

SECTION 1 - USING THE KCBW PROGRAM

1. KCBW GETTING STARTED

This program is provided as a supplement to the KING COUNTY SURFACE WATER DESIGN MANUAL. The program can assist the user with the analysis and iterative design of the stormwater conveyance systems described in Section 1.2.

1.1.1. MINIMUM SYSTEM REQUIREMENTS

This software was designed to work with an IBM-PC, with a 80386 CPU or faster. A math coprocessor is required with a 80386 CPU machine. The machine must have a minimum of 640K of available RAM. DOS 5.0 or higher and a non-monochrome monitor are also required. A minimum of one floppy disk drive (double sided - high density), one CD-ROM drive, or a modem with Internet connection, is necessary for installation.

1.1.2. PREREQUISITES

This program is designed to assist engineers in the design of stormwater drainage systems. Users should be knowledgeable in the fields of hydraulics and open channel flow. An understanding of MS-DOS is required. The use of an ASCII text editor would be helpful. The program is not copy protected and should be backed up on another floppy disk. Store the original disk in a safe location.

1.1.3. TRAINING

King County will provide training courses on the use of this program on a periodic basis. Although not required to use the program, the introductory training session is recommended for all first time users. To sign-up or inquiry about upcoming training sessions call (206) 296-1900. Examples of backwater analyses are located in the User's Guide portion of this document that will further assist users in learning basic procedures.

1.1.4. DISCLAIMER

This program and accompanying documentation are provided “as-is” without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by the user. King County disclaims all warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the program and accompanying documentation. In no event shall King County be liable for any damages whatsoever (including without limitation damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if King County has been advised of the possibility of such damages.

1.1.5. LIMITED SUPPORT

If there are any questions, problems, or comments about this program, please contact:

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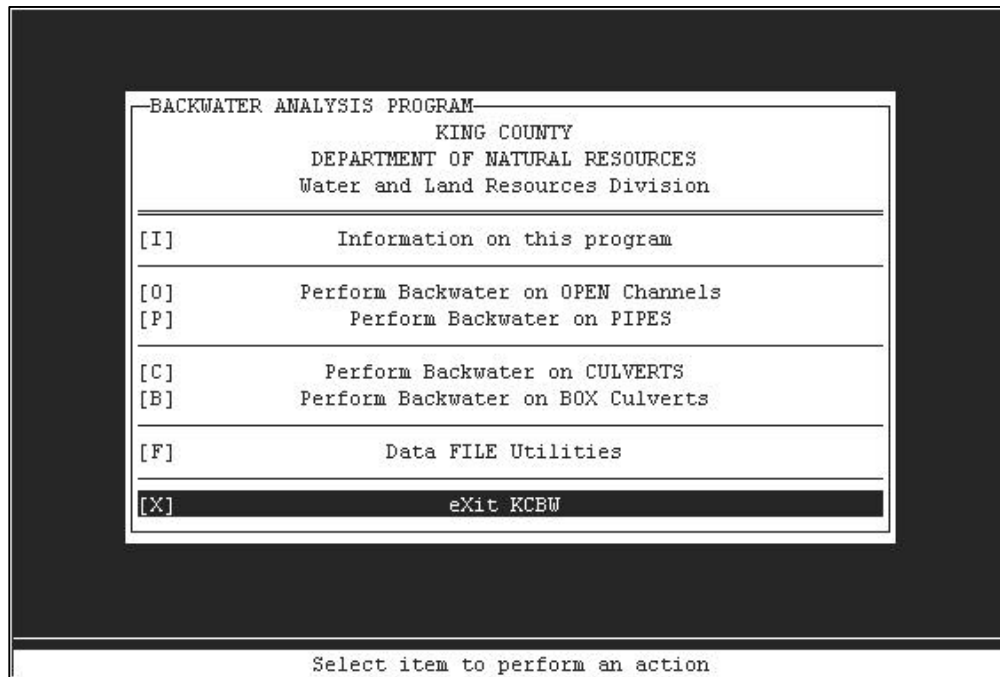
EMAIL: Jeff.Jacobson@metrokc.gov or Kelly.Whiting@metrokc.gov

Webpage: <http://splash.metrokc.gov/wlr/lds/manual.htm>



1.2. KCBW MAIN MENU DESCRIPTION

Start the program by running the KCBW.EXE program file or by clicking on the Windows shortcut icon provided with the installation disk. The Main Menu box should appear on the screen:



Activation of any of these routines will start with the Main Menu. Menu items can be selected by highlighting the item and pressing enter, or by pressing the letter shown in brackets to the left of the item title. The following is a brief description of the options listed on the menu (Figure 1). All menu choices are described in detail in subsequent sections.

