Map Accuracy

An inaccurate map is not a reliable map. "X" may mark the spot where the treasure is buried, but unless the seeker can

meet the U.S. National Map Accuracy Standards.

National Map Accuracy Standards

To find methods of ensuring the accuracy of both location (the latitude and longitude of a point) and elevation (the altitude above sea level), the American Society for Photogrammetry and Remote Sensing—an organization actively involved in the science of making precise measurements from photographs (photogrammetry) and acquiring information from aerial photographs and satellite image data (remote sensing)—set up a committee in 1937 to draft accuracy specifications. Sparked by this work, agencies of the Federal Government, including the USGS, began their own inquiries and studies of map accuracy standards. In 1941, the U.S. Bureau of the Budget issued the "United States National Map Accuracy Standards," which applied to all Federal agencies that produce maps. The standards were revised several times, and the current version was issued in 1947. (The standards are printed on the reverse of this factsheet.)

quadrangle topographic map, the horizontal accuracy standard requires that the positions of 90 percent of all points tested must be accurate within 1/50th of an inch (0.05 centimeters) on the map. At 1:24,000 scale, 1/50th of an inch is 40 feet (12.2 meters). The vertical accuracy standard requires that the elevation of 90 percent of all points tested must be correct within half of the contour interval. On a map with a contour interval of 10 feet, the map must correctly show 90 percent of all points tested within 5 feet (1.5 meters) of the actual elevation.

All maps produced by the USGS at 1:250,000 scale and larger are prepared by methods designed to meet these accuracy standards and carry the statement, "This map complies with National Map Accuracy Standards." Exceptions to this practice involve areas covered by dense woodland or obscured by fog or clouds; in those areas, aerial photographs cannot provide the detail needed for precise mapping. The USGS tests enough of its maps to ensure that the instruments and procedures the Survey uses are producing maps that meet the U.S. National Map Accuracy Standards.

How the Survey MaintainsracHs

maps, the USGS is able to determine that its procedures for collecting map information ensure a high level of map accuracy.

Factual Errors

There are other kinds of errors in mapmaking. Names and symbols of features and classification of roads or woodlands are among the principal items that are subject to factual error. Mapmakers cannot apply a numerical value to this kind of information; they must rely on local sources for their information. Sometimes the local information is wrong. Sometimes names change or new names and features are added in an area. The USGS cartographers and editors check all maps thoroughly and, as a matter of professional pride, attempt to keep factual errors to a minimum.

"Errors" resulting from selection, generalization, and displacement are necessary results of mapping complex features at reduced scales. In congested areas, large buildings may be plotted to

map scale, it may not be possible to show each of several closely spaced linear features in its correct position. In such cases, one feature, such as a railroad, is positioned in its true location and others, such as parallel roads or rivers, are displaced the minimum amount necessary to make each symbol legible or are omitted to make the highest priority symbol legible.

United States National Map Accuracy Standards

With a view to the utmost economy and expedition in producing maps that fulfill not only the broad needs for standard or principal maps, but also the reasonable particular needs of individual agencies, the Federal Government has defined the following standards of accuracy for published maps:

1. Horizontal accuracy. For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch. These limits of accuracy shall apply to positions of well-defined points only. Well-defined points are those that are easily visible or recoverable on the ground, such as the following: monuments or markers, such as bench marks, property boundary monuments; intersections of roads and railroads; corners of large buildings or structures (or center points of small buildings). In general, what is well-defined will also be determined by what is plottable on the scale of the map with-in 1/100 inch. Thus, while the intersec-tion of two roads or property lines meeting at right angles would come within a sensible interpretation, identi-fication of the intersection of such lines meeting at an acute angle would not be practicable within 1/100 inch. Similarly, features not identifiable upon the ground within close limits are not to be considered as test points within the limits quoted, even though their positions may be scaled closely upon the map. This class would cover timber lines and soil boundaries.
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