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BEACH PROFILE ANALYSIS SYSTEM (BPAS). VOLUME V. BPAS USER'S GUI--ETC(U)

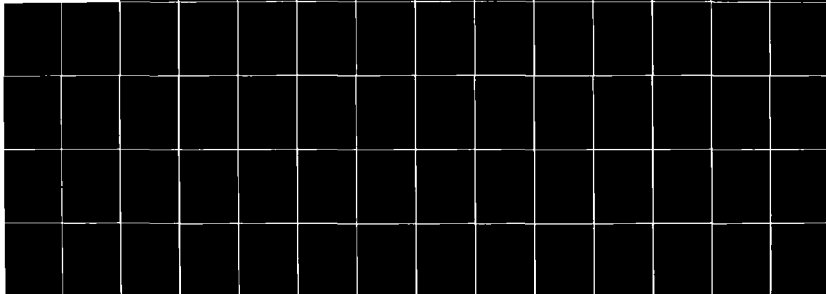
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Beach Profile Analysis System (BPAS)

Volume V

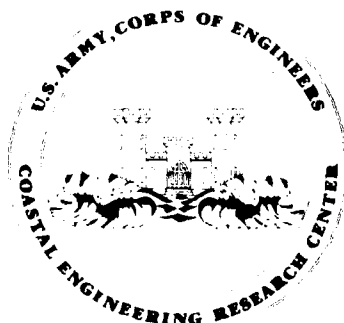
BPAS User's Guide: Analysis Module BEACH

by

Marilyn V. Fleming and Timothy J. Lawler

TECHNICAL REPORT NO. 82-1 (V)

JUNE 1982



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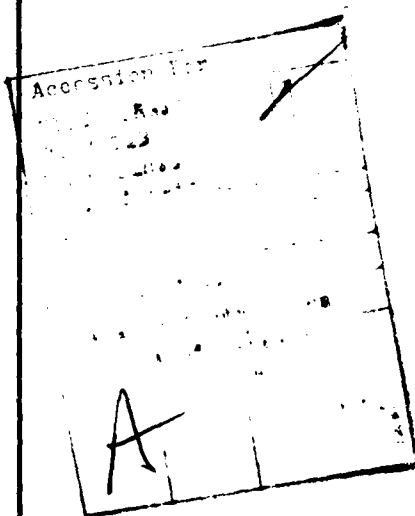
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The first editing program checks for missing or unreasonable data, surveying or note-reducing errors, and improper arrangement of data cards. The second editing program assumes that most errors have been corrected and, while it does some minor editing, its major function is to sort, reformat, and store the data on the selected permanent storage media. It is also used to update or extract data from existing files and performs some preliminary data analysis.

The analysis programs compute changes in shoreline position, selected contour positions, sand level, sand volume, and statistical trends and correlations. The results are plotted in a number of ways for display purposes. Output can be specified for English or metric units and can be referenced to any horizontal or vertical datum. Contour positions, including the shoreline position, are interpolated linearly between adjacent surveyed points on the profile. If a survey does not cross the datum elevation, but does reach a specified minimum elevation (e.g., +2 feet MSL), the shoreline position can be extrapolated using the two seawardmost points. Before computing volume changes, common bonds are established relative to the landward and seaward extent of the surveys on each profile line. The computed area under each profile is then expressed in terms of a "unit volume" for a shore-normal slice that is one unit wide. Rates of change in shoreline position and unit volume are computed by linear regression analysis.

The BPAS package has been designed for use primarily on the CDC 6600 computer, although much of the coding was done in standard FORTRAN for use on other systems.



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PREFACE

This report is published to provide coastal engineers with the documentation of a package of computer programs for editing, analyzing, and displaying beach profile survey data. This package, named the Beach Profile Analysis System (BPAS), was needed for the analysis of a large data bank of field and laboratory profile surveys. The work was carried out under the U.S. Army Coastal Engineering Research Center's (CERC) Beach Profile Studies work unit, Shore Protection and Restoration Program, Coastal Engineering Area of Civil Works Research and Development.

This report (Vol. V), the fifth of eight volumes, contains user instructions for the analysis module BEACH, which produces plots and tables of unit volume and shoreline position changes.

The report was prepared by Marilyn V. Fleming and Timothy J. Lawler, Systems Analysts, under the supervision of P. Pierce, Chief, ADP Office, with the assistance of Allan E. DeWall, Geologist, under the supervision of C.J. Galvin, formerly Chief, Coastal Processes Branch, and Mr. R.P. Savage, Chief, Research Division.

Instrumental insight concerning a previous version of the Beach Profile Analysis System was provided by B. Sims. Programing was accomplished by M. Fleming and T. Lawler with the assistance of D. French, J. Alquist, R. Hylton, and F. Wilson.

The authors acknowledge the helpful discussions and review comments of Drs. C. Everts, C. Galvin, R. Hallermeier, and C. Vincent, and W. Birkemeier, M. Hemsley, A. DeWall, H.C. Miller, B. Sims, and P. Vitale.

Technical Director of CERC was Dr. Robert W. Whalin, P.E., upon publication of this report.

Comments on this publication are invited.

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TED E. BISHOP
Colonel, Corps of Engineers
Commander and Director

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CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	by	To obtain
inches	25.4	millimeters
	2.54	centimeters
square inches	6.452	square centimeters
cubic inches	16.39	cubic centimeters
feet	30.48	centimeters
	0.3048	meters
square feet	0.0929	square meters
cubic feet	0.0283	cubic meters
yards	0.9144	meters
square yards	0.836	square meters
cubic yards	0.7646	cubic meters
miles	1.6093	kilometers
square miles	259.0	hectares
knots	1.852	kilometers per hour
acres	0.4047	hectares
foot-pounds	1.3558	newton meters
millibars	1.0197×10^{-3}	kilograms per square centimeter
ounces	28.35	grams
pounds	453.6	grams
	0.4536	kilograms
ton, long	1.0160	metric tons
ton, short	0.9072	metric tons
degrees (angle)	0.01745	radians
Fahrenheit degrees	5/9	Celsius degrees or Kelvins ¹

¹To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use formula: $C = (5/9) (F - 32)$.

To obtain Kelvin (K) readings, use formula: $K = (5/9) (F - 32) + 273.15$.

BEACH PROFILE ANALYSIS SYSTEM (BPAS)

Volume V. BPAS User's Guide: Analysis Module BEACH

by
Marilyn V. Fleming and Timothy J. Lawler

I. INTRODUCTION

This report, the fifth of eight volumes, provides user instructions for processing analysis module BEACH, a part of the Beach Profile Analysis System (BPAS). (Fig. 1). The BPAS is a package of computer programs which edit and analyze beach profile data. The objective of the analysis is to compute and display changes in unit volume, shoreline position, and profile geometry. BEACH displays beach profile changes, through time, at a locality by providing tabular and graphical displays of shoreline and unit volume changes. The module also displays the results of linear regression analysis correlating shoreline and unit volume changes with time and with one another.

Volumes I and VIII contain information concerning data collection, formatting and restrictions, and program computations, assumptions, and error messages not repeated in this volume. It is recommended that Volumes I and VIII be used in conjunction with this volume. Volume II, which is a user's guide for processing the editing routines, EDIT1 and EDIT2, contains guidelines for the initial preparation of survey data. These guidelines are not repeated in this volume. Other volumes available in the series are:

(a) Volume III, "BPAS User's Guide: Analysis Module SURVY1," which produces comparative plots of beach profiles.

(b) Volume IV, "BPAS User's Guide: Analysis Module SURVY2," which produces plots and tables of contour positions.

(c) Volume VI, "BPAS User's Guide: Analysis Module VOLCTR," which produces tables and plots of change in unit volume between specific contour segments.

(d) Volume VII, "BPAS User's Guide: Analysis Module ELVDIS," which produces tables and plots of change and maximum and minimum elevations at specific distances.

Each of these volumes contains instructions for processing only the module with which it is concerned.

II. PROGRAM DESCRIPTION

The survey input data processed by program BEACH (Fig. 2) are assumed to have already been processed through the editing routines, EDIT1 and EDIT2. These edit routines perform a thorough edit and a partial analysis of the data. The result of this preliminary analysis is contained on the first record in the survey data input file, the header record. The information on the header record, along with information specifying desired outputs and optional data specifications, is used to determine whether the data will exceed the program capabilities. If capabilities will be exceeded or the job has been improperly set up, BEACH will print an appropriate error message and stop execution after this initial test. Otherwise, the program will continue.

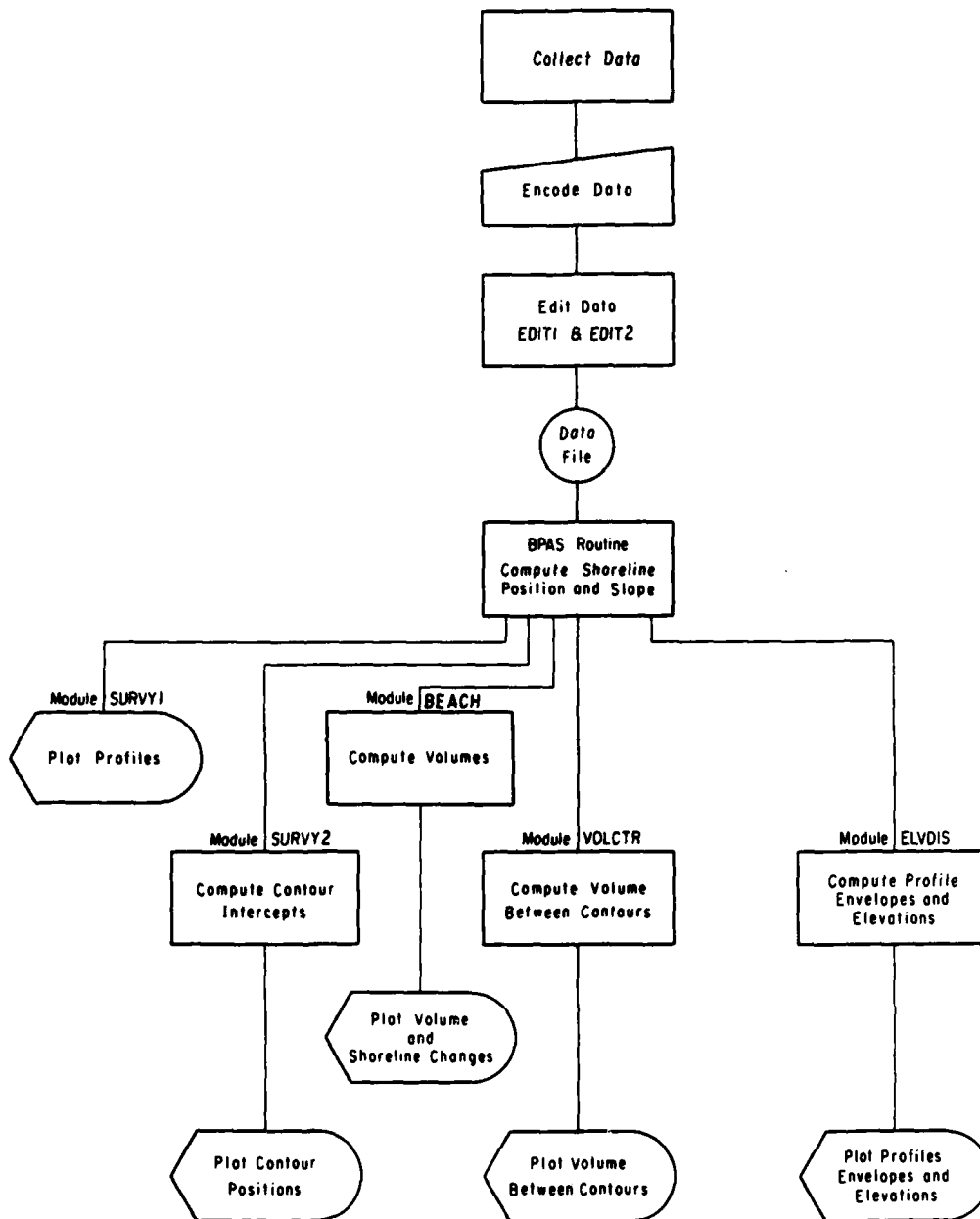


Figure 1. Beach Profile Analysis System.