1.2.1. INFORMATION ON THIS PROGRAM [I]

Pressing the I key displays program information.

1.2.2. PERFORM BACKWATER ON OPEN CHANNELS [O]

This routine employs the standard step backwater method to calculate the flows through a channel that may be uniform or irregular in either cross section or roughness coefficient. Channel data can only be input through a Data-File created in the Data File Utilities (See Section 6). This menu item can be selected by pressing the O key.

1.2.3. PERFORM BACKWATER ON PIPES [P]

This routine employs the standard step backwater method to calculate the flows and headwater elevations through a pipe network. The pipes may be of different materials, slopes, sizes, grades, and inlet configuration. Up to fifty pipes may be analyzed per network. Before running this routine, pipe data must be entered using a pipe data file created using the Data File Utilities (see Section 6). This menu item can be selected by pressing the P key.

1.2.4. PERFORM BACKWATER ON CULVERTS [C]

This routine employs the standard step backwater method to calculate the flows through a single or multiple (parallel) culverts at a given location. The culverts may be of different materials, slopes, sizes, and grades. Culvert data is input from the keyboard. This menu item can be selected by pressing the C key.

1.2.5. PERFORM BACKWATER ON BOX CULVERTS [B]

This routine employs the standard step backwater method to calculate the flows through a single or multiple (parallel) box culverts at a given location. The box culverts may be of different materials, slopes, sizes, and grades. Box culvert data is input from the keyboard. This menu item can be selected by pressing the B key.

1.2.6. DATA FILE ROUTINES [F]

The Data Utilities provide routines to create data files for channels and pipe networks; to create HW/TW files for modeling tailwater conditions; and to revise HW/TW files. This menu item can be selected by pressing the F key. The routines within this program include:

- **Create/Revise Channel-Data [C]** This is a routine used to create, review, or revise data files for the Backwater Channel routine. Use Channel-Data Input Forms to mathematically describe the channel you wish to analyze.
- **Create/Revise Pipe-Data [P]** This is a routine used to create, review, or revise data files for the BWPIPE Program. Use Pipe-Data Input Forms to mathematically describe the pipes you wish to analyze.
- **Create/Revise HW/TW Data [T]** This is a routine used to create, review, or revise HW/TW data files for use in the main Backwater programs.
- **Scale HW/TW Data [S]** This is a program used to revise existing HW/TW data files by adjusting flow specifications.
- **Merge HW/TW Data [M]** This is a program used to revise existing HW data files by adjusting increments for analysis and to combine existing HW data files.

1.2.7. EXIT KCBW PROGRAM [X]

This option ends the program and returns the computer to the computer operating system (e.g, DOS prompt or Windows Desktop). This menu item can be selected by pressing the X key.

1.3. INSTALLING THE PROGRAM

The program disk contains an Installation file. It is recommended that for initial set-up the installation program be run. To do so, change to the floppy drive containing the program disk and type (or double click in Windows)

> **README (or INSTALL)**

and press **Enter**.

The program will copy the executable file and runoff files to a directory called C:\KC_SWDM\KCBW. The following additional files are included.

KCBW.EXE executable file. DOS based version of KCBW. May be run in a Windows environment. Does not support mouse drivers. Output is directed to text files for documentation and printing.

WKCBW.EXE executable file. Windows based version of KCBW. Uses different windows for input/output. Supports windows mouse drivers. Output is directed to text files for documentation and printing.

KCBW.HLP data file. Must be located in same directory as the executable file.

1.3.1. PROGRAM EXECUTION

To execute KCBW you can do any of the following,

DOS environment:

- 1) add the KCBW sub-directory to the DOS path,
- 2) locate KCBW.BAT file on the existing DOS path **(Recommended)**,
- 3) execute KCBW with the full path name.

If using KCBW.BAT file located on the DOS path, as recommended above,

- 1) change directories to the desired default directory where data and output files are, or will be, stored for this analysis,
- 2) type **KCBW**, and press **Enter**,
- 3) to start KCBW with special startup parameters, simply append the desired startup parameters to the command line (see Section 1.3.3). For example, **KCBW N!newrun** will startup KCBW to record a new executable file which will be saved to file called NEWRUN.BWX.

