DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

GEOMENU: A PROGRAM FOR USING US GEODATA FILES FROM 1:2,000,000-SCALE MAPS IN ISM

by

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Documentation (Paper copy) and
5 1/4" diskette with documentation
and executable and source code

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GEOMENU: A Program for using US GeoData Files from 1:2,000,000-Scale maps in ISM is a program designed to use the U.S. Geological Survey's US GeoData Digital Line Graph files from maps at 1:2,000,000 scale in Dynamic Graphic's Interactive Surface Modeling (ISM) software as annotation files. The data files are divided into 21 Regional files which are then subdivided into 8 major types of line data: administrative, cultural, and political boundaries; roads and trails; streams; water bodies; railroads; and hypsography. The user can select any of these line types from the files for one or more Regions or for a user-defined latitude-longitude window. Then if desired the user can change from Albers Equal-Area conic projection to a different map projection.

Requirements: US GeoData Digital Line Graph files in 1:2,000,000 scale, VAX computer, Digital Command Language (DCL), FORTRAN 77 compiler, ISM version 6.93b mapping program, dumb terminal with optional graphics capabilities compatible with ISM, and compatible plotter. A. - Separate paper copy of the documentation. B. - Documentation, executable program, and source code are all included as an ASCII file on an MS-DOS formatted 5.25 inch diskette which may be up-loaded onto a VAX.

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PURPOSE

The U.S. Geological Survey produces digital versions of many of its map products which may be used with digital mapping applications. This program is designed to use specifically the U.S. Geological Survey's GeoData Digital Line Graph (DLG) files from 1:2,000,000-scale maps in Dynamic Graphic's Interactive Surface Modeling (ISM) software as annotation files. Other US GeoData files are available at other scales, but this program runs only for the 1:2,000,000 DLG files.

These DLG files were digitized from the National Atlas maps which were published at a scale of 1:2,000,000 in the Albers Equal-Area conic projection. By using the DLG files in ISM, the scale may be changed. The files are divided into 21 Regional files which are subdivided into 8 major types of line data: administrative, cultural, and political boundaries; roads and trails; streams; water bodies; railroads; and hypsography. The user can select any of these line types from the files for one or more Regions or for a user-defined latitude-longitude window. Then if desired the user can select a different map projection. A final output file is created which can be used in Interactive Surface Modeling, version 6.93b as an annotation file.

The US GeoData DLG's from 1:2,000,000-scale maps were derived from the National Atlas maps which were published at a scale of 1:2,000,000 and digitized at the same scale for these files. At this original scale, the accuracy of any given location is no better than 3333 feet. Therefore the accuracy of any map product derived from the files by this program will be no better than 3333 feet, or about three quarters of a mile. These files can be used to map at any scale, however, it must be realized the mapping error will be proportionally larger at larger scales such as 1:500,000. It is best to use these files for mapping at the original scale of 1:2,000,000 or smaller, such as a scale of 1:10,000,000.

The program is written in FORTRAN 77 and uses a menu interface written in Digital Command Language (DCL). The menu and program run on a VAX 11/780 in VMS Version 4.7.

ORIGINAL DATA

All data contained in the US GeoData DLG data files from 1:2,000,000-scale maps are represented on maps as points, lines, and areas. For example, airfields are point data features; roads, railroads, and streams are line data features; and national forests and lakes are area data features.

Each feature is made up of lines with various attributes such as line attributes which are directly represented as lines; area attributes which are lines that describe the boundary of a feature; degenerate line attributes which are lines with no length; and point attributes.

For this program, only the lines are extracted from the original DLG files. Each line can be extracted by minor feature codes which are given in Table 2. Examples of minor feature number codes are:

3095 - Intercoastal waterways, under Rivers and Streams
4040 - Marsh/swamp, length < 10 km, under Water Bodies
5001 - Interstate, under Roads and Trails
6030 - National Monument, length of longest dimension > 20 km, under Administrative Boundaries

For further information on these files refer to *USGS, 1987, Digital Line Graphs from 1:2,000,000-Scale Maps--Data Users Guide 3,*.

OPERATION OF THE PROGRAM

To begin the program type GEOMENU. While in the first two menus you may exit by typing 0 (zero). In the first menu you select a Region. If more than one Region is needed you must repeat the program for each Region (combining the Regions is done in ISM). In the second menu you select the type of data. Note that for some of the data types, files either do not exist or more than one file exists for a given Region. If you select one of the non-existent files, you will be asked to make another selection. If more than one file exists, a directory of the files will be shown and you must type the name of the file to be used. After the selections are determined, you are asked to name the final output file. Throughout this section on Operation of the Program the screen output is shown in italics and the user's answer in bold.

FILE NAME IS: DUA2:[GEODATA.CPLAINS]CPLPOLY.DAT

ENTER THE NAME OF THE FINAL OUTPUT FILE : **COPOLT.ANN**

After selecting the Region, data type, and the final output filename, you are asked if you plan to use the map on a **National level**, meaning two or more Regions combined. National level reorients the data from two or more Regions to a common reference point. If you do plan to combine the data of two or more Regions (i.e., at National level), answer "Y" or "y" for yes, or answer "N" or "n" for no. If you answer no and you plan to change the projection, see page 10 for other instructions.

WILL THIS MAP BE USED
ON A NATIONAL LEVEL (Y/N)?: **Y**

The next prompt asks you to **select minor feature code(s)**. For a list of the available minor feature codes see Table 2. To select all of the minor feature codes type 0 (zero). To select specific minor feature codes, type 1 (one). After all the needed minor feature codes have been entered, type 0 (zero).

