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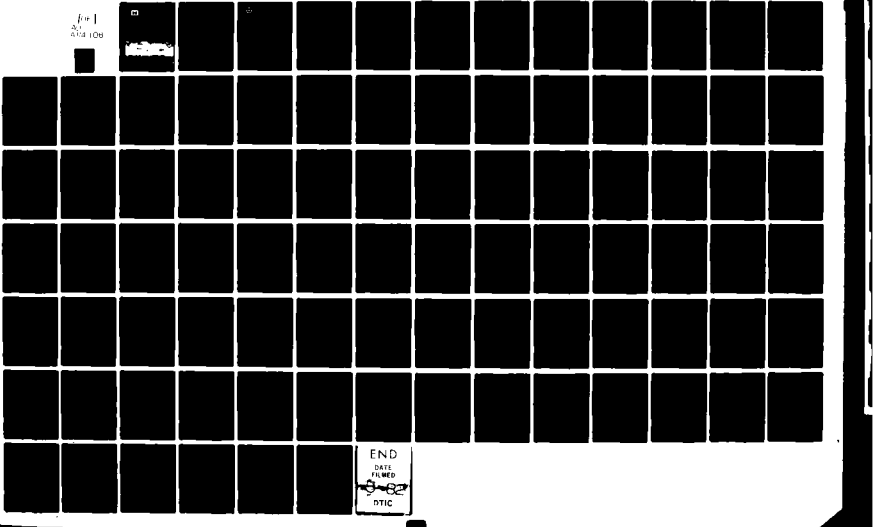

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MISCELLANEOUS PAPER GL-82-1

GEOTECHNICAL COMPUTER PROGRAM SURVEY

Compiled and Edited

by

Earl V. Edris, Jr. and Wipawi Vanadit-Ellis

Geotechnical Laboratory
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

March 1982
Final Report

Prepared for Office, Chief of Engineers, U. S. Army
Washington, D. C. 20314

Under Computer Applications in Geotechnical Engineering Project

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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWE-SS

10 March 1982

SUBJECT: Miscellaneous Paper GL-82-1, "Geotechnical Computer Program Survey"

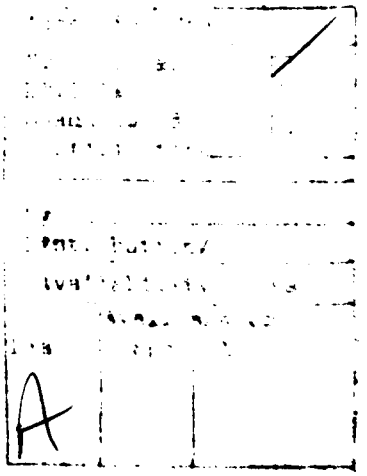
All Corps Elements with Civil Works Responsibilities

1. The subject report contains a listing of computer programs used by geotechnical groups within the Corps. This information is being disseminated as a ready reference in identifying available programs that could serve similar needs of various offices. The information provided about each program will allow engineers to determine if their needs will be met by a particular program. More detailed information can be obtained by contacting the designated office or individual listed. As is the intent of the CAGE tasks, this report provides a means of reducing future redundancy and provides the engineer with a cost-effective means of expanding his capabilities.

2. I strongly urge the use of this report as a reference when computer application needs arise.

FOR THE COMMANDER:

LLOYD A. DUSCHA, P.E.
Chief, Engineering Division
Directorate of Civil Works



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The results of a survey of geotechnical computer programs used in U. S. Army Corps of Engineers Offices are presented in tables listing program name, contact office/author, program number and availability, type of computer, documentation status, abstract availability, and a brief description of the program. Many of the programs are not listed in the computer program library.

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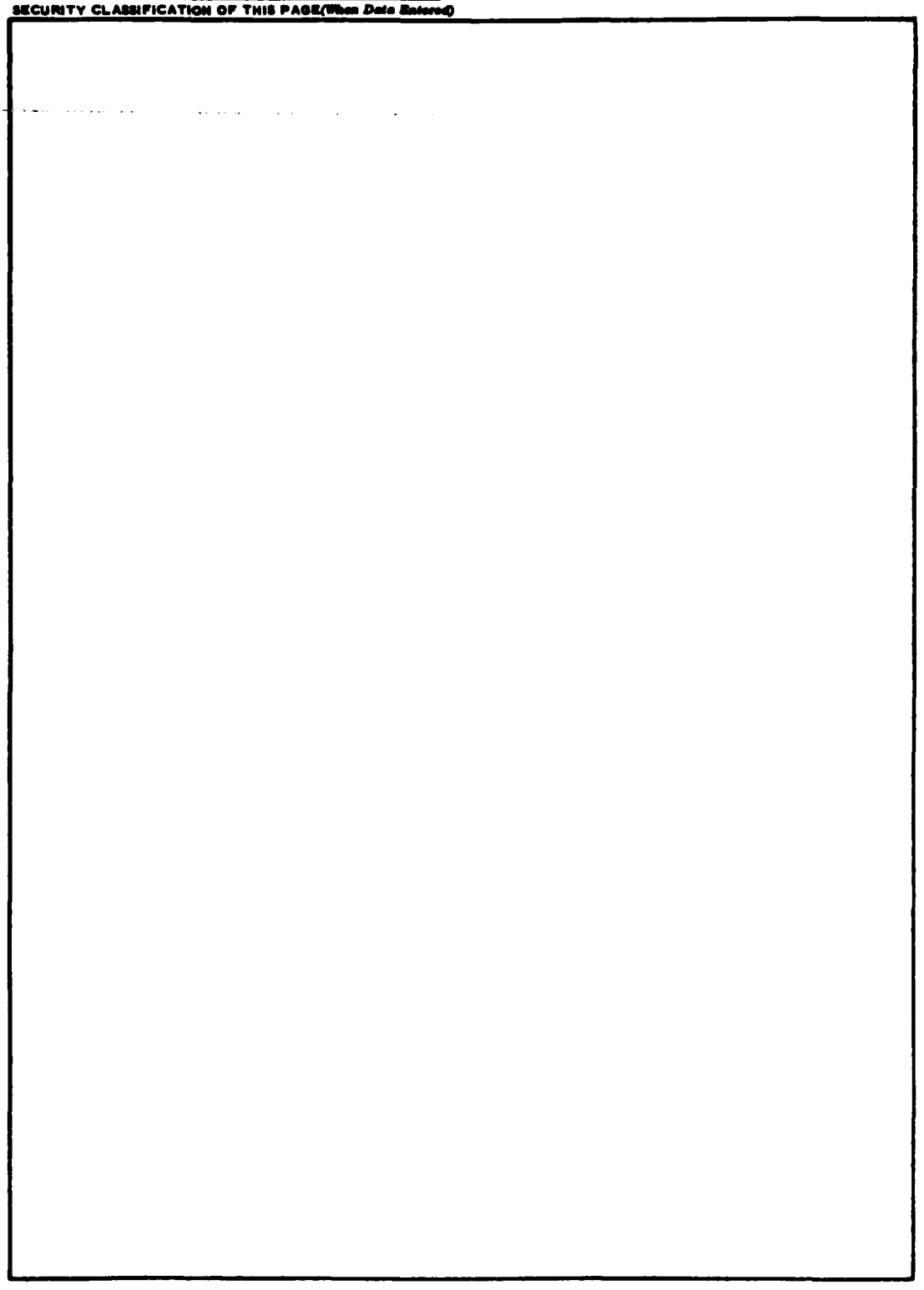

Preface

This list of computer programs was compiled by the Geotechnical Laboratory (GL) of the U. S. Army Engineer Waterways Experiment Station (WES) during the period June 1980 to October 1981. This report is a product of the Computer Applications in Geotechnical Engineering (CAGE) Project of the Office, Chief of Engineers (OCE), U. S. Army.

The list was compiled and edited by Mr. Earl V. Edris, Jr., and Ms. Wipawi Vanadit-Ellis, Soil Mechanics Division (SMD), based on responses received from the Divisions and Districts of the U. S. Army Corps of Engineers and the Automatic Data Processing (ADP) Center at the WES. Gratitude is expressed to all the points-of-contact for their cooperation in this effort.

Mr. W. E. Strohm, Jr., Engineering Geology and Rock Mechanics Division (EG&RMD), CAGE Principal Investigator, monitored the work. Messrs. Richard Malm, Richard Davidson, and Paul Fisher, Civil Works Directorate, were OCE points-of-contact. Dr. William F. Marcuson III and Dr. Paul F. Hadala were Chief and Assistant Chief, respectively, GL.

COL Nelson P. Conover, CE, and COL Tilford C. Creel, CE, were Commanders and Directors of WES during the preparation of this report. Mr. Fred R. Brown was Technical Director.

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GEOTECHNICAL COMPUTER PROGRAM SURVEY

Introduction

History of program listing*

1. The St. Paul District, Corps of Engineers (CE), surveyed the existing computer programs in the area of geotechnical engineering used by the various Corps Districts for the 1976 INFOCORP Conference.** This survey was conducted at the request of the computer user's group within the Corps (INFOCORP) so that duplication of programming efforts could be avoided. However, this report is now out of date. A partial listing of geotechnical programs is available in an annual publication of the Engineer Computer Program Library (ECPL) which is entitled "Engineering Computer Programs Catalog."† This listing, which can be obtained through the ECPL at WES, is comprised of submitted program documentation as described in ER-18-129 which consists of a copy of the program and a reference document describing program usage. Thus, not all Corps developed geotechnical programs are listed with the ECPL. During the first phase of the Computer Applications in Geotechnical Engineering (CAGE) project (a survey of the computer applications in the various Corps division and district offices),†† the question of available programs was

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* The following work was used for general guidance in the writing of this report: N. Radhakrishnan and Paul K. Senter (ed.). 1981. "List of Soils, Soil-Structure Interaction and Other Related Programs Available for LMVD Engineers" Technical Report K-81-1, Automatic Data Processing Center, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

** Douglas Spaulding, "Survey of Computer Programs in the Area of Soil Mechanics," Presentation at the 1976 INFOCORP Conference at Davis, Calif.

† U. S. Army Engineer Waterways Experiment Station. 1981. "WES Engineering Computer Programs Library Catalog," Corps of Engineers, Vicksburg, Miss.

†† D. P. Hammer and Robert D. Bennett. 1979. "Results of Geotechnical Computer Usage Survey," Miscellaneous Paper GL-79-19, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

raised frequently by various Division and District office representatives who felt neither of these sources were complete. Thus, one of the initial tasks of the CAGE group was to update and revise the list of geotechnical computer programs. Hopefully, this report, which is an updated list of geotechnical computer programs used within the CE, will be consulted before any new programs are written so that duplication of effort will be avoided.

Program grouping

2. In order to provide a manageable framework to present the survey results, the programs were placed in one of the following 15 categories:

a. Slope stability.

b. Seepage.

c. Stress computation, settlement, and consolidation.

d. Piles, sheet piles, and cells.

e. T-walls.

f. Earthquake engineering.

g. Geophysics.

h. Instrumentation.

(1) Piezometer data.

(2) Inclinometer data.

(3) Other.

i. Laboratory testing and boring logs.

j. Embankment quantities, quality control, volumes, and riprap.

k. Grouting and tunneling.

l. Pavements.

m. Finite element method and finite difference.

n. Utility programs.

o. Miscellaneous.

The programs are listed alphabetically by program name for each category. Programs in the utility category consist of those programs that are not geotechnical but are used with geotechnical data manipulation or collection programs.

Data for survey

3. The basis for the information described in this report was a survey letter asking all the geotechnical branches in the various continental U. S. Corps Offices to list all the computer programs they use. In addition to the program name, also requested were the author, program number, a brief description of the program, and the type of computer necessary to run the program. Responses were obtained from WES and all CE District and Division offices except the Tulsa and New York Districts. Thus, the majority of the geotechnical programs used by Corps personnel are included in this report. In a number of responses, documentation was not addressed and the availability of documentation is unknown and assumed not to exist. The editors of this report used the information provided by the field offices to categorize the programs. The following breakdown indicates the number of programs in each category along with how many are engineering programs or data handling programs:

Category	Total Number of Programs	Engineering Programs	Data Handling Programs
a. Slope stability	42	37	5
b. Seepage	18	13	5
c. Stress computation, settlement and consolidation	14	14	0
d. Piles, sheet piles, and cells	37	36	1
e. T-walls	4	4	0
f. Earthquake engineering	28	17	11
g. Geophysics	12	8	4
h. Instrumentation			
(1) Piezometer data	23	0	23
(2) Inclinometer data	29	0	29
(3) Other	19	0	19
i. Laboratory testing, and boring logs	38	0	38

Category	Total Number of Programs	Engineering Programs	Data Handling Programs
j. Embankment quantities, quality control, volumes and riprap	27	8	19
k. Crouting and tunneling	6	2	4
l. Pavements	8	8	0
m. Finite element method and difference	21	12	9
n. Utility programs	19	0	19
o. Miscellaneous	6	2	4

Computer system abbreviations

4. Abbreviations of computer systems or equipment used in this report are defined as:

BCS	Boeing Computer Services Corporation Control Data Computers (CDC 6600, CDC 7600, and Cyber 175)
Honeywell 6620	One of Honeywell 6000 series computers located at various CE Division locations
OPM	Office of Personnel Management Honeywell 6000 series at Macon, Ga.
DPS-1	U. S. Army Engineer Waterways Experiment Station's Honeywell computer
H-635	Honeywell 635 computer
H-400	One of Honeywell 400 series computers
H-225	Honeywell 225 computer
Harris S120	One of Harris' 120 series minicomputers located at various CE District offices
IBM 370	International Business Machine computer
McDonald Douglas	Private computer service using IBM computers

INFONET	Computer Services Corporation UNIVAC 1108 and 1106 computers
LBL	Lawrence Berkeley Laboratories, CDC 7600 and 6600
TEK 4051	Tektronix computer screen, desktop graphics computing system
TEK 4081	Tektronic computer graphics system
TEK 4662	Tektronic interactive digital plotter
TEK 4907	Tektronix file management system to allow off-line digitizing using Tektronix 4014 graphics terminal with Option 5

All programs that run on the Honeywell 6620 and H-635 will run on the DPS-1, and most programs that run on the H-400 and H-225 will run on the DPS-1 and Honeywell 6620.

