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DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

Bulletin 788—A

POLITECHNIKA GDAŃSKA
ZAKŁAD GEOLOGII

TOPOGRAPHIC INSTRUCTIONS

OF THE

UNITED STATES GEOLOGICAL SURVEY

A. ADMINISTRATION

COMPILED BY H. M. FRYE

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PREFACE

POLITECHNIKA GDAŃSKA ZAKŁAD GEOLOGII

This manual is intended to replace all former instructions relating to the topographic work of the United States Geological Survey and to provide a manual of instruction for the personnel of other organizations engaged in topographic surveying. An attempt has been made to have these instructions complete so far as the technical work of topographic mapping is concerned. General regulations and instructions for the Geological Survey have for the most part been omitted, but those relating to fiscal affairs and to a few other important phases of administration have been digested and repeated herein.

The manual is issued in several parts, each covering a general subject, thus saving public funds by providing a distribution of separate parts to those interested only in one or more of the subjects. These several parts have been prepared by the members of the topographic branch best qualified for each task, and each part has been reviewed and revised by the section chief responsible for the administration of that particular part of topographic work.

Each part, except "Administration," has been approved by the Board of Surveys and Maps. In fact, all the technical parts have been reviewed by a committee of the board and made a part of a report of that committee.

Criticism of these instructions, suggestions for their improvement, and notice of errors or omissions are invited.

C. H. Birdseye,
Chief Topographic Engineer.

Approved:
Geo. Otis Smith, *Director.*

Washington, D. C., *June 7, 1926.*

POLITECHNIKA GDAŃSKA
ZAKŁAD GEOLOGII

TOPOGRAPHIC INSTRUCTIONS OF THE UNITED STATES GEOLOGICAL SURVEY

A. ADMINISTRATION

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AUTHORIZATION FOR TOPOGRAPHIC WORK

The United States Geological Survey was created by act of Congress approved March 3, 1879, and the formation of the topographic branch was the natural result of the growth of the organization. It was apparent from the beginning that no adequate classification of lands or conclusive geologic determinations could be made without base maps. Hence in the earlier years the topographic maps were made as a part of the general work of the Geological Survey, and allotments for the cost of such maps were made from the general appropriation.

APPROPRIATION ACTS

The sundry civil act for the fiscal year 1889 appropriated funds for one chief geographer, three geographers, and three topographers. These positions were provided for until the end of the fiscal year 1892. For the fiscal years 1893 to 1924 one chief geographer, one geographer, and two topographers were specifically provided for under the heading "Scientific assistants," except that for the fiscal years 1897 to 1924 the title "chief" was omitted. Beginning with the fiscal year 1923 appropriations for the topographic work have been made in the Interior Department appropriation act. For the fiscal years 1925–1927 the compensations of "scientific assistants" were not itemized but were included in a lump sum.

A specific appropriation for topographic surveys was first made in the sundry civil act of October 2, 1888, for the fiscal year 1889.

Below are quotations from the sundry civil and Interior Department appropriation acts for several years, showing the principal

changes in the wording of the acts; the intervening acts contain changes only in amounts appropriated or slight changes in the wording of the authorizations.

Fiscal year 1889.—For topographic surveys in various portions of the United States, including the pay of temporary employees in field and in office, the cost of all instruments, apparatus, and materials, and all other necessary expenses connected therewith, $199,000.

Fiscal year 1891.—For topographic surveys in various portions of the United States, $325,000, one-half of which sum shall be expended west of the one hundredth meridian.

Fiscal year 1893.—For topographic surveys in various portions of the United States, $240,000; $60,000 of which shall be expended west of the ninety-seventh meridian in the States of North Dakota, South Dakota, Nebraska, Kansas,[1] and the Territory of Oklahoma, and at least one-half of the remainder shall be expended west of the one hundred and third meridian.

Fiscal year 1897.—For topographic surveys in various portions of the United States, $175,000, to be immediately available, $35,000 of which shall be expended west of the ninety-seventh meridian in the States of North Dakota, South Dakota, Nebraska, Kansas, Texas, and the Territory of Oklahoma, and at least one-third of the remainder shall be expended west of the one hundred and third meridian: *Provided*, That hereafter in such surveys west of the ninety-fifth meridian elevations above a base level located in each area under survey shall be determined and marked on the ground by iron or stone posts or permanent bench marks, at least two such posts or bench marks to be established in each township or equivalent area, except in the forest-clad and mountain areas, where at least one shall be established, and these shall be placed, whenever practicable, near the township corners of the public-land surveys; and in the areas east of the ninety-fifth meridian at least one such post or bench mark shall be similarly established in each area equivalent to the area of a township of the public-land surveys.

Fiscal year 1898.—For the survey of the public lands that have been or may hereafter be designated as forest reserves by Executive proclamation, * * * and including public lands adjacent thereto, which may be designated for survey by the Secretary of the Interior, $150,000, to be immediately available: * * * The surveys herein provided for shall be made under the supervision of the Director of the Geological Survey, * * * and if subdivision surveys shall be found to be necessary, they shall be executed under the rectangular system, as now provided by law. The plats and field notes prepared shall be approved and certified to by the Director of the Geological Survey, and two copies of the field notes shall be returned; * * * and twenty photolithographic copies of the plat shall be returned, * * * the original plat and other copies * * * shall have the facsimile signature of the Director of the Survey attached. * * * *Provided, however*, That a copy of every topographic map and other maps showing the distribution of the forests, together with such field notes as may be taken relating thereto, shall be certified thereto by the Director of the Survey and filed in the General Land Office.

Fiscal year 1900.—For topographic surveys in various portions of the United States, $240,000, to be immediately available;[2]

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[1] In subsequent years Texas was included.

[2] For 1913 and 1916 the words "to be immediately available" were eliminated, and for 1914 and 1915 the words "one-half to be immediately available" were included.

For continuation of the survey [3] of the public lands that have been or may hereafter be designated as forest reserves,[4] $130,000, to be immediately available.[2]

And provided further, That hereafter all standard, meander, township, and section lines of the public-land surveys shall, as heretofore, be established under the direction and supervision of the Commissioner of the General Land Office, whether the lands to be surveyed are within or without reservations, except that where the exterior boundaries of public forest reservations are required to be coincident with standard, township, or section lines such boundaries may, if not previously established in the ordinary course of the public-land surveys, be established and marked under the supervision of the Director of the United States Geological Survey whenever necessary to complete the survey of such exterior boundaries.

Fiscal year 1917.—For topographic surveys in various portions of the United States, $350,000: *Provided*, That in expending this sum preference shall be given special topographic surveys of areas selected by the War Department and in securing such extra topographic data as are requested by the War Department in these or other areas;

For continuation of topographic surveys of the public lands that have been or may hereafter be designated as national forests, $75,000.

Fiscal year 1920.—For topographic surveys in various portions of the United States, including lands in national forests, $325,000.

Fiscal year 1924.—For topographic surveys in various portions of the United States, including lands in national forests, $500,000: *Provided*, That no part of this appropriation shall be expended in cooperation with States or municipalities except upon the basis of the State or municipality bearing all of the expense incident thereto in excess of such an amount as is necessary for the Geological Survey to perform its share of standard topographic surveys.

Fiscal year 1926.—For topographic surveys in various portions of the United States, including lands in national forests, $485,000, of which amount not to exceed $305,900 may be expended for personal services in the District of Columbia: *Provided*, That no part of this appropriation shall be expended in cooperation with States or municipalities except upon the basis of the State or municipality bearing all of the expense incident thereto in excess of such an amount as is necessary for the Geological Survey to perform its share of standard topographic surveys.

Fiscal year 1927.—For topographic surveys in various portions of the United States, including lands in national forests, $451,700, of which amount not to exceed $267,000 may be expended for personal services in the District of Columbia: *Provided*, That no part of this appropriation shall be expended in cooperation with States or municipalities except upon the basis of the State or municipality bearing all of the expense incident thereto in excess of such an amount as is necessary for the Geological Survey to perform its share of standard topographic surveys, such share of the Geological Survey in no case exceeding 50 per cent: *Provided further*, That $372,200 of this amount shall be available only for such cooperation with States or municipalities.

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[2] See footnote 2, p. 2.

[3] For 1909 and subsequent years this wording was changed to "topographic survey."

[4] For 1910 and subsequent years this wording was changed to "national forests."

DEFICIENCY ACTS

The Geological Survey has had only two deficiency appropriations for topographic surveys. The deficiency act of July 28, 1892, carried the following appropriation:

Geological Survey: For topography east of one hundredth meridian, fiscal year 1891, $3,818.87; for topography west of one hundredth meridian, fiscal year 1891, $754.51 ..... $4,573.38

The first deficiency act for the fiscal year 1926, approved March 3, 1926, contained the following provision:

United States Geological Survey.—For topographic surveys in various portions of the United States, including the general objects of expenditure enumerated in the second paragraph under the caption "United States Geological Survey," in the Interior Department appropriation act for the fiscal year 1926, and including not to exceed $33,000 for personal services in the District of Columbia, fiscal year 1926, $73,300, to be expended in cooperation with States or municipalities on standard topographic surveys and on a basis on which the share of the Geological Survey shall in no case exceed 50 per cent.

TEMPLE ACT

Since the war engineers and others have demanded more rapid progress in the completion of the standard topographic map. This interest resulted in the passage by the Sixty-eighth Congress of what is known as the Temple Act, approved February 27, 1925, which is as follows:

AN ACT To provide for the completion of the topographical survey of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the President be, and hereby is, authorized to complete, within a period of twenty years from the date of the passage of this act, a general utility topographical survey of the territory of the United States, including adequate horizontal and vertical control, and the securing of such topographic and hydrographic data as may be required for this purpose, and the preparation and publication of the resulting maps and data: *Provided,* That in carrying out the provisions of this act the President is authorized to utilize the services and facilities or such agencies of the Government as now exist or may hereafter be created, and to allot to them (in addition to and not in substitution for other funds available to such agencies under other appropriations or from other sources) funds from the appropriation herein authorized, or from such appropriation or appropriations as may hereafter be made for the purpose of this act.

SEC. 2. That the agencies which may be engaged in carrying out the provisions of this act are authorized to enter into cooperative agreements with and to receive funds made available by any State or civic subdivision for the purpose of expediting the completion of the mapping within its borders.

SEC. 3. The sum of $950,000 is hereby authorized to be appropriated out of any moneys in the Treasury not otherwise appropriated, to be available until the 30th day of June, 1926, for the purpose of carrying out the provisions of this act, both in the District of Columbia and elsewhere as the President may deem essential and proper.

COOPERATION WITH WAR DEPARTMENT ON SPECIAL MILITARY INFORMATION

First agreement.—On January 12, 1905, an agreement was approved by the Secretary of the Interior and the Secretary of War designed to make the topographic maps of the Geological Survey more useful to the War Department. This agreement provided that the Geological Survey should show on its topographic maps resulting from new surveys or resurveys the location and extent of timbered areas, of important railroad cuts and embankments, and of important arroyos, and should furnish to the War Department one photolithographic copy of each new topographic map on which the following special military information should be lettered by appropriate and authorized abbreviations: Whether streams are fordable or unfordable; the width, depth of water, character of bottom, and height and steepness of banks of all unfordable streams at points of crossing; the length, kind, character of material, and height above water of wagon and railroad bridges over the unfordable streams; the location of the highest points of hills and ridges; the nature of ferries; and the location of mills, waterworks, and roundhouses.

Second agreement.—The photolithographic maps furnished under the first agreement did not prove satisfactory to the War Department, and on October 14, 1911, a second agreement was approved by the Secretary of the Interior and the Secretary of War, which provided that the Geological Survey should issue a special War Department edition of 100 copies of each topographic map published on a scale of 1:62,500 or larger, on which should be printed the special military information previously requested, together with the location of blacksmith shops, permanent post-office buildings, churches, and schoolhouses.

