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State Water Survey Division

SURFACE WATER SECTION

AT THE

UNIVERSITY OF ILLINOIS

ENR

Illinois Department of
Energy and Natural Resources

SWS Contract Report 350

**ILLINOIS FLOODPLAIN MANAGEMENT INFORMATION SYSTEM
(IFMIS)
DESIGN MANUAL**

by Robert A. Sinclair

This report was prepared with support from
Illinois Division of Water Resources

Champaign, Illinois
September 1984



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Summary

The information requirements for comprehensive floodplain management in Illinois are substantial and require an automated approach to storage and retrieval. Nearly 200 pertinent information items for each of the 700 communities have been identified as part of the required data base for floodplain management.

This report describes the hardware and software specifications for a personal computer system to store and manipulate the floodplain management data base. It also describes the data items that the data base will contain and how they will be integrated into a common data base from a variety of sources. It identifies the various sources of data and the procedures that will be necessary for the data items to become a common entity.

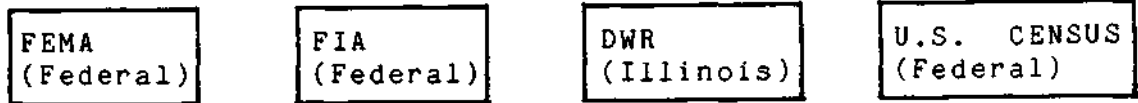
The floodplain management data base system will be implemented on an IBM Personal Computer AT, 5170 model 99 using the Ashton-Tate dBASE III relational data base management software. The floodplain management data base will involve the integration of one hundred and ten different data elements and one hundred and ninety-two data items collected from four different federal and state agencies. Some data items can be obtained in machine readable form (MRF) and some other data items must be coded, tabulated, and entered into machine readable form before they can

be integrated into the data base. The desired floodplain management data base will initially be about one million characters (bytes) in size and will reside on the IBM Personal Computer AT 20 megabyte fixed disk drive.

Scope of Information Collection

Four sources of floodplain management information are required for floodplain management in Illinois. They are the Federal Emergency Management Agency (FEMA), the Division of Water Resources of the Illinois Department of Transportation (DWR), the Federal Insurance Administration (FIA), and the United States Bureau of the Census.

Sources of Floodplain Management Information



The data⁽¹⁾ from FEMA is held and made available to outside individuals by the FEMA Computer Group⁽²⁾ on a no charge basis (other than computer tapes). There are three machine readable files available from the FEMA Computer Group. They are 1) the Community Status file, 2) the Flood Map file, and 3) the Flood Study file. These three machine readable files will be obtained by contacting Bill Robertson of the FEMA Computer Group at area code 202, telephone number 287-0223.

The Claims master file⁽⁶⁾ and Policy master file⁽⁷⁾ data are also needed and are available from the Federal Insurance Administration (FIA). These two data files are held for FIA by the Computer Scientific Corporation (CSC), a contractor and consultant to FIA. These two data files are not as readily available and must be requested from FIA. The individual to contact at FIA is:

Mr. Kimber Wald, Project Manager
c/o National Flood Insurance Program
9901A George Palmer Highway
Lanham, MD 20706
(301) 731-5300

From conversations with FEMA it appears the Policy and Claims files are not structured in the manner that the data is desired, consequently, much more work must be done by CSC and there will be a longer delay in getting these data. At the time of this writing it is not know what if any charge there will be for these two data files.

The data from DWR is in non machine readable form. This data will be collected and tabulated by DWR and then put into machine readable form. The Census data available form the U. S. Bureau of the Census is in machine readable form and will be obtained from one of many sources.

There are one hundred and ninety-two data items but only one hundred and ten data elements. This is because a particular data element is desired for a period of years (see Appendix A). The data items in Appendix A are broken down into four categories: A, B, C, and D. The source of the data is also shown along with the size of the data item in characters (commonly known as field width). For example: data item A1, Community Name is available from the Federal Emergency Management Agency (FEMA) Computer Group, and it has a field width of twenty characters. Data item A6, Regional Planning Commission is available from the Illinois Division of Water Resources (DWR), and has a field width of four.

Personal Computer Hardware
Specification

After reviewing several different microcomputer systems and taking into consideration the software and hardware compatible situation and the information storage and processing requirements, the IBM Personal Computer AT, 5170 model 99⁽³⁾ has been selected to hold and massage the floodplain management data base. The IBM Personal Computer AT is based on a high performance 16/24-bit Intel 80286 microprocessor. The 5170 model 99 is equipped with a high capacity 1.2 megabyte diskette drive, a 20 megabyte fixed disk drive, enhanced keyboard, Read Only Memory (ROM) base BASIC language, clock/calendar with battery backup, and keylock. The model 99 comes with 512 kilobytes of

Random Access Memory (RAM). The standard features are as follows:

- * Advanced high-performance Intel 80286 Microprocessor
- * ROM based automatic power on self test of system components
- * ROM based BASIC language interpreter
- * 8086 compatible real address mode
- * Protected virtual address mode
- * 512 kilobytes of memory
- * 1.2 megabytes high capacity diskette drive
- * 20 megabytes fixed disk drive
- * Fixed disk interface
- * Fixed disk in use indicator light
- * Serial/parallel interface
- * System clock/calendar/system configuration storage with battery backup
- * Sound system
- * Keylock
- * Bi-directional keyboard interface
- * Enhanced keyboard
- * Switchable worldwide power supply
- * Power-on indicator light
- * Eight I/O expansion slots
- * Socket for 80287 math co-processor
- * 24-bit addressing
- * 16-level data path
- * Seven-channel direct memory access (DMA)
- * 16-level interrupt
- * Three programmable timers

Personal Computer Software

Specifications

The IBM Personal Computer AT, 5170 model 99 requires the 3.0 version of the Disk Operating System (DOS 3.0). DOS 3.0 supports the 20 megabyte fixed disk drive and the 1.2 megabyte high capacity diskette drive in the 5170 system. With DOS 3.0, the 1.2 megabyte diskette will also read single- and dual-sided

diskettes formatted at 160/180 kilobytes and 320/360 kilobytes capacity.

The floodplain management data base will be supported using the Ashton-Tate relational data base management software dBASE III⁽⁵⁾.

The technical specification for dBase III are:

Each data base file

Number of records -	1 billion maximum
Number of bytes -	2 billion maximum
Record size -	4000 bytes in dbf.file
	512 kilobytes in dbt.file
Fields -	128 maximum

Field sizes

Character fields -	254 bytes maximum
Date fields -	8 bytes maximum
Logical fields -	1 byte maximum
Numeric fields -	19 bytes maximum

File operations

15 open files of all types.
 10 open data base files. A data base file counts as two if memo fields are used.
 Seven open index files per active data base file
 One open format file per active data base file.

Numeric Accuracy

15.9 digits. Note that the decimal point does not count as a digit in determining accuracy.

Largest number: $1 \times 10^{+307}$

Smallest number 1×10^{-307}

Memory variables

Number of active memory variables: 256
 Total number of bytes of memory variables: 6000

dBASE III adheres to the relational model for data base management systems. A relational data base is viewed as one or more rectangular tables of rows and columns. Each of these tables is called a 'relation'. The rows are called records and the columns are called fields.

A relational data base management system provides the capability to cross-reference between relations (data base files in dBASE III). The IBM Personal Computer AT fully supports dBASE III.

Creation of Data Base

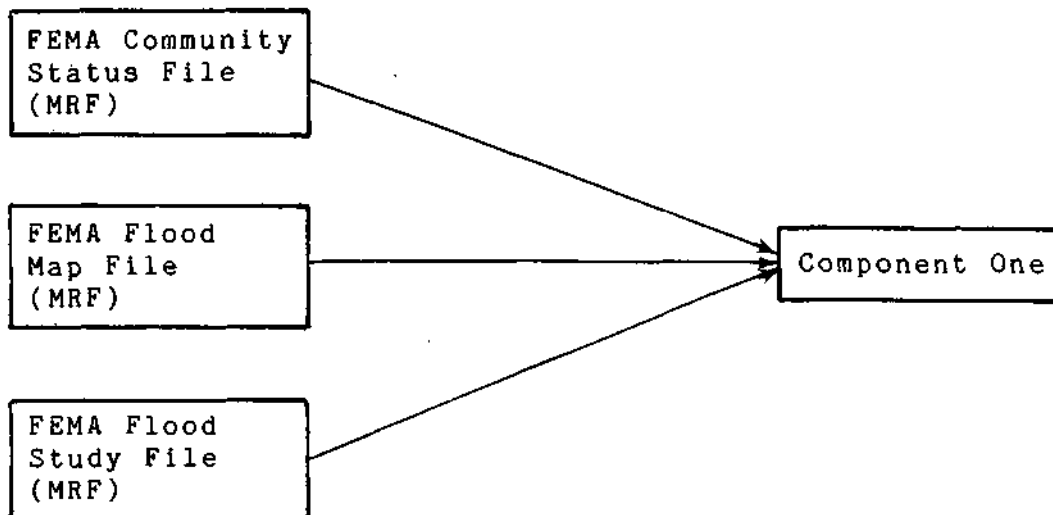
Since the floodplain management data base must be obtained from four different sources (FEMA, FIA, DWR, & U.S.Census) it will be built as four individual components then integrated into one data base.

The key data element is Community ID number. The four components will be related by this data element. The integration, relationships, and retrievals will be achieved using this particular data element.

