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JOURNAL OF THE SURVEYING AND MAPPING DIVISION

PROCEEDINGS OF
THE AMERICAN SOCIETY
OF CIVIL ENGINEERS

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DISCUSSION

Proc. Paper 8085

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 x 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.

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[a] Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.

8101 SURVEYING RESPONSIBILITY OF THE ENGINEER-MANAGER

KEY WORDS: coordinates; land surveys; management; site surveys; surveying; survey planning; surveys

ABSTRACT: As project complexity grows, civil engineers tend to become engineer-managers. Such managers often give surveying less than adequate consideration. is a trend towards use of technicians for survey responsibilities. This trend is encouraged by salary scales and schools. Use of technicians makes the manager's understanding of surveys more critical. Intangible factors affecting the manager's survey decisions include public relations, economics, and time for solving problems. Technical competence must encompass equipment, procedures, accuracies, and coordinate systems. Familiarity with mapping controls is essential. A thorough understanding of the function and overlapping of the fields of control, land and engineering surveys must be included in the manager's talents. Judgment of the manager's overall project performance will reflect his ability in the survey field.

REFERENCE: Watkins, Daniel J., "Surveying Responsibility Of The Engineer-Manager," Journal of the Surveying and Mapping Division, ASCE. Vol. 97, No. SU1, Proc. Paper 8101, May, 1971, pp. 1-6.

8096 PHILADELPHIA-LINDENWOLD HIGH-SPEED LINE SURVEYS

KEY WORDS: construction; design; maps; monuments; railroad tracks; rapid transit railways; surveys

ABSTRACT: A main base line (monumented center line) of tangents and simple curves, separate from track geometry with its profusion of spirals, is a practical necessity for a Rapid Transit project. It permits coordinated design and construction layout. Track alignment can be revised to fit specific conditions without changing the general construction base line. A modified second order survey, such as 1:15,000, is preferred for high speed transit projects. Strategic control points of base lines, and their references, should be permanently located on existing structures where possible, by the use of concrete monuments or iron pins where necessary. Preservation of control point references by contractors is especially important when there are following contractors. Early location of right of way lines, and tieing them to the main base line can prevent costly encroachment by fences and drainage structures. The various surveys, aerial photography control, design, right of way, construction, and as-builts are described.

REFERENCE: Hultin, Carl E., "Philadelphia-Lindenwold High-Speed Line Surveys," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8096, May, 1971, pp. 7-12.

8136 REGIONAL CONTROL SUPPLIED BY PHOTOGRAMMETRY

KEY WORDS: adjusting; aerial photography; comparators; computers; curvature; errors; least squares method; photogrammetry; refraction; surveys; triangulation; urban development

ABSTRACT: Where second-order geodetic control has a spacing of 3 miles to 5 miles, the positions and elevations of a virtually unlimited number of premarked ground points within a control figure can be determined with a rms error of 0.15 ft horizontally and 0.25 ft vertically for a total cost of about $5,000 for an area of 25 sq miles. A block of 25 photographs is a practical unit taken from an altitude of 5,000 ft to 7,500 ft with a glass-plate camera and an overlap of 60 % in both directions. Corrections are made for comparator errors, film deformation (if film is used), lens distortion and atmospheric refraction, and a rectangular geocentric coordinate system is applied to recognize the effect of earth curvature. The premarked ground points become recoverable supplemental control. Thereafter lower-altitude film photographs can be used for mapping in three dimensions with conventional plotting instruments without any further field surveys.

REFERENCE: Tewinkel, G. Carper, "Regional Control Supplied by Photogrammetry," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8136, May, 1971, pp. 13-25.

8119 CHANNEL RECTIFICATION ENGINEERING SURVEY PROGRAM

KEY WORDS: aerial photography; channels (waterways); construction; design; engineering; instruments; logistics; mapping; maps; planning; rivers; standards; surveys; techniques

ABSTRACT: Accurate surveys and adequate maps are essential for planning, design, and construction of channel rectification and other works for a major river project; to insure the completed project it is necessary to safely perform functions intended in design and purpose. A complete analysis of the approach to the project survey and mapping requirements is necessary. What accuracies, methods, instruments, scales, and contour intervals are needed to provide the data required? Priorities for areas or data must be established. Effective plans must be made for such items as aerial photographic scales, flight direction, type of camera, location, refinement and density of ground surveys, map scales and contour intervals, logistics, and numerous other items. After these decisions are made, effective plans are accomplished for the preliminary survey and mapping for engineering and design, construction survey, and post-construction survey. Without proper planning for all phases of a project, including the use of modern techniques and high accuracy standards in surveying and mapping, costly delays are likely to occur.