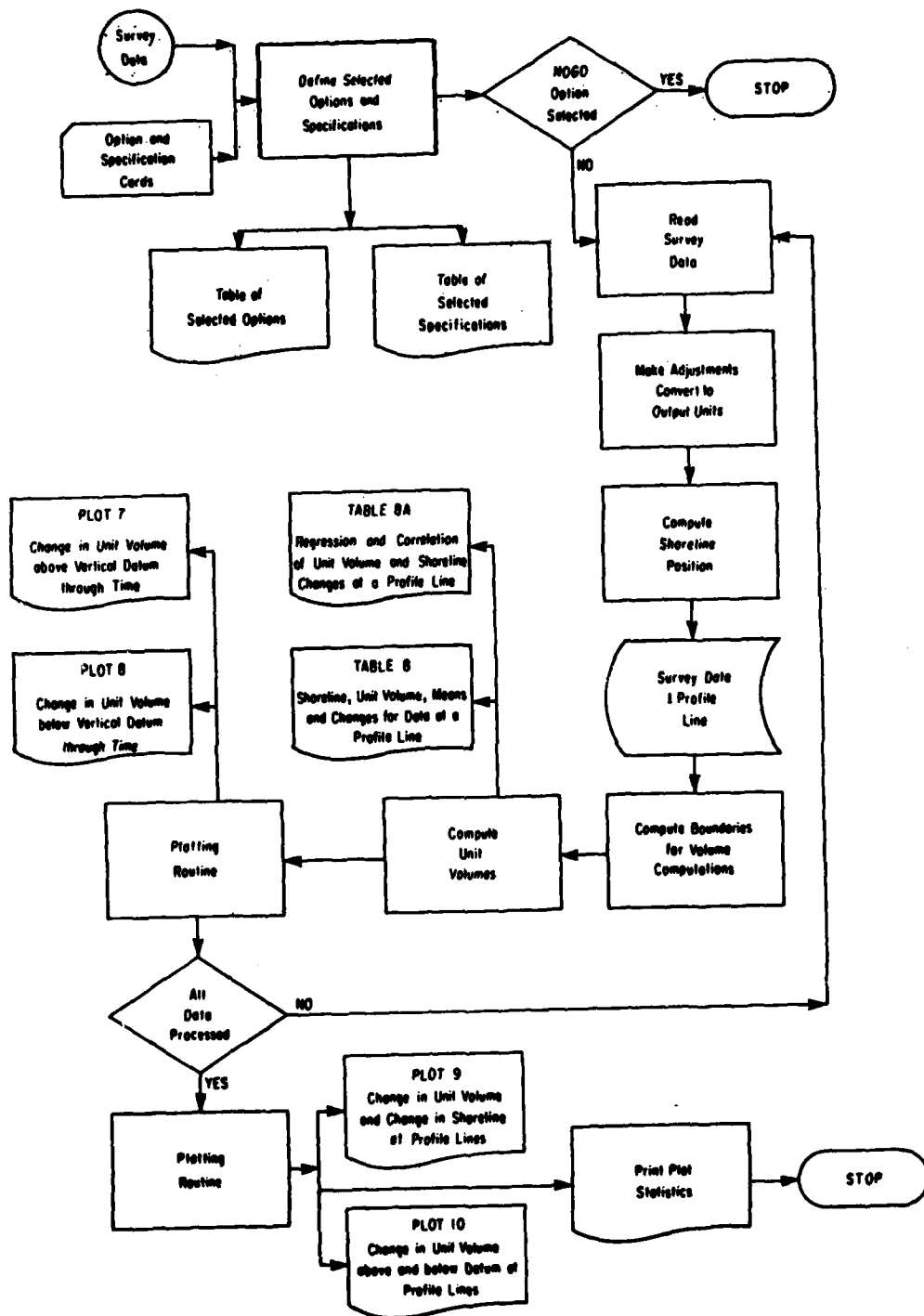


Figure 2. Analysis module BEACH.

BEACH reads the survey input data, finds the shoreline position, computes unit volume above and below datum, and produces the requested plot or table outputs. Records are read from the survey input data file, requested adjustments to the vertical or horizontal coordinates are made, and the coordinates are converted to output units of measurement. The distance to the shoreline position is computed and this point is added to each record if it is not a surveyed coordinate. Once all data for a single profile line have been processed, the reference shoreline position, the mean shoreline position, the appropriate boundaries for unit volume computations, the reference unit volume, the unit volumes, the mean unit volume, and the changes in shoreline and unit volume are computed. Outputs pertaining to each profile line are produced and regression analysis is performed before the data for the next line are read. If the reference shoreline position or reference unit volume above datum for any profile line cannot be computed (e.g., no shoreline position defined during selected reference survey or profile begins too far seaward to qualify for unit volume computations during the reference survey), there will be no output for that line except a message to inform the user.

Outputs for all profile lines are produced after all the data have been read. When these outputs are completed, plot statistics (number of each type of plot produced) are written.

III. HARDWARE AND SOFTWARE REQUIREMENTS

BEACH is written in extended FORTRAN IV and was designed to take advantage of processing features available on the Control Data Corporation 6600, Cyber 176 or equivalent computer. Such features include the 10-character, 60-bit word size, the FORTRAN-callable sort routine (interfacing with the NOS or NOS/BE operating system SORTMRG utility), and the utility subroutines and functions DATE, TIME, EOF (to check for end of data file), FLOAT, IFIX, ABS, MOD, and the maximum and minimum functions.

General processing requirements include the 500 series CALCOMP plotting instructions, block data subroutines, ENCODE, DECODE, variable dimensions in subroutines, 132-position line printer, a plotter, and 66,000 (decimal) words of core. Also required are the capabilities to process variable length records of up to 635 characters, to perform unformatted reads and writes, to access up to five unique units for input and output, and to use variable formats and variable input and output units in FORTRAN READ and WRITE statements.

A single run producing all available outputs using the input data listed in Appendix G of Volume VIII, 15 surveys of 12 profile lines, required an average of 38,000 words of core and 16 CPU seconds of processing time. There were 24 pages of output and 56 plots. The job created about 4,500 plot cards. The program is dimensioned to process up to 150 surveys of 100 profile lines, each defined with up to 60 coordinate pairs. The restrictions on number of surveys, profile lines, and coordinate pairs can be changed; however, a discussion of the method for doing so is outside the scope of this report.

IV. INPUT DATA

The input data consist of survey records which have been carefully edited and properly formatted by the EDIT1 and EDIT2 programs (see Vol. II). The first record in the survey data file, the header record (Table 1), supplies the range of profile line numbers, survey numbers, and dates. It specifies in

Table 1. Format of the header record.

Position No.	Entry description	FORTTRAN format
1-2	00	A2
3-5	Lowest profile line number in data file	I3
6-9	Lowest survey identification number in data file	I4
10-12	Highest profile line number in data file	I3
13-16	Highest survey identification number in data file	I4
17-19	Maximum number coordinate pairs required to define any one survey	I3
20	Number of places to the right of the decimal for distance coordinates	I1
21	Number of places to the right of the decimal for elevation coordinates	I1
22-23	Two-character abbreviation for units of measurement in which data are recorded	A2
24-27	Four-character acronym describing the vertical datum to which data are referenced	A4
28-49	Range of dates, including time, covered by data (yr(I2), mon(I2), d(I2, hr(I3), min(I2))	2(3I2,I3,I2)
50-80	Data description (31 characters)	31A1

what units of measurement the data are recorded, where the decimal should be in the distance and elevation coordinates, and to what vertical datum the data are recorded. This record also contains a 31-character data description. This information is as supplied to or computed by the EDIT2 program. If the information on the header record indicates that the data will exceed any of the program dimensions, an error message is printed and program execution is stopped.

The survey data file, from magnetic media (Table 2) or card images (Table 3), must be sorted by profile line number and then survey number. The module ignores locality codes so all data on a single file should be from the same locality.

V. MODULE OUTPUTS

BEACH will produce two tabular and four graphical displays, referred to as TABLE8, TABLE8A, PLOT7, PLOT8, PLOT9, and PLOT10. Any or all of these may be produced during a single run. The default specifications for these outputs have been designed so that they may be published without requiring redrafting. In addition, tables of selected options and processing and output specifications are produced by each run of each analysis module. The plot statistics are produced by the analysis modules when plot output has been requested. A footnote or plot legend, "X EXTRAPOLATED DATUM," will appear only if the user

Table 2. Format of final data file--recorded on magnetic media.

Position No.	Entry description	FORTTRAN format
1-2	Locality code	A2
3-5	Profile line number	I3
6-9	Survey identification number	I4
10-15	Date of survey	3I2
16-20	Time of survey	I3,I2
21-23	Number of coordinate pairs in the record	I3
24-28	Minimum elevation on the record	I5
29-35	Blank	7X
36-end	Distance and elevation coordinate pairs, five positions per coordinate, no decimal	I5

Table 3. Format of final data file--card image data.

Position No.	Entry description	FORTTRAN format
First card in each record		
1-2	Locality code	A2
3-5	Profile line number	I3
6-9	Survey identification number	I4
10	Card number (1)	A1
11-16	Date of survey	3I2
17-21	Time of survey	I3,I2
22-24	Number of coordinate pairs in the record	I3
25-29	Minimum elevation this record	I5
30-40	Blank	
41-80	First four distance, elevation coordinate, five columns each coordinate, no decimals ¹	8I5
Second and following cards in each record		
1-9	Same as for first card	
10	Card number (1-9, then A-Z)	A1
11-80	Seven distance, elevation coordinate pairs, five positions each coordinate	14I5

¹Position of decimal is defined on the header record (see Table 5).

NOTE.--If there are exactly four coordinate pairs (first card only needed, filled to position 80), the second and the last card in the record must be a blank card.

has elected to allow extrapolation of the shore line position. Every output variable computed using an extrapolated datum is identified by an "X." Sample outputs in the following figures have been photo-reduced.

The boundaries used in unit volume computations are written on the tabular outputs only. Whenever a volume, shoreline position, or change cannot be computed, blanks appear on the tables. There are no plot outputs for these surveys. When there are insufficient data to perform regression analysis (all required variables must be defined on at least two surveys), a message to that effect is written in place of the output variable.

Surveys are identified by date. If requested, the time of the survey is also written. When there is more than one profile line involved, the date used is that associated with the profile line having the largest line number (e.g., range of dates in title of PLOT9 and PLOT10).

Time-elapsed is the independent variable for regression analysis and the independent axis for plot outputs. At the user's option, this may be expressed in hours, days, months, or years. When months are selected, only 1 year's data are displayed on each plot. Enough plots will be output to depict all data.

1. Table of Options Selected (Fig. 3).

This table, produced after all option cards have been read by the program, prints the value assigned to each variable which can be defined on an option card. This table should be examined to ensure that the values assigned to these variables are as anticipated.

2. Table of Specifications Selected (Fig. 4).

This table is produced after all special processing and output selection specifications have been read by the program. User should ensure that anticipated processing specifications and outputs match those actually selected.

3. TABLE8 (Fig. 5).

For each profile line this table displays:

(a) Distance to output horizontal datum from input horizontal datum.

(b) Distance to mean shoreline position from output horizontal datum.

(c) Mean unit volume above vertical datum.

(d) Mean unit volume below vertical datum.

(e) Boundaries for volume computations.

Then, for each survey of the profile line the table displays:

(a) Survey date and, if specified, time.

U P I I O N S HAM MUN 02/12/81 AT 11.48.00.

ANALYSIS MULTIPLE SELECTED== BEACH

USER SELECTED MUN ID== HAM

LOCALITY DESCRIPTION IS TEST BEACH

EACH SURVEYED LINE WILL BE CALLED A PROFILE

INPUT DISTANCES ARE COMPUTED FROM THE BENCHMARK

INPUT DISTANCES TO FT X 100000, ELEVATIONS TO FT X 100001

VERTICAL DATUM IS MSL
A CORRECTION OF 0.000 FT WILL BE MADE TO EACH VERTICAL COORDINATE.

TIME WILL APPEAR ON OUTPUT. 24-HOUR SYSTEM WILL BE USED.

HORIZONTAL DATUM IS
THE SIGHTLINE POSITION ON
REFERENCE SURVEY
THERE ARE NO MORE THAN 2 PROFILE LINES.
THE INITIAL SURVEY OF EACH PROFILE LINE WILL BE THE REFERENCE SURVEY.

UNIT VOLUME ABOVE DATUM==

ZERO VOLUME ABOVE IS
THE UNIT VOLUME ON
REFERENCE SURVEY
THERE ARE NO MORE THAN 2 PROFILE LINES.
THE INITIAL SURVEY OF EACH PROFILE LINE WILL BE THE REFERENCE SURVEY.
PROFILE MUST BEGIN NO MORE THAN 120,000 FT SEWARD OF BENCHMARK TO BE CONSIDERED FOR VOLUME COMPUTATIONS.

