Chapter 12

Hydrograph Options

Overview

Input Screen Options

The create intermediate file option of the SACPRE program contains a series of input screens for the following hydrograph computations:

- generate hydrograph
- route hydrograph
- combine hydrographs.

Each of these hydrograph computations involves one or more input screens.

Pause and Exit Options

After any hydrograph computation the user has the option of performing another hydrograph computation or the user may pause or exit the program.
Pause option: Allows the user to save the intermediate file at any point so that the intermediate file can be added to later.

Exit option: Creates a final intermediate file which can no longer be added to using the preprocessor screens.

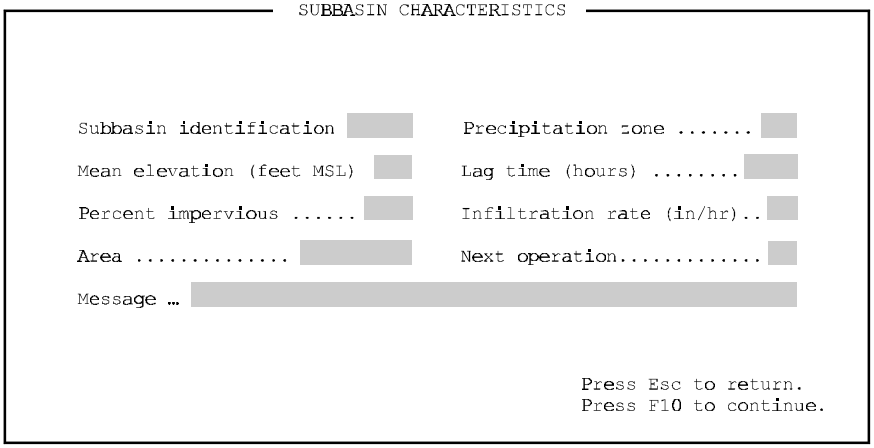
Generate Hydrograph

Introduction

If the user chooses to create an intermediate file, the first hydrologic calculation will be to generate a hydrograph. To generate a hydrograph the program will prompt the user to complete the *Subbasin Characteristics* screen.

Subbasin Characteristics Screen

The input to the following *Subbasin Characteristics* screen is used to calculate the effective precipitation and generate a runoff hydrograph for individual subbasins. The user may fill in all the required input parameters on this screen or may leave the lag time, percent impervious and infiltration rate parameters blank and additional submenus for these parameters will follow as the program continues.



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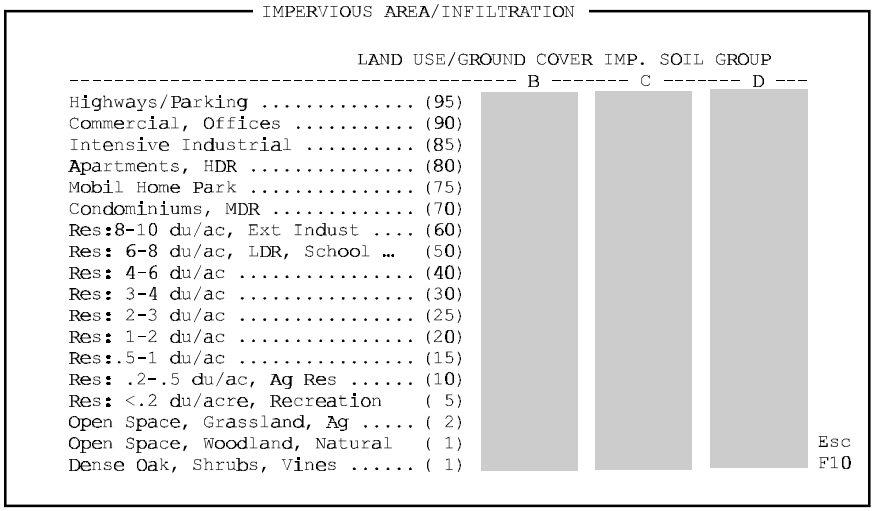
Generate Hydrograph (continued)

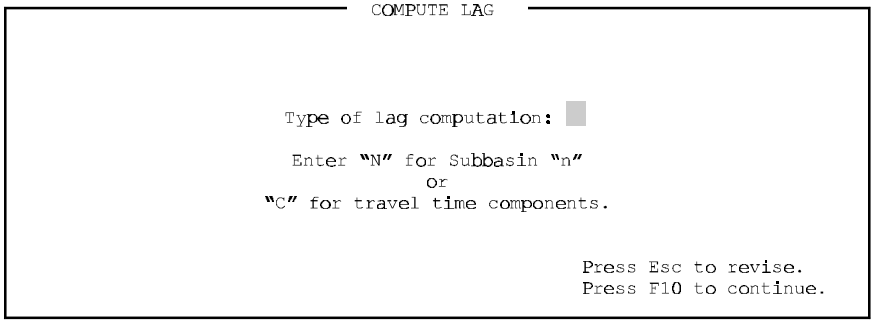
Impervious Area, Infiltration Screen

The following optional screen is to aid the user in determining the weighted basin impervious area and/or infiltration rate.