Additional Information

5. For further information on any program in the table, the user should address his inquiry to the ECPL, the contact office, or the authors of the program. The program numbers of the programs that are part of the Conversationally Oriented Real-Time Program Systems (CORPS) are indicated along with the programs in the ECPL in the column "Program Name and Availability." Information on how to access the CORPS is contained in an unnumbered WES report entitled "Manual for a Conversationally Oriented Real-Time Program-Generated System (CORPS)."*

* H. Wayne Jones. 1979. "Manual for a Conversationally Oriented Real-Time Program-Generated System (CORPS)," Automatic Data Processing Center, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Summary

6. The attached listing provides the most current information available for geotechnical computer programs in use by Corps of Engineers offices. The large number of programs in certain categories raises the possibility of duplication. From the information provided, it is sometimes not possible to determine the degree of duplication. Some of the programs do perform essentially the same engineering calculations but have different input/output structures which fit the needs of a particular District. Also, some variations were developed because of the various computer systems used in the Corps. The reader is urged to use the information in this report and take advantage of previously developed programs where possible.

Listing of Available Programs

7. The available programs are described on pages 9-82.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Active Wedge	Detroit/M. Grazioli, P. Kytasty	741-G1-F3020	H-225	No	No	This is a component of Stability by Method of Wedges (Program 741-G1-3060), which is useful for estimating active loads on structure.
Bishop's Method Slope Stability	Wilmington/G. Lefebvre Revised by L. Mitchell	741-E1-K7103	Harris S120	No	Yes	Calculate the factors of safety for specified circles, or search for the circular slip surface having the minimum factor of safety, using either the Ordinary Method of Slices or Bishop's Modified Method.
Channels	Memphis/ R. E. Brittain		H-635	No	No	This program utilizes the Method of Planes. The program is written in conversational FORTRAN IV with the purpose of keeping input to a minimum while retaining sufficient flexibility to allow its usage for most conditions encountered in the design and analysis of channel sections with variable channel bank and excavated material slopes. The program is applicable only to horizontal soil strata.
Circular Arc Method (SSA003)	WES/J. Cheek	741-F3-R0003 ECPL	H-635	Yes	Yes	Circular arc method that follows the design procedures outlined in EM 1110-2-1902 dated 27 Dec 1960. In analysis mode, the program will handle cases of after construction, sudden drawdown, steady seepage and partial pool and automatically locate critical pool elevations.
Circular Arc	Detroit/L. C. Slack, R. L. James, SWA Modified by Detroit	741-G1-F3010	H-225 H-400	No	No	Circular arc analysis as described in EM 1110-2-1902, 1960. Detroit District has added several search routine options for locating the min. F.S. The program cannot handle seismic analysis.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Circular Arc	Nashville/ J. E. Bowles	741-500	Infonet	No	No	Simplified Bishop method, as described in textbook "Analytical and Computer Methods in Foundation Engineering" by J. E. Bowles.
Circular Arc	Mobile/L. C. Slack, R. L. James, SWA Revised W. McAleer, SAM	741-S8-K5030	Harris S120	No	No	Program performs circular arc stability analysis.
DATACHECK	Vicksburg/G. Wardlaw LMK		TEK 4081	No	No	Performs datacheck and plots input data file for STAB/LMVD wedge method analysis and executes STAB Program for analysis.
Grid and Plotting for Circle Plane	Rock Island	741-G1-F412A, F413A, F414A	BCS	No	Yes	Calcomp plot of stability analysis showing section, trial and critical failure surfaces, design envelopes, factor of safety and soils table. Data from 741-VV-F427A in accordance with EM 1110-2-1902 dated April 1970.
GSLOPE	WES/R. Hall, WESKA		H-635	Yes	No	An interactive graphics program. Solves slope stability problems and displays results graphically and produces drum plots.
ICES	Alaska/MIT		IBM 370	Yes	Yes	The program gives the user a choice of selecting either simple, but approximate versions of the Method of Slices where classic circular failure arcs are assumed, or the Morgenstern-Price Method where failure surfaces approximated by straight lines are specified by the engineer.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Kansas City Wedge	Kansas City/ R. Davidson	741-F5-C1020 741-X6-C1020	H-635 BCS	Yes	Yes	This program performs stability analyses of earth and rockfill embankments and slopes using either a wedge method or slip circle method, substantially in accordance with EM 1110-2-1902, "Stability of Earth and Rockfill Dams," dated 1 April 1970.
Master Stability Analysis	New Orleans/ L. Manson K. Broussard LMN	741-X6-A2520 741-F3-A2520	BCS H-635	No	Yes	Determine the critical profile of any natural or man-made earth slope embankment for which shear failure could occur along a surface approximated by a series of planes. It uses the wedge method of stability analysis to design either a minimum section or revetment foundation through an interactive procedure.
Modified Swedish Method (WES104)	WES/Y. S. Jeng, WESGE	741-F3-R0104 CORPS-I0009 ECPL	H-635 OPM BCS	Yes	Yes	Modified Swedish Method is used for slope stability analysis (EM 1110-2-1902, 1970) for circular and noncircular arc. The solutions for simplified Bishop Method and Feullius Method are associated to the solution of the critical arc if a family of arcs are searched by using a grid system.
Modified Swedish Arc	Detroit/L. C. Slack, R. L. James, SWA Modified by Detroit	741-F-3011	H-225	No	No	Performs the modified Swedish slope stability procedure as described. This program cannot handle seismic analysis.
Passive Wedge	Detroit/M. Grazioli, P. Kytasty	741-G1-F3030	H-225	No	No	This is a component of Stability by Method of Wedges (Program 741-G1-F3060). Is useful for estimating passive forces at structures.
PIC 2	St. Louis/T. Wolff, LMS		BCS	No	No	Gives graphic display of input data for SLD wedge slope stability (time-sharing version). Allows "windowing" of data.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
PICTURE	St. Louis/T. Wolff, LMS		H-635 BCS	No	No	Gives graphic display of input data for NOD slope stability program "UPMASTAB" (same as CORPS program I0005). Allows windowing of data.
Pore Pressure Arc Stability	Fort Worth/Y. S. Jeng, WES, modified by R. MacDonald, LMS	741-F3-A3001	H-635	Yes	Yes	The program was altered for use in certain analyses: Force polygon subroutines were changed such that tensile earth forces were zeroed and a few messages were printed to explain how and where tensile forces were handled. Pore pressures can now be simulated in confined layers by using Bishop's pore pressure coefficient (Ro) in certain input profile layers, with phreatic pore pressures used in all others.
Slip Circle Slope Stability With Side Forces	WES (W. Jones, WESKA)/ D. Spaulding NCS	741-I1-F5030 CORPS-I0013 ECPL	H-635 BCS OPM	Yes	Yes	Performs slip circle slope stability calculations on embankments or natural slopes in accordance with EM 1110-2-1902, draft Feb 1968. The program calculates the factor of safety against sliding for a series of trial arcs tangent to a horizontal plane, and locates the circle with the least factor of safety.
Slope II	WES (R. Mosher, WESKA E. Edris, WESGE)/ Geo-Slope Programming, Ltd.		BCS	Yes	No	Slope stability package containing Felenius or Ordinary Method, Simplified Bishop Method, Spencer Method. Janbu Simplified Method, Janbu Generalized Method, Morgenstern-Price Method, Nonvellier Method, Lowe-Karafiath Method, Corps of Engineers Method, and Modified Swedish Method. Pore pressure can be handled by linear coefficient, a non-linear coefficient, a series of piezometric lines, or a grid of pore pressure values.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
SLOPE 8R	Los Angeles, Kansas City/S. Wright et al, UC Berkeley		BCS	No	Yes	Calculates the factor of safety for specified noncircular slip surface.
Slope Stability Analysis	Seattle/R. L. James, R. J. Yunker, L. C. Slack, E. T. Gates	41-K5-G301	IBM 360	Yes	Yes	This program is designed to compute coordinates of intersections of the failure arc and boundary lines of an earth embankment and to select values of the friction angle and coefficient of cohesion applicable to each segment of the failure arc. The program then computes the factor of safety for a particular failure arc for the end-of-construction condition, for drawdown, steady seepage, or partial pool conditions.
Slope Stability Analysis By Method Of Wedges	WES/L. Manson, LMN	713-F3-A2160 CORPS-I0006 ECPL	H-635 BCS OPM	Yes	Yes	Determines the factor of safety using the stability analysis by the method of wedges on any embankment or slope.
Slope Stability Wedge Method (SSW028)	WES/J. Cheek, R. Hall	741-F3-R0028 ECPL	H-635	Yes	Yes	This program utilizes a wedge method slope stability program that follows the design procedures used in the Lower Mississippi Valley Division for analysis of plane failures. The program provides for calculating safety factors for the after construction, sudden drawdown, partial pool, and steady seepage cases.
Slope Stability Wedge Method (SSW028L)	WES/R. Mosher, WESKA		Honeywell 6620			This program is a modified version of SSW028 that can handle soils with linear varying shear strength.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Slope Stability Analysis With Plot Routines Mod #2	New Orleans/ L. Manson J. Montegut P. Oakland K. Broussard LMN	741-X6-A217A 741-F3-A217A	H-635 BCS	No	Yes	The program determines the factor of safety using stability analysis by the method of wedges on any embankment or slope. In addition, the program outputs the data required to generate a Calcomp 925/1036 drum plot of the stability analysis plate from program 741-X6-A217B.
Slope Stability Analysis Plot	New Orleans/ L. Manson J. Montegut LMN	741-F3-A217B	H-635	No	Yes	The program is intended to have general application in providing the safety analysis of any natural or man-made earth slope embankment for which shear failure may occur along a surface approximated by a series of planes. The program is directly applicable to all cases for which the wedge method of stability analysis is valid.
Slope Stability Using Generalized Failure Surface	WES (W. Jones, WESKA)/ D. Spaulding NCS	741-F3-F5020 CORPS-I0014 ECPL	H-635 BCS OPM	Yes	Yes	Performs slope stability calculations on embankment or natural slopes in accordance with EM 1110-2-1902, April 1970. Also calculates factors of safety for failure surfaces defined by (1) a series of up to 50 straight line segments or (2) an upslope wedge, neutral block and downslope wedge. Will minimize factor for failure surfaces described by method 2.
SLOPWE	WES/L. Manson, LMN G. Wardlaw, LMK R. Hall, WESKA	741-C9-A4030	H-400	Yes	No	Slope stability analysis using the method of planes as described by LMVD division criteria.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Soil Design Procedure, SDDP-1	Buffalo/New York State DOT		H-400 BCS	Yes	Yes	The program computes the factors of safety by two methods, the Ordinary Method of Slices and the Modified Bishop Equation. Both methods assume a circular arc failure surface and compute the forces acting within the one of failure by dividing the zone into a number of finite slices with vertical sides. Once a method is chosen and a starting center and radius is inputted in the data, the program conducts a systematic search varying both the radius and location of the slip circle until the critical circle is located for the method chosen. Values for the factor of safety are listed for each method at each location for each radius tried. More than one starting location and radius for the slip surface can be input into the program at a time.
6STAB	Vicksburg/ L. Manson, LMN Giles, LMK	741-G9-A4010	H-635 H-400 TEK 4081	Yes	No	Slope stability analyses, method of planes, wedge method.
STAB	Vicksburg/G. Wardlaw, LMK		TEK 4081	No	No	Stability analysis program to determine safety factors using method of planes or LMVD Wedge Method.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
STABR	Los Angeles, Sacramento, Kansas City/ G. Lefebvre, UC Berkeley	741-X8-E402A	BCS	No	No	Calculate factor of safety for circular slip surfaces using Ordinary Method of Slices or Bishop's Modified Method. A routine searches for the minimum factor of safety.
Stability With Uplift	WES (W. Jones, WESKA)/ L. Manson D. Beer LMN	741-F3-A2530 CORPS-I0005 ECPL	BCS OPM H-635	Yes	Yes	Determines the safety analysis of any natural or man-made earth slope embankment for which shear failure may occur along a surface approximated by a series of planes.
Stability Analysis Force Polygon Plot	Rock Island	741-VV-F406A	BCS	No	Yes	Plots section with slices, force polygon and typical slice using input and output from both circular and noncircular arc programs (CORPS I0013 and I0014). It computes or solves force polygon using input from manual computations, then makes plots as stated previously. Input from manual computations is all force vectors except magnitude of earth force and normal force.
Stability By Method Of Wedges	Detroit/M. Grazioli, P. Kytasty	741-G1-F3060	BCS	No	Yes	(a) Searches for critical boundaries and computes minimum factor of safety. (b) Uses straight planes through dissimilar soils. (c) Neutral block is sliding on horizontal plane. (d) Inclination of side forces can be entered or computed. (e) EM 1110-2-1902, dated April 1970, is applicable. (f) Composite strength situations must be approximated manually and coded in as part of soil (slope) profile describing soils of different strength. (g) Does not handle seismic effects.

SLOPE STABILITY

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
WDG	St. Louis/V. Fowler, LMS	741-X6-A319A	BCS	Yes	No	Slope stability, by the wedge method, based on EM 1110-2-1902, 1970.
WEDGE80	WES/Y. S. Jeng, WESGE		H-635	No	No	This program has a search routine for the critical wedge location, based on the EM 1110-2-1902, 1970. It can perform pseudo dynamics analysis and also has the capacity to plot force polygon, wedge plane and embankment section.
Wedge Method	WES/Y. S. Jeng, WESGE	741-G9-R0107	H-635	No	Yes	Using the wedge method as described in Appendix IV, EM 1110-2-1902, 1970, two or more different types of soils along the base of the central block can be considered and the trial failure plane shifted to the weaker zone by input instructions. Pore water pressures can be calculated from either a flow net or from a phreatic line which considers a linear increase in water pressure with depth. These can be considered independently for each block system. For example, a flow net can be used for the active wedge, while a phreatic line can be used for either the central block or passive wedge.
Wedge Method With Excess Pore Pressure (SSW039)	WES/J. Cheek	741-F3-R0039 ECPL	H-635	Yes	Yes	The program is intended to have general application in providing the safety analysis of any natural or man-made earth slope for which the wedge method with excess pore water pressure is valid.
W104P	WES/Y. S. Jeng, WESGE		H-635	No	No	This is the batch mode of the program WES104, where drum plottings for force polygon failure surface and embankment section can be assigned.

