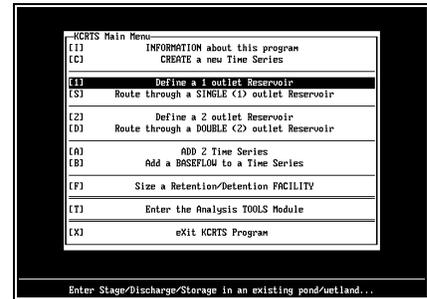


## SECTION 3 - DEFINE A 1-OUTLET RESERVOIR/ ROUTE THROUGH A SINGLE (1) OUTLET RESERVOIR

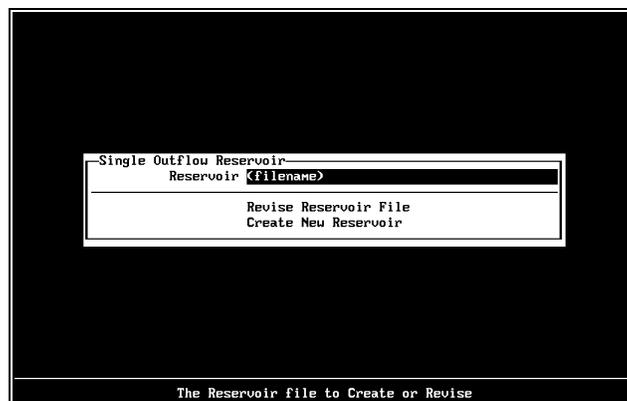
These routines allow the user to describe how a single outlet reservoir (lake, pond, detention pipe, etc.) attenuates flows from a contributing drainage basin. The user may create/modify a routing data file for a reservoir with a single outlet for use in the ROUTE routine. This routine is similar to *ROUTE 2 - Dual Outlet Reservoir Routing* (Page 13). The level pool routing technique used is described in the *King County Surface Water Design Manual* Section 3.2.4.



### 3.1 DEFINE A 1 OUTLET RESERVOIR [1]

This menu item can be selected with the "1" key while in the main menu.

The user is prompted to enter the reservoir file name to be edited.



- **Reservoir (filename):** Specify the name of the reservoir file to be edited/created. The default extension is RS1. Note: The reservoir information from a standard R/D facility file can also be read into this routine.

*Revise Reservoir File.* Select this option to modify an existing reservoir file. At any time, you can cancel all edits by pressing the ESC key.

*Create New Reservoir.* Select this option to create a new reservoir definition. The user is presented with columns and rows of stage-discharge-storage-permeable area curves. Fill in the data as needed. The first record must be all zeros. The remaining records should be entered in increasing stage order. The user may choose any increment for the stages and the increment may vary. Each record must contain (in order) stage (ft), discharge (cfs), storage (cu ft), and perm-area (sq ft).

Edit Reservoir: POND.RS1			
Stage (Ft)	Discharge (CFS)	Storage (Cu-Ft)	Permeable Area (Sq-Ft)
0.00	0.000	0.	0.
1.00	0.300	2000.	500.
1.50	1.20	25000.	900.
2.50	3.30	55000.	1400.
4.00	10.20	100000.	2000.
6.00	14.50	150000.	3000.
*****	*****	*****	*****
*****	*****	*****	*****
*****	*****	*****	*****
*****	*****	*****	*****
*****	*****	*****	*****
Next Set of stage/discharge relations Rank Rows—Eliminate Duplicate Stages Done Editing stage/discharge relations			

Enter Stage, 0.0=Bottom of Reservoir

- **Stage:** The water surface elevation in relationship to the base elevation datum of the reservoir. First row must be zero and subsequent rows must have increasing stage values.
- **Discharge:** The outflow rate (cfs) from the reservoir at this stage. First row must be zero and subsequent rows must be equal to or greater than the preceding row.
- **Storage:** The reservoir cumulative storage volume (cu ft) at this stage. First row must be zero and subsequent rows must be equal to or greater than the preceding row.
- **Perm-Area:** The reservoir plan view surface area (sq ft) where vertical infiltration can occur at this stage. If infiltration is not being modeled, the column may contain all zeros. First row may be non-zero and subsequent rows must be equal to or greater than the preceding row.

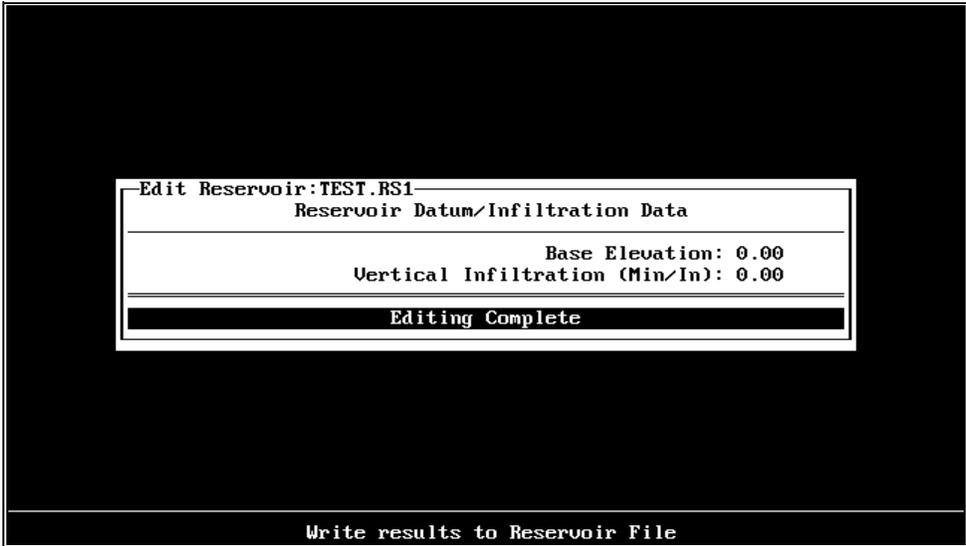
**Next Set of Stage/Discharge Relations:** Select this option if additional rows are desired. There is a maximum of 20 rows of routing data per reservoir.