Compute Lag Screen

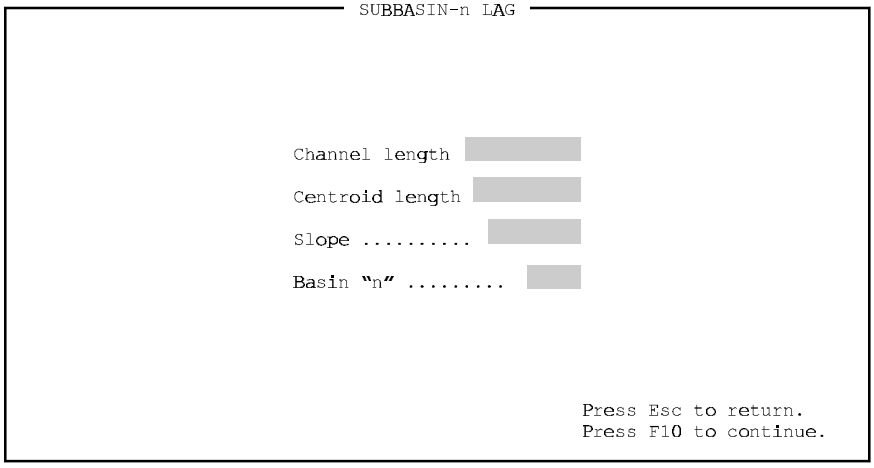
If the user leaves the lag time parameter blank on the *Subbasin Characteristic* screen the following screen will prompt the user to choose between the two methods of calculating basin lag time outlined in Chapter 7.



Generate Hydrograph (continued)

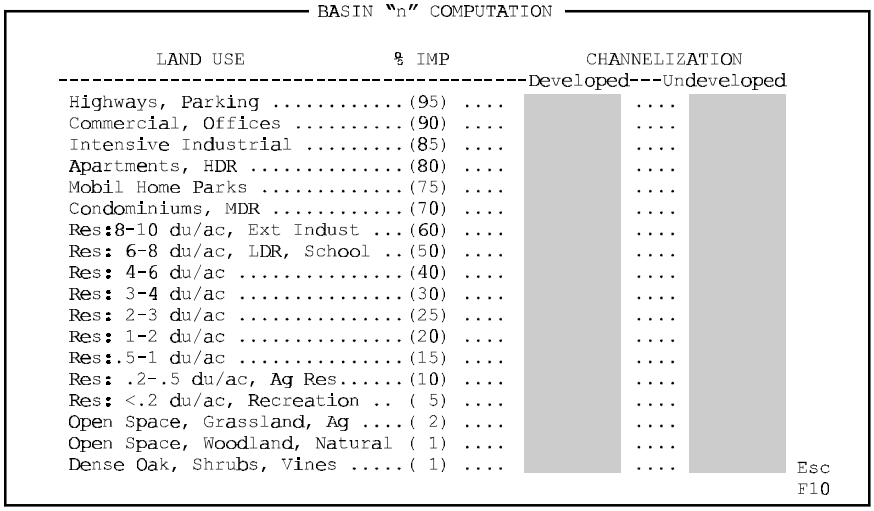
Subbasin "N" Lag Screens

If the user chose the subbasin "n" option in the *Compute Lag* screen the following screen will appear.



Subbasin "n" Lag Screens (cont.)

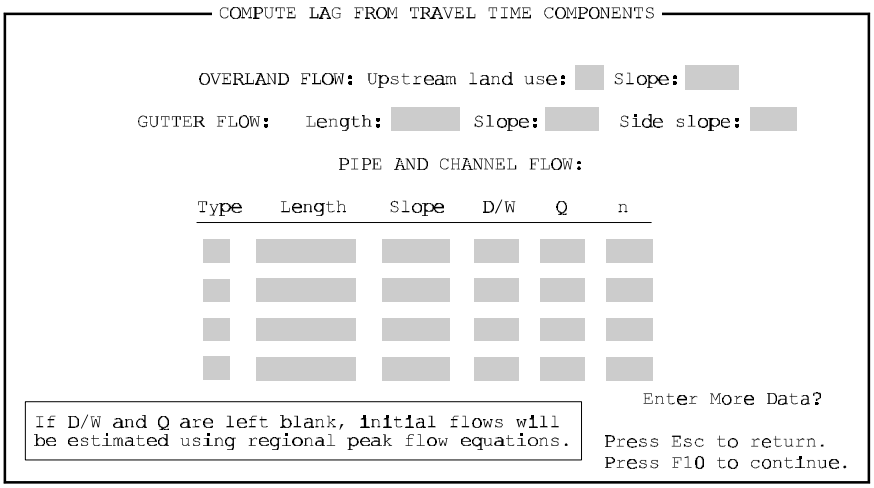
The following optional screen is available to aid the user in determining the Basin "n" parameter if the input parameter is left blank on the *Subbasin "n" Lag* screen.



