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TR-20 - Project Formulation Program - Hydrology

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Jim Meadows

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Washington, D. C. 20250

June 8, 1965

Advisory ENG 41

TO: State Conservationists

FROM: C. J. Francis, Director, Engineering Division

Re: TR-20 - Project Formulation Program - Hydrology

Technical Release No. 20, Project Formulation Program - Hydrology, contains instructions for the preparation of watershed hydrologic data for processing through an electronic computer. It replaces the original TR-20 dated April 27, 1964 stamped "REVIEW DRAFT - NOT FOR RELEASE."

The program has been tested on more than 100 watersheds during the past year. The suggestions received from field hydrologists who have used the program are incorporated in this final draft.

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U. S. Department of Agriculture
Soil Conservation Service
Engineering Division

Technical Release No. 20
Central Technical Unit
May 1965

COMPUTER PROGRAM FOR PROJECT FORMULATION

HYDROLOGY

COMPUTER PROGRAM FOR PROJECT FORMULATION

HYDROLOGY

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COMPUTER PROGRAM FOR PROJECT FORMULATION

HYDROLOGY

Introduction

The computer program in FORTRAN II for IBM 7090/7094 equipment was developed for hydrologic processes in project formulation. The program computes surface runoff resulting from any synthetic or natural rainstorm. It will take into account conditions having a bearing on runoff and will route the flow through stream channels and reservoirs. It will combine the routed hydrograph with those from other tributaries and print out the peak discharges, their time of occurrence and the water surface elevation for each at any desired cross section or structure. In addition it will print out the coordinates of the routed hydrograph together with the corresponding elevation of each if requested. The program provides for the continuous analyses of nine different storms over a watershed under present conditions, and with various combinations of land treatment floodwater-retarding structures and channel improvement. It will perform these routings through as many as 120 reaches and 60 structures in any one continuous run. It has been programmed so that other aspects of watershed planning can be added later.

The program was developed by the Hydrology Branch of SCS in cooperation with the Hydrograph Laboratory of ARS through a contract with C-E-I-R, Inc. Instructions for card punching and machine operation are contained in the C-E-I-R Report.[1/]

This Technical Release is intended primarily for use by SCS hydrologists in the preparation of input data for processing through the "Project Formulation Program-Hydrology."

Purpose of Computer Program

The program was developed primarily to improve the quality of watershed projects and at the same time reduce overall project costs by providing a means of analyzing more alternative systems of structural measures. It is not anticipated that the use of the program will materially reduce the cost of watershed planning but should produce a work plan, which when installed, will be more effective for the cost.

1/ Developed under Purchase Order No. 340-MD-CA-62 with C-E-I-R, Inc. and described in detail by them in an unpublished report entitled "Computer Program for Project Formulation, Hydrology," Jan. 1964. Some modifications and additions have since been made through the Statistical Reporting Service (SRS) of the Dept. of Agriculture.

Capabilities and Limitations

The computer will perform, in any one continuous operation:

1. Route through 60 structures and an unlimited number of variations for each structure, including the variation of having no structure (null structure).

2. Route through 120 stream reaches and an unlimited number of channel modifications for each reach.

3. Compute up to 300 ordinates of a hydrograph and print out the discharge and elevation for each.

4. Make an unlimited number of routings through a watershed, including variations in rainfall amounts, rainfall duration and antecedent moisture condition.

5. Develop and route the runoff from 9 different storm distributions. It will develop and route the runoff for an unlimited number of depths and durations for any storm distribution defined in dimensionless units.

6. Combine hydrographs from an unlimited number of tributaries and reach terminals.

A further limitation of 600 standard control cards will be described under "Field Input Data, Standard Control For Watershed Format." The only restriction to those items described as being unlimited is the cost of machine time and the practicability of dealing with a too-voluminous quantity of output data. In regard to machine time the computer can process approximately 12 complete routings for an average watershed within 0.2 of an hour. However, any one error in input data can increase the processing time and cost by a half each time it has to be searched out and the data returned to the computer.

The program has been developed with strict adherence to a policy of having it: (1) as flexible as possible in the use of input data; (2) provide for the maximum use of engineering judgement; (3) engineer-oriented rather than machine-oriented; and (4) described in the FORTRAN system to provide for ease in future extensions, alterations and recompilation for other computer models. The input data sheets are in a format with headings familiar to the field engineers rather than in machine code. With very few exceptions the spaces for recording the input data do not require rigid adherence to number placement. The output data are arranged on the print-out sheets for ease in reading and are identified in notations familiar to SCS engineers. Since the computer can perform a large number of operations in fractions of a second no effort was made to save machine time at the expense of engineer time.

Using the Program

In view of the limited number of watersheds studied each year, and the relatively small amount of computer time required, it is necessary to pool the workload of the States to attain maximum efficiency in using the program. Provisions have, therefore, been made to provide the computer services through the SCS Central Technical Unit at Hyattsville, Maryland.

Service Hydrologists may secure assistance through regular Service channels during their first application of the program. Detailed instructions for preparing field data follow. The complete and checked tabulation of field data is then forwarded to the Central Technical Unit for processing (Exhibit 1 through 43).

General Computer Characteristics

A brief description of the computer's functions and of some of its characteristics may help one to better understand the instructions for the preparation of input-data sheets. Figure 1 is a simplified block diagram taken from the C-E I-R, Inc. report. It shows the sequence in which the machine performs its various major functions. Data described on the field input forms are punched onto IBM cards and then usually transferred from the cards to magnetic tape. Input data will be of two kinds --- one the "library data" and the other the "executive data." In the normal processing of a watershed, STANDARD-CONTROL DATA together with TABULAR DATA (Structure Data, Stream-Cross-Section Data, Cumulative-Rain-Fall Table, Dimensionless-Hydrograph Table, and Routing-Coefficient Table) may be referred to as library data, tape or cards. EXECUTIVE-CONTROL DATA may be referred to as executive data, tape or cards.

The first block in Figure 1 indicates that the library data are first read into the computer. The following terms appearing in Figure 1 are instructions to the computer.

COMPUT--Instruction for the machine to develop an inflow hydrograph to a structure or routing reach; or to develop a hydrograph for the local intervening area contributing to a routing reach.

RESVOR--Instruction for the machine to route the inflow hydrograph through a structure.

REACH--Instruction for the machine to route the inflow hydrograph through a stream reach.

ADDHYD--Instruction for the machine to combine two hydrographs.

SAVMOV--Instruction for the machine to set a hydrograph aside in machine memory for subsequent consideration. It can be recalled by a SAVMOV instruction or by ADDHYD, REACH or RESVOR depending on its location and the next step in the standard control sequence.

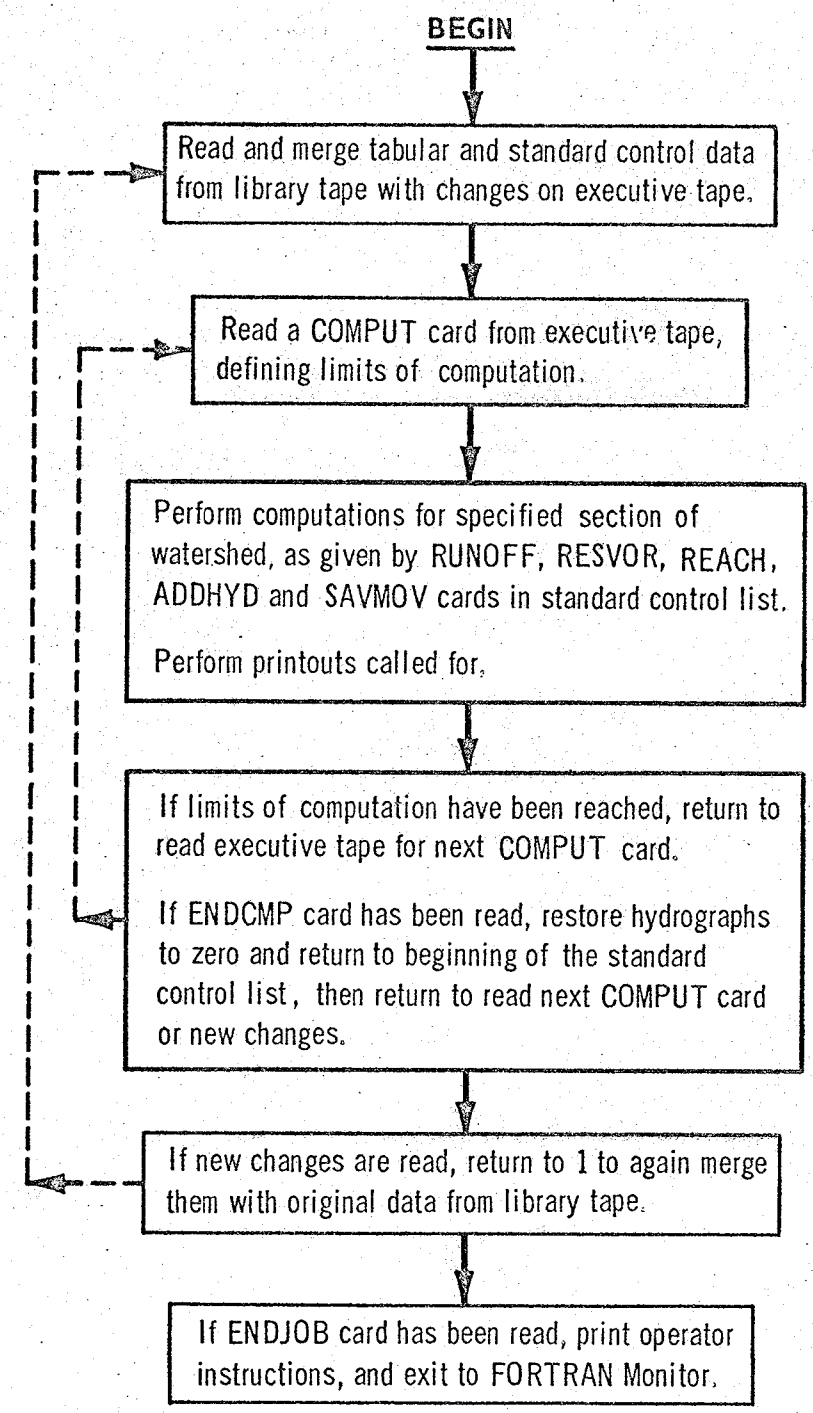


FIGURE 1.— Block diagram from C-E-I-R Inc. Report (see footnote, 1/) showing major operations of watershed program.

ENDCMP--Instruction to signify the finish of a single continuous routing through the watershed involving one or more COMPUT instructions. In some cases it will signify the conclusion of a continuous routing through only a portion of a watershed.

ENDJOB--Instruction to signify the conclusion of computer processing for a given watershed.

The procedures will be discussed in more detail under the section describing data formats.

Field Input Data

General

A form for listing each type of input data is available and may be ordered from Central Supply, Soil Conservation Service, Washington, D.C. A list of input data forms and the quantity of each required for an average watershed follows:

Form Title	Form Number	Required Quantity
Dimensionless Hydrograph Table:		
Discharge vs. Time, blank form	265	1
Discharge vs. Time, preprinted	266	1
Routing Coefficient Table:		
C vs. Velocity, blank form	267	1
C vs. Velocity, preprinted	268	1
Structure Data	269	50
Stream Cross-section Data	270	50
Cumulative Rainfall Tables:		
For Natural Storms	271	2
For one-day Evaluation Storms	272(a)	1
For Emergency Spillway or Freeboard Hydrograph	272(b)	1
Standard Control for Watershed	273	50
Executive Control	274	5
Modify Standard Control	275	5
Read Discharge Hydrograph	276	1

Instructions for the preparation of input data can be divided into the following requirements and functions:

1. Having a straight line schematic map that conveniently identifies the locations dimensions and areas of the physical characteristics

of the watershed; and displays all alternate structural systems together with the routing and evaluation reaches through which they are to be analyzed (Exhibit 2).

2. Establishment of a STANDARD CONTROL system which consists of a series of instructions to the computer that are much like a sequential check-list of steps a hydrologist might develop if he were doing it manually. They define the exact sequence in which hydrographs are to be developed for subwatershed areas, routed through structures and stream reaches, and combined at tributary junctions and selected reach terminals. It establishes a system of consecutive steps through which any number of alternative systems can be routed for analysis (Exhibits 16 through 24).

3. Setting forth the EXECUTIVE CONTROL directives which describe each alternative situation that is to be analyzed through the standard control system. Each directive specifies the storm, its starting time, the antecedent moisture condition under which it is to be analyzed, and the portion (all or part) of the watershed through which it is to be routed (Exhibits 26, 35, 40 and 43).

4. Compilation of tabular data to support the requirements of the standard control system. They are subdivided into STRUCTURE DATA, STREAM CROSS SECTION DATA, CUMULATIVE RAINFALL DATA, the DIMENSIONLESS HYDROGRAPH TABLE and the ROUTING COEFFICIENT (C) TABLE. For example, one of the steps in the standard control system may require the hydrograph from the previous step to be routed through a specific structure. In order to perform this function, the computer will "call up" the STRUCTURE DATA as the necessary input for routing through this particular structure (Exhibits 3 through 15).

Schematic Map

A schematic chart or flow diagram for the watershed is an important aid in compiling input data and is especially important to those checking and handling the data through processing (See Exhibit 2). It should be completed before preparing the input data, and should accompany the input data to the computer center. The location of all possible structures to be considered should be shown together with all cross sections that represent routing-reach terminals. The structures and cross sections are numbered preferably in the sequence in which they will be routed. The drainage area above each structure and the area of local drainage to each reach are added as shown on Exhibit 2. The reach length, time-of-concentration (T_c) and runoff-curve number should also be included for ready reference.

Standard-Control-For-Watershed Format

The standard-control-for-watershed format in Exhibits 16 through 24 sets forth the logical sequence in which flood routings through the

reaches and structures of a watershed are usually performed. The form properly completed instructs the machine to develop a hydrograph, route it through a structure or routing reach, and add it to hydrographs for intervening areas or in storage, transfer it to a more convenient location in storage, or place it in storage for subsequent use in the sequence. Care in analyzing the watershed problem and limiting the number of analyses to be made will keep machine time at a minimum. careless errors in the input of this form or in any of the other forms may cause the machine to stop or to print out "nonsense" data.

Each line of data on the form is that which is to be punched on a single IBM punch card. The 80 spaces across the top of the form represent the 80 positions on a punch card. Each line instructs the machine to perform a specific operation (subroutine). There can be up to 600 standard-control operations (cards) for each watershed. All unused lines must be crossed out to prevent key punchers from punching cards from the preprinted data on the form. The last line, ENDATA, must be marked out on all standard-control sheets except the last.

The "Data Code" heading (Columns 1 through 3, Exhibit 16) simply provides the machine with a number with which it can search out data from the merged library and executive tapes when needed. The "6" in this case signifies to the machine that it is standard-control data. It is preprinted on the forms and the field technician can ignore it in preparing his input data, except that it must be crossed out on any unused line.

The "Subroutine Operations" (Columns 4 through 12, Exhibit 16) are described by coded name and a number. The coded names, RUNOFF, RESVOR, etc. were previously described. These names are for the convenience of the hydrologist while the corresponding number tells the machine which operation it should perform. The preprinted sequence of operations is that usually followed in routing through the watershed. The first subroutine RUNOFF-1 instructs the machine to develop an inflow hydrograph for the area above a structure. RESVOR-2 instructs the machine to route the inflow hydrograph through the structure. REACH-3 instructs the machine to route the outflow from the structure through the next stream reach. The next RUNOFF-1 subroutine instructs the machine to compute a hydrograph for the local inflow to the reach previously routed. ADDHYD-4 instructs the machine to combine the routed reach hydrograph with the local inflow hydrograph. If the combined hydrograph is next to be routed through the following downstream reach, the remaining lines on the sheet are crossed out. The REACH-3 operations on a second sheet instructs the machine to do the reach routing (See Exhibits 16 and 17). Thus the routing sequence can be directed from one reach to the next. ENDATA line is crossed out on all but the last standard-control sheet following the last subroutine for the watershed (See Exhibit 24). SAVMOV-5 operation, first appearing on Exhibit 17, will be explained under the heading "Hydrograph Number."

The "X-section/Structure" heading (Columns 13 to 18, Exhibit 16) contains blank spaces which are to be filled in with the cross-section number or structure number associated with the subroutine of the preceding columns. All spaces for each designation must be filled in completely. For example, structure number 1 should be noted as "01" under the structure column and cross-section number 1 as "001" under the x-section column. The largest numbers that can be expressed for any structure or cross section are 60 and 120 respectively. It should be noted that cross sections can be a means of denoting control points in the system in addition to those defining the average cross-sectional shape of a routing reach. This is illustrated in Figure 2(a).

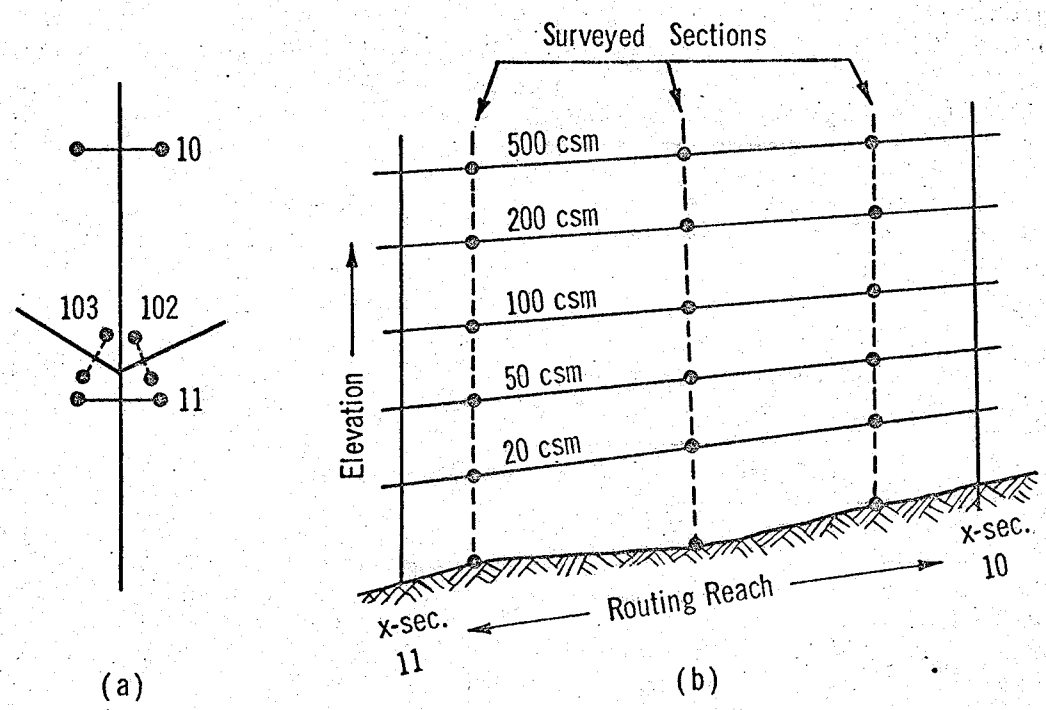


FIGURE 2. —— Use of cross section in computer program.

Cross sections 10 and 11 represent rating sections while 102 and 103 merely denote control points. In Exhibit 2, 101 is not a cross section but is used as an expedient for designating a location. The use of control points can aid greatly in describing the standard control for the watershed. Cross section 11 of Figure 2(b) may not be an actual surveyed section but one obtained from the water-surface profiles. Therefore, cross sections denoting reach terminals may not necessarily be located at surveyed sections, but can be taken from water surface profiles.

The following rules are suggested for correlating structure/cross-section numbers with subroutines:

Subroutine	Structure or Cross-Section Number Should be: (Refer to Exhibits 16 and 17)
6-RUNOFF-1	That which designates the area for which the hydrograph is developed (See line/card 118).
6-RESVOR-2	That through which the routing is being performed (See line/card 119).
6-REACH-3	The terminal point to which the steram reach routing is performed (See line/card 120).
6-ADDHYD-4	That point at which the two hydrographs are to be combined (See line/card 122).
6-SAVMOV-5	Generally that represented by the hydrograph (See line/card 126).

The "Hydrograph Number" heading (Columns 19 through 24, Exhibit 16) provides spaces in which machine-memory storage is designated by numbers 1 through 7. They represent the internal-machine storage from which the computer obtains an input hydrograph for a specified subroutine (operation) and in which it stores the computed output hydrograph. All seven storage elements are the same and could be used interchangeably for input and output of any operation, however, in order to standardize the use of the format, certain memory-storage elements have been preprinted to apply to specific operations.

Hydrograph for		Machine Storage Elements						
		Savmov				Operating		
		1	2	3	4	5	6	7
6-RUNOFF-1 --	into						x	
6-RESVOR-2 --	from						x	
	into							x
6-REACH-3 --	from							x
	into					x		
6-ADDHYD-4 --	from					x	x	
	into							x
6-SAVMOV-5 --	from either	x	x	x	x	x	x	x
	into either	x	x	x	x	x	x	x

The cardinal rule to remember is that only one hydrograph can occupy any one storage element at a time and that there must be a hydrograph in the storage element from which a subroutine operation is "calling it up." It is recommended that all storage elements be checked for compliance with this rule before field input data are submitted for key punching. The SAVMOV-5 operation under the previous heading can now be more easily explained. It is an instruction for the machine to remove an output hydrograph from one storage element and place it in another. It will remove a hydrograph from an operating storage element 5, 6, or 7 and place it into an element 1, 2, 3 or 4 for safe keeping until called up as input for a subsequent operation. The operating-storage elements can thus be vacated in order to transfer operations to a tributary (See line/card 126, Exhibit 17). When operations are completed for the tributary, a SAVMOV-5 can conversely instruct the machine to recall the hydrograph from its storage element 1, 2, 3 or 4 and place it back into an operating element 5 or 6 (See line/card 154, Exhibit 23). A SAVMOV-5 subroutine can further be used to change an output hydrograph from one operating element into another operating element appropriate for the next subroutine operation (See line/card 136, Exhibit 19).

The three "Data Field" headings (Columns 25 through 36, 37 through 48, and 49 through 60, Exhibit 16) are filled in with data according to the individual headings which are mostly self-explanatory. All figures in each data field must have a decimal point. Commas should not be used within the figure to indicate thousands as they are often interpreted by key punchers to mean a decimal point.

The "Surf. Elev. at T = 0, Ft." is the water-surface elevation of detention storage at the beginning of the storm (See line/card 119, Exhibit 16). The machine will route the inflow hydrograph through the structure, starting with the outflow discharge rate at the above designated elevation, and continue the routing until the outflow returns to a zero rate of discharge. The starting elevation will usually be the crest of the principal spillway, with outflow discharge equal to zero. However, if it is desired to have a portion of the storm runoff occupy storage below the crest of the principal spillway, the starting elevation can so indicate. In this event, a volume equal to that below the crest of the principal spillway will be withheld from the total volume of the routed outflow. Hence, the flood-outflow volume on the print-out data will be less than the flood-inflow volume. (There are other reasons why the volume of routed outflow may show up on the print-out data as less than the volume under the inflow hydrograph prior to routing. This will be explained under "output options" and Figure 3). Conversely, if for any reason, mistakenly or otherwise, the routing is directed to commence at some elevation above that of the crest of the principal spillway, the machine will start routing at zero discharge but will immediately build up, without any effect on storage, to the discharge rate shown for the starting elevation and continue the routing until the outflow rate returns to zero and the water surface elevation is lowered to the crest of the principal spillway. In this case, the volume of storage between the crest of the principal spillway and the "Surf. Elev. at T = 0, Ft."

at which routing was started will be added to the volume of flood runoff under the outflow hydrograph. This could inadvertently show up as an unreasonable increase in routed outflow over inflow and appear unrealistic.

Note the option of specifying a routing coefficient (C).[2] If the steady flow velocity for the routing reach has been precomputed for one reason or other, a corresponding routing coefficient "C" from Exhibit 3 can be inserted as on line/card 141, Exhibit 21. The machine will compute the modified coefficient "C*" for the reach routing without searching for a cross section with which to make the computation. Conversely, if a coefficient "C" is not shown and the space is left blank, the machine will compute the routing coefficient from the appropriate cross-section data and C-table (See line/card 120, Exhibit 16). The computer selects incremental discharge rates from the inflow hydrograph and divides them by corresponding areas from the cross-section data to obtain incremental steady-flow velocities for the routing reach. It selects those rates which are equal to or greater than one-half the peak-discharge rate. The computer then selects a routing coefficient from the "C" table that corresponds to the average of the incremental velocities which it computed. The incremental units correspond to the "main-time increment" specified on the executive control format. In either event the "C" table, Exhibit 3, must always be included in the stack of input data. The routing reach in Data Field No. 1 approaches floodplain length for overbank floods and channel length for inbank flows.[2]

The spaces under "Output Options" heading (Columns 61 through 70, exhibit 16) permit one to choose the hydrograph data which he desires to have printed as output.

A "1" in blank space below:	Produces the following printout:
PEAK	Peak Discharge and corresponding time-of-peak and elevation (max. stage for a cross section and max. storage elevation for a structure).
HYD	Hydrograph coordinates of time versus discharge.
ELEV	Hydrograph coordinates of time versus elevation at cross sections and water surface versus time in structures. (Elevation of the peak discharge is given with PEAK).

2/ The routing coefficient is for the Convex Routing Procedure in NEH 4, Watershed Hydrology, Chapter 17.

(Continued)

VOL	Volume of water under the hydrograph in inches depth, acre-feet and cfs-hours.
PUNCH	The hydrograph and related information is written on a tape that is later used to produce punched cards with a "Read-Discharge-Hydrograph" format.

If none of the options are selected the machine will complete the respective subroutine and move the resultant hydrograph into the next subroutine without providing any printout. If three or more hydrographs are combined to describe a final hydrograph at a location, the machine must:

First combine hydrograph a with b,

Then combine hydrographs a and b with c.

In this and similar cases it would not be necessary to require printout of the partially combined hydrographs.

Modify-Standard-Control Format

Having previously described standard-control format as a means of establishing a fixed sequence of operations, the means of modifying this fixed sequence is next described. The modify-standard-control format provides for inserting new routines into the sequence, altering data for existing routines, and deleting any operation in the sequence (See Exhibits 33 and 34). There are three additional items included on this format which pertain to the standard control but do not actually modify it. They are LIST, UPDATE, and BASFLO (See Exhibits 25, 34, 36, 37, 38 and 39). Insertions, alterations and deletions are referenced to the standard control subroutine to which each applies. They must appear in the same sequence as their corresponding subroutine appears in the standard control sequence. Note that an ALTER-3 for cross sections 002 and 005 on Exhibit 33 precede the INSERT-2 for cross section 006 on Exhibit 34. Furthermore, the alteration for cross-section 002 precedes that for cross-section 005. This is the same order in which cross sections 002, 005 and 006 appear in the standard control sequence (See Exhibits 17 and 23). A DELETE-4 is subject to these same requirements for its order of appearance.

Operation INSERT requires a header card, 7-INSERT-2, that specifies the cross section or structure sequence after which the insertion is desired. The computer places the insertions immediately following the end of the first series of standard control operations having a cross-section or structure number corresponding to the number indicated on the "7-INSERT-2" card. Note that line/card 257, Exhibit 34, will cause the data on line/cards 258 and 259 to be inserted following line/card 155, Exhibit 23. The new data must make up a continuous sequence of operations that fit into the overall standard control sequence. This often requires deleting or altering some of the original sequence in order to match the new with the old. A header card designated as 7-INSERT-2 must be used for each point at which an insertion of new data is desired, and in the same order in which these points appear on the original standard control list.

Operation ALTER-3 enables changes to be made in the hydrograph storage number, data fields, and in the output options (See line/cards 254 through 256,

Exhibit 33). Compare line/card 255 with 123, Exhibit 17 and 256 with 150, Exhibit 23. Data given in columns 1 to 18 must be identical with the standard control card being altered. Thus, original data will be replaced with data shown in the respective data fields or locations on the alter card.

There are situations where two or more standard control cards will have identical data in columns 1 to 18. Note this identity between line/cards 137, Exhibit 19, and 140, Exhibit 20. In this case the machine would apply the ALTER instruction to the identical card appearing first. Hence, it would alter card 137. If alterations were desired in card 140 the cross section 003 on the standard control sheet would need to be changed to some unused cross section number (control point) such as 103. It could not be a number greater than 160. This affixes a control point to be recognized by the computer as previously described for Figure 2.

Operation DELETE enables instructing the machine to erase from machine memory all the data on a standard control line/card identical in columns 1 to 18 to those shown under DELETE.

There is no limit to the number of INSERT, ALTER and DELETE instructions that may be used except that the final number of standard-control operations (line/cards) can not exceed 600.

The use of LIST and UPDATE on the modify-standard control sheet is optional. When a LIST is specified the computer will cause a listing of all tabular and standard control data to be printed out along with the ensuing computations.(See output Exhibit 45, page 5). An UPDATE is used particularly when the library tape for a watershed is to be retained for subsequent processing, and it is desired that all new tabular data and modifications to standard control data should replace the original counterparts to become a permanent record thereon. It will in addition cause only the changes in tabular and standard control data to be printed out along with the ensuing computations. For this reason it may be used in place of LIST and reduce the volume of print-out by not having all unchanged tabular and standard control data repeated. If neither LIST nor UPDATE are used the computer will incorporate all modifications in the ensuing computations without having them printed out or recorded on the library tape.

