USDA Service Center Agencies
Geospatial Data Management Team
Data Management Plan For

Elevation Contour Data

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I. Purpose and Scope (business case)

A. Purpose

The digital elevation contour dataset is one of the many geospatial datasets created and managed by the National Cartography and Geospatial Center (NCGC) of the USDA. Contours are series of lines which connect points with equal elevation or height which is the most efficient illustration of ground surface topography and relief. Traditionally, contour lines were printed on a map to show the elevation difference for a given region or area. Later, those contour maps were scanned and processed into Digital Raster Graphics (DRG) for ease of use, transfer, manipulation and update. The digital contour dataset is the most recent geo-information products produced by the NCGC based on the USGS 10 meter and 30 meter National Elevation Dataset (NED).

Digital contour data could be used in many ways for watershed management, soil and water conversation practices, environment and water quality improvement/management, watershed delineation, hydrologic analysis, and many other uses. It serves great needs for engineers, architects, planners, natural resource managers/users/owners and USDA field service agencies.

One of the important practices of soil and water conservation or soil erosion control is to build terraces on sloped land. For best conservation results and its own and lower land safety and durability, terraces need to be built on the same height or elevation. The contour dataset could serve as a start point in initial planning and design and a great tool in monitoring and guiding of terrace build up. Similar functions could also be implemented for contour buffer zone planning and creation using the contour data.

In watershed management, known the watershed boundary, the stream distribution, and the slope characteristics are important. All those could be easily accomplished using contour data. In comparison to other datasets which could also provide elevation information, such as DEM or NED, the contour dataset is easier to understand for most users and quicker for them to learn how to manipulate for their specific needs since they are already very familiar with tradition contour maps and their usages.

The two examples given above are just a quick peek of numerous usages of contour data in supporting NRCS activities. It is true that users could use NED or DEM data to create contours themselves. However, the knowledge, hardware and associated software needs place many constrains on the user site. Besides, quality, accuracy, precision and consistence might be compromised due to the difference in user's GIS knowledge and hardware/software setup difference. NCGC made an effort to create this dataset for the whole coterminous USA and tried to minimize these short comings and provide a quick and easy contour data source for the direct use of USDA customers.

B. Scope

At the time of this document write-up, NCGC has finished creation of contour data for the whole continental USA. Future plan is to create comparable datasets for Alaska, Hawaii, and other territories of the USA.

II. Acquisition

A. Data Source

1. Producer Information
   a. Name

      Original data used for creating the contour were the USGS 7.5 minute Digital Elevation Dataset (NED). For the most part, 10 meter resolution NED data where used. For regions without 10 meter dataset, 30 meter NED were re-sampled to 10 meter, then used for creating the contour dataset. Hence, the resulting contour dataset was created from combination of original NED10 and re-sampled NED30 datasets.

      The National Cartography and Geospatial Center (NCGC), NRCS of the USDA, created this dataset as an effort to support the needs of USDA customers, such as Field Service Office personal, conservationist and others.

   b. Location of Headquarters

      National Cartography and Geospatial Center
      Natural Resources Conservation Service
      US Department of Agriculture
      501 Felix Street, Building 23
      P. O. Box 6567
      Fort Worth, Texas 76115-0567
      USA

   c. Internet Address

      http://www.ncgc.nrcs.usda.gov/
      http://wms.ftw.nrcs.usda.gov

2. Publisher Information
   a. Name

      Same as producer

   b. Location of Headquarters

      Same as producer

   c. Internet Address

      Same as producer

3. Acquisition Information
   a. Delivery Media

      The source DEM and NED data were on line at NCGC.

   b. Download URL

      None

   c. Projected Data Availability Schedule

B. Standards Information

1. Geospatial Data Standard
   a. Standard Name and Steward Information

      The contour dataset was created based on USGS NED data, which is built upon the most recent applicable standards for geospatial data and metadata. Specifically, the datasets conform with the USGS's National Mapping Program Standards.

   b. Standard Version

      None

   c. Standard URL

      http://gisdata.usgs.gov/Ned/standards.asp

2. Metadata Standard
   a. Standard Name and Steward Information

      Metadata are compliant with:
      Federal Geographic Data Committee (FGDC)
      Content Standard for Digital Geographic Metadata FGDC
      STD-001-1998 Version 2 revised June 1998

   b. Description of Metadata Captured

      The Federal Geographic Data Committee's content standard for digital geospatial metadata (http://www.fgdc.gov/metadata/contstan.html) is used to document the dataset. This implementation will be in place until file specific metadata information for each individual contour file is implemented.
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   c. Metadata Accuracy and Completeness Assessment