Generate Hydrograph (continued)

Compute Lag from Travel Time Components Screen

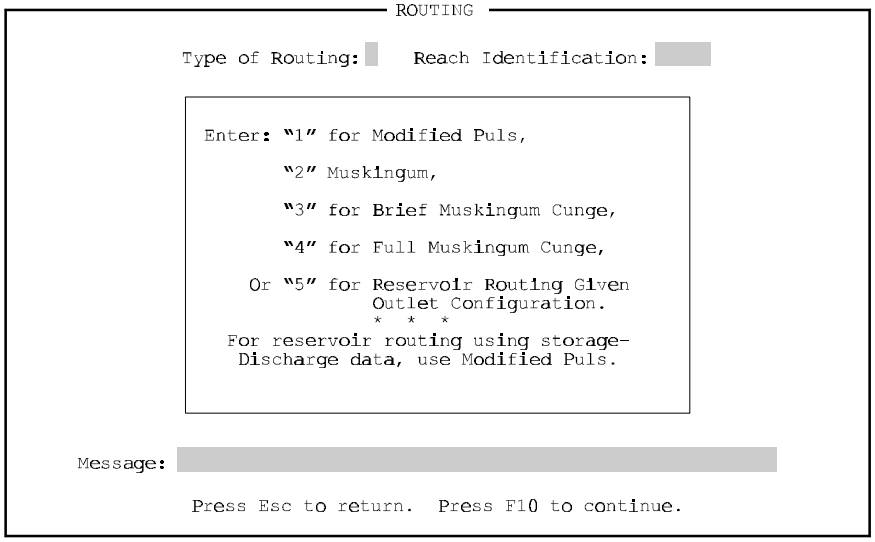
If the user chose the travel time components option in the *Compute Lag* screen, the following screen will appear. Additional pipe and channel flow data may be entered on a subsequent menu if "Y" is indicated in the "Enter More Data" box.



Route Hydrograph

Introduction

Five hydrograph routing options are available in SACPRE. The *Type of Routing* screen and the individual screens for each option are shown below. Information on the application of each method is available in Chapter 8. Detailed information on the parameters required for each routing option is provided in the HEC-1 Manual.



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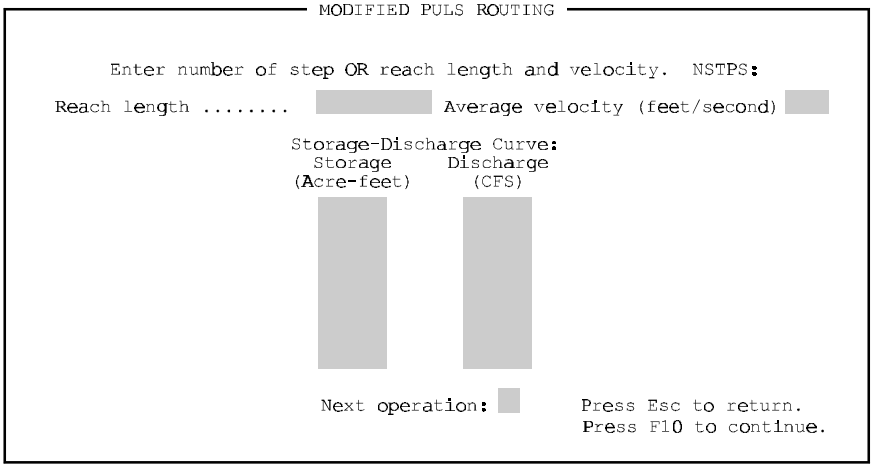
Route Hydrograph (continued)

Modified Puls Routing Screen

The Modified Puls routing method is used for channels influenced by backwater or for channels with available HEC-2 storage discharge information. The *Modified Puls Routing* screen is shown below.



If the number of steps (NSTPS) is not entered, it is calculated from reach length and velocity with the following equation:

$$NSTPS = \frac{reach\ length/velocity}{2\ x\ NMIN}$$

where: NMIN is the time interval.

The factor of 2 in the denominator was added to reflect hydrograph attenuation typical to developed channels in Sacramento County. The maximum NSTPS has been set to 5.