VOLUME BELOW DATUM==

ZERO VOLUME BELOW IS
THE UNIT VOLUME ON
REFERENCE SURVEY
THERE ARE NO MORE THAN 2 PROFILE LINES.
REFERENCE SURVEY NUMBER IS 18
PROFILE MUST END NO LESS THAN 1511,000 FT SEWARD OF SELECTED HORIZONTAL DATUM TO BE CONSIDERED FOR VOLUME COMPUTATIONS.

A CONVERSION FACTOR OF 1.00000 WILL BE USED TO GO FROM INPUT UNITS (FT) TO OUTPUT UNITS (FT)
A CONVERSION FACTOR OF .03704 WILL BE USED TO GO FROM SQUARE FT TO YD3/FT

EXTRAPOLATION WILL BE DONE TO MSL IF THE LAST SURVEYED POINT REACHES A MINIMUM ELEVATION OF 2,000 FT

SURVEY INPUT DATA WILL BE READ FROM UNIT 7 IN THIS FORMAT==
(24,13,14,3,12,13,12,13,15,0,7X,120FS,0)

Figure 3. Sample BEACH output--table of options selected.

SPECIFICATIONS SELECTED FOR ANALYSIS MODULE BEACH MAH RUN 02/12/81 AT 11.48.40.

TABLE 8 WILL BE OUTPUT.
TABLE 8A WILL BE OUTPUT.
TIME MEASURED AND DISPLAYED IN MONTHS
UPPER LIMIT FOR VOLUME COMPUTATIONS IS PROFILE SURFACE.
LOWER BOUNDARY FOR VOLUME COMPUTATIONS IS -100.000 FT FROM MSL
SLOPE OF REGRESSION LINE FOR SHORELINE CHANGES WILL BE IN FT/MONTH
SLOPE OF REGRESSION LINE FOR VOLUME CHANGES WILL BE IN YD3/FT/MONTH
NO PLOT OUTPUT.

Figure 4. Sample BEACH output--specifications selected.

MAN RUN 03/05/81 AT 16:22.59, PAGE 8

UNIT VOLUME (YDS/FT), DISTANCE (FT) TO SHORELINE AND CHANGES AT PROFILE LINE 8
AT TEST BEACH

01JAN79/ 10.00=100296/ 0.00

REFERENCE ZERO VOLUME BELOW IS
THE UNIT VOLUME ON
01JAN79/ 13.00

REFERENCE HORIZONTAL DATUM IS
THE SHORELINE POSITION ON
01JAN79/ 13.00

DISTANCE FROM BENCHMARK TO HORIZONTAL DATUM
DISTANCE TO MEAN SHORELINE POSITION FROM HORIZONTAL DATUM
MEAN UNIT VOLUME ABOVE MBL
MEAN UNIT VOLUME BELOW MBL

SURVEY DATE/TIME	MONTHS SINCE LAST SURVEY	S H O R E L I N E P O S I T I O N				UNIT VOLUME ABOVE IS		UNIT VOLUME BELOW IS		REFERENCE ZERO VOLUME BELOW IS	
		DISTANCE FROM BENCHMARK	DISTANCE FROM HORIZONTAL DATUM	CHANGE FROM PREVIOUS SURVEY	CUBIC YD/FT	CHANGE FROM REFERENCE	DATUM	CHANGE FROM REFERENCE	DATUM	CHANGE FROM PREVIOUS	DATUM
01JAN79/ 13.00	0.0	340.0	0.0		161.026	0.000	0.000	1296.091	0.000		
24APR79/ 13.00	1.07	331.7	11.7	11.7	162.039	.833	.833	1296.206	.206		
20APR79/ 13.00	1.07	334.2	14.2	2.5	162.095	.870	.870	1296.206	.206		
2JUN79/ 12.00	1.12	336.9	19.9	5.7	163.907	2.173	2.173	1296.206	.206		
2JUL79/ 12.00	1.07	338.0	10.0	-1.0	163.908	1.000	1.000	1296.206	.206		
28SEP79/ 14.00	2.27	361.0	23.0	3.0	166.488	2.481	2.481	1296.206	.206		
28OCT79/ 9.00	1.67	365.7	25.7	4.7	166.488	2.290	2.290	1296.206	.206		
28NOV79/ 10.00	.97	365.0	25.0	.8	167.114	5.839	5.839	1296.206	.206		
01JAN79/ 13.00	1.37	355.6	18.6	-7.3	167.033	9.000	9.000	1296.206	.206		
11MAR79/ 11.00	2.27	363.4	23.4	6.8	169.103	7.330	7.330	1296.206	.206		
7APR79/ 0.00	.67	372.3	22.3	9.0	168.968	6.740	6.740	1296.206	.206		
01JUN79/ 10.00	2.17	365.2	25.2	-7.2	168.864	0.022	0.022	1296.206	.206		
03JUL79/ 10.00	1.0	339.0	-8.2	-20.2	162.088	.248	.248	1296.077	-.013		
27SEP79/ 14.00	2.6	331.9	-8.1	-7.1	156.969	-6.838	-6.838	1296.598	-.400		
10DEC79/ 9.00	2.07	368.1	28.1	36.2	163.003	1.019	1.019	1296.206	.206		

BOUNDARIES
ELEVATION
AND
DISTANCE

MBL TO 22.20 FT ABOVE MBL
MOST SEAWARD MBL INTERCEPT TO
0.00 FT FROM BENCHMARK

MBL TO -100.00 FT BELOW MBL
0.00 FT FROM BENCHMARK TO
10.00 FT FROM HORIZONTAL
DATUM

Figure 5. Sample BEACH output--TABLE8.

- (b) Time elapsed between surveys of a profile line.
- (c) Distance to shoreline position from the input horizontal datum.
- (d) Distance to shoreline position from the output horizontal datum.
- (e) Distance to the shoreline position from its position during the previous survey.
- (f) Total unit volume above vertical datum.
- (g) Change in unit volume above vertical datum from some reference unit volume.
- (h) Change in unit volume above vertical datum from one survey to the next.
- (i) Items f, g, and h are also displayed for unit volume below vertical datum when the option for such computations has been selected (option card 6).

There is one table for each profile line. The number of surveys determines the number of pages per table. Data for up to 26 surveys will be written on each page.

4. TABLE8A (Fig. 6).

This output provides the following for each profile line:

- (a) Boundaries used for volume computations.
- (b) Correlation coefficients for change in unit volume above the vertical datum to change in shoreline positions from (1) the values during the previous survey and (2) the selected reference values.
- (c) Correlation coefficients for change in unit volume above the vertical datum to change in unit volume below the vertical datum from (1) the unit volumes during the previous survey and (2) the selected reference unit volumes.
- (d) Equation of the least squares fit regression line for change in shoreline position versus elapsed time.
- (e) Equation of the least squares fit regression line for change in unit volume above the vertical datum from the selected reference unit volume versus elapsed time.
- (f) Equation of the least squares fit regression line for change in unit volume below the vertical datum from the selected reference unit volume versus elapsed time.

There is one table of one page produced for each profile line.

STATISTICAL CORRELATIONS FOR 15 SURVEYS OF PROFILE LINE 00
AT TEST BEACH
27JUL77/1400 - 22FAN79/1515

REFERENCE HORIZONTAL DATUM IS
THE SHORELINE POSITION ON
28JUL77/1000

REFERENCE ZERO VOLUME ABOVE IS
THE UNIT VOLUME ON
28JUL77/1000

REFERENCE ZERO VOLUME BELOW IS
THE UNIT VOLUME ON
21OCT77/1450

CORRELATION COEFFICIENTS

	FROM PREVIOUS SURVEY	FROM REFERENCE
CHANGE IN UNIT VOLUME (YD3/FT) ABOVE MBL VS. SHORELINE POSITION (FT)	.4030	.7085
CHANGE IN UNIT VOLUME (YD3/FT) ABOVE MBL VS. CHANGE IN UNIT VOLUME (YD3/FT) BELOW MBL	.2447	.3396

EQUATION OF REGRESSION LINE (LEAST SQUARES FIT)

CHANGE IN SHORELINE POSITION VS. ELAPSED TIME

SLOPE OF REGRESSION LINE IS	-.0575	FT/ DAY	INTERCEPT AT	-9.6411 FT
CHANGE IN UNIT VOLUME ABOVE MBL VS. ELAPSED TIME				
SLOPE OF REGRESSION LINE IS	-.0111	YD3/FT/ DAY	INTERCEPT AT	1.2406 YD3/FT
CHANGE IN UNIT VOLUME BELOW MBL VS. ELAPSED TIME				
SLOPE OF REGRESSION LINE IS	.1144	YD3/FT/ DAY	INTERCEPT AT	-19.5600 YD3/FT

BOUNDARIES

ELEVATION	MSL TO 23.50 FT ABOVE MBL	MSL TO 100.00 FT BELOW MSL
DISTANCE	MOST SEAWARD MBL INTERCEPT TO 120.00 FT FROM BENCHMARK	120.00 FT FROM BENCHMARK TO 1527.64 FT FROM HORIZONTAL DATUM

Figure 6. Sample BEACH output--TABLE8A.

5. PLOT7 (Fig. 7).

This plot displays the change in unit volume above the vertical datum with time. There will be at least one plot for each profile line. If time is expressed as months, there will be as many plots per profile line as there are years in the data set.

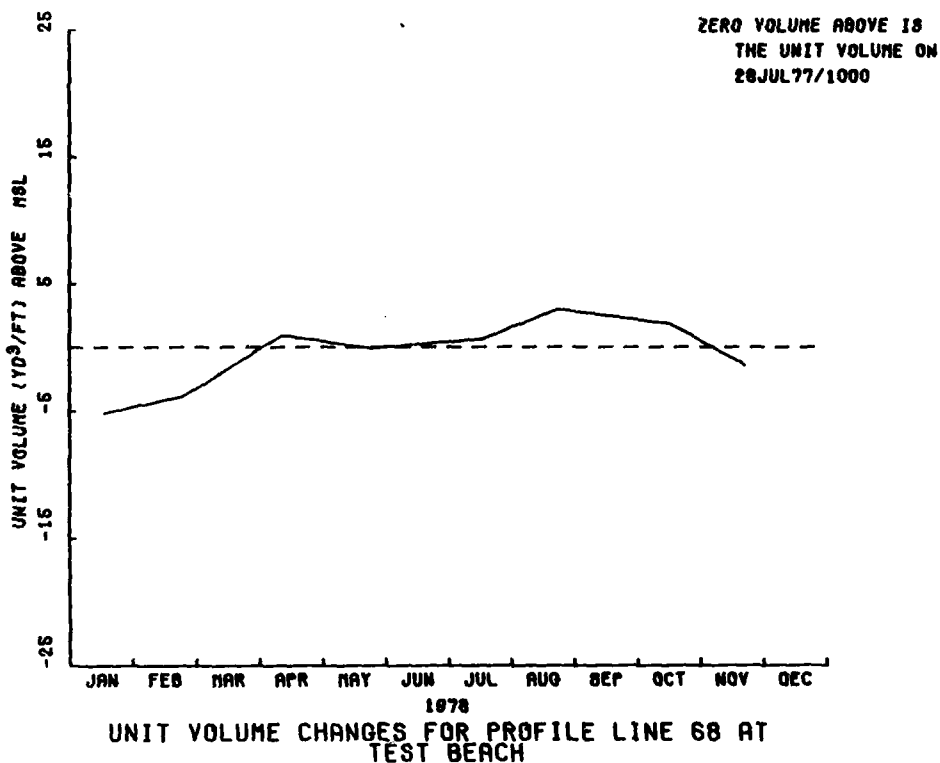


Figure 7. Sample BEACH output--change in unit volume above datum with time.

6. PLOT8 (Fig. 8).

This output shows change in unit volume below vertical datum with time. There will be at least one plot per profile line unless time is expressed as months. In this case, there will be as many plots per profile line as there are years in the data set.

