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COMPUTER APPROACH
TO
SOIL & WATER CONSERVATION
ENGINEERING
2001 EDITION

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INTRODUCTION:

The programs outlined in the following appendices have been written in an effort to expedite the engineering efforts involved in the design of soil and water related conservation applications. These programs should provide quick, accurate engineering solutions, but more importantly they will allow alternatives that are normally too time consuming to pursue without the use of the computer. In addition to quick answers, the programs will also provide much of the documentation necessary to support the designs. It is important to note however, that good sound engineering judgment is required in providing the inputs to the programs, to insure good sound engineering solutions.

HARDWARE REQUIREMENTS:

These programs have been written to operate in an MS-DOS™ environment using the Microsoft Basic Professional Development System, ver. 7.1. All the programs should run on equipment with 640 K RAM. The programs should run on the following operating systems:

- Microsoft Windows 3.1
- Microsoft Windows 95
- Microsoft Windows 98
- Microsoft Windows NT – Ver 4
- Microsoft Windows ME – (this is the most advanced in the efforts to phase out DOS and it is doubtful that the programs will all run in this environment, although it has not been verified.)
- Microsoft Windows 2000 Professional – has not been tested.

A system with one floppy disk is the minimum requirement, but the programs are driven by a main menu and have become large enough that they perform most smoothly on a system with a hard / fixed disk drive. Graphics capability is required for some of the programs while the remainder will run on non-graphic systems. All the programs have been compiled in order to maximize performance and secure the code.

Features have been added in an attempt to allow the programs to run on a variety of printers and monitors and in a variety of locations. Please refer to Appendix on “Engineering Program Configuration” for further details on setting up your particular system.

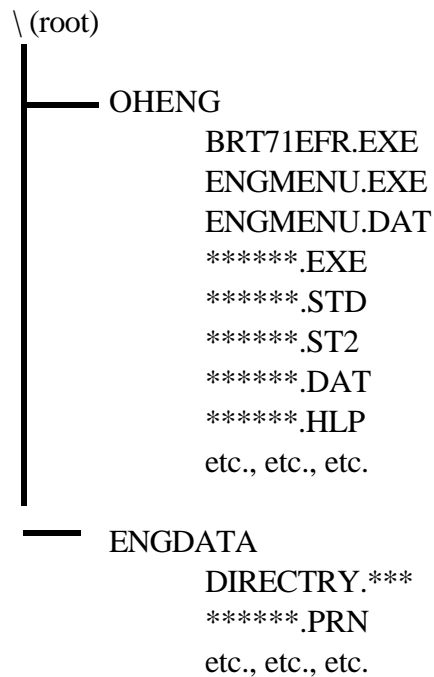
PROGRAM DISTRIBUTION:

Each of the programs are packaged in self extracting zipped files that have compressed using PKZIP™ Although these files can be distributed on diskettes or compact disks, the preferred method is to download them from the Ohio NRCS WEB site.

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INSTALLATION PROCEDURES:

For ease of management, it is recommended that the executable files and all of the supporting files be maintained in one subdirectory. The data should be kept in a different subdirectory so that the back up procedures are as simple as possible. A typical system might look like the following.



Once the system has been set up in a manner similar to this, the installation should proceed with relative ease. The actual procedure may vary but specific details should accompany the diskette(s) or be included on the first diskette in the form of a “readme” file or an “install.doc” file.

Following a successful installation, the programs are ready to run. To begin the programs, move to the subdirectory where the programs reside. If you followed the scheme previously discussed, move to “OHENG”. Once in this subdirectory, enter “engmenu” and you will be on your way.

Following a new installation, it is important to review the setup to insure that the programs are properly informed about your particular system. This is accomplished by selecting the utilities option. Next select the item that relates to the “OH_ENG.CFG” file. Guidance on using this utility can be found in the appendices.

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REQUIRED FILES:

Each of the programs is compiled into one executable file. There is a list of files that support each of the programs. If they are absent, error conditions will be created. A general list of these files and their purpose follows. More specific file requirements can be found in the appendix that applies to each specific program.

