The process of producing a map

01 Aerial photography

Taking areal photos needed for producing maps

Using surveying aircraft, aerial photos needed for producing maps are taken. When taking such photos, plotting work is done by overlapping adjacent photos in order to create 3D images.


Image of aerial photography

02 Plotting

Plotting buildings,etc., from aerial photographs

In order to accurately plot buildings, etc., control points that have been prepared as position references are used to assign accurate positions to aerial photos. After that, plotting principles are used to depict roads, buildings, etc., while viewing 2 aerial photos in 3D with a plotting instrument.

Plotting

03 Field surveys
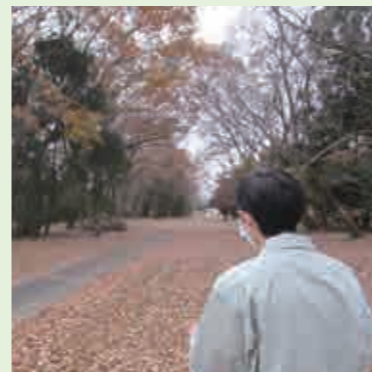
Confirming unclear points with plotting work

Field surveys are carried out when road terrain, land-use conditions, etc., are difficult to confirm with aerial photos due to tree cover.

Surveys of a road with tree cover

04 Map editing

Editing maps to make them easy to understand

To show more clearly what mapping data represent, associated information such as roads and buildings is added. Furthermore, by annotating municipalities, etc., transcribing map symbols, etc., maps that will be familiar to everyone can be created.

Plotted data

Symbols, annotations, etc., are assigned to maps
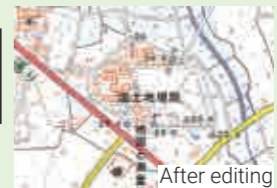
After editing

Columns Prompt Update
— Maps updated upon the opening of a new road —

Before updating → Road plans are collected and reflected in maps → After updating

In addition to aerial photos, blueprints that are provided by road builders and managers are also used to update maps. By collecting road blueprints before a road is opened, work can proceed beforehand to update the map. Through this work, maps of 140 new roads were updated in FY 2020 as soon as the roads were opened.

Columns Let's learn about plotting principles!
— Landforms "jump out" from photos —

Aerial photos that are used in plotting work can be taken of a wide area at a distance of 1500m or more (flight altitude). High-performance cameras are used to take these photos.

Now, let's there is a giant who is at least 1500m tall. At the positions of the giant's right and left eyes, the shutter of the camera that is loaded on the aircraft is released. The images obtained therefrom would be the same as the images reflected in the giant's two retinas.

In actuality, points of various locations on the ground whose positions are precisely known are prepared, and large marks are added so that the points in the photos can be precisely understood. Target points on the ground, and pixels of those points shown in the photos, all express collection of straight lines that correspond to the giant's lines of vision. However, because all of these lines of vision pass through the giant's eyes (camera center), we can calculate the positions of the giant's eyes and the orientation of his lines of sight (camera positions and orientation). If we know the camera's positions and orientation, we can get an accurate understanding of everything on the ground that was targeted by the photos.

Using such principles, we create maps from photos. By viewing from the giant's 2 eyes (using 2 photos), we can simultaneously understand both the horizontal position and the depth (height).

By setting up a partition between photos, and viewing the left photo with the left eye and the right photo with the right eye, we can get a 3-dimensional view of the undulations of the terrain.