7. PLOT9 (Fig. 9).

This scatter plot depicts change in unit volume between consecutive surveys. Volume above vertical datum is on the vertical axis, volume below is on the horizontal. Up to 10 profile lines, each represented by a different

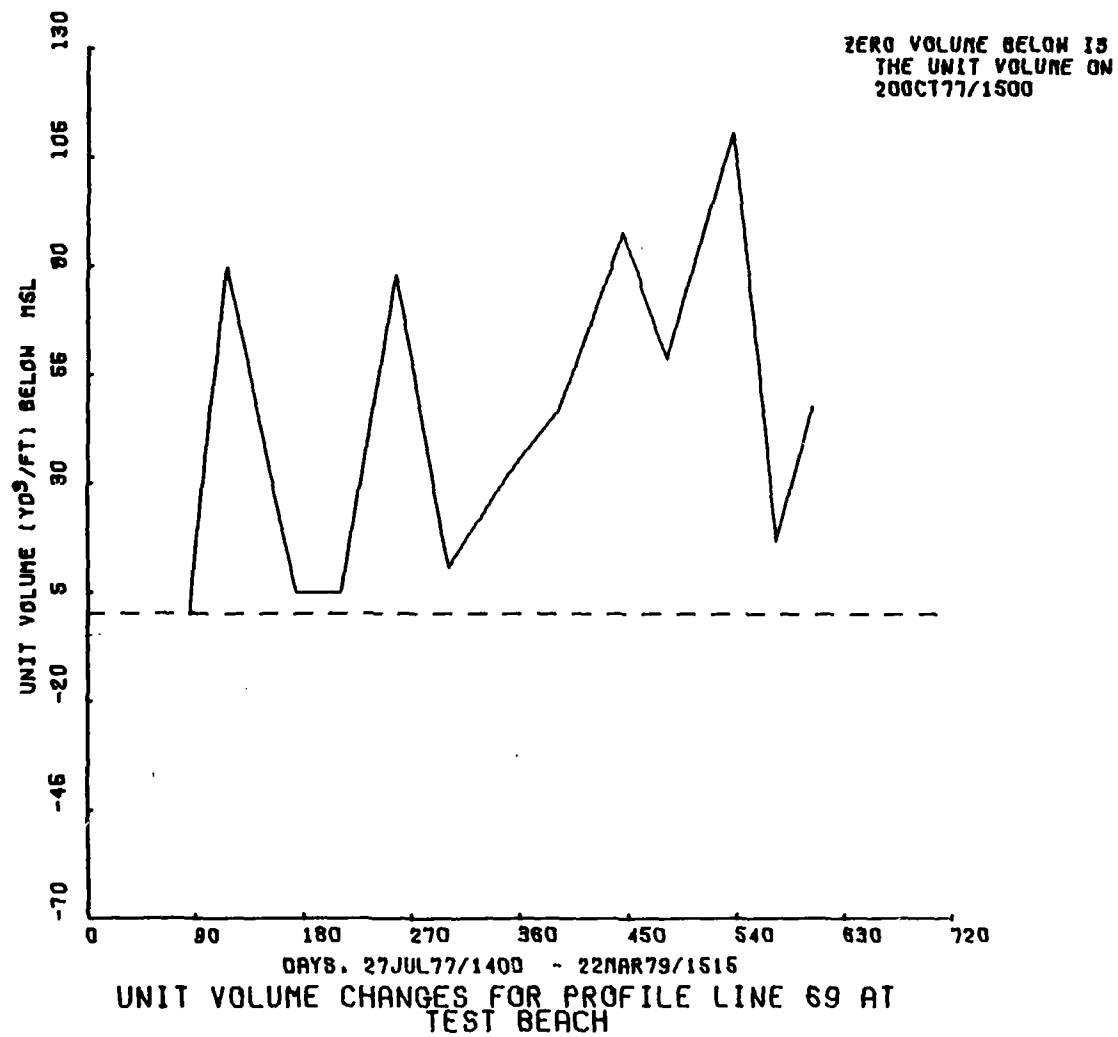


Figure 8. Sample BEACH output--change in unit volume below datum with time.

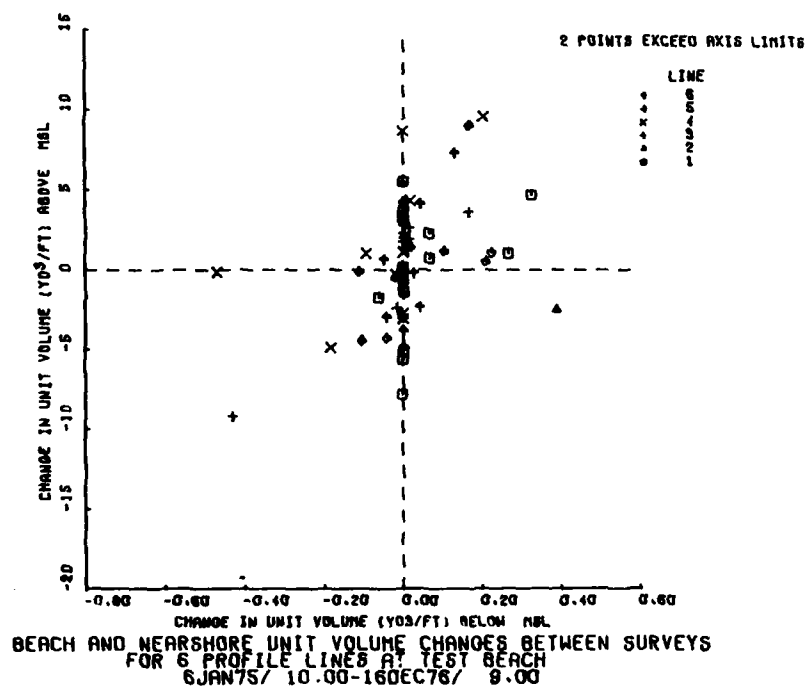
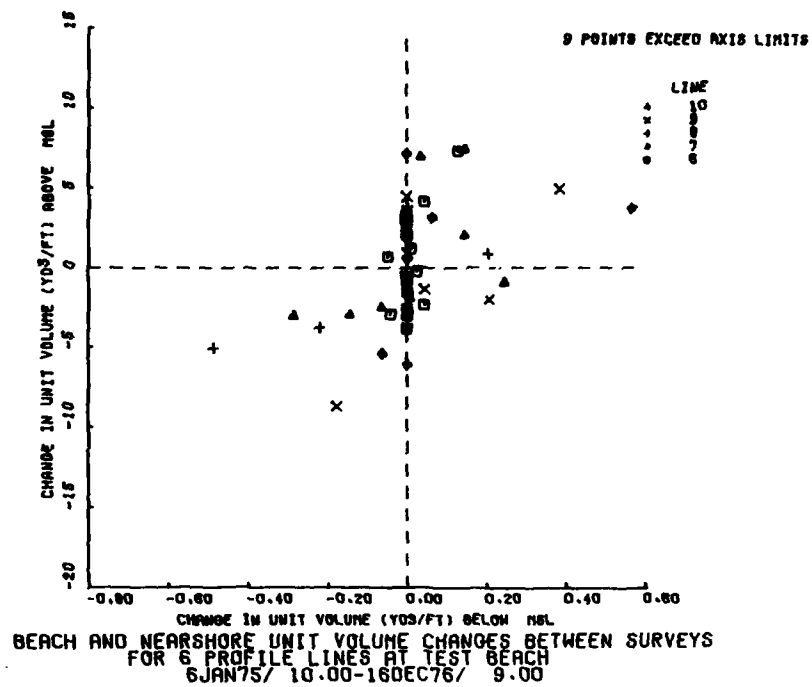


Figure 9. Sample BEACH output--change in unit volume above datum to change in unit volume below datum.

symbol, may be displayed on a single plot. The number of data points representing a change outside the axis limits is written in the plot legend. Such points are not plotted. The number of plots produced depends on the number of profile lines represented on a single plot. When more than one plot is required, the plots may be overlapped so that the last profile line represented on one plot will be the first displayed on the next.

8. PLOT10 (Fig. 10).

This scatter plot depicts the change in unit volume versus the change in shoreline position between consecutive surveys. Change in unit volume above vertical datum is on the vertical axis, change in shoreline position is on the horizontal. Up to 10 profile lines, each represented by a different symbol, may be displayed on a single plot. The number of data points outside the axis limits is written in the plot legend. Such points are not plotted. The number of plots produced depends on the number of profile lines displayed on a single plot. When more than one plot is required, the plots may be overlapped so that the last profile line represented on one plot will be the first displayed on the next.

9. PLOT Statistics (Fig. 11).

At the end of each run for which PLOT7, PLOT8, PLOT9, or PLOT10 output was requested, there is a printed table of the number of sets of axes drawn for each type of plot. This information may be used to determine how many plots to expect.

VI. JOB STRUCTURE

The job structure for each of the analysis modules is the same (Fig. 12). The only required system separators are those following the system job control cards and signaling the end of the job. The Appendix contains record layouts for each of the option, processing, and output specification cards used by module BEACH. The option and processing specification cards are optional unless unit volume below datum is to be computed. If the processing specification cards are absent, the module assigns default values. The output specification cards are required only to identify which outputs are desired; there is a default set of specifications for each BEACH output. The format and defaults for the option and processing specification cards are described in paragraphs 3, 4, and 5 of this section. Note that the option and specification cards must be followed by a blank card to signal the end of the cards to be read. The inclusion of option, processing, and output specification cards used by modules other than BEACH have no effect on processing; they are ignored.

The following contains formats for the records needed to run the module. It is recommended that data be right-justified; i.e., the rightmost character or number always occupies the rightmost position in the field. This will ensure that extra zeros are not added to the end of numeric entries when they are read by the module.

1. Program Identification Cards.

The program identification card (Table 4) is mandatory. It allows the user to assign a name to each run, defines which analysis module is to be processed, and provides the option to halt execution after the tables of selected options, processing, and output specifications have been printed.

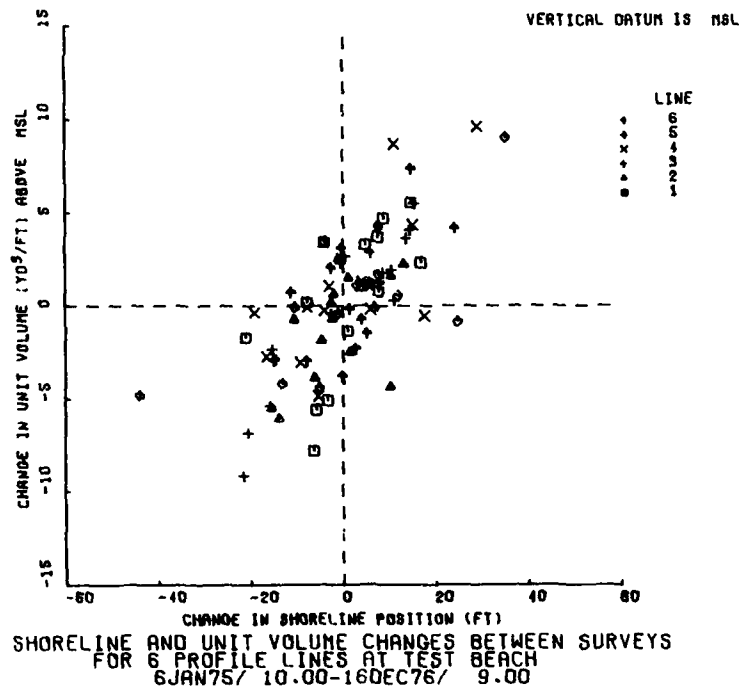
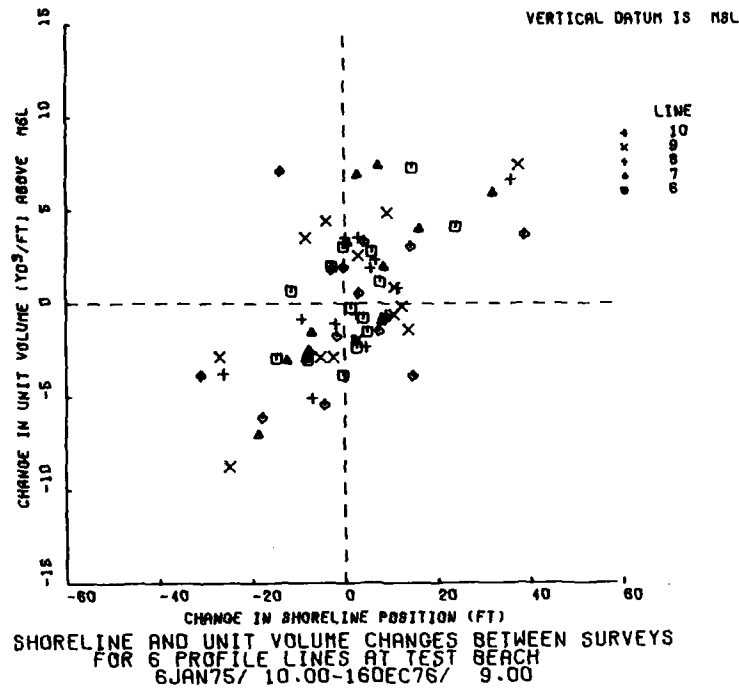
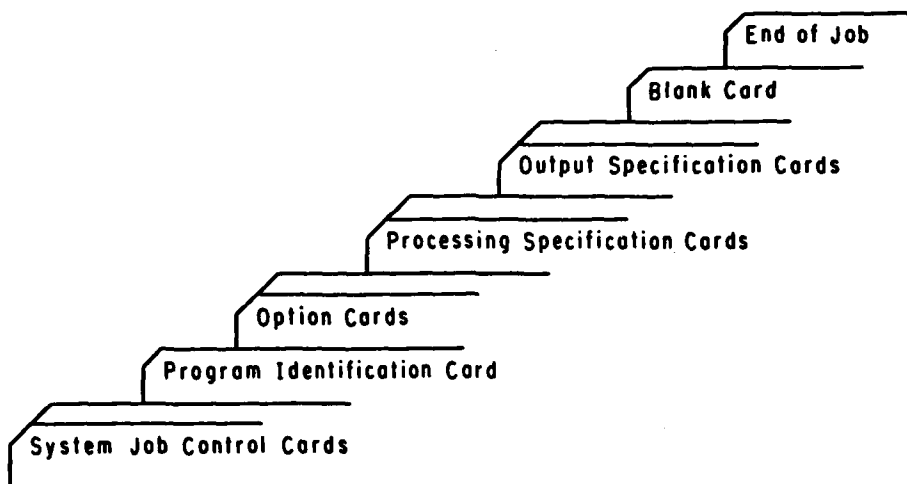