Once changes in tabular data or modifications in standard control data have been made, they will remain in effect for all subsequent COMPUT instructions until further changed or modified. Thus, in reusing a deck of punched cards for a follow-up processing of a watershed, the new processing must be an extension of the concluding tabular and standard control data in the previous run. More on follow-up processing is described later.

The BASFLO card at the bottom of the modify standard control format allows a uniform rate of base flow in cfs to be introduced into reach routings at any location. The BASFLO card will precede a COMPUT card and the flow will be combined with the hydrograph from the next REACH (routing) operation. Thus, it will be automatically included in the hydrographs of

subsequent reach routings. The COMPUT card governs the reaches in which base flow will be added. Line/card 263 on Exhibit 36 shows a base flow of 10 cfs to be added to the routed hydrograph at cross section 002 since the next COMPUT instruction card 264, Exhibit 35 is from 002 and thru 002. Line/card 265 shows a new base flow of zero cfs. This removes the 10 cfs from being added to the next reach routing between structures 02 and cross section 004 (See line/cards 266 and 267). Line/card 268 initiates a new base flow of 5 cfs to be added to cross section 005 and continue on through cross section 006 according to line/card 269. Line/card 270 changes the base flow to 26 cfs at cross section 007 (See line/card 271). Hence, the base flow can be changed at any downstream reach by breaking the COMPUT series into appropriate FROM-THRU segments and inserting a BASFLO card with the new cfs recorded in Data Field 1. Once a BASFLO cfs is inserted it will continue to be added into each subsequent REACH operation until a new BASFLO cfs or a zero BASFLO is inserted. The new BASFLO cfs can be greater or less than the one previous. The new BASFLO cfs will be added to each REACH subroutine that follows. The old BASFLO figure is dropped when a new BASFLO figure is included.

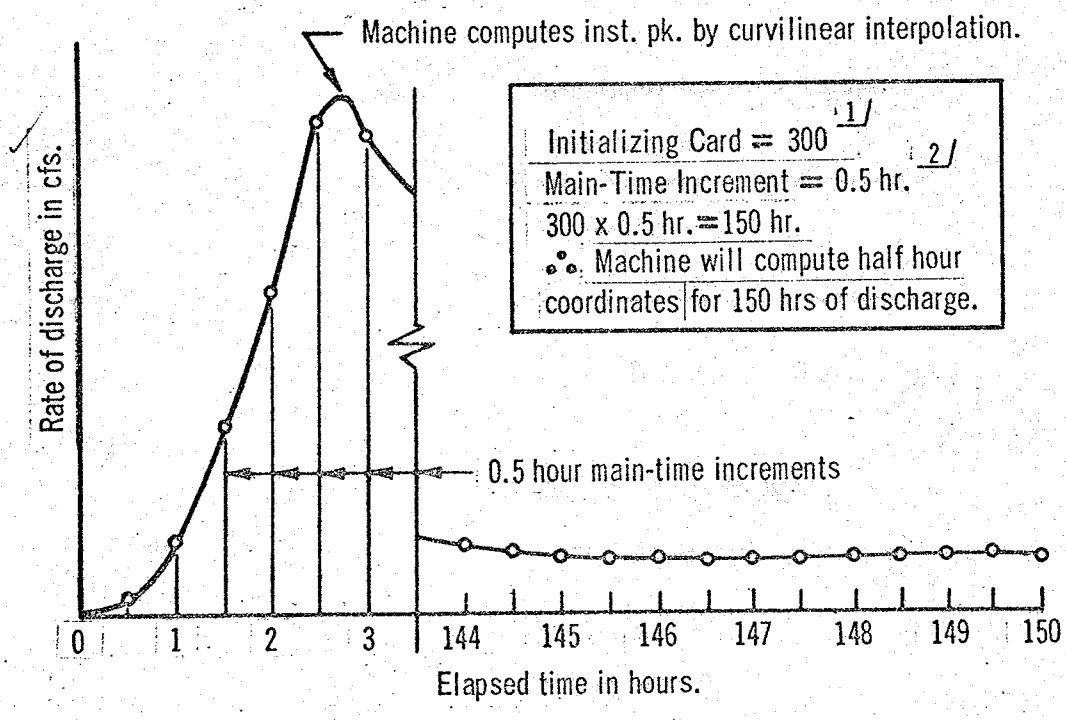
Executive-Control-For-Watershed Format

The executive-control format exercises overall control of the program and specifies the standard control operations to be performed (See Exhibits 26, 35, 40 and 42). The first entry is the INCREM card which specifies the main-time increment in hours. It will remain in force for a series of COMPUTS until superseded by the insertion of a new INCREM card. All hydrographs generated by the program will be determined at time intervals given by this increment (See Figure 3). It is important that the main-time increment be made short enough to adequately describe the hydrographs for the smaller subwatersheds; and large enough that, when multiplied by the number of coordinates, it will extend through the peak periods of larger hydrographs. Increments of 0.5 hr. will not adequately define the hydrograph for a small subwatershed having a T_c of less than an hour. On the other hand a main-time increment of 0.2 hr. and 100 coordinates will not adequately define a hydrograph with a time-to-peak greater than 20 hours. An INCREM card must precede the first COMPUT card of any series of COMPUTS (See line/cards 161 thru 166, Exhibit 26). The preprinted 7-INCREM-6 must be crossed out when a main-time increment is not inserted (See Exhibit 40).

The COMPUT card is the most powerful card in the program. It specifies the cross section and/or structure locations where routings are to begin and end. It also gives the rainfall starting time, depth and duration, and the rain table number that is to apply between the beginning and ending locations. A single compute command may extend over the standard control list of an entire watershed, with up to 120 cross sections and 60 structures. If a watershed exceeds either of these limits, it must be broken into two or more jobs with the output of one used as the input to the next.

The starting point for a computation is specified by a cross-section or structure number (but not both). This number must correspond to a cross section or structure that appears in the X-SECTION/STRUCTURE column of a

routine in the standard control list. The computer will commence with the cross section or structure number specified under FROM and continue computing through the sequence of standard control subroutines until the cross section or structure specified under THRU has been reached and completed. The computation stops as soon as it finds that it has passed on to an operation with a cross-section or structure number different and beyond that under THRU, and looks for its next instruction. The next instruction could be another COMPUT card commencing where the last compute instruction left off, but with changes in one or all three DATA FIELDS; or it could be ENDCMP and the machine would return to the beginning of the standard control sequence, pick up changes in data and then pass on to another COMPUT series, preceded by a new INCREM header card. However, if there were no changes in standard control or tabular data, a new INCREM header card would not be required since the next COMPUT would be a continuation of the same COMPUT series. However, if in doubt include a new INCREM line/card. Unnecessary repetition of the INCREM line/cards does not disrupt the computer's performance as long as the MAIN-TIME-INCREMENT space is filled in properly.



1/ See sample letter of transmital, Exhibit 1.

2/ See executive-control sheets, Exhibit 26, 35 & 42.

FIGURE 3.—Hydrograph coordinates determined by computer.

The program can store up to nine cumulative rainfall tables. Tables 1 and 2 are preprinted. Table 1 is a cumulative rainfall table for one-day watershed evaluation storms. Table 2 is a cumulative rainfall table for emergency spillway or freeboard hydrographs. They are shown in Exhibits 5 and 6 respectively. Natural storms in which the hydrologist may have an interest can be described in the remaining seven tables. They will be discussed in more detail under Tabular Data. The rainfall that is to apply to the area covered by the COMPUT card is specified by giving a RAIN TABLE NO. and the STARTING TIME on the COMPUT line of input data. Proper multipliers are entered in the spaces for RAINFALL DEPTH and RAINFALL DURATION. In Table 1, the rainfall depth is normalized for a maximum depth of 1.0 and a fixed duration of 24 hours. Therefore, the storm depth must be inserted as a multiplier under RAINFALL DEPTH, and a 1.0 under RAINFALL DURATION. In Table 2, both the rainfall depth and duration are normalized to a maximum depth and duration of 1.0. Therefore, the storm depth and duration are inserted as multipliers under both RAINFALL DEPTH and RAINFALL DURATION respectively. Natural storms that may be assigned table numbers 3 through 9 will usually be defined in full dimensions for both depth and duration. In these cases a 1.0 should be inserted under both RAINFALL DEPTH and RAINFALL DURATION. RAIN TABLE Nos. 1 and 3 are specified on Exhibit 26, and RAIN TABLE No. 2 is specified on Exhibit 40.

A soil moisture condition 1, 2, or 3 must be specified under SOIL. They represent the three antecedent moisture conditions I, II and III described in the National Engineering Handbook (Section 4). The runoff curve numbers used in the RUNOFF operations on the standard control format are for a 2 condition. When a dry condition 1 or a wet condition 3 are specified under SOIL, the machine will make the adjustment in the curve number according to Table 10.1 of NEH 4.

In many cases, a uniform rainfall will be applied over the entire watershed so that only a single COMPUT card is required. However, a series of COMPUT cards may be given with different rainfall depths extending over different parts of the watershed. Normally, these COMPUT cards will extend over successive parts of the standard-control list. For a given COMPUT card, the cross section or structure appearing under THRU must always be farther down the standard-control list than the cross section or structure appearing under FROM. Likewise the cross sections or structures appearing in one of a series of COMPUT cards (not separated by an ENDCMP card) must also be farther down on the standard-control list than the cross section or structure given for a previous COMPUT instruction.

When computations are to have been completed for a given "pass" through the watershed, an ENDCMP card is supplied. At this point the machine will return to the beginning of the standard-control sequence and pick up any modifications in the standard control and changes in tabular data before commencing the next comput instruction. There is no limit on the number of runs through a watershed which the computer can make. An ENDJOB card is provided following the last COMPUT instruction (See line/card 293, Exhibit 42). Modifications in standard control were discussed in a previous section under modify-standard-control format. Changes in

tabular data will be discussed in the following sections under tabular-data formats. The ordering of these changes will be described under a subsequent section "Stacking Input-Data Sheets".

Tabular-Data Formats

There are six tabular-data formats in addition to the standard-control-data format which provide input data for the library tape. The tabular-data formats are (1) Routing-Coefficient Table, C vs. Velocity, (2) Dimensionless-Hydrograph Table, Discharge vs. Time, (3) Cumulative-Rainfall Tables, (4) Stream-Cross-Section Data, (5) Structure Data, and (6) Read-Discharge Hydrograph.

Routing-Coefficient Table, C vs. Velocity. - - This is a preprinted table as shown in Exhibit 3. It can be prepunched on a permanent set of cards identified from 1 through 18 and must be included in every watershed job. These data are used by the computer for its REACH subroutine. They are part of the convex routing procedure which the computer uses in routing through stream reaches.[3] Line/cards 2 through 17, Exhibit 3, are the (C) values associated with an average steady-flow velocity through the routing reach. The machine computes average steady-flow velocity as described for routing coefficient under "Standard-Control-For-Watershed Format".

Dimensionless-Hydrograph Table, Discharge vs. Time. - - This is a preprinted table as shown in Exhibit 4. It can be prepunched on a permanent set of cards identified from 19 through 31 and must be included in every watershed job. The computer uses these data in RUNOFF subroutines for developing inflow hydrographs to structures and for local inflow hydrographs from intervening areas draining into a stream reach. The dimensionless hydrograph is described in Chapter 16, NEH 4. Line/cards 20 through 30 in Exhibit 4 contain the ratio of discharge to peak discharge for each 0.02 increment of the time scale. Any dimensionless distribution graph may be used but the number of entries must not exceed 75.

Cumulative-Rainfall Tables. - - There are two preprinted tables, Exhibits 5 and 6, and one filled-in table, Exhibit 7, included in the Sample Watershed. The first is a preprinted cumulative-rainfall table for one-day watershed evaluation storms, Table No. 1, Exhibit 5. The entries in line/cards 33 through 42 are the ratios of half-hour storm accumulation to total storm depth at 24 hours (one day). When this table is specified in the executive control, a storm depth in inches must be shown in Data Field No. 2 because these units are dimensionless, and a 1.0 for duration in Data Field No. 3 because time is in actual hours (See line/card 162, Exhibit 26). There is no limit to the number of storm depths which can be routed through the watershed when Cumulative-Rainfall Table No. 1 is used. This rainfall table is suitable for evaluation of watersheds in which the travel time through the watershed is approximately 2 days or less.

3/ The Convex Routing procedure is described in Chapter 17, NEH 4.

Rainfall Table No. 2, Exhibit 6, is a storm distribution for developing emergency-spillway and freeboard hydrographs. Both depth and duration must be supplied in Data Field Nos. 2 and 3 respectively on the executive-control format when Rainfall Table No. 2 is specified (See line/card 273 and 274, Exhibit 40). It describes the same hydrograph as developed from the 6-hour distribution graph in ES-1003. There is no limit to the number of storm depths and durations that can be routed when specifying Rainfall Table No. 2.

The computer can accept seven actual or synthetic storms in addition to the two described above. These storms are described on Cumulative-Rainfall Table, form SCS-271 (See Exhibit 7). The values from left to right in the five data fields are accumulated-rainfall depths, in inches, for 2-hour time increments. Any time increment can be selected to describe an actual storm. The time increment is specified in the space in which the 2.0 appears on line/card 57. The number of entries in the body of the format cannot exceed 20 lines (100 spaces). This means that if a 1-hour time increment is specified, storms up to 99 hours duration can be used. All five data fields must be filled in on each line or the line crossed out as shown in Exhibit 7. Note that 4.0 inches, at 24 hours, in Data Field No. 3 of line/card 60 is the end of rainfall, however, the 4.0 is repeated in Data Fields 4 and 5 to complete the line.

A 9-ENDTBL line/card must follow each rainfall table. Each cumulative rainfall table must be labeled with a separate number between 1 and 9 inclusive for its identification in the computer. The rainfall storm in Exhibit 7 is identified as Table Number 3 on line/card 57. When it is desired to route this storm through the watershed, Rainfall Table Number 3 is specified in the executive control as shown on line/card 164 and 165, Exhibit 26. Note further that a 1.0 appears under both the rainfall-depth and rainfall-duration data fields because Table 3 contains actual hours and inches.

Stream-Cross-Section Data. - - The stream-cross-section table relates the watersurface elevation to discharge in csm or cfs and to the cross-sectional-end area in square feet. These data may be the water surface at a surveyed cross section, an average of two or more surveyed cross sections, or obtained from watersurface profiles as shown in Figure 2 (b). The important consideration is that the cross-section data should represent the hydraulic conditions for the reach through which flood routing is to be performed (See Exhibit 7). The data for computer cross section number 001 are an average of the discharge and end area for surveyed sections 1R, 2R and 3R, related to elevations at the foot of the routing reach. The numbering and number of computer cross sections cannot exceed 120 in any one job. The discussion under "Read Discharge Hydrograph Data" explains how watersheds having more than 120 routing reaches are submitted for processing. If discharge is given in cubic-feet-per-second-per-square mile (csm) the total drainage above the cross section must be shown in the space provided on the input form (See line/card 62, Exhibit 8). The computer multiplies the figure shown

in this space by the discharge in csm in order to convert to cfs. Therefore if the discharge in Data Field No.2 is given in cfs, a figure of 1.0 must be put in the drainage area space. The number of coordinates describing each cross section cannot exceed the data-field spaces on a single input form (20 elevations).

If the channel represented by a cross section is to be reshaped as an alternate consideration in a watershed plan, a new data sheet is made up for the reshaped cross section and inserted ahead of the executive control sheets to which it pertains (See Exhibit 27). Note its position between Exhibits 26 and 35. The improved channel data for cross section 007 applies to the compute instruction on line/card 271, Exhibit 40. Any number of alternate channel conditions for any one section or sections can be compared by inserting each ahead of the respective executive-control sheets.

The numbering of cross sections need not be in consecutive order. Similarly, the data sheets can be in any order when inserted in the stack. However, chances of error will be minimized if they are numbered and stacked in the order in which they will appear in the standard-control routing sequence. The elevations in Data Field No. 1 must increase from top to bottom, however, they need not increase by a constant increment. The computer makes a straight line interpolation between data for the elevations shown. It will, furthermore, extrapolate data beyond the highest elevation by a straight line extension through the last two values of data shown.

Decimal points must accompany all figures in the data fields. Commas representing thousands should <u>not</u> be included with figures. Some key punchers are accustomed to recognizing marks similar to commas as signifying decimal points. All unused lines must be crossed out.

Structure Data. - - Structure-data tables relate the water-surface elevation to spillway discharge and storage. Structures can be numbered from 01 through 60. No more than 60 structures can be included in a job. The discussion under "Read-Discharge-Hydrograph Data" explains how watersheds having more than 60 structure sites are submitted for processing. Any number of structure conditions can be processed for each numbered site. There must be a structure-data sheet for each condition at each site. There are usually two structure conditions described for each site. One is the NULL structure for present watershed conditions (See Exhibit 12). A second data sheet is for the structure as it would be constructed. Additional data sheets would be included for alternate structure characteristics. For considering a NULL structure, the first line of data only is filled in on line/card 107, Exhibit 12. This avoids having to modify the standard-control sequence between processing present and future conditions. When the sequence finds only one data card for a structure, it moves the inflow hydrograph into the next standard-control-subroutine sequence without routing it. The usual practice is to insert the same first line of data for the null structure as for the structure in-place.

Each structure-data sheet must have a structure number and 9-ENDTBL (See line/cards 106 and 108, Exhibit 12). The number of coordinates describing a structure cannot exceed the data-field spaces on a single input form (20 elevations). NULL-structure data should be stacked ahead of the standard-control sheets for processing present-watershed conditions. Note that Exhibits 12 through 15 precede the first standard-control-for-watershed sheet, Exhibit 16.

Structure-data sheets for structures in-place precede the second set of executive control sheets for future conditions. Note that structure-data sheets, Exhibits 28 through 32, precede the executive-control sheet 35 and 40. Structure 05 has been inserted (Exhibit 28) for the first time. It was not included with the NULL structures because its inclusion necessitates a modification in standard control for reasons other than simply being considered as "in" or "out." Notice on Exhibit 2 that structure 05 will inundate all or part of two routing reaches and hence requires modification of the standard control to exclude these portions from reach routing. The instructions for modification are explained under "Modify-Standard Control." The modification must also precede the executive-control sheets that include structure 05. Note that Exhibits 33 and 34 follow the new structure data, including structure 05, and precede Exhibits 35 and 40, the new comput instructions. Structure-data sheets that make further alterations to structure characteristics will precede the respective executive-control sheets in the same manner.

The zero discharge on the first line in Data Field No. 2 must be oriented to the crest elevation of the low stage outlet in the principal spillway. See the explanation of "Surface Elevation at T = 0, ft.," Data Field No. 1, under section on "Standard-Control-For-Watershed" format.

Decimal points must accompany all figures in the data fields. Do <u>not</u> use commas with figures to denote thousands. All unused lines must be crossed out. Structure numbering need not be consecutive and the data sheets preceding each respective set of executive control sheets can be inserted into the pack in any order. However, chances of error will be minimized if the structures are numbered and stacked in the order in which they will appear in the standard-control routing sequence. The elevations in Data Field No. 1 must increase from top to bottom, however, they need not increase by a constant increment. The computer makes a straight line interpolation between data for the elevations shown. It will, furthermore, extrapolate data above the highest elevation by a straight line extension through the last two values of data shown.

Read-Discharge-Hydrograph Data. - - The read-discharge-hydrograph format provides a means of introducing hydrographs at any desired point in the watershed. Time must be in hours and discharge in cfs. It enables inserting stream-gage data where appropriate. In addition, it makes it possible to break the watershed processing into two or more parts where the structure locations exceed 60 or the number of routing reaches exceed 120, or where there are more than 600 line/cards in the standard-control set. It further enables reprocessing a lower portion of the water-

shed with outflow hydrographs from the upper portion of a previous run. The two latter cases require resubmission of input data to the computer.

The read-discharge-hydrograph data differ from other tabular data in some respects. First, they are actual hydrographs which go directly into one of the 7 hydrograph-storage elements described under standard control. Second, each is inserted into the executive-control stack ahead of the COMPUT instruction that designates the first standard-control subroutine for which the inserted hydrograph is to be used (See Exhibit 41).

The "6" in column 17 of line/card 276 instructs the computer to place the hydrograph in storage element 6. Since the form precedes a compute instruction commencing with structure 05, line/card 291, Exhibit 42, the computer will place the hydrograph in standard-control storage element 6 associated with structure 05. In this watershed example, structure 05 was inserted into the standard-control sequence by line/card 259 on modify-standard-control sheet, Exhibit 34. Note that the input hydrograph in storage element 6 for structure 05 is a RESVOR-2 subroutine. This means that the new hydrograph will be routed through structure 05.

Line/card 277, the second line on the read-discharge-hydrograph format, provides appropriate spaces for showing (a) the time at which the zero point of the hydrograph is to be related, (b) the time increment specifying the time coordinates related to discharge, (3) the drainage area which the computer uses to compute volume in terms of inches on the printout sheets and (4) a continuation, discontinuation or change in any previously described BASFLO. This format is unlike other tabular data formats in that it can be continued on additional sheets, using up to but no more than 300 coordinates, by crossing out the 9-ENDTBL line on all but the last sheet. The body of the format is similar in that each line must be complete as shown in line/card 288 or crossed out, decimal points must be shown and commas denoting thousands should <u>not</u> be used.

Stacking Input-Data Sheets

Figure 1 indicates the order in which the taped data must be arranged and hence the sequence in which field-data-input sheets must be stacked (See Figure 4). The stacking of input data will commence with the data that go on the library tape. The following order is suggested (See Exhibits 3 through 42):

Preprinted data sheets:
ROUTING-COEFFICIENT TABLE (one sheet, cards 1 thru 18)
DIMENSIONLESS-HYDROGRAPH TABLE (one sheet, cards 19 thru 31)
CUMULATIVE-RAINFALL TABLE FOR ONE-DAY-EVALUATION STORMS (Table 1) (one sheet, cards 32 through 43)
CUMULATIVE-RAINFALL TABLE FOR EMERGENCY-SPILLWAY OR FREEBOARD HYDROGRAPHS (Table 2) (one sheet, cards 44 through 56)

Fill-in sheets:

CUMULATIVE-RAINFALL TABLE FOR ACTUAL STORMS (Tables 3, 4,....9) (one sheet per table)

STREAM-CROSS-SECTION TABLE (one sheet for each cross section)

STRUCTURE TABLE (one sheet for each structure)

STANDARD-CONTROL-FOR-WATERSHED DATA (several sheets, depending upon the complexity and size of the watershed)

MODIFY-STANDARD-CONTROL FORMAT (one sheet with only LIST shown)

EXECUTIVE-CONTROL-FOR WATERSHED (all sheets having COMPUT instructions pertaining to the above library data)

Modified STREAM-CROSS-SECTION TABLE (one sheet for each cross section being altered)

Modified STRUCTURE TABLE (one sheet for each structure being altered)

MODIFY-STANDARD-CONTROL DATA (one or more sheets including one for UPDATE)

EXECUTIVE-CONTROL-FOR WATERSHED (all sheets having instructions pertaining to the above modified data) They often contain the same series of COMPUT instructions as those for the original data.

(Additional sheets with modification of library tape data).

(Additional EXECUTIVE CONTROL sheets with ENDJOB instructions on last sheet).

The space labeled "Card No. Identification" under columns 73 through 80 should not be filled in until all forms for a watershed have been completed and stacked as described above. The numbering will start with "1" for the first line on the first sheet in the stack. Note that the numbering in columns 73 through 80 commences with 1 on Exhibit 3 and continues consecutively to 293 on Exhibit 42 at the end of the input stack. These numbers are used to sort the punched cards, expecially where two or more operators have punched them. It also provides for mechanical sorting should the deck of cards become shuffled or disarranged during handling and storing. If there are less than a thousand cards in the stack, columns 78 through 80 should be reserved for this numbering and if there are one thousand cards or more, columns 77 through 80 should be reserved. Those remaining in the 72 - 80 Card No./Identification columns can be used for abbreviated words, letters, etc. in identifying the data. Exhibits 3, 4, 5 and 6 are a set of preprinted data for cards 1 through 56. This can be a permanent deck and used for all watersheds in which the numbering on subsequent input-data sheets commences with 57. This can mean a substantial saving in card punching costs where many watersheds are processed at a central location. Card numbering can provide the required sequence of data in lieu of a strict adherence to stacking the input sheets for the sequence. Note how the numbering of line/cards 261 through 272, Exhibits 35 through 40 provides the proper sequence without having to use an executive-control sheet between each BASFLO insertion.

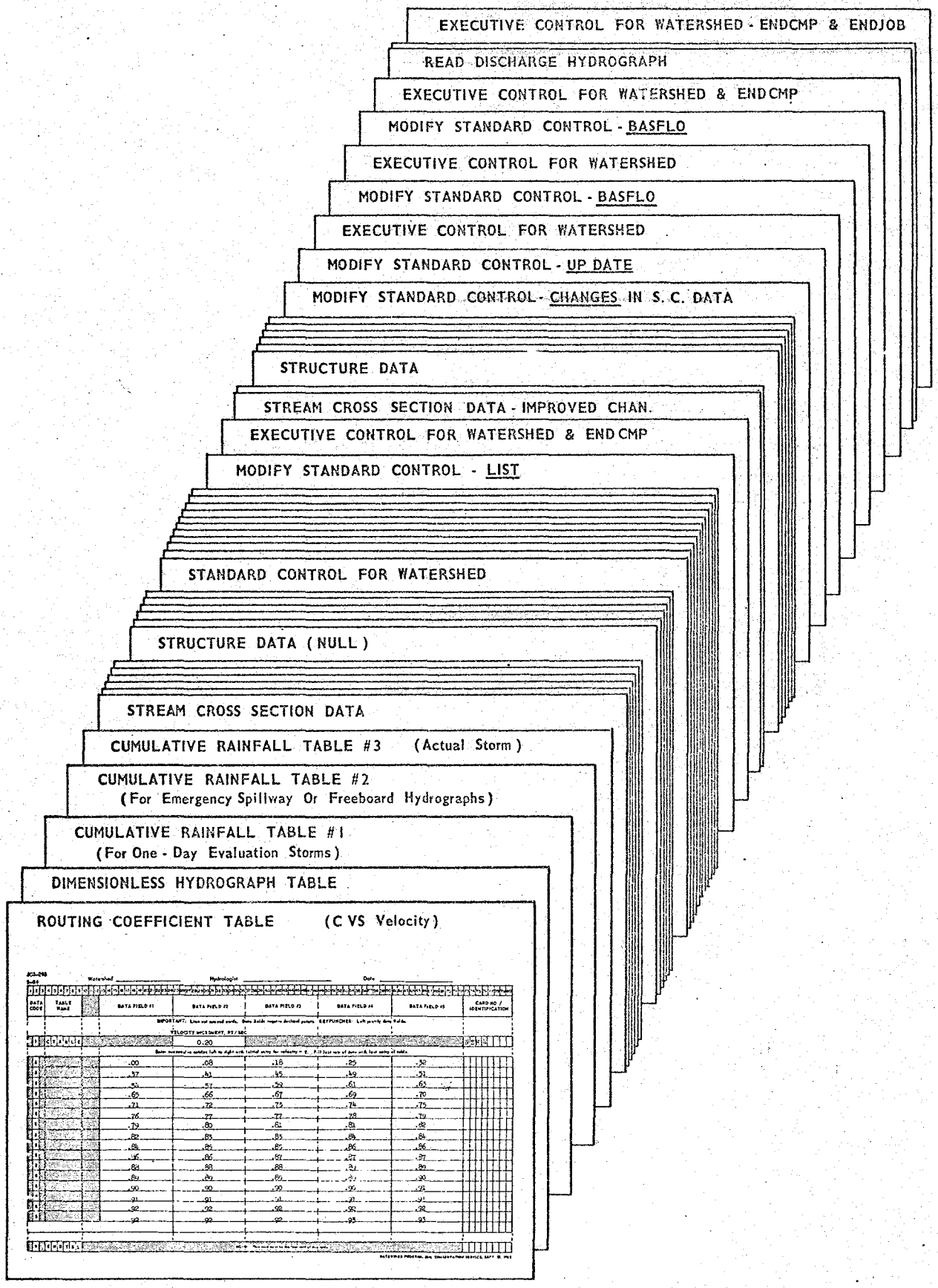


FIGURE 4.— Arrangement of data-input sheets.

List of Precautions

General

1. There must be decimal points in all figures in all data fields. Commas should not be used to signify thousands.

2. Preprinted data must be crossed out on all unused lines of every format.

3. If forms are duplicated by some "copy" process, make sure all preprinted figures and letters are legible along with the fill-in material.

4. The Routing-Coefficient Table and Dimensionless-Hydrograph Table must be included in every stack of input data.

5. The preprinted Cumulative-Rainfall Tables 1 and 2 must be included if specified in any COMPUT line on any executive-control sheet.

Cumulative-Rainfall Table, Actual

1. Each actual-rainfall table must be numbered differently with some number from 3 through 9.

2. A time increment must be inserted which is consistent with tabular values and subwatershed T_c's. If it is necessary that the computer develop accurate hydrographs for the smaller subwatersheds in the "run", the time increment (D) must be less than their T_c. If for other reasons the time increment must be greater than the T_c for some subwatersheds, less accuracy in their hydograph development must be tolerated as the ratio D/T_c increases.