The Data Base Building Blocks

Component One

Sources of Data

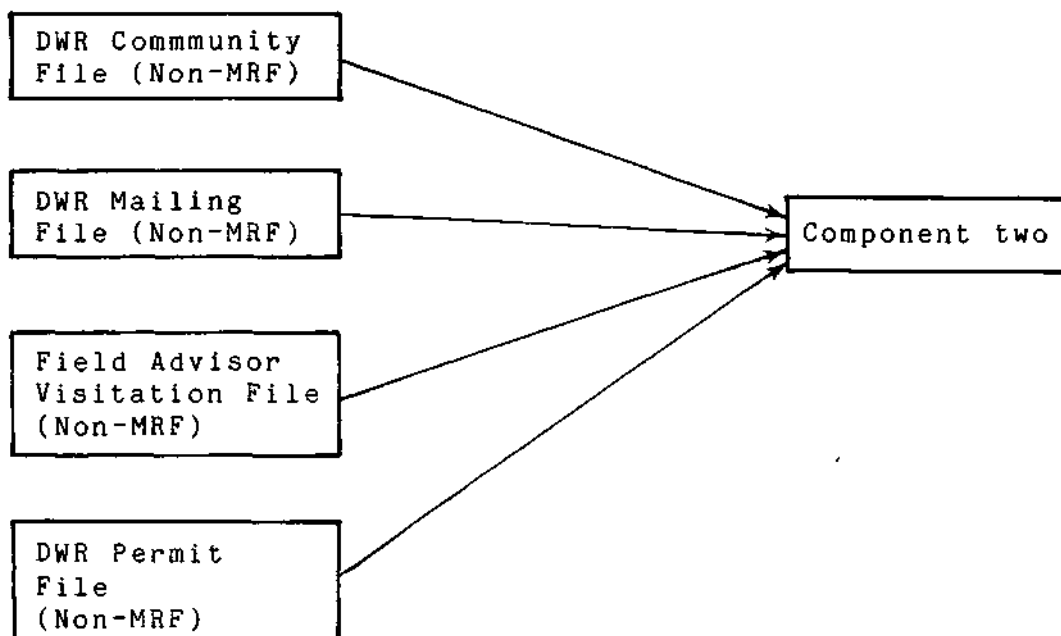


The FEMA Community Status, Flood Map, and Flood Study files are more readily available than some of the other sources of data, consequently, the work will begin on Component One first. There are twenty nine data elements, thirty seven data items, for a total field width of 322 characters. Component One is much too long to be composed of one record. Component One will be composed of five records for ease of output, updates, and speed of retrievals. Each of Component one's records will contain Community ID number along with the record type. The record type groupings are: Identification-Status information, Personnel-Address, Visitation data, and Floodplain Statistics (2 records).

Component Two

Component two's source of data is Illinois's Division of Water Resources. The data are being compiled from a number of sources within DWR. The data entry format will be developed later after consultation with the staff of DWR. The sources of data from within DWR are as follows:

Sources of data



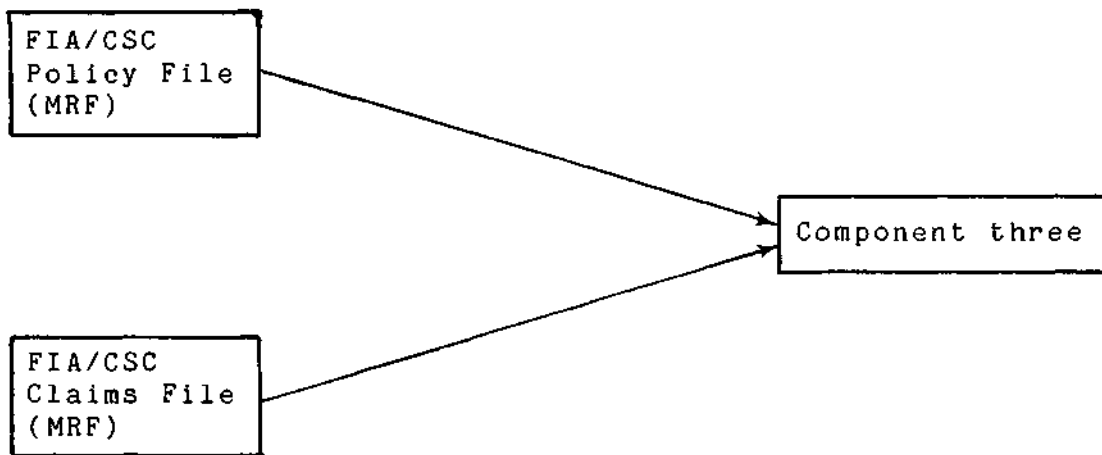
There are twelve data elements in component two and twenty six data items. One data element is an annual value for an eight year period involving two data items. The twenty six data items represent 224 characters of information. Component two will be composed of 3 or 4 records depending upon the breakdown of . the

categories of the data. At the present time, there appears there will be a Region-Personnel record, a Floodway-Statistics record, and a Floodplain-Statistics record.

Component Three

The data for component three are available in machine readable form from the Federal Insurance Administration's computer support contractor, Computer Scientific Corporation (CSC). The CSC is the data manager for the FIA's Policy and Claims files. These two files contain the sixty seven data elements that are needed to build component three.

Source of data



Within these sixty seven data elements, there are one hundred and twenty eight data items because a period of years is desired for the same data element. These one hundred and twenty eight data items represent 479 characters of information. Component three will be composed of eight records (see Appendix A).

The data items for Component Three will be grouped in more of a physical arrangement of records rather than a logical grouping of the records. The data items will be grouped in the following manner:

Record one	-	C1-C29
Record two	-	C30-C32
Record three	-	C34-C44
Record four	-	C45-C64
Record five	-	D1-D21
Record six	-	D22-D32
Record seven	-	D33-D73
Record eight	-	D74-D84

Component Four

Only one data element is needed from the U.S. Bureau of the Census. That data element is the Community Total Population with a field width of nine characters. This information may be obtained from a variety of sources. The actual source of the data will depend upon the level of convenience.

Source of data



The Community Total Population will be merged with Component One during the compilation stage of the project.

