Lab 3: Topographic map design and construction

Objective:

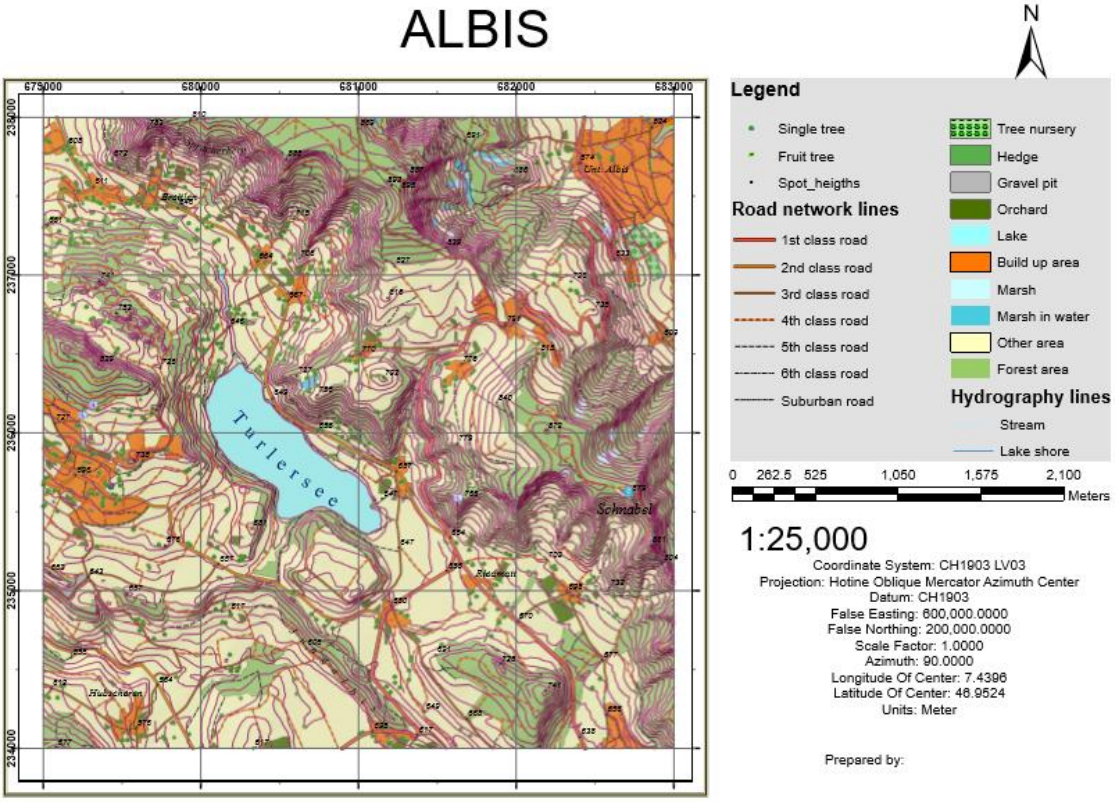
By using the skills you have obtained in previous exercises and applying the theory you have learned in the classes you should be able to design and produce a printed A4 size sheet of a small topographic map at a scale of 1:25,000

You should therefore concentrate your efforts in this exercise on the production of a cartographically well designed map. It is your responsibility to carefully study the task, search through the reference information provided:

the pre-knowledge of GIS;

the on_line help of ArcMap;

Output/Result: 1:25,000 topographic map design and construction



Introduction

Information on the data

The data originate from the Swiss Survey - Federal Office of Topography _ in Wabern, Switzerland (http://www.swisstopo.ch). It covers an area of 4x4km Albis/Türlersee, sheet LK 1111 Albis, corner .

-By: Niraj K.C.

- Coordinates: 679000/238000, 683000/234000.
- The vector data, VECTOR25, are derived from the National Map 1:25,000.
- The data are organized thematically and topologically.
- The data contain three types of geometrical elements "points", _lines_ and "polygons".
- The layer names and attributes of the shape files are explained in the German language. The explanation and translation is available in the appendix of this exercise description. Your map will be in the English language.

Design

Create symbol specifications:

- Design cartographic symbology for all the polygons.
- Design the cartographic line symbols for all the lines in the map: Road network lines, other traffic lines, Hydrography lines, other object lines.
- Design the cartographic point symbols for all the points in the map: Hedges and trees, other object points.
- Symbolise contours, label index contour.

Create text specifications:

- The available .tif image can be used as a guide to place text in the map.
- Each type of text can have a different font and/or different font size and/or colour.

Create a lay-out sketch:

- To design the lay-out, you can take a A4 size sheet of paper and make a sketch of the lay-out of the map sheet.This sketch should show the overall dimensions, colours, text fonts of the elements which you are going to place on the map sheet.
- The map should be printed in colour on an A4 size paper. The lay-out design can be landscape-oriented or portrait-oriented, to be decided by you.