3. A 1.0 must appear in both data fields 2 and 3 on executive-control-for-watershed format when rain depth and duration are shown in the table as inches and hours respectively.

4. There must be a figure in all data fields of each line used and all unused lines must be crossed out.

Stream-Cross-Section Data

1. Each cross section must be numbered differently with some number from 001 through 120.

2. If discharge rate is in csm, the size of drainage area must be shown in square miles. If discharge rate is in cfs, a 1.0 must be in the drainage area space.

3. All unused lines must be crossed out.

4. Do not cross out ENDTBL line.

Structure Data

1. Each structure must be numbered differently with some number from 01 through 60.

2. All unused lines must be crossed out.

3. Do not cross out ENDTBL line.

Standard-Control-For-Watershed (S.C.) Format

1. A structure or a cross-section number, never both, must appear in every line of S.C. Data.

2. There must be figures in all data-field spaces for all subroutines, - except that the "optional" space (C coefficient) will be left blank for any REACH subroutine for which cross-section data is provided. Conversely, there must be cross-section data for every REACH subroutine in which this space is blank.

3. There must be structure data for every RESVOR subroutine.

4. ENDATA must be crossed out on all except last S.C. sheet. It must not be crossed out on the last S.C. sheet.

5. Omission of decimal points from curve numbers and reach lengths continues to be the most common source of error in input data.

6. The total number of lines (subroutines) of S.C. data must not exceed 600.

Modify-Standard-Control Format

1. In specifying an INSERT after a cross section or structure number, check the STANDARD CONTROL sequence for any previous appearance of the same number. An INSERT, specified for a cross section or structure number appearing more than once and separated by other numbers will result in the machine inserting the new standard control data after its first appearance in the sequence.

2. There will be cases in which two or more cards in a standard control sequence will have the same data in spaces 1 to 18. An ALTER or DELETE instruction will be enacted on the card which appears first in the sequence.

3. INSERT, ALTER and DELETE instructions must be arranged in the same order as that for the subroutines in the standard control sequence which they modify.

4. Have sheets showing LIST or UPDATE lines been inserted where desired?

Executive-Control-For Watershed (E.C)

1. The, 7-INCREM-6, main-time increment must be specified in hours. It should not be too large in relation to the T_p of the smaller sub-

watershed hydrographs involved. This is a header card that must precede each set of COMPUT instructions that follow new or modified data. Whenever in doubt, include this header card.

2. FROM and THRU must each be filled in with a structure or cross-section number for each COMPUT line.

3. The inclusion or omission of ENDCMP is very important. In case of doubt as to which way it should be, the instructions under E.C. format should be reviewed.

4. A rain-table number and soil number must be shown for each COMPUT line under columns 65 and 69 respectively.

5. Data Fields 2 and 3 must have figures that are appropriate for the rain-table number.

a) For Table 1, enter actual rain depth and 1.0 for duration.
b) For Table 2, enter actual rain depth and actual duration. A consideration should be given to making this duration in hours times 0.02 (the time increment on the cumulative rainfall table) less than the T_c's for the subwatersheds. See precaution number 5 under "Cumulative-Rainfall Table, Actual".
c) For actual rain tables, enter 1.0 in both rain-depth and duration spaces.

6. Each set of E.C. sheets will pertain to the last set of S.C. or tabular data modifications regardless of whether LIST or UPDATE (or neither) were called for.

7. ENDJOB must be crossed out on all but last E.C. sheet.

Follow-up Processing

After analyzing the output from a watershed after the initial processing it may be desirable to reprocess the watershed with additional changes in the standard control and/or tabular data. There are two choices for the preparation of input data and the follow-up processing:

1. The original input data can be manually ordered and rearranged to suit the new conditions. This means pulling useable data sheets from the original pack and adding new input sheets that will complete the instructions for the new run. The original set of input sheets would be sorted and combined with the new sheets. The line/cards on the new sheets would be numbered to fit into the sequence of the original line/cards. There can be skips in the numbering sequence. If there are more new cards than omissions provided through removal of original cards, a new numbering sequence can be inserted. It would be 1 AFT----, 2 AFT----, etc., with the number of the line/card which they should follow after "AFT", e.g. 1 AFT 100 meaning that it should be the first card to follow card 100. All sheets from the original pack, on which there are no changes in data or sequence numbers, should have ORIGINAL stamped or marked in the upper right corner. This will identify those cards which can be pulled from the original deck and used without being repunched. This choice would be limited to situations where there was little or no change in the standard control sequence.

2. The original COMPUT lines on the EXECUTIVE CONTROL input sheets can be crossed out lightly (or the entire sheet removed) and replaced with a "dummy" set of COMPUT instructions. A dummy set would be a single COMPUT instruction for each original COMPUT series and would instruct the machine to compute FROM and THRU only the first cross section or structure in the watershed. Thus, the machine would pass through the original data making alterations after each dummy COMPUT until it had finally established within the computer the last set of conditions that existed at the conclusion of the original run. (By replacing the original COMPUT instructions with brief dummy COMPUT instructions, only a few seconds of computing time is required to run through this abbreviated portion of the original data. The ENDJOB is crossed out. New data sheets, modified standard control sheets and executive control sheets are added to the original pack to fulfill the new requirements and treat them as a continuation of the original run. There will be "skips" in the numbering sequence on the original sheets, which is permissible as explained above as long as the remaining numbers are in an increasing order. The numbering on the new input sheets will commence with the number of the former ENDJOB card. The letter of transmittal should list the numbers for all lines crossed out on the original input sheets. This will facilitate removing the respective punched cards from the original deck and save repunching the original data. Additional standard-control data would be limited to that for which both old and new line/cards would not exceed 600.

If the new processing affects only a lower portion of the watershed, as in the case of improved channels, hydrograph data from previous processing

of the upper portion can be introduced and thus eliminate the need for the computer to reprocess those standard-control subroutines included in the upper portion. A "read-discharge-hydrograph" data format is used for this input as previously described.

Output Data

Simplicity of output data corresponding to the simplicity of the input data has been maintained. The hydrograph-peak discharges, their time of occurrence, and the watersurface elevation, if applicable, are given under appropriate headings. The hydrograph-output data are preceded by related data and instructions on the standard-control and executive-control formats. The hydrograph ordinates are listed from left to right instead of vertically as customarily used by hydrologists.

A printout of computer output for the Sample Watershed is included as Exhibit 45. Output data should be checked for consistency and unreasonable results as soon as it is returned. The following table is a suggested format for summarizing output data.

Peak Discharge (cfs) - Alternate Programs Compared

Location		Present	Programs A	B	C	D	etc.
2.5" Rainfall 5 yr. Frequency							
Structure 01		690	53	53	etc.	etc.	etc.
Cross section	001	1039	560	560			
	002	1099	681	681			
Structure 02		743	93	743			
Cross section	003	824	345	824			
	004	1995	1139	1736			
	005	2232	668	1942			
	etc.	etc.	etc.	etc.			
3.4" Rainfall 10 yr. Frequency							
Structure 01		902	54	etc.	etc.	etc.	etc.
Cross section	001	1410	792				
	etc.	etc.	etc.				

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Head, Central Technical Unit, Hydrology Branch, Engr. Div., SCS, Hyattsville, Md. DATE: ---

FROM : Name, Address, Title, etc.

SUBJECT: EDP - Project Formulation Program - (Hydrology) - Sample Watershed

The enclosed schematic map and input data sheets are submitted for processing. Return one copy each of the printout and listing of input data to: (Name, title and address).

(100, 200 or 300) should be punched in columns 3 through 5 on the initializing card, indicating the number of coordinates desired in the computed hydrographs.

(If applicable):
Retain the punched cards on file in your office until (date) for use in case a follow-up processing is needed for this watershed.

Remarks concerning unusual features associated with the processing of this watershed and/or questionable points in description of input data follow:

cc: (w/o enclosures): EandWP Unit

Exhibit 1

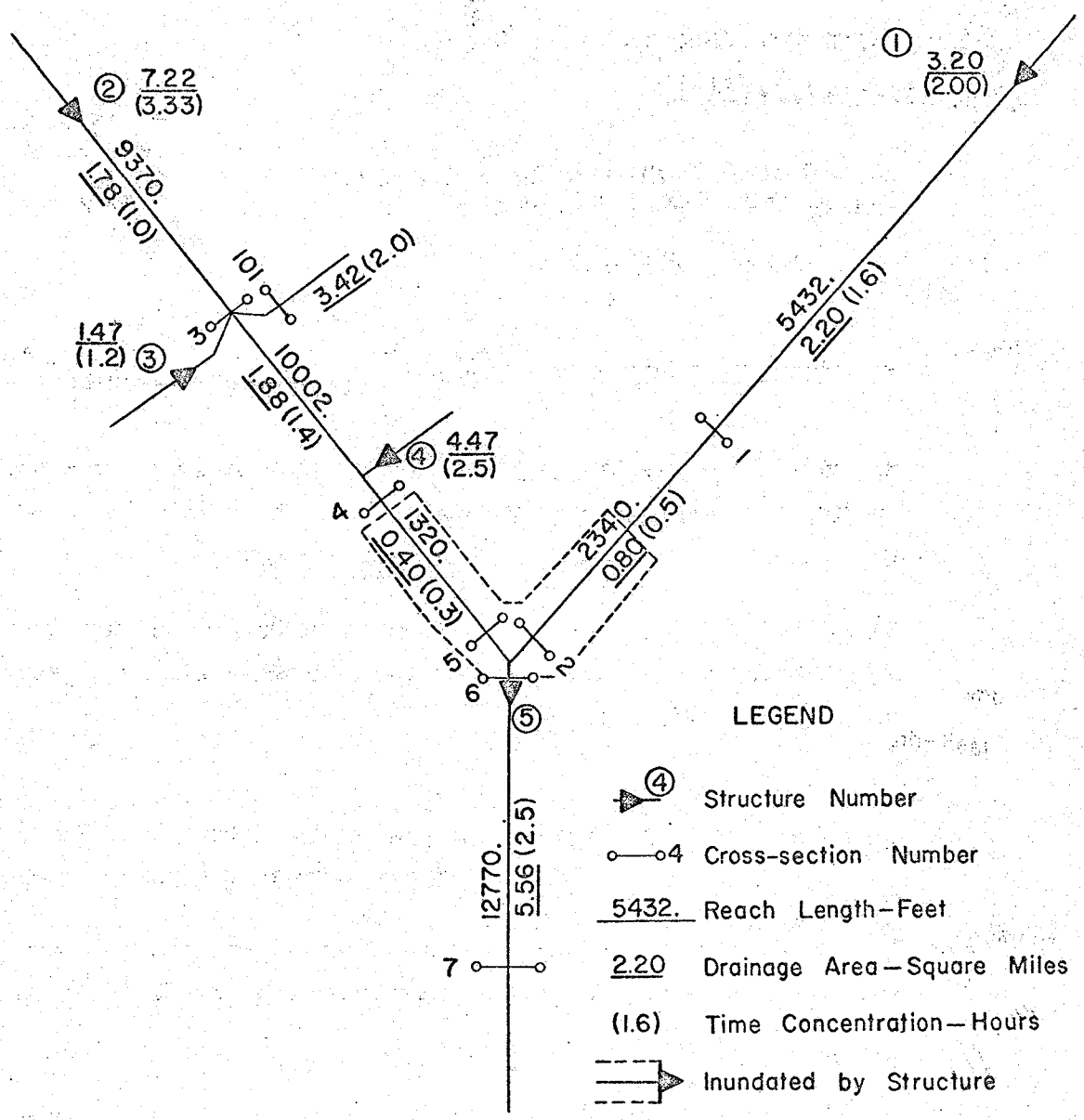


EXHIBIT 2.—Schematic drawing of Sample Watershed.

ROUTING COEFFICIENT TABLE C VS. VELOCITY

SCS-268
5-64

Watershed *Sample* Hydrologist *ABC.* Date *10/25/63*

DATA CODE	TABLE NAME	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO. / IDENTIFICATION
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
		VELOCITY INCREMENT, FT/SEC					
1	C T A B L E		0.20				1
		Enter successive entries left to right with initial entry for velocity = 0. Fill last row of data with last entry of table.					
8		.00	.08	.18	.25	.32	2
8		.37	.41	.45	.49	.51	3
8		.54	.57	.59	.61	.63	4
8		.65	.66	.67	.69	.70	5
8		.71	.72	.73	.74	.75	6
8		.76	.77	.77	.78	.79	7
8		.79	.80	.81	.81	.82	8
8		.82	.83	.83	.84	.84	9
8		.84	.85	.85	.86	.86	10
8		.86	.86	.87	.87	.87	11
8		.88	.88	.88	.89	.89	12
8		.89	.89	.89	.89	.90	13
8		.90	.90	.90	.90	.91	14
8		.91	.91	.91	.91	.91	15
8		.92	.92	.92	.92	.92	16
8		.92	.92	.92	.93	.93	17
9	E N D T B L	NOTE: This card must be the last card of this table.					18

Line/card	Velocity ft/sec	"C"
2	0	0
	0.2	0.08
	.4	.18
	.6	.25
	.8	.32
3	1.0	.37
	1.2	.41
	1.4	.45
	1.6	.49
	1.8	.51
4	2.0	.54
	2.2	.57
	2.4	.59
	2.6	.61
etc	etc	etc

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

Exhibit 3

DIMENSIONLESS HYDROGRAPH TABLE, DISCHARGE VS. TIME

SCS-266
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	TABLE NAME	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO./ IDENTIFICATION

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

DIMENSIONLESS TIME INCREMENT (Last entry must be for dimensionless time 1.0)

4	DIMHYD		0.02				19

Enter successive entries left to right with initial entry for time = 0. Fill last row of data with last entry of table.

8		.000	.015	.075	.160	.280	20
8		.430	.600	.770	.890	.970	21
8		1.000	.980	.920	.840	.750	22
8		.660	.565	.490	.420	.365	23
8		.320	.279	.240	.210	.180	24
8		.155	.130	.113	.098	.086	25
8		.075	.065	.056	.047	.041	26
8		.035	.030	.026	.022	.019	27
8		.017	.015	.013	.011	.009	28
8		.007	.005	.003	.002	.001	29
8		.000	.000	.000	.000	.000	30
9	ENDTBL						31

Ref: NEH 4, Chapter 16

Line/card	Time Ratio T/T_b	Discharge Ratio q/q_p
20	0	0
	0.02	0.015
	.04	.075
	.06	.160
	.08	.280
21	.10	.430
	.12	.600
	.14	.770
	.16	.890
	.18	.970
22	.20	1.000
	.22	.980
	.24	.920
	.26	.840
	.28	.750
23	.30	.660
	etc	etc

NOTE: This card — not the last card of this table.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

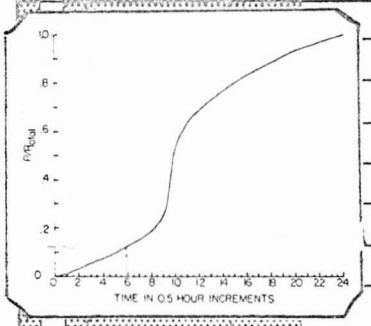
Exhibit 4

CUMULATIVE RAINFALL TABLE, FOR ONE-DAY WATERSHED EVALUATION STORMS

SCS-272(a)
Rev.

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	TABLE ID NAME	TABLE ID NO.	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO. / IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
		TABLE NO.		TIME INCREMENT*				
5	RAINFL	1		0.5				32
			Enter successive entries left to right with first entry for time = 0. Fill last row of data with last entry of table.					
8			.000	.008	.017	.026	.035	33
			.045	.055	.065	.076	.087	34
			.099	.112	.125	.140	.156	35
			.174	.194	.219	.254	.303	36
			.515	.583	.624	.654	.682	37
			.705	.727	.748	.767	.784	38
			.800	.816	.830	.844	.857	39
			.870	.882	.893	.905	.916	40
			.926	.936	.946	.955	.965	41
8			.974	.983	.992	1.000	1.000	42
9	ENDTBL		NOTE: This card must be the last card of this table.					43



WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

*Time increment is 0.5 hour. On "Executive Control for Watershed" (SCS-274) form set DATA FIELD #2 to actual rainfall depth and rainfall duration, DATA FIELD #3, to 1.0.

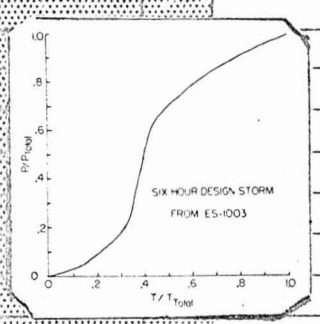
Exhibit 5

CUMULATIVE RAINFALL TABLE, FOR EMERGENCY SPILLWAY OR FREEBOARD HYDROGRAPHS

SCS-272(b)
Rev.

Watershed *Sample* Hydrologist *ABC.* Date *10/25/63*

DATA CODE	TABLE ID NAME	TABLE ID NO.	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO. / IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
		TABLE NO.		TIME INCREMENT*				
5	RAINFL	2		.02				44
			Enter successive entries left to right with first entry for time = 0. Fill last row of data with last entry of table.					
8			.00	.01	.02	.02	.03	45
8			.04	.05	.06	.07	.08	46
8			.10	.11	.13	.14	.17	47
8			.19	.22	.27	.35	.44	48
8			.52	.60	.63	.66	.68	49
8			.70	.72	.74	.76	.77	50
8			.79	.80	.82	.83	.84	51
8			.85	.87	.88	.89	.90	52
8			.91	.92	.93	.94	.95	53
8			.9567	.9633	.97	.98	.99	54
8			1.00	1.00	1.00	1.00	1.00	55
9	ENDTBL		NOTE: This card must be the last card of this table.					56



WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

*Time increment is 0.02 of unit duration, hence storm duration and rainfall depth need to be shown in DATA FIELDS #3 and #2 respectively on "Executive Control for Watershed" (SCS-274) form.

Exhibit 6

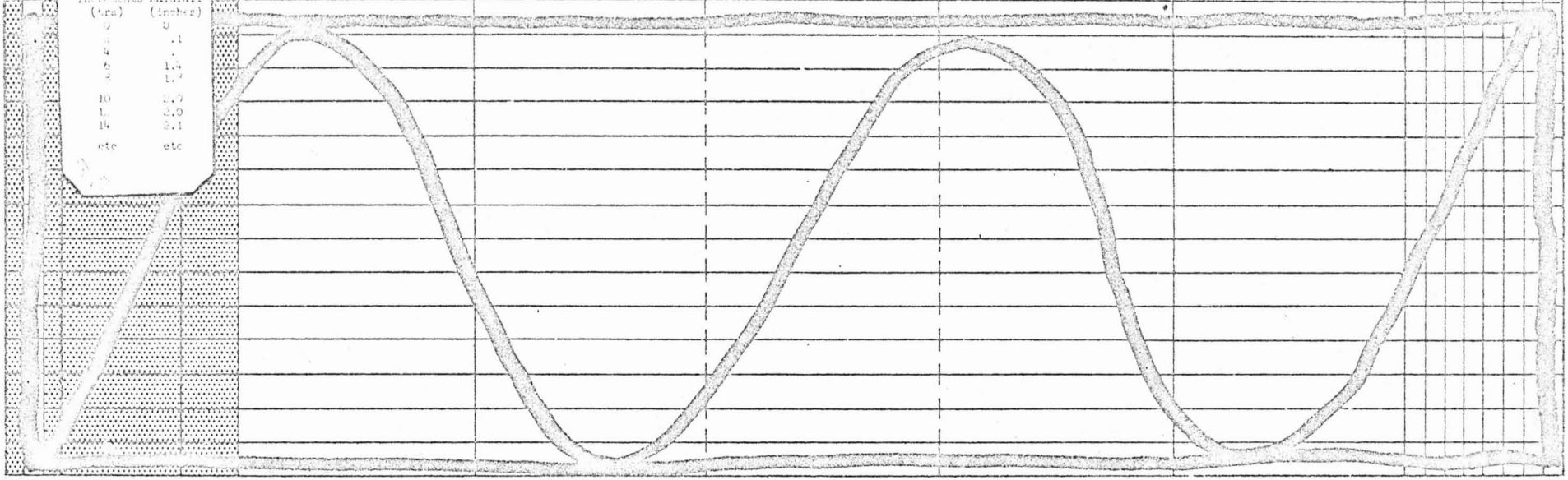
CUMULATIVE RAINFALL TABLE, ACTUAL

SCS-271
5-64

Watershed *Sample* Hydrologist *ABC.* Date *10/25/63*

DATA CODE	TABLE ID NAME	TABLE ID NO.	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO. / IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
		TABLE NO.	TIME INCREMENT					
5	RAINFL	3		2.0				57
			Must be a number between 5 and 9 inclusive, with a different number for each storm.	In hours for natural storms.				
			Enter successive entries left to right with first entry for time = 0. Fill last row of data with last entry of table.					
8			0.0	0.1	0.7	1.4	1.8	58
8			2.0	2.0	2.1	2.3	2.7	59
8			3.4	3.9	4.0	4.0	4.0	60
9	ENDTBL		NOTE: This card must be the last card of this table.					61

Time Increments (hrs)	Accumulated Rainfall (inches)
0	0
2	.1
4	.
6	1.4
8	1.7
10	2.0
12	2.0
14	2.1
etc	etc



WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

Exhibit 7

STREAM CROSS-SECTION DATA
Cross Section No. Average of 1R, 2R & 3R

SCS-270
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
				IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.				
		X SECTN NO. (001 - 120)		DRAINAGE AREA, SQ. MI.				
2	XSECTN	001		5.4				62
				(If tabulated discharge in CFS, enter 1.0)				
				ELEVATION, FT.	DISCHARGE, CSM	END AREA, SQ. FT.		
8				742.	0.0	0.0		63
8				743.	8.0	20.		64
8				744.	20.0	80.		65
8				746.	75.	190.		66
8				748.	200.	350.		67
8				750.	450.	650.		68
8				752.	800.	1350.		69
8				754.	1400.	2450.		70
8				755.	1800.	3150.		71
9	ENDTBL			NOTE: This card must be the last card for each cross-section.				72

Exhibit 8

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

STREAM CROSS-SECTION DATA
Cross Section No. 4R

SCS-270
5-64

Watershed Sample Hydrologist ABC. Date 10/25/63

DATA CODE	TABLE NAME			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
				IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.				
		X SECTN NO. (001 - 120)		DRAINAGE AREA, SQ. MI.				
2	XSECTN	002		6.2				73
				(If tabulated discharge in CFS, enter 1.0)				
				ELEVATION, FT.	DISCHARGE, CSM	END AREA, SQ. FT.		
8				645.	0.0	0.0		74
8				646.	10.	20.		75
8				648.	50.	90.		76
8				650.	150.	260.		77
8				652.	400.	790.		78
8				654.	1100.	2230.		79
8				656.	2300.	4900.		80
8				658.	3500.	7700.		81
9	ENDTBL			NOTE: This card must be the last card for each cross-section.				82

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 9

STREAM CROSS-SECTION DATA
Cross Section No. Average of 1L, 2L & 3L

SCS-270
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.				
		X SECTN NO. (001 - 120)	DRAINAGE AREA, SQ. MI.				
2	XSECTN	003	1.0				83
			(If tabulated discharge in CFS, enter 1.0) Discharge for this x-sectn. is in cfs. Hence 1.0 under drainage area.				
			ELEVATION, FT.	DISCHARGE, CSM	END AREA, SQ. FT.		
8			749.	0.0	0.0		84
8			750.	81.	40.		85
8			752.	306.	110.		86
8			754.	585.	170.		87
8			756.	1098.	300.		88
8			758.	2106.	650.		89
8			760.	3843.	1270.		90
8			762.	7200.	2030.		91
9	EMDTSL		NOTE: This card must be the last card for each cross-section.				92

Exhibit 10

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

STREAM CROSS-SECTION DATA
Cross Section No. Average of 4M & 5M

SCS-270
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
				IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.				
		X SECTN NO. (001 - 120)		DRAINAGE AREA, SQ. MI.				
2	XSECTN	007		32.42				93
				(If tabulated discharge in CFS, enter 1.0)				
				ELEVATION, FT.	DISCHARGE, CSM	END AREA, SQ. FT.		
8				619.8	0.0	0.0		94
8				622.	7.	60.		95
8				624.	15.	130.		96
8				626.	23.	230.		97
8				628.	33.	400.		98
8				630.	46.	650.		99
8				632.	62.	1150.		100
8				634.	105.	1850.		101
8				636.	175.	3000.		102
8				638.	280.	5700.		103
8				640.	1000.	11000.		104
9	EMDTCL			NOTE: This card must be the last card for each cross-section.				105

Exhibit 11

STRUCTURE DATA
Structure No. LR (NULL STR. DATA)

SCS-269
5-64

Watershed Sample Hydrologist AAC Date 10/25/63

DATA CODE	TABLE NAME			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)						
0	STRUCT	01						106
				ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8				852.4	0.0	88.		107
9	ENDTBL							108

Original structure designation must be changed to a number between 1 and 60. Computer ignores any data above the fill-in lines.

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields

NULL structure data for analyzing a watershed without the structure included.

By including only the first line of structure data, the computer moves the inflow hydrograph into the next subroutine without routing it.

NOTE: This card must be the last card for each structure.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 12

STRUCTURE DATA
Structure No. 1L (NULL)

SCS-269
5-64

Watershed Sample Hydrologist AEC Date 10/25/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO./ IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	02					109
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields					
			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			863.3	0.0	200.		110
8							
8							
8							
8							
8							
8							
8							
8							
8							
8							
8							
8							
8							
8							
9	ENDTBL		NOTE: This card must be the last card for each structure.				111

Exhibit 13

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

STRUCTURE DATA
Structure No. 2L (NULL)

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	03					1/12

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields

			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			822.8	0.0	50.		1/13
9	ENDTBL	NOTE. This card must be the last card for each structure.					1/14

Exhibit 14

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

STRUCTURE DATA
Structure No. 3L (NULL)

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)					
2	STRUCT	04					115
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields					
			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			724.5	0.0	160.		116
9	END TBL	NOTE: This card must be the last card for each structure					117

Exhibit 15

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	NO.	X SECTION/ STRUCTURE XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.	Put "1" in space						
6	RUNOFF	1		01			6	3.20	92.	2.0	1	1		1			118
								SURF. ELEV. AT T=0, FT.									
6	RESVOR	2		01	6		7	852.4			1	1	1	1			119
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
6	REACH	3	001		7		5	5432.			1			1			120
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	001				6	2.2	92.	1.6	1			1			121
6	ADDHYD	4	001		5	6	7				1	1		1			122
6	SAVHOY	5															
6	ADDHYD	4															
6	SAVHOY	5															
	ENDATA																

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

Develop an inflow hydrograph to structure 01.

Route thru reservoir 01.

PEAK - provides peak discharge, time-to-peak and elev. of max. water surface in reservoir.

Leave blank when cross-section tabular data is included. Machine will compute routing coefficient.

Route thru reach to cross-section 001.

Elevation of water surface in reservoir at zero discharge.

ELEV - provides elevation corresponding to discharge rate for each "main-time increment."

Develop a hydrograph for local area between str. 01 and cross-section 001.

Length of reach for routing.

Space for "NO. OF ROUTINGS" may appear on some formats. It should never be used.

Combine the local and routed hydrographs.

Cross out remaining subroutines and go to the next sheet in order to route between x-sec's. 001 & 002.

HYD - provides discharge rate for each "main-time increment."

The ENDATA line must be crossed out on all except last sheet of SC data.

NOTE: This card is to be used ONLY

WATERSHED PROGRAM SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 16

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	SUBROUTINE (OPERATION) NO.	X SECTION/ STRUCTURE XSECTN NO.	X SECTION/ STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.																	
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.	Put "1" in space						
6	RUNOFF						4										
								SURF. ELEV. AT T=0, FT.									
6	DEPHOP	2			6		7										
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
6	REACH	3	002		7		5	2340.			1	1		1			123
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	002				6	0.8	92.	0.5	1			1			124
6	ADDHYD	4	002		5	6	7				1			1			125
6	SAVMOV	5	002		7		2										126
6	[illegible]																
6	[illegible]				5	7											
[illegible]																	

SAVMOV - transfers the hydrograph from computer storage element 7 to 2.

NOTE: This card is to be used ONLY at end of all standard control cards.

WATERSHED PROGRAM SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 17

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	SUBROUTINE (OPERATION) NO.	X SECTION/ STRUCTURE XSECTN NO.	X SECTION/ STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
	IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.										Put "1" in space						
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1		02			6	7.22	85.	3.33	1	1					127
								SURF. ELEV. AT T=0, FT.									
6	RESVOR	2		02	6		7	863.3			1						128
								LENGTH, FT.	(OPTIONAL) ROUTING COEFFICIENT (C)	NO. OF ROUTINGS							
6	REACH	3	003		7		5	9370.			1			1			129
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	003				6	1.78	85.	1.0							130
6	ADDHYD	4	003		5	6	7				1			1			131
6	SAVMOV	5	003		7		3										132
					5	6	7										
	END DATA							NOTE: This card is to be used ONLY at end of all standard control cards.									