Figure 10. Sample BEACH output—change in unit volume above datum to change in shoreline.

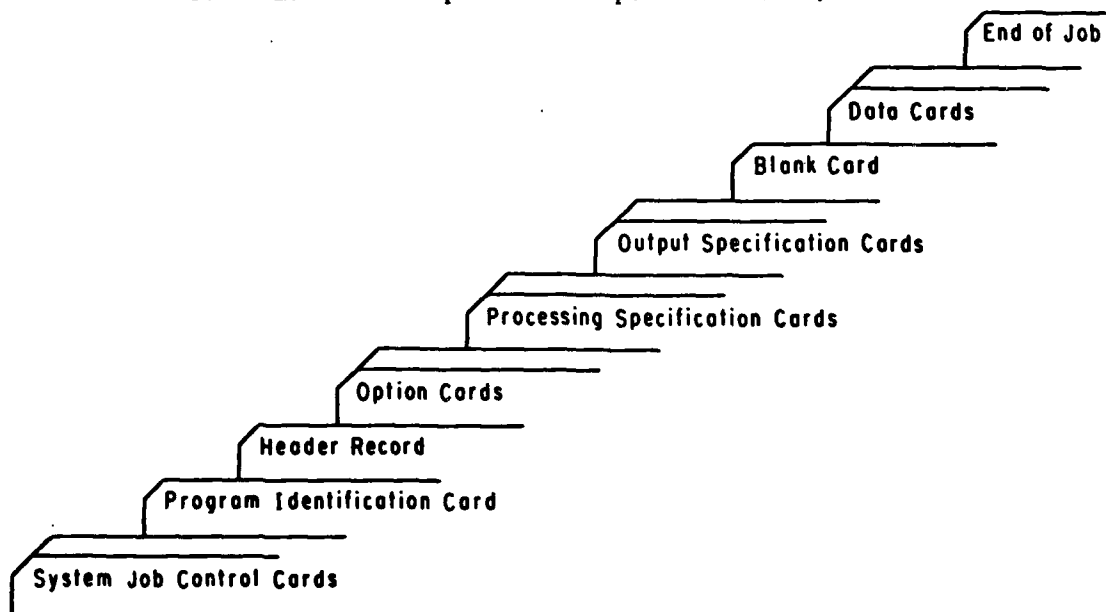
THIS RUN GENERATED THE FOLLOWING GRAPHIC OUTPUT.

PLOT TYPE	NUMBER OF PLOTS
-----	-----
9	2
10	10

Figure 11. Sample BEACH output--plot statistics.



(1) Data on magnetic media. (Survey data file not read from from same unit as options and specifications.)



(2) Data on cards or card images. (Survey data file will be read from the same unit as the options and specifications.)

Figure 12. Job structure.

Table 4. Program identification card.

Position No.	Entry description	Default value	FORTTRAN format
1-6	Run identification, usually initials of individual submitting job.	None	A6
8-13	Name of analysis module to be processed. This entry is <i>mandatory</i> . Enter "BEACH."	None	A6
15-16	Unit from which survey data will be read. Enter a "5" in position 16 if data are to be read from cards or card images.	7 (magnetic media)	I2
77-80	Enter "NOGO" to halt execution after printing of options and specifications, otherwise leave blank.	Run will be executed	A4

It is recommended that a printout of selected options and specifications, with further execution suppressed, be the first run for each analysis attempted. To do this, prepare the job and submit it with NOGO in positions 77 to 80 of the program identification card. The printed options (Fig. 3) and specifications (Fig. 4) should be carefully examined to be sure they match those requested. When satisfied that the desired options, specifications, and selected outputs are correct, resubmit the job with positions 77 to 80 blank.

2. The Header Record.

The header record (Table 1) follows the program identification card when data are read from cards or card images. If survey data are read in magnetic media format, the header record is not a part of the deck setup. See Section IV if more information concerning the header record is desired.

3. The Option Cards.

The option cards make it possible for the user to change some of the data characteristics, processing procedures, and output specifications assumed by the programs. Unless unit volume below datum is to be computed, none of the option cards are required. Table 5 contains the option cards used by BEACH and the values assigned when option cards are omitted. If any of the values are to be changed, only the option cards defining the value to be changed need be submitted and only the fields on the card pertaining to that value need be completed. A more detailed description of each option card follows.

a. Option Card 1--Input Horizontal Datum (Table 6). OPT CRD 1 defines the name of the lines surveyed (e.g., profile, range, transect) and the name of the input horizontal datum (e.g., bench mark, base line). If the card is omitted or the pertinent field left blank, the line will be labeled a PROFILE line and the input horizontal datum will be called the BENCH MARK.

b. Option Card 2--Display of Time (Table 7). The date of a survey always appears on outputs, but the time of the survey does not. OPT CRD 2 allows the user to define the type of time, if any, which is to appear on outputs. If the card is omitted or blank, only the date will appear. If the time of day

Table 5. BEACH analysis options and their defaults.

Option card	Option	Default value
OPT CRD 1	Name of input horizontal datum	Bench mark
	Name of line surveyed	Profile
OPT CRD 2	Format of time on outputs	No time appears
OPT CRD 3	Abbreviation for new vertical datum and required vertical correction.	Abbreviation is as read from header record and no correction is made.
OPT CRD 4	Output horizontal datum	Shoreline position during first survey of each profile line.
OPT CRD 5	For unit volume above datum: reference for volume changes	Volume during first survey of each profile line.
	minimum acceptable starting distance (profiles beginning farther seaward are eliminated).	Input horizontal datum (e.g., bench mark).
OPT CRD 6 ¹	For unit volume below datum: whether volume is to be computed and displayed.	Volume is not computed and displayed.
	If volume is computed: reference for volume changes	Volume during first survey of each profile line.
	seaward boundary for volume computations.	None
OPT CRD 7	Description of the data, for use in titles.	As read from the header record
OPT CRD 8	Linear units in which output is to appear.	As read from the header record
	Conversion factor to change input linear units to output linear units.	1.0
	Cubic units in which output is to appear.	If output units are anything but feet, UNIT ³ /UNIT; if output units are feet, YD ³ /FT.
	Conversion factor to convert squared output units to unit volume.	1.0 if output units are not feet; 1/27 if output units are feet.
OPT CRD 9	Whether or not the distance to the shoreline should be extrapolated, and the minimum elevation from which extrapolation is considered valid (>0).	No extrapolation is performed.
OPT CRD 10	Format in which the final data file is to be read.	As necessary to read data as formatted in Table 3 if input is on cards, otherwise as in Table 2.

¹If this card is omitted, unit volume below datum is not computed.

Table 6. Option card 1--input horizontal datum.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"1"	I1
11-17	Enter the seven-character name of surveyed line if other than PROFILE.	A7
19-28	Enter the 10-character name of input horizontal datum if other than BENCH MARK.	A10

Table 7. Option card 2--display of time.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"2"	I1
11	Enter the code for the type of time to be written on printed outputs: 0 - no time is written 1 - 24-hour clock time 2 - decimal time	I1

NOTE.--Date of survey is always displayed on output.

(24-hour clock) or the time, hours, and hundredths option is selected, both date and time will be written on outputs. If the latter time option is selected, the minutes will be converted to hundredths of an hour and time displayed as a decimal number.

c. Option Card 3--Output Vertical Datum (Table 8). OPT CRD 3 allows the user to change the vertical datum to which the survey data are referenced. If the card is omitted or left blank, the vertical datum will be as defined on the header record and there will be no change to the vertical coordinates. If a change is desired, enter the four-character abbreviation of the new vertical datum and the amount, in selected *output units*, which must be *added* to each vertical coordinate to make the adjustment.

d. Option Card 4--Output Horizontal Datum (Table 9). OPT CRD 4 allows the user to select the reference horizontal datum to which the output is to be adjusted. If this card is omitted or left blank, the shoreline position during the first survey of each profile line is the output horizontal datum. The distance to the shoreline during the first survey at each profile is computed and this amount is *subtracted* from each distance coordinate. This may or may not be the same survey at all profile lines. Other choices for the output horizontal datum are: (1) the shoreline position during a survey other

Table 8. Option card 3--output vertical datum.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"3"	I1
11-14	Enter the four-character abbreviation for output vertical datum if other than that on header record.	A4
15-25	Enter the amount, in <i>output</i> units, to be <i>added</i> to each vertical coordinate.	F10.3

Table 9. Option card 4--output horizontal datum.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"4"	I1
11-13	Enter the number of profile lines. <i>Used only when the output horizontal datum is to be user-supplied. If left blank, the number of profile lines will be as defined on the header record.¹ The program will expect to read an adjustment for the number of lines entered here.</i>	I3
15 (IXDTM)	Enter the type of output horizontal datum selected: 1 or blank - shoreline position during first or defined reference survey of each line 3 - mean shoreline position 4 - no adjustment to distance coordinates 5 - user-supplied. Adjustments entered on SUP 4A cards.	I1
16-19 (IXDTM = 1 only)	Enter the reference survey number. If blank, program uses the first survey of each line which may or may not be the same for all profile lines. All profile lines not surveyed during the selected reference are eliminated from processing.	I4
16-38 (IXDTM = 5 only)	Enter the first line of description of user-supplied horizontal datum.	2A10,A3
39-67 (IXDTM = 5 only)	Enter the second line of description of user-supplied horizontal datum.	2A10,A9

¹The header record contains the largest and smallest profile line number. If there is not a profile line associated with each number between, this field should not be left blank.

than the first, (2) the mean shoreline position, (3) the input horizontal datum (i.e., bench mark--in this case the distance coordinates are unaltered), and (4) a user-supplied correction. If shoreline on reference survey, mean shoreline, or bench mark is chosen, use OPT CRD 4, format 1, shown in the Appendix; if the correction is user-supplied, use OPT CRD 4, format 2.

If the correction is supplied, the user must provide SUP 4A (Table 10) cards to define the amount, in output units, which is to be subtracted from each distance coordinate at each profile line. The SUP 4A cards must immediately follow OPT CRD 4, be sequentially numbered, and cannot be included if the output horizontal datum adjustment is not user-supplied. While there need not be an entry on the SUP 4A cards for every profile line in the data set, only those represented will be processed by BEACH.

Table 10. Supplementary option cards 4A--distance to output horizontal datum, user-supplied.