Windows Environment:

- 1) Use the single shortcut icon provided on disk to access the program. This options requires that the user update the default working directory so that output files are saved to the appropriate location.
- 2) Use multiple shortcut icons, one for each working directory. Copy the shortcut icon provided, change working directory, and rename. **(Recommended)**.
- 3) Start the program from the Windows Explorer (not recommended).

If using a Windows shortcut icon to run KCBW.EXE, as recommended above,

- 1) The shortcut icon contains properties that can be modified by right-clicking the shortcut icon and selecting Properties.
- 2) **Command Line:** The command line should include the Windows wildcard symbol, **?**, at the end of the command line. For example, Cmnd Line: c:\kc_swdm\kcrt.exe ?. When the command line is appended with the wildcard symbol, Windows will prompt for special startup parameters as described in Section 1.3.3.
- 3) **Working Directory:** The working directory should be set to the desired default directory where data and output files are, or will be, stored for this analysis. The working directory must exist prior to running the program with the

shortcut icon. The working directory may be on a hard disk, network drive, or floppy disk drive depending on user preferences.

To execute WKCBW you can do any of the following,

- 1) Create a shortcut icon on the Windows desktop,
- 2) From Windows explorer, drag the WKCRTS.EXE file to the desktop and release. This should create a shortcut icon on the desktop **(Recommended)**,
- 3) Start the program from the Windows Explorer (not recommended).

When running WKCBW.EXE in Windows environment, the following startup screen will appear.

Working Directory:	c:\kc_swdm\kcrtcs\example	<input checked="" type="checkbox"/> Save
Startup Parameters:	[specify]	
Project is in King County		
Select item to perform an action		

Working Directory: Set the path to the desired default working where data and output files are located, or will be saved to during the run.

Save: Check this box if you want KCBW to use this path as the default directory on subsequent runs.

Startup Parameters: Specify any of the KCBW special startup parameters described in Section 1.3.3.culvert.

1.3.2. STOPPING PROGRAM EXECUTION

The program can be stopped by selecting the "[X] eXit KCBW Program" menu item from the KCBW Main Menu. In addition, the program can be aborted at any time by simultaneously pressing the Ctrl and Break or the Ctrl and C keys (WARNING: unsaved files will be lost). In either case the user will be returned to the DOS prompt (or Windows desktop). To suspend execution of the program, press the Pause key. Press any key to resume execution.

1.3.3. ADVANCED KCBW EXECUTION MODES

In addition to the normal start-up, KCBW can be executed with three additional options related to the use of Input Response (EXEC) data files. See the end of this section for more information on the use of EXEC files. The run modes are controlled by the command line.

NORMAL INTERACTIVE MODE:

This is the basic start-up mode.

- > **KCBW**
and press **Enter**.

[N!] EXEC RECORD (NEW) MODE:

This option allows the user to record a New Input Response (EXEC) file for later execution. While running the program will only record the commands to be run at a later time. The example command below will record all user input into an ASCII file named RECORD.BWX.

- > **KCBW N!record**
and press **Enter**.

[E!] EXEC RUN (EXECUTE) MODE:

This option allows the user to run an existing Input Response (EXEC) file. All commands within the RECORD.BWX file will be executed. Any existing data files with the same filename as output files specified in the EXEC file will be automatically overwritten.

- > **KCBW E!record**
and press **Enter**.

[O!] EXEC OUTPUT MODE:

This option allows the user to echo the screen output from the execution of an Input Response (EXEC) file. The program will execute all commands within the RECORD.BWX file but will create an additional file RECORD.TXT, which will contain the screen output from the run. This option is not needed to obtain results from an EXEC run as all output results can be obtained from the data files created during the run. This mode is useful in checking and debugging EXEC files for proper execution.

- > **KCBW E!record O!record.txt**
and press **Enter**.

1.3.4. USER INTERFACE

When user interaction is required by the program the user will be presented with a popup menu box. The top line will include the Box Title. For example the box title of the first is "Backwater Analysis Program". The menu screens overwrite the output screen. If you wish to view the results from the last executed command press the **F10 key**. The previous output screen will be displayed until another key is hit.

All boxes can present the following types of items: Menu Items (In the KCBW Main Menu, this is the only Item type.), File Names, Real and Integer Values, Dates and Logical Choice. The keys on the keypad are used to move around the box. The movements are standard:

Key	Action
PgUp	Move to the Top Item in the column
PgDn	Move to the Bottom Item in the column
Up arrow	Move up one Item
Down arrow	Move down one Item
Escape	Exit box, cancel all edits returns to previous screen
Enter	Select Menu Item or Edit Data
Insert	Edit Data (in insert mode)
F1,F2	Display general Help Screen.
F10	Display Output Screen.
	The Display is canceled by pressing any key.
	This screen is also displayed while the program is computing.
When editing a Logical Choice, all keys toggle the value from one item to the other.	