Exhibit 18

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist AHC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	NO.	X SECTION/ STRUCTURE XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
	IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.										Put "1" in space						
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1		03			6	1.47	85.	1.2							133
								SURF. ELEV. AT T=0, FT.									
6	RESVOR	2		03	6		7	822.8									134
								LENGTH, FT.	(OPTIONAL) ROUTING COEFFICIENT (C)	NO. OF ROUTINGS							
			101					5									
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	101				6	3.42	87.	2.0							135
6	SAVMOV	5		03	7		5										136
6	ADDHYD	4	003		5	6	7										137
6	SAVMOV	5	003		7		5										138
END DATA								NOTE: This card is to be used ONLY at end of all standard control cards.									

Exhibit 19

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	NO.	X SECTION/ STRUCTURE XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUTPUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
	IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.										Put "1" in space						
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
								SURF. ELEV. AT T=0, FT.									
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	SAVMOV	5	003		3		6										139
6	ADDHYD	4	003		5	6	7				1			1			140
								NOTE: This card is to be used ONLY at end of all standard control cards.									

Exhibit 20

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	NO.	X SECTION/ STRUCTURE XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
	IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.										Put "1" in space						
6	[illegible]	1					4	AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	[illegible]	2			0		7	SURF. ELEV. AT T=0, FT.									
6	REACH	3	004		7		5	LENGTH, FT. 1000Z.	ROUTING COEFFICIENT (C) 0.72	NO. OF ROUTINGS (OPTIONAL) —	1			1			141
6	RUNOFF	1	004				6	AREA, SQ. MI. 1.88	RUNOFF CURVE NO. 87.	TIME OF CONCENTRATION, HRS. 1.4	1			1			142
6	ADDHYD	4	004		5	6	7				1			1			143
6	SAVMOV	5	004		7		4										144
8	[illegible]																
[illegible]																	
[illegible]																	

When a coefficient is provided, the machine will not search for tabular data with which to compute it.

NOTE: This card is to be used ONLY at end of all standard control cards.

WATERSHED PROGRAM SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 21

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields. Put "1" in space

DATA CODE	SUBROUTINE (OPERATION) NAME	SUBROUTINE (OPERATION) NO.	X SECTION/ STRUCTURE XSECTN NO.	X SECTION/ STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUTPUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1		04		6		4.47	87.	2.5	1			1			145
								SURF. ELEV. AT T=0, FT.									
6	RESVOR	2		04	6		7	730.0			1			1			146
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
6	ROUTE	3				7											
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1															
6	SAYMOV	5		04	7		6										147
6	SAYMOV	5	004		4		5										148
6	ADDHYD	4	004		5	6	7										149
6	END																

NOTE: This card is to be used ONLY at end of all standard control cards.

WATERSHED PROGRAM SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 22

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	SUBROUTINE (OPERATION) NO.	X SECTION/ STRUCTURE XSECTN NO.	X SECTION/ STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.											Put "1" in space						
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
								SURF. ELEV. AT T=0, FT.									
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
6	REACH	3	005		7		5	1320.	0.5		1	1		1			150
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	005				6	0.40	87.	0.3							151
6	ADDHYD	4	005		5	6	7										152
6	SAYMOV	5	005		7		6										153
6	SAYMOV	5	002		2		5										154
6	ADDHYD	4	006		5	6	7										155
DATA																	

NOTE: This card is optional

WATERSHED PROGRAM SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 23

STANDARD CONTROL FOR WATERSHED

SCS-273
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	SUBROUTINE (OPERATION) NAME	NO.	X SECTION/ STRUCTURE XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO./ IDENTIFICATION
	IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.										Put "1" in space						
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF						6										
								SURF. ELEV. AT T=0, FT.									
6	RESVOR	2					7										
								LENGTH, FT.	ROUTING COEFFICIENT (C) (OPTIONAL)	NO. OF ROUTINGS							
6	REACH	3	007		7		5	12770.			1	1		1			156
								AREA, SQ. MI.	RUNOFF CURVE NO.	TIME OF CONCENTRATION, HRS.							
6	RUNOFF	1	007				6	5.56	82.	2.5	1						157
6	ADDHYD	4	007		5	6	7				1	1		1			158
6	[illegible]	5															
6	[illegible]	5															
6	[illegible]	5			6		7										
6	[illegible]																
	ENDATA							NOTE: This card is to be used ONLY at end of all standard control cards.									159

ENDATA line/card must be at end of all SC data.

WATERSHED PROGRAM SOIL CONSERVATION SERVICE JAN 20, 1964

Exhibit 24

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN STRUCTURE XSECTN NO	XSECTN STRUCTURE STRUCT. NO	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD.	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

IMPORTANT: Modifications must be given in the order that they appear on the standard control list.

NOTE: The following cards are inserted following the XSECTN STRUCTURE specified.

7 ADD — NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.

7 DELETE — NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.

Good practice to have LIST line/card follow SC data. Print-out will list tabular and SC data preceding computed data.

7 LIST — NOTE: This card is used for printout of tabular data and standard control list that are currently effective. 160

7 LIBRARY — NOTE: This card is used to make permanent changes of the library tape. Printout of library tape follows changes.

7 BASEFLOW — NEW BASE FLOW, CFS — NOTE: This card normally precedes a COMPUT card.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 25

EXECUTIVE CONTROL FOR WATERSHED

SCS-274
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	CARD NO./ IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.			
			MAIN TIME INCREMENT, HRS.	(This increment is required for initial computations. Remains in force until new increment is entered or permanent data changed.)		
7	INCREM	6	0.2			161
7	COMPUT	7	FROM XSECTN OR STRUCT: 01 THRU (1) XSECTN OR STRUCT: 007 — STARTING TIME, HRS.: 0.0	RAINFALL DEPTH, INCHES (Set depth and duration to 1.0 for actual rainfall): 2.5	RAINFALL DURATION, HRS.: 1.0	RAIN TABLE NO. (1 - 9): 1 — SOIL 1 - Dry 2 - Norm 3 - Wet: 2 — 162
	ENDCMP	1				163
7	COMPUT	7	FROM XSECTN OR STRUCT: 01 THRU (1) XSECTN OR STRUCT: 002 — STARTING TIME, HRS.: 0.0	RAINFALL DEPTH, INCHES: 1.0	RAINFALL DURATION, HRS.: 1.0	RAIN TABLE NO.: 3 — SOIL: 2 — 164
	ENDCMP	1				
7	COMPUT	7	FROM XSECTN OR STRUCT: 02 THRU (1) XSECTN OR STRUCT: 003 — STARTING TIME, HRS.: 0.25	RAINFALL DEPTH, INCHES: 1.0	RAINFALL DURATION, HRS.: 1.0	RAIN TABLE NO.: 3 — SOIL: 2 — 165
	ENDCMP	1	NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.			166
7	COMPUT	7				
	ENDCMP	1				
	ENDJOB	1				

All computed hydrographs will be described for time intervals of 0.2 hr. Should not be too large in relation to T_c, nor too small according to max. computed time period (T_{max}).

See rain table No. 1. Depth is dimensionless while time is in 24 hours (total). Hence 2.5" under depth and 1.0 (unity) under duration.

ENDCMP will cause computer to reset all hydrograph ordinates to zero and search for new tabular data and for modifications to SC data; and re-initiate computations at top of watershed (or commencing with XSECTION OR STRUCT under FROM).

"end" of a watershed; it may follow a series of COMPUT cards.

See rain table No. 3. Both depth and time are in actual units. Hence 1.0 (unity) in both spaces.

Storm period over tributary above X-sec. 003 lags 0.25 hour behind that over the tributary above X-sec. 002.

Actual storm (RAIN TABLE NO. 3) commences 0.25 hour later in branch above X-sec. 003

ENDCMP crossed out because line/cards 164 and 165 together make up one continuous analysis starting with structure 01 and continuing through cross-section 002.

ENDJOB must be crossed out on all but last sheet.

1) Starting from the beginning or from the end of the preceding COMPUT card, the program will start with the 1st operation on the standard control list having the XSECTN / STRUCT under FROM and will perform all operations through the 1st appearance of the XSECTN / STRUCT under THRU. Two or more COMPUT cards in series will normally cover successive parts of the standard control list.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 26

STREAM CROSS-SECTION DATA
Cross Section No. 4M & 5M - Improved Channel

SCS-270
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
				IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.				
		X SECTN NO. (001 - 120)		DRAINAGE AREA, SQ. MI.				
2	XSECTN	007		32.42				167
				(If tabulated discharge in CFS, enter 1.0)				
				ELEVATION, FT.	DISCHARGE, CSM	END AREA, SQ. FT.		
8				620.	0.0	0.0		168
8				622.	7.	60.		169
8				624.	15.	130.		170
8				626.	23.	230.		171
8				628.	35.	400.		172
8				630.	75.	750.		173
8				632.	110.	1250.		174
8				634.	190.	1950.		175
8				636.	250.	3100.		176
8				638.	410.	5800.		177
8				640.	1000.	11000.		178
9	EMDTBL			NOTE: This card must be the last card for each cross-section.				179

New data for cross section 007. (Compare with Exhibit 11).

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 27

STRUCTURE DATA
Structure No. 1 MS.

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/25/63

DATA CODE	TABLE NAME	STRUCTURE NO. (01-60)	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	CARD NO. / IDENTIFICATION
3	STRUCT	05				180

Structure 05 included for first time.

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields

		ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.	CARD NO.
8		663.	0.0	200.	181
8		664.	58.	250.	182
8		668.	256.	375.	183
8		672.	300.	575.	184
8		676.	352.	860.	185
8		680.	371.	1225.	186
8		684.	396.	1650.	187
8		688.	418.	2200.	188
8		690.4	440.	2575.	189
8		691.4	1286.	2740.	190
8		692.4	3440.	2900.	191
8		693.4	6802.	3075.	192
8		694.4	10950.	3250.	193
8		695.4	15677.	3425.	194
8		696.4	21034.	3600.	195
8					
8					
8					
8					
8					

9	ENDTBL	NOTE: This card must be the last card for each structure.	196

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Exhibit 28

STRUCTURE DATA
Structure No. 1R

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/23/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO./ IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	01					197
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields					
			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			852.4	0.0	88.		198
8			852.7	6.	96.		199
8			853.1	20.	105.		200
8			853.5	43.	125.		201
8			856.0	47.	175.		202
8			860.0	54.	325.		203
8			864.	59.	525.		204
8			868.	65.	775.		205
8			872.	69.	1100.		206
8			874.3	72.	1290.		207
8			875.3	294.	1400.		208
8			876.3	705.	1500.		209
8			877.3	1346.	1625.		210
8			878.3	2137.	1725.		211
8			879.3	3038.	1850.		212
9	ENDTBL		NOTE: This card must be the last card for each structure.				213

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 29

STRUCTURE DATA
Structure No. 1L

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/23/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	02					214

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields

			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			863.3	0.0	200.		215
8			864.6	76.	240.		216
8			872.	95.	575.		217
8			880.	110.	1225.		218
8			884.	119.	1650.		219
8			888.	125.	2200.		220
8			890.4	129.	2575.		221
8			891.4	1286.	2740.		222
8			892.4	3440.	2900.		223
8			893.4	6802.	3075.		224
8			894.4	10950.	3250.		225
8			895.4	15677.	3425.		226
8			896.4	21034.	3600.		227
8							
8							
8							
8							
8							
9	ENDTBL		NOTE: This card must be the last card for each structure.				228

Exhibit 30

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

STRUCTURE DATA
Structure No. 2L

SCS-269
5-64

Watershed Sample Hydrologist ABC Date 10/23/63

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	03					229
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields					
			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			822.8	0.0	50.		230
8			827.1	13.	90.		231
8			835.1	22.	200.		232
8			849.1	33.	600.		233
8			851.5	34.	690.		234
8			852.5	585.	740.		235
8			853.5	1610.	780.		236
8			854.5	3210.	830.		237
8			855.5	5186.	870.		238
8			856.5	7437.	920.		239
8			857.5	9990.	980.		240
8			858.5	12700.	1030.		241
9	ENDTBL		NOTE: This card must be the last card for each structure.				242

Exhibit 31

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

STRUCTURE DATA
Structure No. _____

SCS-269
5-64

Watershed _____ Hydrologist _____ Date _____

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3		CARD NO. / IDENTIFICATION
		STRUCTURE NO. (01-60)					
3	STRUCT	04					243
		IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields					
			ELEVATION, FT.	DISCHARGE, CFS	STORAGE, ACRE FT.		
8			724.5	0.0	160.		244
8			725.5	62.	190.		245
8			730.	79.	460.		246
8			735.	88.	1000.		247
8			740.	96.	1840.		248
8			741.4	97.	2120.		249
8			742.4	594.	2320.		250
8			743.4	1518.	2540.		251
8			744.4	2960.	2700.		252
9	ENDTBL		NOTE: This card must be the last card for each structure.				253

Exhibit 32

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *AK* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN STRUCTURE XSECTN NO	XSECTN STRUCTURE STRUCT NO	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUTPUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION
1	INSERT	2						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered									
3																	
4																	
5																	
6																	
7	ALTER	3						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered									254
6	REACH	3	002		7		5	1200.			1			1			255
6	REACH	3	005		7		5	1.	1.								256
6																	
6																	
6																	
6																	
7	DELETE							NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted									
6																	
6																	
6																	
6																	
7	LIST							NOTE: This card is used for printout of tabular data and standard control list that are currently effective									
7	MODIFY							NOTE: This card is used to make permanent changes of the library tape. Printout of library tape follows changes.									
								NEW BASE FLOW, CFS									
7	DELETE							NOTE: This card normally precedes COMPUTE card									

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

IMPORTANT: Modifications must be given in the order that they appear on the standard control list.

Changes length of reach from 2640 feet to 1200 feet. See Exhibits 2 and line, card 125, Exhibit 1. Backwater from structure 00 inundates all but 1200 feet of reach above cross-section 002.

Eliminates routed effect through reach above x-sec. 005 by reducing length from 1500 feet to 1 foot. Entire reach will be inundated by backwater from inundation of structure 00.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 33

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *ABC.* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN/STRUCTURE XSECTN NO.	XSECTN/STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION
IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.																	
IMPORTANT: Modifications must be given in the order that they appear on the standard control list.																	
7	INSERT	2	006					NOTE: The following cards are inserted following the XSECTN/STRUCTURE specified.									257
6	SAVMOV	5	006		7		6	—	—	—							258
6	RESVOR	2		05	6		7	663.	—	—	1	1	1	1	1		259

PUNCH - provides automatic card punching of hydrograph coordinates.

Standard-control-subroutine sequence is modified to provide for inclusion of structure 05 for first time.

7	ALTER	3						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.									
6																	
6																	

	DELETE							NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.									

Causes new tabular data and modifications to standard control data to be shown on print-out.

7	UPDATE	1						NOTE: This card is used to make permanent changes of the library tape. Printout of library tape follows changes.									260
									NEW BASE FLOW, CFS								
7	BASELO	5															

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 34

EXECUTIVE CONTROL FOR WATERSHED

SCS-274
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.			DATA FIELD #1	DATA FIELD #2	DATA FIELD #3			CARD NO./ IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
					MAIN TIME INCREMENT, HRS.	(This increment is required for initial computations. Remains in force until new increment is entered or permanent data changed.)				
7	INCREM	6			0.2					261
			FROM XSECTN OR STRUCT	THRU (1) XSECTN OR STRUCT	STARTING TIME, HRS.	RAINFALL DEPTH, INCHES (Set depth and duration to 1.0 for actual rainfall)	RAINFALL DURATION, HRS.	RAIN TABLE NO. (1 - 9)	SOIL 1 - Dry 2 - Norm 3 - Wet	
7	COMPUT	7	01	001	0.0	2.5	1.0	1	2	262
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7	002	002	0.0	2.5	1.0	1	2	264
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7	02	04	0.0	2.5	1.0	1	2	266
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7	004	004	0.0	2.5	1.0	1	2	267
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	ENDJOB	7			NOTE: This card terminates the entire watershed program.					

(1) Starting from the beginning or from the end of the preceding COMPUT card, the program will start with the 1st operation on the standard control list having the XSECTN / STRUCT under FROM and will perform all operations through the 1st appearance of the XSECTN / STRUCT under THRU. Two or more COMPUT cards in series will normally cover successive parts of the standard control list.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 35

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN NO.	STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	INPUT #2	OUTPUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	HYD	ELEV	VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

IMPORTANT: Modifications must be given in the order that they appear on the standard control list.

NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.

DATA CODE	OPERATION NAME	OPERATION NO.
6		
6		
6		
6		

DATA CODE	OPERATION NAME	OPERATION NO.
	DELETE	4

NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.

	LIST	

NOTE: This card is used for printout of tabular data and standard control list that are currently effective.

BASFLO card 263 being inserted to add 10 cfs to routed hydrograph at x-sec. 002.

DATA CODE	OPERATION NAME	OPERATION NO.	NEW BASE FLOW, CFS		CARD NO. / IDENTIFICATION
7	BASFLO	5	*10.*	NOTE: This card normally precedes a COMPUT card.	263

Exhibit 36

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO	XSECTN STRUCTURE XSECTN NO	XSECTN STRUCTURE STRUCT NO	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.												
					IMPORTANT: Modifications must be given in the order that they appear on the standard control list.												
7	I N S E R T	2						NOTE: The following cards are inserted following the XSECTN/STRUCTURE specified.									
	A L T E R							NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.									
	D E L E T E							NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.									
7	[illegible]							NOTE: This card is used for printout of tabular data and standard control list that are currently effective.									
	U P D A T E	1						NOTE: This card [illegible] changes of the [illegible]									
								NEW BASE FLOW, CFS									
7	B A S F L O	5						0.0	NOTE: This card normally precedes a COMPUT card.								265

BASFLO card 265 being inserted to remove 10 cfs base flow from computations between str. 02 and x-sec. 004 incl.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 37

MODIFY STANDARD CONTROL

SCS-275
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN / STRUCTURE XSECTN NO.	XSECTN / STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUT-PUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION

IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.

IMPORTANT: Modifications must be given in the order that they appear on the standard control list.

4	INSERT	2						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.									
6																	
6																	
6																	
6																	
5	ALTER	2						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.									
6																	
6																	
6																	
6																	
7	DELETE	2						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.									
6																	
6																	
6																	
6																	
8	LIST							NOTE: This card is used for printout of tabular data and standard control list that are currently effective.									
8	UPDATE	3						NOTE: This card is used to make permanent changes of the library tape. Printout of library tape follows changes.									
7	BASFLO	5						NEW BASE FLOW, CFS 5.0	NOTE: This card normally precedes a COMPUT card.								268

BASFLO card 268 being inserted to add 5 cfs to routed hydrograph at x-sec. 006.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 38

SCS-275
5-64

MODIFY STANDARD CONTROL

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	XSECTN / STRUCTURE XSECTN NO.	XSECTN / STRUCTURE STRUCT. NO.	HYDROGRAPH NUMBER INPUT #1	HYDROGRAPH NUMBER INPUT #2	HYDROGRAPH NUMBER OUTPUT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	OUTPUT OPTIONS PRINT PEAK	PRINT HYD	PRINT ELEV	PRINT VOL	PUNCH	NOT USED	CARD NO. / IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.												
					IMPORTANT: Modifications must be given in the order that they appear on the standard control list.												
6																	
6																	
6																	
7	D E L E T E	3						NOTE: Data given in columns 1 to 18 must be identical with standard control card to be altered.									
6																	
6																	
6																	
7								NOTE: Data given in columns 1 to 18 must be identical with standard control card to be deleted.									
6																	
6																	
6																	
6																	
1								NOTE: This card is used for printout of tabular data and standard control list that are currently effective.									
1	U P D A T E																
7	B A S F L O	5						NEW BASE FLOW, CFS 26.0	NOTE: This card normally precedes a COMPUT card.								270

BASFLO card 270 being inserted to change from 0 cfs to 26 cfs added to routed hydrograph at x-sec. 00 .

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 39

EXECUTIVE CONTROL FOR WATERSHED

SCS-274
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	FROM XSECTN OR STRUCT	THRU (1) XSECTN OR STRUCT	DATA FIELD #1 / STARTING TIME, HRS.	DATA FIELD #2 / RAINFALL DEPTH, INCHES (Set depth and duration to 1.0 for actual rainfall)	DATA FIELD #3 / RAINFALL DURATION, HRS.	RAIN TABLE NO. (1 - 9)	SOIL 1 - Dry 2 - Norm 3 - Wet	CARD NO./ IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
					MAIN TIME INCREMENT, HRS.	(This increment is required for initial computations. Remains in force until new increment is entered or permanent data changed.)				
7	INCREM	4								
7	COMPUT	7	005	006	0.0	2.5	1.0	1	2	269
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7	05	007	0.0	2.5	1.0	1	2	271
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					272
7	COMPUT	7								
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					

(1) Starting from the beginning or from the end of the preceding COMPUT card, the program will start with the 1st operation on the standard control list having the XSECTN STRUCT under FROM and will perform all operations through the 1st appearance of the XSECTN/STRUCT under THRU. Two or more COMPUT cards in series will normally cover successive parts of the standard control list.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 40

EXECUTIVE CONTROL FOR WATERSHED

SCS-274
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	FROM XSECTN OR STRUCT	THRU (1) XSECTN OR STRUCT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	RAIN TABLE NO. (1 - 9)	SOIL 1 - Dry 2 - Norm 3 - Wet	CARD NO./ IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
					MAIN TIME INCREMENT, HRS.	(This increment is required for initial computations. Remains in force until new increment is entered or permanent data changed.)				
7	INCREMENT									
					STARTING TIME, HRS.	RAINFALL DEPTH, INCHES (Set depth and duration to 1.0 for actual rainfall)	RAINFALL DURATION, HRS.			
7	COMPUT	7	01	01	0.0	9.2	6.0	2	2	273
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7	02	02	0.0	9.2	6.0	2	2	274
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					275
7	COMPUT	7								
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
7	COMPUT	7								
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	ENDPROG	1			NOTE: This card terminates the entire program.					

(1) Starting from the beginning or from the end of the preceding COMPUT card, the program will start with the 1st operation on the standard control list having the XSECTN / STRUCT under FROM and will perform all operations through the 1st appearance of the XSECTN / STRUCT under THRU. Two or more COMPUT cards in series will normally cover successive parts of the standard control list.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN. 20, 1964

Exhibit 41

READ DISCHARGE HYDROGRAPH

SCS-276
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	TABLE NAME		DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO./ IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
			LOCATION					
7	READHD	8	6					276
			STARTING TIME, HRS.	TIME INCREMENT, HRS.	DRAINAGE AREA, SQ. MI.	BASE FLOW, CFS		
7	READHD	9	0.0	2.0	26.84			277
			Enter successive entries left to right with first entry for starting time. Fill last row of data with last entry of table.					
8			0.0	100.	300.	550.	1350.	278
8			1900.	1800.	1200.	950.	700.	279
8			500.	300.	225.	250.	700.	280
8			1450.	1350.	1100.	925.	550.	281
8			625.	575.	525.	500.	600.	282
8			1000.	775.	600.	400.	400.	283
8			750.	500.	325.	300.	300.	284
8			300.	300.	275.	225.	175.	285
8			125.	90.	80.	50.	40.	286
8			30.	25.	20.	15.	10.	287
8			5.	0.0	0.0	0.0	0.0	288
9	ENDTBL		NOTE: This card must be the last card of this table.					289

Places the hydrograph into computer storage element 6.

Zero discharge is related to zero starting time. Starting time on line/card 277 will relate to starting time on line/card 291.

Discharge rate is described from left to right in time increments of 2 hours.

This gaged hydrograph is inserted ahead of line/card 290 as the inflow hydrograph to str. 09.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, SEPT. 30, 1963

Exhibit 42

EXECUTIVE CONTROL FOR WATERSHED

SCS-274
5-64

Watershed *Sample* Hydrologist *ABC* Date *10/25/63*

DATA CODE	OPERATION NAME	OPERATION NO.	FROM XSECTN OR STRUCT	THRU (1) XSECTN OR STRUCT	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	RAIN TABLE NO. (1 - 9)	SOIL 1 - Dry 2 - Norm 3 - Wet	CARD NO./ IDENTIFICATION
					IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
					MAIN TIME INCREMENT, HRS.	(This increment is required for initial computations. Remains in force until new increment is entered or permanent data changed.)				
7	INCREM	6			1.0					290
					STARTING TIME, HRS.	RAINFALL DEPTH, INCHES (Set depth and duration to 1.0 for actual rainfall)	RAINFALL DURATION, HRS.			
7	COMPUT	7	05	007	0.0	4.4	1.0	1	2	291
	ENDCMP	1			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					292
	~~COMPUT~~	~~7~~								
	~~ENDCMP~~	~~1~~			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	~~COMPUT~~	~~7~~								
	~~ENDCMP~~	~~1~~			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	~~COMPUT~~	~~7~~								
	~~ENDCMP~~	~~1~~			NOTE: This card is required at "end" of a watershed; it may follow a series of COMPUT cards.					
	ENDJOB	2			NOTE: This card terminates the entire watershed program.					293

Starting from the beginning or from the end of the preceding COMPUT card, the program will start with the 1st operation on the standard control list having the XSECTN STRUCT under FROM and will perform all operations through the 1st appearance of the XSECTN STRUCT under THRU. Two or more COMPUT cards in series will normally cover successive parts of the standard control list.