- BRT71EFR.EXE** - As mentioned above, each of the programs are compiled and this file is referred to as a runtime module. Basically, this means that this file **has** to be present for **any** of the programs to run.
- OH_ENG.CFG** - Each program reads this file to determine things like the type of monitor or printer being used, the colors desired, or the directory where the data is to be saved. As you might guess, this file is required for the programs to run properly.
- PROGNAME.ST?** - These files contain most of the default values or values that are required by standards and specifications. Some programs require a file similar to this and others do not. If one is required and not available, the error message should explain the programs needs.
- PROGNAME.HLP** - This file contains help information for the program. All of the programs will run without this specific file available. However, if the program looks for such a file and can not locate it, a "*No help available !!*" message will result and a file with zero bytes and a "HLP" extension will be created.
- OHIOENG3.ICO** - This is an icon file that can be used for those systems that use WINDOWS™.

SPECIAL KEYS:

- ¿ Each application is written to be as "friendly" as possible. In most cases the inputs are solicited using a light colored box or entry cell. It should be noted that the inputs are not registered to the program until the "**return**" (↵) key is pressed. Failing to press the "return" key might result in an error message or it might result in computations being made without the input you thought you had made. Remember to input the requested data and then **press return** (¿) before computing, printing or saving the data. Later versions of the programs have made the **tab key** to also act as the return key.

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- F1** This function key will display help information if it is available. On some screens, you will be offered an option of selecting help for the particular entry where the cursor is, the entire screen or special keys.
- F2** This key has been designated as the "**edit**" key. Pressing this key will afford you the opportunity to edit a previous entry or default value without completely retyping it. In this mode, the system shifts into an automatic "insert" mode and the left and right cursor keys and the backspace key, all become active. Once again, the return (↵) key will register your final entry.
- F3** In some instances, pressing this key will cause a calculator to pop up on the screen. This is handy when you need to make a quick calculation. Pressing F1 while the calculator is on the screen will cause a "help" window to appear that explains how to use the calculator.
- F4** Where applicable, this key will provide a list of choices for the entry at the cursor position. Normally a message will appear at the bottom of the screen when this key has been activated.
- F5** This key is often used to cause the print functions to be activated. This also will be noted at the bottom of the screen.
- F9** In many cases a computation process is initiated using F9. It is normally used in combination with a data entry screen where values can be entered, a computation made, answers evaluated and the process repeated until a satisfactory or acceptable solution is reached.
- F10** On several occasions the F10 key is used to signify that the edits or entries on the current screen are complete and the user is ready to proceed.
- Alt P** This combination of keys is frequently used on graphics screens. Their purpose is to reproduce the graphics display on the printer that is identified as being connected to the system. Using this procedure has advantages over using "Print Scrn" in that it deals with EGA and VGA graphics better than some versions of DOS™ do and it will plot on laser printers.
- OTHER KEYS:** The bottom row of the screen contains the function keys that are applicable for that particular screen. If there are too many "hot" keys to display they will normally be displayed on the help screen. In addition, the status of the "Caps Lock" and "Num Lock" keys will be displayed in the lower right hand corner of the screen.

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EXPECTED ERRORS:

Many error conditions have been trapped within the programs. These errors will generate a brief alarm and a message on the screen. Some messages will remain displayed for about two seconds so you need to be alert or you will need to reproduce the error to get a second chance at reading the error message. Others which may have slightly more serious consequences might require pressing a key in order to make them disappear. Typical errors would be that a letter was used when a number was expected, the entry was too long or too large, a computation was attempted with no data, etc.... Most of these errors conditions are self explanatory or are explained in the appendices. If you do not understand the significance of the error, discuss it with your area engineering staff or IRM staff.

UNEXPECTED ERRORS:

A great deal of effort has been made to get the so called "bugs" out of these programs. It is however, nearly impossible to catch them all. In an effort to deal with these situations, a procedure has been developed to catch these "bugs" in a manner that will not cause the program to "**bomb out**" and lose valuable data for you. If you should be infested with one of these little "critters", a message will appear on the screen with a brief description of what has happened. The message might not be meaningful to you but someone wants to know about it, (namely me !!) so please follow the instructions that appear and try to document to the best of your ability the events that led up to the situation. If you have saved (or can save) any data related to the job that you are working on, copy the files to a diskette and please forward the diskette and the printed screen to me. This information will be very valuable in keeping the "bugs" from attacking other users.