ENTER 1 TO SELECT A MINOR FEATURE CODE
OR 0 TO GET ALL TYPES OF MINOR
FEATURE CODES : **0**

or

ENTER 1 TO SELECT A MINOR FEATURE CODE
OR 0 TO GET ALL TYPES OF MINOR
FEATURE CODES : **1**

If the answer above was 1,

ENTER A MINOR FEATURE CODE (REFER TO MANUAL)
FOR SELECTION, OR A ZERO TO QUIT: **6024**

ENTER A MINOR FEATURE CODE (REFER TO MANUAL)
FOR SELECTION, OR A ZERO TO QUIT: **6030**

ENTER A MINOR FEATURE CODE (REFER TO MANUAL)
FOR SELECTION, OR A ZERO TO QUIT: **0**

After selecting the minor feature codes you are asked to **select the line type.** This will assign a line type code in the output file. The line types correspond to the codes used in the Interactive Surface Modeling software.

LINE TYPES ARE:
1=SOLID
2=BOLD
3=SHORT DASH
4=MEDIUM DASH
5=LONG DASH
6=MEDIUM/SHORT DASH
7=LONG/SHORT DASH
8=MEDIUM/TWO SHORT DASH
9=LONG/TWO SHORT DASH
10=SOLID HASHED
PLEASE ENTER THE LINE TYPE (1-10): **2**

After the line type is selected, the next screen displays fifteen projection parameters, map registration coordinates, A1 through A4 values (see below), and the center point coordinates of the digitized data. The projection parameters are used if the data are to be converted from the Albers Equal-Area conic projection to a different projection. The map registration coordinates are the four corners of the Region map in longitude and latitude. In some Regions, the actual coordinates are 1° to 2° beyond those displayed on the screen. The A1 through A4 values are used to produce the reoriented data if you responded **yes** to the National level question at the beginning of the program. The center point coordinates are the center points of the Region map. After viewing this information, press return to continue.

WORKING ON CENTRAL PLAINS STATES

THE 15 PROJECTION PARAMETERS ARE:

0.63782064000000D+07	*0.67686579972911D-02*	*0.29030000000000D+08*
0.45030000000000D+08	*-0.96000000000000D+08*	*0.23000000000000D+08*
0.00000000000000D+00	*0.00000000000000D+00*	*0.00000000000000D+00*
0.00000000000000D+00	*0.00000000000000D+00*	*0.00000000000000D+00*
0.00000000000000D+00	*0.00000000000000D+00*	*0.00000000000000D+00*

THE COORDINATES OF THE FOUR CORNERS ARE:

-108.00000 37.00000
-108.00000 43.00000
-95.00000 43.00000
-95.00000 37.00000

A1 - A4 VALUES USED FOR REORIENTATION ARE:

0.507150487080000D+02 0.293839363020000D+01
-0.464103710530000D+06 0.191890622940000D+07

CENTER POINT COORDINATES ARE:

LONGITUDE= -101.50000
LATITUDE= 40.00000

HIT RETURN TO CONTINUE

Next, you may select either a window or the entire mapped area, for retrieval. To select the entire area type 0 (zero); to select a window, type the minimum longitude, maximum longitude, minimum latitude, and maximum latitude in decimal degrees. The longitude must be negative because the data is in the western hemisphere; the latitude must be positive because the data is in the northern hemisphere. The minimum longitude must be less than the maximum longitude (example - if the minimum longitude is -125.0, then the maximum longitude must be greater than -125.0, such as -120.0).

ENTER MINIMUM X (LONGITUDE) VALUE IN DEGREES DECIMAL
OR 0 FOR ENTIRE REGION: **0**

OR

ENTER MINIMUM X (LONGITUDE) VALUE IN DEGREES DECIMAL
OR 0 FOR ENTIRE REGION: **-108.0**
ENTER MAXIMUM X (LONGITUDE) VALUE IN DEGREES DECIMAL **-103.0**
ENTER MINIMUM Y (LATITUDE) VALUE IN DEGREES DECIMAL **37.0**
ENTER MAXIMUM Y (LATITUDE) VALUE IN DEGREES DECIMAL **43.0**

If you have selected a window, or portion of the Region, answer "Y" or "y" to display the line count for that window and also the status relative to the window of each line in the Region file; "N" or "n" suppresses the display. By displaying the status of each line number, you are able to tell how far along the retrieval is; however,

displaying the status slows down the execution of the program. The next screen displays parameters used in the original Region data. Press return to continue.

DO YOU WANT TO DISPLAY THE LINE COUNT?: (Y or N) **N**

INITIALIZATION PARAMETERS (ALBERS EQUAL-AREA CONIC PROJECTION)
SEMI-MAJOR AXIS OF ELLIPSOID = 6378206.40 METERS
ECCENTRICITY SQUARED = 0.006768658
LATITUDE OF 1ST ST. PARALLEL = 29 30 0.000
LATITUDE OF 2ND ST. PARALLEL = 45 30 0.000
LONGITUDE OF ORIGIN = -101 30 0.000
LATITUDE OF ORIGIN = 40 0 0.000
FALSE EASTING = 0.00 METERS
FALSE NORTHING = 0.00 METERS
X(1) IN ALBERS EQUAL-AREA = -11271.8740717
Y(1) IN ALBERS EQUAL-AREA = -6232.7592579
X(2) IN ALBERS EQUAL-AREA = -2394.3561140
Y(2) IN ALBERS EQUAL-AREA = 6627.5530082
HIT RETURN TO CONTINUE

The next display gives data type, total number of data lines for the Region, and the number of data lines included in the final output file.