SEEPAGE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
BERM	Vicksburg/G. Wardlaw, LMK		H-400 H-635 TEK4081	Yes	No	Design of semipervious seepage berm according to methods presented in WES TM 3-424.
Design For Infinite System Of Relief Wells	WES (W. Jones, WESKA)/ G. L. Cohn, A. Ellingson NPS	741-F3-F5050 ECPL CORPS-I0015	H-635 OPM BCS	Yes	Yes	The program determines the relief well spacing for given well penetrations into the previous substratum as suggested by the WES TM 3-424, Vol. 1. The program computes the factor of safety for the given condition to determine the necessity for relief wells. When relief wells are required, the program designs the spacing versus penetration into the aquifer for conditions with or without a landward top semipervious stratum and can compute seepage quantities for the design conditions.
Design of Finite Preasure Relief Wells By Image Method	Kansas City/M. Wiley, KCD	741-F5-C1010	H-400 BCS	No	Yes	The purpose of this program is to provide the design engineer with a rapid method of computing the relationships between well flow, drawdown at a well, and drawdown at any reference point in a finite relief well system.
Equipotential Line Contouring For Finite Element Seepage Output	St. Paul/F. Tracy, WESKA, Modified By D. Spaulding	741-X-F060	H-400	No	No	This program plots equipotential lines from data output from a finite element seepage program. The input data consists of various plot control cards in addition to the equipotential values at the node points of a finite element mesh.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Finite Difference Model For Aquifer Simulation In 2-D	Nashville/P. Trescott, USGS, Reston, VA	741-0330	Infonet	Yes	No	Performs the following aquifer analyses in 2-D: dewatering; large drawdowns in unconfined aquifers; and leakage and recharge to confined aquifers.
Finite Difference Model For Simulation of 3-D Groundwater Flow	Nashville/P. Trescott, USGS, Reston, VA		Infonet	Yes	No	Similar to 2-D program but includes 3-D effects.
Finite Element Coding Program	St. Paul/R. Lundstrom	741-X-F5190	BCS	Yes	No	This program assists the user in coding data for program 741-X-F5140, a plane and axisymmetric finite element program. It accepts data as unformatted input and writes it in formatted form. In addition, it will generate columns or nodes and elements where a series of adjacent columns in the mesh are all similar to each other.
Finite Element Plot	St. Paul/R. Lundstrom	741-X-F5150	BCS	Yes	No	This program plots data and results for program data checking and includes element and material numbers, node numbers, and boundary conditions. The plot of results includes nodal heads, velocity vectors, and steam function values. Interpolation marks are made at each element for easy hand contouring of heads and steam function values. The program can limit its plot to only portions of the mesh and can "window" in on certain portions to provide great format flexibility for doing plots for reports.

SEEPAGE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Finite Element Graphics Plot	St. Paul/R. Lundstrom	741-X-F5180	BCS	Yes	No	This program is similar to Finite Element Plot (program No. 741-X-F5150), except that it is written for the graphics terminal.
GEONARD/SEEP	Sacramento/R. Taylor, UC Berkeley	741-X6-L2190 741-G9-R0006 ECPL	BCS	No	Yes	Finite element analysis of a free surface or confined steady flow of groundwater in a two-dimensional or axisymmetric porous region.
Relief Well Plot	Louisville/N. Wolf	741-22-14P ECPL	H-225	Yes	No	This program plots relief well readings in GPM and also plots reservoir pool and tailwater readings. The program currently will plot only 1 calendar year at a time. However, it is now being changed so that it will be possible to make multiple-year plots.
SEEPBERM	Memphis/L. Sulzberger		H-635	No	No	This program is used to determine the need for landside seepage berms and to design such berms in accordance with guidelines and procedures presented in WES TM No. 3-424, "Investigation of Under Seepage and Its Control, Lower Mississippi River Levees," and Lower Mississippi Valley DIVR 1110-1-400, Change 1, dated 30 November 1976.
SEEP-2DFE	Kansas City/ C. S. Desai		BCS	No	No	Two-dimensional finite element seepage program. Uses 4-node isoparametric quadrilateral element. Capabilities: Steady and transient confined and unconfined seepage through earth banks, dams, and cofferdams. Input hydrograph (head) can vary (up and down) with time for transient case. Program modified by Kansas City District to plot results on Calcomp plotter or Tektronics terminal (GCS software).

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Underseepage Analysis	Rock Island	741-G6-[illegible]65A	H-225	Yes	No	Calculates a thickness and width of sand berms for sand levee protection based on the effects of water seepage under levees.
2-D FEM Seepage Program	WES/F. Tracy, WESKA	704-F3-R0245 EGPL	H-635	Yes	Yes	Solves plane and axisymmetric steady-state and transient seepage problems by the finite element method.
A Plane and Axisymmetric Finite Element Program for Steady-State and Transient Seepage Problems	St. Paul/R. Lundstrom	741-X-F5140	ECS	No	No	This program is a modification of '2-D FEM Seepage Program' by F. Tracy (program No. 704-F3-R0245). The program is capable of analyzing plane or axisymmetric, steady-state or transient, and confined and/or unconfined problems.
3-D FEM Seepage Program	WES/F. Tracy, WESKA	704-F3-R0718 EGPL	H-635	Yes	Yes	Solves [illegible] state and transient seepage problems by the finite element method.

SEEPAGE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
2-D Seepage Analysis	St. Paul/D. Spaulding	741-X-F040	H-400	No	No	This program determines pressures (and equipotentials and flow velocities in two-dimensional flow problems governed by Darcy's law. Both plane and axisymmetric problems with zoned heterogeneity with isotropic or anisotropic materials under conditions of saturated, steady flow can be solved. Concentrated flow and pressure boundary conditioning may be considered. The program has the capability of solving certain unconfined flow problems by adjusting the location of free surface boundaries internally within the program. The program has an extensive data edit routine which performs checks on input data and also provides a plot of the input mesh configuration. If desired, the program also outputs punched cards for plotting of equipotential lines by use of a separate program like Equipotential Line Contouring (program No. 741-X-F060).

STRESS COMPUTATION, SETTLEMENT, AND CONSOLIDATION

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
CBEAR	WES/G. Muster, M. O'Neill University of Houston R. Mosher W. Jones M. Pace WESKA		H-635 BCS OPM	Yes	No	Computes the net bearing capacity of shallow strip rectangular, square, or circular footings on one or two layer soil systems and considers the effects of surcharge, inclined footing base, footing embedment, inclined load, eccentric load (in two directions) submerged soil and inclined soil surface.
Consolidation of Soft Layers by Finite Strain (CSLFS)	WES/K. Cargill, WESGE		H-635	Yes	Yes	CSLFS computes the void ratio, total and effective stresses, pore water pressures, settlements, and degrees of consolidation for homogeneous soft clay layers or dredged fill deposited on a compressible or incompressible layer by one-dimensional finite strain consolidation theory. Lower boundary of the compressible layer may be completely free draining, impermeable, or neither. The void ratio-effective stress and void ratio-permeability relationships are input as point values and thus may assume any form. Program will handle any number of dredged fill layers deposited at any time during course of consolidation.
Determination of Vertical Stress Analysis	Mobile	741-E1-K5020	Harris S120	No	No	Program uses the Boussinesq method to compute vertical stress generated by line loading. Up to three soil strata can be utilized in the profile.

STRESS COMPUTATION, SETTLEMENT, AND CONSOLIDATION

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Embankment Loading	Buffalo/ I. G. Reinig II		H-225 BCS	No	Yes	The program computes the stresses beneath a strip footing or strip embankment using an elastic solution. The stresses can be computed for a specific point grid or individual points selected. The program will compute the correct vertical, horizontal, and shear (xz) stresses for any combination of uniform vertical loads superimposed. It will also compute the principal stresses, maximum shear stresses and their orientation.
FD31	WES/R. Olson, Univ. of TX, Austin, Modified by R. Mosher, WESKA	741-F3-R0106 ECPL CORPS-I0011	H-635 OPM	Yes	Yes	The program computes settlement and time-settlement relationships for compressible materials based on Terzaghi's 1-D analysis. The program is only valid for 1-D analysis
MAGSETII	WES/R. Schiffman, D. Jubenville, V. Partyka, Univ. of Colorado, Modified by R. Mosher, WESKA	741-F3-R0105 ECPL CORPS-I0010	H-635 OPM	Yes	Yes	The program utilizes Terzaghi's one-dimensional consolidation theory, simplified to apply to a 2-D condition for estimating settlement in cohesive soils.
PROCON	WES/L. D. Johnson WESGE		H-635	Yes	Yes	Predicts 3-D consolidation of dredged material and foundation soils. Dredged material placed at variable time intervals.
RESFIL	Walla Walla/ E. S. Nobari, J. M. Duncan (U. C. Berkeley)		IBM 370	No	No	Computes stresses and strain in a soil mass with seepage pressures for 2-dimensional plane strain conditions.

STRESS COMPUTATION, SETTLEMENT, AND CONSOLIDATION

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Stress	Vicksburg/D. Dennis		TEK 4081	No	No	Analysis program for determining vertical stress induction on irregular shapes.
Stres 2	Sacramento	741-X6-L2280				This program reads tape file produced by LUSH 2 (741-X6-L2170) and computes time history of normal stress, shear stress, shear strain, and maximum shear strain.
Stress, Strain 2-D	Walla Walla/R. Weller		IBM 370	No	No	Compute stresses and strains in a continuum for two-dimension, plane strain conditions.
Vertical Stress Induction	WES/L. Manson, LMN	741-F3-A2540 ECPL CORPS-I0008	H-635 BCS OPM	Yes	Yes	Program employs the superposition of subsections using the principles of the Boussinesq point load Formula for long strip loading (two-dimensional) to determine the influence coefficient for selected position in a subgrade medium.
Vertical Stresses Beneath Embankment and Footing Loadings	WES (R. Mosher, WESKA)/ D. Spaulding, NCS	741-F3-F5010 ECPL CORPS-I0016	H-635 BCS OPM	Yes	Yes	The program finds vertical stresses for applied structural loadings. Solution method assumes that the foundation material is homogeneous and linearly elastic and that superposition is valid.
Vertical Stress Induction and Settlement Analysis	New Orleans/J. Flock, M. Pittman, LMN	741-X6-A2400	H-635	Yes	Yes	To compute induced vertical stresses within a soil continuum due to a general-shaped imposed surface load using either Westergaard and Boussinesq theory for both two- and three dimensional analysis. The program uses these results for the computation of ultimate and time rate of consolidation

PILES, SHEET PILES, AND CELLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
1ANPI	Vicksburg/G. Wardlaw, LMK	741-F3-A4090	H-400 H-635	Yes	No	Analysis of anchored sheet pile retaining wall by the free earth support method with seepage forces.
1CANPI	Vicksburg/G. Wardlaw, LMK		H-400 H-635	Yes	No	Analysis of cantilevered sheet pile retaining wall with seepage forces.
3-D Pile Foundation Analysis	New Orleans/T. Mudd, LMS; H. Edgecombe, LMN	713-F3-A2210	H-635 BCS	No	Yes	3-Dimensional Analysis of a pile foundation with battered piles.
ANCWAL	WES (W. Jones, WESKA)/ M. Grazioli, NCE	713-F3-F3010 ECPL CORPS-X0027	H-635 BCS OPM	Yes	No	Designs anchored bulkhead walls by four soil analysis methods: equivalent beam, free earth support, elastic line (a fixed earth method), and equal moment. Calculates lateral loads resulting from active and passive earth pressures (including wall friction) by Coulomb theory.
Base Supplement To Improved 3-D Pile	St. Louis/C. Smith, LMS		H-635	No	No	Uses pile forces output from improved 3-D Pile to calculate moments and shears in base slab.
BENT1	WES (N. Radhakrishnan, WESKA)/ L. Reese, Univ. of TX, F. Parker	713-F3-R0014 ECPL CORPS-I0002	H-635 BCS	Yes	Yes	Analysis of group pile behavior by finite difference method.
BRIDPL	Memphis/R. Brittain, LMM		H-635	No	No	This program uses static pile formulae to determine the minimum bridge pile lengths required to satisfy given safety criteria. The program assumes horizontal soils stratification and a continuous mode which should be familiar to engineers.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
CANPLOT Cantilever Retaining Wall Pile Analysis (Q&S Cases) Considering Uplift (Interactive Graphics Version)	New Orleans/ L. Lamarca, L. Manson, D. Beer, B. Matherne, LMN	741-F3-A2020 741-X6-A2020	H-635 BCS	Yes Yes	Yes Yes	Computes lateral earth forces and overturning moments for each foot of depth along a cantilever retaining wall and balances each to satisfy stability requirements of the method of planes thereby determining the depth of penetration. It then uses the applied lateral earth force, wave force, etc., on the pile to calculate the transverse shear force, bending moment, and deflection (from the undeformed position) at pertinent pile positions. The program can also plot the net pressure, deflection, bending moment diagrams superimposed on the strata lines by means of either an interactive graphics terminal or Calcomp drum plotter.
Cantilever Retaining Wall Q&S Case	WES/M. Lamarca, LMN	741-F3-A2370 ECPL CORPS-I0007	H-635 BCS OPM	Yes	Yes	Determine the penetration of a cantilever retaining wall or an anchored bulkhead by balancing forces and moments to satisfy stability requirements by the method of planes.
Cantilever Retaining Wall Stability By The Method Of Planes (S) Case, C=Zero	New Orleans/ L. Manson, LMN	741-F3-A2120	H-635	Yes	Yes	Determine the penetration of a sheet pile by balancing forces and moments to satisfy stability requirements by the method of planes for the (S) case, C=zero.
Cantilever Retaining Wall, Stability Design	St. Louis/J. Worts	713-R1-A3440	H-635	Yes	No	Determines cantilever retaining wall dimensions according to EM 1110-2-2502 for stability.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
CANWAL	WES/L. Manson, LMN	741-F3-A2999 ECPL CORPS-X0026	H-635 BCS OPM	Yes	Yes	Determines the penetration of the cantilever retaining Wall by Method of planes. Analyzes the wall as a cantilever beam fixed at the theoretical depth of penetration, and determines shears, bending moments, and deflections per foot of wall.
CCELL	WES/K. Mosher, W. Jones WESKA	CORPS-X0040	BCS	Yes	Yes	The Corps program for analysis/design of circular sheet pile cells founded on rock or soil. It determines or design for the factor of safety of sliding, interlock tension, vertical and horizontal shear, penetration of inboard sheeting (soil), slippage between the sheet pile and cell fill (rock), and pullout of outboard sheeting.
CELLRK	WES (W. Jones, WESKA)/ W. Green, R. Warren, ORN	713-F3-H3190 ECPL CORPS-X0028	H-635 BCS OPM	Yes	Yes	Analysis of a circular cofferdam cell or circular mooring cell of a given equivalent width under specified loading conditions.
CELLSL	WES (W. Jones, WESKA)/ E. Alter, NCB	713-F3-F1050 ECPL CORPS-X0029	H-635 BCS OPM	Yes	Yes	Design of a sheet pile or a parallel wall by the Cumming's Method.
COM62	WES/L. Reese, Univ. of TX, N. Radhakrishnan, WESKA	713-F3-R0018 ECPL CORPS-I0001	H-635 BCS OPM	Yes	Yes	Analyzes laterally loaded piles in nonlinear soil media. Solves for deflection, shear, moment, and reaction in a single pile under a variety of boundary conditions specified at the top of the pile.
CSHTWAL	WES (W. Jones, WESKA)/ W. Dawkins, Oklahoma State University	713-F3-R0039 ECPL CORPS-X0031	H-635 BCS OPM	Yes	Yes	Performs either a design or analysis of an anchored or cantilever sheet pile retaining wall. Uses classical soil mechanics procedures for determining the required depth of penetration of a new wall or assesses the factor of safety of an existing wall.