REFERENCE: Shields, John M., "Channel Rectification Engineering Survey Program," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8119, May, 1971, pp. 61-68.

8088 SURVEYS AND MAPPING IN WATER RESOURCE

KEY WORDS: corps of engineers; flood control; floods; mapping; navigation; planning; surveying; water resources

ABSTRACT: Surveys and mapping have been essential to water resource development in the United States. From the pioneer single purpose navigation network, federal interest in water resource development has broadened to include multipurpose uses of water and related land resources. The quality of multipurpose planning has been enhanced by improved techniques in surveys and mapping. An example of the role of surveys and mapping in water resource development is illustrated by the Vicksburg District's study of providing levee protection to the Vicksburg-Yazoo area north of Vicksburg, Miss. Survey information, aerial mosaics, and quadrangle maps were used to prepare working curves for converting various types of flood damage to an average annual basis for comparison with annual costs. Studies indicate that a levee project to provide protection from the Mississippi River Project Design Flood would be economically justified. With the diminishing opportunities for water resources development, wise and timely development and utilization of these resources will require creative and imaginative planning and engineering reflecting physical changes and new technology in surveying and mapping.

REFERENCE: Pitts, Kerry F., "Surveys and Mapping in Water Resource Development," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8088, May, 1971, pp. 69-81.

8098 CONTROL SURVEYS FOR MAJOR BRIDGES

KEY WORDS: bridge piers; bridges; columns; computers; construction; deformation; earthwork; footings; foundations; mapping; photogrammetry; settlement; surveying; surveying instruments; surveys; topography; triangulation; vertical indicators

ABSTRACT: Some old methods of surveying are combined with new ones to provide fast and very accurate survey control on major long-span bridges. The oldest type instrument, a mariner's navagation sextant, was used along with the more modern high accuracy devices. These instruments include optical theodolites, electronic distance measuring equipment, engineering lasers, computers, precise levels, depth recorders, two-way portable radios, and other related surveying equipment. The proper use of these instruments will provide the highest caliber survey control from initial planning to preliminary surveys, photogrammetric mapping, triangulation, hydrographic surveys, foundation explorations, property surveys, and primary survey control for construction. This paper covers the surveying procedures used for the planning and construction of the San Diego-Coronado Bay Bridge in California and the preliminary survey work being done for a proposed Southern Crossing of San Francisco Bay.

REFERENCE: Moore, Normand L., and Begell, Richard G., "Control Surveys for Major Bridges," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8098, May, 1971, pp. 83-96.

8105 GEODETIC COMPUTATIONS BY ELECTRONIC COMPUTER

KEY WORDS: abstracts; azimuth; boundaries; computation; computer programs; error detection codes; geodesy; geodimeter; grids (coordinates); history; latitude; longitude; monuments; position (location); stars; surveys; triangulation

ABSTRACT: The electronic computer makes the recomputation of old control surveys on the North American Datum of 1927 economically feasible. Restoration of the Massachusetts Town Boundary Survey of 1882-1914, comprising 1,501 main scheme triangulation stations and 7,000 town corner monuments, began in 1967. Completion date for this project has not been determined. Salvage value is approximately 3,500 second-order stations. Computer programs in various stages of development include: Azimuth of a Circumpolar Star at any Hour Angle; Horizontal Angle Station Adjustment; Abstract of Horizontal Directions; Geodimeter Reduction; Formation of Condition Equations; Least Squares Adjustment of Triangulation Net; Forward Position Computation; Inverse Position Computation; Conversion of Geographic Coordinates to Grid Coordinates; Conversion of Grid Coordinates to Geographic Coordinates; and Traverse Computation on the Ellipsoid.

REFERENCE: Clohecy, Gerald F., "Geodetic Computations by Electronic Computer," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8105, May, 1971, pp. 97-101.