The agreement also provided that the Geological Survey should concentrate its topographic mapping efforts on those unmapped areas of the United States along the coasts and borders, and should comply, so far as practicable, with requests made by the War Department to give priority to work in areas of which maps were needed for military purposes. The War Department agreed to obtain annual appropriations of about $60,000 to reimburse the Geological Survey for this additional work, but the first of these appropriations was not approved until July 1, 1916, and was carried in the sundry civil act for 1917, as follows:

Topographic maps, War Department.—For reimbursing the United States Geological Survey for expenses incurred in making special topographic surveys of areas selected by the War Department, and for additional expenses incurred in securing such extra topographic data as are requested by the War Department in these or other areas, and engraving and printing the same on atlas sheets of the United States Geological Survey, $35,000: *Provided*, That

the Secretary of War is authorized to advance from this appropriation to the United States Geological Survey such sums as the Secretary of the Interior may request.

This agreement remained in effect until after the end of the World War, and the Geological Survey delivered to the War Department special military editions of its topographic maps, each accompanied by a confidential report containing military information.

During the World War the topographic branch of the Geological Survey gave its entire attention to special military surveys, and the importance of topographic mapping was emphasized as a matter of vital military necessity.

Since 1917 appropriations have been made in War Department acts under the heading "Military surveys and maps," and funds have been allotted from such appropriations to repay the Geological Survey for topographic surveys requested by the War Department.

Third agreement.—In 1920 the War Department adopted the standard topographic maps of the Geological Survey as the tactical maps for the use of the Army, and a third agreement between the Secretary of the Interior and the Secretary of War canceled the former agreements and authorized the abandonment of the collection by the Geological Survey of confidential military information.

This agreement provided that the Geological Survey should show on its standard topographic maps a classification of highways and highway bridges and the rectangular grid adopted by the Army and should furnish to the War Department 200 copies of each standard topographic map published thereafter.

The agreement also provided that the War Department would, except in emergency, cease publication of progressive military or tactical maps of areas mapped by the Geological Survey, and would concentrate its topographic mapping in the continental United States to special military surveys, to quadrangle mapping of areas not mapped by the Geological Survey, and to the revision of old maps.

The agreement further provided that the War Department would allot to the Geological Survey not less than 50 per cent annually of its appropriation for military surveys and maps, to be expended on topographic surveys of such areas as were mutually agreed upon.

Fourth agreement.—In 1926 a fourth agreement was approved by the Secretary of the Interior and the Secretary of War replacing all former agreements. This agreement embodied the principal features of the third agreement with the following exceptions: Provision was made that the Geological Survey would furnish the War Department with 300 instead of 200 copies of each standard topographic map published by the Geological Survey, credit to be applied to the War Department's quota for the number of copies not delivered and all requests for maps to be made through the Chief of Engineers.

The agreement provided that the Corps of Engineers would allot to the Geological Survey not less than $12,500 annually from its appropriation for military surveys and maps.

Provision was also made to add the Harriman index number of the quadrangle to each topographic map if the use of that system is approved by the Board of Surveys and Maps.

The following is an extract from the War Department appropriation act of 1927:

Military surveys and maps.—For the execution of topographic and other surveys, the securing of such extra topographic data as may be required, and the preparation and printing of maps required for military purposes and for research and development of surveying by means of aerial photography and in field reproduction methods, to be immediately available and remain available until December 31, 1927, $80,000:[5] *Provided*, That the Secretary of War is authorized to secure the assistance, wherever practicable, of the United States Geological Survey, the Coast and Geodetic Survey, or other mapping agencies of the Government in this work and to allot funds therefor to them from this appropriation.

STATE COOPERATION

In addition to funds appropriated direct to the Geological Survey and allotments made by the War Department, the Geological Survey has, since the fiscal year 1885, engaged in cooperation with many States and their subdivisions, the States paying part (usually half) of the expense of topographic mapping. For the fiscal year 1927 the several States have allotted $378,791.88.

On page 36 is a table showing by fiscal years the funds made available for topographic mapping from all sources, and on pages 29–35 detailed information in regard to such cooperation.

ORGANIZATION OF THE TOPOGRAPHIC BRANCH

The topographic branch is organized under the direction of a chief topographic engineer into three field divisions (Atlantic, Central, and Pacific), each of which is in charge of a division engineer.

The Atlantic division is subdivided into the New England, Middle Atlantic, South Atlantic, and Ohio Valley sections; the Central division into the Great Lakes, Missouri Valley, Red River, and Rocky Mountain sections; and the Pacific division into the North Pacific, South Pacific, Salt Lake Basin, and Hawaiian sections. Each section is in charge of a topographic engineer.

The office work is both administrative and technical in character.

The administrative work is handled by a chief clerk allocated to clerical, administrative, and fiscal service, grade 7, assisted by clerical employees ranging from grades 5 to 2.

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[5] Of this amount $12,500 was allotted to the Geological Survey.

Technical office work is divided into five sections—computing, inspection and editing, cartography, photographic surveying, and relief mapping—and each section is in charge of a topographic engineer in professional and scientific service, grade 4, or an associate engineer in professional and scientific service, grade 3. The personnel of each of these sections is made up of professional, subprofessional, and clerical employees of various grades.

The members of the technical force, with headquarters at Washington, D. C., and those with headquarters in the field, are classified in professional, subprofessional, and field grades as follows:

	District of Columbia classification	Field classification	Range of salaries
Chief topographic engineer	P. and S.–5		$5,200–$6,000
Division engineers	P. and S.–5	F.–16	5,200– 6,000
Topographic engineers in charge	P. and S.–4	F.–15	3,800– 5,000
Associate engineers	P. and S.–3	F.–13	3,000– 3,600
Assistant engineers Chief engineering aids	P. and S.–2 or S. P.–8	F.–11	2,400– 3,000
Junior engineers Senior engineering aids	P. and S.–1 or S. P.–6	F.–9	1,860– 2,400
Assistant engineering aids	S. P.–4	F.–7	1,500– 1,860
Apprentice engineering aids	S. P.–2	F.–5	1,140– 1,500

Promotions within the grades are made by the Department of the Interior on the basis of efficiency ratings, but reallocations to fill vacancies in a different grade require the approval of the Personnel Classification Board.

Entrance into the engineering aid group has been made through certification by the Civil Service Commission after the applicant passed an examination for topographic aid. No examination for this position has been held since 1924, and no new appointments in the engineering aid groups are contemplated. Those who entered the service through the examination for topographic aid in 1924 are not eligible for promotion above $1,800 without qualifying for the professional service.

Entrance into the professional grade is made through certification by the Civil Service Commission after the applicant has passed the technical examination for junior topographic engineer. This examination is usually held yearly, during the college spring-vacation period, and one of the necessary requirements is a degree in civil engineering from an institution of recognized standing. Engineers with the proper qualifications and civil-service status may be transferred to the professional grade from other departments, providing there are vacancies.

PUBLICATIONS

The published results of the work of the topographic branch are maps and geodetic reports. The office work consists principally of

computing and adjusting field observations, inking and drafting field sheets, and inspecting and editing maps for final publication. The engraving and printing of these maps is done by the division of engraving and printing, another unit of the Geological Survey.

GENERAL OFFICE INSTRUCTIONS

Travel authorization.—Every permanent man must have a travel authorization before leaving for the field, the number and date of which must be shown on all vouchers claiming expenses for travel or per diem.

Letters of instruction.—At the beginning of the field season and at the completion of an assignment, letters of instruction are issued to permanent men in regard to their field work. Authority for purchases or repairs exceeding $100, for the employment or promotion of temporary assistants, and for the delivery of camp outfits, animals, or automobiles is also given when necessary.

Miscellaneous instructions.—Before leaving the Washington office for an assignment, field men should turn in all office instruments and map material, clear their desks and map file cases, submit a report of their office work, send address cards to the new post offices, and report to their division engineers that they have carried out these instructions.

ORGANIZATION OF FIELD PARTIES

CLASSIFICATION

The chief topographic engineer is responsible for the administrative and technical control of all the work of the topographic branch, acting under the general supervision of the Director.

The division engineers are responsible for all the technical and administrative work of their respective divisions, acting under the general supervision of the chief topographic engineer.

Topographic engineers in charge of sections exercise such specific technical and adminstrative control over the employees of the section as may be delegated to them by the division engineer. The technical supervision is usually close and specific; the administrative supervision is more general.

The party chiefs are usually in the grade of associate engineer, and they exercise immediate supervision over the members of their parties under the general or specific instructions of the section and division chiefs. Under some conditions engineers of lower grades act as party chiefs, but usually the sequence of work and authority is graded down to the lowest engineering aid, and the entire field party, in charge of an associate engineer, is made up of one or more employees of each lower grade. Recorders, rodmen, chainmen, packers, teamsters, chauffeurs, and cooks are in the unclassified service and are employed as temporary assistants.

EMPLOYMENT OF TEMPORARY ASSISTANTS

Applications.—Persons desiring temporary employment as rodmen, recorders, chainmen, etc. (grade 1), must file applications, on the form provided for that purpose, with the chief topographic engineer in Washington. Appointments will be made by the section or party chiefs from the list of applicants on file as vacancies occur in field parties, preference being given to former employees of the Survey whose services have been satisfactory and who are endeavoring to prepare themselves for civil-service examination for the grade of junior topographic engineer; to applicants who are available for the entire field season (usually April 15 to November 15); to residents of States in which service is to be performed; to other applicants in order of priority of application and fitness for the work.

Applicants for grade 1 must be free from all contagious diseases and qualified for rigorous outdoor work and must be between the ages of 20 and 40 years. The rate of pay for initial employment is $110 to $120 a month, the employee paying his own subsistence expenses and his traveling expenses to and from the place of employment.

Laborers, chauffeurs, teamsters, packers, and cooks (grade 2) are employed by the party chiefs as the necessity may arise.

Letters of employment.—Before entering upon his field duties every temporary employee must sign an agreement specifying the terms of his employment, and the party chief must forward this letter of employment immediately to the section chief or division engineer for approval and transmittal to the chief topographic engineer. Salaries for more than one week's services can not be paid until letters of employment are on file. Temporary employees hired in connection with their automobiles should sign letters of employment. Application cards should be made out by temporary employees hired in the field and should be submitted with their letters of employment.

FIELD ADMINISTRATION

Field insurance.—As no leave of absence is given to temporary employees in the field, whether employed by the month or by the day, their pay stops immediately if they become incapacitated by reason of accident or sickness. In order that other members of a party may not be called on to bear the expenses entailed by sickness or accident of one member, chiefs of parties are instructed to urge all employees to take out insurance. To provide this insurance at the lowest possible rate a mutual-benefit association has been formed by members of the Geological Survey and other Government bureaus. This association exists solely for the purpose of giving health and accident insurance to field men at cost and of preventing unnecessary burdens

from falling on the immediate associates of those disabled. Information concerning membership may be obtained from chiefs of parties.

Right to compensation for personal injuries.—Under the Federal compensation act of September 7, 1916, all civil employees of the United States are entitled to compensation for injuries sustained in the performance of duty which cause disability to perform work for a period of more than three days. The act also provides for the payment of certain expenses incurred for medical and hospital attention resulting from such injuries.

The act provides no benefits for sickness not due to injuries, but an amendment, approved June 6, 1924, provides that compensation shall be paid for occupational diseases or "any disease proximately caused by the employment."

The mere fact that disease develops after the employee enters Government service can not be accepted as sufficient basis for an award of compensation; direct causal relationship of the employment must be shown, and common diseases, such as colds, pneumonia, tuberculosis, typhoid fever, or rheumatism, which may be and usually are due to causes entirely outside the employment, can rarely and only under the most unusual conditions be the basis of an award under this act.

Section 20 of the compensation act provides that original claims for compensation for disability shall be made within 60 days after the injury, but for any reasonable cause the commission may allow such claims to be made at any time within one year. All original claims for compensation for death shall be made within one year after death.

Chiefs of parties should provide themselves with a copy of "Regulations concerning duties of employees, official supervisors, medical officers, and others," a printed list showing the location of all designated medical officers, hospitals, and dispensaries, and blank forms for reporting injuries and filing claims for compensation in compliance with the regulations.