DATA TYPE IS ADMIN BOUNDARIES WITH 454 LINES
FINISHED, 308 LINES INCLUDED

The GeoData at a scale of 1:2,000,000 are in Albers Equal-Area conic projection. To change the projection, type "Y" or "y" at the prompt. Type "N" or "n" to retain the Albers Equal-Area conic projection.

WOULD YOU LIKE TO CHANGE FROM ALBERS EQUAL-AREA CONIC TO ANOTHER PROJECTION (Y/N)? **N**

If you change the projection, you are asked to select the number of the desired projection from the menu displayed. Refer to Table 3 for the projection menu. If you wish to change the standard parallels, central meridian, origin of projection, false easting, or false northing you must continue by answering "Y" or "y". If you do not continue then the default values used for the output file are shown on page 8.

The output units of the data must be entered. The unit options are ground meters, feet, kilometers, and miles. The output units chosen will be the same units you will use with ISM. If the projection you select is Universal Transverse Mercator (UTM), you must enter the appropriate UTM zone code. See Table 4. If the projection chosen is State Plane Coordinates, you must enter the appropriate State plane zone

code (additional menus not shown here, appear for the entry of the codes). See Table 5. Next select the major area in which the data is located.

0)METERS
1)FEET
2)KILOMETERS
3)MILES

ENTER UNIT CHOICES (0,1,2 OR 3): **0**

IN WHAT MAJOR AREA IS THE ANNOTATION FILE FROM:

1=CONTINENTAL UNITED STATES
2=HAWAIIAN ISLANDS
3=ALASKA

ENTER THE MAJOR AREA (1,2,OR 3): 1

If your answered yes to the first question of using the data on a National Level (page 5), default values are used for the first and second standard parallel, longitude of central meridian, latitude of origin of projection, and false easting and false northing at the origin. If you answered no, you are prompted for these values and you can use the values shown below for the appropriate area of your map.

	Cont. U.S.	Alaska	Hawaii
1st Standard Parallel	29.5°	55.0°	8.0°
2nd Standard Parallel	45.5°	65.0°	18.0°
Longitude of central meridian	-96.0°	-154.0°	-157.0°
Latitude of origin of projection	23.0°	5.0°	3.0°
False easting at central meridian	0.0°	0.0°	0.0°
False northing at origin	0.0°	0.0°	0.0°

For further information on each of these values, refer to *Map Projections used by the U.S. Geological Survey* by John Synder, USGS Bulletin 1532, 1983.

Additional parameters that are used in the projection may be changed by answering "Y" or "y". A total of fifteen different parameters for each projection are used. If you wish to change the standard parallels, central meridian, or origin of projection you will need to change the values at this point. As an example for the projections of Albers Conical Equal-Area and Lambert Conformal Conic change parameter 3 for a new value of first standard parallel, parameter 4 for a new value of second standard parallel, parameter 5 for a new value of central meridian, and parameter 6 for a new value of origin of projection. For further information on the parameters, refer to the *Computer documentation - General Cartographic Transformation Package* by the U.S. Geological Survey.

WOULD YOU LIKE TO CHANGE ANY OF THE PARAMETERS OF THE NUMBER 11 PROJECTION (Y/N): **N**

INITIALIZATION PARAMETERS (LAMBERT AZIMUTHAL EQUAL-AREA PROJECTION)
RADIUS OF SPHERE = 6378206.40 METERS
LONGITUDE OF CENTER = - 96 0 0.000
LATITUDE OF CENTER = 37 30 0.000
FALSE EASTING = 0.00 METERS
FALSE NORTHING = 0.00 METERS

When the retrieval is complete, the total number of lines included are displayed.

CONVERSION IS COMPLETED.
CONVERTED 345 LINES

JOB COMPLETED

APPENDIX

To install the program GEOMENU (and the included GEOMAPS program, see below), copy all the files contained on the diskette to your VAX system. Next assign a symbol for the users to run the program; i.e. to use the symbol GEOMENU, if installed on the disk DRA3 in the directory USER, add the line GEOMENU:==@DRA3:[USER]GEOMENU in the LOGIN.COM file. If this is not possible run the program by typing @GEOMENU from within the directory you have installed the file.

The following files are used:

DCL Files	Description
GEOMENU.COM	command file which determines the input file and runs the GEOMAPS digital line graph data retrieval program
PAGE.COM	command file used in GEOMENU.COM to clear the screen
PARAM.DAT	contains the default values of the parameters used to change the geographic projection

FORTRAN Files	Description
GEOMAPS.FOR	main program which performs the retrieval and creates the final output file
GEOMAPS.EXE	executable file of GEOMAPS.FOR
GCTP.FOR	source for subroutines called from GEOMAPS.FOR, converts data to a different projection
GCTP.OBJ	object code for file GCTP.FOR

The naming of the input digital line graph data is consistent for all Regions and data types. In the command file GEOMENU.COM the disk, subdirectory, and data files are determined by the answers supplied by the user to the first two menus. Within the file the following variables are used to determine the input file; the variable GDDSK is the disk which contains the data file; the variable GDDIR is the top directory the data file is in; the SUBDIR variable is the subdirectory the data file is in; the variable GDRGN is the prefix for the Region of the file; and the variable DATATYPE is the type of data.

REFERENCES CITED

Dynamic Graphics, Inc., 1988, Interactive Surface Modeling User's Guide: Dynamic Graphics, Inc., 491 p. Available from Dynamic Graphics, Inc., 2855 Telegraph Avenue, Suite 405, Berkeley, California 94705, (415)845-8180.

