INSTITUT CARTOGRÀFIC DE CATALUNYA

Topographic cartography at 1:1 000 and 1:2 000   June 2005/Version 2

Example of topographic cartography at 1:1 000 (Bell-lloc d'Urgell).

Topographic cartography of Catalonia at 1:1 000 and 1:2 000 scales is commissioned by organizations such as the Direcció General d'Urbanisme (urban development), the Direcció General de Carreteres (roads) of the Departament de Política Territorial i Obres Públiques (regional planning and public works) of the Generalitat de Catalunya (autonomous government), other departments of the Generalitat, regional councils and town councils. Generically, and together with some cartography projects at 1:500 scale, it may be considered to be the digital topographical cartography at the largest scale undertaken within the territory, although it does not provide total coverage of Catalonia.

Contents

The cartography includes vectorial information compiled with photogrammetric stereoplotting, complemented with the incorporation of measurements and observations made during the field revision.

The relief is represented by contour lines and spot heights at significant points. The contour lines are at 1 meter intervals in the cartography at 1:1 000 scale and at 2 meter interval at 1:2 000 scale, with master contour lines every 5 and 10 meters respectively.

The plannimetric data includes information about the hydrography, making a distinction between the permanent network and the non-permanent network and between natural and artificial waters; communication routes and the center lines of urban roads, classified into paved and unpaved roads; railways and cable transport systems; bridges and jetties; electric power lines with towers, posts, pillars and streetlights; and land and vegetation cover, such as forests, apparent agricultural plots, gardens, beaches or firebreaks. The information on built up zones includes buildings, with the lines of façades, dividing walls, volumetric lines, constructions, porticoes, canopies, fences, walls, pavements and other urban elements. Urban blocks interpretable from the aforementioned data are also included.

The toponymy includes the nomenclature of roads and streets, kilometer points, police numbers and place names related to hydrography, natural sites and population entities.

The data model has undergone few variations between the different versions. The latest version includes the storage of the Z coordinate and the capture of some elements such as flood-prone stream beds, pavement limits, the center lines of streets, covered façades and the polygons of blocks of houses. Although it is not an object-oriented model, it has been prepared so that it is very easy to use in geographic information system.

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The cartography has a dictionary, published on CD-ROM, which describes the technical specifications of the base and the objects used for the representation of the topographic elements. Geometric representation has been established for each element describing its spatial component (point, line, polygon), and information is provided referring to the definition of each element, the classification criteria, the methods with which it has been obtained and the selection criteria, making a clear distinction between the photogrammetric stereoplotting, field revision and editing phases. Some photographs with superimposed vectorial information help to identify the correct capture of the elements, and finally there is an example of graphic representation.

The data is associated with metadata, in other words, it is accompanied by a description of the principal characteristics of the base, the preparation method, the technical data, the content, etc.

Process of obtaining the data

The process of obtaining the base begins with making the flight. The scale is 1:5 000 for cartography at 1:1 000 scale and 1:8 000 for cartography at 1:2 000. The flight photography is taken in black and white. GPS data is obtained from the center of the frame, which makes it possible to reduce the quantity of field data necessary for the aerial triangulation of the project. The negatives of the photographs are directly scanned from the roll of film and internal orientation is completed automatically. Field support is performed with GPS. Semi-automatic digital aerial triangulation is used.
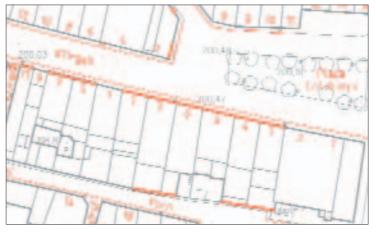
Photogrammetric capture is carried out with digital photogrammetric stations that allow the superimposition of the aerial images in raster format over the vectorial data in 3D. Superimposition helps to reduce errors during capture and is essential to the revision and verification of the data.

Field revision gathers information not visible in the frames which can be obtained from the public thoroughfare. For example, measurements are taken of the width of streets and pavements, as a result of which the lines of projections, terraces or eaves captured during photogrammetric stereoplotting can be withdrawn, elements that were hidden by shadows or projections of buildings are captured, and positioning measurements are taken of specific elements such as trees or streetlights. Additional information such as police numbers or street names is also collected. This information is annotated manually in the field report in accordance with the regulations indicated on the technical specifications sheet.

During the editing phase the sheets are cut and the structure of the data is verified with respect to coding, connections and polygonation. The place names and the cover sheet are also included and the metadata is generated.

Catalogue

There is a catalogue of the large scale cartography published on the ICC web site, where beside the area of the mapped zone, information is given about the type of cartography (urban, road, hydrographic, others), the date of the flight, the date of the cartography, the scale, dimensions, the area and the client for whom it was produced.

The photogrammetric stereoplotting data is shown in grey and the data incorporated from field revision in red.