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USER'S MANUAL FOR PROGRAM CHANSEC

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USER'S MANUAL FOR PROGRAM CHANSEC

In computer simulation of large river systems, hand modification of cross-sectional data is so time consuming that evaluation of more than a few alternative channel designs is impractical. Because of this, an interactive computer program (CHANSEC) was developed that modifies an existing set of digitized cross sections to reflect modifications such as channelization, levee placement or changes in channel roughness. The program also plots cross sections and the bed profile on a Tektronix screen or pen plotter. In only a few minutes, this program can modify the cross section file of hundreds of miles of river to reflect channelization.

A manual was prepared to assist the computer user in utilizing Program CHANSEC. The following section provides detailed instructions on the use of the program. An example run of the program is provided on pages 8 through 10.

I. PROGRAM EXECUTION

After login is completed, the following is entered:

```
-CHAN
```

The next display shown is

```
CROSS SECTION-CHANNEL MODIFICATION

ENTER NAME OF CROSS SECTIONS FILE TO BE USED.
THE NAME ** MUST ** END WITH A PERIOD (.)
?
```

The name of the file containing the cross sections to be modified is entered. The structure of the cross sectional data must correspond to

the format on page 11. Currently, the program allows a maximum of 100 cross sections to a file. It is necessary to know the river mile associated with each cross section since modifications are performed on a "range" of river miles. Once the file name is supplied, the program will respond with

```
SELECT ONE OF THE FOLLOWING:
     1  CHANNELIZE CROSSECTIONS
     2  LEVEE PLACEMENT
     3  EDIT MANNING'S N
     4  PLOT
     5  NO CHANGES- END PROGRAM
?
```

The user will select a category from the above five options. The number for the option desired is entered. If (5) NO CHANGES-END PROGRAM is selected, refer to page 5 of this manual. The program will return to the above display after completion of the first operation for selection of another option.

The original file of cross sections remains unchanged after execution of the program. The first three options generate a new data file that requires the user to supply a name at the end of the program to save that file. If only (4) PLOTTING is done with no modifications, no new file is created.

Once the above selection is completed, operations are performed on a "range" of river miles. The program will respond with

```
ENTER RANGE OF RIVER MILES
FROM:
?
```

For "FROM," enter the river mile of the cross section where the modifications will begin. The program will respond with

```
TO:
?
```

The "TO: is the river mile of the last cross section in the range. The "TO" river mile must be greater than the "FROM" river mile.

Depending on the original option selected (1) through (5), one of the following functions is performed:

(1) CHANNELIZE CROSS SECTIONS

For the range of cross sections specified above, channelization is performed using the following information. The program responds:

```
ENTER THALWEG ELEVATION FOR DOWNSTREAM SECTION IN FEET M.S.L.
?
```

The desired thalweg elevation at the downstream cross section is entered. The program responds with:

```
ENTER NEW RIVER SLOPE FOR REACH
?
```

The slope for the new channel, in a decimal value, is supplied to the program. The program adjusts the thalweg elevation for each cross section according to the slope value entered.

The next program response is

```
ENTER CHANNEL WIDTH, RIGHT SIDE SLOPE, AND LEFT SIDE SLOPE.
?
```

Values for channel bottom width and side slopes must be entered. Side slopes are entered as whole numbers (a slope of three is equivalent to a slope with a one-foot vertical rise for three feet horizontal run).

The right and left sides refer to the channel looking downstream. The three values may be entered on one line, separated by commas, or entered one at a time. When the channelization computations are complete, the total volume cut for the reach is displayed:

```
TOTAL VOLUME CUT =     273917. THOUSAND CUBIC YARDS.

ANOTHER REACH (0-NO,1-YES)
?
```

The user then has the opportunity to channelize another reach. By answering "1" (yes), the program returns to the statement below:

```
ENTER RANGE OF RIVER MILES
FROM:
?
TO:
?
```

If the user is finished with this option, enter "0," and the program will return to the selection display.

(2) LEVEE PLACEMENT

Levees may be placed on the specified range of cross sections according to information supplied to the following questions:

```
ENTER DISTANCE FROM RIGHT LEVEE TO THALWEG
?

ENTER DISTANCE FROM LEFT LEVEE TO THALWEG
?
```

The user will enter appropriate values for distances from the levee for the range.

New cross sections are then determined and the following is displayed:

```
ANOTHER REACH (0-NO,1-YES)
?
```

If the user desires to place levees on another reach of river, enter "1," and the program will question for the next range.