The sheet should contain:

- The map at scale 1:25,000
- A 1000-meter measure grid in the given coordinate system.
- A map legend (English language)
- Title of the map: *Albis*
- Coordinate system: *CH1903+LV3, Oblique Mercator projection, with a false Easting of 2600,000 m and a false Northing of 1200,000 m*
  Origin: *Old Observatory in Bern*
  Scale bar and scale: *1:25,000*

Construction

Symbolize the data:

- Apply the designed symbology for all the polygons
- Apply the designed symbology for all the lines. To create proper road connections, you can make use of *Symbol levels.*

- Apply the designed symbology for all the points.

Height representation:

- Height can be represented in the map by showing (selected) contour lines and spot heights with their height values.
- If there time available, you can create a hill shading to include it in your map: see the last page of this description.

Text placement:

- Place the text in your map: the available Tiff image can be used as a reference for the text placement.
- Select the font, size and colour according to your text specifications.

Lay-out

Page and print setup:

- Select the printer and the page size and page orientation.
- Switch to lay-out view and select in the *Data Frame* Tab of the Data Frame properties a data frame with a fixed extent following the outline of the layer *framemap* (advanced). After that, change the scale to 1:25,000 by dragging a corner of the map to make it larger or smaller. Then, place the map at the correct position on the paper sheet. (This will be demonstrated).

Grid:

- Create a 1000 meter measure grid by following the *Grids and graticule* wizard (*data frame properties*: *Grids tab*.)

Map legend:

- Start the legend wizard (Insert-Legend) and create a legend to explain the symbols in the map. Place the legend at the position defined by your lay-out design. In order to make final adjustments in the legend you can convert the legend to graphics (right-click the legend), then you can ungroup the legend elements in order to edit each individual element.

Scale bar, title and text:

- Create a scale bar for the 1:25,000 scale by using the scale bar selector (Insert-Scale bar)
- Create and place the map title
- Place other text.
-

Export and print the map:

- The final map should be exported to a standardized format which can be read by a printing company.
- Export the map to a .PDF format: Options:
- General: 300 DPI, Format: Destination colourspace: CMYK colours.

- Embed all fonts.
- Print the map on the colour printer and check the result.

Appendix:
Object catalog:
Attribute: Objectval:
PRI25-po All polygons

- Z_baumSch Tree nursery
- Z_gebue Hedge
- Z_Kigrub Gravel pit
- Z_ObstAn Orchard
- Z_See Lake
- Z_Siedl Build up area
- Z_Sumpf Marsh
- Z_SumWa Marsh in water
- Z_Uebrig Other area
- Z_Wald Forest area

Str25_al Road network lines:

- 1_klass 1st class road, at least 6 m wide
- 2_klass 2nd class road, 4 to 6 m wide
- 3_klass 3rd class road, 2.5 to 4 m wide
- 4_klass 4th class road, narrow road
- 5_klass 5th class road, bicycle or vehicle track
- 6_klass 6th class road, footpath
- Q_klass Suburban road, private path

Uvk25_l Other traffic lines

- Skilift Ski lift

Gwn25_al Hydrography lines

- Bach Stream
- Bach_u Underground course of stream (do not use this)
- See Lake shore
- Seeachse Lake axis, Fictive water steam axis in lake (do not use this)

Eob25_l Other object lines

- BoeschOK Top edge of escarpment (cliff, rock) (do not use this)

Topographic map design and construction

- BoeschUK Bottom edge of escarpment (do not use this)
- HPS_Ltg High tension electricity line
- Ruine Ruin

Heb25_l Hedges and trees lines (do not use this)

- Baureihe Row of trees (do not use this)
- Hecke Hedge (do not use this)
- Obreihe Orchard (do not use this)

Heb25_p Hedges and trees points

- Einbaum Single tree
- Obstbaum Fruit tree

Eob25_p Other objects points

- Austurm Watch tower
- Kiturm steeple (church tower)
- Reserv Reservoir (water basin)

Other files:

- Framemap Shape file of frame map fragment
- Swis3D.dxf DXF file of contour lines and spot height points
- R_image_hr.tif Reference image for text placing in map fragment
- Contour lines

Create hill shading:

Create another map with hill shading:

- A Hill shading can be created from the contour lines and spot heights:
- Load the 3d Analyst extension and add the 3d analyst toolbar to ArcMap.

Select: Create/modify Tin:

Create Tin from features from the 3d analyst toolbar. Select the layers *contour lines* and *spot heights.* For Height source: select: *Feature Z values.* Triangulate as *Masspoints.*
Tag value field: *None*
From the just created TIN, you can create a hill shading:
From the 3DAnalyst toolbar, point to *Surface Analyses*, and select *Hillshade.*
Input surface: You have just created TIN
Azimuth is the angular direction of the sun, measured from North in clockwise degrees from 0 to 360.
The default is 315 (northwest).
The altitude is the slope or angle of the sun above the horizon. The default is 45 degrees.
Output cell size: Approximate 5 (meter per pixel) will give a reasonable resolution.
Save the hillshading on your drive. In the table of contents, make sure that the hillshading is placed _on top of_ the polygon shape file. To make the hillshading transparent, you can select the *transparency* from the *display* Tab of the layers *properties*.

-By: Niraj K.C.