In case an employee is injured in a section of the country where no United States medical officer or hospital is located, and there is no physician designated for that vicinity in the printed list issued by the commission, a local physician may be employed. (See the regulations above cited, p. 36, pars. 93–98.)

The chief topographic engineer should be notified immediately in regard to every injury resulting in death, or in any loss of time, or in any expenditure for medical, surgical, or hospital services or supplies. These reports should not be omitted in cases in which the time lost was covered by annual or sick leave or in which no claim for compensation is contemplated.

The blanks covering the employee's injury and claim for expenses should be properly filled out in the field and forwarded to the chief topographic engineer for transmittal to the Employees' Compensation Commission.

Typhoid-fever prevention.—Field men are more liable to contract typhoid fever than any other disease. It is therefore urged that everyone who has not already had that disease protect himself against it by inoculation with any antityphoid serum or "vaccine" as prepared and administered by the United States Army surgeons. This prophylactic will be administered without charge to anyone applying in person to the designated officers of the Public Health Service in each State. (See Treasury Department Circular, Public Health Service, November 24, 1922.)

Farmers' Bulletin 478, United States Department of Agriculture, gives valuable suggestions on means of avoiding typhoid fever and the use of the prophylactic for its prevention.

Care of public property.—Chiefs of parties will be held responsible for the public property intrusted to their care and are expected to see that it receives no rougher usage than conditions necessitate.

Purchase of property in field.—Every article of property which appears on a voucher as having been purchased and which is not expendable must be accounted for on the returns to the custodian. In cooperating States separate Federal vouchers for such articles must be submitted for payment. Those in direct charge of property should be prepared to make a statement to the custodian as to its condition and the amount on hand. Animals, tents, wagons, and property of considerable value must not be purchased without authority from the division engineer. Animals purchased must be reported on Form 9–061.

Storage.—In arranging for the care of field property at the end of a season efforts should be made to store it near a main line of railway; if possible, in a fireproof building.

Contracts for storage, etc.—If the total storage charge estimated for the winter season will not exceed $100, it is only necessary to have a record of the transaction that will place some obligation on the caretaker. Three copies of "Receipt, proposal, and acceptance," for storage or pasturage (Form 9–007 or 9–008) must therefore be prepared, one copy to be delivered to the caretaker and two to be sent to the chief topographic engineer through the division engineer.

The following requirements must be observed if the total charge for storage, or the other services indicated, will exceed $100:

1. A contract must be entered into for continuing services such as pasturage and storage, hire of team or automobile not employed in connection with services of individual, hire of horses, hire of

room for office or storage, and all other continuing services other than personal when the total payments for the fiscal year will exceed $100. Field men must determine whether or not the payments will run above this figure and act accordingly.

2. If it is found that a contract will be necessary, bids for the service must be obtained from three or more dealers if possible; the lowest bid is to be accepted if satisfactory, and a contract entered into. The contract must be sent to the Washington office for approval. If the lowest bid is not accepted, a detailed statement of the reasons for accepting a higher bid must accompany the contract.

3. The short-form contract should be submitted in quadruplicate, two copies to be signed by the contractor and a third to bear the "Oath of disinterestedness." After approval, one of the signed copies will be returned to the contractor by the Washington office.

4. If no competition is available and a contract is necessary, it may be entered into with the only available dealer, but a statement to that effect should accompany it, and each voucher covering payment for the service should indicate by the symbols "4(c)" that there was only one contractor from whom the service could be obtained, and by "A" under "Form of agreement" that a contract has been entered into.

5. Day-to-day purchases of oil and gasoline and repairs to automobiles are not continuing services, and therefore the only limitation to such transactions is that no daily purchase or repair bill may exceed $100 without a formal contract. Vouchers must not be split in order to avoid the necessity of entering into a formal contract.

All contracts for continuing service, except personal employment, should be renewed at the beginning of the fiscal year.

Prior authority should be procured from the chief topographic engineer for all expenditures in excess of $100 and from the Director for all in excess of $500.

Inventories.—When nonexpendable property is stored a detailed inventory (Form 9–054) stating the condition of each article must be made and forwarded to the chief topographic engineer. Reports on condition and transfer of automobiles and of livestock should be made at the same time. When property, automobiles, or animals are removed from storage or pasturage, inventories and proper reports should be made in triplicate, one copy to be retained by the field man, one copy to be delivered to the caretaker, and one copy to be mailed to the branch chief clerk for transmission to the division of field equipment. At the end of a field season an inventory on Form 9–445–b must be made of all property charged against the party chief by the division of field equipment since the beginning of the year that has not been previously reported on this form. All prop-

erty that is being returned, held, transferred, or stored or that has been lost should be included.

Transfer of property.—When equipment is transferred from one field man to another an inventory of property (Form 9–054) should be made out; for automobiles Form 9–057 should be used, and for livestock Form 9–061. Instruments and other property should be recorded on Forms 9–139 and 9–455–b. All these reports should be transmitted to the branch chief clerk.

Sale of property.—Survey property can be sold only at public auction (see instructions in par. 74, fiscal regulations); an inspection report on Form 9–047 and authorization from the Director are required before the sale is held. When so authorized, unserviceable passenger-carrying vehicles may be exchanged as part payment for new passenger-carrying or freight-carrying vehicles, but unserviceable freight-carrying vehicles may be exchanged only for new freight-carrying vehicles.

Abandonment of property.—If property is so unserviceable that the expense of holding an auction sale of it is unwarranted, it may be abandoned after submitting an inspection report (Form 9–047) and obtaining the approval of the Director. (See p. 18 for instructions concerning abandonment of automobiles.)

Lost or stolen property.—If any Government property is lost or stolen, a report must be made promptly on Form 9–445–b and explained fully on Form 9–048; Form 9–061 should be used for livestock, and reasonable charges for recovering animals are allowed.

Returned property.—All property that is being returned to the division of field equipment must be reported in triplicate on Form 9–445–b; no property will be accepted or credited until this signed form has been received. This report should be sent along with the bill of lading to the branch chief clerk; it must not be inclosed in the boxes shipped.

CAMP ADMINISTRATION

If camp outfits are used, their character should be determined by the size of the party, the means of transportation, and the nature of the work. The party chief should insist on punctuality, order, and neatness. Proper discipline is absolutely essential to efficiency.

A United States flag and a Geological Survey pennant must be displayed over each camp.

Camp sites should be carefully selected and the tents arranged in definite order and not at random. Wagons and other vehicles should be parked on one side. Harness, saddles, etc., should be kept off the ground and either hung on racks or placed in the wagons. Animals should be corralled at a sufficient distance from the tents to prevent them from interfering with comfort and sanitation. The camp

should be kept neat at all times; no loose articles, papers, or refuse should be allowed to litter the grounds.

Chiefs of parties should formulate sanitary regulations for camp administration adapted to the locality and should see that they are rigidly enforced. Promiscuous drinking from streams, failure to use boiled drinking water, carelessness in selecting camp sites, inadequate provision for the disposal of refuse, failure to observe sanitation in the arrangement of toilet facilities, insufficient screening from flies, and failure to use mosquito netting in malarial districts are responsible for most of the sickness in camp. (See "Typhoid-fever prevention," p. 12.)

Subsistence.—The Geological Survey allows a per diem in lieu of subsistence for camp parties. The following ration list is recommended as a general guide. Experience has shown it to be ample in amount for all essential articles.

Ration list for topographic field parties[1]

[100 rations]

Fresh meat, including fish and poultry	pounds	100
Cured meat, canned meat, or cheese	do	50
Lard	do	15
Flour, bread, or crackers	do	80
Cornmeal, cereals, macaroni, sago, or cornstarch	do	15
Baking powder or yeast cakes	do	5
Sugar	do	40
Molasses	gallon	1
Coffee	pounds	12
Tea, chocolate, or cocoa	do	2
Milk, condensed	cans	10
Butter	pounds	10
Dried fruit	do	20
Rice or beans	do	20
Potatoes or other fresh vegetables	do	100
Canned vegetables or fruit	cans	30
Spices	ounces	4
Flavoring extracts	do	4
Pepper or mustard	do	8
Pickles	quarts	3
Vinegar	quart	1
Salt	pounds	4
Miscellaneous items:		
Soap	bars	12
Sapolio	cans	4
Matches	boxes	24
Candles	dozen	4
Paper lunch bags		100
Kerosene	gallons	15

[1] The following substitutions may be made: 8 eggs for 1 pound of meat; 5 pounds of fresh meat for 2 pounds of cured meat; 5 quarts of fresh milk for 1 can of condensed milk; 5 pounds of fresh fruit for 1 pound of dried fruit; 3 pounds of fresh vegetables for 1 pound of dried vegetables.

Rations for stock.—For stock the following ration may be used as a basis for estimate:

Daily ration, in pounds, for stock

	Oats[a]	Corn[a]	Hay
Heavy horses	12	15	24
Mules	10	12	20

[a] The rations of oats and corn are substitutes for each other.

Camp equipage.—In order to facilitate field work in regions where camping is necessary or desirable, parties will be furnished with complete camp equipage, including tents, stoves, camp furniture, mess and cooking outfits, as well as means of transportation, such as wagons, automobiles, and other vehicles, harness, riding saddles, packsaddles, and necessary accessories.

Camp beds.—When necessary, a camp bed, consisting of one folding cot, two lamb's wool comforts, one woolen double blanket, one pillow, and one canvas bed cover, will be supplied for each permanent employee, on properly approved requisition through the Washington office. Temporary employees must furnish their own beds except on special field trips in which standardization of equipment is required.

Care of camp property.—As wear of camp property results mostly from carelessness in packing, loading, and transporting when camp is moved, party chiefs should take pains to instruct their assistants as to proper methods of handling it. Wagons should be painted and harness should be oiled as often as is necessary to keep in good condition. The teamster should be required to give proper attention to these details.

Storing and pasturing.—Storing should be done with order and system. The materials should be placed in boxes, the boxes numbered, and lists made of the articles in each box. The boxes should be securely packed and nailed, so that, if necessary, they may be safely shipped by rail. When wagon outfits are used the boxes may be left on the wagons ready to haul away. Precautions must be taken to protect property against dampness and rodents. Tents, harness, blankets, etc., must be thoroughly dried before packing; otherwise they will be ruined by mildew. Axles of vehicles must be cleaned with coal oil and well covered with axle grease. Cooking utensils and tableware must not be packed unwashed but must be thoroughly cleaned and dried. No food, matches, or grain should be stored.

Chiefs of parties must exercise great care in selecting proper localities and responsible caretakers for public animals to be placed in pasturage. Shelter, water, and character of forage, as well as the reliability of the caretaker, should govern selection. All shoes should

be removed, and an inventory and a complete description of all animals should be made before they are delivered to the caretaker. (See "Inventories," pp. 13–14; "Contracts for storage," pp. 12–13.

Entertaining persons in camp.—Chiefs of parties and all other employees of the Survey are cautioned against entertaining in camp, when on field duty, any persons in a manner calculated to interfere with public business or to entail public expense.

Personal baggage.—Personal baggage should consist of essentials only and should be carried in canvas bags, suit cases, or locker trunks. Large trunks should not be taken to camp, except where they can be readily transported by wagon or rail.

GENERAL INFORMATION

AUTOMOBILES

Purchase of automobiles.—Automobiles must not be purchased without authority from the chief topographic engineer. A report on Form 9–057 of the engine and body numbers, make and type of car, Survey identification tag number, and date and place purchased must be made for new automobiles.

Purchase of automobile tires and tubes.—Chiefs of parties should anticipate their needs for tires and tubes for each quarter and be prepared to order them through the division engineer when a call for a definite quantity order is made. Vouchers in payment of emergency purchases in the field must be accompanied by a brief note addressed to the division engineer, explaining the emergency purchase and giving the reason why these supplies were not procured from the Washington office.