If levee placement is complete, enter "0" and the program will return for selection of another option.

(3) EDIT MANNING'S n

The user may edit the values of Manning's n associated with each cross section through this option. For the range of cross sections previously entered, respond to the following question:

```
ENTER NEW MANNING'S N FOR RIGHT OVERBANK, MAIN CHANNEL, AND LEFT OVERBANK
?
```

Enter three values in the order requested for Manning's n. The values may be entered on one line, separated by commas, or entered one at a time after each question mark.

Once the values are changed in the file, the user has the option of changing Manning's n for another reach of river by responding to the next question:

```
ANOTHER REACH (0-NO,1-YES)
?
```

Enter "1" to change values on another reach, or "0" if completed with the option.

(4) PLOT

The user has the choice of plotting original cross sections, new cross sections, or bed profile for the range of river miles specified.

If the user begins the program and chooses only to plot the cross sections in the file with no modifications, the following is displayed:

```
ENTER 0--PLOT BED PROFILE
      1--PLOT CROSS SECTIONS
?
```

If any options (1) through (3) have been executed, the following is displayed:

```
ENTER 0--PLOT BED PROFILE
      1--PLOT ORIGINAL AND NEW CROSS SECTIONS
?
```

If "0" or "1" is selected for the range of cross sections chosen, the program will proceed to the corresponding selection.

Plot Bed Profile

The bed profile for the desired cross sections may be plotted on the Tektronix screen or pen plotter. The program asks for a response to the following:

```
ENTER 1 FOR PEN PLOTTER; 2 FOR SCREEN
?
```

Enter "1" or "2" and the plot will be executed.

Once the profile plot is complete, a question mark will appear in the lower left corner of the screen. This allows a pause for the user to view the plot or make a hard copy of the display.

When ready to continue, strike the carriage return after the question mark appears and the computer will continue to the next question.

The user may then plot another range, or return to the option selection display.

Plot Cross Sections or Plot Original and New Cross Sections

Each cross section in the range will be individually plotted by this option. If modifications were made to the file, both the original and the new cross section will be plotted.

The plots may be drawn on either the Tektronix screen or pen plotter. The program asks for a response to the following:

```
ENTER 1 FOR PEN PLOTTER; 2 FOR SCREEN
?
```

Select "1" or "2" and the plot will be executed.

After one cross section is plotted, a question mark appears in the lower left corner of the screen. This allows the user to pause between cross sections for viewing or making a hard copy of the display.

When ready to plot another cross section, the user will strike the carriage return after the question mark appears.

After all cross sections are plotted, the user may plot another range or return to the selection display.

(5) NO CHANGES

Once the user has completed the options desired, the new cross sections will be stored in a separate file. The user should respond to:

```
ENTER NAME FOR NEW CROSS SECTION FILE.
THE FILE NAME MUST END WITH A PERIOD.
?
```

An appropriate name for the file must be entered that has seven characters or less, followed by a period.

The new data is filed under that name and the program ends by displaying:

```
READY
```

Should only option (4) PLOT (without changes) be selected, no new file is generated, and the program ends by displaying:

```
READY
```

II. SAMPLE RUN

```
EXAMPLE RUN OF CHANSEC

-CHAN


CROSS SECTION-CHANNEL MODIFICATION

ENTER NAME OF CROSS SECTIONS FILE TO BE USED.
THE NAME ** MUST ** END WITH A PERIOD (.)
? MAINNTL.

SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 1


ENTER RANGE OF RIVER MILES
FROM:
? 116.2
TO:
? 130

ENTER THALWEG ELEVATION FOR DOWNSTREAM SECTION IN FEET M.S.L.
? 75

ENTER NEW RIVER SLOPE FOR REACH
? .0001

ENTER CHANNEL WIDTH, RIGHT SIDE SLOPE, AND LEFT SIDE SLOPE.
? 250,3,3

TOTAL VOLUME CUT =       6016. THOUSAND CUBIC YARDS.

ANOTHER REACH (0-NO,1-YES)
? 0
```

```
SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 2


ENTER RANGE OF RIVER MILES
FROM:
? 116.2
TO:
? 140.0

ENTER DISTANCE FROM RIGHT LEVEE TO THALWEG
? 1000

ENTER DISTANCE FROM LEFT LEVEE TO THALWEG
? 850

ANOTHER REACH (0-NO,1-YES)
? 0

SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 3


ENTER RANGE OF RIVER MILES
FROM:
? 116.2
TO:
? 140.0

ENTER NEW MANNINGS N FOR RIGHT OVERBANK, MAIN CHANNEL, AND LEFT OVERBANK
? .150,.030,.125

ANOTHER REACH (0-NO,1-YES)
? 0
```

```
ANOTHER REACH (0-NO,1-YES)
? 0

SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 4

ENTER RANGE OF RIVER MILES
FROM:
? 116.2
TO:
? 117.0

ENTER 0-- PLOT BED PROFILE
      1-- PLOT ORIGINAL AND NEW CROSS SECTIONS
? 1


ENTER 1 FOR PEN PLOTTER; 2 FOR SCREEN
? 1
```