WATERSHED PROGRAM, SOIL CONSERVATION SERVICE, JAN 20, 1964

Exhibit 43

Exhibit 44

Machine Listing of Input Data Punched on Cards
(Cards 1 thru 293)

```
1001    SAMPLE WATERSHED
1 CTABLE                0.20                                                1
8          .00          .08          .18          .25          .32        0002
8          .37          .41          .45          .49          .51        0003
8          .54          .57          .59          .61          .63        0004
8          .65          .66          .67          .69          .70        0005
8          .71          .72          .73          .74          .75        0006
8          .76          .77          .77          .78          .79        0007
8          .79          .80          .81          .81          .82        0008
8          .82          .83          .83          .84          .84        0009
8          .84          .85          .85          .86          .86        0010
8          .86          .86          .87          .87          .87        0011
8          .88          .88          .88          .89          .89        0012
8          .89          .89          .89          .89          .90        0013
8          .90          .90          .90          .90          .91        0014
8          .91          .91          .91          .91          .91        0015
8          .92          .92          .92          .92          .92        0016
8          .92          .92          .92          .93          .93        0017
9 ENDTBL                                                                   18
4 DIMHYD                0.02                                              0019
8          .000         .015         .075         .160         .280       0020
8          .430         .600         .770         .890         .970       0021
8          1.000        .980         .920         .840         .750       0022
8          .660         .565         .490         .420         .365       0023
8          .320         .279         .240         .210         .180       0024
8          .155         .130         .113         .098         .086       0025
8          .075         .065         .056         .047         .041       0026
8          .035         .030         .026         .022         .019       0027
8          .017         .015         .013         .011         .009       0028
8          .007         .005         .003         .002         .001       0029
8          .000         .000         .000         .000         .000       0030
9 ENDTBL                                                                   31
5 RAINFL 1              0.5                                               0032
8          .000         .008         .017         .026         .035       0033
8          .045         .055         .065         .076         .087       0034
8          .099         .112         .125         .140         .156       0035
8          .174         .194         .219         .254         .303       0036
8          .515         .583         .624         .654         .682       0037
8          .705         .727         .748         .767         .784       0038
8          .800         .816         .830         .844         .857       0039
8          .870         .882         .893         .905         .916       0040
8          .926         .936         .946         .955         .965       0041
```

```
8            .974        .983        .992        1.000       1.000       0042
9 ENDTBL                                                                   43
5 RAINFL 2               .02                                             0044
8            .00         .01         .02         .02         .03         0045
8            .04         .05         .06         .07         .08         0046
8            .10         .11         .13         .14         .17         0047
8            .19         .22         .27         .35         .44         0048
8            .52         .60         .63         .66         .68         0049
8            .70         .72         .74         .76         .77         0050
8            .79         .80         .82         .83         .84         0051
8            .85         .87         .88         .89         .90         0052
8            .91         .92         .93         .94         .95         0053
8            .9567       .9633       .97         .98         .99         0054
8            1.00        1.00        1.00        1.00        1.00        0055
9 ENDTBL                                                                   56
5 RAINFL 3               2.0                                             0057
8            0.0         0.1         0.7         1.4         1.8         0058
8            2.0         2.0         2.1         2.3         2.7         0059
8            3.4         3.9         4.0         4.0         4.0         0060
9 ENDTBL                                                                   61
2 XSECTN     C01         5.4                                             0062
8                        742.        0.0         0.0                     0063
8                        743.        8.0         20.                     0064
8                        744.        20.0        80.                     0065
8                        746.        75.         190.                    0066
8                        748.        200.        350.                    0067
8                        750.        450.        650.                    0068
8                        752.        800.        1350.                   0069
8                        754.        1400.       2450.                   0070
8                        755.        1800.       3150.                   0071
9 ENDTBL                                                                   72
2 XSECTN     002         6.2                                             0073
8                        645.        0.0         0.0                     0074
8                        646.        10.         20.                     0075
8                        648.        50.         90.                     0076
8                        650.        150.        260.                    0077
8                        652.        400.        790.                    0078
8                        654.        1100.       2230.                   0079
8                        656.        2300.       4900.                   0080
8                        658.        3500.       7700.                   0081
9 ENDTBL                                                                   82
2 XSECTN     003         1.0                                             0083
```

```
8                       749.        0.0         0.0                                 0084
8                       750.        81.         40.                                 0085
8                       752.        306.        110.                                0086
8                       754.        585.        170.                                0087
8                       756.        1098.       300.                                0088
8                       758.        2106.       650.                                0089
8                       760.        3843.       1270.                               0090
8                       762.        7200.       2030.                               0091
9 ENDTBL                                                                             92
2 XSECTN    007         32.42                                                       0093
8                       619.8       0.0         0.0                                 0094
8                       622.        7.          60.                                 0095
8                       624.        15.         130.                                0096
8                       626.        23.         230.                                0097
8                       628.        33.         400.                                0098
8                       630.        46.         650.                                0099
8                       632.        62.         1150.                               0100
8                       634.        105.        1850.                               0101
8                       636.        175.        3000.                               0102
8                       638.        280.        5700.                               0103
8                       640.        1000.       11000.                              0104
9 ENDTBL                                                                             0105
3 STRUCT        01                                                                   0106
8                       852.4       0.0         88.                                 0107
9 ENDTBL                                                                             0108
3 STRUCT        02                                                                   0109
8                       863.3       0.0         200.                                0110
9 ENDTBL                                                                             0111
3 STRUCT        03                                                                   0112
8                       822.8       0.0         50.                                 0113
9 ENDTBL                                                                             0114
3 STRUCT        04                                                                   0115
8                       724.5       0.0         160.                                0116
9 ENDTBL                                                                             0117
6 RUNOFF 1      01      6 3.20      92.         2.00        1 1     1               0118
6 RESVOR 2      01 6    7 852.4                             1 1 1 1                 0119
6 REACH  3 001    7     5 5432.                             1       1               0120
6 RUNOFF 1 001          6 2.20      92.         1.6         1       1               0121
6 ADDHYD 4 001    5 6 7                                     1 1     1               0122
6 REACH  3 002    7     5 2340.                             1 1     1               0123
6 RUNOFF 1 002          6 0.80      92.         0.5         1       1               0124
6 ADDHYD 4 002    5 6 7                                     1       1               0125
```

```
6 SAVMOV 5 002    7    2                                                    0126
6 RUNOFF 1     02       6 7.22        85.        3.33      1 1            0127
6 RESVOR 2     02 6     7 863.3                            1               0128
6 REACH  3 003    7     5 9370.                            1       1       0129
6 RUNOFF 1 003           6 1.78        85.        1.0                     0130
6 ADDHYD 4 003    5 6 7                                   1       1       0131
6 SAVMOV 5 003    7     3                                                  0132
6 RUNOFF 1     03       6 1.47        85.        1.2                     0133
6 RESVOR 2     03 6     7 822.8                                            0134
6 RUNOFF 1 101           6 3.42        87.        2.0                     0135
6 SAVMOV 5     03 7     5                                                  0136
6 ADDHYD 4 003    5 6 7                                                   0137
6 SAVMOV 5 003    7     5                                                  0138
6 SAVMOV 5 003    3     6                                                  0139
6 ADDHYD 4 003    5 6 7                                   1       1       0140
6 REACH  3 004    7     5 10002.      0.72                1       1       0141
6 RUNOFF 1 004           6 1.88        87.        1.4     1       1       0142
6 ADDHYD 4 004    5 6 7                                   1       1       0143
6 SAVMOV 5 004    7     4                                                  0144
6 RUNOFF 1     04       6 4.47        87.        2.5     1       1       0145
6 RESVOR 2     04 6     7 730.0                            1       1       0146
6 SAVMOV 5     04 7     6                                                  0147
6 SAVMOV 5 004    4     5                                                  0148
6 ADDHYD 4 004    5 6 7                                                   0149
6 REACH  3 005    7     5 1320.       0.50                1 1     1       0150
6 RUNOFF 1 005           6 0.40        87.        0.3                     0151
6 ADDHYD 4 005    5 6 7                                   1       1       0152
6 SAVMOV 5 005    7     6                                                  0153
6 SAVMOV 5 002    2     5                                                  0154
6 ADDHYD 4 006    5 6 7                                   1 1     1       0155
6 REACH  3 007    7     5 12770.                           1 1     1       0156
6 RUNOFF 1 007           6 5.56        82.        2.5     1               0157
6 ADDHYD 4 007    5 6 7                                   1 1     1       0158
  ENDATA                                                                   0159
7 LIST                                                                     160
7 INCREM 6               0.2                                              0161
7 COMPUT 7     01 007    0.0           2.5        1.0         1     2     0162
  ENDCMP 1                                                                 0163
7 COMPUT 7     01 002    0.0           1.0        1.0         3     2     0164
7 COMPUT 7     02 003    0.25          1.0        1.0         3     2     0165
  ENDCMP 1                                                                 0166
2 XSECTN    007          32.42                                             0167
```

```
8                    620.      0.0       0.0                    0168
8                    622.      7.        60.                    0169
8                    624.      15.       130.                   0170
8                    626.      23.       230.                   0171
8                    628.      35.       400.                   0172
8                    630.      75.       750.                   0173
8                    632.      110.      1250.                  0174
8                    634.      190.      1950.                  0175
8                    636.      250.      3100.                  0176
8                    638.      410.      5800.                  0177
8                    640.      1000.     11000.                 0178
9 ENDTBL                                                        0179
3 STRUCT       05                                               0180
8                    663.      0.0       200.                   0181
8                    664.      58.       250.                   0182
8                    668.      256.      375.                   0183
8                    672.      300.      575.                   0184
8                    676.      352.      860.                   0185
8                    680.      371.      1225.                  0186
8                    684.      396.      1650.                  0187
8                    688.      418.      2200.                  0188
8                    690.4     440.      2575.                  0189
8                    691.4     1286.     2740.                  0190
8                    692.4     3440.     2900.                  0191
8                    693.4     6802.     3075.                  0192
8                    694.4     10950.    3250.                  0193
8                    695.4     15677.    3425.                  0194
8                    696.4     21034.    3600.                  0195
9 ENDTBL                                                        0196
3 STRUCT       01                                               0197
8                    852.4     0.0       88.                    0198
8                    852.7     6.        96.                    0199
8                    853.1     20.       105.                   0200
8                    853.5     43.       125.                   0201
8                    856.0     47.       175.                   0202
8                    860.0     54.       325.                   0203
8                    864.0     59.       525.                   0204
8                    868.0     65.       775.                   0205
8                    872.0     69.       1100.                  0206
8                    874.3     72.       1290.                  0207
8                    875.3     294.      1400.                  0208
8                    876.3     705.      1500.                  0209
```

B E.15c

```
8                    877.3     1346.     1625.                    0210
8                    878.3     2137.     1725.                    0211
8                    879.3     3038.     1850.                    0212
9 ENDTBL                                                          0213
3 STRUCT       02                                                 0214
8                    863.3     0.0       200.                     0215
8                    864.6     76.       240.                     0216
8                    872.0     95.       575.                     0217
8                    880.      110.      1225.                    0218
8                    884.      119.      1650.                    0219
8                    888.      125.      2200.                    0220
8                    890.4     129.      2575.                    0221
8                    891.4     1286.     2740.                    0222
8                    892.4     3440.     2900.                    0223
8                    893.4     6802.     3075.                    0224
8                    894.4     10950.    3250.                    0225
8                    895.4     15677.    3425.                    0226
8                    896.4     21034.    3600.                    0227
9 ENDTBL                                                          0228
3 STRUCT       03                                                 0229
8                    822.8     0.0       50.                      0230
8                    827.1     13.       90.                      0231
8                    835.1     22.       200.                     0232
8                    849.1     33.       600.                     0233
8                    851.5     34.       690.                     0234
8                    852.5     585.      740.                     0235
8                    853.5     1610.     780.                     0236
8                    854.5     3210.     830.                     0237
8                    855.5     5186.     870.                     0238
8                    856.5     7437.     920.                     0239
8                    857.5     9990.     980.                     0240
8                    858.5     12700.    1030.                    0241
9 ENDTBL                                                          0242
3 STRUCT       04                                                 0243
8                    724.5     0.0       160.                     0244
8                    725.5     62.       190.                     0245
8                    730.      79.       460.                     0246
8                    735.      88.       1000.                    0247
8                    740.      96.       1840.                    0248
8                    741.4     97.       2120.                    0249
8                    742.4     594.      2320.                    0250
8                    743.4     1518.     2540.                    0251
```

Exhibit 45

Machine Listing of Output
(Pages 1 thru 67)

```
8                          744.4      2960.      2700.                                0252
9 ENDTBL                                                                             0253
7 ALTER   3                                                                          0254
6 REACH   3 002    7    5 1200.                                  1      1            0255
6 REACH   3 005    7    5 1.          1.                                            0256
7 INSERT  2 006                                                                      0257
6 SAVMOV  5 006    7    6                                                            0258
6 RESVOR  2     05 6    7 663.                                   1 1 1 1 1          0259
7 UPDATE  1                                                                          0260
7 INCREM  6                0.2                                                       0261
7 COMPUT  7     01 001     0.0        2.5        1.0                 1    2         0262
7 BASFLO  5                10.                                                       0263
7 COMPUT  7 002    002     0.0        2.5        1.0                 1    2         0264
7 BASFLO  5                0.0                                                       0265
7 COMPUT  7     02     04  0.0        2.5        1.0                 1    2         0266
7 COMPUT  7 004    004     0.0        2.5        1.0                 1    2         0267
7 BASFLO  5                5.0                                                       0268
7 COMPUT  7 005    006     0.0        2.5        1.0                 1    2         0269
7 BASFLO  5                26.0                                                      0270
7 COMPUT  7     05 007     0.0        2.5        1.0                 1    2         0271
  ENDCMP  1                                                                          0272
7 COMPUT  7     01     01  0.0        9.2        6.0                 2    2         0273
7 COMPUT  7     02     02  0.0        9.2        6.0                 2    2         0274
  ENDCMP  1                                                                          0275
7 READHD  8      6                                                                   0276
7 READHD  9 0.0            2.0        26.84                                         0277
8           0.0            100.       300.       550.       1350.                   0278
8           1900.          1800.      1200.      950.       700.                    0279
8           500.           300.       225.       250.       700.                    0280
8           1450.          1350.      1100.      925.       550.                    0281
8           625.           575.       525.       500.       600.                    0282
8           1000.          775.       600.       400.       400.                    0283
8           750.           500.       325.       300.       300.                    0284
8           300.           300.       275.       225.       175.                    0285
8           125.           90.        80.        50.        40.                     0286
8           30.            25.        20.        15.        10.                     0287
8           5.             0.0        0.0        0.0        0.0                     0288
9 ENDTBL                                                                             0289
7 INCREM  6                1.0                                                       0290
7 COMPUT  7     05 007     0.0        4.4        1.0                 1    2         0291
  ENDCMP  1                                                                          0292
  ENDJOB  2                                                                          0293
```

* SAMPLE WATERSHED

* XEQ

ENTRY POINTS TO SUBROUTINES REQUESTED FROM LIBRARY,
EXP(3

LOGICAL TAPE	MACHINE TAPE	TOTAL WRITES	TOTAL READS	NOISE RECORDS WRITING	NOISE RECORDS READING	TOTAL REDUNDANCIES WRITING	TOTAL REDUNDANCIES READING	POSITIONING ERRORS
1	A 1	0	23	0	0	0	0	0
5	A 2	0	645	0	0	0	0	0
6	A 3	10	0	0	0	0	0	0
7	B 4	5	1	0	0	0	0	0

BE

EFT PAGE

BE

EXECUTIVE CONTROL CARD, OPERATION LIST

LISTING OF DATA IN CORE

LIBRARY TAPE UNCHANGED

		VELOCITY INCREMENT			
1 CTABLE		0.2000			
8	-0.	0.0800	0.1800	0.2500	0.3200
8	0.3700	0.4100	0.4500	0.4900	0.5100
8	0.5400	0.5700	0.5900	0.6100	0.6300
8	0.6500	0.6600	0.6700	0.6900	0.7000
8	0.7100	0.7200	0.7300	0.7400	0.7500
8	0.7600	0.7700	0.7700	0.7800	0.7900
8	0.7900	0.8000	0.8100	0.8100	0.8200
8	0.8200	0.8300	0.8300	0.8400	0.8400
8	0.8400	0.8500	0.8500	0.8600	0.8600
8	0.8600	0.8600	0.8700	0.8700	0.8700
8	0.8800	0.8800	0.8800	0.8900	0.8900
8	0.8900	0.8900	0.8900	0.8900	0.9000
8	0.9000	0.9000	0.9000	0.9000	0.9100
8	0.9100	0.9100	0.9100	0.9100	0.9100
8	0.9200	0.9200	0.9200	0.9200	0.9200
8	0.9200	0.9200	0.9200	0.9300	0.9300
9 ENDTBL					

	XSECTN NO.	DRAINAGE AREA		
2 XSECTN	1	5.4000		
		ELEVATION	DISCHARGE	END AREA
8		742.0000	0.	0.
8		743.0000	8.0000	20.0000
8		744.0000	20.0000	80.0000
8		746.0000	75.0000	190.0000
8		748.0000	200.0000	350.0000
8		750.0000	450.0000	650.0000
8		752.0000	800.0000	1350.0000
8		754.0000	1400.0000	2450.0000
8		755.0000	1800.0000	3150.0000

```
9 ENDTBL

          XSECTN NO.        DRAINAGE AREA
2 XSECTN      2                 6.2000
                             ELEVATION    DISCHARGE     END AREA
8                            645.0000       0.            0.
8                            646.0000      10.0000       20.0000
8                            648.0000      50.0000       90.0000
8                            650.0000     150.0000      260.0000
8                            652.0000     400.0000      790.0000
8                            654.0000    1100.0000     2230.0000
8                            656.0000    2300.0000     4900.0000
8                            658.0000    3499.9999     7700.0000
9 ENDTBL

          XSECTN NO.        DRAINAGE AREA
2 XSECTN      3                 1.0000
                             ELEVATION    DISCHARGE     END AREA
8                            749.0000       0.            0.
8                            750.0000      81.0000       40.0000
8                            752.0000     306.0000      110.0000
8                            754.0000     585.0000      170.0000
8                            756.0000    1098.0000      300.0000
8                            758.0000    2106.0000      650.0000
8                            760.0000    3843.0000     1270.0000
8                            762.0000    7200.0000     2030.0000
9 ENDTBL

          XSECTN NO.        DRAINAGE AREA
2 XSECTN      7                32.4200
                             ELEVATION    DISCHARGE     END AREA
8                            619.8000       0.            0.
8                            622.0000       7.0000       60.0000
8                            624.0000      15.0000      130.0000
8                            626.0000      23.0000      230.0000
8                            628.0000      33.0000      400.0000
8                            630.0000      46.0000      650.0000
8                            632.0000      62.0000     1150.0000
8                            634.0000     105.0000     1850.0000
8                            636.0000     175.0000     3000.0000
8                            638.0000     280.0000     5700.0000
8                            640.0000    1000.0000    11000.0000
9 ENDTBL

          STRUCT NO.
3 STRUCT      1
                             ELEVATION    DISCHARGE      STORAGE
8                            852.4000       0.           88.0000
```

BE


```
9 ENDTBL


          STRUCT NO.
3 STRUCT        2
                          ELEVATION   DISCHARGE     STORAGE
8                          863.3000      0.        200.0000
9 ENDTBL


          STRUCT NO.
3 STRUCT        3
                          ELEVATION   DISCHARGE     STORAGE
8                          822.8000      0.         50.0000
9 ENDTBL


          STRUCT NO.
3 STRUCT        4
                          ELEVATION   DISCHARGE     STORAGE
8                          724.5000      0.        160.0000
9 ENDTBL


                     TIME INCREMENT
4 DIMHYD                     0.0200
8                 -0.        0.0150      0.0750      0.1600      0.2800
8                  0.4300    0.6000      0.7700      0.8900      0.9700
8                  1.0000    0.9800      0.9200      0.8400      0.7500
8                  0.6600    0.5650      0.4900      0.4200      0.3650
8                  0.3200    0.2790      0.2400      0.2100      0.1800
8                  0.1550    0.1300      0.1130      0.0980      0.0860
8                  0.0750    0.0650      0.0560      0.0470      0.0410
8                  0.0350    0.0300      0.0260      0.0220      0.0190
8                  0.0170    0.0150      0.0130      0.0110      0.0090
8                  0.0070    0.0050      0.0030      0.0020      0.0010
8                 -0.       -0.         -0.         -0.         -0.
9 ENDTBL


                     TIME INCREMENT
5 RAINFL 1                   0.5000
8                 -0.        0.0080      0.0170      0.0260      0.0350
8                  0.0450    0.0550      0.0650      0.0760      0.0870
8                  0.0990    0.1120      0.1250      0.1400      0.1560
8                  0.1740    0.1940      0.2190      0.2540      0.3030
8                  0.5150    0.5830      0.6240      0.6540      0.6820
8                  0.7050    0.7270      0.7480      0.7670      0.7840
8                  0.8000    0.8160      0.8300      0.8440      0.8570
```

```
8                0.8700      0.8820      0.8930      0.9050      0.9160
8                0.9260      0.9360      0.9460      0.9550      0.9650
8                0.9740      0.9830      0.9920      1.0000      1.0000
9 ENDTBL


                    TIME INCREMENT
5 RAINFL 2                  0.0200
8               -0.         0.0100      0.0200      0.0200      0.0300
8                0.0400      0.0500      0.0600      0.0700      0.0800
8                0.1000      0.1100      0.1300      0.1400      0.1700
8                0.1900      0.2200      0.2700      0.3500      0.4400
8                0.5200      0.6000      0.6300      0.6600      0.6800
8                0.7000      0.7200      0.7400      0.7600      0.7700
8                0.7900      0.8000      0.8200      0.8300      0.8400
8                0.8500      0.8700      0.8800      0.8900      0.9000
8                0.9100      0.9200      0.9300      0.9400      0.9500
8                0.9567      0.9633      0.9700      0.9800      0.9900
8                1.0000      1.0000      1.0000      1.0000      1.0000
9 ENDTBL


                    TIME INCREMENT
5 RAINFL 3                  2.0000
8                0.          0.1000      0.7000      1.4000      1.8000
8                2.0000      2.0000      2.1000      2.3000      2.7000
8                3.4000      3.9000      4.0000      4.0000      4.0000
9 ENDTBL
```

```
6 RUNOFF 1      1      6      3.2000     92.0000     2.00001 1    1
6 RESVOR 2      1 6    7    852.4000                       1 1 1 1
6 REACH  3   1    7    5   5432.0000     -0.        -0.    1      1
6 RUNOFF 1   1         6      2.2000     92.0000     1.60001      1
6 ADDHYD 4   1    5 6 7                                   1 1    1
6 REACH  3   2    7    5   2340.0000     -0.        -0.    1 1    1
6 RUNOFF 1   2         6      0.8000     92.0000     0.50001      1
6 ADDHYD 4   2    5 6 7                                   1      1
6 SAVMOV 5   2    7    2
6 RUNOFF 1      2      6      7.2200     85.0000     3.33001 1
6 RESVOR 2      2 6    7    863.3000                       1
6 REACH  3   3    7    5   9370.0000     -0.        -0.    1      1
6 RUNOFF 1   3         6      1.7800     85.0000     1.0000
6 ADDHYD 4   3    5 6 7                                   1      1
6 SAVMOV 5   3    7    3
6 RUNOFF 1      3      6      1.4700     85.0000     1.2000
6 RESVOR 2      3 6    7    822.8000
6 RUNOFF 1 101         6      3.4200     87.0000     2.0000
6 SAVMOV 5      3 7    5
6 ADDHYD 4   3    5 6 7
6 SAVMOV 5   3    7    5
6 SAVMOV 5   3    3    6
6 ADDHYD 4   3    5 6 7                                   1      1
6 REACH  3   4    7    5  10002.0000      0.7200     -0.    1      1
6 RUNOFF 1   4         6      1.8800     87.0000     1.40001      1
6 ADDHYD 4   4    5 6 7                                   1      1
6 SAVMOV 5   4    7    4
6 RUNOFF 1      4      6      4.4700     87.0000     2.50001      1
6 RESVOR 2      4 6    7    730.0000                       1      1
6 SAVMOV 5      4 7    6
6 SAVMOV 5   4    4    5
6 ADDHYD 4   4    5 6 7
6 REACH  3   5    7    5   1320.0000      0.5000     -0.    1 1    1
6 RUNOFF 1   5         6      0.4000     87.0000     0.3000
6 ADDHYD 4   5    5 6 7                                   1      1
6 SAVMOV 5   5    7    6
6 SAVMOV 5   2    2    5
6 ADDHYD 4   6    5 6 7                                   1 1    1
6 REACH  3   7    7    5  12770.0000     -0.        -0.    1 1    1
6 RUNOFF 1   7         6      5.5600     82.0000     2.50001
6 ADDHYD 4   7    5 6 7                                   1 1    1
  ENDATA
```

END OF LISTING

EXECUTIVE CONTROL CARD, OPERATION INCREM, MAIN TIME INCREMENT= 0.20

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 1 TO XSECTN/STRUCT 7/ 0
STARTING TIME= 0. RAIN DEPTH= 2.50 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 1
AREA= 3.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 2.00

COMPUTED CURVE NO.= 92.0

PEAK TIMES 11.14 PEAK DISCHARGES 689.640 PEAK ELEVATIONS (RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
4.00	DISCHG	0.02	0.10	0.29	0.68	1.34	2.31	3.62	5.27	7.22	9.44
6.00	DISCHG	11.88	14.50	17.30	20.30	23.54	27.04	30.79	34.81	39.11	43.73
8.00	DISCHG	48.70	54.11	60.10	66.93	75.06	84.85	96.96	112.00	133.38	169.58
10.00	DISCHG	231.64	322.61	434.61	546.93	634.53	681.81	688.16	662.78	619.10	567.75
12.00	DISCHG	517.07	471.51	431.39	395.72	363.95	335.69	311.42	291.21	273.82	258.75
14.00	DISCHG	245.66	234.21	223.94	214.48	205.67	197.44	189.68	182.46	175.89	170.02
16.00	DISCHG	164.83	160.17	155.89	151.88	148.13	144.66	141.47	138.52	135.82	133.34
18.00	DISCHG	131.01	128.73	126.40	123.96	121.52	119.24	117.28	115.70	114.41	113.17
20.00	DISCHG	111.76	110.12	108.26	106.31	104.45	102.79	101.35	100.04	98.76	97.48
22.00	DISCHG	96.29	95.28	94.49	93.85	93.21	92.48	91.67	90.84	90.04	89.26
24.00	DISCHG	88.43	87.06	84.44	79.90	73.09	64.36	54.70	45.16	36.57	29.28
26.00	DISCHG	23.34	18.62	14.85	11.80	9.34	7.37	5.81	4.60	3.62	2.82
28.00	DISCHG	2.18	1.68	1.28	0.97	0.72	0.53	0.37	0.24	0.14	0.07
30.00	DISCHG	0.03	0.01	0.00	0.	0.	0.	0.	0.		

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 3536.61 ACRE-FT= 292.27

SUBROUTINE RESVOR, STRUCTURE 1
SURFACE ELEVATION= 852.40

NULL STRUCTURE...NO ELEVATIONS GIVEN

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.14	689.640	(NULL)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
4.00	DISCHG	0.02	0.10	0.29	0.68	1.34	2.31	3.62	5.27	7.22	9.44
6.00	DISCHG	11.88	14.50	17.30	20.30	23.54	27.04	30.79	34.81	39.11	43.73
8.00	DISCHG	48.70	54.11	60.10	66.93	75.06	84.85	96.96	112.00	133.38	169.58
10.00	DISCHG	231.64	322.61	434.61	546.93	634.53	681.81	688.16	662.78	619.10	567.75
12.00	DISCHG	517.07	471.51	431.39	395.72	363.95	335.69	311.42	291.21	273.82	258.75
14.00	DISCHG	245.66	234.21	223.94	214.48	205.67	197.44	189.68	182.46	175.89	170.02
16.00	DISCHG	164.83	160.17	155.89	151.88	148.13	144.66	141.47	138.52	135.82	133.34
18.00	DISCHG	131.01	128.73	126.40	123.96	121.52	119.24	117.28	115.70	114.41	113.17
20.00	DISCHG	111.76	110.12	108.26	106.31	104.45	102.79	101.35	100.04	98.76	97.48
22.00	DISCHG	96.29	95.28	94.49	93.85	93.21	92.48	91.67	90.84	90.04	89.26
24.00	DISCHG	88.43	87.06	84.44	79.90	73.09	64.36	54.70	45.16	36.57	29.28
26.00	DISCHG	23.34	18.62	14.85	11.80	9.34	7.37	5.81	4.60	3.62	2.82
28.00	DISCHG	2.18	1.68	1.28	0.97	0.72	0.53	0.37	0.24	0.14	0.07
30.00	DISCHG	0.03	0.01	0.00	0.	0.	0.	0.	0.		

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 3536.61 ACRE-FT= 292.27

SUBROUTINE REACH , CROSS-SECTION 1
LENGTH= 5432.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 2.413 ROUTING COEFF= 0.5913 MODIFIED COEFFICIENT= 0.3837

PEAK TIMES 12.03 PEAK DISCHARGES 632.220 PEAK ELEVATIONS 746.67

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 3536.61 ACRE-FT= 292.27

SUBROUTINE RUNOFF, CROSS-SECTION 1
AREA= 2.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 1.60

COMPUTED CURVE NO.= 92.0

PEAK TIMES 10.87 PEAK DISCHARGES 533.918 PEAK ELEVATIONS (RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7126 CFS-HRS= 2431.58 ACRE-FT= 200.95

SUBROUTINE ADDHYD, CROSS-SECTION 1
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES 11.71 PEAK DISCHARGES 969.579 PEAK ELEVATIONS 747.67

TIME HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 5.40

0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
4.00	DISCHG	0.03	0.12	0.36	0.82	1.58	2.68	4.15	6.03	8.35	11.10
6.00	DISCHG	14.24	17.77	21.70	26.06	30.85	36.03	41.60	47.56	53.98	60.91
8.00	DISCHG	68.35	76.43	85.32	95.37	107.07	120.82	137.37	157.46	185.32	231.80
10.00	DISCHG	310.43	422.68	552.55	674.81	772.10	846.17	902.80	943.85	966.24	967.31
12.00	DISCHG	946.47	907.13	856.10	799.63	742.79	688.04	637.00	590.74	549.38	512.93
14.00	DISCHG	481.05	452.83	427.57	404.93	384.74	366.84	350.94	336.81	324.17	312.68
16.00	DISCHG	302.00	291.90	282.44	273.77	265.93	258.83	252.29	246.25	240.69	235.57
18.00	DISCHG	230.81	226.25	221.77	217.36	213.12	209.26	205.84	202.78	199.83	196.85
20.00	DISCHG	193.80	190.73	187.73	184.85	182.11	179.49	176.93	174.36	171.76	169.23
22.00	DISCHG	166.98	165.10	163.49	161.93	160.31	158.71	157.20	155.85	154.60	153.34
24.00	DISCHG	151.93	149.80	146.15	140.28	132.06	122.21	111.50	100.40	89.01	77.57

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26.00	DISCHG	66.37	55.78	46.19	37.83	30.76	24.85	19.95	15.94	12.68	10.05
28.00	DISCHG	7.94	6.25	4.89	3.81	2.95	2.28	1.76	1.35	1.03	0.77
30.00	DISCHG	0.56	0.39	0.27	0.17	0.11	0.07	0.04	0.03	0.02	0.01
32.00	DISCHG	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 5968.19 ACRE-FT= 493.21

SUBROUTINE REACH , CROSS-SECTION 2
LENGTH= 2340.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 3.554 ROUTING COEFF= 0.6854 MODIFIED COEFFICIENT= 0.8420

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.07	967.172	650.05

HYDROGRAPH, TZERO= 0.13 DELTA T= 0.20 DRAINAGE AREA= 5.40

TIME											
0.13	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.13	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.13	DISCHG	0.00	0.02	0.10	0.32	0.74	1.45	2.48	3.89	5.69	7.93
6.13	DISCHG	10.60	13.67	17.13	20.98	25.25	29.96	35.07	40.57	46.46	52.79
8.13	DISCHG	59.63	66.97	74.93	83.68	93.52	104.93	118.31	134.36	153.81	180.34
10.13	DISCHG	223.67	296.72	402.78	528.08	651.75	753.09	831.46	891.52	935.59	961.39
12.13	DISCHG	966.38	949.61	913.84	865.22	809.99	753.41	698.37	646.70	599.59	557.31
14.13	DISCHG	519.95	487.20	458.26	432.42	409.28	388.62	370.28	354.00	339.53	326.59
16.13	DISCHG	314.88	304.03	293.82	284.24	275.42	267.43	260.19	253.54	247.40	241.75
18.13	DISCHG	236.55	231.72	227.11	222.62	218.19	213.92	209.99	206.50	203.37	200.39
20.13	DISCHG	197.41	194.37	191.30	188.29	185.39	182.63	179.99	177.41	174.84	172.25
22.13	DISCHG	169.71	167.41	165.47	163.80	162.22	160.62	159.01	157.49	156.11	154.84
24.13	DISCHG	153.58	152.19	150.18	146.79	141.31	133.52	123.99	113.48	102.46	91.14

26.13	DISCHG	79.72	68.48	57.78	48.02	39.44	32.13	26.00	20.91	16.73	13.32
28.13	DISCHG	10.57	8.36	6.58	5.16	4.02	3.12	2.41	1.86	1.43	1.09
30.13	DISCHG	0.82	0.60	0.43	0.29	0.19	0.12	0.08	0.05	0.03	0.02
32.13	DISCHG	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 5968.19 ACRE-FT= 493.21

SUBROUTINE RUNOFF, CROSS-SECTION 2
AREA= 0.80 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 0.50

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
10.16	319.113	(RUNOFF)
19.10	27.980	(RUNOFF)
22.10	23.429	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7136 CFS-HRS= 884.71 ACRE-FT= 73.11

SUBROUTINE ADDHYD, CROSS-SECTION 2
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.04	1029.805	650.13

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7127 CFS-HRS= 6852.90 ACRE-FT= 566.32

SUBROUTINE SAVMOV, CROSS-SECTION 2
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 2

SUBROUTINE RUNOFF, STRUCTURE 2
AREA= 7.22 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 3.33

COMPUTED CURVE NO.= 85.0

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PEAK TIMES 12.21 | PEAK DISCHARGES 743.034 | PEAK ELEVATIONS (RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 7.22

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.00	DISCHG	0.	0.	0.	0.00	0.01	0.04	0.14	0.37	0.79	1.51
8.00	DISCHG	2.61	4.22	6.47	9.47	13.42	18.51	25.01	33.36	44.64	62.37
10.00	DISCHG	91.61	135.24	192.62	264.37	348.02	437.99	525.93	603.24	665.65	710.03
12.00	DISCHG	735.19	742.98	736.75	720.41	696.91	669.17	640.00	611.75	584.83	560.34
14.00	DISCHG	537.43	515.73	495.44	476.56	458.36	441.11	424.82	409.94	396.15	383.25
16.00	DISCHG	371.10	359.55	348.61	338.30	328.64	319.59	311.05	303.08	295.59	288.58
18.00	DISCHG	282.11	276.03	270.17	264.51	258.99	253.64	248.46	243.48	238.81	234.50
20.00	DISCHG	230.49	226.74	223.23	219.87	216.57	213.34	210.17	207.08	204.07	201.19
22.00	DISCHG	198.47	195.91	193.51	191.29	189.26	187.38	185.60	183.92	182.30	180.70
24.00	DISCHG	179.09	177.31	174.90	171.60	167.05	160.97	153.19	143.70	132.89	121.22
26.00	DISCHG	109.15	97.19	85.77	75.19	65.61	57.07	49.56	43.08	37.44	32.55
28.00	DISCHG	28.28	24.52	21.21	18.35	15.84	13.67	11.79	10.18	8.79	7.58
30.00	DISCHG	6.52	5.58	4.77	4.06	3.45	2.92	2.47	2.08	1.74	1.45
32.00	DISCHG	1.19	0.97	0.78	0.61	0.46	0.33	0.23	0.14	0.08	0.04
34.00	DISCHG	0.02	0.00	0.00	0.	0.	0.	0.	0.		