Summary of Components

The characteristics of the components of the data base are as follows:

<u>Component</u>	<u>Data elements</u>	<u>Data items</u>	<u>Total characters</u>	<u>Number records</u>
One	30	37	322	5
Two	12	26	224	3
Three	67	128	479	8
Four	1	1	9	1
Totals	110	192	1034	17

Since seven hundred and thirty five of Illinois' eight hundred and ninety six communities with identified floodplains are currently in the National Flood Insurance program, the Floodplain Management data base will approach a maximum size of about 1

million characters in size ($103^4 \times 896$ equal approx. 1 million).

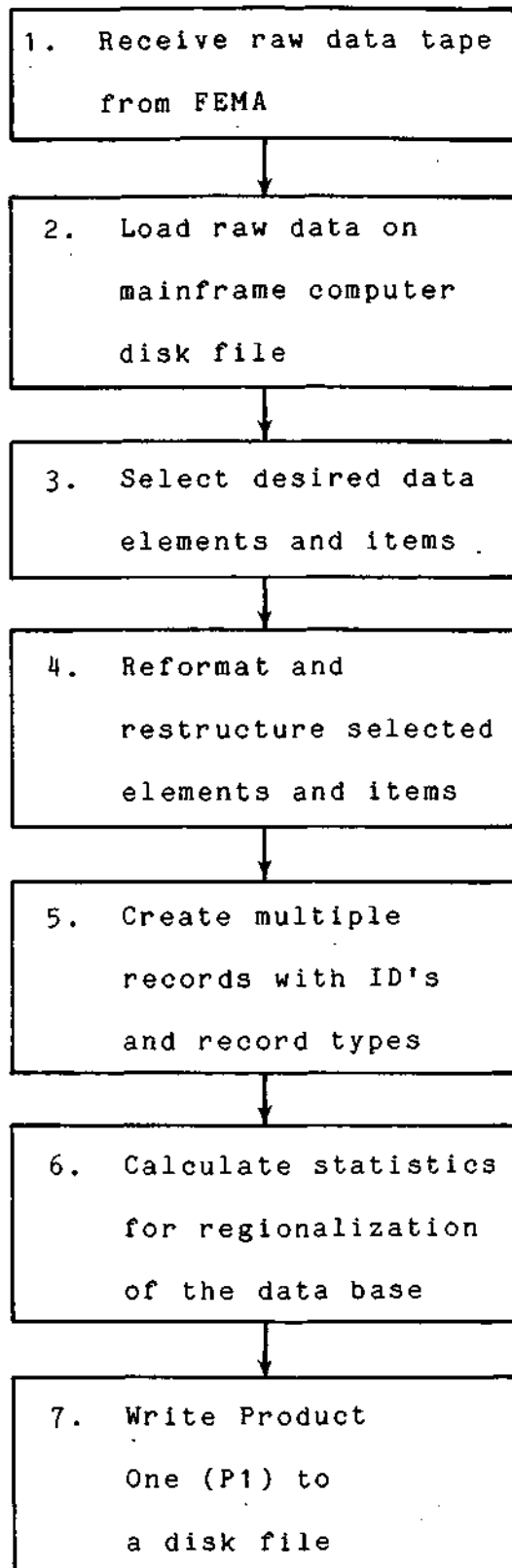
Please understand that in any data base management system there is overhead, consequently, the data base with the overhead of the system could expand to be 1.5 million characters in size.

Data Manipulation

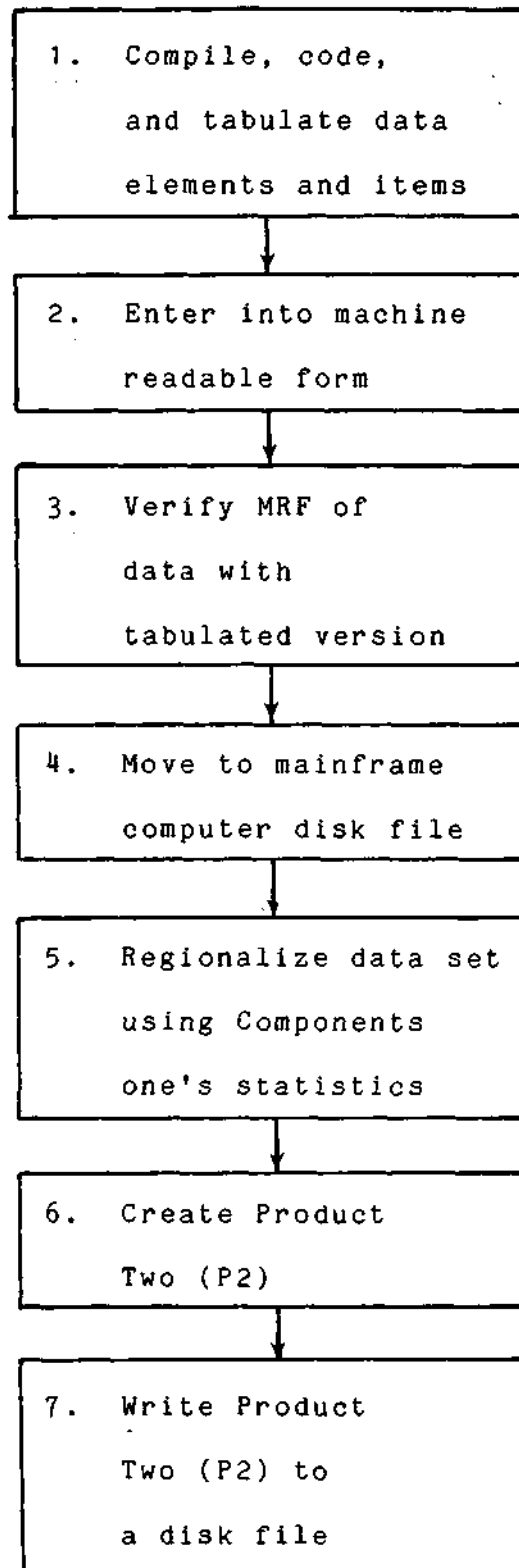
Before the data elements of the four components can be integrated they all must be brought to a common standard. There must be commonality among the four components. Consequently, the data elements from the various sources will be processed to create four products. The steps or procedures involving the various components that are necessary to achieve commonality for the four products are shown below.