(Figure 1 is the plot produced by these steps.)

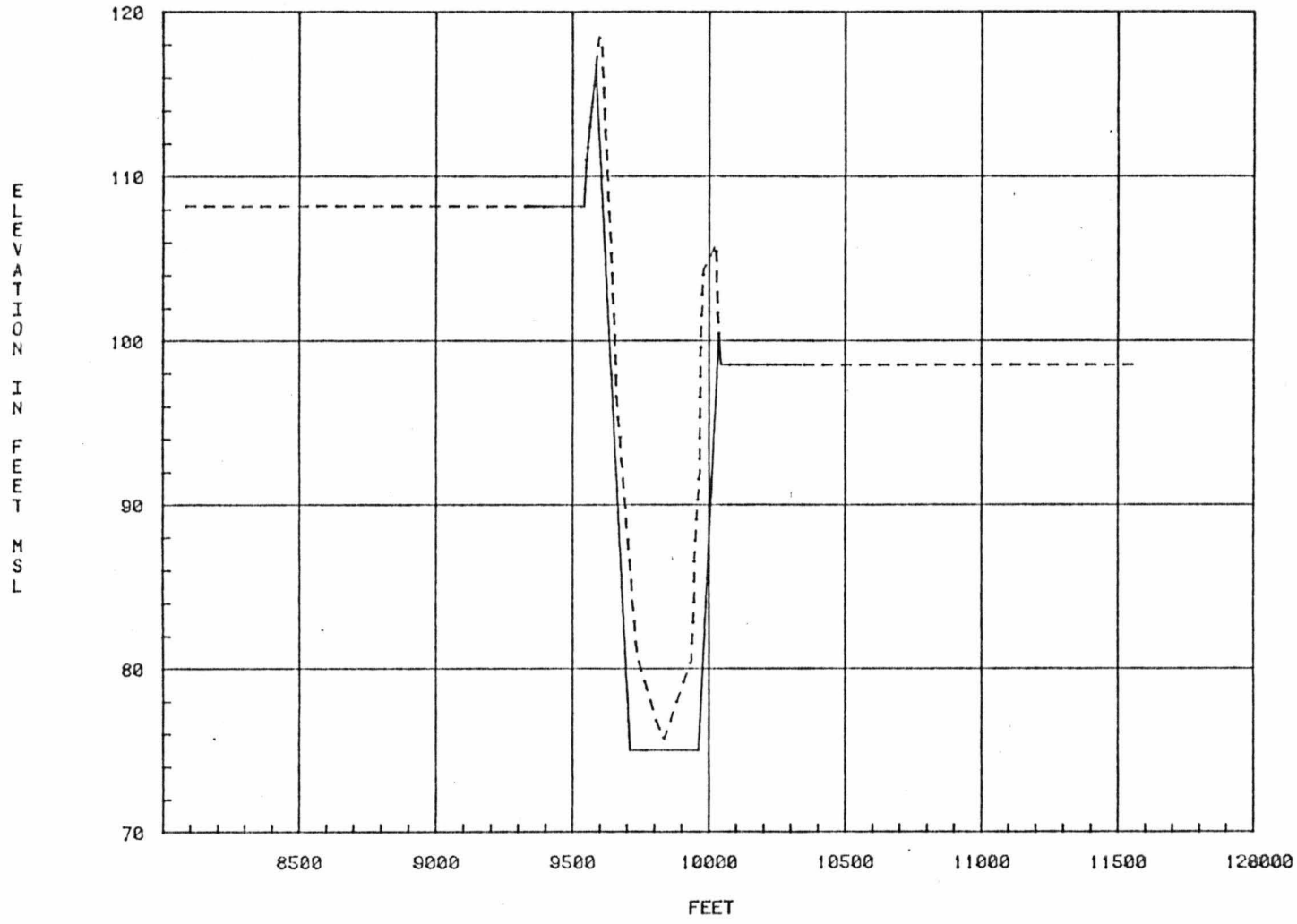
```
SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 4


ENTER RANGE OF RIVER MILES
FROM:
? 116.2
TO:
? 307.0

ENTER 0-- PLOT BED PROFILE
      1-- PLOT ORIGINAL AND NEW CROSS SECTIONS
? 0

ENTER 1 FOR PEN PLOTTER; 2 FOR SCREEN
? 1
```