Snyder, J.P., 1983, Map projections used by the U.S. Geological Survey: U.S. Geological Survey Bulletin 1532 [Second edition], 313 p.

U.S. Geological Survey, 1981, Computer documentation- General cartographic transformation package: Reston, Va., U.S. Geological Survey, 60 p. Available from U.S. Geological Survey, Earth Science Information Center, 507 National Center, Room 1-C-107, 12201 Sunrise Valley Drive, Reston, Virginia 22092, (703)648-5963.

U.S. Geological Survey. 1987, Digital line graphs from 1:2,000,000 - scale maps -- Data users guide 3: Reston, Va., U.S. Geological Survey, 71 p. Available from USGS Books and Reports Sales, Federal Center, Box 25425, Denver, Colorado 80225, (303)236-7476.

U.S. Geological Survey, 1970, The National Atlas of the United States of America: Washington, D.C., U.S. Geological Survey, 417 p.

Table 1 -- Listing of regions and types of data

GEODATA REGION MENU

1 - ALEUTIAN ISLANDS
2 - HAWAIIAN ISLANDS
3 - CENTRAL ALASKA
4 - NORTHERN ALASKA
5 - SOUTH EASTERN ALASKA
6 - SOUTH WESTERN ALASKA
7 - ARIZONA AND NEW MEXICO
8 - CENTRAL MISSISSIPPI VALLEY STATES (IL,IN,IA,KY,MO)
9 - CENTRAL PACIFIC STATES (CA-central,NV,UT)
10 - CENTRAL PLAINS STATES (CO,KS,NE)
11 - FLORIDA
12 - MID ATLANTIC STATES (CT,DE,MD,MA,NJ,OH,PA,RI,VA,DC,WV)
13 - NORTHERN GREAT LAKES STATES (MI,MN,WI)
14 - NORTH EASTERN STATES (CT,ME,MA,NH,NY,RI,VT)
15 - NORTHERN PLAINS STATES(MT-eastern,ND,SD,WY)
16 - NORTH WESTERN STATES (CA-northern,ID,MT-western,OR,WA)
17 - SOUTHERN CALIFORNIA
18 - SOUTH MISSISSIPPI VALLEY STATES (AL,AR,LA,MS,TN,TX-eastern)
19 - SOUTH EASTERN STATES (GA,NC,SC)
20 - SOUTHERN PLAINS STATES (OK,TX-northern)
21 - SOUTHERN TEXAS
0 - EXIT

DATA TYPE MENU

1 - ADMINISTRATIVE BOUNDARIES
2 - CULTURAL FEATURES
3 - POLITICAL BOUNDARIES
4 - ROADS AND TRAILS
5 - STREAMS
6 - WATER BODIES
7 - RAILROADS (DOES NOT EXIST FOR ALEUTIANS AND SOUTHEAST ALASKA)
8 - HYPSOGRAPHY (ONLY FOR THE REGIONS OF ARIZONA AND NEW MEXICO, NORTHERN PLAINS, CENTRAL PLAINS, NORTHWEST STATES, NORTHERN ALASKA)
0 - EXIT

Table 2 -- Listing of minor feature codes

Rivers and Streams

3001 River/stream (double line, shoreline)
3002 River/stream (double line, centerline)
3003* River/stream (single line), perennial, length <20 km, or <12 mi
3004 River/stream (single line), perennial, length 20-<30 km, or 12-<19 mi
3005 River/stream (single line), perennial, length 30-<40 km, or 19-<25 mi
3006 River/stream (single line), perennial, length 40-<50 km, or 25-<31 mi
3007 River/stream (single line), perennial, length 50-<60 km, or 31-<37 mi
3008 River/stream (single line), perennial, length 60-<80 km, or 34-<50 mi
3009 River/stream (single line), perennial, length 80-<100 km, or 50-<62 mi
3010 River/stream (single line), perennial, length 100-<125 km, or 62-<78 mi
3011 River/stream (single line), perennial, length 125-<150 km, or 78-<93 mi
3012 River/stream (single line), perennial, length 150-<200 km, or 93-<124 mi
3013 River/stream (single line), perennial, length 200-<250 km, or 124-<155 mi
3014 River/stream (single line), perennial, length 250-<300 km, or 155-<186 mi
3015 River/stream (single line), perennial, length 300-<350 km, or 186-<217 mi
3016 River/stream (single line), perennial, length 350+ km, or 217+ mi
3017* River/stream (single line), intermittent, length <20 km, or <12 mi
3018 River/stream (single line), intermittent, length 20-<30 km, or 12-<19 mi
3019 River/stream (single line), intermittent, length 30-<40 km, or 19-<25 mi
3020 River/stream (single line), intermittent, length 40-<50 km, or 25-<31 mi
3021 River/stream (single line), intermittent, length 50-<60 km, or 31-<37 mi
3022 River/stream (single line), intermittent, length 60-<80 km, or 37-<50 mi
3023 River/stream (single line), intermittent, length 80-<100 km, or 50-<62 mi
3024 River/stream (single line), intermittent, length 100-<125 km, or 62-<78 mi
3025 River/stream (single line), intermittent, length 125-<150 km, or 78-<93 mi
3026 River/stream (single line), intermittent, length 150-<200 km, or 93-<124 mi
3027 River/stream (single line), intermittent, length 200-<250 km, or 124-<155 mi
3028 River/stream (single line), intermittent, length 250-<300 km, or 155-<186 mi
3029 River/stream (single line), intermittent, length 300-<350 km, or 186-<217 mi
3030 River/stream (single line), intermittent, length 350+ km, or 217+ mi
3035* River/stream, centerline in water body, perennial, length <2 km, or <1 mi
3036 River/stream, centerline in water body, perennial, length 2-<4 km, or 1-<2 mi
3037 River/stream, centerline in water body, perennial, length 4-<6 km, or 2-<4 mi
3038 River/stream, centerline in water body, perennial, length 6-<8 km, or 4-<5 mi
3039 River/stream, centerline in water body, perennial, length 8-<10 km, or 5-<6 mi
3040 River/stream, centerline in water body, perennial, length 10-<15 km, or 6-<9 mi
3041 River/stream, centerline in water body, perennial, length 15-<20 km, or 90-12 mi
3042 River/stream, centerline in water body, perennial, length 20-<25 km, or 12-<16 mi
3043 River/stream, centerline in water body, perennial, length 25-<30 km, or 16-<19 mi
3044 River/stream, centerline in water body, perennial, length 30-<40 km, or 19-<25 mi
3045 River/stream, centerline in water body, perennial, length 40-<50 km, or 25-<31 mi
3046 River/stream, centerline in water body, perennial, length 50-<60 km, or 31-<37 mi
3047 River/stream, centerline in water body, perennial, length 60-<80 km, or 37-<50 mi
3048 River/stream, centerline in water body, perennial, length 80+ km, or 50+ mi
3050 River/stream, centerline in water body, intermittent, length <2 km, or <1 mi
3051 River/stream, centerline in water body, intermittent, length 2-<4 km, or 1-<2 mi
3052 River/stream, centerline in water body, intermittent, length 4-<6 km, or 2-<4 mi
3053 River/stream, centerline in water body, intermittent, length 5-<8 km, or 4-<5 mi
3054 River/stream, centerline in water body, intermittent, length 8-<10 km, or 5-<6 mi
3055 River/stream, centerline in water body, intermittent, length 10-<15 km, or 5-<9 mi

