Some Constructions on Topographic Maps for Illustration of Photogrammetric Principles

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BY CONPUTATION or descriptive geometry, it is possible to superimpose various constructions on a topographic contour map, to show quantitatively the geometric relationships between the essentially orthographic projection of the map and the perspective projection of a corresponding aerial photograph. Although

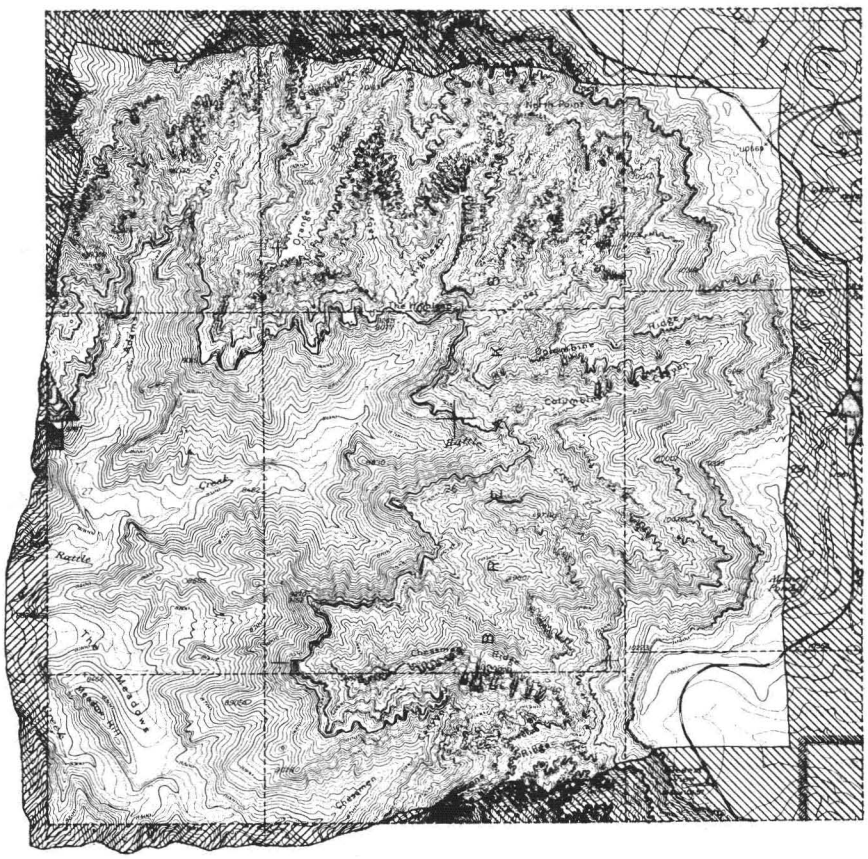

FIG. 1. Construction on central portion of U. S. Geological Survey topographic map of Cedar Breaks National Monument, Utah (1936), showing irregular coverage of 9″×9″ vertical photograph with 6″ lens, from altitude of about 6,500 feet above rim of Markagunt Plateau into which cliffs of Cedar Breaks are carved. Total relief is approximately one-half mile; width of field of view about two miles. Unshaded area is common to both map and photo; diagonal shading at lower left is peripheral portion of photo coverage below common scale datum of photo and map, therefore "pulled into" photo from beyond edge of square map area; opposite diagonal shading is peripheral portion of map area above common scale datum of photo and map, therefore not "pulled into" photo.

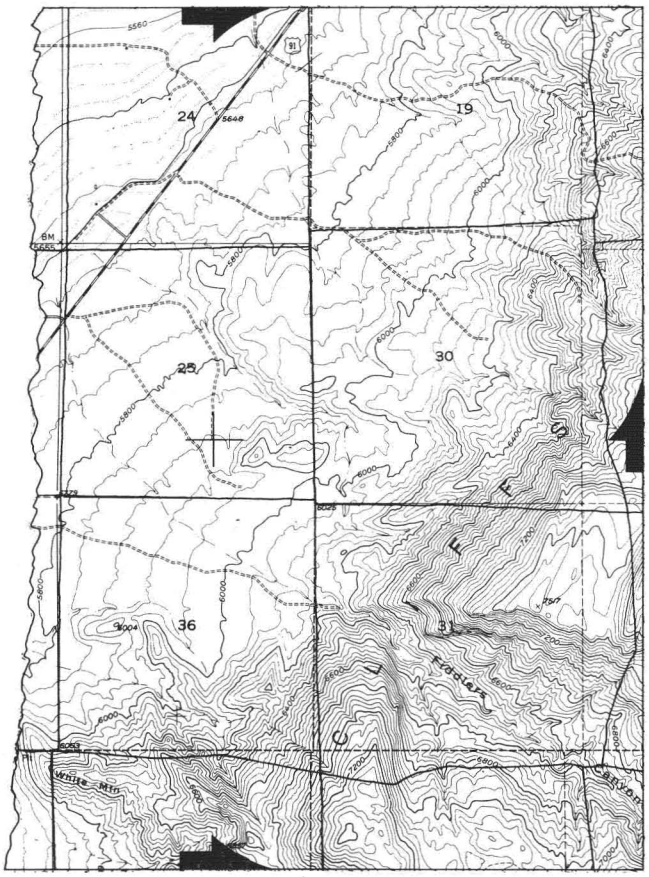

FIG. 2. Construction on northeast portion of U. S. Geological Survey topographic map of Cedar City, Utah, quadrangle (1950), showing portion of skeletal "aerial vertical photograph" taken with 6″ lens from an altitude of about 12,000 feet above valley at left. Irregular graticule shows effects of relief displacement on section lines which cross rough topography at right and gently sloping piedmont plain at left. Common scale datum of map and "photograph" lies at approximately the same elevation as the base of the steep cliffs.

the examples illustrated here deal with aerial verticals, the idea can be applied also to obliques.

For quantitative illustration of some of the relationships between the essentially orthographic projection of a topographic contour map and the perspective view of an aerial photograph, skeletal constructions can be made directly on the map, by computation or descriptive geometry. Inasmuch as the geometry of a vertical photograph is simpler than that of an oblique, verticals probably offer an easier approach for elementary illustration. Some very effective constructions can be made to show: (1) the irregularities of single photographic and stereoscopic coverage or overlap in areas of considerable relief, and (2) the effects of relief displacement on inclined lines and planes (*e.g.*, roads, section line fences, drainage, geologic structural dip, and topographic slopes or contour spacing). Many other applications of this idea will be suggested by personal needs and experience in teaching photogrammetry.