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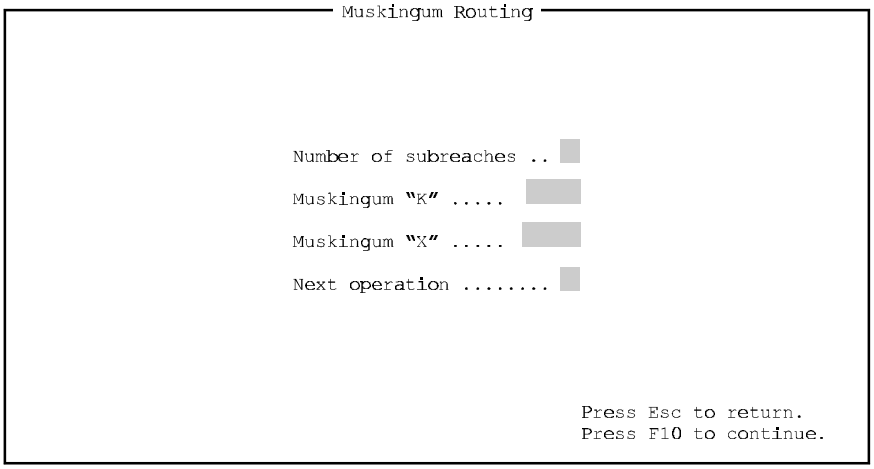
Route Hydrograph (continued)

Muskingum Routing Screen

The Muskingum Routing method is for channels where limited cross-sectional information is available. The *Muskingum Routing* screen is shown below.



The number of subreaches is chosen to satisfy a stability criteria as described in the HEC-1 manual. The Muskingum "K" value may be approximated as the travel time in hours for the reach based on the flow velocity at normal depth. Typical ranges for the Muskingum "X" value are given below:

Channel description	Muskingum "X" range
Most channel flow is in the floodplain	0.0-0.15
Natural channels	0.20-0.35
Excavated earth or concrete channels	0.40-0.50

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Route Hydrograph (continued)

Muskingum Cunge Routing Screens

The Muskingum Cunge Routing method is used for channels with insignificant backwater effects or for channels with standard cross-sections. The brief *Muskingum Cunge Routing* screen is shown below.

Muskingum Cunge Routing

Channel length: Channel slope ....

Manning's roughness: Width or diameter ....

Side slope ..... Channel type (see below)

Channel Type	Type Code	Width/Diameter	Side Slope
Circular	C	>0	N/A
Near Square	S	>0	0
Rectangular	T	>0	0
Triangular	T	0	0<s<15
Trapezoidal	T	0	0<s<15

Next operation:

Press Esc to return.
Press F10 to continue.

The full *Muskingum Cunge Routing* screen is shown below.

Muskingum Cunge Routing

Channel length: Channel slope (decimal):

Manning's Roughness
Left overbank ...
Channel .....
Right overbank ..

Representative Cross-section

Location	Station (Feet)	Elev. (feet)
Left overbank		
Left overbank		
Left bank		
Channel		
Channel		
Right bank ...		
Right overbank		
Right overbank		

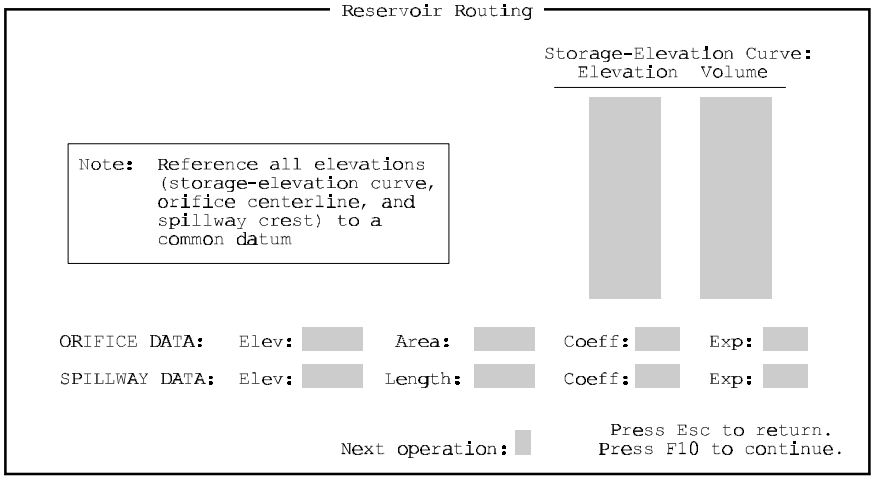
Next operation:

Press Esc to return.
Press F10 to continue.

Route Hydrograph (continued)

Reservoir Routing Screen

Reservoir routing is used to route a hydrograph through a storage facility such as detention basin. The *Reservoir Routing* screen is shown below.



Combine Hydrographs

Introduction

The combine hydrograph option adds the flows of runoff hydrographs together for each incremental point in time to create a new runoff hydrograph.

Combine Hydrograph Screen

The following SACPRE input screen, *Combine Hydrographs*, allows the user to combine up to five hydrographs.