of manholes (MH's 1-72) on that particular card. Each film block contains detailed information on 9 manholes and there are 8 blocks per card. For a total of 72 manholes per card. Each of the 9 documents per block (or frame) has detailed information on the design and function of a specific manhole. The attached sheet shows the layout of this new Invert Sheet.

Figure 6. Sanitary data in microfilm format.

in the sheer size of the data. This led to use of microfiche cards, containing all the overlay combinations, which could be utilized. Also, all inventory inspection sheets could be placed on a microfiche card. The saving of space is outstanding. The inventory overlays can be stored in four or five, flat, file drawers and the inspection sheets in one four-drawer file cabinet. The microfiche can be stored in a drawer of approximately 3 sq. ft. in size. This is a reduction in the original size of approximately 1/600th. With this size reduction the inventory system can be utilized anywhere that a portable projector can be used. This then makes the system easily accessable and provides additional versatility to its user.

CONCLUSION

In conclusion, after having discussed the steps involved in establishing Muncie's sewer system inventory and new record system, it may be helpful to briefly cover some of the financial aspects of Muncie's program. The cost of such an updated program is quite extensive. The cost involved in Muncie's program was reduced considerably through the careful use of the college work-study and the Comprehensive Employment Training Act (CETA) programs. The work-study program is sponsored by a university in conjunction with the federal government. In this program the student works full-time during the summer months to help finance his expenses during the

STRUCTURE NUMBER	LOCATION OF STRUCTURE	INSPECTION DATE	RAISE	CLEAN	REPAIR	REPLACE	TRAF. HAZ.
NW-83 S 39	NORTH SIDE OF NORWOOD, 3RD HOUSE WEST OF OAKWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 40	N.W. CORNER OF NORWOOD & OAKWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 41	NORTH SIDE OF NORWOOD, EAST OF OAKWOOD AT THE CURVE	7-28-76	NO	NO	NO		NO
NW-83 S 42	S.W. CORNER OF NORWOOD & TIMBER LANE	7-28-76	NO	YES	NO		NO
NW-83 S 43	S.W. CORNER OF NORWOOD & ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 44	S.E. CORNER OF NORWOOD & ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 45	SOUTH SIDE OF NORWOOD, 5TH HOUSE EAST OF ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 46	SOUTH SIDE OF OAKWOOD, 3RD HOUSE WEST OF OAKWOOD	7-28-76	NO	NO	NO		NO
NW-83 S 47	S.W. CORNER OF NORWOOD & OAKWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 48	SOUTH SIDE OF NORWOOD, EAST OF OAKWOOD AT THE CURVE	7-28-76	NO	NO	NO		NO
NW-83 S 49	WEST SIDE OF VERNON, 150 FT. NORTH OF HARVARD	7-28-76	NO	YES	NO		NO
NW-83 S 50	EAST SIDE OF VERNON, 150 FT. NORTH OF HARVARD	7-28-76	NO	YES	NO		NO
NW-83 S 51	NORTH SIDE OF HARVARD, 4TH HOUSE WEST OF ROSEWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 52	NORTH SIDE OF ROYAL OAK, 3RD HOUSE EAST OF PARK	7-28-76	NO	NO	NO		NO
NW-83 S 53	NORTH SIDE OF AUDUBON & ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 54	NORTH SIDE OF AUDUBON & ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 55	NORTH SIDE OF HARVARD BETWEEN OAKWOOD & VERNON	7-28-76	NO	NO	NO		NO
NW-83 S 56	SOUTH SIDE OF HARVARD, 4TH HOUSE WEST OF ROSEWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 57	S.W. CORNER OF AUDUBON & ROYAL OAK	7-28-76	NO	NO	NO		NO
NW-83 S 58	WEST SIDE OF HARVARD & OAKWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 59	SOUTH SIDE OF HARVARD BETWEEN OAKWOOD & VERNON	7-28-76	NO	YES	NO		NO
NW-83 S 60	SOUTH SIDE OF HARVARD, 4TH HOUSE EAST OF ROSEWOOD	7-28-76	NO	YES	NO		NO
NW-83 S 61	S.E. CORNER OF AUDUBON & ROYAL OAK	7-28-76	NO	NO	NO	VIII	NO
NW-83 S 62	EAST SIDE OF HARVARD & OAKWOOD	7-28-76					
NW-83 S 63	WEST SIDE OF TIMBER LANE AT 3500 TIMBER LANE	7-12-76	NO	NO	NO		NO
NW-83 S 64	EAST SIDE OF TIMBER LANE ACROSS FROM 3500 TIMBER LANE	7-12-76	NO	YES	NO		NO
NW-83 S 65	EAST SIDE OF TIMBER LANE, NORTH OF WOODMONT	7-12-76	NO	YES	NO		NO
NW-83 S 66	NORTH SIDE OF AUDUBON BETWEEN PARK & ROYAL OAK	7-12-76	NO	NO	NO		NO
NW-83 S 67	NORTH SIDE OF NORTHFIELD BETWEEN ROSEWOOD & WOODMONT	7-12-76	NO	NO	NO		NO
NW-83 S 68	SOUTH SIDE OF AUDUBON BETWEEN PARK & ROYAL OAK	7-12-76	NO	NO	NO		NO
NW-83 S 69	SOUTH SIDE OF NORTHFIELD BETWEEN ROSEWOOD & WOODMONT	7-12-76	NO	NO	NO		NO
NW-83 S 70	WEST SIDE OF OAKWOOD BETWEEN HARVARD & WOODMONT	7-12-76	NO	NO	NO		NO
NW-83 S 71	EAST SIDE OF OAKWOOD BETWEEN HARVARD & WOODMONT	7-12-76		NO	NO		
NW-83 S 72	W. SIDE OF ROYAL OAK BETWEEN WOODMONT & N. BEND ROYAL OAK	7-12-76	NO	NO	NO		NO
NW-83 S 73	E. SIDE OF ROYAL OAK BETWEEN WOODMONT & N. BEND ROYAL OAK	7-12-76	NO	NO	NO		NO
NW-83 S 74	N.W. CORNER OF ROSEWOOD & WOODMONT	7-12-76	NO	YES	NO		NO
NW-83 S 75	NORTH SIDE OF WOODMONT BETWEEN OAKWOOD & ROSEWOOD	7-12-76	NO	YES	NO		NO
NW-83 S 76	N.W. CORNER OF TIMBER LANE & WOODMONT	7-12-76	NO	YES	NO		NO
NW-83 S 77	N.E. CORNER OF TIMBER LANE & WOODMONT	7-12-76	NO	NO	NO		NO
NW-83 S 78	SOUTH SIDE OF WOODMONT BETWEEN OAKWOOD & ROSEWOOD	7-12-76	NO	YES	NO		NO
NW-83 S 79	S.W. CORNER OF ROSEWOOD & WOODMONT	7-12-76	NO				NO
NW-83 S 80	S.E. CORNER OF TIMBER LANE & WOODMONT	7-12-76	NO	NO	NO		NO
NW-83 S 81	N.W. CORNER OF AUDUBON & WOODMONT	7-12-76	NO	NO	NO		NO

Figure 7. Sample computer printout.

school year. The student receives 80% of this pay from the program and 20% from the city. The CETA program is also sponsored by the federal government. Persons qualifying to work under this program may be employed at no cost to the city.

In fact, during the three years of the study, the city has paid approximately $30,000, excluding grant monies, in personnel and equipment costs.