PILES, SHEET PILES, AND CELLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
CSSIWAL	WES (W. Jones, WESKA)/ W. Dawkins, Oklahoma State University	713-F3-R0051 ECPL CORPS-X0033	H-635 BCS	Yes	Yes	A special purpose program which performs soil-structure interaction analysis of either anchored or cantilever retaining walls. Simplified procedures are incorporated in the program to automatically generate the soil force - displacement characteristics from conventional soil properties.
DUKEFOR	WES (H. Taylor, WESGE)/ D. Holloway	741-F3-R0008 ECPL	H-635	Yes	Yes	1D finite difference simulation of pile driving and load testing behavior.
Hrennikoff Pile Analysis With Summation of Results	New Orleans/ R. Villarubia, G. Finley, C. Ruckstuhl, & D. Elguezabal, LMN	713-F3-A2150 ECPL	H-635	Yes	Yes	Computes actual axial and transverse loads and allowable transverse loads on each pile row for each set of applied forces and moments on a given pile arrangement of a battered pile foundation by the Hrennikoff method.
LMVDPILE	WES/D. Martin, H. Jones, N. Radhakrishnan, WESKA	713-F3-R0026 ECPL	H-635	Yes	Yes	This program is a general stiffness method of analysis of two- and three-dimensional pile foundations. The pile cap is assumed to be rigid. Deflections and individual pile loads are computed as required by the designer.
LPILE	Los Angeles/ L. Reese (Univ. of TX), J. Lysmer, (U. C. Berkeley)		BCS	No	Yes	Program calculates lateral deflections and moments in a pile on nonlinear Winkler supports using the finite difference method.

PILES, SHEET PILES, AND CELLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
MAKE	WES (K. Radhakrishnan, WESKA) Parker, T. Austin	713-F3-R0016 ECPL CORPS-I0004	H-635 BCS	Yes	Yes	Generates lateral pressure versus moment curves for piles in sand or clay.
PILE3D	WES/T. Mudd, J. Hartman, LMS	713-F3-A3840 ECPL CORPS-X0014	H-635	Yes	Yes	Indeterminate pile analysis by matrix method with 3-D load combination on 3-D pile foundation with rigid cap. Piles may be battered in any combination of directions. Soil system is averaged into one layer with input value of lateral subgrade modulus. Multiple load cases. Variable pile fixity into cap in 3 steps of 0.0 (pinned), 0.5 (flexible), or 1.0 (fixed). (Similar to LMVDPILE, 713-F3-R0026).
Pile Capacity Computations	New Orleans/D. Beer, K. Broussard, LMN	741-F3-A2110 741-X6-A2110	H-635 BCS	No	Yes	The program computes the pile bearing capacity which results from cohesion or adhesion and from friction. The pile capacity is computed for a pile in either compression or tension when pile tip is either at the top, middle or bottom of each stratum or at the top or bottom of each stratum and any other elevations selected by the user.
PILES	Vicksburg/G. Wardlaw, LMK		TEK4081	No	No	Performs analysis of single pile using static formulae and interactive input. Allows inclusion or exclusion of resistance in top stratum. Q or S strengths can be used in the top stratum.
PILGPI	WES (R. Mosher, WESKA)/ M. O'Neill, Univ. of Houston, Texas		H-635	Yes	No	Computes static load-deformation behavior of pile groups. It uses a "hybrid" model using soil-structure methods for individual piles and theory of elasticity for group effects.

PILES, SHEET PILES, AND CELLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
PX4C3	WES/L. Reese Univ. of TX, H. Coyle, Texas A&M University, N. Radhakrishnan, WESKA	713-F3-R0015 ECPL CORPS-I0003	H-635 BCS OPM	Yes	Yes	Analyzes axially loaded piles in nonlinear soil media. Computes load-displacement relationships for axially loaded piles, where the pile has a constant outside diameter by the finite difference method.
QPILE	Vicksburg/G. Wardlaw, LMK		H-635	Yes	No	Determines pile penetrations for vertical or battered piles in tension or compression with considerations for surcharge pools and piezometric heads. Allows individual analyses of piles under structures using stratified soil data. Method of analysis is by static formulae.
REDUCE	Vicksburg/G. Wardlaw, LMK		TEK4081	Yes	No	Reduces the data (strains and deflections) from instrumented test piles. Provides load transfer K factors, end bearing, and elastic deformation data.
SAPPILE	WES/H. Jones, WES		H-635	Yes	No	A modified, general purpose structural analysis program (SAP4) with a three-dimensional pile element added: Good for analysis of 3-D flexible cap file foundations.
SSP Anchor Wall	Detroit/ M. Grazioli, P. Kytasty, L. Marchinda	741-G1-F3070	H-225 H-400 BCS	Yes	No	Program provides a design of SSP, sheet steel pile, anchor wall (backwall) by the Packshaw method. Actually this is a structural program which was initiated by and written for geotechnical engineers. It uses the active wedge method (741-G1-F3020) to compute the maximum available resisting pressures from inside the doubled wall cell against the backwall.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Static Pile Capacity	Detroit	741-F3006	H-225	No	No	Required length of pile is computed, or existing piles are analyzed for safety factor. This program was expanded by Detroit District to solve for maximum of 25 soil layers.
TAMPOR	WES (H. Taylor, WESGE)/D. Holloway	741-F3-R0007 ECPL	H-635	Yes	Yes	Pile driving analysis by the wave equation lumped parameter finite difference method.
Wave Equation for Pile Response to Impact Type Driving	Sacramento/Bowles	741-X6-2150		No	Yes	This program will compute segments, weights, and spring constants for constant section piles of any shape. It will also compute properties (average) for round tapered (hollow or solid) piles and allow reading individual segment areas and weights for stepped piles.
WESTTI	WES (H. Taylor, WESGE)/T. Hirsch, L. Carr, L. Lowery, Texas A&M	741-F3-R0009 ECPL	H-635	Yes	Yes	The program performs wave equations analysis of pile drivers by a single blow of the hammer. Conventional pile and soil models are used. The program can be used to predict impact stresses in piles during driving and to estimate the static soil resistance on piles at the time of driving.
WESWEAP	WES (H. Taylor, WESGE)/G. Gable, F. Rausche	741-F3-R0010 ECPL	H-635	Yes	Yes	The program performs wave equation analysis of piles driven by a single blow of any type of impact hammer. Conventional pile and soil models were used in addition to both a thermodynamic model for diesels and refined mechanical hammer models. The program can be used to predict impact stresses in piles during driving and to estimate static soil resistance on piles at the time of driving.

T-WALLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Floodwall Structural and Sliding Stability (T-WALL)	Louisville/Powers, Metka	741-22-010	H-225	Yes	Yes	This program is designed to make structural (overturning) and sliding stability (by the creep method) analyses of floodwalls. Answers are given as length of the resultant arc for loadings 1 and 2 in the structural analysis and as factors of safety in the Q, R, and S cases in the sliding stability analysis. The program works for both horizontal and sloping base inverted T-type floodwalls.
Foundation Stability in Bearing	Detroit/M. Grazioli, P. Kytasty	741-G1-F3050	H-225	Yes	No	Analyzes stability of footing against sliding near cuts or on slopes. This program has been used for analyzing the stability of existing floodwalls and building footings in light of proposed channel deepening.
G-WALL	WES/R. Hall, WESKA		H-635 OPM	Yes	No	The program performs deep-seated sliding stability analysis of structures. The analysis is a wedge method slope-stability analysis that follows the design procedures used in the LMVD for analysis of plane failures. The program provides for calculation of uplift by entering profile of force water seepage pressures.

T-WALLS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
TWDA	WES/W. Price, R. Hall, R. Mosher, H. Jones, M. George,	713-F3-R0027 ECPL	OPM BCS	Yes	Yes	Analysis or design of an inverted T-Wall subjected to retaining wall and/or floodwall loadings. Design comparisons for finding the most economical combination of base embedment, key length, base width, and base slope are based on construction cost of excavation, concrete, and backfill. Performs stability analysis or design and structural analysis or design. Conforms to EM 1110-2-2501, EM 1110-2-2502, and other Corps of Engineers procedures. Active earth pressures may be calculated by Coulomb's equations or by the incremental wedge method. The program is highly interactive, following a computer-aided design methodology. The analysis procedure considers overturning, sliding, and bearing pressure, relative to the soil immediately adjacent to the wall.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
APLOT 2	Los Angeles/ R. Gutschow, LAD	741-G9-L1029	BCS	Yes	Yes	Program plots time-history data generated from dynamic response programs such as SHAKE and QUAD 4. Earthquake acceleration - time histories can be plotted from card input on a Calcomp Plotter.
CALCOE	M. E. Hynes-Griffin, WESGH/S. K. Sarma		BCS	No	No	Computes coefficients used in series solution for the equation of motion solved in SPISCOE.
CHAR 2D	W. Deer, WESGH/ B. Wylie, Univ. of Michigan		H-635	Yes	No	2-D latticework model for wave propagation by *method of characteristics.*
CHARSOIL	W. Deer, WESGH/ B. Wylie, Univ. of Michigan		H-635	Yes	No	1-D wave propagation by method of characteristics.
COMBINE	Sacramento/ J. Lysmer, T. Udaka, H. B. Seed, R. Hwang, U. C. Berkeley	741-X6-L2180	BCS		No	This program is designed to superimpose two *solutions obtained by the program* LUSH 2.
DEQR	Sacramento/Cal. Tech, Rev. by Anderson	741-X[illegible]-L2290	BCS		No	For earthquake records and spectra calculations of earthquake records digitized at equal time intervals. The output is also plotted on a 30" Calcomp Plotter.
DISPLAC	Los Angeles/ T. Yamashita, A. Arita		BCS		Yes	Determines embankment displacements due to an earthquake. The yield accelerations are determined for different embankment heights using a Pseudo-Static slope stability analysis. Embankment displacements are calculated for yield accelerations exceeded ground accelerations.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Earthquake Data Selection (Mardsen Number)	Seattle/ K. Hughes	735-E1-G3030	Harris S120		Yes	This program prints out information about earthquakes in requested Mardsen number areas. The information is obtained from N.O.A.A. tapes.
Earthquake Epicenter Plot and List	Portland/A. W. Amos, D. H. Scofield	735-E1-G2010	Harris S120	No	No	Lists earthquakes within a given area and/or compares distances from a given center. Plots epicenters on a Lambert Conformal Map Projection.
Earthquake Graph	Portland/A. W. Amos, D. H. Scofield	735-E1-G2020	Harris S120	No	No	Performs computations and plots earthquake magnitude versus hypocentral distance from a given center.
EQCYCLE	W. Deer, WESGH/ K. L. Lee, J. M. Vagneron, UCLA	741-X6-L1022	BCS	Yes	Yes	Computes equivalent number of cycles for acceleration and stress time histories. Converts irregular cycles of acceleration, stress, deflections, and time history of an earthquake into equivalent number of significant cycles by counting the zero crossings.
Equivalent Cycle Program and Plot	W. Deer, WESGH	741-X6-L2300	BCS	No	No	Computes the number of equivalent cycles for earthquake records and plots the data.
EQRISK: Evaluation of Earthquake Risk to Site	Seattle/R. K. McGuire, USGS	735-E1-G3070	Harris S120	No	Yes	Seismic risk analysis based on theory developed by Cornell and Merz, 1973.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
FQRSK	Los Angeles/ R. Gutschow		BCS	No	Yes	To determine the locations of significant earthquake recordings in an area specified about a specific point in southern California.
EQS	M. E. Hynes-Griffin, WESCH/S. K. Sarma		BCS	Yes	No	A program for the static and dynamic analysis of earth slopes by the Sarma Method.
FLUSH	Sacramento/J. Lysmer, T. Udaka, H. B. Seed, R. Hwang, U. C. Berkeley	741-X6-L2310	BCS	No	No	Fast version of program LUSH 2.
FRISK	M. E. Hynes-Griffin, WESCH/R. K. McGuire, USGS		BCS	No	No	Seismic risk analysis that includes the effort of fault rapture length.
GADFLEA	Los Angeles/ H. B. Seed, J. R. Booker, M. S. Rahman, U. C. Berkeley		BCS	No	Yes	A computer program for the analysis of pore pressure generation and dissipation during cyclic or earthquake loading.
Location of Local Earthquake Sources by Group	Seattle/B. A. Bolt, P. Okubo, R. Uhrhammer, U. C. Berkeley	735-E1-G3100	Harris S120	No	Yes	This program is designed to locate local earthquake sources by groups, rather than individually, using a small array (less than 40 km) of seismographic stations and a half-space velocity model.
LUSH 2	W. Deer, WESCH/ J. Lysmer, T. Udaka, H. B. Seed, R. Hwang, U. C. Berkeley	741-X6-L2170	BCS	No	No	Response of embankment to variable dynamic inputs.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
PSEQGN	Seattle/P. Ruiz, J. Penzien, U. C. Berkeley	735-E1-G3090	Harris S120	No	Yes	The program uses a linear stochastic model to generate records of filtered nonstationary shot noise to simulate ground motion accelerograms recorded during strong motion earthquakes. The model is designed in such a way that it will reflect the principle features that are to be simulated.
QUAD 4	W. Deer, WESGH/ I. Idriss, J. Lysmer, R. Hwang, H. B. Seed, U. C. Berkeley	741-X6-L1021	BCS	Yes	Yes	To evaluate the seismic response of two-dimensional soil structures by variable damping finite element procedures.
SEISCOE	M. E. Hynes-Griffin, WESGH/S. K. Sarma		BCS	No	No	The program uses a shear beam analytical model to compute acceleration amplification spectra and seismic coefficients for an embankment on a rigid base or a foundation layer of limited depth.
SHAKE	Sacramento/ B. Schnabel, J. Lysmer, H. B. Seed, U. C. Berkeley	741-X6-L2140	BCS	Yes	No	This is a program for one-dimensional earthquake response analysis of horizontally layered sites.
SHAKE 2	W. Deer, WESGH/ B. Schnabel, J. Lysmer, H. B. Seed, UC Berkeley	741-F3-R0005 ECPL	BCS INFONET IBM 360 H-6620	Yes	Yes	This program computes one-dimensional wave propagation response in a horizontal layered semi-infinite system subjected to vertically traveling shear waves. The method is based on the continuous solution to the shear wave equation.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
SIMQKE	Seattle/E. Vanmarcke, C. Cornell, D. Gasparini, S. Hou, M.I.T.	735-E1-G3080	Harris S120	Yes	Yes	The program was developed to simulate earthquake motions. Evaluation of structural response and floor response spectra using simulated motions is frequently an important step in the seismic design of constructed facilities.
SPECEQ	W. Deer, WESGH/ P. Jennings, Calif. Inst. of Tech.		H-635	Yes	No	Generates response spectra for time histories.
SPEC PLOT	Los Angeles/ R. Gutschow, LAD	741-G9-L1030	BCS	No	No	Program plots velocity and acceleration spectra derived from SHAKE programs.
Spectra Response Analysis	Sacramento/ Sacramento with Dames and Moore	741-X6-L2240	BCS	No	No	The program evaluates dynamic response spectra at various periods and presents the results as a log-log plot.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Crosshole	WES/D. Butler, G. Skoglund, G. Landers, R. Wahl, WESGH		DPSI	Yes	No	Performs calculations required to determine true seismic velocities and interface depths for multi layer soil and rock profiles from data collected from crosshole testing.
Earthtides Plot	Seattle	735-E1-G3050	Harris S120	No	Yes	Purpose is to generate the theoretical gravity, tilt and strain tides, and then to print, punch and/or plot these generated quantities. The option parameter OPT indicates which type(s) of calculations are wanted.
Hilbert	WES/D. Butler, WESGH		DPS-1	No	No	Computes the Hilbert transform of an input set of digitized profile data and plots both input and transformed profiles. Useful for computing vertical gravity gradient profiles from measured or calculated horizontal gravity gradient profiles over two-dimensional structures.
Reduction of Base Station Calibration Loop and Drift Data	Seattle/D. Barnes	735-E1-G3060	Harris S120	No	Yes	The first option performs LaCoste gravity meter data reductions, makes tidal corrections, linear drift corrections (optional), and obtains observed gravities which are compared with previously established gravities and with the observed gravity of the previous station. An optional plotter output produces plots designed to show drift and calibration errors. The second option creates a tide table for each day requested.
REFRDIR	WES/D. Butler and A. Gangi, WESGH		DPS-1	No	No	Solves the direct or forward seismic refraction problem for any number of layers with given seismic wave speeds thicknesses and interface dips. Computes apparent velocities, intercept times and produces time distance plots for forward/reverse profiles.