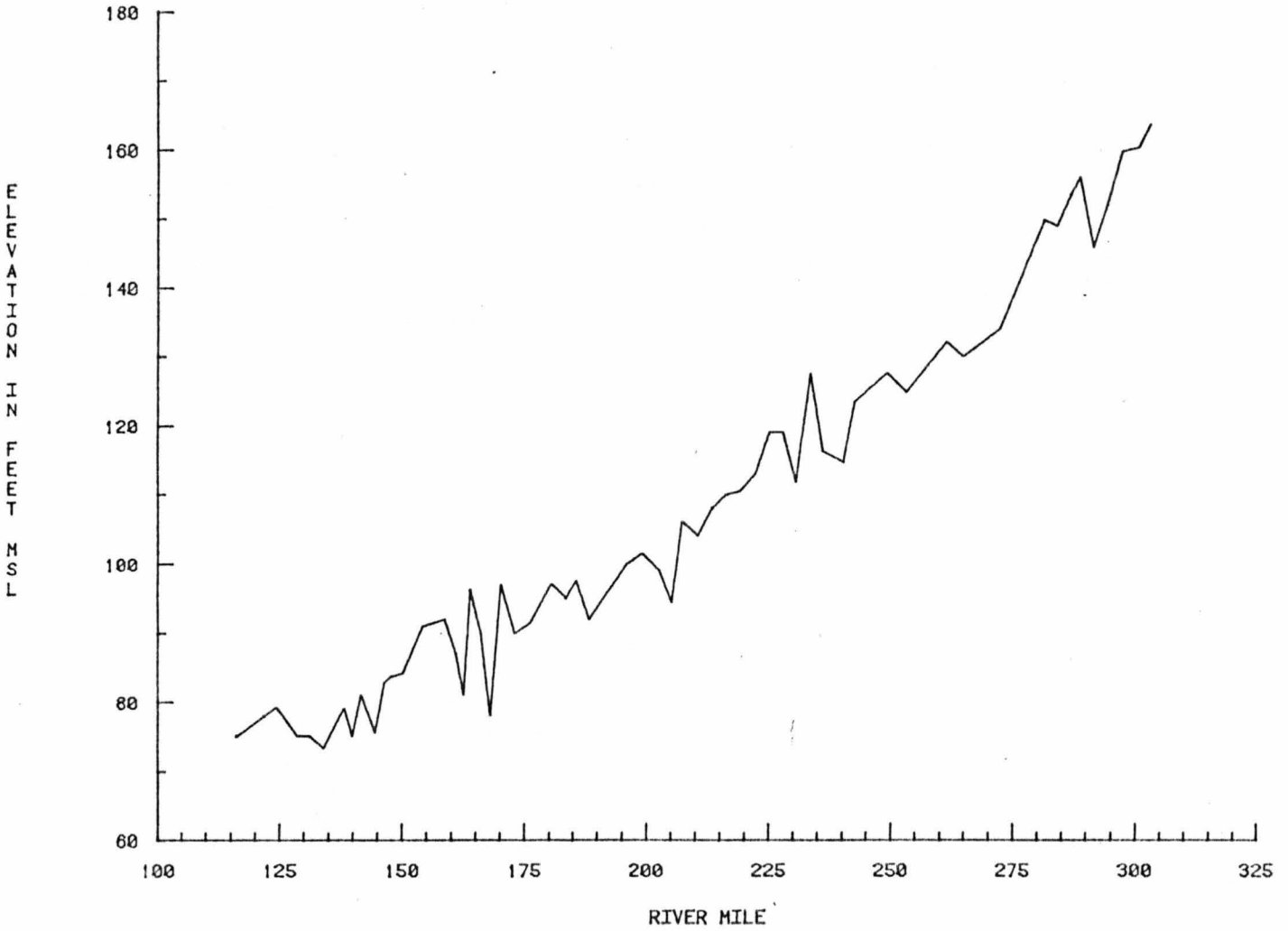
(Figure 2 is the plot produced by these steps.)