**Rank Rows—Eliminate Duplicate Stages:** Select this option if the stages (first column) are not in ascending order. Rows can be deleted by changing the stage to 0.0 and selecting this option. To insert a row, add data to the bottom of the table and select this option.

- **To add new row:** insert new data in first blank row at bottom of existing data. Select this option and the new data will be moved up into the table based on the stage elevation.
- **To delete existing row:** Change the stage value of the row to be deleted to 0.0. When selected, this option looks for duplicate stage entries and will delete the second duplicate entry.

**Done Editing Stage/Discharge Relations:** Select this option to continue once all routing data has been correctly entered.

The user is then prompted to enter the Base Elevation (elevation at 0 stage) and vertical permeability rate.



The screenshot shows a software interface with a black background. A white-bordered dialog box is centered, containing the following text:

```
Edit Reservoir: TEST.RS1
Reservoir Datum/Infiltration Data
-----
Base Elevation: 0.00
Vertical Infiltration (Min/In): 0.00
-----
Editing Complete
```

Below the dialog box, at the bottom of the black area, is the text "Write results to Reservoir File".

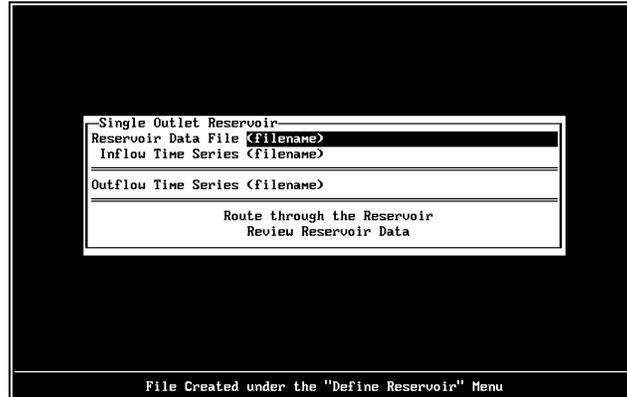
- **Base Elevation:** The elevation of the reservoir at stage = 0.0, usually based on KCAS datum.
- **Vertical Infiltration (Min/In):** The average vertical infiltration of the reservoir soils in minutes per inch. Vertical infiltration is the inverse of the design infiltration rate determined per Section 5.4 of the Surface Water Design Manual.

*Editing Complete:* Select this menu item to continue. All of the reservoir information will be saved to the reservoir file.

### 3.2 ROUTE THROUGH A SINGLE (1) OUTLET RESERVOIR [S]

This menu item can be selected with the [S] key while in the Main Menu.

The user is prompted to identify reservoir and time series data files to be used in the routing routine. This routing calculates a new outflow time series based on the inflow time series and reservoir data.



- **Reservoir Data File (filename):** Designate a reservoir file (see *Define a 1 Outlet Reservoir*) or a Retention/Detention facility. For a reservoir file, the extension does not need to be entered. A default extension of RSI is assumed. For a Retention/Detention facility, the full name must be entered, including the extension RDF.
- **Inflow Time Series:** Enter the name of the time series file to be routed through the reservoir. A TSF extension is assumed.
- **Outflow Time Series:** Enter the name of outflow time series which is generated during routing. The TSF extension will be automatically added.

*Review Reservoir Data:* Select this option to review the reservoir data before routing.

*Route through the Reservoir:* Select this option to perform the reservoir routing.

The program calculates a new "outflow" time series based on the inflow time series and routing data. When the process is completed, pressing the F10 key reveals the following screen:

```

KCRTS Command
-----
Route through a SINGLE (1) outlet Reservoir
-----
Loading Reservoir File:POND.RS1 :
Time Series Found in Memory:test.tsf :

Reservoir Routing [Single Outlet]
Computing Series:OUT.tsf
Years Complete: 8

Inflow/Outflow Analysis
-----
Peak Inflow Discharge: 13.68 CFS at 6:00 on Jan 9 in Year 8
Peak Outflow Discharge: 10.70 CFS at 9:00 on Jan 9 in Year 8
Peak Reservoir Stage: 4.23 Ft
Peak Reservoir Elev: 4.23 Ft
Peak Reservoir Storage: 105872. Cu-Ft
: 2.430 Ac-Ft

Storing Time Series File:OUT.tsf 8

Routing Complete
    
```

- **Peak Inflow Discharge (cfs):** The maximum inflow rate, including date and time, of the specified time series entering the reservoir.
- **Peak Outflow Discharge (cfs):** The maximum discharge rate from the reservoir, including date and time, for this outflow time series.
- **Peak Reservoir Stage And Elevation (ft):** The maximum water surface stage for this inflow time series and routing data. The Peak Reservoir Elevation is equal to the Peak Stage plus the Base Elevation specified in the routing data file.
- **Peak Reservoir Storage (cu-ft, ac-ft):** The maximum storage volume of the reservoir for this inflow time series in cubic-feet and acre-feet. The timing of the maximum storage volume (and water surface) coincides with the timing of the Peak Outflow Discharge.

### \*\*CAUTION\*\*

**Routing Data Has Been Extrapolated...:** If this message is displayed, the inflow time series has exceeded the capacity of the reservoir. The program extrapolates the routing data to create a larger reservoir and continues execution. The extrapolation is based on the linear relationship between the last two data lines in the reservoir data table. The user should modify the reservoir data file to cover the full range of flows encountered.