Position No.	Entry description	FORTRAN format
1-3	"SUP"	A3
5-6	"4A"	A2
7-9	Sequential card number	I3
11-13	Profile line number	I3
14-23	Corresponding adjustment in <i>output</i> units, to be <i>subtracted</i> from each distance coordinate.	F10.3
24-26	Profile line number	I3
27-36	Corresponding adjustment	F10.3
37-39	Profile line number	I3
40-49	Corresponding adjustment	F10.3
50-52	Profile line number	I3
53-62	Corresponding adjustment	F10.3
63-65	Profile line number	I3
66-75	Corresponding adjustment	F10.3

The output horizontal datum option has proven to be useful for plotting profiles with horizontal datums well inland of the active beach, or for comparing lines with datums at varying distances from the shoreline. By adjusting the horizontal datum, profiles are effectively "lined up" at the shoreline, dune crest, or other selected reference distance. Care must be taken to ensure that the horizontal datum exists on the reference survey of each profile line. For example, under default conditions, the reference survey is the first survey of each profile line and the horizontal datum is the distance to the zero elevation at the time of that survey. If this position is not defined (i.e., the survey did not extend far enough seaward), the profile line is eliminated from the data set and any output from that particular line is suppressed.

Care must also be taken to ensure that subsequent runs of the data file have the same reference. When data are extracted from larger sets or new data are added to existing sets, it is possible that the first survey of a line will change; it is certain that the mean shoreline position will change. Under these circumstances, the user should record the distance to the horizontal datum for the original data set and supply it on SUP 4A card during subsequent runs.

e. Option Card 5--Zero Unit Volume (Table 11). OPT CRD 5 enables the user to select the zero unit volume for unit volume changes above datum. Zero unit volume will be subtracted from unit volumes to compute changes from the reference. Also on this card is the minimum distance, in output units, from the input horizontal datum that a profile must begin to be considered for unit volume computations. Since the landward boundary for unit volume computation is the landwardmost point all surveys of a profile line have in common, some unusually short surveys may force a landward boundary that is too far seaward. These surveys will not be considered if they begin farther seaward than the specified tolerance. This tolerance should be carefully chosen since it may cause too many surveys to be eliminated. The maximum and minimum tables produced by the EDIT2 program (see Vol. II) are quite useful in selecting an appropriate tolerance. Unit volume above datum will not be computed at profiles which begin farther seaward than the selected tolerance or which do not extend to the output vertical datum.

If the card is omitted or left blank, the zero unit volume will be the volume computed during the first survey of each profile line and only surveys beginning at or landward of the input horizontal datum will be considered for volume computations.

Other options which may be selected for zero unit volume are: (1) unit volume during a reference survey other than the first, (2) the mean unit volume at each profile line, or (3) a user-supplied unit volume. Use OPT CRD 5, format 1, in the Appendix if unit volume during a reference survey or mean unit volume is chosen as the zero; use OPT CRD 5, format 2, if the zero volume is user-supplied.

If the zero unit volume is user-supplied, supplementary option cards SUP 5A (Table 12) must be included immediately following OPT CRD 5. There should be as many of these cards as required to supply a zero volume for the number of profile lines read from OPT CRD 5. All profile lines need not be represented; those not represented will be eliminated from all BEACH outputs.

Also required, when the zero volume is user-supplied, immediately following SUP 5A cards, are SUP 5B (Table 13) cards. These cards provide the landward boundary used for volume computations at each profile line represented on the SUP 5A cards. All profiles beginning farther seaward than the defined landward boundary are eliminated from processing.

SUP 5A and SUP 5B cards are included only when the zero volume is user-supplied.

All BEACH outputs require that a reference for computing change in unit volume be supplied. The reference should be carefully selected; if unit volume cannot be computed during the reference survey (profile begins too far seaward or does not extend to output vertical datum) all data collected at the profile line will be eliminated from the data set and there will be no output

Table 11. Option card 5--zero unit volume above datum.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"5"	I1
11-13 (IVOL = 5 only)	Enter the number of profile lines. The module will expect to read a zero volume and a landward boundary for the number of lines entered here.	I3
15 (IVOL)	Enter the type of reference for unit volume changes: 1 or blank - unit volume during first or defined reference survey 3 - mean unit volume 5 - user-supplied; zero volumes and associated landward boundaries entered on SUP 5A and SUP 5B cards.	I1
16-19 (IVOL = 1 only)	Enter the reference survey number for volume changes. If this field is blank, the volume computed during the first survey of each profile line will be used.	I4
16-38 (IVOL = 5 only)	Enter the first line of description of user-supplied zero volume.	2A10,A3
39-67 (IVOL = 5 only)	Enter the second line of description of user-supplied zero volume.	2A10,A9
71-80 (IVOL = 1 and 3 only)	Enter minimum acceptable starting distance from the input horizontal datum in output units. Profiles beginning farther seaward are eliminated.	F10.3

Table 12. Supplementary option cards 5A--zero unit volume above datum, user-supplied.

Position No.	Entry description	FORTRAN format
1-3	"SUP"	A3
5-6	"5A"	A2
7-9	Sequential card number	I3
11-13	Profile line number	I3
14-23	Associated zero unit volume in cubic output units	F10.3
24-26	Profile line number	I3
27-36	Zero unit volume	F10.3
37-39	Profile line number	I3
40-49	Zero unit volume	F10.3
50-52	Profile line number	I3
53-62	Zero unit volume	F10.3
63-65	Profile line number	I3
66-75	Zero unit volume	F10.3

Table 13. Supplementary option cards 5B--landward boundary for user-supplied zero volumes.

Position No.	Entry description	FORTRAN format
1-3	"SUP"	A3
5-6	"5B"	A2
7-9	Sequential card number	I3
11-13	Profile line number	I3
14-23	Associated landward boundary in output units from output horizontal datum	F10.3
24-26	Profile line number	I3
27-36	Landward boundary	F10.3
37-39	Profile line number	I3
40-49	Landward boundary	F10.3
50-52	Profile line number	I3
53-62	Landward boundary	F10.3
63-65	Profile line number	I3
66-75	Landward boundary	F10.3

NOTE:--There must be an entry on these cards for each entry on the SUP 5A cards.

for that line. Also remember that changing the data set may cause the reference volume to change (e.g., first survey or mean unit volume may change). Under these conditions, the user should supply the reference unit volume on subsequent runs.

f. Option Card 6--Zero Unit Volume Below Datum (Table 14). The information supplied on OPT CRD 6 corresponds to the information provided on OPT CRD 5 with the following exceptions:

(1) If the card is omitted, unit volume below datum will not be computed. PLOT8 and PLOT9 cannot be produced.

(2) The seaward boundary, from output horizontal datum, rather than the minimum profile starting distance is supplied. There is no default for this value.

(3) The supplementary option cards SUP 6B contain seaward rather than landward boundaries.

Again, the supplementary option cards SUP 6A (Table 15) and SUP 6B (Table 16) are included only if the zero unit volumes are user-supplied. The failure to identify a profile line on these cards, while it will inhibit the computation of unit volume below datum at the profile line, has no effect on the computation of unit volume above datum or shoreline computations.

Unit volume below datum is not computed for profiles which either end landward of the selected seaward boundary or for which unit volume above datum cannot be computed. If unit volume below datum cannot be computed for the reference survey, there will be no unit volume below datum computations for the profile line. This has no effect on unit volume above datum or shoreline position computations. Subparagraphs d and e of this paragraph provide guidelines and cautions in selecting the reference. If the reference unit volume is not user-supplied, use OPT CRD 6, format 1, in the Appendix. If the zero unit volume is user-supplied, use OPT CRD 6, format 2.

g. Option Card 7--Data Description (Table 17). The description of the data (e.g., locality or site name) contained on the header record will appear on each output. If the user wishes to change this description, OPT CRD 7 may be used. If the card is omitted or left blank, the data description will be as defined on the header record.

h. Option Card 8--Linear Output Units (Table 18). OPT CRD 8 is used to define the linear output units. If the card is omitted or left blank, the linear output units will be the same as the input. If output units are to be meters or centimeters and the input is in feet, the conversion factor is supplied by the program; otherwise, the user must supply the required conversion factor. Each distance and elevation read from the input survey file will be multiplied by this factor.

Once linear output units are determined, cubic output units will be expressed as follows:

Table 14. Option card 6--zero unit volume below datum.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"6"	I1
11-13 (IVOL = 5 only)	Enter the number of profile lines used only when the reference unit volume is user-supplied. The program will expect to read a zero volume and a seaward boundary for the number of lines entered here.	I3
15 (IVOL)	Enter the type of reference for unit volume changes: blank - no unit volume below datum will be computed 1 - unit volume during first or defined reference survey 3 - mean unit volume 5 - user-supplied; zero volumes and associated seaward boundaries entered on SUP 6A and SUP 6B cards.	I1
16-19 (IVOL = 1 only)	Enter the reference survey number for zero volume if blank program uses first survey of each profile line, which may or may not be the same for all lines. Enter a survey number if a survey other than the first should be used.	I4
16-38 (IVOL = 5 only)	Enter the first line of description of user-supplied zero volume.	2A10,A3
39-67 (IVOL = 5 only)	Enter the second line of description of user-supplied zero volume.	2A10,A9
71-80 (IVOL = 1 and 3 only)	Enter seaward boundary in output units from output horizontal datum. Profiles ending farther landward will have no unit volume below datum computed.	F10.3

Table 15. Supplementary option cards 6A--zero unit volume below datum, user-supplied.

Position No.	Entry description	FORTTRAN format
1-3	"SUP"	A3
5-6	"6A"	A2
7-9	Sequential card number	I3
11-13	Profile line number	I3
14-23	Associated zero unit volume in cubic output units	F10.3
24-26	Profile line number	I3
27-36	Zero unit volume	F10.3
37-39	Profile line number	I3
40-49	Zero unit volume	F10.3
50-52	Profile line number	I3
53-62	Zero unit volume	F10.3
63-65	Profile line number	I3
66-75	Zero unit volume	F10.3

Table 16. Supplementary option cards 6B--seaward boundary for user-supplied zero volumes.

Position No.	Entry description	FORTTRAN format
1-3	"SUP"	A3
5-6	"6B"	A2
7-9	Sequential card number	I3
11-13	Profile line number	I3
14-23	Associated seaward boundary in output units from input horizontal datum	F10.3
24-26	Profile line number	I3
27-36	Seaward boundary	F10.3
37-39	Profile line number	I3
40-49	Seaward boundary	F10.3
50-52	Profile line number	I3
53-62	Seaward boundary	F10.3
63-65	Profile line number	I3
66-75	Seaward boundary	F10.3

NOTE:--There must be an entry on these cards for each entry on the SUP 6A cards.

Table 17. Option card 7--data description.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"7"	I1
11-41	Enter the 31-character data description which supersedes the description on the header record.	3A10,A1

Table 18. Option card 8--linear and cubic output units.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-9	"CRD"	A3
9	"8"	I1
11-12	Enter the abbreviation for linear output units of measurement. If blank, these will be as defined on the header record.	A2
13-22	Enter the conversion factor. Input units are multiplied by this number to convert to output units. This field may be blank if (a) Input and output units are the same (factor set to 1). (b) Input units are FT, output units are M (factor set to 0.3048). (c) Input units are FT, output units are CM (factor set to 30.48).	F10.3
24-25	Enter the abbreviation for cubic part ¹ of unit volume. If blank, and (a) Linear output units are FT, this will be YD. (b) Linear output units are not feet, this will be the same as linear output units.	A2
27-28	Enter the abbreviation for linear part ¹ of unit volume. If blank, this will be the same as linear output units.	A2
30-39	Enter the factor to convert squared output units to cubic output units. If blank, and (a) Linear output units are feet, this will be 1/27. (b) Linear output units are not feet, this will be 1.0.	F10.3

¹In the expression YD^3/FT , YD is the cubic part, FT is the linear part.

(1) Units cubed per unit unless output units are feet.

(2) Cubic yards per foot if output units are feet.

If this is not acceptable, an appropriate description and factor to convert squared output units to cubic units may be entered on OPT CRD 8.

i. Option Card 9--Extrapolation to Zero Elevation (Table 19). Since the shoreline position is of major interest in the analysis of beach profile data, there may be cases when the user decides that extrapolating the distance to the zero elevation is valid. In this case, OPT CRD 9 can be used to specify the elevation, in output units relative to the output vertical datum, that the last surveyed point must reach before the shoreline position can be extrapolated. If the card is omitted or left blank, no extrapolation occurs. When any computation is performed using data for which the shoreline position was extrapolated, output of the results of that computation is flagged. No extrapolation will be performed for profiles where the last line segment is not sloping seaward.