Identification tags for Survey automobiles.—When automobiles are purchased a set of tags bearing a Survey number are sent from the Washington office and should be attached to the machine. Paper Survey emblems, one to be attached on each side of the car, are also furnished. All Geological Survey automobiles must carry Survey emblems as well as tags, and request should be made for them if they are not already on the car. In placing emblems on the car a light coat of shellac or varnish for outside protection is desirable. Unnumbered tags to replace lost or defaced tags will be sent upon request, the same number to be painted on them.

State licenses.—The United States Government does not recognize the right of State officers to enforce State laws so as to require Federal employees (including temporary employees) to submit to an examination or to obtain State permits to perform their official duties. (See Supreme Court decision 289, October term, 1920.) This policy applies to drivers' licenses and State registration tags. Some States furnish without charge special Federal registration tags,

and tags so furnished should be carried on Survey cars, but one of the Survey identification tags should also be fastened inside the car. If a Survey employee is arrested for failure to have a State driver's license or a State registration tag, the fact should be reported to the nearest United States district attorney and to the chief topographic engineer. The Survey will not condone violations of traffic regulations and will take proper disciplinary measures if such violations are reported. Every driver of a Survey car is expected to be capable of handling it and to observe all local traffic regulations.

Care of automobiles.—Survey automobiles are intended for official use only. Repairs should be made promptly and with as little time lost to field work as practicable. All parts requiring oil or grease must be examined frequently, and all bolts and nuts must be kept tight. Radiators should be kept full of water, and attention must be given to storage batteries every 10 days.

Maintenance-cost record for automobiles.—A cost record is being kept on all cars purchased since January 1, 1926. Field engineers will keep a supply of automobile maintenance account blanks (Form 7876) and from them must compile a monthly automobile cost sheet in duplicate, one copy being forwarded to the Washington office and one copy being retained for future use. The cost sheet should show the total quantity and total cost of each item of expense. From these records the upkeep cost per mile will be computed in the Washington office. To obtain accurate mileage records it is necessary that speedometers on all cars purchased since January 1, 1926, be kept in good adjustment.

Storage of automobiles.—Automobiles should be stored in a fireproof building. Air should be let out of tires, if necessary, and the cars jacked up. Storage batteries should be taken out and provision made for recharging them monthly. A single contract should be made for all Survey cars in the vicinity at a rate of so much per car per month, so that cars can be added or withdrawn without necessitating a change in contract. (See "Contracts for storage," pp. 12–13.)

Abandonment of automobiles.—If an automobile is so unserviceable that the expense of holding an auction sale of it is unwarranted, it may be abandoned after submitting an inspection report (Form 9–047) and obtaining the approval of the Director. Serviceable parts should be taken out for use on other machines. When engines are interchanged, a report must be made, giving correct numbers. All tags from automobiles that are sold, exchanged, or abandoned must be forwarded to the division of field equipment. (See p. 14 for instructions concerning transfer or sale of automobiles.)

Automobile accidents.—Drivers of Geological Survey cars must drive carefully. All accidents must be immediately reported to the chief topographic engineer. Should there be a possibility of arrest

or of a suit for damages, complete details should be wired to him, and he will request the Department of the Interior to ask the Department of Justice to assign the nearest United States district attorney to defend the case. Survey employees should not pay charges for damages unless the damages are due to their personal negligence. If the claim is considered just, a voucher should be submitted to the chief topographic engineer, supported by evidence to show the obligation of the United States, and he will submit it as a claim.

Travel in privately owned automobiles.—Prior authority must be obtained for travel in privately owned automobiles to and from field assignments. Requests for such authority should be made to the chief topographic engineer. A copy of this authorization or a reference to it must accompany voucher claims for reimbursement for expenses thus incurred.

OFFICE REPORTS

Every day's service of permanent employees, except administrative officers and clerks, must be reported on either an office or a field report blank. Each office report must show whether the service was performed in the District of Columbia or at a field office. Leave of absence preceded and followed by service in the District of Columbia should be so charged and entered on the Washington office report blank. Leave preceded by service in the District of Columbia and followed by service in the field or leave preceded by service in the field and followed by service in the District of Columbia should be counted as service in the District of Columbia if taken within the District of Columbia or as field service if taken outside. Office reports must not cover any service in the field or any travel to and from the field. Office reports are used both for work records and for pay-roll charges, and they must be so complete that there will be no uncertainty as to the amount of work done or the number of days spent on each particular job. Each day covered by the report should be accounted for, and, if practicable, Sundays, holidays, and leave of absence should be prorated against some particular job for which there is an allotment. However, periods of leave of one day or more should be indicated under "Remarks" for a check on office leave records.

REPORTS OF FIELD PARTIES

A monthly report is required from each chief of party on the topographic, transit-control, or level work done under his direction. Reports should be made out in triplicate unless otherwise instructed. One copy is sent directly to the chief topographic engineer, one copy to the division engineer, and one copy to the topographic engineer

in charge of the section. Reports should be complete in every detail and should include the names and work of all employees rendering technical service as well as the names and time of all temporary men employed during the month. Absence from duty through leave or other causes should be fully reported. Reports should be mailed not later than the first day of each month, as a summary must be submitted to the Director early in the month. At the conclusion of field work reports should be submitted promptly and should not be delayed by leave of absence or extended travel. The regular monthly form is to be used for topographic, triangulation, traverse, and level work, and a separate report must be made for each quadrangle and State. Diagrams should be carefully drawn, as they are used to keep the office progress maps up to date.

Expenditures for services in the District of Columbia are limited by statute, and it is necessary to keep a close check on such services. Therefore, reports of field parties must not include service in the Washington office or any field office. Travel to and from these offices and leave taken on the way should be included on the field report, and an office report should be submitted covering the time beginning with the day of arrival at the location of the office even though leave of absence may be taken at the location of the office before duty is begun.

Reports of "transfer of permanent and temporary employees" should be submitted to the chief topographic engineer when the transfers are made.

A report (Form 9–946) giving the names of the field assistants of grades 1 and 2 and the dates of their employment is required of all party chiefs. This report is to be made out at the end of each field season or on December 31 should field work be continuous. Recommendations concerning these temporary employees should be transmitted to the chief topographic engineer at the same time.

At the end of the field season a "certificate of users of Survey field property" (Form 9–036) should be filled out and transmitted to the branch chief clerk.

FIELD NOTEBOOKS AND RECORDS

Party chiefs will be held responsible for plane-table sheets, traverse sheets, field notebooks, and other valuable manuscript data until they are delivered to the agent of an express company or the registry clerk of a post office and a receipt is obtained. Field sheets should be protected from injury or loss and when completed should be sent to the proper office by registered mail or express. Should any maps or map material be carried to the Washington office in

personal baggage they must be delivered immediately on arrival to the section of inspection and editing for recording. Adjustments or corrections should not be allowed to accumulate but should be transferred promptly to the final field sheet. Information sheets, name sheets, road-classification sheets, and woodland sheets should be examined before leaving the field in order to insure complete data. Should maps and records be turned over to a successor in the field a receipt covering each item must be obtained. All party records and memoranda should be kept up to date and preferably in a separate file or book. Notebooks should usually be forwarded to the Washington office by registered mail, addressed to the chief topographic engineer. If duplicate data are entered in separate notebooks the books should be forwarded on different days, so that if either set is lost the other may be used. Every effort should be made to prevent the possibility of entire loss of results. Under no circumstance should valuable records be forwarded by ordinary mail.

CHANGES OF ADDRESS

All changes of address while in the field or on leave should be reported promptly to the chief topographic engineer, division engineers, and section chiefs. Arrangements should be made for the prompt delivery of mail, express, telegrams, and telephone messages. Addresses given on final party pay rolls and other vouchers should be correct, so that checks will be sent to the proper points. Individual addresses for members of the party should be given when necessary.

LEAVE OF ABSENCE

Permanent employees in the field desiring to take leave at the end of the field season should forward the request on Form 1–034 through their section chief long enough in advance to obtain approval of the request before the beginning of leave status. If the exact date is dependent upon the completion of the field work, and this date can not be determined in advance, the request should state the number of days desired, and when the exact date is known it should be communicated to the division engineer, who will insert proper dates on the leave request. Telegraphic requests for leave can not be charged to the Government.

UNPAID BILLS

Engineers should pay all outstanding bills before leaving the field and should make every effort to see that temporary assistants leave no unpaid bills.

VOUCHERS

Engineers assigned to sections should submit all vouchers, reports, or other official papers to their section chief, who will forward them to the division engineer, unless specific instructions have been given to send the originals directly to the division engineer or to the Washington office, and copies of the reports and a summary of the vouchers to the section chief. Vouchers should be submitted promptly at the end of each month, and complete data as to appropriation, allotment, and cost should be entered on the memorandum copy. During the last quarter of the fiscal year the voucher should be submitted semimonthly. On June 1 an itemized estimate of expenditures for June should be submitted, and on June 16 a revised estimate for the last half of the month. All changes to be made on the Washington office pay roll should be reported by wire to the chief topographic engineer.

Cost records.—The entries at the top of a voucher under "Appropriation symbol" and "Allotment" are for the bookkeepers' records and not for cost of work records. The field man should enter the appropriation and allotment in pencil on the memorandum copy of the voucher, and the section topographic engineer will verify these entries and stamp the correct entries on both original and memorandum copies. Cost records are kept by quadrangles or projects with the following entries: Field salaries, miscellaneous field expenses, office salaries, and miscellaneous office expenses. All salaries and miscellaneous expenditures should be classified as follows: Horizontal control, levels, aerial surveys, and sketching. The field engineers must enter this classification on memorandum copies of all vouchers, both Federal and State, and on memorandum copies of transportation requests and bills of lading. Under the heading "Salaries" will be entered all temporary salaries and full permanent salaries, including the retirement deduction. Under "Miscellaneous field expenses" will be entered all other field charges.

Cost records should therefore be entered on accounts by typewriter or in ink, in the following form:

Quadrangle	Field salaries	Miscellaneous field expenses	Horizontal control	Levels	Sketching	Total
Flint, Mich.	$200.00	$50.00	$50.00	$75.00	$125.00	$250.00
Schoolcraft Mich.	150.00	75.00	50.00	50.00	125.00	225.00
	350.00	125.00	100.00	125.00	250.00	475.00

If the voucher covers expenditures on only one quadrangle, omit the last line giving totals. If the voucher covers only one class of

work, such as sketching, omit the columns for other classes of work and the total column, and mark the sketching column "Total—sketching."

On Federal vouchers the cost entry will be made in the space for "Remarks," or in a party pay roll at the left of the title-page, the space marked "Classification summary" being left for a different classification which is to be reported to Congress. On State vouchers the classification will be made in the body of the voucher, below and to the left unless there is a suitable blank space elsewhere on the voucher. On memorandum copies of transportation requests and bills of lading the cost entry will be made directly below the statement of appropriation and allotment. (See fiscal regulations for specimen memorandum copies of vouchers.)

Expenditures for services in the District of Columbia are limited by statute, and every voucher, both Federal and State, covering payment for services in the District of Columbia, must carry on the memorandum copy the added entry "Service in D. C. ——— days, $———." All other pay vouchers should carry the entry "No service in D. C." Leave of absence immediately preceded and followed by service in the District of Columbia will be counted as service in the District of Columbia. (See "Office reports" and "Reports of field parties," pp. 19–20.)

Supplemental instructions as to cost records and memoranda in regard to the submission of State and Federal vouchers will be given by the division engineer at the beginning of the field season and at such other times as may be necessary.

Memorandum copies of transportation requests and bills of lading must be transmitted through the division engineer to the chief topographic engineer immediately after the use of the original, and the cost of the service (estimated if necessary) should be indicated as well as the quadrangle or project charge. A record should be kept of transportation requests for use in preparation of travel-expense vouchers and of both transportation requests and bills of lading for use in preparation of monthly reports.

Suggestions for rendition of vouchers.—Most of the following suggestions are repetitions of the requirements of the Geological Survey's fiscal regulations, to which references by pages or paragraphs are made herein.