SUBROUTINE RESVOR, STRUCTURE 2
SURFACE ELEVATION= 863.30

PEAK TIMES 12.21 | PEAK DISCHARGES 743.034 | PEAK ELEVATIONS (NULL)

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SUBROUTINE REACH ,   CROSS-SECTION   3
LENGTH=   9370.00     INPUT COEFFICIENT= -0.          INPUT ROUTINGS= -0.

          AVERAGE WATER VELOCITY=   3.353       ROUTING COEFF= 0.6677       MODIFIED COEFFICIENT= 0.3463

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
             13.36                        705.743                        754.47

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.1909        CFS-HRS=     5549.05        ACRE-FT=     458.57


SUBROUTINE RUNOFF,   CROSS-SECTION   3
AREA=   1.78     INPUT RUNOFF CURVE=  85.0     TIME OF CONCENTRATION=  1.00

          COMPUTED CURVE NO.=  85.0


SUBROUTINE ADDHYD,   CROSS-SECTION   3
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
             10.61                        387.034                        752.58
             13.31                        797.880                        754.83

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.1909        CFS-HRS=     6917.42        ACRE-FT=     571.66


SUBROUTINE SAVMOV,   CROSS-SECTION   3
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 3


SUBROUTINE RUNOFF,   STRUCTURE  3
AREA=   1.47     INPUT RUNOFF CURVE=  85.0     TIME OF CONCENTRATION=  1.20

          COMPUTED CURVE NO.=  85.0


SUBROUTINE RESVOR,   STRUCTURE  3
SURFACE ELEVATION=  822.80


SUBROUTINE RUNOFF,   CROSS-SECTION 101
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AREA= 3.42 INPUT RUNOFF CURVE= 87.0 TIME OF CONCENTRATION= 2.00

COMPUTED CURVE NO.= 87.0

SUBROUTINE SAVMOV, STRUCTURE 3
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

SUBROUTINE ADDHYD, CROSS-SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

SUBROUTINE SAVMOV, CROSS-SECTION 3
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

SUBROUTINE SAVMOV, CROSS-SECTION 3
INPUT HYDROGRAPH= 3 OUTPUT HYDROGRAPH= 6

SUBROUTINE ADDHYD, CROSS-SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.05	1126.069	756.06
12.82	1165.287	756.13

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.2244 CFS-HRS= 10976.06 ACRE-FT= 907.06

SUBROUTINE REACH , CROSS-SECTION 4
LENGTH= 10002.00 INPUT COEFFICIENT= 0.7200 INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 4.200 ROUTING COEFF= 0.7200 MODIFIED COEFFICIENT= 0.4141

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
13.72	1154.829	(NULL)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.2244 CFS-HRS= 10976.06 ACRE-FT= 907.06

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SUBROUTINE RUNOFF,   CROSS-SECTION   4
AREA=   1.88     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  1.40

          COMPUTED CURVE NO.=  87.0

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             10.78                        356.637                      (RUNOFF)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.3261        CFS-HRS=     1608.96        ACRE-FT=     132.96


SUBROUTINE ADDHYD,   CROSS-SECTION   4
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.99                       1268.654                      (NULL)
             13.59                       1265.380                      (NULL)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.2366        CFS-HRS=    12585.02        ACRE-FT=    1040.03


SUBROUTINE SAVMOV,   CROSS-SECTION   4
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 4


SUBROUTINE RUNOFF,   STRUCTURE  4
AREA=   4.47     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  2.50

          COMPUTED CURVE NO.=  87.0

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.55                        623.575                      (RUNOFF)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.3265        CFS-HRS=     3826.59        ACRE-FT=     316.23


SUBROUTINE RESVOR,   STRUCTURE  4
SURFACE ELEVATION=  730.00

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.55                        623.575                      (NULL)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.3265        CFS-HRS=     3826.59        ACRE-FT=     316.23
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SUBROUTINE SAVMOV, STRUCTURE 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

SUBROUTINE SAVMOV, CROSS-SECTION 4
INPUT HYDROGRAPH= 4 OUTPUT HYDROGRAPH= 5

SUBROUTINE ADDHYD, CROSS-SECTION 4
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

SUBROUTINE REACH , CROSS-SECTION 5
LENGTH= 1320.00 INPUT COEFFICIENT= 0.5000 INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 1.800 ROUTING COEFF= 0.5000 MODIFIED COEFFICIENT= 0.7436

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.17	1863.092	(NULL)

HYDROGRAPH, TZERO= 0.10 DELTA T= 0.20 DRAINAGE AREA= 20.24

TIME											
0.10	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.10	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.10	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.10	DISCHG	0.00	0.01	0.08	0.32	0.86	1.84	3.39	5.62	8.65	12.63
8.10	DISCHG	17.78	24.29	32.40	42.35	54.43	69.10	86.93	108.86	136.17	173.43
10.10	DISCHG	232.99	332.78	480.30	669.03	888.92	1129.77	1370.80	1581.12	1735.27	1825.60
12.10	DISCHG	1860.52	1854.37	1823.24	1781.92	1741.71	1708.16	1682.72	1662.96	1645.54	1627.34
14.10	DISCHG	1606.05	1580.78	1551.29	1517.18	1478.72	1436.65	1392.07	1346.28	1300.47	1255.62
16.10	DISCHG	1212.40	1171.15	1132.05	1095.00	1059.86	1026.45	994.73	964.86	936.97	911.05
18.10	DISCHG	886.92	864.45	843.36	823.40	804.35	786.12	768.79	752.42	737.05	722.77
20.10	DISCHG	709.59	697.27	685.46	673.83	662.24	650.69	639.34	628.37	617.88	607.92
22.10	DISCHG	598.60	590.00	582.00	574.47	567.39	560.84	554.76	548.94	543.24	537.62

24.10	DISCHG	532.07	526.53	520.35	512.25	501.01	485.95	466.57	442.60	414.61	384.22
26.10	DISCHG	353.47	323.96	296.64	271.88	249.61	229.43	210.84	193.39	176.77	160.83
28.10	DISCHG	145.51	130.90	117.10	104.17	92.20	81.23	71.29	62.38	54.44	47.40
30.10	DISCHG	41.20	35.74	30.94	26.75	23.08	19.90	17.15	14.77	12.73	10.97
32.10	DISCHG	9.44	8.13	6.99	6.00	5.13	4.39	3.74	3.18	2.69	2.27
34.10	DISCHG	1.91	1.59	1.31	1.07	0.87	0.69	0.54	0.41	0.31	0.23
36.10	DISCHG	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01	0.01	0.01
38.10	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.2564 CFS-HRS= 16411.61 ACRE-FT= 1356.26

SUBROUTINE RUNOFF, CROSS-SECTION 5
AREA= 0.40 INPUT RUNOFF CURVE= 87.0 TIME OF CONCENTRATION= 0.30

COMPUTED CURVE NO.= 87.0

SUBROUTINE ADDHYD, CROSS-SECTION 5
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.18	1882.949	(NULL)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.2580 CFS-HRS= 16757.47 ACRE-FT= 1384.84

SUBROUTINE SAVMOV, CROSS-SECTION 5
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

SUBROUTINE SAVMOV, CROSS-SECTION 2
INPUT HYDROGRAPH= 2 OUTPUT HYDROGRAPH= 5

SUBROUTINE ADDHYD, CROSS-SECTION 6
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS

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12.12 2909.686 (NULL)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 26.84

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.01
4.00	DISCHG	0.14	0.50	1.06	1.81	2.80	4.08	5.71	7.77	10.17	12.92
6.00	DISCHG	16.13	20.11	24.93	30.24	36.22	42.97	50.94	60.28	70.70	82.66
8.00	DISCHG	96.11	112.55	132.19	155.01	183.36	215.52	256.27	306.39	402.71	592.73
10.00	DISCHG	825.76	962.05	1067.25	1275.76	1551.61	1859.76	2166.91	2443.38	2668.29	2821.60
12.00	DISCHG	2899.27	2905.54	2856.75	2776.17	2681.86	2587.71	2500.72	2422.88	2352.85	2287.51
14.00	DISCHG	2225.41	2164.00	2102.48	2041.02	1978.28	1914.62	1850.94	1788.00	1725.74	1664.47
16.00	DISCHG	1606.02	1551.39	1500.17	1451.55	1405.06	1361.28	1320.50	1282.47	1246.65	1212.72
18.00	DISCHG	1181.22	1151.53	1123.50	1098.01	1074.74	1052.60	1030.34	1008.67	988.42	969.20
20.00	DISCHG	951.36	935.03	919.67	904.81	890.20	875.78	860.80	845.74	832.13	820.07
22.00	DISCHG	808.75	796.98	785.44	775.21	766.00	757.49	749.51	741.98	734.33	726.27
24.00	DISCHG	718.41	704.30	686.07	670.36	653.78	633.05	606.83	575.04	538.28	497.93
26.00	DISCHG	456.00	414.51	375.04	338.63	305.77	276.42	250.14	226.37	204.58	184.40
28.00	DISCHG	165.60	148.08	131.82	116.81	103.03	90.50	79.21	69.13	60.18	52.29
30.00	DISCHG	45.35	39.25	33.92	29.26	25.20	21.69	18.66	16.05	13.81	11.89
32.00	DISCHG	10.23	8.81	7.57	6.50	5.57	4.77	4.07	3.46	2.94	2.48
34.00	DISCHG	2.09	1.75	1.45	1.20	0.97	0.78	0.61	0.48	0.36	0.27
36.00	DISCHG	0.20	0.14	0.10	0.07	0.05	0.03	0.02	0.02	0.01	0.01
38.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.3630 CFS-HRS= 23610.36 ACRE-FT= 1951.16

SUBROUTINE REACH , CROSS-SECTION 7
LENGTH= 12770.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 1.868 ROUTING COEFF= 0.5202 MODIFIED COEFFICIENT= 0.1381

PEAK TIMES PEAK DISCHARGES PEAK ELEVATIONS

14.72 2343.084 632.48

HYDROGRAPH, TZERO= 0.99 DELTA T= 0.20 DRAINAGE AREA= 26.84

TIME											
0.99	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.99	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.99	DISCHG	0.00	0.02	0.09	0.22	0.44	0.77	1.23	1.85	2.66	3.70
6.99	DISCHG	4.97	6.52	8.39	10.68	13.38	16.53	20.19	24.44	29.39	35.09
8.99	DISCHG	41.66	49.18	57.94	68.20	80.19	94.44	111.17	131.21	155.41	189.57
10.99	DISCHG	245.26	325.45	413.39	503.71	610.36	740.38	895.01	1070.70	1260.32	1454.81
12.99	DISCHG	1643.62	1817.07	1967.43	2090.27	2185.02	2253.65	2299.80	2327.55	2340.72	2342.40
14.99	DISCHG	2334.81	2319.70	2298.19	2271.16	2239.37	2203.30	2163.42	2120.26	2074.36	2026.20
16.99	DISCHG	1976.24	1925.09	1873.47	1821.91	1770.75	1720.23	1670.65	1622.28	1575.34	1529.94
18.99	DISCHG	1486.12	1444.00	1403.60	1364.91	1328.04	1293.05	1259.83	1228.13	1197.82	1168.89
20.99	DISCHG	1141.31	1115.07	1090.20	1066.64	1044.29	1023.00	1002.66	983.07	964.10	945.87
22.99	DISCHG	928.49	911.95	896.07	880.79	866.20	852.36	839.26	826.86	815.13	803.97
24.99	DISCHG	793.24	782.90	772.04	760.17	747.76	734.78	720.73	704.99	687.04	666.49
26.99	DISCHG	643.21	617.35	589.33	559.73	529.18	498.32	467.67	437.62	408.44	380.28
28.99	DISCHG	353.22	327.31	302.55	278.96	256.56	235.36	215.35	196.54	178.94	162.54
30.99	DISCHG	147.31	133.22	120.24	108.32	97.40	87.42	78.34	70.10	62.63	55.89
32.99	DISCHG	49.81	44.34	39.43	35.03	31.09	27.57	24.42	21.61	19.10	16.87
34.99	DISCHG	14.88	13.11	11.54	10.15	8.91	7.82	6.84	5.98	5.22	4.55
36.99	DISCHG	3.96	3.44	2.98	2.59	2.24	1.94	1.67	1.44	1.25	1.08
38.99	DISCHG	0.93	0.80	0.69	0.60	0.51	0.44	0.38	0.33	0.28	0.24

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.3630 CFS-HRS= 23610.06 ACRE-FT= 1951.14

SUBROUTINE RUNOFF, CROSS-SECTION 7
AREA= 5.56 INPUT RUNOFF CURVE= 82.0 TIME OF CONCENTRATION= 2.50

COMPUTED CURVE NO.= 82.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS (RUNOFF)
11.66	539.655	

SUBROUTINE ADDHYD, CROSS-SECTION 7
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES 14.54 PEAK DISCHARGES 2620.992 PEAK ELEVATIONS 632.88

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 32.40

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.00	DISCHG	0.	0.	0.	0.	0.00	0.00	0.02	0.10	0.24	0.46
6.00	DISCHG	0.79	1.26	1.89	2.73	3.78	5.07	6.63	8.53	10.84	13.59
8.00	DISCHG	16.85	20.77	25.57	31.56	39.06	48.44	60.19	75.06	94.83	124.18
10.00	DISCHG	170.15	236.23	322.65	427.71	547.85	681.16	820.27	944.51	1049.14	1153.44
12.00	DISCHG	1269.15	1401.84	1552.18	1716.74	1887.08	2053.10	2204.70	2334.46	2438.30	2515.72
14.00	DISCHG	2569.08	2602.09	2618.03	2620.36	2611.84	2594.56	2570.33	2540.29	2505.39	2466.42
16.00	DISCHG	2423.85	2378.08	2329.33	2278.07	2224.70	2169.71	2113.86	2057.90	2002.41	1947.71
18.00	DISCHG	1894.07	1841.58	1790.41	1740.69	1692.52	1646.04	1601.43	1558.82	1518.21	1479.63
20.00	DISCHG	1442.99	1408.04	1374.46	1342.12	1311.13	1281.52	1253.37	1226.70	1201.48	1177.57
22.00	DISCHG	1154.83	1133.15	1112.36	1092.35	1073.21	1054.96	1037.54	1020.76	1004.57	989.08
24.00	DISCHG	974.29	959.84	945.12	929.62	912.82	894.32	874.35	852.77	829.84	806.88
26.00	DISCHG	784.31	761.85	738.90	714.92	689.31	661.80	632.37	601.37	569.30	536.74
28.00	DISCHG	504.23	472.27	441.14	411.07	382.17	354.51	328.12	302.98	279.09	256.46
30.00	DISCHG	235.07	214.92	196.01	178.32	161.87	146.61	132.52	119.56	107.67	96.79
32.00	DISCHG	86.87	77.84	69.65	62.22	55.52	49.48	44.05	39.17	34.80	30.88
34.00	DISCHG	27.38	24.25	21.46	18.97	16.75	14.77	13.02	11.46	10.08	8.85
36.00	DISCHG	7.76	6.79	5.94	5.18	4.52	3.93	3.41	2.96	2.56	2.22
38.00	DISCHG	1.92	1.66	1.43	1.24	1.07	0.92	0.79	0.68	0.59	0.51

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.3024 CFS-HRS= 27232.79 ACRE-FT= 2250.52

ENDCMP

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 1 TO XSECTN/STRUCT 2/ 0
STARTING TIME= 0. RAIN DEPTH= 1.00 RAIN DURATION= 1.00 RAIN TABLE NO.= 3 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 1
AREA= 3.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 2.00

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
6.66	498.268	(RUNOFF)
20.61	633.967	(RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.13	0.99	3.74	9.99	21.33	38.64	61.77	89.60
4.00	DISCHG	120.56	153.40	187.39	222.23	257.86	293.89	329.44	363.56	395.42	424.61
6.00	DISCHG	451.05	473.43	489.74	497.75	496.04	485.48	469.22	450.85	433.51	418.71
8.00	DISCHG	406.92	396.97	386.65	373.59	356.44	335.48	312.72	290.49	270.49	253.51
10.00	DISCHG	239.70	227.76	215.51	200.61	181.68	159.03	134.64	110.88	89.57	71.49
12.00	DISCHG	56.80	45.66	38.24	34.77	35.47	39.77	46.38	53.94	61.14	67.41
14.00	DISCHG	72.60	77.28	82.47	89.27	98.29	109.36	121.39	133.20	143.88	153.01
16.00	DISCHG	160.55	167.65	176.25	188.43	205.45	226.87	250.56	274.06	295.36	313.61
18.00	DISCHG	328.62	342.28	357.69	378.19	405.82	439.96	477.37	514.30	547.76	576.45
20.00	DISCHG	600.10	618.10	629.68	633.91	630.09	619.23	603.95	587.10	571.29	557.69
22.00	DISCHG	546.61	535.68	520.98	498.28	465.05	422.28	374.61	327.27	284.43	247.91
24.00	DISCHG	218.07	193.76	172.87	153.23	133.65	113.89	94.75	77.29	62.06	49.28
26.00	DISCHG	38.93	30.74	24.27	19.07	14.90	11.57	8.90	6.80	5.12	3.80
28.00	DISCHG	2.81	2.10	1.58	1.20	0.90	0.66	0.46	0.30	0.18	0.09
30.00	DISCHG	0.04	0.01	0.	0.	0.	0.	0.	0.	0.	0.
32.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

36.00	DISCHG	0.	0.	0.

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1532 CFS-HRS= 6511.91 ACRE-FT= 538.14

SUBROUTINE RESVOR, STRUCTURE 1
SURFACE ELEVATION= 852.40

NULL STRUCTURE...NO ELEVATIONS GIVEN

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
6.66	498.268	(NULL)
20.61	633.967	(NULL)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.13	0.99	3.74	9.99	21.33	38.64	61.77	89.60
4.00	DISCHG	120.56	153.40	187.39	222.23	257.86	293.89	329.44	363.56	395.42	424.61
6.00	DISCHG	451.05	473.43	489.74	497.75	496.04	485.48	469.22	450.85	433.51	418.71
8.00	DISCHG	406.92	396.97	386.65	373.59	356.44	335.48	312.72	290.49	270.49	253.51
10.00	DISCHG	239.70	227.76	215.51	200.61	181.68	159.03	134.64	110.88	89.57	71.49
12.00	DISCHG	56.80	45.66	38.24	34.77	35.47	39.77	46.38	53.94	61.14	67.41
14.00	DISCHG	72.60	77.28	82.47	89.27	98.29	109.36	121.39	133.20	143.88	153.01
16.00	DISCHG	160.55	167.65	176.25	188.43	205.45	226.87	250.56	274.06	295.36	313.61
18.00	DISCHG	328.62	342.28	357.69	378.19	405.82	439.96	477.37	514.30	547.76	576.45
20.00	DISCHG	600.10	618.10	629.68	633.91	630.09	619.23	603.95	587.10	571.29	557.69
22.00	DISCHG	546.61	535.68	520.98	498.28	465.05	422.28	374.61	327.27	284.43	247.91
24.00	DISCHG	218.07	193.76	172.87	153.23	133.65	113.89	94.75	77.29	62.06	49.28
26.00	DISCHG	38.93	30.74	24.27	19.07	14.90	11.57	8.90	6.80	5.12	3.80
28.00	DISCHG	2.81	2.10	1.58	1.20	0.90	0.66	0.46	0.30	0.18	0.09
30.00	DISCHG	0.04	0.01	0.	0.	0.	0.	0.	0.	0.	0.
32.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36.00	DISCHG	0.	0.	0.							

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1532 CFS-HRS= 6511.91 ACRE-FT= 538.14

SUBROUTINE REACH , CROSS-SECTION 1
LENGTH= 5432.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 2.285 ROUTING COEFF= 0.5785 MODIFIED COEFFICIENT= 0.3639

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
7.57	480.400	746.22
21.51	618.043	746.63

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1532 CFS-HRS= 6511.91 ACRE-FT= 538.14

SUBROUTINE RUNOFF, CROSS-SECTION 1
AREA= 2.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 1.60

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
6.43	359.480	(RUNOFF)
20.37	450.735	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1534 CFS-HRS= 4477.23 ACRE-FT= 370.00

SUBROUTINE ADDHYD, CROSS-SECTION 1
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
7.08	779.164	747.11
21.03	1015.214	747.81

TIME HYDROGRAPH, TZERO= 0. DELTA Y= 0.20 DRAINAGE AREA= 5.40

0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.16	1.22	4.64	12.25	25.49	44.84	70.04	100.58
4.00	DISCHG	135.96	176.09	221.03	270.63	324.07	379.66	435.76	491.20	545.33	597.61
6.00	DISCHG	647.61	693.15	730.83	757.64	772.74	778.63	778.09	772.78	763.16	749.97
8.00	DISCHG	734.20	716.10	695.27	670.89	643.07	613.45	583.72	554.70	526.29	498.62

10.00	DISCHG	471.98	445.75	418.59	389.07	356.87	323.51	290.52	258.62	227.63	197.60
12.00	DISCHG	168.80	142.46	120.41	104.10	93.92	88.67	87.03	88.11	91.50	96.73
14.00	DISCHG	103.29	111.10	120.52	132.09	145.81	160.79	176.09	191.23	206.20	220.89
16.00	DISCHG	235.14	249.85	266.77	287.61	312.81	340.67	369.43	398.18	426.94	455.50
18.00	DISCHG	483.45	511.98	543.46	580.37	623.27	669.66	716.89	763.64	810.02	855.73
20.00	DISCHG	900.23	941.11	974.78	998.36	1011.01	1015.03	1012.96	1006.41	996.00	982.56
22.00	DISCHG	967.00	947.99	922.41	886.96	841.05	788.46	733.17	677.30	620.95	564.71
24.00	DISCHG	509.49	456.25	405.81	358.31	313.95	273.19	236.38	203.47	173.88	147.22
26.00	DISCHG	123.27	101.95	83.36	67.52	54.37	43.58	34.77	27.61	21.80	17.11
28.00	DISCHG	13.35	10.32	7.90	6.00	4.54	3.43	2.60	1.98	1.49	1.11
30.00	DISCHG	0.81	0.58	0.40	0.27	0.17	0.11	0.07	0.04	0.03	0.02
32.00	DISCHG	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1533 CFS-HRS= 10989.14 ACRE-FT= 908.14

SUBROUTINE REACH , CROSS-SECTION 2
LENGTH= 2340.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 3.547 ROUTING COEFF= 0.6847 MODIFIED COEFFICIENT= 0.8412

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
7.46	778.273	649.51
21.40	1014.594	650.11

HYDROGRAPH, TZERO= 0.13 DELTA T= 0.20 DRAINAGE AREA= 5.40

TIME											
0.13	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.13	DISCHG	0.	0.	0.	0.13	1.05	4.07	10.95	23.18	41.40	65.49
4.13	DISCHG	95.00	129.46	168.68	212.71	261.43	314.12	369.26	425.20	480.72	535.07
6.13	DISCHG	587.68	638.09	684.40	723.45	752.22	769.48	777.18	777.94	773.60	764.82
8.13	DISCHG	752.33	737.08	719.43	699.11	675.37	648.20	618.97	589.32	560.19	531.67

10.13	DISCHG	503.87	477.05	450.72	423.69	394.57	362.86	329.76	296.75	264.68	233.51
12.13	DISCHG	203.30	174.28	147.51	124.71	107.37	96.05	89.84	87.47	88.01	90.95
14.13	DISCHG	95.81	102.10	109.67	118.80	129.98	143.29	158.01	173.22	188.37	203.37
16.13	DISCHG	218.11	232.43	247.09	263.64	283.81	308.20	335.51	364.04	392.76	421.51
18.13	DISCHG	450.10	478.16	506.61	537.61	573.58	615.38	661.04	708.02	754.81	801.25
20.13	DISCHG	847.08	891.79	933.28	968.19	993.57	1008.24	1013.95	1013.12	1007.47	997.82
22.13	DISCHG	984.98	969.86	951.47	927.02	893.32	849.35	798.13	743.49	687.81	631.57
24.13	DISCHG	575.33	519.95	466.37	415.43	367.38	322.43	281.01	243.47	209.82	179.59
26.13	DISCHG	152.36	127.89	106.07	86.96	70.61	56.95	45.70	36.50	29.02	22.95
28.13	DISCHG	18.04	14.09	10.92	8.38	6.38	4.83	3.66	2.77	2.10	1.59
30.13	DISCHG	1.19	0.87	0.63	0.44	0.29	0.19	0.12	0.08	0.05	0.03
32.13	DISCHG	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
34.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38.13	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1533 CFS-HRS= 10989.14 ACRE-FT= 908.14

SUBROUTINE RUNOFF, CROSS-SECTION 2
AREA= 0.80 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 0.50

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
5.95	146.101	(RUNOFF)
7.91	91.541	(RUNOFF)
9.90	47.522	(RUNOFF)
19.91	174.796	(RUNOFF)
21.90	127.666	(RUNOFF)
23.90	25.724	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1552 CFS-HRS= 1629.00 ACRE-FT= 134.62

SUBROUTINE ADDHYD, CROSS-SECTION 2
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
7.47	867.699	649.80
21.40	1139.292	650.27

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1535 CFS-HRS= 12618.15 ACRE-FT= 1042.76

SUBROUTINE SAVMOV, CROSS-SECTION 2
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 2

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 2 TO XSECTN/STRUCT 3/ 0
STARTING TIME= 0.25 RAIN DEPTH= 1.00 RAIN DURATION= 1.00 RAIN TABLE NO.= 3 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 2
AREA= 7.22 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 3.33

COMPUTED CURVE NO.= 85.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
8.51	635.031	(RUNOFF)
21.90	1148.313	(RUNOFF)

HYDROGRAPH, TZERO= 0.25 DELTA T= 0.20 DRAINAGE AREA= 7.22

TIME											
0.25	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.25	DISCHG	0.	0.	0.	0.	0.	0.03	0.26	1.07	2.97	6.62
4.25	DISCHG	12.79	22.36	36.26	55.10	79.27	108.90	143.82	183.57	227.42	274.50
6.25	DISCHG	323.90	374.26	423.45	469.96	512.19	548.73	578.49	600.91	616.68	626.81
8.25	DISCHG	632.52	634.89	634.29	631.17	625.46	616.87	605.15	590.31	572.77	553.40
10.25	DISCHG	532.92	511.88	490.24	468.16	445.09	420.59	394.17	365.77	335.70	304.76
12.25	DISCHG	273.62	243.38	215.45	190.81	170.02	153.57	141.63	134.26	130.57	129.87
14.25	DISCHG	131.30	134.22	138.53	144.12	151.03	159.49	169.63	181.50	194.77	208.92
16.25	DISCHG	223.54	238.46	254.24	271.14	289.85	311.03	335.20	362.53	392.47	424.11
18.25	DISCHG	456.56	489.35	523.11	558.10	595.33	635.80	680.43	729.45	782.11	837.02
20.25	DISCHG	892.84	947.53	998.32	1043.35	1081.27	1110.97	1131.85	1143.75	1148.31	1146.92
22.25	DISCHG	1141.38	1132.53	1119.33	1101.28	1077.33	1046.04	1006.47	958.36	903.35	843.77
24.25	DISCHG	781.84	719.86	659.63	602.48	548.65	498.13	450.67	406.19	364.11	324.63
26.25	DISCHG	287.55	253.02	221.46	193.18	167.92	145.71	126.30	109.63	95.11	82.44
28.25	DISCHG	71.31	61.48	52.82	45.26	38.69	33.03	28.12	23.93	20.32	17.22
30.25	DISCHG	14.54	12.22	10.18	8.40	6.85	5.53	4.40	3.47	2.71	2.13
32.25	DISCHG	1.67	1.31	1.03	0.81	0.61	0.44	0.31	0.20	0.11	0.06
34.25	DISCHG	0.03	0.01	0.00	0.	0.	0.	0.	0.	0.	0.