GEOPHYSICS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
REFRINV	WES/D. Butler, A. Gangi, WESGH		DPS-1	No	No	Solves the inverse seismic refraction problem for given forward and reverse profile apparent velocities and intercept times. Compute true seismic wave speeds, layer thicknesses, and interface dips.
RESDIR	WES/D. Butler, Davis, WESGH		DPS-1	No	No	Solves the direct or forward electrical resistivity sounding problem for given layer thicknesses and true resistivities. Computes apparent resistivities for specified electrode spacings (Wenner, Schlumberger, or Dipole-Dipole arrays) and plots results.
RESINV	WES/D. Butler, Davis, WESGH		DPS-1	No	No	Solves the inverse electrical resistivity sounding problem for given field data collected with the Wenner, Schlumberger, or Dipole-Dipole arrays. For specified number of layers and a "guessed" initial or starting model, computes a best fit model (true resistivities and layer thicknesses).
SIPT	WES(R. Wahl, WESGH)/ J. H. Scott, B. L. Tibbetts, and R. G. Burdick, USBM		DPS-1	Yes	No	Seismic refraction inverse modeling program. This program accepts seismic refraction data as input and outputs a plotted vertical cross section representing velocity layering beneath a seismic spread.
TALGRAD	WES/D. Butler, WESGH		DPS-1	No	No	Computes gravity, vertical gravity gradient, and horizontal gravity gradient profiles over two-dimensional polygonal models using the Hubbert-Talwani algorithm.

GEOPHYSICS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
TIDES	WES/D. Butler, WESGH		DPS-1	No	No	Computes the theoretical solid earth tide for any location at any time (past, present, or future) for any time span and plots results in form suitable for direct use in making microgravity survey data corrections.
WENN (Modified)	Kansas City/ A. K. Zohdy, S. Severini		BCS	No	No	From apparent resistivity data obtained with Wenner array, program determines true resistivity and depths.

INSTRUMENTATION

A. Piezometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Carlson Piezometer Data Reduction and Storage	Alaska/R. Searcy	741-E1-G1006	Harris S120	No	Yes	To sort and reduce data from Carlson pore pressure cells.
Hall Piezometer Data Reduction And Storage	Alaska/R. Searcy	741-E1-G1005	Harris S120	No	Yes	To sort and reduce data from Hall pore pressure cells at Moose Creek Dam.
Piezometer Data Listing And File Appending	Albuquerque/H. Meyer	741-F6-M1121B	H-6620	No	Yes	(1) Reduce piezometer field data. (2) Append existing disc file with new data. (3) List data by date or piezometer name.
Piezometer Data Edit Program	New Orleans/ J. Montegut, J. Soileau, LMN	732-F3-A220A	H-635	No	Yes	This program is used to edit and sort input data cards prior to entry into the master file.
Piezometer Master File Update Program	New Orleans/ J. Soileau, LMN	732-F3-A220B	H-635	No	Yes	Updates the Piezometer Master File using valid transactions from the edit program as input to update an existing file.
Piezometer Data Extract Program	New Orleans/ J. Soileau, LMN	732-F3-A220C	H-635	No	Yes	This program extracts specified data from the Piezometer Master File to be used as input to the Piezometer Plot Program.
Piezometer Plot Program	New Orleans/ J. Montegut, LMN	732-F3-A220D	H-635	No	Yes	Plots data outputted from extract program (732-F3-A220C).

INSTRUMENTATION

A. Piezometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Piezometer Audit Summary Report	New Orleans/ J. Soileau, LMN	732-F3-A220E	H-635	No	Yes	Prepares report summarizing content of the Piezometer Master File.
Piezometer Tabular Listing	New Orleans/ J. Soileau, LMN	732-F3-A220F	H-635	No	Yes	Used to prepare tabular listing of piezometer readings along with headwater and tailwater readings.
Piezometer And Seepage Plotting	Albuquerque/H. Meyer	741-F6-M112A	H-6620	No	Yes	(1) Plot Piezometric water surface elevation versus time with an optional correlation plot of Reservoir elevation, Tailwater elevation, and/or Embankment fill elevation. (2) Plot Seepage measurements in GPM or CFS with same optional correlation plot as above.
Piezometer And Observation Well File	St. Paul/J. Johnson	741-F5-F5110	H-400	No	Yes	This program has two main purposes: (1) program will build and maintain historical file for all piezometer and observation wells in district, (2) program will provide three types of reports ("Inventory of Piezometers and Observation Wells," "Summary Report of All Readings," and "Readings Update Report"). Program is also used in conjunction with 741-F5-F511A, which will select data from file and create Fortran readable output tape, this tape is then used as input to plot programs.

INSTRUMENTATION

A. Piezometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Piezometer And Observation Well Data Plot	St. Paul/D. Spaulding	741-F5-F5120	H-400	No	Yes	The program utilizes instrument reading data from tape and card input to produce plots of instrument (piezometer or observation well) readings versus time. Two plot formats are available. The record option format produces an 11- by 14-3/4-in. plot which can be stored in a computer size file; the second format is the plate option which produces a plate size plot (28" x 40") complete with title block and border. Five different horizontal time scales may be used. Ten different lengths of time may be plotted which vary from 2 days to 24 years. The length of time depends on the scale and plot option selected. Correlation plots which may be plotted on either option include river stage, pool level, tailwater and embankment height.
Piezometer Plot (Open And Close)	Louisville/N. Wolf, C. Gowin (Modified by Huntington/ K. Adhya, T. Plummer)	741-82-13P	H-225 McDonald Douglas IBM 370/168 INFONET	No	Yes	This program plots piezometer readings for both open and closed system piezometers. It also plots reservoir and tailwater pool elevations. The plots are set up to cover 1 calendar year, can be plotted as multiple-year plots if desired.
Piezometer Plot	Louisville/C. Gowin, Modified by Huntington/ K. Adhya, T. Plummer	741-81-14P	INFONET TEK4014	Yes	Yes	Program plots piezometer data, headwater data and tailwater data.
Piezometer Plot (Under Construc.)	Louisville/N. Wolf	741-22-19P	H-225	No	Yes	This program plots piezometer levels for projects under construction. It also plots the embankment elevation and ratio of pore pressure to embankment pressure.

INSTRUMENTATION

A. Piezometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Piezometer Plot	Sacramento/N. Wolf, Revised by Anderson	803-X6-L2130	BCS	No	No	Plots piezometric data on Calcomp Plotter.
Piezometer Information System Plot (CRT Version)	New Orleans/ J. Soileau, J. Montegut K. Beniot, LMN	732-F3-A220G	H-635	No	Yes	Generates a plot (on an interactive graphics display terminal) of piezometer, headwater, and tailwater elevations versus dates the data was recorded.
Piezometer Profile Extract	New Orleans/ P. Winterfield, LMN	732-F3-A220H	H-635	No	Yes	Extract data from Piezometer Info System tape and write data onto disk for use with Piezometer Profile Plot.
Piezometer Profile Plot	New Orleans/ P. Winterfield, LMN	732-F3-A220I	H-635	No	Yes	Used to graphically display piezometer water surface profiles.
Piezometer Change For TOR, WSE, HW, & TW	New Orleans/ P. Winterfield, J. Soileau, LMN	732-F3-A220J	H-635	No	Yes	Used to search the piezometer master tape to find a specific piezometer and between specific dates have the ability to change (by adding numerically) either, or all, of the elevation records representing top of riser (TOR), water surface elevation (WSE), in the riser; headwater (HW), and tailwater elevations (TW).

INSTRUMENTATION

A. Piezometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Plot Of Observation Well And Pool Elevation	Rock Island	741-G1-F410H, 410I	H-225	No	No	F410H - The program plots a graph of observation well elevation minus tailwater elevation for various pool *elevations minus tailwater elevations*. Makes a one-year plot using the same data as for program number 741-F1-F428A. F410I - Program plots a graph of observation well elevation versus pool elevation. Makes a one-year plot using the same data as for program number 741-F1-F428A.
SDMS	Vicksburg (G. Wardlaw, LMK)/L. Guice, C. Schroeder, Louisiana Tech Univ.	---	TEK4081	Yes	No	Sequential data management system for piezometer data. It has a structured form for the storage, recall, and display of piezometer data.
Well Point Piezometer Data Reduction And Storage	Alaska/R. Searcy, Kennedy	741-E1-G11004	Harris S120	No	Yes	To sort and reduce data from Well Point Piezometers at Moose Creek Dam.

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
DIGINC1 (Slope Inclinometer Program)	Baltimore/R. Leach, WESGE, Revised by Baltimore District		H-635	Yes	No	This program reduces data from the Digitilt Slope Indicator and the Hall Inclo-Meter and tabulates the degree of deflection at various intervals along the casing so that any lateral movement in slopes or embankments can be documented and monitored. The program also provides deflection versus depth for various scales.
DIGINC	WES/R. Leach, WESGE		H-635	Yes	No	Reduces and plots inclinometer data from the Digitilt and Hall Inclo-Meter.
DIGIT8	Vicksburg/G. Wardlaw, LMK	741-G1-A4040	TEK4081	Yes	No	An interactive data reduction program used to reduce data from the Slope Indicator Mag Tape Reader, Vertical Slope Pipes.
DIGITAPE	St. Louis/ W. Bereswill, LMS		H-635	Yes	No	To convert inclinometer data recorded on tape in the field to a format which will allow for further reduction.
DIGITH	Vicksburg/W. Forrest, LMK		TEK4081	Yes	No	An interactive data reduction program used to reduce data from the Slope Indicator Mag Tape Reader, Horizontal Slope Pipes.
Inclinometer Compress I	St. Louis/J. Jobst, LMS	741-F3-A320D	H-635	Yes	No	Extracts inclinometer identification information for each data set on the tape as well as the relative position on the tape and writes this information to a data file.
Inclinometer Compress II	St. Louis/J. Jobst, LMS	741-F3-A320E	H-635	Yes	No	Extracts the most recent inclinometer data sets on the tape, based on an index file, and writes them to a new tape.