      None

C. Acquired Data Structure

1. Geospatial Data Format
   a. Format (raster, vector, etc.)

      The contour data is vector. The contour data was generated from NED raster data. The entire contour dataset is stored in a Microsoft SQL server database as ArcGIS feature class and was created using ESRI technology.

b. Format Name

The contour data is stored in ArcSDE format in a Microsoft SQL database.

c. Data Extent

The contour data are available for the contiguous United States currently. Datasets for Alaska, Hawaii, and other US territories will follow.

d. Horizontal and Vertical Resolution

N/A.

e. Absolute Horizontal and Vertical Accuracy

HORIZONTAL POSITIONAL ACCURACY

Horizontal positional accuracy is based upon the use of USGS NED source quadrangles, which are compiled to meet National Map Accuracy Standards (NMAS). NMAS horizontal accuracy requires at least 90 percent of points tested are within 0.02 inches of the true position. The digital data are estimated to contain a horizontal positional error of less than or equal to 0.003 inches standard error in the two component directions relative to the source quadrangle.

VERTICAL POSITIONAL ACCURACY

Vertical accuracy of the contour dataset was basically same as the NED source data, which is +/- 7 to 15 meters.

f. Nominal Scale

1:24,000.

g. Horizontal and Vertical Datum

The horizontal reference datum is North American Datum of 1983 (NAD83) for the continental USA. The vertical datum is mean sea level.

h. Projection

Geographic.

i. Coordinate Units

Decimal degrees. The Z units could be either in meter or feet.

j. Average Data Set Size

Normally, a 7.5 minute contour file has a size between 20 to 40 megabytes as a shape file.

k. Symbology

None

2. Attribute Data Format
   a. Format Name

      N/A.

   b. Database Size

      N/A.

3. Data Model
   a. Geospatial Data Structure

      ESRI shape file is a proprietary geo-spatial data structure developed by Environmental Systems Research Institute (ESRI) of Redlands, California. For a detailed description of shape file, please see ESRI white paper of ESRI Shapefile Technical Description at:
      http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf

   b. Attribute Data Structure

      N/A.

   c. Database Table Definition

      N/A.

   d. Data Relationship Definition

      N/A

   b. Data Dictionary

      The source data, e.g. the NED data dictionary are at:
      ftp://edcftp.cr.usgs.gov/pub/data/ned/documents/NED_DataDictionary.pdf

      A hypertext version is available at:
      ftp://nmdpow9.er.usgs.gov/public/dem_html/standards_dem.html

D. Policies

1. Restrictions
   a. Use Constraints

      The U.S. Department of Agriculture, Natural Resources Conservation Service, should be acknowledged as the data source in products derived from these data.

      This data set is not designed for use as a primary regulatory tool in permitting or setting decisions, but may be used as a reference source. This is public information and may be interpreted by organizations, agencies, units of government, or others based on needs; however, they are responsible for the appropriate application. Federal, State, or local regulatory bodies are not to reassign to the Natural Resources Conservation Service any authority for the decisions that they make. The Natural Resources Conservation Service will not perform any evaluations of these maps for purposes related solely to State or local regulatory programs.

      Digital data files are periodically updated. Users are responsible for obtaining the latest version of the data.

b. Access Constraints

None

c. Certification Issues
None

2. Maintenance
a. Temporal Information

The contour datasets are periodically updated when enough new NED10 data are available from USGS. Those new NED 10 meter data will be used to replace the re-sampled NED30 dataset and recreate the contour for the area. It is the users responsibility to obtain the latest version of the data.

b. Average Update Cycle

Periodically as enough new NED10 dataset is available from USGS.

E. Acquisition Cost

1. Cooperative Agreement
a. Description of Agreement

None

b. Status of Agreement

None

2. Cost to Acquire Data

FTP is free for electronically available data.

III. Integration

A. Value Added Process

1. Benefit to the Service Center

NCGC created this dataset to make service center's work more productive and efficient by allowing them to direct use the contour data instead of creating them from NED data themselves.

The dataset also provides service centers with a consistent data through out of the USA. The dataset itself was created using mostly 10 meter NED and re-sampled 30 meter NED for the regions currently without 10 meter NED. Hence, the contour dataset should be more detailed and precise than NED30 created contour.