36.25	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38.25	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SUBROUTINE RESVOR, STRUCTURE 2
SURFACE ELEVATION= 863.30

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
8.51	635.031	(NULL)
21.90	1148.313	(NULL)

SUBROUTINE REACH , CROSS-SECTION 3
LENGTH= 9370.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 3.554 ROUTING COEFF= 0.6854 MODIFIED COEFFICIENT= 0.3692

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
9.63	626.667	754.16
23.04	1133.990	756.07

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.4837 CFS-HRS= 11573.10 ACRE-FT= 956.40

SUBROUTINE RUNOFF, CROSS-SECTION 3
AREA= 1.78 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 1.00

COMPUTED CURVE NO.= 85.0

SUBROUTINE ADDHYD, CROSS-SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
8.84	731.542	754.57
22.47	1361.469	756.52

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.4838 CFS-HRS= 14426.98 ACRE-FT= 1192.25

SUBROUTINE SAVMOV, CROSS-SECTION 3
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 3

ENDCMP

CROSS-SECTION DATA, CROSS-SECTION NO. 7 DRAINAGE AREA= 32.42

	ELEVATION	DISCHARGE	END AREA
8	620.0000	0.	0.
8	622.0000	7.0000	60.0000
8	624.0000	15.0000	130.0000
8	626.0000	23.0000	230.0000
8	628.0000	35.0000	400.0000
8	630.0000	75.0000	750.0000
8	632.0000	110.0000	1250.0000
8	634.0000	190.0000	1950.0000
8	636.0000	250.0000	3100.0000
8	638.0000	410.0000	5800.0000
8	640.0000	1000.0000	11000.0000

STRUCTURE DATA, STRUCTURE NO. 5

	ELEVATION	DISCHARGE	STORAGE
8	663.0000	0.	200.0000
8	664.0000	58.0000	250.0000
8	668.0000	256.0000	375.0000
8	672.0000	300.0000	575.0000
8	676.0000	352.0000	860.0000
8	680.0000	371.0000	1225.0000
8	684.0000	396.0000	1650.0000
8	688.0000	418.0000	2200.0000
8	690.4000	440.0000	2575.0000
8	691.4000	1286.0000	2740.0000
8	692.4000	3440.0000	2900.0000
8	693.4000	6802.0000	3075.0000
8	694.4000	10950.0000	3250.0000
8	695.4000	15677.0000	3425.0000
8	696.4000	21034.0000	3600.0000

STRUCTURE DATA, STRUCTURE NO. 1

	ELEVATION	DISCHARGE	STORAGE
8	852.4000	0.	88.0000
8	852.7000	6.0000	96.0000
8	853.1000	20.0000	105.0000
8	853.5000	43.0000	125.0000
8	856.0000	47.0000	175.0000
8	860.0000	54.0000	325.0000
8	864.0000	59.0000	525.0000
8	868.0000	65.0000	775.0000
8	872.0000	69.0000	1100.0000
8	874.3000	72.0000	1290.0000
8	875.3000	294.0000	1400.0000
8	876.3000	705.0000	1500.0000
8	877.3000	1346.0000	1625.0000
8	878.3000	2137.0000	1725.0000

8	879.3000	3038.0000	1850.0000

STRUCTURE DATA, STRUCTURE NO. 2

	ELEVATION	DISCHARGE	STORAGE
8	863.3000	0.	200.0000
8	864.6000	76.0000	240.0000
8	872.0000	95.0000	575.0000
8	880.0000	110.0000	1225.0000
8	884.0000	119.0000	1650.0000
8	888.0000	125.0000	2200.0000
8	890.4000	129.0000	2575.0000
8	891.4000	1286.0000	2740.0000
8	892.4000	3440.0000	2900.0000
8	893.4000	6802.0000	3075.0000
8	894.4000	10950.0000	3250.0000
8	895.4000	15677.0000	3425.0000
8	896.4000	21034.0000	3600.0000

STRUCTURE DATA, STRUCTURE NO. 3

	ELEVATION	DISCHARGE	STORAGE
8	822.8000	0.	50.0000
8	827.1000	13.0000	90.0000
8	835.1000	22.0000	200.0000
8	849.1000	33.0000	600.0000
8	851.5000	34.0000	690.0000
8	852.5000	585.0000	740.0000
8	853.5000	1610.0000	780.0000
8	854.5000	3210.0000	830.0000
8	855.5000	5186.0000	870.0000
8	856.5000	7437.0000	920.0000
8	857.5000	9990.0000	980.0000
8	858.5000	12700.0000	1030.0000

STRUCTURE DATA, STRUCTURE NO. 4

	ELEVATION	DISCHARGE	STORAGE
8	724.5000	0.	160.0000
8	725.5000	62.0000	190.0000
8	730.0000	79.0000	460.0000
8	735.0000	88.0000	1000.0000
8	740.0000	96.0000	1840.0000
8	741.4000	97.0000	2120.0000
8	742.4000	594.0000	2320.0000
8	743.4000	1518.0000	2540.0000
8	744.4000	2960.0000	2700.0000

CHANGES TO STANDARD CONTROL LIST FOLLOW

EXECUTIVE CONTROL CARD, OPERATION ALTER

```
STANDARD CONTROL CARD,  SUBROUTINE REACH ,     CROSS-SECTION=   2     STRUCTURE=  0
IN1 HYD=7     IN2 HYD=0     OUT HYD=5     DATA FIELDS=      1200.0000     -0.          -0.
OUTPUT OPTION= 1 0 0 1 0 0     ID=     0255

STANDARD CONTROL CARD,  SUBROUTINE REACH ,     CROSS-SECTION=   5     STRUCTURE=  0
IN1 HYD=7     IN2 HYD=0     OUT HYD=5     DATA FIELDS=         1.0000      1.0000      -0.
OUTPUT OPTION= 0 0 0 0 0 0     ID=     0256
```

EXECUTIVE CONTROL CARD, OPERATION INSERT, XSECTN/STRUCT= 6/ 0

```
STANDARD CONTROL CARD,  SUBROUTINE SAVMOV,     CROSS-SECTION=   6     STRUCTURE=  0
IN1 HYD=7     IN2 HYD=0     OUT HYD=6     DATA FIELDS=         -0.         -0.          -0.
OUTPUT OPTION= 0 0 0 0 0 0     ID=     0258

STANDARD CONTROL CARD,  SUBROUTINE RESVOR,     CROSS-SECTION=   0     STRUCTURE=  5
IN1 HYD=6     IN2 HYD=0     OUT HYD=7     DATA FIELDS=       663.0000     -0.          -0.
OUTPUT OPTION= 1 1 1 1 1 0     ID=     0259
```

(Pages 37 thru 42 excluded. They were a re-listing of the data on library tape.)

EXECUTIVE CONTROL CARD, OPERATION INCREM, MAIN TIME INCREMENT= 0.20

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 1 TO XSECTN/STRUCT 1/ 0
STARTING TIME= 0. RAIN DEPTH= 2.50 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 1
AREA= 3.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 2.00

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.14	689.640	(RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
4.00	DISCHG	0.02	0.10	0.29	0.68	1.34	2.31	3.62	5.27	7.22	9.44
6.00	DISCHG	11.88	14.50	17.30	20.30	23.54	27.04	30.79	34.81	39.11	43.73
8.00	DISCHG	48.70	54.11	60.10	66.93	75.06	84.85	96.96	112.00	133.38	169.58
10.00	DISCHG	231.64	322.61	434.61	546.93	634.53	681.81	688.16	662.78	619.10	567.75
12.00	DISCHG	517.07	471.51	431.39	395.72	363.95	335.69	311.42	291.21	273.82	258.75
14.00	DISCHG	245.66	234.21	223.94	214.48	205.67	197.44	189.68	182.46	175.89	170.02
16.00	DISCHG	164.83	160.17	155.89	151.88	148.13	144.66	141.47	138.52	135.82	133.34
18.00	DISCHG	131.01	128.73	126.40	123.96	121.52	119.24	117.28	115.70	114.41	113.17
20.00	DISCHG	111.76	110.12	108.26	106.31	104.45	102.79	101.35	100.04	98.76	97.48
22.00	DISCHG	96.29	95.28	94.49	93.85	93.21	92.48	91.67	90.84	90.04	89.26
24.00	DISCHG	88.43	87.06	84.44	79.90	73.09	64.36	54.70	45.16	36.57	29.28
26.00	DISCHG	23.34	18.62	14.85	11.80	9.34	7.37	5.81	4.60	3.62	2.82
28.00	DISCHG	2.18	1.68	1.28	0.97	0.72	0.53	0.37	0.24	0.14	0.07
30.00	DISCHG	0.03	0.01	0.00	0.	0.	0.	0.	0.		

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7125 CFS-HRS= 3536.61 ACRE-FT= 292.27

SUBROUTINE RESVOR, STRUCTURE 1
SURFACE ELEVATION= 852.40

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
25.23	53.349	859.63

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	ELEV	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
2.00	ELEV	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.40
4.00	DISCHG	0.00	0.00	0.00	0.01	0.02	0.04	0.08	0.13	0.21	0.31
4.00	ELEV	852.40	852.40	852.40	852.40	852.40	852.40	852.40	852.41	852.41	852.42
6.00	DISCHG	0.44	0.59	0.78	1.00	1.26	1.56	1.89	2.28	2.70	3.18
6.00	ELEV	852.42	852.43	852.44	852.45	852.46	852.48	852.49	852.51	852.54	852.56
8.00	DISCHG	3.71	4.30	4.95	5.67	6.98	8.83	10.91	13.29	16.07	19.50
8.00	ELEV	852.59	852.61	852.65	852.68	852.73	852.78	852.84	852.91	852.99	853.09
10.00	DISCHG	23.04	27.83	34.43	43.00	43.73	44.54	45.38	46.22	47.00	47.42
10.00	ELEV	853.15	853.24	853.35	853.50	853.95	854.46	854.99	855.51	856.00	856.24
12.00	DISCHG	47.80	48.15	48.46	48.74	49.00	49.23	49.44	49.63	49.81	49.98
12.00	ELEV	856.46	856.66	856.83	856.99	857.14	857.27	857.39	857.51	857.61	857.70
14.00	DISCHG	50.14	50.28	50.42	50.55	50.67	50.79	50.90	51.00	51.10	51.20
14.00	ELEV	857.79	857.88	857.95	858.03	858.10	858.17	858.23	858.29	858.34	858.40
16.00	DISCHG	51.29	51.37	51.45	51.53	51.61	51.68	51.75	51.82	51.89	51.95
16.00	ELEV	858.45	858.50	858.55	858.59	858.63	858.68	858.72	858.75	858.79	858.83
18.00	DISCHG	52.01	52.07	52.13	52.19	52.24	52.29	52.35	52.39	52.44	52.49
18.00	ELEV	858.86	858.90	858.93	858.96	859.00	859.03	859.05	859.08	859.11	859.14
20.00	DISCHG	52.54	52.58	52.63	52.67	52.71	52.75	52.79	52.82	52.86	52.89
20.00	ELEV	859.16	859.19	859.21	859.24	859.26	859.28	859.31	859.33	859.35	859.37
22.00	DISCHG	52.93	52.96	52.99	53.02	53.06	53.09	53.12	53.15	53.17	53.20
22.00	ELEV	859.39	859.41	859.42	859.44	859.46	859.48	859.49	859.51	859.53	859.54
24.00	DISCHG	53.23	53.26	53.28	53.30	53.32	53.33	53.34	53.34	53.33	53.31
24.00	ELEV	859.56	859.58	859.59	859.60	859.61	859.62	859.62	859.62	859.61	859.61
26.00	DISCHG	53.29	53.26	53.24	53.21	53.17	53.14	53.10	53.07	53.03	52.99
26.00	ELEV	859.59	859.58	859.56	859.55	859.53	859.51	859.49	859.47	859.44	859.42
28.00	DISCHG	52.95	52.91	52.87	52.83	52.79	52.75	52.71	52.67	52.63	52.59
28.00	ELEV	859.40	859.38	859.35	859.33	859.31	859.29	859.26	859.24	859.22	859.19

30.00	DISCHG	52.55	52.51	52.47	52.43	52.39	52.35	52.31	52.27	52.23	52.19
30.00	ELEV	859.17	859.15	859.12	859.10	859.08	859.06	859.03	859.01	858.99	858.96
32.00	DISCHG	52.14	52.10	52.06	52.02	51.98	51.94	51.90	51.86	51.82	51.78
32.00	ELEV	858.94	858.92	858.89	858.87	858.85	858.83	858.80	858.78	858.76	858.73
34.00	DISCHG	51.74	51.70	51.66	51.62	51.58	51.55	51.51	51.47	51.43	51.39
34.00	ELEV	858.71	858.69	858.67	858.64	858.62	858.60	858.57	858.55	858.53	858.51
36.00	DISCHG	51.35	51.31	51.27	51.23	51.19	51.15	51.11	51.07	51.03	50.99
36.00	ELEV	858.48	858.46	858.44	858.42	858.39	858.37	858.35	858.33	858.30	858.28
38.00	DISCHG	50.95	50.91	50.87	50.83	50.80	50.76	50.72	50.68	50.64	50.60
38.00	ELEV	858.26	858.24	858.21	858.19	858.17	858.15	858.12	858.10	858.08	858.06

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.7533 CFS-HRS= 1555.62 ACRE-FT= 128.56

SUBROUTINE REACH , CROSS-SECTION 1
LENGTH= 5432.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 1.866 ROUTING COEFF= 0.5198 MODIFIED COEFFICIENT= 0.2946

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
26.27	53.323	743.16

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.7366 CFS-HRS= 1521.20 ACRE-FT= 125.71

SUBROUTINE RUNOFF, CROSS-SECTION 1
AREA= 2.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 1.60

COMPUTED CURVE NO.= 92.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
10.87	533.918	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.7126 CFS-HRS= 2431.58 ACRE-FT= 200.95

SUBROUTINE ADDHYD, CROSS-SECTION 1
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
10.89	554.936	746.44

TIME HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 5.40

0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.00
4.00	DISCHG	0.03	0.12	0.35	0.81	1.52	2.51	3.75	5.22	6.90	8.74
6.00	DISCHG	10.70	12.76	14.94	17.32	19.93	22.75	25.76	28.98	32.46	36.24
8.00	DISCHG	40.32	44.80	49.85	55.78	63.05	71.96	83.07	97.03	117.81	155.80
10.00	DISCHG	223.89	321.53	428.17	511.88	550.91	548.26	518.79	476.44	432.27	392.27
12.00	DISCHG	357.38	327.00	301.43	280.04	262.18	246.75	233.56	222.74	213.94	206.73
14.00	DISCHG	200.55	194.79	189.11	183.54	178.25	173.49	169.33	165.84	162.93	160.43
16.00	DISCHG	158.07	155.62	153.12	150.73	148.58	146.63	144.83	143.15	141.63	140.24
18.00	DISCHG	138.92	137.53	135.98	134.28	132.62	131.27	130.36	129.79	129.26	128.50
20.00	DISCHG	127.44	126.11	124.69	123.35	122.22	121.33	120.60	119.87	119.05	118.17
22.00	DISCHG	117.46	117.03	116.81	116.57	116.16	115.59	114.99	114.46	114.01	113.57
24.00	DISCHG	113.00	111.70	108.87	103.87	96.79	88.77	81.08	74.56	69.41	65.52
26.00	DISCHG	62.57	60.28	58.53	57.20	56.21	55.45	54.85	54.39	54.03	53.76
28.00	DISCHG	53.55	53.37	53.23	53.12	53.03	52.97	52.93	52.89	52.85	52.81
30.00	DISCHG	52.77	52.73	52.69	52.65	52.61	52.57	52.53	52.49	52.45	52.41
32.00	DISCHG	52.37	52.33	52.29	52.25	52.21	52.17	52.12	52.08	52.04	52.00
34.00	DISCHG	51.96	51.92	51.88	51.84	51.80	51.76	51.72	51.68	51.64	51.60
36.00	DISCHG	51.57	51.53	51.49	51.45	51.41	51.37	51.33	51.29	51.25	51.21
38.00	DISCHG	51.17	51.13	51.09	51.05	51.01	50.97	50.93	50.89	50.85	50.81

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.1281 CFS-HRS= 3931.44 ACRE-FT= 324.89

```
EXECUTIVE CONTROL CARD,  OPERATION BASFLO,     NEW BASE FLOW=  10.00

EXECUTIVE CONTROL CARD,  OPERATION COMPUT,     FROM XSECTN/STRUCT   2/  0     TO XSECTN/STRUCT   2/  0
STARTING TIME=  0.       RAIN DEPTH=  2.50     RAIN DURATION=  1.00     RAIN TABLE NO.= 1     SOIL CONDITION= 2


SUBROUTINE REACH ,   CROSS-SECTION   2
LENGTH=   1200.00     INPUT COEFFICIENT= -0.          INPUT ROUTINGS= -0.

          AVERAGE WATER VELOCITY=   3.492       ROUTING COEFF= 0.6792       MODIFIED COEFFICIENT= 0.9700

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.16                        564.241                       648.82

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.2399        CFS-HRS=     4320.96        ACRE-FT=     357.08


SUBROUTINE RUNOFF,   CROSS-SECTION   2
AREA=   0.80     INPUT RUNOFF CURVE=  92.0     TIME OF CONCENTRATION=  0.50

          COMPUTED CURVE NO.=  92.0

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             10.16                        319.113                      (RUNOFF)
             19.10                         27.980                      (RUNOFF)
             22.10                         23.429                      (RUNOFF)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.7136        CFS-HRS=      884.71        ACRE-FT=      73.11


SUBROUTINE ADDHYD,   CROSS-SECTION   2
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.05                        669.390                       649.16

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.3002        CFS-HRS=     5202.38        ACRE-FT=     429.92


SUBROUTINE SAVMOV,   CROSS-SECTION   2
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 2
```

EXECUTIVE CONTROL CARD, OPERATION BASFLO, NEW BASE FLOW= 0.

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 2 TO XSECTN/STRUCT 0/ 4
STARTING TIME= 0. RAIN DEPTH= 2.50 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 2
AREA= 7.22 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 3.33

COMPUTED CURVE NO.= 85.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.21	743.034	(RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 7.22

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.00	DISCHG	0.	0.	0.	0.00	0.01	0.04	0.14	0.37	0.79	1.51
8.00	DISCHG	2.61	4.22	6.47	9.47	13.42	18.51	25.01	33.36	44.64	62.37
10.00	DISCHG	91.61	135.24	192.62	264.37	348.02	437.99	525.93	603.24	665.65	710.03
12.00	DISCHG	735.19	742.98	736.75	720.41	696.91	669.17	640.00	611.75	584.83	560.34
14.00	DISCHG	537.43	515.73	495.44	476.56	458.36	441.11	424.82	409.94	396.15	383.25
16.00	DISCHG	371.10	359.55	348.61	338.30	328.64	319.59	311.05	303.08	295.59	288.58
18.00	DISCHG	282.11	276.03	270.17	264.51	258.99	253.64	248.46	243.48	238.81	234.50
20.00	DISCHG	230.49	226.74	223.23	219.87	216.57	213.34	210.17	207.08	204.07	201.19
22.00	DISCHG	198.47	195.91	193.51	191.29	189.26	187.38	185.60	183.92	182.30	180.70
24.00	DISCHG	179.09	177.31	174.90	171.60	167.05	160.97	153.19	143.70	132.89	121.22
26.00	DISCHG	109.15	97.19	85.77	75.19	65.61	57.07	49.56	43.08	37.44	32.55
28.00	DISCHG	28.28	24.52	21.21	18.35	15.84	13.67	11.79	10.18	8.79	7.58
30.00	DISCHG	6.52	5.58	4.77	4.06	3.45	2.92	2.47	2.08	1.74	1.45
32.00	DISCHG	1.19	0.97	0.78	0.61	0.46	0.33	0.23	0.14	0.08	0.04
34.00	DISCHG	0.02	0.00	0.00	0.	0.	0.	0.	0.		

SUBROUTINE RESVOR, STRUCTURE 2
SURFACE ELEVATION= 863.30

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
26.28	92.760	871.13

SUBROUTINE REACH , CROSS-SECTION 3
LENGTH= 9370.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 2.095 ROUTING COEFF= 0.5543 MODIFIED COEFFICIENT= 0.2092

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
27.90	92.738	750.10

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.5369 CFS-HRS= 2501.53 ACRE-FT= 206.73

SUBROUTINE RUNOFF, CROSS-SECTION 3
AREA= 1.78 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 1.00

COMPUTED CURVE NO.= 85.0

SUBROUTINE ADDHYD, CROSS-SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
10.51	344.550	752.28
13.76	160.200	750.70
19.36	140.116	750.53
22.35	134.350	750.47
27.91	92.723	750.10

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.6558 CFS-HRS= 3809.19 ACRE-FT= 314.79

SUBROUTINE SAVMOV, CROSS-SECTION 3
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 3

```
SUBROUTINE RUNOFF,   STRUCTURE  3
AREA=   1.47     INPUT RUNOFF CURVE=  85.0     TIME OF CONCENTRATION=  1.20

          COMPUTED CURVE NO.=  85.0


SUBROUTINE RESVOR,   STRUCTURE  3
SURFACE ELEVATION=  822.80


SUBROUTINE RUNOFF,   CROSS-SECTION 101
AREA=   3.42     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  2.00

          COMPUTED CURVE NO.=  87.0


SUBROUTINE SAVMOV,   STRUCTURE  3
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5


SUBROUTINE ADDHYD,   CROSS-SECTION   3
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7


SUBROUTINE SAVMOV,   CROSS-SECTION   3
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5


SUBROUTINE SAVMOV,   CROSS-SECTION   3
INPUT HYDROGRAPH= 3     OUTPUT HYDROGRAPH= 6


SUBROUTINE ADDHYD,   CROSS-SECTION   3
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIMES                PEAK DISCHARGES              PEAK ELEVATIONS
             10.97                     805.606                       754.86

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   0.7998     CFS-HRS=     7169.67     ACRE-FT=     592.50
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SUBROUTINE REACH ,   CROSS-SECTION   4
LENGTH=  10002.00     INPUT COEFFICIENT=  0.7200     INPUT ROUTINGS= -0.

          AVERAGE WATER VELOCITY=   4.200       ROUTING COEFF= 0.7200       MODIFIED COEFFICIENT= 0.4141

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
             11.96                        754.180                        (NULL)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   0.7943        CFS-HRS=     7119.95        ACRE-FT=     588.39


SUBROUTINE RUNOFF,   CROSS-SECTION   4
AREA=   1.88     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  1.40

          COMPUTED CURVE NO.=  87.0

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
             10.78                        356.637                       (RUNOFF)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   1.3261        CFS-HRS=     1608.96        ACRE-FT=     132.96


SUBROUTINE ADDHYD,   CROSS-SECTION   4
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
             11.78                        962.194                        (NULL)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   0.8528        CFS-HRS=     8679.79        ACRE-FT=     717.30


SUBROUTINE SAVMOV,   CROSS-SECTION   4
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 4


SUBROUTINE RUNOFF,   STRUCTURE  4
AREA=   4.47     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  2.50

          COMPUTED CURVE NO.=  87.0

          PEAK TIMES                  PEAK DISCHARGES                PEAK ELEVATIONS
```

11.55 623.575 (RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 1.3265 CFS-HRS= 3826.59 ACRE-FT= 316.23

SUBROUTINE RESVOR, STRUCTURE 4
SURFACE ELEVATION= 730.00

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
5.90	88.798	735.50
25.26	81.979	731.66

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.9577 CFS-HRS= 2762.71 ACRE-FT= 228.31

SUBROUTINE SAVMOV, STRUCTURE 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

```
EXECUTIVE CONTROL CARD,  OPERATION COMPUT,     FROM XSECTN/STRUCT   4/  0     TO XSECTN/STRUCT   4/  0
STARTING TIME=  0.       RAIN DEPTH=  2.50     RAIN DURATION=  1.00     RAIN TABLE NO.= 1     SOIL CONDITION= 2


SUBROUTINE SAVMOV,   CROSS-SECTION   4
INPUT HYDROGRAPH= 4     OUTPUT HYDROGRAPH= 5


SUBROUTINE ADDHYD,   CROSS-SECTION   4
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7
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```
EXECUTIVE CONTROL CARD,  OPERATION BASFLD,     NEW BASE FLOW=   5.00

EXECUTIVE CONTROL CARD,  OPERATION COMPUT,     FROM XSECTN/STRUCT   5/  0     TO XSECTN/STRUCT   6/  0
STARTING TIME=  0.       RAIN DEPTH=  2.50     RAIN DURATION=  1.00     RAIN TABLE NO.= 1     SOIL CONDITION= 2


SUBROUTINE REACH ,   CROSS-SECTION   5
LENGTH=      1.00     INPUT COEFFICIENT=  1.0000     INPUT ROUTINGS= -0.

          AVERAGE WATER VELOCITY=  16.000       ROUTING COEFF= 1.0000       MODIFIED COEFFICIENT= 1.0000


SUBROUTINE RUNOFF,   CROSS-SECTION   5
AREA=   0.40     INPUT RUNOFF CURVE=  87.0     TIME OF CONCENTRATION=  0.30

          COMPUTED CURVE NO.=  87.0


SUBROUTINE ADDHYD,   CROSS-SECTION   5
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.97                       1074.000                      (NULL)

          TOTAL WATER, IN INCHES ON DRAINAGE AREA=   0.8972        CFS-HRS=    11951.60        ACRE-FT=     987.68


SUBROUTINE SAVMOV,   CROSS-SECTION   5
INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6


SUBROUTINE SAVMOV,   CROSS-SECTION   2
INPUT HYDROGRAPH= 2     OUTPUT HYDROGRAPH= 5


SUBROUTINE ADDHYD,   CROSS-SECTION   6
INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIMES                  PEAK DISCHARGES              PEAK ELEVATIONS
             11.62                       1603.551                      (NULL)
```

TIME HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 26.84

0.	DISCHG	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
2.00	DISCHG	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.01
4.00	DISCHG	15.14	15.51	16.10	16.90	17.98	19.35	21.04	23.08	25.31	27.70
6.00	DISCHG	109.25	112.25	115.82	119.62	123.85	128.55	134.09	140.51	147.51	155.51
8.00	DISCHG	164.42	175.66	189.38	205.49	226.31	250.06	281.23	320.37	403.82	580.81
10.00	DISCHG	804.06	932.34	1013.03	1155.77	1308.49	1440.32	1535.22	1586.83	1603.42	1591.17
12.00	DISCHG	1556.41	1499.97	1428.79	1353.82	1279.76	1210.86	1148.71	1093.47	1044.68	1001.04
14.00	DISCHG	962.92	928.90	898.37	871.70	847.45	825.51	805.97	788.50	772.06	756.03
16.00	DISCHG	741.42	728.58	716.88	705.58	694.44	684.08	674.91	666.68	658.82	651.00
18.00	DISCHG	643.77	636.60	629.43	623.36	618.30	613.52	608.04	602.53	597.63	592.75
20.00	DISCHG	588.12	583.87	579.66	575.42	571.25	567.26	562.72	557.94	554.24	551.56
22.00	DISCHG	549.14	545.90	542.46	539.84	537.70	535.74	533.84	531.97	529.77	527.02
24.00	DISCHG	524.32	515.14	501.23	489.14	476.06	460.14	441.61	421.37	400.47	380.10
26.00	DISCHG	361.04	343.65	328.17	314.82	303.59	294.35	286.86	280.85	276.03	272.18
28.00	DISCHG	269.12	266.70	264.80	263.29	262.08	261.11	260.33	259.70	259.18	258.74
30.00	DISCHG	258.37	258.04	257.74	257.48	257.25	257.04	256.85	256.68	256.51	256.35
32.00	DISCHG	256.19	256.03	255.87	255.71	255.55	255.39	255.23	255.06	254.90	254.73
34.00	DISCHG	254.57	254.40	254.24	254.07	253.91	253.74	253.57	253.41	253.24	253.07
36.00	DISCHG	252.91	252.74	252.58	252.41	252.24	252.08	251.91	251.74	251.58	251.41
38.00	DISCHG	251.25	251.08	250.92	250.75	250.59	250.42	250.26	250.09	249.93	249.76