Table 2 -- continued

3056 River/stream, centerline in water body, intermittent, length 15-<20 km, or 9-<12 mi
3057 River/stream, centerline in water body, intermittent, length 20-<25 km, or 12-<16 mi
3058 River/stream, centerline in water body, intermittent, length 25-<30 km, or 16-<19 mi
3059 River/stream, centerline in water body, intermittent, length 30+ km, or 19+ mi
3060 Braided stream, average width of braid 6+, km, or 4+ mi
3061 Braided stream, average width of braid 0-<2 km, or 0-<1 mi
3062 Braided stream, average width of braid 2-<4 km, or 1-<2 mi
3063 Braided stream, average width of braid 4-<6 km, or 2-<4 mi
3070* Canal, navigable, length <1 km, or <1 mi
3071 Canal, navigable, length 1-<10 km, or 1-<6 mi
3072 Canal, navigable, length 10-<20 km, or 6-<12 mi
3073 Canal, navigable, length 20-<40 km, or 12-<25 mi
3074 Canal, navigable, length 40-<60 km, or 25-<37 mi
3075 Canal, navigable, length 60-<80 km, or 37-<50 mi
3076 Canal, navigable, length 80+ km, or 50+ mi
3077 Canal, other, length <1 km, or <1 mi
3078 Canal, other, length 1-<10 km, or 1-<6 mi
3079 Canal, other, length 10-<20 km, or 6-<12 mi
3080 Canal, other, length 20-<40 km, or 12-<25 mi
3081 Canal, other, length 40-<60 km, or 25-<37 mi
3082 Canal, other, length 60-<80 km, or 37-<50 mi
3083 Canal, other, length 80+ km, or 50+ mi
3086 Ditch (perennial)
3095 Intercoastal waterway

Water Bodies

4000 U.S. coastline including Great Lakes
4001* Perennial water body, lake, reservoir, and island, length <2 km, or <1 mi
4002 Perennial water body, lake, reservoir, and island, length 2-<4 km, or 1-<2 mi
4003 Perennial water body, lake, reservoir, and island, length 4-<6 km, or 2-<4 mi
4004 Perennial water body, lake, reservoir, and island, length 6-<8 km, or 4-<5 mi4005 Perennial water body, lake, reservoir, and island, length 8-<10 km, or 5-<6 mi
4006 Perennial water body, lake, reservoir, and island, length 10-<15 km, or 5-<9 mi
4007 Perennial water body, lake, reservoir, and island, length 15-<20 km, or -<12 mi
4008 Perennial water body, lake, reservoir, and island, length 20-<25 km, or 12-<16 mi
4009 Perennial water body, lake, reservoir, and island, length 25-<30 km, or 16-<19 mi
4010 Perennial water body, lake, reservoir, and island, length 30-<40 km, or 19-<25 mi
4011 Perennial water body, lake, reservoir, and island, length 40-<50 km, or 25-<31 mi
4012 Perennial water body, lake, reservoir, and island, length 50-<60 km, or 31-<37 mi
4013 Perennial water body, lake, reservoir, and island, length 60-<80 km, or 37-<50 mi
4014 Perennial water body, lake, reservoir, and island, length 80+ km, or 50+ mi
4021* Intermittent water body, lake or reservoir, length <2 km, or <1 mi
4022 Intermittent water body, lake or reservoir, length 2-<4 km, or 1-<2 mi
4023 Intermittent water body, lake or reservoir, length 4-<6 km, or 2-<4 mi
4024 Intermittent water body, lake or reservoir, length 6-<8 km, or 4-<5 mi
4025 Intermittent water body, lake or reservoir, length 8-<10 km, or 5-<6 mi
4026 Intermittent water body, lake or reservoir, length 10-<15 km, or 5-<9 mi
4027 Intermittent water body, lake or reservoir, length 15-<20 km, or 9-<12 mi
4028 Intermittent water body, lake or reservoir, length 20-<25 km, or 12-<16 mi
4029 Intermittent water body, lake or reservoir, length 25-<30 km, or 16-<19 mi
4030 Intermittent water body, lake or reservoir, length 30-<40 km, or 19-<25 mi
4031 Intermittent water body, lake or reservoir, length 40-<50 km, or 25-<31 mi
4032 Intermittent water body, lake or reservoir, length 50-<60 km, or 31-<37 mi