Table 19. Option card 9--extrapolation to zero elevation.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
9	"9"	I1
11-20	Enter the maximum elevation above the output vertical datum, in output units, which the last surveyed point must reach in order that the shoreline position (datum intercept) be extrapolated. If this is blank or zero, the shoreline position will not be extrapolated.	F10.3

j. Option Card 10--Format of Input Data (Table 20). If the format specified for card image data (Table 3) or magnetic media data (Table 2) does not fit the format of the user's input data, an alternate format may be specified using OPT CRD 10. Knowledge of FORTRAN format specifications is required to use this option effectively. All the data elements but the locality code are used in the analysis computations. Thus, while this card can be used to change the field length, order, or format in which data elements are read, all elements must be present. The expected order of the variables is shown in Tables 2 and 3; the order in which the variables are read may be changed by using the FORTRAN tab or T format specification. The I format specification is described in most FORTRAN texts and reference manuals, e.g., Stuart (1970)¹.

¹Stuart, F., *FORTRAN Programming*, John Wiley & Sons, Inc., 1970.

Table 20. Option card 10--format of input data.

Position No.	Entry description	FORTRAN format
1-3	"OPT"	A3
5-7	"CRD"	A3
8-9	"10"	I2
11-80	Enter the survey data format. If this card is blank or omitted, data will read as follows: (a) Input unit is 5 (2X,I3,I4,1X,3I2, I3,I2,F5.0,11X,8F5.0/(10X,I3F5.0)). (b) Input unit is 7 (2X,I3,I4,3I2,I3, I2,I3,F5.0,7X,I20F5.0).	7A10

4. Processing Specification Cards.

These cards are used to define special physical characteristics or processing requirements of the data. When they are omitted, the program assumes that the data conform to certain specifications and assigns default values based on these assumptions. The only processing specification card used by BEACH is the VOLUME specification card (Table 21); it is used to define upper and lower contour boundaries for volume computations. If the card is not included, the lower contour for volume computations will be -100 units and the upper contour will be the profile surface. When processing specification cards used for other analysis modules are included in the BEACH setup, they are ignored and there is no effect on processing.

Table 21. Format of VOLUME specification card.

Position No.	Entry description	FORTRAN format	Default value
1-6	"VOLUME"	A6	None
11-20	Lower boundary, in output units relative to output vertical datum. Must be ≤ 0 .	F10.3	-100
21-30	Upper boundary, in output units relative to output vertical datum. Must be more than lower boundary.	F10.3	Profile surface

5. Output Specification Cards.

BEACH will produce two tabular and four graphical displays: TABLE8, TABLE8A, PLOT7, PLOT8, PLOT9, and PLOT10. These outputs are described in detail in Section V. Any or all of the outputs may be produced during a single run. An output and any required specifications for the output are selected by entering an output specification card. One, and only one, card must be entered for each output selected.

a. Table Output. TABLE8 (Fig. 5) and TABLE8A (Fig. 6) are selected on the same output specification card (Table 22). Information on this card determines whether TABLE8, TABLE8A, or both are to be output and the type of time (hours, days, months, or years) to be used in the regression analysis.

Table 22. Format of TABLE specification card.

Position No.	Entry description	FORTRAN format	Default value
1-5	"TABLE"	A5	None
9	"8"	I1	None
10	Enter an "A" if TABLE8A output is desired.	A1	TABLE8A is not output
12-15	Enter "ONLY" if only TABLE8A output is desired.	A4	TABLE8 is output.
27 ¹	Enter type of time for regression analysis and time between surveys: "H" - hours "D" - days "M" - months "Y" - years	A1	Time is expressed as months.

¹This entry must match the type of time selected for PLOT7 and PLOT8 outputs.

b. Plot Output. Table 23 describes the format for the output specification cards for plot output (Figs. 7 to 10) and defines the defaults which will be assigned if positions 13 to 80 are not completed. A separate card must be prepared for each type of plot to be output. With the exception of the plot output unit, it is not necessary that each type of plot have the same specifications when more than one type is output during a single run; format specifications for each type of plot are read and processed separately.

(1) Output Unit for Plot Commands. The plot commands may be written either to unit 3 (normally signaling card output) or 8 (normally signaling output to magnetic tape). The user must ensure that data written to these units are handled properly in the job control stream. All plot commands will be written to the unit defined on the last plot output specification card encountered.

(2) Default Plot Specification. If the defaults for values supplied in positions 13 to 80 are acceptable and the selected output units of measurement are feet, positions 13 to 80 need not be completed. However, if any plot specifications are to be supplied or output units are not feet, all fields must be completed. (The unit onto which plot commands are to be written may be changed without affecting other default specifications.)

(3) Horizontal Axis (Time, PLOT7 and PLOT8 Only). There are four ways in which time may be represented on the horizontal axis: hours, days, months,

Table 23. Format of PLOT specification card.

Position No.	Entry description	FORTTRAN format	Default value	PLOT7	Used by PLOT8	PLOT9	PLOT10
1-4	"PLOT"	A4	None	Yes	Yes	Yes	Yes
8-9	Plot number (7, 8, 9, 10)	I2	None	Yes	Yes	Yes	Yes
11 ¹	Output unit for plot: blank or "3" - cards "8" - magnetic tape	I1	3	Yes	Yes	Yes	Yes
12	Use default specifications? "0" - yes (cannot be used if output units are not feet) "1" - no Horizontal axis: PLOT7 and PLOT8, time ² PLOT9, change in volume below datum PLOT10, change in shoreline	I1	3	Yes	Yes	Yes	Yes
13-20	origin	F8.2	0 (PLOT7, PLOT8) -30 (PLOT9) -150 (PLOT10)	Yes	Yes	Yes	Yes
21-27	increment (units per inch on plot)	F7.2	2 (PLOT7, PLOT8) 10 (PLOT9) 50 (PLOT10)	Yes	Yes	Yes	Yes
28-31	length in inches Vertical axis: PLOT7, PLOT9, and PLOT10, unit volume above datum PLOT8, unit volume below datum	F4.1	6	Yes	Yes	Yes	Yes
33-40	origin	F8.2	-25	Yes	Yes	Yes	Yes
41-47	increment (units per inch on plot)	F7.2	10	Yes	Yes	Yes	Yes
48-51	length in inches	F4.1	5	Yes	Yes	Yes	Yes
53-54	Number profile lines on each plot	I2	10	No	No	Yes	Yes
62-67	Overlap: "OVLAP" - plots overlapped blank - no overlap	A6	No overlap	No	No	Yes	Yes
69	Factoring: "0" - size of plot not altered "1" - size of plot altered	I1	No factoring	Yes	Yes	Yes	Yes
71	Type of time ³	A1	Time in months	Yes	Yes	No	No

¹Must be the same for all plot outputs.

²If type of time is months, the user has no control over horizontal axis origin, increment, or length; and positions 13 to 31 may be blank. If time is years, the year should be expressed as 19XX.

³This selection must agree on TABLE 8A, PLOT7, and PLOT8.

or years (Fig. 13). When time is represented in months, the user has no control over the origin, length, or increment on the horizontal axis. Positions 26 to 42 may be left blank. Type of time (hours, days, months, or years) must agree on PLOT7, PLOT8, TABLE8, and TABLE8A specification cards. If it does not, the type of time used will be that read from the last specification card encountered.

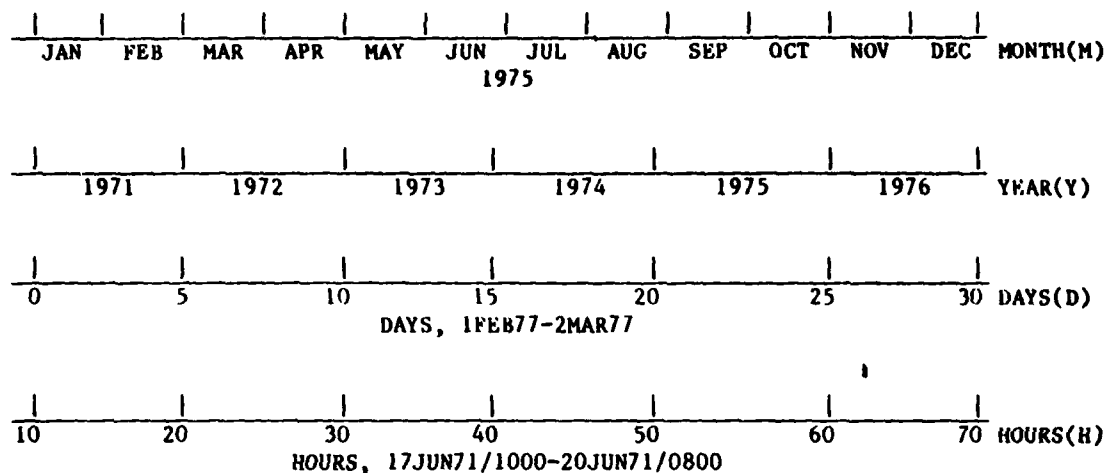


Figure 13. Types of time-elapsed axis available.

(4) Lines Per Plot. While data for only one profile line can be depicted on each PLOT7 and PLOT8 output, data for up to 10 profiles may be displayed on each PLOT9 and PLOT10 output. The number of lines per plot appears in the plot title describing how many profile lines are represented on the plot. It is possible, therefore, for the last plot to contain data for less profile lines than indicated in the title.

(5) Overlap (PLOT9 and PLOT10 Only). When the number of profiles drawn on a single plot (lines per plot) is greater than 1, the user may specify that plots be overlapped. The last profile line drawn on each plot will be the first drawn on the next until all data have been plotted. The overlapped data counts toward the number of lines per plot.

(6) Factoring. The factoring option is used to specify whether or not the final plot size is to be altered before being output. The user has no control over the factor used; this is determined by the length of the longer axis. When plots are factored, the x-axis will be no longer than 10 inches and the y-axis no longer than 6 inches. Plot size will be increased if both axes are shorter and decreased if either is longer.

(7) Defining Axis Length, Increment, and Origin. The TABLE8 output from the module can be used to determine the best axis specifications. PLOT9 and PLOT10 will not plot data which fall outside the parameter defined by the axis. These two plots depict a great deal of data on a single axis and if a

sufficient increment is not allowed, the information may be difficult to interpret. PLOT7 and PLOT8 will draw data for no more than a single profile line per plot. All data are plotted no matter where they fall. Allow an extra inch on both the horizontal and vertical axes so that the plot legend will not interfere with the plotted data. When a large number of plots are to be produced, some test plots should be run and examined before the final production run is submitted.

VII. SUMMARY

BEACH produces two table and four graphical displays. Its major functions are to display and relate unit volume and shoreline position changes. As with other analysis programs in the BPAS, outputs have been designed so that they can be used in reports without being redrafted.