Follow specimen copies of vouchers given in fiscal regulations.

Items must be stated in chronologic order. (Par. 164 (c).)

The time of departure from and arrival at official headquarters must be stated. (Par. 164 (f) and par. (a) on p. 86.)

If meals are taken en route that should or might have been taken at official headquarters the necessity of so taking them must be explained.

Reference to the method of all travel must be made in the body of the voucher.

Transportation requests covering more than one person must plainly indicate the name of each person. This information must also be given in the voucher. An employee who renders a voucher involving transportation issued by another employee must mention that fact. (Par. 114 (b).)

Telegrams from Washington must be sent paid; telegrams to Washington must be sent collect and marked "Official business." Charges for telegrams between points in the field must be supported by copies of the telegrams, which must be receipted by the company's representative.

Each employee, either permanent or temporary, should submit his own travel-expense voucher, which must be certified to by the chief of party.

Form 1012 must be used as a voucher for per diem if travel is performed during the period it covers. Transportation requests or scrip must be mentioned in the body of the voucher (p. 94) and listed in the space provided for them.

The number of pieces of baggage transferred and the charges for the transfer must be stated. A charge for transfer of baggage in excess of 75 cents must be explained. (The notation "Usual charge" will suffice.) (Par. 126 and par. (c) on p. 86, as amended.)

A charge for excess baggage must contain, in addition to a statement of the points between which the baggage was shipped, the rate, the weight, and a statement that the excess consisted of Government property or of personal property carried for official use. (Par. 124 and par. (w) on p. 89.)

Charges for transportation (street car, bus, taxi, auto, etc.) between places of temporary residence and places of temporary employment are items of subsistence and are included in the maximum amount allowed by the travel order. (1 Comp. Gen. 403 and 773.) Charges for transportation between working points are items of travel. The charges of these two kinds should be clearly distinguished on the voucher.

A voucher covering a period in which leave is taken while the employee is in a "travel status" must state the hours at which official duty was stopped and resumed. (Pars. 150 and 154.) It must show plainly any detour made for personal convenience and must state the direct route of official travel. (Par. 122.) Meals taken just prior to or immediately after annual leave are usually not proper items for charges, and claims therefor must be explained.

If the account includes a period in which no expenses are charged, a reason for the break must be given. In other words, a voucher for

reimbursement of expenses for subsistence must show a complete history of the period it covers.

Charges for bus or taxi fares for personal transfer between station and hotel or hotel and station must state why street cars were not used. (Par. 126 and par. (o) on p. 88.)

The place where expenses were incurred must be indicated. This requirement includes expenses of all kinds—meals, lodging, or miscellaneous items. (Par. 164 (g).) For meals taken on train the phrase "en route" will suffice. The fiscal regulations do not permit a charge for cleaning clothes; they permit a charge for pressing only, and this charge is included in the allowance for subsistence or per diem. (Par. 137 as amended.)

The name of any person involved in an expenditure for which reimbursement is claimed must be stated. If charges are made for subsistence furnished for a driver or helper used in connection with the hire of an automobile, the name of the person from whom the car is hired must be given. (Par. 165 (j).)

A claim for reimbursement for a package shipped by parcel post must state the weight of the package and the points between which it was shipped. Government parcel-post packages may be insured the same as private shipments. (Par. 85 as amended.)

All vouchers for reimbursement of traveling expenses or subsistence other than those covering travel from and to headquarters should contain the statement "Continuing voucher; in field."

Every voucher and subvoucher must contain the name (not initials) and title of the person signing. (Par. 165 (m).) If any change is made in a subvoucher, it must be accompanied by the statement "Change made before signature by payee," and the statement must be initialed by the payee. (Par. 165 (g) and p. 89.)

Any unusual expenditure should be briefly explained.

All charges for automobile or livery hire, whether on direct vouchers or reimbursement vouchers, must contain the statement, if appropriate, "No other practicable means of transportation available." (Par. 125 (a) and par. (o) on p. 88.)

If an automobile or other conveyance, with a driver, is hired by oral agreement with the understanding that the Geological Survey is to pay for the subsistence of the driver, the items covering such subsistence must contain the driver's name and a reference to the person from whom the conveyance was hired, in order that the auditors can readily connect the two. (Par. (q) on p. 88.)

In submitting direct vouchers or reimbursement vouchers covering supplies, storage, etc., for a hired car, reference must be made to the person from whom the car was hired. (Par. 125 (e).) In order to prevent complications it is suggested that automobiles be hired with the understanding that the owner is to pay all charges

for repairs or replacements. If a rodman is hired with his car, the letter of employment should specify that the Geological Survey will pay for gasoline, oil, ferriage, tolls, and storage away from the owner's garage.

All charges for automobile supplies, hire, storage, etc., must contain one of the following notations: "Government-owned passenger car," "Government-owned truck," "Passenger car hired from ———," or "Truck hired from ——." (Par. 125 (e).) If a Government car, the number must be given.

Reimbursement from public funds for the hire of an automobile by one employee from another employee, or from any members of an employee's family, is not authorized. (See 4 Comp. Gen. 370.)

The dates of all expenditures must be shown. (Par. 65 (b).)

The unit price of articles must be given.

On principal vouchers the method of advertising or the absence of advertising must always be stated. If a purchase is made under the provision covering purchases amounting to not more than $100 that fact must be indicated. The form of agreement must also be stated. (Pp. 39, 44.)

Certain States impose a consumer's tax on gasoline. This tax will not be paid by the Federal Government, and vouchers covering purchases of gasoline in these States must show whether or not they include the tax.

When a temporary employee is being returned to the initial point of employment or to his home, salary should also be paid for the period included in the travel, the only exception being that half-day salaries will not be paid and if the man reaches the point to which he is allowed traveling expenses before noon his salary will not be paid for that day. Transportation requests for such travel must be used whenever possible, and the trip for which salary and expenses are claimed must be one that is actually made. If a man elects to go to some other point than that to which he is entitled to travel, his account must state the travel that was actually made, and if the expense is greater than that authorized, the difference will be disallowed by the section of accounts.

FIGHTING FOREST FIRES

Chiefs of parties are directed to render such assistance as may be necessary for the suppression of fires in or threatening national forests and to respond promptly to emergency fire calls which the district forest officers may make. Fires discovered by members of Geological Survey parties which can not be put out should be reported to the nearest known forest officer immediately.

PRIVATE INTEREST IN LANDS OR MINES

A provision of the organic law prohibits employees of the Geological Survey from having any personal or private interest in the land or mineral wealth of a region under survey and also prohibits them from making an examination or survey of property for private persons or for corporations.

RELATIONS TO THE GOVERNMENT

Loyalty on the part of every member of the Geological Survey to the Survey as an organization and as a part of the Interior Department is essential to its continued efficiency and high standing.

The topographic branch cooperates with other branches of the Survey, and to render such cooperation effective the interests of the Survey as a whole must be kept in mind rather than the special interests of any particular branch or division.

Members of the topographic branch should keep themselves informed regarding Survey work in general and topographic work in particular. (See "Uses of topographic maps," pp. 28–29.)

The topographic branch is frequently called upon to cooperate with the General Land Office, the Bureau of Reclamation, the Forest Service, the Bureau of Soils, the Coast and Geodetic Survey, the Corps of Engineers, the Army Air Service, and other Government bureaus. Topographers assigned to such work should so far as practicable familiarize themselves with the regulations and methods of procedure of the cooperating bureau and should conform to them.

RELATIONS TO STATE SURVEYS

It is essential to efficiency and economy that cordial relations exist between the United States Geological Survey and the State organizations with which it cooperates. When formal cooperation with a State is in force, engineers submitting expense vouchers should first familiarize themselves with the State methods of accounting so as to avoid confusion and delay in settlement of vouchers. State cooperating officials should be given every facility for examination of field sheets or control data whenever they desire to do so during the field season.

RELATIONS TO THE PUBLIC

Courtesy to the public is enjoined on every member and employee of the topographic branch. Should persons make serious inquiry concerning work that the Survey is carrying on, time should be taken to give them the information, and when Federal and State

governments are cooperating. Survey employees will be expected on all proper occasions to make known to citizens the relations of the State to the work which is being done.

Should chiefs of parties be requested to give out tracings of topographic field sheets, they should wire to the chief topographic engineer for instructions. Elevations of bench marks may be furnished to engineers or local officials, upon request, provided they are marked "Preliminary figures, subject to adjustment." Other incomplete data should not be furnished, but names and addresses of interested persons should be taken, so that the final results may be sent to them when available.

Objection is sometimes made to entry on private property by members of the Geological Survey engaged in official work, but it is believed that such objections may generally be overcome by an explanation of the public character of the work. Should the objections persist, the chief topographic engineer must be notified, and he will endeavor to obtain authority through the proper State officials. No forcible entry should be made. Laws enacted by certain State legislatures grant authority for entry on private property to officials of the United States Geological Survey.

INFORMATION TO THE PRESS

Employees in the field are permitted and even encouraged to make known the nature and character of their work and its relation to the other work of the Geological Survey and the Government. This may be done by carefully prepared statements to the press and by papers or talks before civic organizations.

However, no statements relative to the policy of the Geological Survey other than quotations from previously authorized statements may be given to the press without authorization from the Director. Whenever a member of the Survey is asked for a statement regarding official matters which involve Survey policies that have not been made public, he must, before giving it, obtain authorization from the Director. These restrictions apply to employees in the field as well as in Washington.

USES OF TOPOGRAPHIC MAPS

The need for topographic surveys may be measured in terms of the uses to which the resulting topographic maps are put. In general a topographic map is essential to any problem dealing with the use of the land. Specific examples of these uses are given below.

1. Natural-resources base map for Geologic Atlas of the United States; special geologic problems (economic, physiographic, etc.);

determination of the mineral and water resources; classification of the public lands; soil surveys; forest investigations.

2. Federal administration of national parks; national forests; national monuments; Indian, military, and game reservations; postal and rural delivery service; census service; transportation services; aerial navigation; education.

3. State administration by State engineers, State geologists, State foresters, State highway commissioners; in the location of State and county boundary lines; in the conservation of State resources; in legislation involving charters, rights, etc., of State agricultural colleges.

4. Military; as a base for military maps in the national defense; for maneuvers by the Army and National Guard; in the selection of routes of travel and transportation.

5. Engineering, in railroad and highway location; projects for power; irrigation, drainage, reservoir, and power sites and canal lines; affording bench marks and triangulation points for further large-scale surveys; river and harbor improvements.

6. Municipal administration of water supply; flood control; sewage disposal; establishment of local bench marks and triangulation; extension of city limits; changes in property lines; subdivision of land.

7. Aviation, in study of aerial routes, landing fields, etc.; data for preparation of special flight maps.

8. Educational, in teaching geography and physiography; as a base for miscellaneous educational studies.

9. Travel, as guide maps.

COOPERATION IN TOPOGRAPHIC SURVEYS

GENERAL CHARACTER

Cooperation in scientific work may consist in an exchange of information between two or more parties or in the expenditure by them of money for investigation or work in which they are mutually interested.

The United States Geological Survey has for many years cooperated with other bureaus of the Federal Government, particularly the Coast and Geodetic Survey, the Army Air Service, the General Land Office, the Bureau of Reclamation, the Corps of Engineers of the Army, the Bureau of Soils, the Forest Service, and the Weather Bureau, thus avoiding much expensive duplication of work. It has also received each year assistance in various forms from many individuals and corporations and has thus acquired much valuable information which otherwise could not have been

readily obtained. In return for this aid it has furnished maps and other publications to those assisting.

Cooperation to promote the common purpose of advancing knowledge and aiding development has existed between State organizations and the Federal Survey, and definite agreements were entered into early in the history of the Federal Survey. In the fiscal year 1885 it was agreed between the Director of the Survey and the Board of Commissioners of the State of Massachusetts that the topographic work in the State should be divided; that the State should pay one-half of the expense of field work and the Federal Survey one-half; and that the Survey should engrave the maps and give transfers from plates to the State commissioners.