8102 MISSISSIPPI VALLEY MAPPING

KEY WORDS: cartography; geodesy; geodetic surveys; government agencies; mapping; maps; measuring instruments; Mississippi River; photogrammetry; surveying; topography

ABSTRACT: The 1957 conference between Geological Survey and Mississippi River Commission officials designated the Geological Survey as the responsible agency for Mississippi Valley mapping. The Mississippi River Commission's annual mapping requirements are assumed by the Geological Survey as part of its regular mapping program. Series conversion materials are supplied to the Mississippi River Commission to enable them to produce 15-minute maps at a 1:62,500 scale. Control requirements for mapping and methods for establishing control are presented. The exchange of data and information between the two agencies expedites the systematic mapping of the Mississippi Valley. Recent developments in instruments and procedures have increased both map production and quality. p. 108

REFERENCE: Robison, Leslie B., "Mississippi Valley Mapping," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8102, May, 1971, pp. 103-108.

8123 HYDROGRAPHIC SURVEY TECHNIQUES ON MISSISSIPPI

KEY WORDS: bank protection; dikes; dredging; hydrographic surveys; navigation; organization; revetments; surveying

ABSTRACT: Hydrographic surveys on the Mississippi River are made throughout the year for navigation and bank stabilization organizations. To facilitate obtaining requested surveys the District's 400 miles of Mississippi River is divided into four reaches of approximately 100 miles, with a survey party responsible for each reach. Each survey party is self sustaining from the standpoint of having the equipment and personnel available to accomplish any survey requested. Typical surveys would include before and after revetment construction, before dike construction, general hydrographic, general dredging, and annual resurveys of revetments and dikes. Methods used to accomplish all the typical surveys are covered and ideas toward improvement are included.

REFERENCE: Welch, Otis T., "Hydrographic Survey Techniques on Mississippi," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8123, May, 1971, pp. 109-112.

8132 IMPROVEMENT OF LAND TITLES

KEY WORDS: computers; data systems; document storage; government agencies; indexes; information retrieval; land use; regional planning; subdivisions; surveying; urban development; urban planning

ABSTRACT: The proper determination of the ownership and use of land requires a system which synthesizes data relating to ownership of, the physical characteristics of, and the public records relating to, land. The present system of keeping land records is antiquated and uncoordinated. Although modern equipment is solving problems of transcription, accessibility, retrievability and storage of land records, it is not performing the essential function of coordination or synthesis. The lack of coordination among land records hampers the work of the engineer, surveyor, lawyer, governmental administrator, land-planner and all other persons who are concerned with the ownership, characteristics and uses of land. CULDATA is a suggested modern system for determining, classifying and recording land data, which should achieve the desired synthesis. CULDATA utilizes the state plane coordinate system, modern surveying techniques and equipment, electronic data-processing and computerized land data banks.

REFERENCE: Zeman, Robert Lewis, "Improvement of Land Titles," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8132, May, 1971, pp. 113-123.

8137 MAPPING FROM SPACE

KEY WORDS: correleation; earth resources observation satellite (ERTS) program; image converter cameras; multiple correlation; remote sensing; spaceborne photography; spatial filtering; surveys

ABSTRACT: Remote sensing of the earth promises to become an operational tool of the engineer and the scientist within the next few years. There are no real technical limits on the uses of data from space sensors. However, it is not practical to fly special missions, particularly in space, for each specific use. General-purpose, earth-sensing missions aimed at meeting a wide variety of requirements must be defined. Engineers must help define earth-sensing missions, based on the concepts of repetitive coverage, multispectral response, and spatial correlation.

REFERENCE: Colvocoresses, Alden P., "Mapping from Space," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8137, May, 1971, pp. 125-132.

8148 SURVEYS FOR SOUTH SHORE RAPID TRANSIT CONSTRUCTION

KEY WORDS: aerial surveys; expenses; photogrammetric surveys; rapid transit railways; surveying instruments; surveys

ABSTRACT: Because of the lack of rapid transit construction within this country during the last quarter century, little experience has been gained in the various aspects of surveying which are involved. This paper presents a correlation of facts, events, and figures relating to the surveying requirements for the construction of a new rapid transit line. The areas of planning, design, and construction are explored with the conclusion being drawn that surveying techniques have a marked impact on the overall project.

REFERENCE: Pacelli, Alfred J., "Surveys For South Shore Rapid Transit Construction," Journal of the Surveying and Mapping Division, ASCE, Vol. 97, No. SU1, Proc. Paper 8148, May, 1971, pp. 133-137.