Table 2 -- continued

4033 Intermittent water body, lake or reservoir, length 60-<80 km, or 37-<50 mi
4034 Intermittent water body, lake or reservoir, length 80+ km, or 50+ mi
4040* Marsh/swamp and salt marsh, length <10 km, or <6 mi
4041 Marsh/swamp and salt marsh, length 10-<17 km, or 6-<11 mi
4042 Marsh/swamp and salt marsh, length 17-<25 km, or 11-<16 mi
4043 Marsh/swamp and salt marsh, length 25-<37 km, or 16-<23 mi
4044 Marsh/swamp and salt marsh, length 37-<50 km, or 23-<31 mi
4045 Marsh/swamp and salt marsh, length 50+ km, or 31+ mi
4050 Dry lake and alkali flat, length <2 km, or <1 mi
4051 Dry lake and alkali flat, length 2-<4 km, or 1-<2 mi
4052 Dry lake and alkali flat, length 4-<6 km, or 2-<4 mi
4053 Dry lake and alkali flat, length 6+ km, or 4+ mi
4060* Glacier, length <4 km, or <2 mi
4061 Glacier, length 4-<10 km, or 2-<6 mi
4062 Glacier, length 10-<17 km, or 6-<11 mi
4063 Glacier, length 17-<25 km, or 11-<16 mi
4064 Glacier, length 25-<37 km, or 16-<23 mi
4065 Glacier, length 37-<50 km, or 23-<31 mi
4066 Glacier, length 50+ km, or 31+ mi

Roads and Trails

5001 Interstate
5002 Major U.S., limited access, divided
5003 Major U.S., limited access, divided
5004 Major U.S., limited access, divided
5005 Toll road[1]
5006 Interstate connector[1]
5007 Limited access, divided connector[1]
5008 Toll connector[1]
5009 Interstate, under construction
5010 Interstate, proposed
5013 Minor U.S., limited access, 310 km (500 mi) and longer
5014 U.S. non-limited access, 310 km (500 mi) and longer
5015 Minor U.S. limited access, less than 310 km (500 mi)
5016 U.S. non-limited access, less than 310 km (500 mi)
5017 Other minor U.S. limited access
5018 Other U.S.[2]
5019 Other minor State primary, limited access
5020 Other State primary
5021 Minor U.S. parallel, within 10 km (6 mi)
5022 U.S. parallel, within 10 km (6 mi)
5023 Minor State parallel, within 10 km (6 mi)
5024 State parallel, within 10 km (6 mi)
5028 State secondary (all weather, hard surface)
5031 Light duty (all weather, hard surface)
5041 Unimproved (fair or dry weather)
5061 Tunnel, road
5062 Ferry, auto

Railroads

5071 Class 1, category A, main line
5072 Class 1, category B, main line

Table 2 -- continued

5073 Class 1, category A, branch line
5074 Class 1, category B, branch line
5075 Other railroad
5078 Tunnel, railroad
5079 Ferry, railroad
5080 Class 1, category A, main-line connector[1]

Political Boundaries

6000 International treaty line
6001 National (land)
6002 National (water)
6005 State/provincial (land)
6006 State/provincial (water)
6009 County, parish, Alaskan borough, or large independent city (land)
6010 County, parish, Alaskan borough, or large independent city (water)
6011 Corporate limit (1 million and over population)
6012 Corporate limit (1/2 to less than 1 million population)
6014 Small independent city (usually not shown as a county)

Administrative Boundaries

6021 National park, length at longest dimension 0-<2 km, or 0-<1 mi
6022 National park, length at longest dimension 2-<8 km, or 1-<5 mi
6023 National park, length at longest dimension 8-<14 km, or 5-<9 mi
6024 National park, length at longest dimension 4-<20 km, or 9-<12 mi
6025 National park, length at longest dimension 20+ km, or 12+ mi
6026 National monument, length at longest dimension 0-<2 km, or 0-<1 mi
6027 National monument, length at longest dimension 2-<8 km, or 1-<5 mi
6028 National monument, length at longest dimension 8-<14 km, or 5-<9 mi
6029 National monument, length at longest dimension 14-<20 km, or 12+ mi
6030 National monument, length at longest dimension 20+ km, or 12+ mi
6031 National seashore or lakeshore, length at longest dimension 0-<2 km, or 0-<1 mi
6032 National seashore or lakeshore, length at longest dimension 2-<8 km, or 1-<5 mi
6033 National seashore or lakeshore, length at longest dimension 8-<14 km, or 5-<9 mi
6034 National seashore or lakeshore, length at longest dimension 4-<20 km, or 9-<12 mi
6035 National seashore or lakeshore, length at longest dimension 20+ km, or 12+ mi
6036 National recreation area, length at longest dimension 0-<2 km, or 0-<1 mi
6037 National recreation area, length at longest dimension 2-<8 km, or 1-<5 mi
6038 National recreation area, length at longest dimension 8-<14 km, or 5-<9 mi
6039 National recreation area, length at longest dimension 14-<20 km, or 9-<12 mi
6040 National recreation area, length at longest dimension 20+ km, or 12+ mi
6041 National wilderness area, length at longest dimension 0-<2 km, or 0-<1 mi
6042 National wilderness area, length at longest dimension 2-<8 km, or 1-<5 mi
6043 National wilderness area, length at longest dimension 8-<14 km, or 5-<9 mi
6044 National wilderness area, length at longest dimension 14-<20 km, or 9-<12 mi
6045 National wilderness area, length at longest dimension 20+ km, or 12+ mi
6051 National forest, length at longest dimension 0-<2 km, or 0-<mi
6052 National forest, length at longest dimension 2-<8 km, or 1-<5 mi
6053 National forest, length at longest dimension 8-<14 km, or 5-<9 mi
6054 National forest, length at longest dimension 14-<20 km, or 9-<12 mi
6055 National forest, length at longest dimension 20+ km, or 12+ mi
6056 National grassland, length at longest dimension 0-<2 km, or 0-<1 mi