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SAVED DATA:

Data is saved a little differently than by most software. For this software package we have tried to develop a scheme that is somewhat consistent throughout all of the programs. To achieve this the following file naming scheme was devised. An example file name might be "**AWM94074.PRN**". This name can be interpreted in the following manner:

AWM	- This three letter code indicates that the data in the file is related to the Animal Waste Management Program.
94	- This indicates that the data was either last saved or initially save in 1994. This number normally comes from the system clock. This is just one reason the time should be correct in your computer. (Note: When retrieving data, the files are sorted in reverse order. With the new mellenium, the "00" and "01" files will appear at the end of the list, so it might be time to weed out the pre 2000 files.)
074	- A job number is assigned to each job by the user. This is a random number but can be used to systematically organize the projects in your office. It is a good practice to number all of the engineering jobs that are worked on within the office. That way the survey data, the design data, the plan data, etc. ... can all have the same job number.(one day the computer might search through the computer and find all the jobs that are inter-related)
PRN	- This file extension simply indicates that the data is saved in an ASCII format and that it is printable either to the screen or to the printer.

In addition to saving the data in a file as described above, information about the job and the file name is maintained in a second file. This file is named **DIRECTRY** and has an extension consistent with the program that is being used. For example, if the survey program is being used, the file is named "DIRECTRY.SSN". This file is used to display the information about each job so that you have a better chance of retrieving the job that you really want. This is all done automatically by the programs, but it is important to understand what is happening because if the "DIRECTRY.xxx and the "xxxxnnnnn.PRN" files become separated, the list of available files may not contain all of the information about the job and the list might appear strange to you. Another consequence of the DIRECTRY.xxx files and the data files becoming separated is that a second DIRECTRY.xxx file might be created. This could get to be confusing after a while.

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There is a maximum of one hundred (100) files allowed in any one "DIRECTORY.xxx". Once the DIRECTORY.xxx file has been filled with one hundred file names, either some will need to be removed or perhaps it is time to archive all of the files for this application and begin again.

As confusing as this sounds, I am sure that it will become more clear as you use the programs. If by chance the DIRECTORY.xxx gets separated from its supporting files or messed up in any other way, it can be erased and will be reconstructed as each of the files in the particular program group is used and saved. Another approach is to edit it using a compatible editor or word processor as it is an ASCII file.

Using a Mouse :


A mouse can be used to make selections from a choice list, move the cursor and duplicate the actions of the Esc and Enter (↵) keys. The left mouse button duplicates the action of the Enter (↵) key and the right button will simulate the Esc key. In addition to the normal procedures of loading a mouse using either "*mouse.com*" or "*mouse.sys*", these programs have one additional requirement. In order to deal with some of the real early versions of DOS, these programs search through the "*autoexec.bat*" and "*config.sys*" files on the "C:" drive for the word "**mouse**". If this word is found, the programs assume that you have a mouse and behaves accordingly. If you do not have a "C:" drive, you might have to use the DOS "assign" or "subst" functions. If "mouse" does not appear in either "*autoexec.bat*" or "*config.sys*", adding REM MOUSE to the "autoexec.bat" file will satisfy the programs and the mouse features should work.

Graphics Required:

Some of the applications require graphics capability. This is typically not a problem with the modern computers. If you access a program only to receive a message indicating that graphics are required, either you have improperly configured the engineering programs or it is time to discuss the need for a new computer with your boss.

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the Engineering Menu:

The engineering menu is a feature that is designed to “package” the Ohio engineering programs and make them easier to access. This program (menu) is activated by entering **engmenu**  at the DOS™ prompt. A choice list will appear that contains all of the programs or applications that can be accessed using this technique. In addition, the date and time will be displayed at the top of the screen. This is the same date and time that will be associated with any data files that are saved and reports that are printed, so this is a good opportunity to make certain that your system clock is correct. While this menu provides easy access to the Ohio engineering programs, it should be noted that the programs can also be activated by entering the title of their individual executable (“**.exe**” extension) file name. (Note - this method is required in order to make the programs run on some network systems)

The programs can be selected by moving the selection bar to the desired program using the arrow keys or the mouse and pressing the enter key or the left mouse button. They can also be reached by pressing the “hot” key which highlighted letter or a letter of a different color. As with the choice lists in all of the programs, if there is a unique selection key for each choice in the list, it will be displayed in a different color or intensity. If a unique choice does not exist, the selection process will be reduced to moving the highlight bar to the desired selection and pressing return. A “<more>” message at the bottom of the selection window indicates that more programs exist that will fit in the window. These can be accessed by holding down the arrow key until the window scrolls. Pressing the F1 function key will provide a brief description of the program that is highlighted.