Under terms varied to suit the conditions of each special case, agreements involving cooperation of some sort have been made between the Director of the United States Geological Survey and State officials of Alabama, Arizona, California, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

The object of each State in these agreements was to direct and promote topographic mapping, to procure scientific information which it was not equipped to obtain, to insure completion of work at an earlier date than would be possible with the Federal or State appropriations alone, or to avail itself in some other way of the special facilities of the Federal Survey; the object of the Director was to expedite the work and carry it on with more detail in areas where the public interest was greatest, to encourage the development of scientific work of value to the people of the country, and to maintain cordial relations among organizations having an essentially common purpose.

On the completion of the field surveys by the Federal Survey, the resulting maps are published by the Government and thus become available to the State. If, for example, the cooperation covers even no more than the preparation of a topographic map, the State benefits by the fact that this will surely be followed more promptly than otherwise would be the case by geologic investigations and mapping, and by the study of mineral, water, and timber resources, for which the topographic maps are primarily prepared as bases.

The Federal Survey benefits by the extension of its legitimate operations made possible through cooperation with the States. The Survey is charged with the duty of making a topographic and geologic map of the entire area of the United States, as well as of studying its

water resources and reporting on its other economic products. The area that can be covered within a given time is increased by means of the greater funds available through cooperation, and the completion of the work is thereby hastened. This advantage is of especial importance in the work on the topographic maps, which form the bases for the studies of economic resources, geology, and hydrography and the classification of lands.

GENERAL POLICY IN COOPERATIVE WORK

From the experience gained, certain conditions essential to the success of cooperation have been established. All work which is in part paid for by the Federal Survey and whose results may be published by it or on its authority must be controlled by the Director. He selects assistants to perform such work or approves their selection. In its execution the work is subject to the supervision and approval of the appropriate chief of branch of the Federal Survey. Payments for continuous service on account of State cooperation can, under civil-service rules, be made to a State official only in case he also receives a Federal appointment. Each year plans and estimates for the season are mutually prepared, and a report of operations and results is submitted to the State officials as well as to the United States Geological Survey. All agreements for cooperation are drawn in such manner as not to conflict with the organic law of the Survey in regard to making or disposing of collections, furnishing information, or giving expert testimony.

One important point to be considered in all such work is that the general plans and methods of the Federal Survey can not be set aside on account of State cooperation. The only warrant for the Geological Survey to engage in cooperative mapping is to expedite the topographic mapping of the United States. In this work certain standards must be maintained, and the relative importance of different areas must be considered with relation to the general public benefit. Congress has recognized State cooperation but has so limited it as to require the States to bear all of the expense in excess of such an amount as is necessary for the Geological Survey to perform its share of standard topographic surveys, such share in no case to exceed 50 per cent.

The Federal allotments to meet State cooperation will bear their proportionate share of the expenses necessary in connection with the proper administration of the field and office work—namely, charges for internal administration of the topographic branch, for repair (but not for purchase) of instruments, for map editing, and for stationery, including field notebooks.

METHODS OF COOPERATION

In the establishment and conduct of cooperative surveys certain methods which have been developed through an experience of over 40 years are followed.

The Director is requested by citizens of a State that may be interested in procuring topographic surveys to inform them as to his ability to accept such offers of cooperation as the State may be prepared to make, it being understood that efforts to secure cooperation must originate with the residents of the State. This Survey furnishes such information concerning the details of previous cooperative arrangements as may be sought. The object desired is usually attained by the introduction in the State legislature of a special bill or an item in the general appropriation bill providing for a cooperative survey to be conducted under the supervision of a State official or commission, who shall have control of the expenditure of the money appropriated, make agreements with the United States Geological Survey as to the methods of conducting the work, and recommend the order in which different portions of the State shall be surveyed. It is usually stipulated that the field operations shall be conducted under the supervision of the Director of the Geological Survey. This Survey furnishes expert assistants, who make the field surveys and office computations and draft the manuscript maps. The Federal Survey accepts the recommendations of the State officials for the employment of such temporary assistants as may prove qualified for the work, thus insuring the employment of residents of the State so far as practicable. The State law usually specifies that a sum equal to that appropriated by the State shall be expended in the same time by the United States Geological Survey.

The following sample act, passed by the Legislature of New Hampshire at its session of 1925, provides appropriations for the complete topographic map of a State:

To provide for the cooperation with the United States Geological Survey for the completion of the topographic mapping of the State of New Hampshire

Resolved by the senate and house of representatives in general court convened:

Topographic maps.—That in order to complete the topographic mapping of the State of New Hampshire and to revise existing United States geological maps of certain areas so that a complete and accurate map of the State of New Hampshire may be obtained to meet the urgent needs of the several State departments, the Federal Government, and all individuals who desire reliable information relative to the natural resources of the State, there is hereby appropriated the sum of $25,000 annually for a period of five years for the cooperation with those branches of the United States Geological Survey engaged in such work, making a total of $125,000 available, only on condition that the United States Government by its duly authorized agents apportions an equal amount to be expended for the same purpose within the State. That so much

of the annual appropriation as remains unexpended at the end of any fiscal year may be available for expenditure until the object of the survey is accomplished.

Agreement for survey.—That the governor and council are hereby authorized and directed to enter into such agreements with the Director of the United States Geological Survey as will assure that the surveys shall be carried out in the most economical manner and that the maps and data be made available for public use as early as practicable.

Authority to cross land.—That in order to carry out the purpose of this resolution all persons employed hereunder are authorized to enter and cross all lands within the State: *Provided*, That in so doing no damage shall be done to private property.

Appropriation.—That the sum of $25,000 shall become immediately available upon the passage of this resolution and like sums for the fiscal years ending June 30, 1926, 1927, 1928, and 1929.

In some States an item in the general appropriation bill similar to the following was considered sufficient:

For cooperation with the United States Geological Survey in the preparation and completion of a contour topographic survey and map of this State, to be paid upon vouchers approved by the governor, the governor is hereby authorized to arrange with the Director or representative of the United States Geological Survey concerning this survey and map, its scale, method of execution, form, and all details of the work in behalf of this State, and may accept or reject the work executed by the United States Geological Survey, the sum of $25,000.

It is hereby provided that said map shall accurately show the outlines of all townships, counties, and extensive wooded areas in this State as existing on the ground at the time of the execution of these surveys; the location of all roads, railroads, streams, canals, lakes, and rivers, and shall show by contour lines the elevation and depression of the surface of the country: *Provided further*, That the State shall pay not to exceed one-half of the cost of survey as completed.

In other States cooperation is arranged through some bureau having specific authority from the legislature, as shown in the Illinois law:

AN ACT To establish and create, at the University of Illinois, the bureau to be known as a State Geological Survey, defining its duties and providing for the preparation and publication of its reports and maps to illustrate the natural resources of the State, and making appropriation therefor.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the general assembly*, That there be, and is hereby, created and established at the University of Illinois a bureau, to be known as a State Geological Survey, which shall be under the direction of a commission, to be known as a State Geological Commission, composed of the governor, who shall be ex officio chairman of said commission, the president of the University of Illinois, and one other competent person to be appointed by the governor, who shall hold office for the term of four years and until his successor is appointed and qualified.

* * * * * * *

10. The said commissioners are hereby authorized to arrange with the Director or the representative of the United States Geological Survey in regard to cooperation between the said United States Geological Survey and the said Geological Commission in the preparation and completion of a contour topo-

graphic survey and map or maps of this State, and said commission may accept or reject the work of the United States Geological Survey.

* * * * * * *

12. The commission may expend in the prosecution of such work a sum equal to that which shall be expended thereon by the United States Geological Survey, provided that not more than $10,000 be expended in this work in any one year. [The appropriation for 1927 is $50,000.]

In some States a department has funds appropriated for its general use which are available for miscellaneous work, and allotments from such funds are often made for cooperation with the Geological Survey without specific legislative authority.

BENEFITS OF COOPERATION

The appropriations made by the States for cooperative surveys are accepted chiefly for actual field work, in which are included the services of temporary employees, who are usually residents of the State, and for the living and traveling expenses of the field force. They may be used in paying office salaries only in so far as is necessary to equalize the expenses of both parties to the cooperation. Thus the larger part of the amount appropriated by the State is returned to its people. The appropriation of the Federal Government is devoted chiefly to paying the salaries of the permanent employees, a small portion of it being expended on general administration and a considerable portion on field and office work. The field work of the cooperative topographic surveys is invariably in charge of engineers of the Federal Survey, who are appointed under the rules of the United States Civil Service Commission by the Secretary of the Interior. Rodmen, recorders, chainmen, packers, teamsters, chauffeurs, cooks, laborers, and other minor assistants are employed in the locality in which the work is being done.

The topographic map is the base upon which the field investigations of geologists, hydrographers, and others are recorded and which makes possible a broader and more general study of the results of their work than is otherwise practicable. It was at once realized by State officials to whom such investigations had been assigned that an accurate and comprehensive performance of their duties was impossible without an adequate topographic base map. The expense of making such maps, however, was found to exceed in most localities the resources procurable through State aid, and the lack of the skilled men required in making such surveys was a barrier not easily surmounted. Competent topographic engineers are rare, and there is little inducement for young engineers of ability to make this their profession outside of the work of the Federal Government, as there is so little opportunity for steady employment in work of this kind elsewhere. It was apparent that in States availing themselves of the personnel and administrative knowledge of the Federal Survey the opportunities for systematic mapping would be greatly increased.

STATUS OF COOPERATIVE WORK

State	Date of cooperation (fiscal years)	Cooperating agencies
Alabama	1900–1907, 1911–12, 1924–1927	State geologist.
Arizona	1919, 1920–21, 1926–27	State bureau of mines, governor through Bureau of Reclamation, State water commissioner.
California	1904–1927	State board of examiners, department of engineering, University of California, board of public service commissioners of the City of Los Angeles, Klamath-Shasta Valley irrigation district, East Bay municipal utility district, Los Angeles County surveyor, department of public works.
Colorado	1921, 1924–1927	State geologist, State engineer, State School of Mines.
Connecticut	1890–91, 1923–25	State board of commissioners, State highway commission. (State completely surveyed.)
Delaware	1926–27	State highway department.
Georgia	do	State geologist.
Hawaii	1910–1915, 1921–1927	Superintendent of public works, governor, commissioner of public lands.
Idaho	1913, 1920–1922, 1926	State engineer, State bureau of mines and geology.
Illinois	1906–1927	State geological survey commission, department of registration and education.
Indiana	1920	State geologist.
Iowa	1908–1917, 1919–1927	State geological survey.
Kentucky	1903–1917, 1919–1925, 1927	State commissioner of geology and forestry, State geological survey.
Louisiana	1903–04, 1907, 1910, 1923	Director of State experiment station, State geologist, board of commissioners, Fifth Louisiana levee district, department of conservation.
Maine	1900–1927	State survey commission, public utilities commission, State water-power commission.
Maryland	1897–1901, 1903–1912	State geologist. (State completely surveyed.)
Massachusetts	1885–1888	State topographic survey commissioners. (State completely surveyed.)
Michigan	1902, 1904–1921, 1926–27	State geologist.
Minnesota	1910–1917	State drainage commission.
Mississippi	1902–03, 1908–09, 1920–1923	Director of State experiment station, Tallahatchie drainage commission, State geological survey.
Missouri	1908–1916, 1920–1927	State bureau of geology and mines, State geologist.
Nebraska	1912, 1914, 1916	Board of regents of the University of Nebraska.
New Hampshire	1896, 1925–1927	Governor, State highway department.
New Jersey	1885–1887	State geologist. (State completely surveyed.)
New York	1893–1917, 1920–1927	State engineer and surveyor. (State completely surveyed; revision in progress.)
North Carolina	1897, 1902–03, 1906–07, 1909–10	Governor, State geologist, commissioner of the department of agriculture.
North Dakota	1920–21, 1923, 1926–27	State geological survey, State engineer
Ohio	1902–1916	Governor. (State completely surveyed.)
Oklahoma	1906–1908, 1912–1915	Territorial survey commission, State geological survey.
Oregon	1906–1917, 1922–1927	State bureau of mines and geology, State engineer.
Pennsylvania	1900–1915, 1919–1927	State department of forests and waters, State topographic and geological survey.
Rhode Island	1888–1889	Governor and three commissioners. (State completely surveyed.)
South Dakota	1922–23	State geologist.
Tennessee	1911, 1922–23, 1925–1927	State geologist, State department of highways and public works.
Texas	1902,1905, 1910, 1915–16, 1920–1927	University of Texas mineral survey, State drainage and levee board, State bureau of economic geology and technology, State board of water engineers, State reclamation engineer, Harris and Orange Counties, Beaumont Chamber of Commerce.
Utah	1923–1927	Box Elder, Davis, Salt Lake, Toole, Utah, and Weber Counties.
Vermont	1914–1917, 1919–1927	Governor, State geologist.
Virginia	1909–1911, 1913–1927	State geologist.
Washington	1910–1925	State board of geological survey, State department of conservation and development.
West Virginia	1899, 1902–1916, 1919–1927	State geological survey, State geologist. (State completely surveyed; revision in progress.)
Wisconsin	1915, 1917, 1919–1927	State geologist.

