The Annotated Photomap for Highway Planning In Congested Suburban Areas

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•SHORTLY AFTER 1946, the Oregon State Highway Department, in cooperation with the U.S. Bureau of Public Roads, began a comprehensive revision of county maps described as the General Highway Map series. The last map of this series was completed in 1963. Because of the considerable time lapse between completion of the first and last county maps of this series, it was recognized that many county maps were badly in need of revision. An appraisal of the methods used to produce this series was made to determine what procedures could be improved to better the quality and increase production in the revision process.

The appraisal indicated clearly that the counties most urgently needing revision were those including or adjacent to the metropolitan centers of the state. For example, Washington County, formerly an area of mostly rural characteristics, showed a population increase within ten years of more than 80 percent, most of which was in a rapidly expanding suburban area adjacent to Portland, the state's largest city.

Although aerial photography had been used in the mapping process for planimetric mapping of large areas and for inventory of roads and culture for some counties, no direct use of photographs had been made as an integral part of the maps. It was apparent that the solution to the problem of producing large-scale maps of congested areas was the use of aerial photographic mosaics which would photographically portray mapping detail, thereby eliminating time-consuming drafting of the multitudinous cultural items.

It was realized that in order to be an effective substitute for a line map, a mosaic would require an undetermined amount of annotation, such as names and cultural symbols. However, a prime consideration in the choice of the photomap is its superiority in the sheer volume of photographic information shown in land use and occupancy.

It was also recognized that the aerial photomap has certain limitations. Considering this and to determine in some detail what annotation was thought essential by the users of these maps, a letter was circulated to key map users in the Highway Department along with a sample of a line map and a sample photomap of the same area. These key map users were requested to list features shown on the line map which, according to their needs, should be annotated on the photomap.

Compilation of the replies received formed the basis for the annotation of the sample map shown in Figure 1. Principal items requested by the map users were the state highway system by surface type, all minor road names, cemeteries, schools, parks, and major transmission lines. Also requested was a map scale bar in feet and, as on line maps, all political subdivisions and the General Land Office section line grid. It is believed that an objective determination from the map users' viewpoint was obtained from this survey and that the resultant photomaps are at least as useful as the old line maps and are superior in furnishing land use and occupancy information.

It was found that the compilation cost was reflected in a direct ratio to the amount of photomap annotation. Although the original compilation cost estimate was exceeded, the published annotated photomap cost was only half that previously experienced in production of comparable line maps. Furthermore, experience gained from use of the new

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Figure 1.

process indicates that the more congested the area being mapped, the greater the percentage of savings in man days compared to the time required for line map drafting.

Briefly, the process used to produce annotated photomaps of Oregon counties is as follows:

The densely populated, highly developed area of a county determines the requirement for large scale mapping. When these areas have been determined, a sheet layout is prepared and new aerial photography at a scale of approximately 1 in. = 2000 ft is procured for the mosaics. The mosaic is compiled from partially rectified photo enlargements at a scale of 1 in. = 600 ft using enlarged 7½-min U.S. Geological Survey quadrangle sheets for control when available. The mosaic is assembled for a large area and is then cut into map-size sheets. Annotation is done on transparent stable base drafting film overlaid on the original mosaic sheets for proper registration of detail. The original mosaics and overlays are reproduced photographically at two scales, one of 1 in. = 600 ft for one-color diazo reproduction (Fig. 1), and one of 1 in. = 1500 ft for four-color lithographic printing (not reproduced here because of printing limitations).

The horizontal place-point accuracy of these photomaps has proven to be greater than the line maps which are being revised, because of the availability of large scale U.S. Geological Survey quadrangle sheets for control that were not compiled at the time the original county maps were made. The mosaics can be compiled with a maximum error of 1 percent, in the areas where maximum differences in elevations exist only.

The use of annotated photomaps to replace the line map enlargements in the County Map Series was begun in December 1963 on an experimental basis. The first published map using the new method was distributed in April 1965. The Photogrammetry Section is presently revising maps of five additional counties which were scheduled for completion by early 1966. These five revisions will provide current highway planning maps of an area containing 75 percent of the state's population.

The annotated photomap furnishes the solution to the problem of providing current maps of rapidly growing and changing suburban areas. It appears feasible to revise the photomaps of these areas every three years or as needed.

The Oregon Photogrammetric Unit is presently experimenting with color aerial photography for use in compilation of the photomaps. While color photography is more expensive, preliminary estimates indicate a further saving in drafting time by reduction in number of overlays. Also, colored aerial mosaics are superior to black and white photography in discernible detail because color is much easier to interpret than various shades of gray.

Studies of cost of previous county mapping using line drafting have shown that the two most expensive items are drafting time and assembly of the information for plotting cultural items, including editing. The aerial photomap reduces these costs to a minimum since nearly all detail is shown on the aerial photographs, except in limited areas of dense ground cover unusual in congested suburban areas.