The four components will be regionalized to make the data sets more manageable in size. At the present time, insufficient information is available to specifically describe how the products will be regionalized, but once the distribution of the communities throughout the state is known, this will be possible. Regionalization of the data base is an important part of the 'fine tuning' that will go into making the Floodplain Management data base perform efficiently on a personal computer using dBASE III. Without regionalization, the searches through the data base would take more time than necessary.

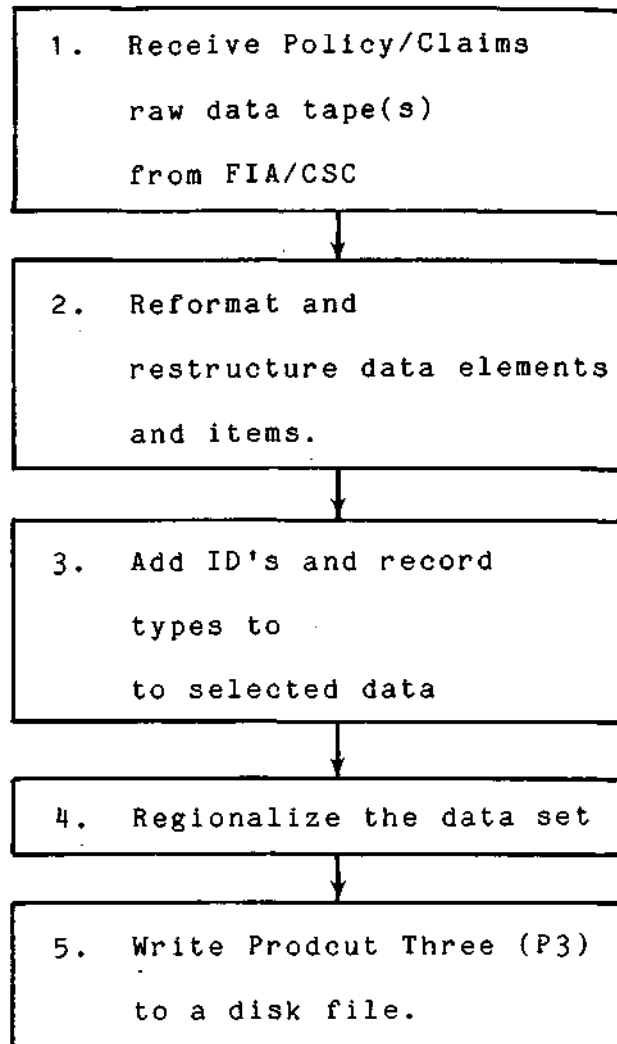
Component One (FEMA)



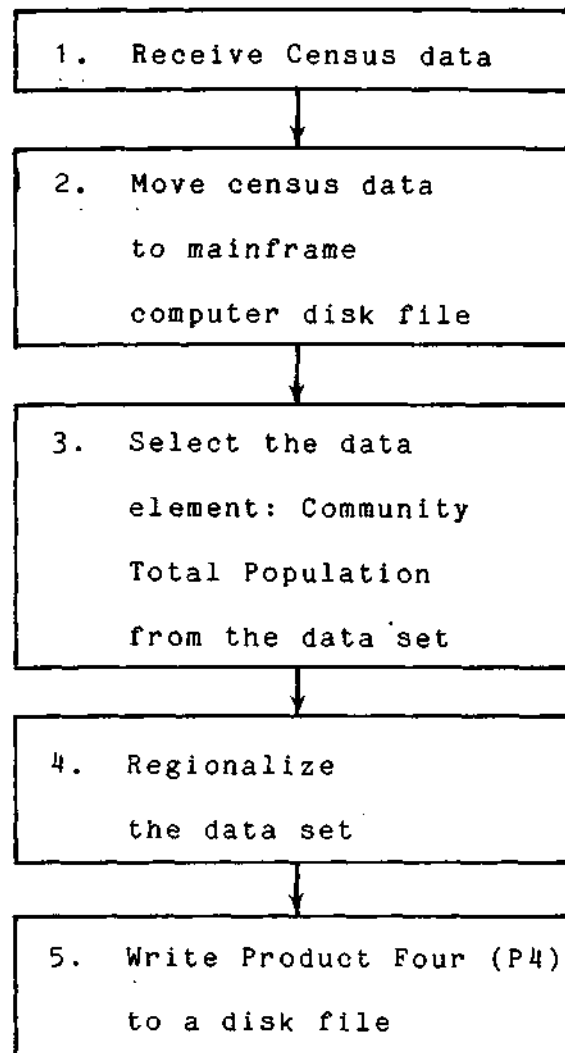
Component Two (DWR)



Component Three



Component Four



The data manipulation phase is generally a black box and is left to the discretion of the system programmer. The programmer will determine the detailed procedures to be used to achieve the final desired products with the necessary commonality for integration.