FUNDS EXPENDED FOR TOPOGRAPHIC MAPPING

Funds allotted for topographic mapping, fiscal years 1880–1927

Fiscal year	Federal funds				State funds	Total
	Scientific assistants	Topographic surveys	Surveying national forests	Military surveys and maps		
1880		[a] $19,624.00				$19,624.00
1881		[a] 44,541.00				44,541.00
1882		[a] 40,575.00				40,575.00
1883		[a] 70,700.00				70,700.00
1884	$16,200	[a] 83,950.00				100,150.00
1885	16,200	[a] 144,665.00			[b] $59,670.60	220,535.60
1886	16,200	[a] 168,310.00				184,510.00
1887	16,200	[a] 188,456.00				204,656.00
1888	16,200	[a] 186,111.00				202,311.00
1889	16,200	199,000.00			4,866.00	220,066.00
1890	16,200	200,000.00			[c] 24,599.21	240,799.21
1891	16,200	[d] 329,573.38				345,773.38
1892	16,200	250,000.00				266,200.00
1893	9,200	240,000.00			3,000.00	252,200.00
1894	9,200	200,000.00			24,000.00	233,200.00
1895	9,200	150,000.00			4,000.00	163,200.00
1896	9,200	150,000.00			5,000.00	164,200.00
1897	9,200	175,000.00			20,312.00	204,512.00
1898	9,200	175,000.00	$150,000.00		16,000.00	350,200.00
1899	9,200	180,000.00	150,000.00		30,500.00	369,700.00
1900	9,200	240,000.00	130,000.00		45,000.00	424,200.00
1901	9,200	240,000.00	130,000.00		46,000.00	425,200.00
1902	9,200	250,000.00	130,000.00		96,500.00	485,700.00
1903	9,200	300,000.00	130,000.00		89,011.00	528,211.00
1904	9,200	300,000.00	130,000.00		105,750.00	544,950.00
1905	9,200	300,000.00	130,000.00		96,100.00	535,300.00
1906	9,200	350,000.00	130,000.00		103,300.00	592,500.00
1907	9,200	350,000.00	100,000.00		121,800.00	581,000.00
1908	9,200	300,000.00	100,000.00		103,850.00	513,050.00
1909	9,200	300,000.00	75,000.00		124,410.23	508,610.23
1910	9,200	350,000.00	75,000.00		180,689.36	614,889.36
1911	9,200	350,000.00	75,000.00		154,383.04	588,583.04
1912	9,200	350,000.00	75,000.00		177,853.00	612,053.00
1913	9,200	350,000.00	75,000.00		161,267.09	595,467.09
1914	9,200	350,000.00	75,000.00		179,047.96	613,247.96
1915	9,200	350,000.00	75,000.00		186,800.07	621,000.07
1916	9,200	350,000.00	75,000.00		166,789.39	600,989.39
1917	9,200	350,000.00	75,000.00	$34,808.30	109,440.69	578,448.99
1918	9,200	350,000.00	75,000.00	553,328.49	56,000.00	1,043,528.49
1919	9,200	142,196.00	74,219.60	374,889.89	102,475.00	702,980.49
1920	9,200	325,000.00		259,040.13	190,904.46	784,144.59
1921	9,200	330,000.00		50,646.72	282,557.71	672,404.43
1922	9,200	330,000.00		14,321.72	230,848.81	584,370.53
1923	9,200	325,000.00		34,629.11	286,412.18	655,241.29
1924	9,200	500,000.00		36,048.41	353,198.22	898,446.63
1925	10,600	500,000.00		14,975.99	412,935.99	938,511.98
1926	11,000	[e] 558,300.00		11,227.96	344,950.14	925,478.10
1927		451,700.00		12,500.00	378,791.88	842,991.88
	461,800	12,737,701.38	2,234,219.60	1,396,416.72	5,079,014.03	21,909,151.73

[a] Allotted from general Survey appropriation.
[b] Cooperative appropriation of $40,000 in Massachusetts available for three fiscal years, 1885–87.
[c] Continuous appropriation in Connecticut available for two fiscal years, 1890–91.
[d] Includes deficiency appropriation of $4,573.38.
[e] Includes deficiency appropriation of $73,300.

REQUISITIONS

STATIONERY

In ordering stationery it is advisable to request not more than three months' supply at one time. Requisitions should be made on Form 14618 or on a separate sheet of paper and should designate articles by numbers if any are known. Below are summarized the amount and kinds of stationery suitable for the field parties of

several classes. Schedules of general articles, any of which may be supplied to a party of any class, are given on page 42.

TRIANGULATION PARTY

1 account book.
10 address, notifications of, 1–567.
2 automobile maintenance account books, 9–086.
12 automobile monthly cost sheets, 7876.
6 automobile, reports on condition of, 9–058.
6 automobile transfer records, 9–057.
6 bills of lading.
3 certificates of users of Survey field property, 9–036.
1 computation book, large, 9–889.
8 contracts, short form, 1–003 h.
4 employment, field, applications for, 9–067.
15 employment, letters of, 9–026.
2 employees, temporary, reports of, to Civil Service Commission, 9–946.
25 envelopes, standard letter size, 3⅞ by 8⅞ inches.
6 envelopes, white, extra letter size, 4½ by 10⅜ inches.
6 envelopes, manila, 5 by 10 inches.
6 envelopes, manila, 10 by 15 inches.
12 envelopes, addressed to topographic branch.
6 envelopes, return-penalty, 3⅝ by 8⅜ inches.
1 ephemeris of the sun and Polaris.
6 freight or express shipment, labels for, 9–050b.
2 geodetic coordinates, computations of, 9–902.
1 geodetic distances, computation of, 9–901.
4 injuries, forms for reporting.
1 ink, fountain-pen, wood case.
2 instruments returned to custodian, 9–445–b.
2 instruments, transfer of, 9–139.
2 leave of absence, applications for, 1–034.
1 logarithms, 7-place or 5-place.
10 mail forwarding cards, postmaster, 1–044.
10 mail, second class, labels for, 9–160.
1 natural sines and cosines.
1 paste, tube.
6 pencils, No. 4.
3 pencil tips, metal and rubber.
20 postal cards, plain, 9–482.
2 property, inventories of, 9–054.
6 receipts, proposal and acceptance, 9–007.
12 recommendations of temporary employees.
12 reports of field party, 9–908.
2 requisitions, instruments, 9–445–a.
1 rubber bands, box.
4 tags, instrument repair, 9–1021.
5 tags, linen, penalty or plain.
5 tags, linen, express shipment.
6 temporary receipts, freight and express, 9–994.
4 triangulation field notebooks, 9–912.
6 vouchers, pay, 9–013a.
6 vouchers, party pay and subsistence, 9–015.

15 vouchers, purchase, 9–012.
2 vouchers, subvoucher book, 9–017 (2 additional for camping party).
6 vouchers, traveling expense, with detached memorandum, 1012.

PRIMARY-TRAVERSE PARTY

1 account book.
20 address, notifications of, 1–567.
2 automobile maintenance account books, 9–086.
12 automobile monthly cost sheets, 7876.
6 automobile, reports on condition of, 9–058.
6 automobile transfer records, 9–057.
12 bills of lading.
3 certificates of users of Survey field property, 9–036.
8 contracts, short form, 1–003 h.
8 employment, field, applications for, 9–067.
25 employment, letters of, 9–026.
2 employees, temporary, reports of, to Civil Service Commission, 9–946.
25 envelopes, standard letter size, 3⅞ by 8⅞ inches.
6 envelopes, white, extra letter size, 4½ by 10⅜ inches.
6 envelopes, manila, 5 by 10 inches.
6 envelopes, manila, 10 by 15 inches.
12 envelopes, addressed to topographic branch.
6 envelopes, return-penalty, 3⅝ by 8⅝ inches.
1 ephemeris of the sun and Polaris.
10 freight or express shipment, labels for, 9–050b.
4 injuries, forms for reporting.
1 ink, fountain pen, wood case.
2 instruments returned to custodian, 9–445–b.
2 instruments, transfer of, 9–139.
2 leave of absence, applications for, 1–034.
1 logarithms, 7-place or 5-place.
24 mail forwarding cards, postmaster, 1–044.
15 mail, second class, labels for, 9–160.
1,000 paper, manila, sheets 3 by 5 inches.
1 natural sines and cosines.
1 paste, tube.
10 pencils, No. 4.
4 pencil tips, metal and rubber.
20 postal cards, plain, 9–482.
1 primary-traverse computation notebook, 9–931.
10 primary-traverse distance record notebooks, 9–929.
12 primary-traverse field notebooks, 9–928.
2 property, inventories of, 9–054.
6 receipts, proposal and acceptance, 9–007.
12 recommendations of temporary employees.
12 reports of field party, 9–908.
2 requisitions, instruments, 9–445–a.
1 rubber bands, box, No. 32.
3 tags, instrument repair, 9–1021.
5 tags, linen, penalty or plain.
10 tags, linen, express shipment.
6 temporary receipts, freight and express, 9–994.
6 vouchers, pay, 9–013a.
6 vouchers, party pay and subsistence, 9–015.

15 vouchers, purchase, 9–012.
3 vouchers, subvoucher book, 9–017 (2 additional for camping party).
6 vouchers, traveling expense, with detached memorandum, 1012.

PRISM-LEVEL PARTY

1 account book.
12 address, notifications of, 1–567.
2 automobile maintenance account books, 9–086.
12 automobile monthly cost sheets, 7876.
6 automobile, reports on condition of, 9–058.
6 automobile transfer records, 9–057.
6 bills of lading.
3 certificates of users of Survey field property, 9–036.
8 contracts, short form, 1–003 h.
6 employment, field, applications for, 9–067.
25 employment, letters of, 9–026.
2 employees, temporary, reports of, to Civil Service Commission, 9–946.
25 envelopes, standard letter size, 3⅞ by 8⅞ inches.
6 envelopes, white, extra letter size, 4½ by 10⅜ inches.
6 envelopes, manila, 5 by 10 inches.
6 envelopes, manila, 10 by 15 inches.
12 envelopes, addressed to topographic branch.
6 envelopes, return-penalty, 3⅝ by 8⅜ inches.
10 freight or express shipment, labels for, 9–050b.
4 injuries, forms for reporting.
2 ink, fountain pen, wood case.
2 instruments returned to custodian, 9–445–b.
2 instruments, transfer of, 9–139.
2 leave of absence, applications for, 1–034.
1 level book, bench-mark descriptions, 9–916.
4 level notebooks, yard rod, 9–940 and 9–940–a.
24 mail forwarding cards, postmaster, 1–044.
15 mail, second class, labels for, 9–160.
1 paste, tube.
6 pencils, No. 4.
20 postal cards, plain, 9–482.
20 precise levels, computation forms, 9–932a.
2 property, inventories of, 9–054.
6 receipts, proposal and acceptance, 9–007.
12 recommendations of temporary employees.
15 reports of field party, 9–908.
2 requisitions, instruments, 9–445–a.
1 rubber bands, box.
3 tags, instrument repair, 9–1021.
5 tags, linen, penalty or plain.
10 tags, linen, express shipment.
6 temporary receipts, freight and express, 9–994.
6 vouchers, pay, 9–013a.
6 vouchers, party pay and subsistence, 9–015.
15 vouchers, purchase, 9–012.
2 vouchers, subvoucher book, 9–017 (2 additional for camping party).
6 vouchers, traveling expense, with detached memorandum, 1012.

