VOL.103 NO.SU1. SEPT. 1977

JOURNAL OF THE SURVEYING AND MAPPING DIVISION

PROCEEDINGS OF
THE AMERICAN SOCIETY
OF CIVIL ENGINEERS

AMERICAN SOCIETY OF CIVIL ENGINEERS FOUNDED 1852

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This Journal is published aperiodically by the American Society of Civil Engineers. Publications office is at 345 East 47th Street, New York, N.Y. 10017. Address all ASCE correspondence to the Editorial and General Offices at 345 East 47th Street, New York, N.Y. 10017. Allow six weeks for change of address to become effective. Subscription price to members is $4.00. Nonmember subscriptions available; prices obtainable on request. PO, SU, TC, UP, WR.

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INFORMATION RETRIEVAL

The key words, abstract, and reference "cards" for each article in this Journal represent part of the ASCE participation in the EJC information retrieval plan. The retrieval data are placed herein so that each can be cut out, placed on a 3 × 5 card and given an accession number for the user's file. The accession number is then entered on key word cards so that the user can subsequently match key words to choose the articles he wishes. Details of this program were given in an August, 1962 article in CIVIL ENGINEERING, reprints of which are available on request to ASCE headquarters.

13175 FUTURE FOR COMMERCIAL MAPPING FIRMS

KEY WORDS: **Aerial photography; Commerce; Federal agencies; Mapping;** Photogrammetry; Remote sensing; Scale (ratio); **State governments**

ABSTRACT: Historically, the traditional demarcation between government mapping and commercial mapping has been at the 1:24,000 scale topographic map. Larger scale mapping for commercial, city, county, and state purposes has traditionally been the responsibility of the commercial mapping firms. Recent advances in high altitude remote sensing and photography, together with the government mapping elements obtaining newer equipment with greater efficiencies and capabilities provides for a concern that the government will break from the traditional scale demarcation and provide urban mapping at scales from 1:1,000 to 1:10,000. This poses an even greater and more critical question of the future role of the commercial mapping firms. The writer foresees a rapidly growing demand for current and accurate mapping, and that budget and personnel limitations being placed on the government will result in increased use of commercial mapping firms to meet routine mapping requirements.

REFERENCE: Anderson, Edward G., "What is the Future for Commercial Mapping Firms?," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13175**, September, 1977, pp. 1-6

13205 AUTOMATED HYDROGRAPHY IN PHILADELPHIA

KEY WORDS: **Automation; Computer graphics;** Dredging; **Hydrographic surveys; Hydrography;** Navigation; **Pennsylvania;** Surveying; Surveys

ABSTRACT: A completely automated hydrographic surveying and plotting system has been assembled by the Corps of Engineers, Philadelphia District. The development of the system is examined from the evaluation of the earliest electronic positioning equipment to the total system now in use. Components of the system and their functions are described.

REFERENCE: Spies, Henry A., "Automated Hydrography in Philadelphia District," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13205**, September, 1977, pp. 7-13

13206 AUTOMATION IN SURVEYING: PRESENT AND FUTURE

KEY WORDS: **Aerial photography; Automation;** Computers; Correlation; Digital techniques; **Forecasting;** Images; Inertia; Information systems; **Mapping; Maps; Photogrammetry; Remote sensing;** Satellites; Scanners; **Stereoscopic map plotters; Surveying; Terrain models**

ABSTRACT: Patterns of present-day automation in photogrammetry are examined in seven broad categories: stereoplotter-computer interface; automatic image correlation; offline orthophoto systems; automated image processing; digital terrain data for engineering; ancillary photogrammetric operations; and nondigital automation. Future objectives of surveying and mapping: land data records computerized in a universal coordinate system; a new unified World datum ellipsoid; widespread use of image maps and thematic maps; a central bank of digitized cartographic information. Predicted components of a future surveying and mapping system are: position determination by use of Earth satellites; position and elevation determination by use of an inertial package in a moving vehicle; imaging systems using multispectral scanners and solid-state sensors; automated production of orthophotos, contours, and digital terrain data; automated map-finishing operations; and powerful computer techniques for complex computations and data handling.

REFERENCE: Thompson, Morris M., "Automation in Surveying and Mapping

13225 COLLINEARITY EQUATIONS FOR SCANNED DATA

KEY WORDS: **Geometry; Least squares method; Linear differential equations; Linearity;** Mapping; Matrices (mathematics); Photogrammetry

ABSTRACT: The collinearity equations, based upon modification of those common in conventional photogrammetry, must accommodate the continuous dynamic nature of the exterior orientation elements. Therefore, some types of functional behavior (polynomials, harmonics, etc.) must be assumed for those orientation elements. In order to investigate image and object point coordinate deformations, and to perform space resection utilizing the method of least squares, it is desirable to generate linear approximations for these collinearity equations. The technique presented for this linearization utilizes a Taylor's series expansion about some approximations for the variables involved. The functions assumed to approximate the dynamic nature of the orientation elements are included in the linearization through the use of matrix premultipliers. The resulting linearized form of analytic expressions may be used to analyze the geometric aspects of scanned imagery.