Hot Keys: If the box has only one column of data, along the left margin, there will be a column of Letters or Numbers in brackets (such as [P]). To execute a menu in these boxes you can highlight the menu item and press return or simply type the character in the bracket.

When editing a channel data file the Edit Channel Popup Box will be drawn. This box has multiple columns of data. In this type of box it is important to know if you are in Edit Mode or not. Menu mode allows for cursor movement and the edit mode is used to input data. The key functions differ between modes as follows

Key	Edit Mode	Menu Mode
Left Arrow	Move Left one Character	Move left one Data Item
Right Arrow	Move Right one Character	Move right one Data Item
Home	Move to the First Character	Move to the first Column
End	Move to the Last Character	Move to the last Column
Escape	Exit Edit mode Cancel edits to this Item	Exit Screen, Cancel all edits
Enter	Exit Edit Mode	Enter Edit Mode, ready to overwrite
Insert	Toggle Overwrite/Insert	Enter Edit Mode, ready to insert
Alpha-Numeric	Overwrite/Insert Data Item	Enter Edit Mode, overwrite first character

As to what data to enter, a help line at the bottom of the screen gives some guidance, more complete information can be found in the King County Surface Water Design Manual.

1.3.5. READING/WRITING FILES TO DISK

The program prompts the user to enter filenames for reading and writing data files to disk. Any DOS filespec, including drive and/or path designators, can be used. When editing a filename, if no extension (or period) is entered, KCBW will add a default extension depending upon the type of file. It is recommended that for all KCBW routines the user allow the program to specify the filename extensions. If a filename already exists, KCBW will prompt the user to verify the filename before file is overwritten.

<i>DATA FILE TYPE</i>	<i>DEFAULT EXTENSION</i>
Headwater/Tailwater Data File	*.BWT
Channel Data File	*.BWC
Pipe Network Data File	*.BWP
Input Response (EXEC) data file	*.BWX

In interactive mode, if the filespec is already being used on the drive/path, the program prompts the user to overwrite or enter new filename. In EXEC mode, existing filenames are automatically overwritten.

To erase a filename previously entered either overwrite the filename with the correct filename or change the first letter to an asterisk (*) and the program will use NO filename. Many of the analytical routines will execute without an output file specified by displaying to screen only.

1.3.6. USE OF TEXT-EDITOR TO CREATE/MODIFY DATA FILES

All data files used by the program are saved on disk in an ASCII format. These data files may be created/revised using a pure ASCII text editor program such as QEdit, DOS EDLIN, etc. Other software programs like Word, Excel, Wordperfect, Lotus etc. may be used if the file can be saved in an ASCII format without any imbedded special control characters. This is particularly useful in modifying EXEC data files.

1.4. INPUT RESPONSE (EXEC) DATA FILES

1.4.1. CREATING AN EXEC INPUT FILE -

The program has the ability to run interactively from the keyboard or by redirecting input from an INPUT RESPONSE data file. An INPUT RESPONSE (EXEC) data file is created by running KCBW in the EXEC RECORD mode. In EXEC RECORD mode, KCBW does not execute the routines but rather saves all input response commands to the user specified EXEC data file. An ASCII text editor can be used to create/modify this file if the program response sequences are known. The example DOS command executes KCBW in the EXEC RECORD MODE where all input response commands are saved to exec data file example.bwx.

> **KCBW N!EXAMPLE**

1.4.2. RUNNING AN EXEC INPUT FILE -

The user can redirect input data from an INPUT RESPONSE (EXEC) data file stored on a disk into the program. KCBW will execute the commands in the file as if the user was typing in responses from the computer keyboard. The example DOS command will execute KCBW in the EXEC EXECUTE MODE, with the input response commands being extracted from the example.bwx data file. The program output will scroll by on the screen (Note: entering Ctrl-PrtScrn prior to execution will direct output to printer).

> **KCBW E!EXAMPLE**

1.4.3. SAVING SCREEN OUTPUT FROM AN EXEC FILE RUN -

The program output screen can be echoed and saved to a text file for later viewing/printing. This is an efficient way to check logic or debug EXEC files. KCBW will execute using the input response commands saved in the example.bwx data file, but all screen output will be echoed to the ASCII text file example.txt.

> **KCBW E!EXAMPLE O!EXAMPLE.TXT**