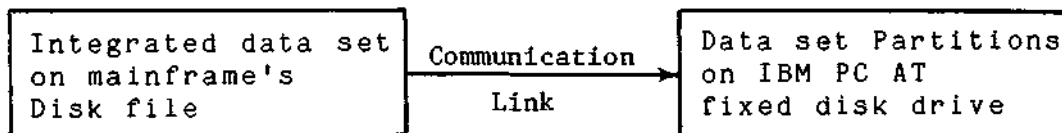
Integration

When the four products P1, P2, P3, and P4 have been created from the raw data with the community ID number and record types embedded in all of the P1, P2, P3, and P4 records, the data elements can then be merged and integrated into the structure described in Appendix A. Since a single record of 1034 characters per community is very long, it would be difficult to use, update, and to do retrievals on, consequently, this single long record will be broken down into multiple records called 'relationships'. These relationships are established as packets of information or data most often used by an individual selecting information from the data base. The schema or arrangement of the data elements and items of a data base is designed after looking at the the frequency and categories of data selected most often by the average user of the system. This will involve some input from the user community along with testing and building of dBASE III program procedures to aid the user in utilizing the data base to its fullest.

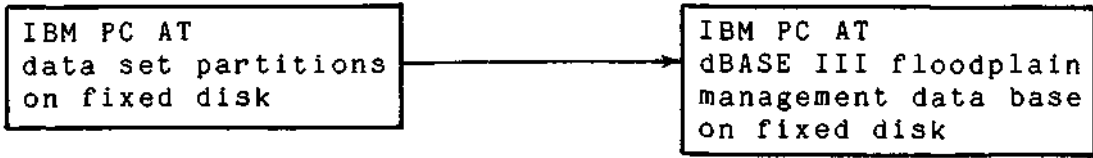
Generally the categories described in Appendix A will be used as the guideline for organizing the data base. The categories will be structured into smaller 'relationships' for the reasons mentioned earlier. The integrated data set will be written to disk as a dBASE III compatible 'text' file.

Building the Personal ComputerData Base

At this point, the integrated data set can be moved from the computer mainframe disk file to the personal computer. The integrated data base will be downloaded (transmitted) from the mainframe to the PC by a data communications link between the two. The communications link sends or receives data at a rate of 96 characters per second. Consequently, it will take about three hours of connection time to download the one million character integrated data set onto the IBM PC AT. The integrated data set will be broken into partitions for convenience of downloading and also for direct loading into dBASE III. The partitions will be very similar to the floodplain management data base relationships.



The relationships, field names (data item name), field type, and field width must be defined before the various partitions of data can be loaded into the dBASE III floodplain management data base. Once this task has been accomplished the data will be read from the fixed disk drive in the raw data format into dBASE III to create the dBASE III data base.



Moving the dBASE III Data Base
to DWR's IBM PC AT

dBASE III has the capability to unload (write) a data base as a text file onto a floppy diskette, then to reload (read) the file onto another computer of the same or different type. Also the data base can be unloaded from the fixed disk to a 1.2 megabyte diskette, taken to the DWR installation, and reloaded onto their fixed disk drive. The option that will be selected will depend upon which approach is more convenient at the time the task must be done.

Using the Personal Computer dBASE III
Floodplain Management Data Base

dBASE III has over one hundred and twenty commands⁽⁵⁾ which can be used to list data, prepare reports, add data, correct data, combine two relationships (files) to make a new relationship (file), delete data, sort data, and generally massage the data in a data base in many different ways.

It is the responsibility of the system programmer to train the users of the floodplain management data base to use the power of dBASE III to extract, list, merge, calculate, display, and sort the data items that they want for their decision making⁽⁴⁾ activities. Some of the products that will be generated using the floodplain management data base is described in the report entitled "Floodplain Management Work Program: FY82". Other desired products will be defined by the user community as they become more comfortable with the data base and develop more of a feel for its capabilities.

dBASE III has a programming language of its own. The system programmer will write programs of commands to do the more routine types of data base management activities. A user manual will be prepared showing the uses of these programs along with examples of outputs from these programs. The manual will contain examples of some of the more common dBASE III commands and how they can be used with floodplain management data base.

Updating the Floodplain Management Data Base

Since the floodplain management information is a dynamic data base, it will need to be updated from time to time. The present plans are to do updates as needed; the frequency depends upon the number of changes to the data bases held by FEMA, FIA/CSC, and

DWR. The machine readable data from FEMA and FIA/CSC will be obtained on tape, massaged in the same fashion described in the 'Creation of the Data Base', compared to the current copy, then the new data will be extracted, and formatted for addition into the dBASE III floodplain management data base. A diskette with the data base relationship structure will be prepared with the new data for merging with the DWR dBASE III version of the floodplain management data base.