INSTRUMENTATION DATA

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Inclinometer Production Run	St. Louis/J. Jobst, LMS	741-F3-A320A	H-635	Yes	No	Calculates deflection profiles of various holes for desired set of data, compares initial/final profiles and plots the changes in deflection.
Inclinometer SLOPE/SPAWN	St. Louis/J. Jobst, LMS	741-F3-A320C	H-635	Yes	No	Reduces inclinometer data. Program constructs control cards and input files for production run and updates (programs 741-F3-A320A and -A320B) and also spawns batch job.
Inclinometer Sort	St. Louis/J. Jobst, LMS	741-F3-A320F	H-635	Yes	No	Sorts inclinometer data set information and squeezed out duplicate set ID's based on positional information.
Inclinometer Update	St. Louis/J. Jobst, LMS	741-F3-A320B	H-635	Yes	No	Merges old historical inclinometer data tape with current readings to give updated historical tape.
MAG-DIAG	St. Louis/ R. Singleton, LMS		H-635	Yes	No	To diagnose inclinometer readings which were recorded on magnetic tape in the field.
Plot Reading From Slope Indicator	Baltimore/J. R. Mora	112070-741-E1120	H-6620	No	No	This program will generate a 27 x 39-in. maximum size drawing using data generated by program 110070. This program is written for a three-pen plotter. The drawing contains: (1) A title block. (2) Two deflection versus depth graphs. (3) A table containing field related data. (4) From 1 to 5 X-Y axis graphs of groove 1-3 versus groove 2-4. (5) From 1 to 5 time-versus-deflection graphs.

INSTRUMENTATION DATA

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Plot of Slope Indicator Data	Rock Island	741-G1-F415A F425B, ØF425C	BCS	No	No	F415A - Program plots results of slope indicator analysis for several runs. Graphs are included for change and movement in both perpendicular planes. F425B - Program tabulates and plots movement and dial change on high speed terminal. F425C - Program tabulates and plots movement and dial change on low-speed terminal.
RUNVER	Vicksburg/G. Wardlaw	741-F3-A4130	H-635	No	No	Plots up to 12 sets of reading for slope indicator casings. Plot is on standard DM size plate with a symbol data legend. Uses TSS input data file.
Slope Indicator	St. Paul/R. Lundstrom	741-F5-F5090	BCS	No	Yes	The program processes slope indicator data read off the electronic readout of the slope indicator measurement device. Deflections are calculated in accordance with the instruction manual written by SINCO. The program has the option to plot deflection versus depth and change in slope versus depth.
Slope Indicator Calculation and Plot	Fort Worth, Galveston	741-G1-M3160, M316A, 803-G1-M2060	H-225	Yes	No	741-G1-M3160 - This program reduces the initial readings from 200-B and outputs cards for input into the next program. It also has a printed output. 741-G1-M316A - This program compares the initial readings with consecutive readings taken on the same test well, and outputs a tape to be used in the next program. It also has a printed output. 803-G1-M2060 - This is the plot program. It uses the tape output of the preceding program plus card information to plot up to a limit of 5 sets of field reading per plot for comparison purposes.

INSTRUMENTATION DATA

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Slope Indicator Data Reduction	Omaha/A. Kineiko	741-C2170	H-6620	No	Yes	This program is designed to aid the engineer in quick preliminary analysis of slope indicator data obtained by use of the Slope Indicator Co., Series 200-B instrument. This program will compute, print in tabular form and plot the accumulated deflection. The data is reduced to slope and deflection and no effort is made to correct for instrument error. The program can handle any number of data sets for any number of holes for one or more projects.
Slope Indicator Data Reduction	Albuquerque/ R. Leach (WESGE) Modified by Albuquerque District	741-F6-M108B	H-6620	No	Yes	Reduces field data from digitilt slope indicator and twist meter. It builds a data file for use with the slope indicator plot program 741-F6-M108A.
Slope Indicator Data Reduction Table and Printer Plot	Omaha/A. Kineiko	741-C2230,	H-6620	No	Yes	This program is designed to aid the engineer in quick preliminary analysis of slope indicator data obtained by use of the Slope Indicator Co., Digitilt, Series 200-B and Series 100 instruments. This program will compute, print in tabular form and plot the accumulated deflection. The data is reduced to slope and deflection and no effort is made to correct for instrument error. The program can handle any number of data sets for any number of holes for one or more projects.

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Slope Indicator Data Reduction Table and Digital Plot	Omaha/A. Kineiko	741-C211X, 741-C2110 X741240	H-6620	No	Yes	This program is designed to aid the engineer in quick preliminary analysis of slope indicator data obtained by use of the Slope Indicator Co., Digitilt instrument. This program will compute, print in tabular form and plot the accumulated deflection. The data is reduced to slope and deflection and no effort is made to correct for instrument error. The program can handle any number of data sets for any number of holes for one or more projects.
Slope Inclinometer Data System-Extract	New Orleans/ P. Winterfield, LMN	741-F3-A2570	H-635	No	Yes	This program will extract requests from the systems master data tape, convert the data to depths in feet and deflections in inches and write this information to a quick-access disc file in a format suitable for use with the slope inclinometer plot program.
Slope Indicator Plot	Louisville	741-22-18P	H-225	Yes	No	This program plots the deflection of a slope indicator in inches versus depth in feet.
Slope Indicator Plotting	Albuquerque/H. Meyer	741-F6-M108A	H-6620	No	Yes	Produces a report quality plot of slope indicator data. These programs are used to reduce the data obtained from the slope indicator series 200-B instrument, and plot the results on a Calcomp plotter.
Slope Indicator Tabulation and Plot	Portland/K. McDonald	741-K5-G4020	Harris 120	No	No	Reduces slope indicator readings and plots the resulting movements of the instrument casing.

INSTRUMENTATION DATA

B. Inclinometer Data

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
SM200B	WES/R. Leach, WESGE		H-635	Yes	No	Reduces and plots inclinometer data from the 200-B and Soiltest C350 instruments.
TWISF	WES/R. Leach, WESGE		H-635 BCS	Yes	No	This data field is used in the main programs SM200B and DIGINC. The program averages readings at each 10-foot interval and calculates the angle of twist for the intervals of depth between the 10-foot readings using a linear interpolation. (A Sinco spiral checking instrument measures the angle of twist in the inclinometer casing with respect to the top of the casing at 10-foot intervals.)
TWIST1	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute, plot, and print out gyroscopic spiral groove data in both tabular and graphic form.
Vertical Deflection of Slope Indicators	Philadelphia/ L. M. Calabro	741-F9-E5010	BCS	No	Yes	This program will reduce readings taken by a Slope Indicator Company vertical deflection mete. used to detect and measure vertical deflection in an earth filled embankment.

INSTRUMENTATION DATA

C. Other Data Programs

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
EXTENS	Baltimore/A. Thornton		H-6620	No	No	This program reduces data from 8-point borehole extensometers and calculates the deflection with respect to a user designated fixed anchor point.
Generalized Soil Data Plot	Rock Island	741-F1-F428A	BCS	No	Yes	Plots time (in months) versus three variables (elevation, feet, inches, etc.). Plots three separate variables using two separate axes, if needed. No limit to length of time plot. Can be adapted to observation well, piezometer, settlement, etc. plots. Also draws mini-section of dam, cut-slope, etc.
Geodolite Reduction	St. Louis/B. Kleber, LMS		TEK4051	No	No	Reduces trilateration survey data that was recorded in the field using electronic distance measuring equipment.
Geodolite Data System Part 1	Omaha/M. E. Fletcher	733-X6-C228A	LBL	No	Yes	The program uses data punched from geodolite data sheets, and computes observed distances from this data. The observed distances printed have been corrected for the curvature of the earth. The final purpose of the Geodolite Data System is to compute the coordinates of a network of reading points in the vicinity of a dam.
Part 2	Omaha/M. E. Fletcher	733-X6-C228B	LBL	No	Yes	The program uses the output tape from Part 1, and applies a ratio correction to the distances. The ratio correction is based on the time elapsed between the measurement of two known distances, and the change in the ratios of the measured to the known distances during the period. The correction is intended to correct for changes in atmospheric temperature during the measurement period.

INSTRUMENTATION DATA

C. Other Data Programs

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Geodolite System Sort	Omaha/M. E. Fletcher	733-X6-C228S	LBL	No	Yes	The program sorts the output tape from Part 2, (733-X6-C228B) by the reading point designations. The sort has the effect of collecting all the observations for a reading point into a group.
Instrument Reading Schedule	St. Paul/R. Lundstrom	741-S8-P5100	BCS	No	No	This program plots a timetable used to keep track of the scheduling and taking of readings from various instruments throughout the District. It was specifically written for piezometer readings. The timetable schedules one year's worth of readings, from March through February.
JNMTR	WES/R. Leach, WESGE		H-635	Yes	No	Reduces joint meter data.
Laser Alignment	Seattle	733-K5-G0050	Harris 120	No	Yes	This program will reduce the field survey data from a laser precise alignment survey to horizontal offsets of the survey points with respect to the reference line. In addition, the program will output the horizontal offsets with respect to the base line survey. The input data must include a SURVEY INFORMATION CARD (8A4, I8, 7XA1, 7XA4, F10.0), SEGMENT INFORMATION CARDS (2I10, 30X), and SURVEY POINT DATA CARDS (3XA1, I3, A1, 3F6.3). A complete description of input data preparation and deck assembly is given in the documentation mentioned above.

INSTRUMENTATION DATA

C. Other Data Programs

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Multiple Position Borehole Extensometer and Load Cell Data	Seattle/R. N. Shryock	41-K5-G304	IBM 360 Model 50	No	Yes	This program reduces data read from Multiple Position Borehole Extensometers (MPBX) manufactured by Terrametrics, Inc. In addition, it produces a plotter tape for plotting cumulative displacements and strain change rates versus time on a Benson-Lehner LTE Plotter.
New Melones Monument Movement Plot	Sacramento/Anderson	803-X6-L2220	BCS	No	No	Plots movements of survey monument data on Calcomp Plotter.
Plot Horizontal Surface Movement	Huntington/L. McCoy	741-41-54P	H-225	No	Yes	Program plots movement vectors for surface movements, horizontal movements on a Calcomp plotter.
PPCELL	WES/R. Leach, WESGE		H-635	Yes	No	Reduces pore pressure cell data.
Pressure Cell Data Reduction and Plot	St. Paul/D. Spaulding	741-X-F080 or 741-S8-F5080	BCS	No	No	The program reads the total pressure readings obtained from field observation of up to nine GLOETZL earth pressure cells, calculates the earth pressure and outputs a tabulation sheet for the earth pressure for readings taken on a particular date. The program also has the capability to list all readings taken to date on a given cell and to plot the pressure cell readings versus time.

INSTRUMENTATION DATA

C. Other Data Programs

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Slumb (Modified)	Kansas City/ A. K. Zohdy, S. Severini		BCS	No	No	From apparent resistivity data obtained with slumberger array the program determines true resistivity and depths.
SNMTR	WES/R. Leach, WESGE		H-635	Yes	No	Reduces strain meter data.
SNTOSS	LMVD/C. Trahan, LMV		H-635	Yes	No	Calculates concrete stress from strain meter data.
Soil Instrument Measurements	Buffalo/I. Reinig		H-225 BCS	No	Yes	The program computes the rectified values and other related information (excess pore pressures, settlement elevation, embankment pressures, etc.) for measurements taken with pneumatic piezometers, total pressure cells, and settlement sensors. Program corrects for calibration in factors for each of the three pneumatic readout instruments used to take measurements. Numbers of instruments handled by program is variable.
Sonde Reports	Sacramento/Threewit	802-S8-L2003	BCS	No	No	Plots both water and radio Sonde results either interactively or on a 30-in. Calcomp Plotter.
SSMTR	WES/R. Leach, WESGE		H-635	Yes	No	Reduces stress meter data.
Structural Behavior Data Reduction	Seattle/ D. J. Bradstreet, B. Woerner	713-E1-G360A	Harris S120	No	Yes	This program will convert structural behavior instrumentation field data to meaningful calibrated values in units such as PSI, feet, inches, etc. These values are then plotted to provide a visual display of historic instrument behavior.

INSTRUMENTATION DATA

C. Other Data Programs

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Structural Behavior Instrument Plot	Seattle/ D. J. Bradstreet, B. Woerner	G371-360B	Harris S120	No	Yes	This program graphs previously calibrated instrumentation data versus time. The types of data it will graph are joint movements, concrete temperatures, plumbline movements, uplift pressures, foundation deformation, piezometer elevations, weir flow, Whittemore gauge data, strain, stress and pool and tailwater elevations.
Surface Monument Data Reduction	Huntington/E. Stone, T. Plummer	733-81-382	Infonet	No	Yes	Program calculates horizontal and vertical surface movements.
Surface Settlement and Horizontal Movement	Albuquerque/H. Meyers	741-F6-M114A	H-6620	No	Yes	(1) Build data file to store surface settlement and horizontal movement data or settlement gage file. (2) List same.