REFERENCE: Baker, James R., "Linearized Collinearity Equations for Scanned Data," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13225**, September, 1977, pp. 25-35

13229 VERTICAL CONTROL FOR MODELS BLOCKS

KEY WORDS: Adjustment; **Airborne equipment; Control;** Lakes; **Leveling;** Leveling devices; Models; **Photogrammetry;** Savings; **Triangulation**

ABSTRACT: In simultaneous block adjustments vertical control points need to be located in dense cross chains if no auxiliary information is available. One additional perimeter control point each between them strengthens the solution, and a further reduction of the vertical block deformation is achieved by normalizing the x-residuals in the projection centers. The use of auxiliary data leads to substantial saving of vertical control points. The interaction between vertical control point distribution, statoscope-, APR-, lake data, and combinations of these is studied with several well-controlled independent model production blocks adjusted with PAT-M-43. The tests indicate that the bridging distance can be increased to the extent that there is virtually no need for control points within the block for small and medium-scale mapping purposes.

REFERENCE: Faig, Wolfgang, El Hakim, Sabry, and Mathew, Thomas, "Vertical Control for Independent Models Blocks," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13229**, September, 1977, pp. 37-46

13241 BROCK & WEYMOUTH PHOTOGRAMMETRIC MAPPING EQUIPMENT

KEY WORDS: **Aerial cameras; Aerial photographs;** Instruments; **Parallax; Photogrammetric surveys;** Photogrammetry; Projection; **Scale (ratio);** Stereoscopic photography; Topographic maps

ABSTRACT: The Brock and Weymouth Mapping Instruments which were designed and built in Philadelphia in the early 1920's were a unique development. The "Brock Process" started a new era in American surveying and was the forerunner for many currently used photogrammetric methods.

REFERENCE: Quinn, Alfred O., "Brock & Weymouth Photogrammetric Mapping Equipment," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13241**, September, 1977, pp. 47-52

13237 MULTIPURPOSE CADASTRES

KEY WORDS: Assessments; **Document storage; Government agencies; Indexes; Information systems;** Land tenure; Land titles; **Land use; Mapping; Natural resources; Planning;** Properties

ABSTRACT: An overview of the history of the evolution of cadastral arrangements is developed. The North American cadastral arrangements are examined with respect to their effectiveness in meeting the requirements of land transfer, real estate assessment, land management, environmental protection; and in understanding the land tenure institution. The design concepts of multipurpose cadastral systems for meeting these requirements are developed and case studies from the Maritime Provinces in Canada, and Massachusetts and Wisconsin in the United States are presented.

REFERENCE: McLaughlin, John D., and Clapp, James L., "Toward the Development of Multipurpose Cadastral Systems," *Journal of the Surveying and Mapping Division,* ASCE, Vol. 103, No. SU1, **Proc. Paper 13237**, September, 1977, pp. 53-73

U.S. CUSTOMARY-SI CONVERSION FACTORS

In accordance with the October, 1970 action of the ASCE Board of Direction, which stated that all publications of the Society should list all measurements in both U.S. Customary and SI (International System) units, the following list contains conversion factors to enable readers to compute the SI unit values of measurements. A complete guide to the SI system and its use has been published by the American Society for Testing and Materials. Copies of this publication (ASTM E-380) can be purchased from ASCE at a price of 75¢ each; orders must be prepaid.

All authors of *Journal* papers are being asked to prepare their papers in this dual-unit format. Until this practice affects the majority of papers published, we will continue to print this table of conversion factors:

To convert	To	Multiply by
inches (in.)	millimeters (mm)	25.40
inches (in.)	centimeters (cm)	2.540
inches (in.)	meters (m)	0.0254
feet (ft)	meters (m)	0.305
miles (miles)	kilometers (km)	1.61
yards (yd)	meters (m)	0.91
square inches (sq in.)	square centimeters (cm^2)	6.45
square feet (sq ft)	square meters (m^2)	0.093
square yards (sq yd)	square meters (m^2)	0.836
acres (acre)	square meters (m^2)	4047
square miles (sq miles)	square kilometers (km^2)	2.59
cubic inches (cu in.)	cubic centimeters (cm^3)	16.4
cubic feet (cu ft)	cubic meters (m^3)	0.028
cubic yards (cu yd)	cubic meters (m^3)	0.765
pounds (lb)	kilograms (kg)	0.453
tons (ton)	kilograms (kg)	907.2
one pound force (lbf)	newtons (N)	4.45
one kilogram force (kgf)	newtons (N)	9.81
pounds per square foot (psf)	newtons per square meter (N/m^2)	47.9
pounds per square inch (psi)	kilonewtons per square meter (kN/m^2)	6.9
gallons (gal)	cubic meters (m^3)	0.0038
acre-feet (acre-ft)	cubic meters (m^3)	1233
gallons per minute (gal/min)	cubic meters per minute (m^3/min)	0.0038
newtons per square meter (N/m^2)	pascals (Pa)	1.00