The new data items which come from DWR will be entered by their personnel directly into their version of the floodplain management data base. As an experiment, the dBASE III floodplain management data base will be initially maintained in two forms. As a regionalized version for small searches and retrievals and also the data base will be maintained as a state-wide coverage for large searches and retrievals. Whether both data bases will be maintained after using the system for a period of time will depend upon the statistics gathered about how the system is used, the activities of the data base, and the speed at which commands are executed.

REFERENCES

1. "Federal Insurance Administration Management Information System Community Status File Data Element Dictionary," Federal Emergency Management Agency, Washington D.C.
2. "Federal Insurance & Hazard Mitigation, Management Information System, Community Status Insurance Data File," Federal Emergency Management Agency, Washington D. C.
3. "IBM Personal Computer AT, 5170 Models 68 and 99 Product Announcement," August 14,1984; IBM Information Systems Group, National Marketing Division, 4111 Northside Parkway, Atlanta, GA 30327.
4. "Floodplain Management Work Program: FY82," September 1982; U. S. Water Resources Council, 2120 L Street, N.W. Washington, D.C. 20037.
5. "dBASE III for Your 16-Bit PC," 1984; Ashton-Tate, 10150 West Jefferson Blvd., Culver City, CA 90230.
6. "National Flood Insurance Program (NFIP) Computer System Documentation -Claims Master File (CMF) Data Dictionary," Federal Insurance Administration, Washington, D.C.
7. "National Flood Insurance Program (NFIP) Computer System Documentation -Claims Master File (CMF) Data Dictionary," Federal Insurance Administration, Washington, D.C.

APPENDIX

Appendix A

Floodplain Management Data Items

CATEGORY A BASIC DATA

Data Item	Source No.	Field Width
A1. Community Name	1	20
A2. Community ID number	1	7
A3. Type of Community	1	2
City (CI)		
Village (VI)		
County (CO)		
A4. County (see attached codes)	1	3
A5. Corps District	2	3
Rock Island (RI)		
St. Louis (StL)		
Chicago (C)		
Louisville (L)		
Memphis (M)		
A6. Regional Planning Commission	2	4
Bi-State (BiSt)		
Champaign County (Cham)		
Embarras (Embr)		
Greater Egypt (GrEg)		
Greater Wabash (GrWa)		
Grundy County (Grun)		
Kankakee County (KKK)		
Kendall County (Kend)		
McLean County (McLn)		
Northeastern (NIPC)		
North Central (NoCn)		
South Central (SoCn)		
Southeastern (SoEa)		
Southern Five (So5)		
Southwestern (SWIM)		
Springfield-Sangamon (Spfd)		
Tri-County (TriC)		
Two Rivers (TwoR)		
West Central (WCIV)		
Western Illinois (WINC)		
Coles County (Cole)		
None (none)		

Sources: 1) FEMA, 2) DWR, 3) FIA-CSC, 4) U.S. Census

Data Item	Source No.	Field Width
A7. Date of original map identification	2	8
A8. Emergency program entry date or nonparticipating(NP)	2	8
A9. Emergency program status	2	5
FIS Underway (FISU)		
LDS Underway (LDSU)		
Special Conversion with map (SPW/M)		
Special Conversion without map (NSFHA)		
Special Conversion, map change (SCMP)		
Needs study (NS)		
A10. Regular program status	1	10
Regular (R) and date entered		
Nonparticipating		
Withdrew (W) date withdrew		
Suspended (S) date suspended		
A11. Conversion Status	1	6
Flood Insurance Study complete (FISC)		
Existing Data Study completed (XDSC)		
NSFHA		
Minimal Flood Hazard (SC)		
Limited Detail Study Completed (LDSC)		
A12. Date of Current Effective Map	1	8
A13. Name of CEO	2	20
A14. Address of CEO	2	40
A15. Phone No. of CEO	2	11
A16. Name of FP Administrator	1	20
A17. Address of FP Administrator	1	40
A18. Phone No. of FP Administrator	1	11
A19. Type of Ordinance	1	7
Resolution (RES)		
Old 2C		
New 2C		
2D		
NIPC		
other		
FEMA model (FEMA)		
A20. Most recent visit including staff initials, date, type of contact (i.e. phone, technical assistance vist, CAPE, workshop etc.)	1	20
A21. Previous visit by staff including same info as A20.	1	20

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census

CATEGORY B ANNUAL REPORT DATA

Data Item	Source No.	Field Width
B1. Total population	4	9
B2. Floodplain population	1	7
B3. Total land area in square miles	1	9
B4. Floodplain land area in square miles	1	9
B5. Total No. of structures		7
B6. Total No. of 1-4 family structures		3
B7. Total 1 of other structures	1	3
B8. Total No. of Floodplain structures	1	8
B9. Total No. of 1-4 family floodplain structures	1	3
B10. Total No. of other floodplain structures	1	3
B11. No. of Floodplain permits granted in 1977	1	3
B12. No. of Floodplain permits granted in 1978	1	3
B13. No. of Floodplain permits granted in 1980	1	3
B16. No. of Floodplain permits granted in 1982	1	3
B17. No. of Floodplain permits granted in 1984	1	3
B18. No. of Floodplain permits granted in 1986	1	3
B19. No. of Floodplain permits granted in 1988	1	3
B20 through B27 - same sequence for the number of variances granted during those years	1	3
B28 through B42 - same sequence for the number of DWR floodway permits requested and granted during those years	2	3
Site visit data		
B43. Number of floodplain residential structures	2	3
B44. Number of non-residential fp structures	2	3
B45. Special floodplain features (narrative)	2	40
B46. FP Development potential		
None (0) FP completely developed		
None (P) FP publicly owned		
Low (L)		
Medium (M)		
High (H)		