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.9903 CFS-HRS= 17153.98 ACRE-FT= 1417.60

SUBROUTINE SAVMOV, CROSS-SECTION 6
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

EXECUTIVE CONTROL CARD, OPERATION BASFLO, NEW BASE FLOW= 26.00

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 5 TO XSECTN/STRUCT 7/ 0
STARTING TIME= 0. RAIN DEPTH= 2.50 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2

SUBROUTINE RESVOR, STRUCTURE 5
SURFACE ELEVATION= 663.00

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
26.09	353.290	676.27

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 26.84

TIME											
0.	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
2.00	DISCHG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.28
2.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
4.00	DISCHG	0.57	0.85	1.13	1.42	1.73	2.05	2.39	2.77	3.17	3.62
4.00	ELEV	663.01	663.01	663.02	663.02	663.03	663.04	663.04	663.05	663.05	663.06
6.00	DISCHG	4.85	6.86	8.89	10.96	13.07	15.21	17.42	19.70	22.06	24.51
6.00	ELEV	663.08	663.12	663.15	663.19	663.23	663.26	663.30	663.34	663.38	663.42
8.00	DISCHG	27.09	29.80	32.70	35.83	39.25	43.03	47.26	52.07	57.96	69.17
8.00	ELEV	663.47	663.51	663.56	663.62	663.68	663.74	663.81	663.90	664.00	664.23
10.00	DISCHG	85.28	105.51	127.92	152.64	180.54	211.39	244.38	259.15	264.00	268.84
10.00	ELEV	664.55	664.96	665.41	665.91	666.48	667.10	667.77	668.29	668.73	669.17
12.00	DISCHG	273.57	278.13	282.43	286.46	290.20	293.66	296.88	299.87	302.21	304.38
12.00	ELEV	669.60	670.01	670.40	670.77	671.11	671.42	671.72	671.99	672.17	672.34
14.00	DISCHG	306.42	308.35	310.17	311.90	313.55	315.12	316.63	318.08	319.47	320.81
14.00	ELEV	672.49	672.64	672.78	672.92	673.04	673.16	673.28	673.39	673.50	673.60
16.00	DISCHG	322.10	323.34	324.54	325.71	326.84	327.93	328.99	330.01	331.02	331.99
16.00	ELEV	673.70	673.80	673.89	673.98	674.06	674.15	674.23	674.31	674.39	674.46
18.00	DISCHG	332.94	333.87	334.77	335.65	336.50	337.35	338.17	338.97	339.76	340.53
18.00	ELEV	674.53	674.61	674.67	674.74	674.81	674.87	674.94	675.00	675.06	675.12
20.00	DISCHG	341.28	342.02	342.74	343.45	344.14	344.82	345.48	346.13	346.76	347.38
20.00	ELEV	675.18	675.23	675.29	675.34	675.40	675.45	675.50	675.55	675.60	675.64
22.00	DISCHG	347.99	348.59	349.18	349.76	350.33	350.89	351.44	351.99	352.15	352.30
22.00	ELEV	675.69	675.74	675.78	675.83	675.87	675.91	675.96	676.00	676.03	676.06
24.00	DISCHG	352.45	352.60	352.73	352.85	352.96	353.06	353.15	353.21	353.26	353.30

24.00	ELEV	676.10	676.13	676.15	676.18	676.20	676.22	676.24	676.26	676.27	676.27
26.00	DISCHG	353.31	353.31	353.29	353.27	353.23	353.18	353.13	353.07	353.01	352.94
26.00	ELEV	676.28	676.28	676.27	676.27	676.26	676.25	676.24	676.23	676.21	676.20
28.00	DISCHG	352.87	352.79	352.72	352.64	352.56	352.49	352.41	352.33	352.25	352.17
28.00	ELEV	676.18	676.17	676.15	676.14	676.12	676.10	676.09	676.07	676.05	676.04
30.00	DISCHG	352.09	352.01	351.74	351.46	351.17	350.89	350.61	350.33	350.04	349.76
30.00	ELEV	676.02	676.00	675.98	675.96	675.94	675.91	675.89	675.87	675.85	675.83
32.00	DISCHG	349.48	349.20	348.92	348.64	348.36	348.08	347.80	347.52	347.24	346.96
32.00	ELEV	675.81	675.78	675.76	675.74	675.72	675.70	675.68	675.66	675.63	675.61
34.00	DISCHG	346.68	346.41	346.13	345.85	345.58	345.30	345.02	344.75	344.47	344.20
34.00	ELEV	675.59	675.57	675.55	675.53	675.51	675.48	675.46	675.44	675.42	675.40
36.00	DISCHG	343.92	343.65	343.37	343.10	342.83	342.55	342.28	342.01	341.74	341.47
36.00	ELEV	675.38	675.36	675.34	675.32	675.29	675.27	675.25	675.23	675.21	675.19
38.00	DISCHG	341.19	340.92	340.65	340.38	340.11	339.84	339.57	339.30	339.03	338.77
38.00	ELEV	675.17	675.15	675.13	675.11	675.09	675.06	675.04	675.02	675.00	674.98

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.5773 CFS-HRS= 9999.05 ACRE-FT= 826.32

PUNCH OUTPUT REQUESTED AT THIS POINT

SUBROUTINE REACH , CROSS-SECTION 7
LENGTH= 12770.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 3.756 ROUTING COEFF= 0.6978 MODIFIED COEFFICIENT= 0.3045

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
27.46	364.233	623.06

HYDROGRAPH, TZERO= 0.66 DELTA T= 0.20 DRAINAGE AREA= 26.84

TIME											
0.66	DISCHG	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
2.66	DISCHG	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
4.66	DISCHG	11.09	11.23	11.42	11.64	11.88	12.13	12.41	12.71	13.03	13.38
6.66	DISCHG	13.76	14.39	15.45	16.80	18.37	20.11	21.97	23.93	25.99	28.14
8.66	DISCHG	30.39	32.73	35.19	37.78	40.54	43.50	46.70	50.22	54.13	58.65
10.66	DISCHG	65.20	74.66	87.41	103.09	121.53	142.85	167.07	193.96	217.16	234.77
12.66	DISCHG	248.49	259.48	268.51	276.10	282.60	288.26	293.26	297.71	301.72	305.22
14.66	DISCHG	308.31	311.09	313.60	315.91	318.04	320.02	321.88	323.63	325.29	326.87

16.66	DISCHG	328.37	329.81	331.19	332.52	333.79	335.02	336.21	337.36	338.47	339.55
18.66	DISCHG	340.60	341.62	342.61	343.57	344.51	345.42	346.31	347.18	348.03	348.86
20.66	DISCHG	349.67	350.47	351.24	352.00	352.75	353.48	354.19	354.89	355.57	356.24
22.66	DISCHG	356.89	357.53	358.16	358.77	359.38	359.97	360.56	361.13	361.70	362.14
24.66	DISCHG	362.49	362.79	363.03	363.24	363.43	363.59	363.74	363.86	363.97	364.06
26.66	DISCHG	364.13	364.19	364.22	364.24	364.25	364.24	364.23	364.20	364.16	364.11
28.66	DISCHG	364.06	364.00	363.94	363.87	363.80	363.73	363.66	363.58	363.50	363.43
30.66	DISCHG	363.35	363.27	363.19	363.05	362.87	362.66	362.42	362.18	361.92	361.65
32.66	DISCHG	361.38	361.11	360.83	360.55	360.27	359.99	359.71	359.44	359.16	358.88
34.66	DISCHG	358.60	358.32	358.04	357.76	357.49	357.21	356.93	356.66	356.38	356.10
36.66	DISCHG	355.83	355.55	355.28	355.00	354.73	354.45	354.18	353.91	353.63	353.36
38.66	DISCHG	353.09	352.82	352.54	352.27	352.00	351.73	351.46	351.19	350.92	350.65

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.5898 CFS-HRS= 10216.14 ACRE-FT= 844.26

SUBROUTINE RUNOFF, CROSS-SECTION 7
AREA= 5.56 INPUT RUNOFF CURVE= 82.0 TIME OF CONCENTRATION= 2.50

COMPUTED CURVE NO.= 82.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.66	539.655	(RUNOFF)

SUBROUTINE ADDHYD, CROSS-SECTION 7
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
0.50	27.875	620.25
12.13	707.101	625.70

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 32.40

TIME											
0.	DISCHG	26.00	26.00	26.00	26.00	11.00	11.00	11.00	11.00	11.00	11.00
2.00	DISCHG	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
4.00	DISCHG	11.00	11.00	11.00	11.06	11.19	11.36	11.57	11.80	12.06	12.33

6.00	DISCHG	12.62	12.94	13.28	13.64	14.21	15.14	16.40	17.91	19.60	21.43
8.00	DISCHG	23.45	25.71	28.35	31.56	35.61	40.79	47.50	56.22	68.53	88.88
10.00	DISCHG	123.88	176.83	247.29	333.50	426.78	514.69	587.96	641.75	675.53	695.14
12.00	DISCHG	705.43	706.51	699.57	689.10	677.08	664.83	652.39	640.28	628.89	618.33
14.00	DISCHG	609.03	601.15	593.86	586.94	580.17	573.51	567.15	561.14	555.59	550.56
16.00	DISCHG	546.08	542.06	538.25	534.55	530.90	527.35	524.01	520.97	518.26	515.88
18.00	DISCHG	513.86	512.01	510.20	508.39	506.56	504.78	503.16	501.79	500.68	499.76
20.00	DISCHG	498.87	497.91	496.78	495.49	494.14	492.82	491.58	490.46	489.45	488.55
22.00	DISCHG	487.74	487.04	486.48	486.05	485.73	485.44	485.14	484.81	484.47	484.10
24.00	DISCHG	483.68	482.87	480.97	477.55	472.20	464.67	455.29	444.81	433.96	423.60
26.00	DISCHG	414.21	406.01	399.02	393.23	388.40	384.37	380.96	378.09	375.67	373.65
28.00	DISCHG	371.97	370.58	369.41	368.41	367.55	366.82	366.20	365.68	365.23	364.85
30.00	DISCHG	364.52	364.24	363.98	363.75	363.54	363.37	363.17	362.96	362.73	362.49
32.00	DISCHG	362.25	361.99	361.73	361.46	361.19	360.91	360.63	360.36	360.08	359.80
34.00	DISCHG	359.52	359.24	358.96	358.68	358.40	358.12	357.85	357.57	357.29	357.01
36.00	DISCHG	356.74	356.46	356.18	355.91	355.63	355.36	355.08	354.81	354.53	354.26
38.00	DISCHG	353.99	353.71	353.44	353.17	352.90	352.62	352.35	352.08	351.81	351.54

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 0.6517 CFS-HRS= 13627.15 ACRE-FT= 1126.15

ENDCMP

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 1 TO XSECTN/STRUCT 0/ 1
STARTING TIME= 0. RAIN DEPTH= 9.20 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 1
AREA= 3.20 INPUT RUNOFF CURVE= 92.0 TIME OF CONCENTRATION= 2.00

COMPUTED CURVE NO.= 92.0

PEAK TIMES 3.60 PEAK DISCHARGES 5544.395 PEAK ELEVATIONS (RUNOFF)

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.10	2.26	11.18	33.84	81.20	162.58	283.51	449.39
2.00	DISCHG	672.99	1001.38	1505.41	2229.23	3135.74	4088.36	4893.06	5394.56	5544.35	5402.01
4.00	DISCHG	5075.61	4665.59	4246.27	3859.89	3519.01	3220.21	2955.09	2716.68	2504.07	2315.68
6.00	DISCHG	2150.03	1996.53	1845.81	1687.97	1512.78	1317.99	1115.41	920.00	744.49	594.24
8.00	DISCHG	469.73	369.62	290.03	226.84	177.35	138.36	107.92	84.75	66.34	51.51
10.00	DISCHG	39.63	30.26	22.94	17.18	12.68	9.28	6.53	4.32	2.59	1.33
12.00	DISCHG	0.55	0.14	0.							

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.3270 CFS-HRS= 17196.87 ACRE-FT= 1421.15

SUBROUTINE RESVOR, STRUCTURE 1
SURFACE ELEVATION= 852.40

PEAK TIMES 8.20 PEAK DISCHARGES 377.936 PEAK ELEVATIONS 875.50

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 3.20

TIME											
0.	DISCHG	0.	0.	0.00	0.02	0.10	0.37	1.08	2.57	5.28	13.69
0.	ELEV	852.40	852.40	852.40	852.40	852.40	852.42	852.45	852.53	852.66	852.92
2.00	DISCHG	25.63	40.91	44.46	46.86	48.95	51.70	54.60	56.70	58.94	61.09
2.00	ELEV	853.20	853.46	854.41	855.92	857.12	858.69	860.48	862.16	863.95	865.39
4.00	DISCHG	63.14	65.03	65.92	66.73	67.47	68.14	68.75	69.41	70.07	70.68
4.00	ELEV	866.76	868.03	868.92	869.73	870.47	871.14	871.75	872.31	872.82	873.29
6.00	DISCHG	71.24	71.77	103.18	157.77	205.10	244.82	276.70	308.05	342.49	363.97

6.00	ELEV	873.72	874.12	874.44	874.69	874.90	875.08	875.22	875.33	875.42	875.47
8.00	DISCHG	375.01	377.94	374.78	367.14	356.29	343.25	328.79	313.52	297.88	288.10
8.00	ELEV	875.50	875.50	875.50	875.48	875.45	875.42	875.38	875.35	875.31	875.27
10.00	DISCHG	280.14	272.10	264.04	256.04	248.12	240.34	232.72	225.26	217.98	210.89
10.00	ELEV	875.24	875.20	875.17	875.13	875.09	875.06	875.02	874.99	874.96	874.93
12.00	DISCHG	204.00	197.32	190.85	184.59	178.53	172.67	167.01	161.53	156.23	151.10
12.00	ELEV	874.89	874.86	874.84	874.81	874.78	874.75	874.73	874.70	874.68	874.66
14.00	DISCHG	146.14	141.35	136.71	132.23	127.89	123.69	119.63	115.71	111.91	108.24
14.00	ELEV	874.63	874.61	874.59	874.57	874.55	874.53	874.51	874.50	874.48	874.46
16.00	DISCHG	104.69	101.25	97.93	94.72	91.61	88.60	85.70	82.88	80.16	77.53
16.00	ELEV	874.45	874.43	874.42	874.40	874.39	874.37	874.36	874.35	874.34	874.32
18.00	DISCHG	74.99	72.53	71.99	71.97	71.95	71.93	71.91	71.89	71.87	71.85
18.00	ELEV	874.31	874.30	874.29	874.27	874.26	874.25	874.23	874.22	874.20	874.19
20.00	DISCHG	71.84	71.82	71.80	71.78	71.76	71.74	71.72	71.70	71.69	71.67
20.00	ELEV	874.17	874.16	874.14	874.13	874.12	874.10	874.09	874.07	874.06	874.04
22.00	DISCHG	71.65	71.63	71.61	71.59	71.57	71.55	71.54	71.52	71.50	71.48
22.00	ELEV	874.03	874.02	874.00	873.99	873.97	873.96	873.94	873.93	873.92	873.90
24.00	DISCHG	71.46	71.44	71.42	71.41	71.39	71.37	71.35	71.33	71.31	71.29
24.00	ELEV	873.89	873.87	873.86	873.84	873.83	873.82	873.80	873.79	873.77	873.76
26.00	DISCHG	71.27	71.26	71.24	71.22	71.20	71.18	71.16	71.14	71.13	71.11
26.00	ELEV	873.74	873.73	873.72	873.70	873.69	873.67	873.66	873.64	873.63	873.62
28.00	DISCHG	71.09	71.07	71.05	71.03	71.01	71.00	70.98	70.96	70.94	70.92
28.00	ELEV	873.60	873.59	873.57	873.56	873.54	873.53	873.52	873.50	873.49	873.47
30.00	DISCHG	70.90	70.89	70.87	70.85	70.83	70.81	70.79	70.77	70.76	70.74
30.00	ELEV	873.46	873.45	873.43	873.42	873.40	873.39	873.37	873.36	873.35	873.33
32.00	DISCHG	70.72	70.70	70.68	70.66	70.65	70.63	70.61	70.59	70.57	70.55
32.00	ELEV	873.32	873.30	873.29	873.28	873.26	873.25	873.23	873.22	873.20	873.19
34.00	DISCHG	70.53	70.52	70.50	70.48	70.46	70.44	70.42	70.41	70.39	70.37
34.00	ELEV	873.18	873.16	873.15	873.13	873.12	873.11	873.09	873.08	873.06	873.05
36.00	DISCHG	70.35	70.33	70.31	70.30	70.28	70.26	70.24	70.22	70.20	70.19
36.00	ELEV	873.04	873.02	873.01	872.99	872.98	872.97	872.95	872.94	872.92	872.91
38.00	DISCHG	70.17	70.15	70.13	70.11	70.09	70.08	70.06	70.04	70.02	70.00
38.00	ELEV	872.90	872.88	872.87	872.85	872.84	872.82	872.81	872.80	872.78	872.77

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.0289 CFS-HRS= 4190.10 ACRE-FT= 346.27

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 2 TO XSECTN/STRUCT 0/ 2
STARTING TIME= 0. RAIN DEPTH= 9.20 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2

SUBROUTINE RUNOFF, STRUCTURE 2
AREA= 7.22 INPUT RUNOFF CURVE= 85.0 TIME OF CONCENTRATION= 3.33

COMPUTED CURVE NO.= 85.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS (RUNOFF)
4.60	8223.215	

HYDROGRAPH, TZERO= 0. DELTA T= 0.20 DRAINAGE AREA= 7.22

TIME											
0.	DISCHG	0.	0.	0.	0.00	0.36	2.54	9.78	27.58	61.53	121.18
2.00	DISCHG	223.26	401.17	709.16	1184.65	1837.25	2654.60	3609.40	4644.88	5668.72	6583.87
4.00	DISCHG	7319.99	7840.78	8135.83	8223.17	8137.42	7926.25	7631.17	7284.73	6919.05	6555.25
6.00	DISCHG	6210.53	5887.32	5574.51	5261.63	4944.40	4620.61	4285.57	3935.10	3578.02	3226.36
8.00	DISCHG	2885.37	2561.44	2259.10	1981.70	1730.10	1505.69	1308.39	1137.83	988.92	860.63
10.00	DISCHG	748.76	650.66	565.65	492.55	428.05	370.70	319.47	274.35	233.88	197.58
12.00	DISCHG	165.50	137.63	113.76	93.63	77.26	64.20	53.40	44.33	36.61	30.00
14.00	DISCHG	24.46	19.81	15.75	12.18	9.15	6.66	4.61	2.96	1.74	0.97
16.00	DISCHG	0.44	0.11	0.							

SUBROUTINE RESVOR, STRUCTURE 2
SURFACE ELEVATION= 863.30

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
9.14	1376.707	891.44

ENDCMP

DISCHARGE HYDROGRAPH, HYDROGRAPH LOCATION 6

STARTING TIME= 0. TIME INCREMENT= 2.00 DRAINAGE AREA= 26.84 BASE FLOW= -0.

8	0.	100.0000	300.0000	550.0000	1350.0000
8	1900.0000	1800.0000	1200.0000	950.0000	700.0000
8	500.0000	300.0000	225.0000	250.0000	700.0000
8	1450.0000	1350.0000	1100.0000	925.0000	550.0000
8	625.0000	575.0000	525.0000	500.0000	600.0000
8	1000.0000	775.0000	600.0000	400.0000	400.0000
8	750.0000	500.0000	325.0000	300.0000	300.0000
8	300.0000	300.0000	275.0000	225.0000	175.0000
8	125.0000	90.0000	80.0000	50.0000	40.0000
8	30.0000	25.0000	20.0000	15.0000	10.0000
8	5.0000	0.	0.	0.	0.
9 ENDTBL					

EXECUTIVE CONTROL CARD, OPERATION INCREM, MAIN TIME INCREMENT= 1.00

EXECUTIVE CONTROL CARD, OPERATION COMPUT, FROM XSECTN/STRUCT 0/ 5 TO XSECTN/STRUCT 7/ 0
STARTING TIME= 0. RAIN DEPTH= 4.40 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2

SUBROUTINE RESVOR, STRUCTURE 5
SURFACE ELEVATION= 663.00

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
21.35	376.139	680.82
56.65	417.652	687.94
62.92	420.990	688.33

HYDROGRAPH, TZERO= 0. DELTA T= 2.00 DRAINAGE AREA= 26.84

TIME											
0.	DISCHG	0.	8.75	42.21	125.73	265.34	311.56	353.52	363.34	369.44	373.64
0.	ELEV	663.00	663.15	663.73	665.37	668.85	672.89	676.32	678.39	679.67	680.42
20.00	DISCHG	375.84	376.07	374.97	373.64	374.62	381.40	391.25	398.26	402.31	404.52
20.00	ELEV	680.77	680.81	680.64	680.42	680.58	681.66	683.24	684.41	685.15	685.55
40.00	DISCHG	405.72	407.00	407.95	408.64	409.57	412.14	415.27	417.07	417.61	417.50
40.00	ELEV	685.77	686.00	686.17	686.30	686.47	686.93	687.50	687.83	687.93	687.91
60.00	DISCHG	418.78	420.77	420.69	419.65	418.49	417.56	416.78	415.93	414.84	413.42
60.00	ELEV	688.09	688.30	688.29	688.18	688.05	687.92	687.78	687.62	687.42	687.17
80.00	DISCHG	411.69	409.68	407.54	405.28	402.91	400.49	398.03	395.34	391.69	388.02
80.00	ELEV	686.85	686.49	686.10	685.69	685.26	684.82	684.37	683.89	683.31	682.72
100.00	DISCHG	384.34	380.64	376.96	373.31	369.85	366.68	363.54	360.42	357.34	354.27

100.00	ELEV	682.13	681.54	680.95	680.37	679.76	679.09	678.43	677.77	677.12	676.48
120.00	DISCHG	349.36	338.98	328.91	319.14	309.66	300.46	289.82	279.47	269.49	259.86
120.00	ELEV	675.80	675.00	674.22	673.47	672.74	672.04	671.07	670.13	669.23	668.35
140.00	DISCHG	220.88	169.74	130.45	100.25	77.04	59.20	48.55	40.06	33.05	27.27
140.00	ELEV	667.29	666.26	665.46	664.85	664.38	664.02	663.84	663.69	663.57	663.47
160.00	DISCHG	22.50	18.56	15.31	12.63	10.42	8.60	7.09	5.85	4.83	3.98
160.00	ELEV	663.39	663.32	663.26	663.22	663.18	663.15	663.12	663.10	663.08	663.07
180.00	DISCHG	3.29	2.71	2.24	1.85	1.52	1.26	1.04	0.86	0.71	0.58
180.00	ELEV	663.06	663.05	663.04	663.03	663.03	663.02	663.02	663.01	663.01	663.01
200.00	DISCHG	0.48	0.40	0.33	0.27	0.22	0.18	0.15	0.12	0.10	0.09
200.00	ELEV	663.01	663.01	663.01	663.00	663.00	663.00	663.00	663.00	663.00	663.00
220.00	DISCHG	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01
220.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
240.00	DISCHG	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
240.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
260.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
280.00	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
300.00	DISCHG	0.	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
300.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
320.00	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
320.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
340.00	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
340.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
360.00	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
360.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
380.00	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
380.00	ELEV	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.0182 CFS-HRS= 52279.92 ACRE-FT= 4320.41

PUNCH OUTPUT REQUESTED AT THIS POINT

SUBROUTINE REACH , CROSS-SECTION 7
LENGTH= 12770.00 INPUT COEFFICIENT= -0. INPUT ROUTINGS= -0.

AVERAGE WATER VELOCITY= 3.752 ROUTING COEFF= 0.6976 MODIFIED COEFFICIENT= 0.8369

PEAK TIMES PEAK DISCHARGES PEAK ELEVATIONS

24.52 375.952 623.15
66.10 420.689 623.49

TIME HYDROGRAPH, TZERO= 0.66 DELTA T= 2.00 DRAINAGE AREA= 26.84

0.66	DISCHG	0.	0.	7.32	36.52	111.18	240.20	299.93	344.78	360.32	367.95
20.66	DISCHG	372.72	375.33	375.95	375.13	373.88	374.50	380.27	389.46	396.83	401.42
40.66	DISCHG	404.01	405.44	406.75	407.75	408.49	409.39	411.69	414.69	416.68	417.46
60.66	DISCHG	417.49	418.57	420.41	420.65	419.81	418.71	417.74	416.94	416.09	415.04
80.66	DISCHG	413.69	412.01	410.06	407.95	405.72	403.37	400.96	398.50	395.86	392.37
100.66	DISCHG	388.73	385.05	381.36	377.68	374.02	370.53	367.31	364.15	361.03	357.94
120.66	DISCHG	354.87	350.26	340.82	330.85	321.05	311.51	302.26	291.85	281.49	271.44
140.66	DISCHG	261.75	227.54	179.17	138.39	106.47	81.84	62.89	50.89	41.82	34.48
160.66	DISCHG	28.44	23.46	19.36	15.97	13.18	10.87	8.97	7.40	6.11	5.04
180.66	DISCHG	4.16	3.43	2.83	2.33	1.93	1.59	1.31	1.08	0.89	0.74
200.66	DISCHG	0.61	0.50	0.41	0.34	0.28	0.23	0.19	0.16	0.13	0.11
220.66	DISCHG	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02
240.66	DISCHG	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
260.66	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280.66	DISCHG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.66	DISCHG	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
320.66	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
340.66	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
360.66	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
380.66	DISCHG	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.0182 CFS-HRS= 52279.92 ACRE-FT= 4320.41

SUBROUTINE RUNOFF, CROSS-SECTION 7
AREA= 5.56 INPUT RUNOFF CURVE= 82.0 TIME OF CONCENTRATION= 2.50

COMPUTED CURVE NO.= 82.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.59	1257.676	(RUNOFF)

SUBROUTINE ADDHYD, CROSS-SECTION 7
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

DUE TO STORAGE OVERFLOW, THE SUM OF HYDROGRAPHS 6 AND 5 WAS TRUNCATED HERE TO 200 VALUES.

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.69	1527.418	628.61
66.14	420.558	623.49

HYDROGRAPH, TZERO= 0. DELTA T= 1.00 DRAINAGE AREA= 32.40

TIME											
0.	DISCHG	0.	0.	0.	1.25	4.91	12.29	29.98	67.82	141.44	262.46
10.00	DISCHG	757.92	1461.05	1514.29	1290.55	1103.25	979.99	884.60	819.89	771.44	733.98
20.00	DISCHG	705.38	682.12	664.15	649.40	635.59	586.55	492.16	430.79	400.70	386.17
30.00	DISCHG	379.62	377.62	378.98	381.84	386.43	390.72	394.40	397.61	399.90	401.86
40.00	DISCHG	403.16	404.26	404.97	405.67	406.32	406.92	407.42	407.88	408.25	408.64
50.00	DISCHG	409.09	409.78	410.93	412.20	413.70	415.03	416.02	416.81	417.20	417.47
60.00	DISCHG	417.48	417.67	418.22	418.89	419.81	420.45	420.57	420.51	420.09	419.62
70.00	DISCHG	419.07	418.54	418.06	417.61	417.20	416.80	416.37	415.92	415.39	414.81
80.00	DISCHG	414.13	413.40	412.56	411.68	410.70	409.70	408.65	407.57	406.46	405.32
90.00	DISCHG	404.14	402.96	401.75	400.54	399.31	398.05	396.73	395.26	393.52	391.75
100.00	DISCHG	389.93	388.10	386.26	384.42	382.58	380.73	378.89	377.05	375.23	373.43
110.00	DISCHG	371.68	369.98	368.37	366.77	365.19	363.62	362.06	360.50	358.96	357.42
120.00	DISCHG	355.88	354.09	351.78	348.65	343.93	339.12	334.14	329.18	324.28	319.43
130.00	DISCHG	314.66	309.94	305.31	300.49	295.28	290.08	284.90	279.78	274.76	269.79
140.00	DISCHG	264.95	255.93	238.82	219.31	195.12	172.23	151.84	132.96	116.99	102.27
150.00	DISCHG	89.96	78.61	69.14	60.85	54.85	49.35	44.81	40.57	36.90	33.45
160.00	DISCHG	30.43	27.59	25.11	22.77	20.71	18.78	17.09	15.50	14.10	12.79
170.00	DISCHG	11.63	10.55	9.60	8.70	7.92	7.18	6.53	5.92	5.39	4.89
180.00	DISCHG	4.45	4.03	3.67	3.33	3.03	2.74	2.50	2.26	2.06	1.87
190.00	DISCHG	1.70	1.54	1.40	1.27	1.16	1.05	0.95	0.87	0.79	0.71

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.9425 CFS-HRS= 61528.19 ACRE-FT= 5084.69

ENDCMP

ENDJOB

ENDJOB CARD ENCOUNTERED. END OF JOB.

REMOVE AND SAVE A5

2945 LINES OUTPUT THIS JOB.

USDA-SCS-HYATTSVILLE, MD. 1963