LABORATORY TESTING AND BORING LOGS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Boring Log Plot	St. Louis/T. Wolff, LMS	803-G1-A3430	H-225	Yes	No	Batch program to plot boring logs, one per sheet on 14 x 21-inch sheets.
BORPLOT	New Orleans/L. Manson, LMN		H-225 H-635	Yes	No	The program provides a plot of the schematic representation of the results of soil and rock exploration of borings or test pits, with the various soil or rock encountered shown by their appropriate symbols. The program was written to standardize the schematic representation of soil materials by conforming to symbols of the Unified Soil Classification System and the rock symbols standardized by the U. S. Geological Survey. The program is a quick, accurate method for plotting general and undisturbed type boring logs and for achieving and maintaining a consistency in presenting graphic representation of soil and rock data throughout the Corps of Engineers.
CARDP	New Orleans/ L. Sulzberger, LMM		H-635	Yes	No	Punches cards for Boring Log Plot Program, 741-F3-A2230.
Classification of Soils	Sacramento/Revised by S. Anderson	741-X6-L203E	BCS	No	No	The program does the calculation for composite test holes, for frequencies of percent finer values of all minus fractions and the calculation of statistical data, revised for CDC 7600.
CON1	MRD Lab/D. Jaros		BCS	No	Yes	CON1 is an interactive computer graphics program designed to plot time-deformation curves, e log-p curves, as well as print out soil specimen data and title block information pertaining to consolidation tests as shown on ENG Form 2090 and MRD Form 956, 1 May 80.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Cone Penetrometer Plot	Kansas City/R. Adrian		BCS	No	No	From data obtained with Dutch Cone (Begeman cone and friction sleeve) apparatus, program tabulates and plots computed cone point bearing q_c and friction sleeve ratio R_f .
Consolid	WES/A. Parks		H-635	Yes	No	Data reduction/plot program for consolidation tests. Input items are taken directly from ENG Forms 3847 and 3848. Output includes e log p and time-consolidation plots.
CS-JCL	WES/A. Parks		H-635	No	No	Job Control Language (JCL) Driver file for CONSOLID program.
D-Shear	WES/A. Parks		H-635	No	No	General Catho-Ray Tube (CRT) Plot program for direct shear tests.
DS-Check	WES/A. Parks		H-635	No	No	This program is to check an input data file for D-Shear program listed above. The purpose of the program is an attempt to flag input typing errors.
DS-JCL	WES/A. Parks		H-635	No	No	Job Control Language (JCL) Driver file for D-Shear program.
General Type Boring Log Plot, Mod 7	New Orleans/L. Manson M. Lamarca, LMN	741-F3-A2230	H-635	Yes	No	To plot a graphic representation of General Type soil and rock symbol and either the water content, stratum change, D_{10} grain size, consistency, color, modification symbols and penetration or a variable input description of the physical properties of soil or rock may be plotted.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
GRAC	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute and plot sieve analysis data, hydrometer analysis data, or both, along with title block information as shown on ENG Form 2087.
Gradation Analysis of Borrow	Los Angeles/Revised by Anderson	741-X6-L203F	BCS	No	No	This program is a revision of 741-X6-L203A. Maximum number of test borings is 800. Error routines have been added and maximum percentage rate is set at 45. Depths for test holes must be positive downward.
Gradation Curve	Albuquerque/H. Meyer	741-F6-M113B	H-6620	No	Yes	Builds a data file with grain size and percent passing for the gradation curve plotting program, 741-F6-M113A.
Gradation Curve Plotting Program	Albuquerque/H. Meyer	741-F6-M113A	H-6620	No	Yes	Plots gradation curve from sieve analysis.
Gradation Analysis of Embankment	Los Angeles/Revised by Anderson	741-X6-L203G	BCS	No	No	This program is a revised version of 741-X6-L203F. The program is set up to read depth fields as station elevation identification and the depth is assigned a unit value for calculations. This is set up for embankment when soil samples are taken at particular stations and elevations.
Penetration Blow Plot	Kansas City/R. Adrian		BCS	No	No	From standard penetration test data, program plots penetration versus blow count.

LABORATORY TESTING AND BORING LOGS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
QU-Check	WES/A. Parks		H-635	Yes	No	This program is used to check an input data file for the QU-Draft and QU-Plot programs listed below. The purpose of the program is an attempt to flag errors in the input data before test results are presented.
QU-Draft	WES/A. Parks		H-635	No	No	Data reduction program with tabulated output for the Q and Uc triaxial soils test. This program is used to transmit draft and/or final data to the districts and other as soon as testing is finished.
QU-JCL	WES/A. Parks		H-635	No	No	Job Control Language (JCL) Driver file for QU-Plot program.
QU-Plot	WES/A. Parks		H-635	No	No	Data reduction/plot program for the Q and Uc triaxial tests. Output sheet features stress-strain plot, Mohr's circles, failure sketches, and time to failure computations.
RBAR4	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute, plot and print out total stress data, effective stress data, soil specimen data, and title block information pertaining to unconsolidated, undrained tests with pore pressure measurements.
RES	MRD Lab/D. Jaros, R. Zaruba		BCS	No	Yes	An interactive computer graphics program designed to compute, plot, and print out gyroscopic groove data in both tabular and graphic form.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
R-TRIAX	WES/A. Parks		H-635	No	No	Data reduction program for the R/R-BAR triaxial test with tabulated output.
SIEVE	St. Louis/T. Wolff		BCS	No	No	From input of weights retained on 5 or 6 standard sieves, program computes percentage passing and retained, classifies material type and gradation, and estimated D_{10} size.
SIEVES	WES/A. Parks		H-635	Yes	No	Data reduction/plot program for grain size analysis. The program uses sieve weights, hydrometer readings, and data codes to produce percent finer plots.
SEV-JCL	WES/A. Parks		H-635	No	No	Job Control Language (JCL) Driver file for SIEVES program.
SHEAR	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute, plot, and print out direct shear test data as shown on ENG Form 2092.
Soil Analysis (SOILAN)	Los Angeles/ R. Gutschow	741-L1016	BCS	No	Yes	Program classifies soil using a standard format of mechanical analysis data and Atterberg Limits. Program calculates blends of test holes, frequencies of percent passing values of all fractions and a limited amount of statistical data. D85, D50, D60, D30, D15 and D10 values can be obtained for individual samples as well as for blend and frequency summaries.

LABORATORY TESTING AND BORING LOGS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Soil Boring Maintenance Program	Mobile/S. Mitchell	741-E1-K5111	Harris S120	No	No	Program maintains a file for individual soil borings to include location, depth, drilling method, lab testing performance and other general information.
Soil Characteristics	Wilmington/J. Waller	741-E1-K7010	Harris S120	No	Yes	Program uses sieve analysis (percent passing or retained) to compute phi normal distribution.
Standard Penetration Test Blow Plot	Kansas City/R. Adrian		BCS	No	No	From standard penetration test data, i.e., penetration per blow, program computes and plots blow per .1 feet versus depth.
TESTING	St. Louis/T. Wolff		BCS	No	No	Program sorts a data file of all types of shear testing. Data can be sorted on boring no., sample no., elevation, soil type, test type, formation, and/or confining stress. Data found in sort can be listed and/or plotted. (Mohr's circles, S envelopes, deviator stress versus moisture content.)
TRANS	Jacksonville/ H. E. Whitsett	BF03	Harris S120	No	No	The program calculates an array of coordinates for identifying boring locations by using electronics positioning equipment in the field.
TRIAl	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute, plot, and print out Triaxial results pertaining to Unconsolidated, Undrained as well as Consolidated Undrained tests as shown on ENG Form 2089.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
UNC3	MRD Lab/D. Jaros		BCS	No	Yes	An interactive computer graphics program designed to compute and plot compressive stress data as well as print out soil specimen data and title block information pertaining to Unconfined Compression Tests.
Undisturbed Boring Log Plot With Grid	New Orleans/L. Manson M. Lamarca, LMN	741-F3-A2240	H-635	Yes	Yes	Plots a graphic representation of undisturbed type soil boring logs, and to plot the data grid, plasticity chart shear strength data charts, and consolidation data grid which may consist of two, three, or four cycle log grids. The soil symbols, stratum changes, penetration resistances, D_{10} sizes consistencies, and modification symbols can be plotted on the log.

EMBANKMENT QUANTITIES, QUALITY CONTROL, VOLUMES, RIPRAP

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Canal and Dike Earthwork	Mobile	732-E1-K5035	Harris S120	No	No	Program uses a template of vertical and horizontal coordinates to compute excavation and fill volumes.
CCNTROL	Los Angeles/ R. Gutschow	741-X6-L1033	BCS	No	Yes	Program uses Form 376 (Summary of Field and Laboratory tests of compacted Fills) as basic data to produce plotted statistical data for monthly construction control reports for embankments.
Channel Riprap Design Tractive Force Method	Galveston/J. Wolff, J. Constant	722-J2-M1120	H-225	No	No	Determines median stone size required to protect the bottom and side slopes of a trapezoidal channel with flow at uniform depth. The computational method used is described in EM 1110-2-1601 dated 1 July 1970. The channel section analyzed may be a tangential reach or a channel bend.
COMPACT-I	St. Louis/J. Jobst, LMS	741-X6-A340I	BCS	Yes	No	An interactive graphics program for the compilation and display of impervious or semipervious soil compaction control data.
COMPACT-P	St. Louis/J. Lee, J. Williams, LMS	741-X6-A340P	BCS	Yes	No	An interactive graphics program for compilation and display of pervious soil compaction control data.
Cross Section	Charleston/W. Bennett	731-K221P	BCS	No	No	Shows channel prism and channel depths to scale desired.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Cross Section	Sacramento/Threewit	YOCDX2, GR	BCS	No	No	Used in conjunction with a Digitizer, interactive display unit and topographic drawings to produce cross sections. Result can be used with other program to calculate quantities of cut and fill.
Cut and Fill Quantities	Sacramento/ L. L. McCoy	732-X6-L201K	BCS	No	No	Given cut and fill quantities for zoned water retention embankments, the program calculates the volumetric quantities of various materials bonded by a set of master terrain data for a curved or straight alignment.
Cut and Fill Quantities	Sacramento/Anderson	732-X6-L201R	BCS	No	No	This program reads ground and template data from tape created on program 732-G1-L201K, and punches new groundline cards (06) with template data points replacing original ground for the width of that template.
Cut and Fill Quantities	Sacramento/Herrigstad	732-X6-L207A	BCS	No	No	Compares actual cut and fill quantities with preconstruction calculated quantities.
Cut and Fill Volumes	Fort Worth	732-G1-M214	H-400	Yes	No	The program computes volume of cut, volume of fill, and the distance of the center of gravity of volumes of cut and fill from centerline. Input consists of cross section distances, elevations, and slopes of the design section. Any number of design sections can be used with the terrain data cards and the design section can be changed (moved up or down, or right or left at any station).
Digital Terrain Model System of Earthwork Computation	Omaha/M. Wiley	741-FS-C1060	BCS	No	No	The program computes the vertical geometry, the profile grade, shape of section on template, the slope intercepts, and excavation at each station on an alignment.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Distribution of Stone Sizes	Buffalo/ I. G. Reinig II		H-225 BCS	No	Yes	1. Calculates stone weights for each sample. 2. Calculates maximum elongation ratio for each stone and average for sample. 3. Arranges stone size by weight in ascending order for each sample. 4. Calculates distribution of stones by number and by weight for any range increment. 5. Calculates arithmetic mean, standard deviation of the mean, standard deviation, twice standard deviation. 6. Program has the option to summarize all stone sizes inputted in each sample and calculates steps 3 through 5 and the average elongation ratio for one large sample.
Earthwork Computation	Nashville	741-430	INFONET	No	No	Uses Tektronix graphics tablet to input data for earthwork computations.
Embankment Quantities	Fort Worth/A. Woolsey	732-G1130	H-225	Yes	No	This program computes embankment quantities given original ground cross sections and coordinates of a zoned embankment cross section. The program will compute quantities for as many as ten embankment materials using as many as ten different embankment templates.
Embankment Quantities Plotting	Albuquerque/H. Meyers	732-F6-M109A	H-6620	No	Yes	Draws a Calcomp plot of input data for the Embankment Quantities Program, (732-F6-M1090).

Program Name	Contract Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Field Compaction Control	Rock Island	741-VV-F404A	BCS	No	No	Plots tally of input data with addition of percent optimum moisture content (or percent points deviation from optimum moisture) and percent optimum dry density. A separate plot is made for two different soils plus a combination of the two. Also shows plot of where data located in respect to specifications limits, a breakdown tally of percent of observations, a bar chart of percent optimum moisture content (or percentage point deviation from optimum moisture content) versus percent of observations, and a bar chart of percent optimum dry density versus percent of observations.
Geotechnical Construction Control Data Base Management System	WES (E. Edris, WESGE)/ D. Ward, E. Edris, A. Parks		BCS	No	No	This system stores and presents the results of field compaction data and the associated laboratory tests. The data is stored in the System 2000 data base. There are programs developed for data entry and the display of the data in tabular and graphical forms.
Plot Moisture Density Vs. Dry Density	Rock Island	741-C1-F426A	H-225	No	No	Program presents graphically by Calcomp plot the field compaction control of impervious soils comparing results of in-place, one-point, and optimum moisture content versus dry density. A selected zero air voids curve is plotted for any specific gravity.
RIPRAP	Jacksonville/ J. I. Chang		Harris S120	No	No	The program computes and compares mean stone sizes by using three different methods - Isbash Method, Corps of Engineers Method (EM 1110-2-1601) and the method described "practical riprap design" (WES Miscellaneous Paper H-78-7).

EMBANKMENT QUANTITIES, QUALITY CONTROL, VOLUMES, RIPRAP

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Riprap Gradation	Rock Island	741-G1-F402A	H-225	No	No	Uses recorded weights and sizes of stone grouping them in ranges. Computes and prints weights retained, percent retained percent finer by weight and number of stones.
Roadway Design System	Portland/D. Bradstreet	732-E1-G310Z	Harris S120	No	No	Performs computations and output quantities for roadways from inputted roadway templates for cuts and fills. Converted Texas RDS to NPD format.
Stratified Excavation Quantities	Wilmington/J. Waller	732-G1-K702B	H-225	No	Yes	Compute quantities for multiple zone excavation and to plot sections.
Soil Density Verification	San Francisco	741-F5-L0050	BCS	No	No	This program stores and verifies field compaction results.
WH46 & WH45	Jacksonville/ R. Bunnel, O. Knappe		Harris S120	No	No	WH46 picks up the coordinates of cross sections from a digitizer and creates a data file for WH45 to compute areas and volumes.
Volume of Jetties	Galveston/ D. O. Ralston, D. B. Campbell	741-G1-M3010	H-225	No	No	Computes stone quantities required for jetties and similar stone structures.
XYZ	Charleston/W. Bennett	731-K2032, 731-K203C	BCS	No	No	Computes yardage quantities at a given depths and side slopes.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
COSTUN	New England/ F. T. Wheby, E. M. Cikanek		INFONET	No	No	A program for estimating costs of tunneling. It performs all logic and computations customarily done by hand in preparation of engineer's estimates or contractor's bid on tunnel-shaft systems. The program described is based on construction methods, work forces, and equipment selections corresponding to the current state-of-the-art of tunneling. The program will accommodate a large number of values of changes in the values of the factors that affect costs, such as tunnel shape and size, shaft depth, ground characteristics, and construction method. To provide great flexibility, the user of the program is provided with the option of selecting a lining type and thickness, profit, and overhead margins and other input data.
Curtain Grouting File Building	Albuquerque/H. Meyer	741-F6-M115A	H-6620	No	Yes	(1) Builds a data file of grouting data. (2) Lists and summarizes data.
Curtain Grouting Plotting	Albuquerque/H. Meyer	741-F6-M115B	H-6620	No	Yes	Plots curtain grouting data on Calcomp Plotter.
GROUTX	St. Louis/J. Jobst		BCS	No	No	An interactive graphics program for reading grout data stored in a disk file and displaying bar charts and data plots as selected from a menu list.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Rational Design of Tunnel Supports	New England/ M. D. Voegele		INFONET	No	No	An interactive graphics based analysis of the support requirements of excavations in jointed rock mass. The Distinct Element methods portray a rock mass as a two-dimensional assembly of discrete blocks. There are no restrictions of block shapes or magnitudes of displacements and rotations. In the configurations used in this report, the Distinct Element method is coupled to a graphics terminal so that movements of the blocks are visually available as the computer calculates them.
Station Plot of Total Grout Take for Red Rock Dam	Rock Island	741-G1-F411G	H-225	No	No	The plot program graphically presents the total grout take (cu-ft/lin-ft) for zone 1, 2, and 3 that contain Primary (1st order), Secondary (2nd order), Tertiary (3rd order), and Quaternary (4th order) holes for each 20 foot reach of Red Rock Dam.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
BISAR	WES (W. Barker WESGP) Shell Oil Company	713-F3-R0053 ECPL	H-635	Yes	Yes	A general-purpose program for computing stresses, strains, and displacements in elastic multi-layered systems subjected to one or more uniform loads, acting uniformly over circular surface area. These surface loads can be combinations of a vertical normal stress and an undirectional tangential stress.
CHEVIT	WES/Chevron Oil Company, modified by Y. Chou, WESGP	713-F3-R0031 ECPL	H-635	Yes	Yes	Program computes closed form solution of stresses, strain and displacements of elastic layered soil systems.
FEVDEF	WES/Al Bush, WESGP		H-635	No	No	This program computes pavement layer modulus values for a given set of measured deflections. The program is used in conjunction with CHEVIT.
FLEXEVAL	WES/Al Bush, WESGP		H-635	No	No	This program is used to evaluate allowable aircraft loads on flexible pavements.
H-51	WES (W. Barker, WESGP)/General Dynamics Corp.	713-F3-R0052 ECPL	H-635	Yes	Yes	A computerized analysis for graphical solution of Westergaard equations of bending for thin slabs on a Winkler foundation (Edge Load Case). Computes block count (Pickett & Ray Influence Chart #6), bending moment and stress at slab edge in a direction parallel to edge.
RIGEVAL	WES/Al Bush, WESGP		H-635	No	No	This program is used to evaluate allowable aircraft loads on rigid pavements.