SOLID LINE - NEW
DASHED LINE - ORIGINAL

RIVER MILE 116.20
DATE- 0 0 0

Figure 1



BED PROFILE

Figure 2

```
ANOTHER REACH (0-NO,1-YES)
? 0

SELECT ONE OF THE FOLLOWING:
     1   CHANNELIZE CROSSECTIONS
     2   LEVEE PLACEMENT
     3   EDIT MANNING'S N
     4   PLOT
     5   NO CHANGES- END PROGRAM
? 5

ENTER NAME FOR NEW CROSS SECTION FILE.
THE FILE NAME MUST END WITH A PERIOD.
? EXAMPLE.
READY.
```

III. CROSS SECTION DATA FORMAT

Cross sectional data used by CHANSEC must be structured in the following FORTRAN format.

For each cross section:

(1) CS card containing number of points in the cross section, river mile, cross section date, and a description.

Format used: (2X, I3, F7.0, 3X, 3(I2, 1X), 1X, 4A10, A7)

(2) PT card(s) lists pairs of horizontal and vertical coordinates (in that order) for each cross-section point. The number of PT cards depends upon number of points in the cross section (6 points per card). The cross section must be digitized from right to left looking downstream.

Format used: ((8X, 6(F6.0, F6.1))

(3) Card containing the following information in the format (2F10.0, 2F10.5).

Horizontal distance of right overbank

Horizontal distance of left overbank

Manning's n for right overbank

Manning's n for main channel

Manning's n for left overbank

Overbank elevation

A sample of the cross-section file used by CHANSEC is shown in Figure 3.

```
CS 15     .50     4  7 70  CORPS OF ENG.X-SECT.PLOTS
PT       -745. 169.0 -250. 169.0 -190. 168.0 -185. 160.0 -175. 155.0 -160. 153.0
PT       -145. 152.0  -80. 154.0  -30. 154.0  -15. 169.0  -10. 169.0   -5. 170.0
PT          5. 169.0   50. 169.0  455. 169.0
   -185.00    -15.00    .15000    .03500    .15000    169.00
CS 13    2.80     4  6 70  CORPS OF ENG.X-SECT.PLOTS
PT         68. 178.0  500. 178.0  555. 178.0  565. 165.0  570. 161.0  580. 160.0
PT        630. 159.0  700. 160.0  705. 159.0  720. 161.0  725. 178.0  750. 179.0
PT       1268. 179.0
    555.00    725.00    .15000    .03500    .15000    178.00
CS 16    5.90     4  6 70  CORPS OF ENG.X-SECT.PLOTS,YOCONA
PT      -1059. 187.2 -800. 187.2 -701. 188.4 -690. 188.0 -677. 182.1 -650. 182.1
PT       -622. 179.5 -602. 171.5 -562. 169.4 -531. 169.4 -500. 167.9 -480. 168.4
PT       -459. 167.5 -435. 187.0 -301. 186.6  141. 186.6
   -622.00   -435.00    .15000    .03500    .15000    186.60
CS 13    9.10     4  2 70  CORPS OF ENG.X-SECT.PLOTS
PT       -520. 195.0 -100. 195.0    5. 195.0   15. 197.0   45. 177.0   50. 175.0
PT         80. 174.0  130. 175.0  140. 176.0  170. 196.0  180. 195.0  250. 194.0
PT        680. 194.0
     15.00    170.00    .15000    .03500    .15000    195.00
CS 16   11.00     4  2 70  CORPS OF ENG.X-SECT.PLOTS
PT       -480. 201.0    0. 201.0   70. 203.0   80. 202.0  120. 178.0  140. 181.0
PT        160. 179.0  180. 182.0  200. 182.0  230. 181.0  250. 183.0  280. 188.0
PT        300. 199.0  315. 200.0  350. 199.0  720. 199.0
     80.00    300.00    .15000    .03500    .15000    199.00
CS 15   12.90     4  1 70  CORPS OF ENG.X-SECT.PLOTS
PT       -765. 209.0 -350. 209.0 -310. 209.0 -265. 208.0 -250. 194.0 -225. 189.0
PT       -165. 188.0 -145. 191.0 -125. 195.0 -120. 202.0 -110. 208.0 -100. 209.0
PT        -20. 207.0    0. 208.0  435. 208.0
   -265.00   -120.00    .15000    .03500    .15000    207.00
```

Figure 3. Sample cross-section file.

NOTES