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census

CATEGORY C INSURANCE DATA

Data Item	Source No.	Field Width
C1. Total number of Flood insurance policies in force in 1978	3	6
C2. Total amount of Flood insurance coverage provided in 1978	3	6
C3 through C21 , the total number of flood insurance policies in force and the total amount of coverage provided in the years 1979 through 1987.	3	6
C22. Total number of 1-4 residential flood insurance policies in force for structures for the current year	3	4
C23. Total number of 1-4 residential flood insurance policies for contents for the current year	3	4
C24. the number of Flood Insurance policies in force on other residential structures for the current year	3	4
C25. the number of FI policies on other residential contents for the current year	3	4
C26. the number of FI policies on nonresidential structures for the current year	3	4
C27. the number of FI policies on nonresidential contents for the current year	3	4
C28. Total number of FI policies in force for small business structures for the current year	3	4
C29. Total number of FI policies in force for small business contents for the current year	3	4
C30 through C33. The total amount of flood insurance coverage provided for the 4 categories listed above (1-4 residential, other residential, nonresidential and small business) for the current year	3	11
C34 through C44, the total premiums paid for the flood insurance coverage for the years 1978 through 1987	3	11
C45. The number of new flood insurance policies in the current year	3	4
C46. Number of Flood insurance policies by their zone rating: Zone A	3	4
C47. Zone A1-A30	3	4
C48. Zone B 3	4	
C49. Zone C 3	4	
C50. No. of policies by their building type Single family (1)	3	1

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census

Data Item		Source No.	Field Width
C51.	Two to four family (2)	3	1
C52.	Five or more residential (3)	3	1
C53.	Nonresidential (1)	3	1
C54.	No. of policies by basement type:		
	No basement (0)	3	1
C54.	Finished basement (1)	3	1
C56.	Unfinished basement (2)	3	1
C57.	With basement from conversion .	3	1
C58.	No. of policies for post FIRM construction	3	3
C59.	No. of post FIRM policies by zone:		
	Zone A	3	4
C61.	Zone B 3	4	
C62.	Zone C 3	4	
C63.	No. of policies on floodproofed structures	3	4
C64.	No. of submit to rate policies for current year	3	3

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census

CATEGORY D CLAIMS DATA

Data Item	Source No.	Field Width
D1. through D10. No. of flood insurance claims by year of flood for the years 1978 through 1987	3	3
D11. through D21, the number of flood insurance claims paid by year of flood 1978 through 1987	3	3
D22 through D32, the dollar value of the flood insurance claims paid by year of flood 1978 through 1987	3	6
D33. No. of flood insurance claims for 1-4 family structures	3	3
D34. Dollar value of claims paid for 1-4 family residential structures	3	3
D35. No. of flood insurance claims paid for other residential structures	3	3
D36. Dollar value of claims paid for other residential structures	3	3
D37. No. of flood insurance claims paid for non-residential structures	3	3
D38. Dollar value of claims paid for nonresidential structures	3	6
D39. No. of flood insurance claims for small business structures	3	3
D40. Dollar value of claims paid for small business structures	3	6
D61. No. of claims paid by type of building (1) one floor	1	2
D62. No. of claims by type of building (2) two floors	3	2
D63. (3) three floors	3	2
D64. (4) split level	3	2
D65. (5) mobile home	3	2
D66. No. of claims by flood zone A-Zone	3	1
D67. No. of claims by flood zone B-Zone	3	1
D68. No. of claims by flood zone C-Zone	3	1
D69. No. of claims by basement type (0) no basement	3	1
D70. No. of claims by basement type (1) finished basement	3	1
D71. (2) unfinished basement	3	1
D72. (3) unfinished basement for conversion	3	1
D73. (4) basement unknown	3	1

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census

Data Item		Source No.	Field Width
D74.	No. of claims filed for structures that are post FIRM (i.e. structures built after the date the community entered the Regular Program. This date is in A10)	3	2
D75.	No. of claims filed based on cause of damage for (1) Bank overflow	3	3
D76.	(2) Surface Water Runoff	3	3
D77.	No. of claims by height of flood water above or below the first floor (0) same level	3	4
D78.	(+1) one foot over	3	4
D79.	(+2) two feet over	3	4
D80.	(+3) three or more feet over	3	4
D81.	(-1) one foot under	3	4
D82.	(-2) two feet under	3	4
D83.	(-3) three or more feet below	3	4
D84 through D94,	dollar amount of disaster assistance paid by year of flood from 1978 through 1987	3	8

Sources: 1) FEMA, 2) DWR, 3)FIA-CSC, 4) U.S. Census