2. Process Model
a. Flow Diagram
None

b. Process Description

- Resample NED30 to 10 meter

- Mosaic thirty-six 7.5 minutes quads to form the 30x30 minutes block for the creation of contour
- Apply a low path filter to the mosaiced NED
- Generate contour for the 30 minute block
- Find those small contour lines from the generated contour and delete them
- Load finished contour data to ArcSDE geodatabase

3. Technical Issues
   a. Tiling

      Contour dataset was originally created on a 30 minute format. Later, the 30 minute block of contour data were appended to each other for a given UTM zone to form a continuous feature class. Because of the use of this scheme, contour dataset could fulfill various tiling needs. However, edge matching might need to be considered when one is working for a region cross the boundary of two adjacent 30 minute block (see details below).

   b. Compression

      None

   c. Scale

      1:24,000.

   d. Tonal Matching

      N/A.

   e. Edge-matching

      The contour dataset was originally produced for each 7.5 minute quadrangle. Edge matching for the adjacent quadrangle was not been performed and there is currently no plan for doing so since there is no known automatic process of doing this. As a result, some small discrepancies may exist where contour lines cross a quadrangle to the adjacent 7.5 minute quadrangle. Users are advised of this difference and may do an edge matching on their own using a GIS package when the area they are working on crosses more than one 7.5 minute block.

4. Quality Control
   a. Procedures

      Visual and manual checks of many individual 30 minute blocks.

   b. Acceptance Criteria

      Line continuity, edge matching, comparison to DRG and hillshade overlay.

5. Data Steward
   a. Name and Organization

      Currently, the data steward for the integrated data is:
      National Cartography and Geospatial Center
      Natural Resources Conservation Service
      US Department of Agriculture

501 Felix Street, Building 23
P. O. Box 6567
Fort Worth, Texas 76115-0567
USA

b. Responsibilities

Storage and access of the data.

B. Integrated Data Structure

1. Geospatial Data Format
   a. Format

      Vector, e.g. contours.

   b. Format Name

      ArcSDE.

   c. Data Extent

      Same as source data.

   d. Horizontal and Vertical Resolution

      Same as source data.

   e. Absolute Horizontal and Vertical Accuracy

      Same as source data.

   f. Nominal Scale

      Same as source data.

   g. Horizontal and Vertical Datum

      Same as source data.

   h. Projection

      Geographic

   i. Coordinate Units

      Decimal degrees.

   j. Symbology

      None.

2. Attribute Data Format
   a. Format Name

      ArcSDE

b. Database Size

N/A.

3. Data Model

a. Geospatial Data Structure

Vector, ESRI ArcSDE in a Microsoft SQL database.

b. Attribute Data Structure

N/A

c. Database Table Definition

N/A

d. Data Relationship Definition

N/A

e. Data Dictionary

N/A

C. Resource Requirements

1. Hardware and Software

This is unknown at this time.

2. Staffing

This is unknown at this time.

D. Integration Cost

1. Hardware and Software

This is unknown at this time.

2. Staffing

This is unknown at this time.

IV. Delivery

A. Specifications

1. Directory Structure

a. Folder Theme Data is Stored In

F:\geodata

2. File Naming Convention

http://www.itc.nrcs.usda.gov/scdm/docs/SPG-GeospatialDataSetFileNamingStandard.pdf

a. List of Theme Files and The File Naming Convention

Shape files:

Poly Files	
map shp	shp file
map dbf	dbf file
map shx	shx file
map sbn	sbn file
map sbx	sbx file

B. User Information

1. Accuracy Assessment

a. Alignment with Other Theme Geospatial Data

The original NED data used for creating this dataset is captured at a scale of 1:24,000. Data acquired at this scale should be considered not sufficiently detailed for the purpose of analysis at large scales. Alignment with other data layers will not be perfect due to the fact that the NED data was originally created at different time and different scales.

b. Content

This contour data should be considered not sufficiently detailed for the purpose of analysis at large scales.

2. Appropriate Uses of the Geospatial Data

a. Display Scale

For a contour map, the original data source scale or smaller, usually 1:24,000.

b. Plot Scale

For the contour map, the original data source scale or smaller, usually 1:24,000.

c. Area Calculations

Area Calculations are as accurate as the source data and capture scale and the algorithm used by ESRI software.

d. Decision Making

The data is as accurate as the source data and capture scale and the algorithm used by ESRI software.

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C. Maintenance and Updating

1. Recommendations and Guidelines

a. Original data location and structure

The integrated database is at NCGC and the data is delivered to the Service Center.

b. Update Cycle

This dataset will be updated periodically depending on the speed of USGS's update of NED10 dataset. Once enough updated NED10 data from USGS are available, the NED30 used for creating the contour for a 30 minute block will be replaced with the

new NED10 and contour for this block will be re-generated and uploaded into the ArcSDE database.

There is also possibility of updating parts of the USA with contours generated using most recent LIDAR data. However, in most part, this is still in the test stage for very limited area and there is no plan for a whole country contour dataset from LIDAR dataset.

c. Availability

Make the updates available as soon as the database is updated.

d. Change Control

This is to be determined.