WYE-LEVEL PARTY

1 account book.
12 address, notifications of, 1–567.
2 automobile maintenance account books, 9–086.
12 automobile monthly cost sheets, 7876.
6 automobile, reports on condition of, 9–058.
6 automobile transfer records, 9–057.
6 bills of lading.
3 certificates of users of Survey field property, 9–036.
8 contracts, short form, 1–003 h.
6 employment, field, applications for, 9–067.
15 employment, letters of, 9–026.
2 employees, temporary, reports of, to Civil Service Commission, 9–946.
25 envelopes, standard letter size, 3⅞ by 8⅞ inches.
6 envelopes, white, extra letter size, 4½ by 10⅜ inches.
6 envelopes, manila, 5 by 10 inches.
4 envelopes, manila, 10 by 15 inches.
12 envelopes, addressed to topographic branch.
6 envelopes, return-penalty, 3⅝ by 8⅝ inches.
10 freight or express shipment, labels for, 9–050b.
4 injuries, forms for reporting.
1 ink, fountain pen, wood case.
2 instruments returned to custodian, 9–445–b.
2 instruments, transfer of, 9–139.
2 leave of absence, applications for, 1–034.
1 level book, bench-mark description, 9–916.
3 level notebooks, primary, black cover, 9–903.
3 level notebooks, primary, yellow cover, 9–903.
24 mail forwarding cards, postmaster, 1–044.
15 mail, second class, labels for, 9–160.
1 paste, tube.
10 pencils, No. 4.
20 postal cards, plain, 9–482.
2 property, inventories of, 9–054.
6 receipts, proposal and acceptance, 9–007.
12 recommendations of temporary employees.
15 reports of field party, 9–908.
2 requisitions, instruments, 9–445–a.
1 rubber bands, box.
4 tags, instrument repair, 9–1021.
5 tags, linen, penalty or plain.
10 tags, linen, express shipment.
6 temporary receipts, freight and express, 9–994.
6 vouchers, pay, 9–013a.
6 vouchers, party pay and subsistence, 9–015.
15 vouchers, purchase, 9–012.
1 voucher, subvoucher book, 9–017 (2 additional for camping party).
6 vouchers, traveling expense, with detached memorandum, 1012.

TOPOGRAPHIC PARTY (1 TOPOGRAPHER)

1 account book.
10 address, notifications of, 1–567.
2 automobile maintenance account books, 9–086.
12 automobile monthly cost sheets, 7876.

6 automobile, reports on condition of, 9–058.
6 automobile transfer records, 9–057.
2 Beaman alidade notebooks, 9–913a.
12 bills of lading.
3 certificates of users of Survey field property, 9–036.
8 contracts, short form, 1–003 h.
6 employment, field, applications for, 9–067.
15 employment, letters of, 9–026.
2 employees, temporary, reports of, to Civil Service Commission, 9–946.
25 envelopes, standard letter size, 3⅞ by 8⅞ inches.
6 envelopes, white, extra letter size, 4½ by 10⅜ inches.
6 envelopes, manila, 5 by 10 inches.
6 envelopes, manila, 10 by 15 inches.
25 envelopes, addressed to topograpic branch.
6 envelopes, return-penalty, 3⅝ by 8⅝ inches.
10 freight or express shipment, labels for, 9–050b.
1 geographic tables and formulas, Bulletin 650.
4 injuries, forms for reporting.
1 ink, fountain pen, wood case.
Ink, waterproof, black, red, green.
2 instruments returned to custodian, 9–445–b.
2 instruments, transfer of, 9–139.
2 leave of absence, applications for, 1–034.
10 mail forwarding cards, postmaster, 1–044.
10 mail, second class, labels for, 9–160.
Paper, double mounted, 18 by 24 or 24 by 31 inches.
Paper, manila, 3 by 5 inches.
Paper, single mounted, 15 by 15 or 9 by 9 inches.
1 paste, tube.
3 pencil tips, metal and rubber.
10 pencils, No. 4.
2 penholders, drawing, writing.
Pens, drawing, K. & E., Gillott's, 290, 291, 303.
Pens, writing, stub, falcon, etc.
1 pins, pyramid.
10 postal cards, plain, 9–482.
4 property, inventories of, 9–054.
6 receipts, proposal and acceptance, 9–007.
12 recommendations of temporary employees.
12 reports of field party, 9–908.
2 requisitions, instruments, 9–445–a.
1 rubber bands, box No. 32.
2 Ruby erasers.
1 sandpaper pencil pointer.
1 stadia table, Johnson's.
1 stadia table, Anderson's.
12 tags, linen, express shipment.
6 tags, instrument repair, 9–1021.
6 temporary receipts, freight and express, 9–994.
Tracing linen.
Tracing paper, thin.
Tracing vellum.
1 vertical-angle record, 9–914.
2 vertical-angle traverse records, 9–913.

1 vertical-angle tables, Davis's.
3 vouchers, pay, 9–013a.
3 vouchers, party pay and subsistence, 9–015.
12 vouchers, purchase, 9–012.
1 voucher, subvoucher book, 9–017 (2 additional for camping party).
4 vouchers, traveling expense, with detached memorandum, 1012.
Water colors, saucers, and brushes.

The following articles are usually required in camping parties only:

Auction sale, advertisement, 9–051.
Auction sale, report of, 9–040.
Flags.
Livestock, description of, 9–061.
Pasturage of public animals, proposal, acceptance, and receipt, 9–008.
Property affidavit, 9–048.
Property, inspection report of, 9–047.
Storage of public property, proposal, acceptance, and receipt, 9–007.

The following articles may also be had upon request if not already supplied:

Baldwin solar charts.
Blotting paper, sheets.
Canteens, 2-quart (on instrument requisition).
Celluloid sheets, 18 by 24 inches, clear, frosted, or opaque.
Clips, Gem, Mogul, etc.
Fasteners, paper.
Letter file, Favorite.
Paper, carbon copy books, official.
Paper, carbon sheets.
Paper, manila covers, 18 by 24 or 15 by 15 inches.
Paper, official letter.
Paper, ruled, 8 by 10½ inches.
Paper, scratch, note size.
Pencils, Kohinoor, 6–H, 7–H, 8–H, 9–H.
Pencils, blue, green, red.
Regulations of Geological Survey.
Scales, plotting, flat boxwood, 1 : 240,000, 1 : 125,000, 1 : 96,000, 1 : 62,500, 1 : 48,000, 1 : 31,680, 1 : 24,000, 1 : 21,120, 1 : 20,000, 1 : 10,000; inches, tenths, and fiftieths; inches, tenths, and eightieths; also 1 : 48,000 for chains. (Either of these may be made into Burkland sight alidades on request.)
Sealing wax.
Tacks, thumb.
Telegram blanks, official.
Topographic instructions.
Water colors, burnt sienna, Prussian blue.

INSTRUMENTS

Requisitions for instruments for individual field parties of the classes named below should be made on Form 9–445–a (white) and should be signed by or marked to be charged to the man who will be responsible for their use and custody:

TRIANGULATION PARTY

1 aneroid.
Bags, book, large or small.
Batteries for flash lamps, round or flat.
2 compasses, prismatic.
2 glasses, field.
1 lamp, electric, hand.
1 plumb bob.
1 protractor, celluloid.
1 tape, steel, 6-foot.
1 tape, steel, 25-foot, meters on back.
1 theodolite.

PRIMARY-TRAVERSE PARTY

Bags, book, large or small.
Batteries, flash lamp, large or small.
3 counters, hand.
Dies, figures, 1 set.
Dies, letters.
1 glass, field.
2 lamps, electric, hand.
11 pins, tally.
2 plumb bobs.
2 rods, range.
1 rod, stadia.
1 tape, 100-foot, steel.
2 tapes, 300-foot, steel.
1 tape-repair outfit.
1 transit, 30-second.

PRISM-LEVEL PARTY (FIRST OR SECOND ORDER WORK)

Bags, book, large or small.
Bench marks, copper nails with washers.
Bench-mark tablets (cooperative or standard).
Cement, cans.
Dies, figures, 1 set.
Dies, letters.
Drills, 1⅛-inch bit.
Hammers.
Hatchets.
Keel, red or blue.
1 level, Locke.
1 level, prism.
Paint, cans, with brushes.
2 pins, turning.
2 rods, yard.
1 tape, steel, 25-foot.
1 umbrella.

WYE-LEVEL PARTY (SECOND OR THIRD ORDER WORK)

Bags, book, large or small.
Bench marks, copper nails with washers.
Bench-mark tablets (cooperative or standard).

Cement, cans.
Dies, figures, 1 set.
Dies, letters.
Drills, 1⅛-inch bit.
Hammers.
Hatchets.
Keel, red or blue.
1 level, plumbing.
1 level, wye, 18-inch.
Paint, cans, with brushes.
2 pins, turning.
1 rod, New York.
1 tape, 25-foot, steel.

WYE-LEVEL PARTY (FOURTH ORDER WORK)

Bags, book, large or small.
1 glass, field.
1 level, 15-inch.
1 rod, Philadelphia.
1 tape, metallic, 50-foot.
6 keels, red or blue.

PLANE-TABLE TRIANGULATION PARTY

1 alidade, 25-inch telescopic.
Bags, book, large or small.
1 compass, 4-inch.
1 glass, field.
Level bubbles (specify size wanted).
1 level, circular.
1 plane-table board, 24 by 31 inches.
Scales, plotting.
1 straightedge.
1 tape, metallic, 50-foot.
1 tripod, Johnson.

TOPOGRAPHIC PARTY (1 TOPOGRAPHER)

1 alidade, 18-inch, telescopic.
1 alidade, sight, Burkland.
1 aneroid.
Bags, book, large or small.
1 compass, 4-inch.
1 counter, hand.
1 set dies, figures and letters VA.
1 glass, field.
Level bubbles (specify size wanted).
1 level, circular.
1 level, Locke.
1 plane-table board, 15 by 15 inches.
1 plane-table board, 18 by 24 inches.
1 protractor, celluloid.
1 rod, stadia.
2 rods, stadia, paper patterns.

Scales, plotting.
1 straightedge.
1 tape, 50-foot, metallic.
1 tripod, Johnson.
1 tripod, Bumstead.

STADIA-TRAVERSE PARTY

1 alidade, 18-inch, telescopic.
1 alidade, sight, Burkland.
Bags, book, large or small.
1 compass, 4-inch.
Level bubbles (specify size wanted).
1 level, circular.
1 plane-table board, 15 by 15 inches.
1 plane-table board, 18 by 24 inches.
1 rod, stadia.
Scales, plotting.
1 tape, 50-foot, metallic.
1 tripod, Johnson.

TAPE-TRAVERSE PARTY

1 alidade, sight, Burkland.
1 aneroid.
Bags, book, large or small.
1 compass, 4-inch.
1 compass, pocket.
1 counter, hand.
1 level, circular.
1 level, Locke.
1 plane-table board, 9 by 9 inches, with compass.
1 plane-table board, 15 by 15 inches, with compass.
Scales, plotting.
1 tripod, Bumstead.
2 tapes, rope.

FOOT-TRAVERSE PARTY

1 alidade, sight, Burkland.
1 aneroid.
Bags, book, large or small.
1 plane-table board, 9 by 9 or 15 by 15 inches, with compass.
Scales, plotting.
1 tripod, Bumstead.

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