APPENDIX

BEACH RECORD LAYOUTS FOR OPTION, PROCESSING,
AND OUTPUT SPECIFICATION CARDS

Program Identification Card for All Analysis Modules

(AL)										(ALG)										(IL)										(A4)																																																	
Run Name										Module Name										Input Unit										Enter "NOGO" to Stop Execution																																																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

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(A10)

NO COMMISSION KEY DISCRIPTION TRANSCRIPTION I AMONY SHEET

SHEET OF SHEETS

0 $\rightarrow$ NO
1 $\rightarrow$ 24 hour clock
2 $\rightarrow$ Hours and hundredths

[illegible]

Option Card 3 for All Analysis Modules
(output vertical datum)

		(A14) (E16.3)	
		Name of Output Vertical Datum	Amount (output units) to add to vertical coordinates to convert
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

OPT CARD 3

Option Card 4, Format 1, for All Analysis Modules

Use this format when horizontal datum is not user-supplied										Horizontal Datum: 1 → Reference survey 3 → Mean shoreline 4 → Benchmark										Horizontal Datum: 1 → Reference survey 3 → Mean shoreline 4 → Benchmark																																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
CPI CARD 4																																																																															

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**Supplementary Option Card 4A for All Analysis Modules
(use only in conjunction with OPT CRD 4, Format 2)**

Use if and only if type on Opt CRD 4 is 5	Seq. Number	Profile Number	Corresponding Correction (output units to be subtracted from distance coordinates)	Profile Number	Corresponding Correction	Profile Number	Corresponding Correction	Profile Number	Corresponding Correction
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33	33	33
34	34	34	34	34	34	34	34	34	34
35	35	35	35	35	35	35	35	35	35
36	36	36	36	36	36	36	36	36	36
37	37	37	37	37	37	37	37	37	37
38	38	38	38	38	38	38	38	38	38
39	39	39	39	39	39	39	39	39	39
40	40	40	40	40	40	40	40	40	40
41	41	41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42	42	42
43	43	43	43	43	43	43	43	43	43
44	44	44	44	44	44	44	44	44	44
45	45	45	45	45	45	45	45	45	45
46	46	46	46	46	46	46	46	46	46
47	47	47	47	47	47	47	47	47	47
48	48	48	48	48	48	48	48	48	48
49	49	49	49	49	49	49	49	49	49
50	50	50	50	50	50	50	50	50	50
51	51	51	51	51	51	51	51	51	51
52	52	52	52	52	52	52	52	52	52
53	53	53	53	53	53	53	53	53	53
54	54	54	54	54	54				

Option Card 5, Format 1, for All Analysis Modules

Use this format when zero volume is not user- supplied										(11) (14) Refer- ence survey number (if not given) type 1 only										Zero volume (above datum): 1 → Reference survey 3 → Mean unit volume										(FID.3) minimum acceptable starting distance (output units from datum horizontal datum)																																																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
OPT CARD 5																																																																															

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Option Card 5, Format 2

(E3)										(2A16,A3)										(2A16,A4)																																																											
Use this format when zero volume is user supplied					Number of profile lines					First line of description of zero unit volume above datum										Second line of description of zero unit volume above datum																																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DATA END 5					5																																																																										

Supplementary Option Card 5A

(use only in conjunction with OPT CRD 5, Format 2 and SUP 5B cards)

SWEETS

Supplementary Option Card 5B
(use only in conjunction with OPT CRD 5, Format 2 and SUP 5A cards)

(I3)		(I3)		(F10.3)		(I3)		(F10.3)		(I3)		(F10.3)		(I3)		(F10.3)	
Use only if type on OPT CRD 5 is 5	Seq. Number	Profile Number	Corresponding landward boundary (output units from output horizontal datum)	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary	Profile Number	Corresponding landward boundary
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378
379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396
397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414
415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432
433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468
469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486
487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558
559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576
577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594
595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612
613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630
631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648
649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666
667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702
703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738
739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756
757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774
775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792
793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810
811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828
829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846
847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864
865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882
883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900

FORM 2900 (1-64) and use the front of this form with need after desired information is filled in. 80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET SHEET 1 OF 1 SHEETS

Option Card 6, Format 1

[illegible]

Option Card 6, Format 2
(must be followed by SUP 6A and SUP 6B cards)

Use this format when zero volume is user-supplied										(I3)										(2A10, A3)										(2A10, A9)																																																	
										Number of Profile Lines										First line of description of zero unit volume below datum										Second line of description of zero unit volume below datum																																																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
OPT CARD 6										5																																																																					

Form 2900 (and reproduction of the form is authorized after device information is filled in.) 80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET SHEET OF SHEETS

Supplementary Option Card 6B
(use only in conjunction with OPT ORD 6, Format 2 and SUP 6A cards)

(I3)		(I3)	(F10.3)	(I3)	(F10.3)	(I3)	(F10.3)	(I3)	(F10.3)	(I3)	(F10.3)	(I3)	(F10.3)
Use only if type on OPT ORD 6 is 5	Seq. Number	Profile Line Number	Corresponding seaward boundary output units from output horizontal column	Profile Number	Corresponding seaward boundary	Profile Number	Corresponding seaward boundary	Profile Number	Corresponding seaward boundary	Profile Number	Corresponding seaward boundary	Profile Number	Corresponding seaward boundary
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98
99	100	101	102	103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182
183	184	185	186	187	188	189	190	191	192	193	194	195	196
197	198	199	200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221	222	223	224
225	226	227	228	229	230	231	232	233	234	235	236	237	238
239	240	241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264	265	266
267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294
295	296	297	298	299	300	301	302	303	304	305	306	307	308
309	310	311	312	313	314	315	316	317	318	319	320	321	322
323	324	325	326	327	328	329	330	331	332	333	334	335	336
337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364
365	366	367	368	369	370	371	372	373	374	375	376	377	378
379	380	381	382	383	384	385	386	387	388	389	390	391	392
393	394	395	396	397	398	399	400	401	402	403	404	405	406
407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434
435	436	437	438	439	440	441	442	443	444	445	446	447	448
449	450	451	452	453	454	455	456	457	458	459	460	461	462
463	464	465	466	467	468	469	470	471	472	473	474	475	476
477	478	479	480	481	482	483	484	485	486	487	488	489	490
491	492	493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516	517	518
519	520	521	522	523	524	525	526	527	528	529	530	531	532
533	534	535	536	537	538	539	540	541	542	543	544	545	546
547	548	549	550	551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570	571	572	573	574
575	576	577	578	579	580	581	582	583	584	585	586	587	588
589	590	591	592	593	594	595	596	597	598	599	600	601	602
603	604	605	606	607	608	609	610	611	612	613	614	615	616
617	618	619	620	621	622	623	624	625	626	627	628	629	630
631	632	633	634	635	636	637	638	639	640	641	642	643	644
645	646	647	648	649	650	651	652	653	654	655	656	657	658
659	660	661	662	663	664	665	666	667	668	669	670	671	672
673	674	675	676	677	678	679	680	681	682	683	684	685	686
687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714
715	716	717	718	719	720	721	722	723	724	725	726	727	728
729	730	731	732	733	734	735	736	737	738	739	740	741	742
743	744	745	746	747	748	749	750	751	752	753	754	755	756
757	758	759	760	761	762	763	764	765	766	767	768	769	770
771	772	773	774	775	776	777	778	779	780	781	782	783	784
785	786	787	788	789	790	791	792	793	794	795	796	797	798
799	800	801	802	803	804	805	806	807	808	809	810	811	812
813	814	815	816	817	818	819	820	821	822	823	824	825	826
827	828	829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852	853	854
855	856	857	858	859	860	861	862	863	864	865	866	867	868
869	870	871	872	873	874	875	876	877	878	879	880	881	882
883	884	885	886	887	888	889	890	891	892	893	894	895	896
897	898	899	900	901	902	903	904	905	906	907	908	909	910
911	912	913	914	915	916	917	918	919	920	921	922	923	924
925	926	927	928	929	930	931	932	933	934	935	936	937	938
939	940	941	942	943	944	945	946	947	948	949	950	951	952
953	954	955	956	957	958	959	960	961	962	963	964	965	966
967	968	969	970	971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990	991	992	993	994
995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022
1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036
1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050
1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064
1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078
1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092
1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106
1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120
1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134
1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148
1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162
1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176
1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190
1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204
1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218
1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232
1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246
1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260
1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274
1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288
1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302
1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316
1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330
1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344
1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358
1359	1360	1361	1362	1363	1364	1365	1366	1367					

Option Card 7
(data description)

(3A10.A1)

		31 Character description of data if that on the header record is not acceptable			
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84
85	86	87	88	89	90
91	92	93	94	95	96
97	98	99	100	101	102
103	104	105	106	107	108
109	110	111	112	113	114
115	116	117	118	119	120
121	122	123	124	125	126
127	128	129	130	131	132
133	134	135	136	137	138
139	140	141	142	143	144
145	146	147	148	149	150
151	152	153	154	155	156
157	158	159	160	161	162
163	164	165	166	167	168
169	170	171	172	173	174
175	176	177	178	179	180
181	182	183	184	185	186
187	188	189	190	191	192
193	194	195	196	197	198
199	200	201	202	203	204
205	206	207	208	209	210
211	212	213	214	215	216
217	218	219	220	221	222
223	224	225	226	227	228
229	230	231	232	233	234
235	236	237	238	239	240
241	242	243	244	245	246
247	248	249	250	251	252
253	254	255	256	257	258
259	260	261	262	263	264
265	266	267	268	269	270
271	272	273	274	275	276
277	278	279	280	281	282
283	284	285	286	287	288
289	290	291	292	293	294
295	296	297	298	299	300

FORM 2900 (Rev. 1-64) (This form is authorized after device information is filled in.)

80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET

SHEET 1 OF 1 SHEETS

Option Card 8
(linear and cubic output units)

		(A1) (F.D.3)	(A2)	(A3)	(F.D.3)																																																																																
		Factor to convert input to output. Not required if: input output is linear or if no conversion is required.	Cubic portion of cubic output units to linear output.	Linear portion of cubic output units to linear output.	Factor to convert squared output units to cubic output units. Not required if no conversion is needed or if changing F12 to Y0/F1																																																																																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80						
OPT CARD 8																																																																																					

ENG 2500 (Local reproduction of this form is authorized after desired information is filed-in.) 80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET SHEET OF SHEETS

Option Card 9
(extrapolation to output vertical datum)

(F10.3)

										Minimum elevation, output units from output vertical datum, of last surveyed point from which shore line can be extrapolated																																																																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
OPT CARD 9																																																																															

SHEET OF SHEETS

80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET

FORM 2900 (Rev. 1-64) (This form is authorized for use by the Department of the Interior.)

ENG 1111

(7A10)

Format of input survey data if other than one of the two described earlier.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SHEET OF SHEETS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SHEET OF SHEETS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SHEET OF SHEETS

VOLUME Specification Card

										(F10.3) Lower elevation for volume below computations. Must be ≤ 0 . If blank - no units is used.										(F10.3) Upper elevation for volume above computations. Must be ≥ 0 . If blank, Profile surface is used.																																																																					
1	2	3	4	5	6	7	8	9	0	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80										
VOLUME																																																																																									

800 FORM 2900 (Last reproduction of this form is authorized after desired information is added.) 80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET

TABLE 8 and TABLE 8A Output Specification Card

(A1)										(A4)										(A1)										* Kind of time																																																	
H=Produce TABLE 8										Do not produce TABLE 8 (as a only cc is not -H)										Enter H, D, M, Y										"H" → hours "D" → days "M" → months "Y" → years must agree with entry in cc 71 of PLOT 7 and PLOT 8																																																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
TABLE 8																																																																															

80 COLUMN KEY PUNCH TRANSCRIPT LAYOUT SHEET

FORM 2500 (If used in production form of this form is authorized after official implementation is indicated.)

ENG FORM 2500 MAY 68

SHEET OF SHEETS

PLOT7, PLOT8, PLOT9, and PLOT10 Specification Cards

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Fleming, Marilyn V. Beach Profile Analysis System (BPAS). Volume V. BPAS user's guide: analysis module BEACH / by Marilyn V. Fleming and Timothy J. Lawler.--Fort Belvoir, Va. : U.S. Army, Corps of Engineers, Coastal Engineering Research Center ; Springfield, Va. : available from NTIS, 1982. [65] p. ill. ; 27 cm.--(Technical report / Coastal Engineering Research Center; no. 82-1 v.(V)). Cover title. An eight-volume package of computer programs for editing, analyzing, and displaying beach profile survey data is presented consisting of an overview of the Beach Profile Analysis System, two editing programs, five analysis programs, and supporting appendices. The primary design is for use on the CDC 6600 computer, although much of the coding was done in standard FORTRAN for use on other systems. 1. Data processing. 2. Beach Profile Analysis System. 3. Beach profile changes. 4. Computer programs. I. Lawler, Timothy J. II. Title. III. Series: Technical report (Coastal Engineering Research Center (U.S.)); no. 82-1, v.V. TC203 .U581tr no. 82-1, v.V 627	Fleming, Marilyn V. Beach Profile Analysis System (BPAS). Volume V. BPAS user's guide: analysis module BEACH / by Marilyn V. Fleming and Timothy J. Lawler.--Fort Belvoir, Va. : U.S. Army, Corps of Engineers, Coastal Engineering Research Center ; Springfield, Va. : available from NTIS, 1982. [65] p. ill. ; 27 cm.--(Technical report / Coastal Engineering Research Center; no. 82-1 v.(V)). Cover title. An eight-volume package of computer programs for editing, analyzing, and displaying beach profile survey data is presented consisting of an overview of the Beach Profile Analysis System, two editing programs, five analysis programs, and supporting appendices. The primary design is for use on the CDC 6600 computer, although much of the coding was done in standard FORTRAN for use on other systems. 1. Data processing. 2. Beach Profile Analysis System. 3. Beach profile changes. 4. Computer programs. I. Lawler, Timothy J. II. Title. III. Series: Technical report (Coastal Engineering Research Center (U.S.)); no. 82-1, v.V. TC203 .U581tr no. 82-1, v.V 627
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