While the menu was designed to access or drive the Ohio engineering programs, it contains features that allow other programs to be added as well. While this feature was added so that other engineering programs such as TR-20¹ and TR-55² could be included in the menu, it would be possible to add your favorite word processor, spread sheet, or ASCII text editor as well.

The program is supported or driven by a file named “*engmenu.dat*”. This file contains the information that is displayed in the menu choice list as well as the instructions necessary to run the applications listed. The “*engmenu.dat*” file is an ASCII file and while it adds versatility to the program, it is very important that its format and structure be respected (particularly the commas and quotation marks). Following is an sample “*engmenu.dat*” file with comments about the different sections. The information that is within the boxes is not a part of the file but is an attempt to explain the information in the file.

¹ TR-20 = NRCS Technical Release No. 20 - Project Formulation Hydrology

² TR-55 = NRCS Technical Release No. 55 - Hydrology for Urbanizing Areas

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Example of "ENGMENU.DAT".

"* Program Identifier *", "OH-Ver 5.2"

All information is contained within quotes and separated by commas. That information that contains an asterisk on each end is purely information for the user. The program does not use it at all. On the line above, the left portion is simply saying that the right portion is a program identifier. In this case it is the version of the menu program and is the information that is displayed on the main screen.

"* Menu Title *", " A Collection of Engineering Programs "

Once again, the data between the asterisks tells the user that the information on the right is the menu title which is the title that is displayed when the menu appears on the screen.

"* Filename *", "* Menu Display *"

The remainder of the information in the file deals with the selections that are available in the menu. The data on the right identifies the programs that are available. In most cases this list of programs will appear in alphabetical order. This information should be descriptive enough that the user can identify the program they wish to access. There is a length limit of 76 characters that can be used for this purpose. The data on the left end of the line identifies the file that is to be used to access the program.

The menu can process two types of files, those that were developed using Microsoft BASIC™ and most others. If the file name ends with an ".exe" extension, the menu assumes that the program referred to was written in BASIC and acts accordingly. This is the case with all of the Ohio Engineering Programs. The other acceptable extension is ".bat" which causes the menu to execute the instructions in the named "batch" file. Applications that were not written in BASIC should use the "batch" file technique. It should be noted that some large applications and some versions of DOS™ might have difficulty with using "batch" files in this manner. An example "batch" file is included later.

If the menu program finds a blank space in the file name portion of "engmenu.dat", it is a signal that there is a submenu associated with this selection. The name of the file listed left of the space is not important as long as it has an "exe: or "bat" extension. The program identifies the portion right of the space as an ASCII file containing a list of instructions for the submenu and interprets this list in the same manner that "engmenu.dat" was interpreted. The menu program allows three layers or two submenus to be displayed on the screen at any one time.

"AWM.EXE",	"Animal Waste Management Systems"
"WW.EXE",	"Waterway Design (w/ retardance)"
"SSRP.EXE",	"Stadia Note Reduction & Plotting"
"HYDRO.EXE",	"Curve Number and Peaks"
"XSEC.EXE",	"Cross-sections w/ Quantities"
"DNL.EXE",	"Downloading Electronic Data"
"UTIL.EXE ENGMENU2.DAT",	"Utility Programs"

The blank space between the E's identifies this as a submenu with the instructions contained in a file named "ENGMENU2.DAT".

"WSP.EXE",	"Water Surface Profiles"
"POND.EXE",	"Pond Design"
"HYDR.EXE",	"Hydraulic Formula Solutions"
"MYPROG.BAT",	"Batch file to run Myprog"

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Example of a "BATCH" file "MYPROG.BAT" When called from the engineering menu, this batch file causes the menu to go into suspension and then executes "myprog". When this program is completed, the engineering menu is reactivated.

cd \mydir

This instruction changes to the directory where myprog resides. If the program were on a different drive, sufficient instructions would need to be given to change to that drive.

myprog

This activates myprog.

cd \oheng

This feature is VERY important. It returns the system to the subdirectory where the engineering programs reside. Failure to do this can cause several error conditions when trying to make selections from the engineering menu.

cls

This clears the screen so that the engineering menu will not have a bunch of friends when it reappears.