Table 2 -- continued

6057 National grassland, length at longest dimension 2-<8 km, or 1-<5 mi
6058 National grassland, length at longest dimension 8-<14 km, or 5-<9 mi
6059 National grassland, length at longest dimension 14-<20 km, or 9-<12 mi
6060 National grassland, length at longest dimension 20+ km, or 12+ mi
6061 National wildlife refuge, length at longest dimension 0-<2 km, or 0-<1 mi
6062 National wildlife refuge, length at longest dimension 2-<8 km, or 1-<5 mi
6063 National wildlife refuge, length at longest dimension 8-<14 km, or 5-<9 mi
6064 National wildlife refuge, length at longest dimension 14-<20 km, or 9-<12 mi
6065 National wildlife refuge, length at longest dimension 20+ km, or 12+ mi
6066 Federal Indian reservation, length at longest dimension 0-<2 km, or 0-<1 mi
6067 Federal Indian reservation, length at longest dimension 2-<8 km, or 1-<5 mi
6068 Federal Indian reservation, length at longest dimension 8-<14 km, or 5-<9 mi
6069 Federal Indian reservation, length at longest dimension 14-<20 km, or 9-<12 mi
6070 Federal Indian reservation, length at longest dimension 20+ km, or 12+ mi
6081 Federal Military reservation, areas of 1-<405 ha, or 1-<1000 acres
6082 Federal Military reservation, areas of 405+ ha, or 1000+ acres
6087 National park, closure line
6088 National monument, closure line
6089 National seashore or lakeshore, closure line
6090 National recreation area, closure line
6091 National wilderness area, closure line
6092 National forest, closure line
6093 National grassland, closure line
6094 National wildlife refuge, closure line
6095 Indian reservation, closure line
6097 Military reservation, closure line

Cultural Features

7001 Commercial airfield
7002 Military airfield
7003 Alaska pipeline

* This code was only used in the Alaskan drainage files.

1 Redundant entry used to provide additional information.

2 U.S. business, alternate, bypass, and routes paralleling U.S. or Interstate routes within 10 to 25 km.

Table 3 -- Listing of map projections

PROJECTION TYPES:

0=GEOGRAPHIC
1=UNIVERSAL TRANSVERSE MERCATOR
2=STATE PLANE COORDINATES
3=ALBERS CONICAL EQUAL AREA
4=LAMBERT CONFORMAL CONIC
5=MERCATOR
6=POLAR STEROGRAPHIC
7=POLYCONIC
8=EQUIDISTANT CONIC
9=TRANSVERSE MERCATOR
10=STEREOGRAPHIC
11=LAMBERT AZIMUTHAL EQUAL AREA
12=AZIMUTHAL EQUIDISTANT
13=GNOMIC
14=ORTHOGRAPHIC
15=GENERAL VERTICAL NEAR-SIDE
16=SINUSOIDAL
17=EQUIRECTANGULAR
18=MILLER CYLINDRICAL
19=VAN DER GRINTEN
20=OBLIQUE MERCATOR

Table 4 -- Listing of UTM zones, central meridians, and longitude ranges
C.M. = Central Meridian

ZONE	C.M.	RANGE	ZONE	C.M.	RANGE
1	177W	180W-174W	31	3E	0-6E
2	171W	174W-168W	32	9E	6E-12E
3	165W	168W-162W	33	15E	12E-18E
4	159W	162W-156W	34	21E	18E-24E
5	153W	156W-150W	35	27E	24E-30E
6	147W	150W-144W	36	33E	30E-36E
7	141W	144W-138W	37	39E	36E-42E
8	135W	138W-132W	38	45E	42E-48E
9	129W	132W-126W	39	51E	48E-54E
10	123W	126W-120W	40	57E	54E-60E
11	117W	120W-114W	41	63E	60E-66E
12	111W	114W-108W	42	69E	66E-72E
13	105W	108W-102W	43	75E	72E-78E
14	99W	102W-96W	44	81E	78E-84E
15	93W	96W-90W	45	87E	84E-90E
16	87W	90W-84W	46	93E	90E-96E
17	81W	84W-78W	47	99E	96E-102E
18	75W	78W-72W	48	105E	102E-108E
19	69W	72W-66W	49	111E	108E-114E
20	63W	66W-60W	50	117E	114E-120E
21	57W	60W-54W	51	123E	120E-126E
22	51W	54W-48W	52	129E	126E-132E
23	45W	48W-42W	53	135E	132E-138E
24	39W	42W-36W	54	141E	138E-144E
25	33W	36W-30W	55	147E	144E-150E
26	27W	30W-24W	56	153E	150E-156E
27	21W	24W-18W	57	159E	156E-162E
28	15W	18W-12W	58	165E	162E-168E
29	9W	12W-6W	59	171E	168E-174E
30	3W	6W-0	60	177E	174E-180E