PAVEMENTS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
WESLAYER	WES/Y. Chou, WESGP		H-635	Yes	No	Finite element program to calculate stresses and deflections in rigid multicomponent pavement with cracks and joints, as well as in the supporting subgrade soil, subjected to loads and temperature warping. This program deals with pavements on layered elastic solids. The pavement can have full or partial loss of subgrade support over designated regions of the pavements. Multiple wheel loads can be used with no limit to the number of wheels. However, the program is limited to a two-slab system.
WESLIQID	WES/Y. Chou, WESGP		H-635	Yes	No	This program is very similar to the WESLAYER program. WESLIQID deals with pavements on a liquid foundation. Variable slab thickness and modulus of subgrade reaction K are incorporated and any number of slabs arranged in an arbitrary pattern can be handled.

FINITE ELEMENT METHOD/FINITE DIFFERENCE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
3D FE Data Edit	WES/F. Tracy, WESKA A. Wade, WESKP	704-F3-R0219 ECPL	H-635	Yes	Yes	This program plots a 3-D finite element (FE) grid using as input the data cards for either the Structural Analysis Program (SAP5) or 3-D Seepage FE analysis programs. The FE grid can be plotted with hidden lines deleted or all lines. The picture can also be rotated for obtaining different views.
AXISYM	WES (H. Taylor, WESGE)/D. Holloway	713-F3-R0030 ECPL	H-635	Yes	Yes	Axisymmetric finite element code verified for analysis of one pile-soil interaction problem.
BMCOL	WES/Prof. Matlock Univ. of TX N. Radhakrishnan WESKA	713-F3-R0050 ECPL CORPS-X0032	H-635	Yes	Yes	Finite difference program to solve a variety of simple and complex beam-column structural problems accounting for movable loads - University of Texas.
CBCSSI	WES (W. Jones, R. Mosher, WESKA)/ W. Dawkins, Oklahoma State University	CORPS-X0060	BCS OPM	Yes	No	A general purpose soil-structure interaction analysis program for beam-columns, axially loaded piles, and sheet pile walls. It uses the finite element method with 1-D beam element for the structural components on fixed supports, nonlinear and/or linear concentrated and/or distributed spring supports. The program is divided into three subprograms: 1. CBEAMC - for the general beam-column analysis; 2. AXPILE - for the analysis of axially loaded piles; 3. SHTSSI - for the SSI analysis of sheet pile walls.

[illegible]	[illegible]/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
[illegible]	[illegible]	[illegible]	[illegible]	No	Yes	To [illegible] the output of finite element program.
[illegible]	Los Angeles K. L. Lee (U. C. Berkeley)	721-X6-L1024	BCS	No	Yes	Linear elastic axisymmetric and plane strain finite element program, including the effect of seepage forces such as through an earth dam.
FEAST	WES/E. Wilson Univ. of California, Berkeley N. Radhakrishnan WESKA	713-F3-R0013 ECPL	H-635	Yes	Yes	Finite element analysis of plane stress structures. Computes stresses and deformations. (University of California).
FESS41	WES/N. Radhakrishnan, WESKA	713-F3-R010A	H-635	Yes	Yes	Finite element method is used to compute stresses and deformations in soil in plane strain geometry. Program takes into account nonlinear behavior of soil systems.
FESS412	WES/N. Radhakrishnan, WESKA	713-F3-R010B	H-635	Yes	Yes	Stresses and deformations in soil masses in axisymmetric or plane strain geometry. Soil system nonlinearity included via incremental-iterative technique - modeling from nonlinear stress-strain fitted in a hyperbolic form for both the shear modulus and Poisson's ratio.
[illegible]	[illegible]	803-X6-L1088	BCS	No	No	Plots data on Calcomp Plotter.

FINITE ELEMENT METHOD/FINITE DIFFERENCE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Finite Element Mesh Plot	Sacramento	803-X6-L208C	BCS	No	No	The input for this program is compatible with seepage program 741-X6-L2260 and 741-X6-L2270. It plots results of listed programs on Calcomp Plotter.
Finite Element Plot	Sacramento	803-X6-L208A	BCS	No	No	This program is a standard Calcomp plot routine written to aid in finding errors when coding for finite element mesh.
GPOSTFEM	WES/F. Tracy, WESKA	704-F3-R0005 ECPL	H-635	Yes	Yes	An interactive graphics program for postprocessing finite element data. Program can generate contour plots, vector plots, isometric and perspective plots.
GPREFEM	WES/F. Tracy, WESFA	704-F3-R0006 ECPL	H-635	Yes	Yes	Preprocessing finite element program. An interactive graphics program for automatically generating finite element grids with on-line data editing.
HEAVE	WES/L. Johnson, WESGE		H-635	Yes	No	Predicts heave check of expansive foundation soils by 2-D finite difference formulation.
ISBILD	WES (W. Jones, WESKA)/ Y. Ozawa, J. M. Duncan	741-F3-R0071 ECPL	H-635	Yes	Yes	A computer program for analysis of static stresses and movements in a graphical preprocessor program to generate meshes for the nonlinear incremental finite element method.

FINITE ELEMENT METHOD/FINITE DIFFERENCE

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
ISBILD-GISB	J. Jones, NPA W. Jones, WESKA	741-F3-R0070 ECPL	H-635	Yes	Yes	To interactively prepare data for the FEM embankment analysis program ISBILD. Display or generate input geometry and make modifications.
Nonlinear Static Analysis of Earth Dams (NSAED)	Los Angeles/ P. Chakrabarti, A. Chopra		BCS IBM 360 IBM 360	No	Yes	Determine stresses and displacements in a homogeneous or zoned embankment cross sections due to gravity loads and seepage pressures. Total gravity loads are applied simultaneously to the *complete structure. The analysis is performed* by the finite element method assuming a condition of plane strain. Nonlinear stress-strain relationship for soil is included.
MATLOCKM	WES (W. Jones, WESKA)/ J. Hartman, LMS		H-635	Yes	No	Determines maximum positive and negative moments, shear displacements and reactions at each location on a beam for any set of vertical load moved incrementally along the length. Modified version of BMCOL for moving loads.
PRESAP	WES/W. Jones, WESKA		H-635	Yes	No	An interactive time-sharing program to generate data for the General Purpose Structural Analysis Program (SAP4).
SOLSAP	WES/J. Palmerton, WESGR		H-635	Yes	No	An extension of the 3-D general purpose program SAP which can account for nonlinear soil properties. Program also simulates incremental construction.

UTILITY ROUTINES

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
CHART 1	WES/R. Leach, WESCE		H-635	Yes	Yes	Increments by sequential numbers all dates following an initial date.
Cut and Fill Quantities	Sacramento/Anderson	732-X6-L207J	BCS	No	No	732-X6-7201K to 732-X6-7207A card conversion CDC 7600 version of 732-G1-L207A.
Extract Program	St. Paul/M. Schwarz	741-F511A	H-400	No	No	This program is used to convert a blocked COBOL tape into a format that a FORTRAN plot program can read. This program extracts from tape the desired information.
Instrumentation Bublentr	St. Louis/G. Willick, LMS		H-635	Yes	No	Allows T/S entry of instrumentation data generated off line on a Texas Instruments Teletype with a bubble memory.
Instrumentation Copy-Tape	St. Louis/J. Jobst, LMS	741-F3-A317T	H-635	Yes	No	Routine to create a copy of a data tape.
Instrumentation Cutoff	St. Louis/J. Jobst, LMS	741-F3-A317Y	H-635	Yes	No	Routine to update a historical data tape by deleting records before a specified cutoff date.
Instrumentation Data Reduction	St. Louis/G. Willick, LMS	741-F3-A3170	H-635	Yes	No	Reduces field data from several different types of instruments.
Instrumentation Dataentr	St. Louis/ W. Bereswill, LMS	741-F3-A317D	H-635	Yes	No	Allows interactive entry of field readings of instrumentation data.
Instrumentation Digitizer	St. Louis/G. Willick, LMS	741-K4-A317G	TEK4051 (TEK4907) (TEK4952)	Yes	No	Allows digitizing of constant base data for plate or drawings.

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Instrumentation Plot Driver	St. Louis/G. Willick, LMS	741-K4-A317P	TEK4051 (TEK4907) (TEK4662)	Yes	No	Converts the pseudo plot commands into a format meaningful to the Tektronix mini computer and to execute these plot commands.
Instrumentation Plot Editor	St. Louis/G. Willick, LMS	741-K4-A317E	TEK4051	No	No	Allows user to manipulate and edit the pseudo plot files.
Instrumentation Plotsys/ Spawn	St. Louis/G. Willick, LMS	741-F3-A317R	H-635	Yes	No	Assists user in running 741-170 series programs (*170, 178, 17C*). Quizzes user for information needed to run the job, sets up the proper job control language, and spawns a batch job.
Instrumentation Pseudo Plot	St. Louis/G. Willick, LMS	741-F3-A317F	H-635	Yes	No	Reduces instrumentation data in a format acceptable for plotting on the TEK4051 computer.
Instrumentation Pull Back	St. Louis/G. Willick, LMS	741-K4-A317I	TEK4051 H-635 (TEK4907)	Yes	No	Assists user in retrieving plot files from H-635 and storing them on TEK4051 storage device.
Instrumentation Tapehdl/ Spawn	St. Louis/G. Willick, LMS	---	H-635	Yes	No	Assists user in running utility programs, for manipulation of data tapes. Quizzes user for information needed to run the job. Set up proper job control language, and spawns a batch job.
Instrumentation Tapein	St. Louis/J. Jobst, LMS	741-F3-A317N	H-635	Yes	No	Routine to convert a BCD tape to an ASCII time-sharing file. Allows user to access a copy of his data via T/S.

UTILITY ROUTINES

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Instrumentation Tlist	St. Louis/J. Jobst, LMS	741-F3-A317L	H-635	Yes	No	Routine to list a data tape.
Instrumentation Tsort	St. Louis/J. Jobst, LMS	741-F3-A317S	H-635	Yes	No	Routine to sort a data tape by instrument type and reading data.
Instrumentation Update	St. Louis/G. Willick, LMS	741-F3-A317B	H-635	Yes	No	Updates and edits historical instrumentation data tapes.

MISCELLANEOUS

Program Name	Contact Office/Author	Program Number and Availability	Computer	Documented	Abstracts	Description
Card Plot	Charleston/W. Bennett	731-K223P	BCS	No	No	Plots soundings or elevation to scale desired.
HIDDEN	WESKA/F. Tracy		H-635	Yes	No	Solves the 3-D hidden surface algorithm.
Inventory of Dams Edit Program	Pacific Ocean Division		BCS	No	No	Edits dam inventory data for obvious errors prior to inclusion in the national data base. Checks numerical data against upper and lower bounds previously furnished for each state. Also checks to insure that data is in accordance with prescribed format.
Levee	Charleston/W. Bennett	731-K220P	BCS	No	No	Draws cross section at scale desired.
Menard	WESSD/G. Baladi		H-635	No	No	Calculates the distribution of stresses and displacements in an elastic transverse isotropic medium due to normal loading on the surface of a cylindrical cavity whose axis of symmetry is inclined to the plane of isotropy.
THERM	Alaska/C. Jaeger, J. Rubel		Harris S120	No	Yes	Calculation of water and ground temperature from resistance measurements obtained with thermistors.

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Edris, Earl V.
Geotechnical computer program survey / compiled and edited by Earl V. Edris, Jr. and Wipawi Vanadit-Ellis (Geotechnical Laboratory, U.S. Army Engineer Waterways Experiment Station). -- Vicksburg, Miss. : The Station ; Springfield, Va. : available from NTIS, 1982.
82 p. ; 27 cm. -- (Miscellaneous paper ; GL-82-1)
Cover title.
"March 1982."
Final report.
"Prepared for Office, Chief of Engineers, U.S. Army under Computer Applications in Geotechnical Engineering Project."

1. Computer programs. 2. Rock mechanics. 3. Soil mechanics. I. Vanadit-Ellis, Wipawi. II. United States. Army. Corps of Engineers. Office of the Chief of Engineers. III. U.S. Army Engineer Waterways

Edris, Earl V.
Geotechnical computer program survey : ... 1982.
(Card 2)

Experiment Station. Geotechnical Laboratory. IV. Title V. Series: Miscellaneous paper (U.S. Army Engineer Waterways Experiment Station) ; GL-82-1.
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