Table 5 -- Listing of State plane coordinate zone codes

STATE	ZONE NAME	TYPE	CODE NO.
Alabama	East	Tr Merc	3101
	West	Tr Merc	3126
Alaska	1	Oblique	6101
	2	Tr Merc	6126
	3	Tr Merc	6151
	4	Tr Merc	6176
	5	Tr Merc	6201
	6	Tr Merc	6226
	7	Tr Merc	6251
	8	Tr Merc	6276
	9	Tr Merc	6301
	10	Lambert	6326
American Samoa	-----	Lambert	------
Arizona	East	Tr Merc	3151
	Central	Tr Merc	3176
	West	Tr Merc	3201
Arkansas	North	Lambert	3226
	South	Lambert	3251
California	I	Lambert	3276
	II	Lambert	3301
	III	Lambert	3326
	IV	Lambert	3351
	V	Lambert	3376
	VI	Lambert	3401
	VII	Lambert	3426
Colorado	North	Lambert	3451
	Central	Lambert	3476
	South	Lambert	3501
Connecticut	----	Lambert	3526
Delaware	----	Tr Merc	3551
District of Columbia	Use Maryland		
Florida	East	Tr Merc	3601
	West	Tr Merc	3626
	North	Lambert	3576
Georgia	East	Tr Merc	3651
	West	Tr Merc	3676
Hawaii	1	Tr Merc	5876
	2	Tr Merc	5901
	3	Tr Merc	5926
	4	Tr Merc	5951
	5	Tr Merc	5976
Idaho	East	Tr Merc	3701
	Central	Tr Merc	3726
	West	Tr Merc	3751
Illinois	East	Tr Merc	3776

Table 5 -- continued

STATE	ZONE NAME	TYPE	CODE NO.
	West	Tr Merc	3801
Indiana	East	Tr Merc	3826
	West	Tr Merc	3851
Iowa	North	Lambert	3876
	South	Lambert	3901
Kansas	North	Lambert	3926
	South	Lambert	3951
Kentucky	North	Lambert	3976
	South	Lambert	4001
Louisiana	North	Lambert	4026
	South	Lambert	4051
	Offshore	Lambert	----
Maine	East	Tr Merc	4076
	West	Tr Merc	4101
Maryland	----	Lambert	4126
Massachusetts	Mainland	Lambert	4151
	Island	Lambert	4176
Michigan (tr merc)	East	Tr Merc	4201
	Central	Tr Merc	4226
	West	Tr Merc	4251
Michigan (lambert)	North	Lambert	6351
	Central	Lambert	6376
	South	Lambert	6401
Minnesota	North	Lambert	4276
	Central	Lambert	4301
	South	Lambert	4326
MIssissippi	East	Tr Merc	4351
	West	Tr Merc	4376
MIssouri	East	Tr Merc	4401
	Central	Tr Merc	4426
	West	Tr Merc	4451
Montana	North	Lambert	4476
	Central	Lambert	4501
	South	Lambert	4526
Nebraska	North	Lambert	4551
	South	Lambert	4576
Nevada	East	Tr Merc	4601
	Central	Tr Merc	4626
	West	Tr Merc	4651
New Hampshire	----	Tr Merc	4676
New Jersey	----	Tr Merc	4701
New Mexico	East	Tr Merc	4726
	Central	Tr Merc	4751
	West	Tr Merc	4776
New York	East	Tr Merc	4801

Table 5 -- continued

STATE	ZONE NAME	TYPE	CODE NO.
	Central	Tr Merc	4826
	West	Tr Merc	4851
	Long Island	Lambert	4876
North Carolina	----	Lambert	4901
North Dakota	North	Lambert	4926
	South	Lambert	4951
Ohio	North	Lambert	4976
	South	Lambert	5001
Oklahoma	North	Lambert	5026
	South	Lambert	5051
Oregon	North	Lambert	5076
	South	Lambert	5101
Pennsylvania	North	Lambert	5126
	South	Lambert	5151
Rhode Island	----	Tr Merc	5176
South Carolina	North	Lambert	5201
	South	Lambert	5226
South Dakota	North	Lambert	5251
	South	Lambert	5276
Tennesee	----	Lambert	5301
Texas	North	Lambert	5326
	North Central	Lambert	5351
	Central	Lambert	5376
	South Central	Lambert	5401
	South	Lambert	5426
Utah	North	Lambert	5451
	Central	Lambert	5476
	South	Lambert	5501
Vermont	----	Tr Merc	5526
Virginia	North	Lambert	5551
	South	Lambert	5576
Washington	North	Lambert	5601
	South	Lambert	5626
West Virginia	North	Lambert	5651
	South	Lambert	5676
Wisconsin	North	Lambert	5701
	Central	Lambert	5726
	South	Lambert	5751
Wyoming	East	Tr Merc	5776
	East Central	Tr Merc	5801
	West Central	Tr Merc	5826
	West	Tr Merc	5851
Puerto Rico	----	Lambert	6001
Virgin Islands	----	Lambert	6001
St. Croix	----	Lambert	6026