(PRELIMINARY DRAFT)

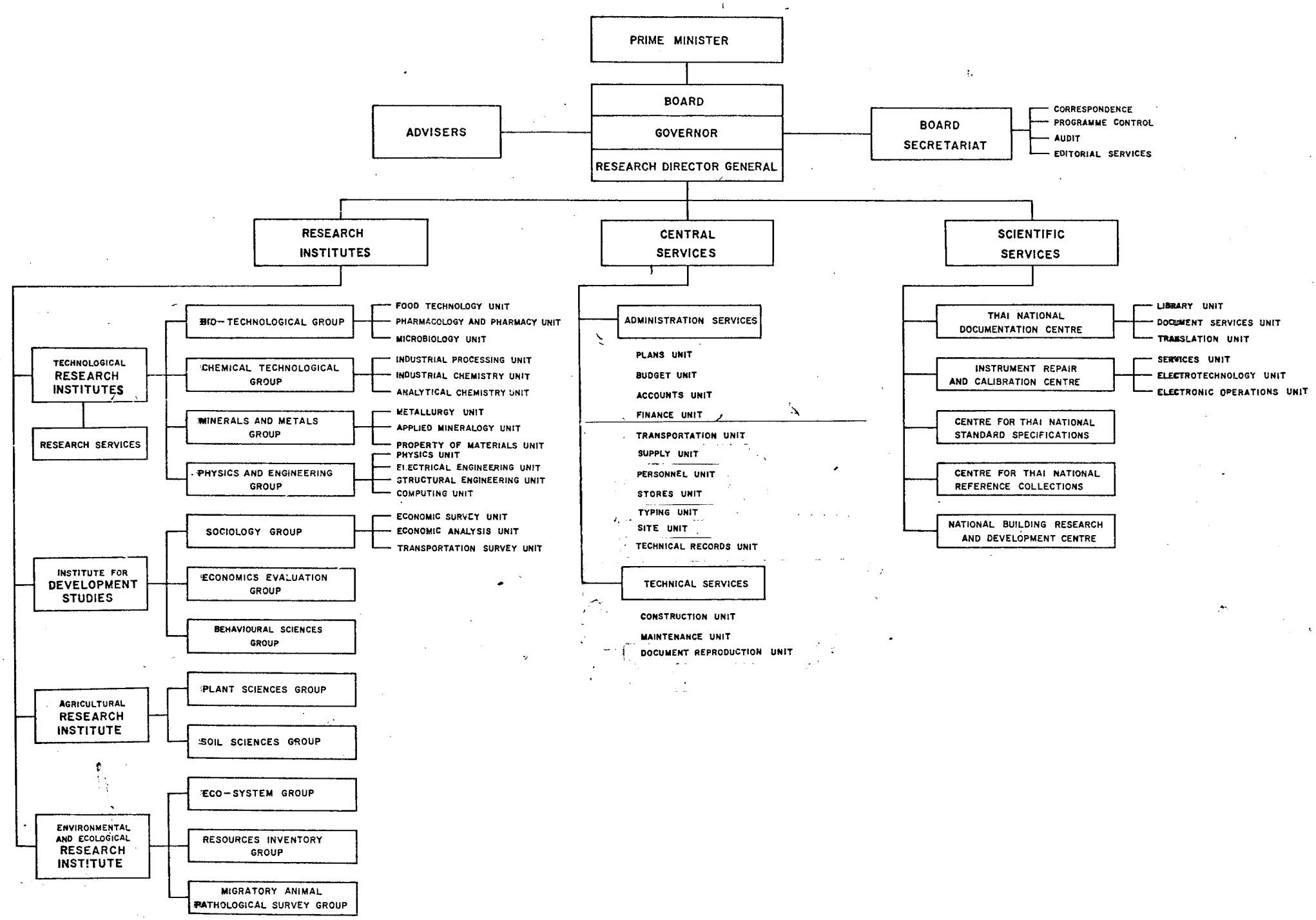
APPENDIXES

TO

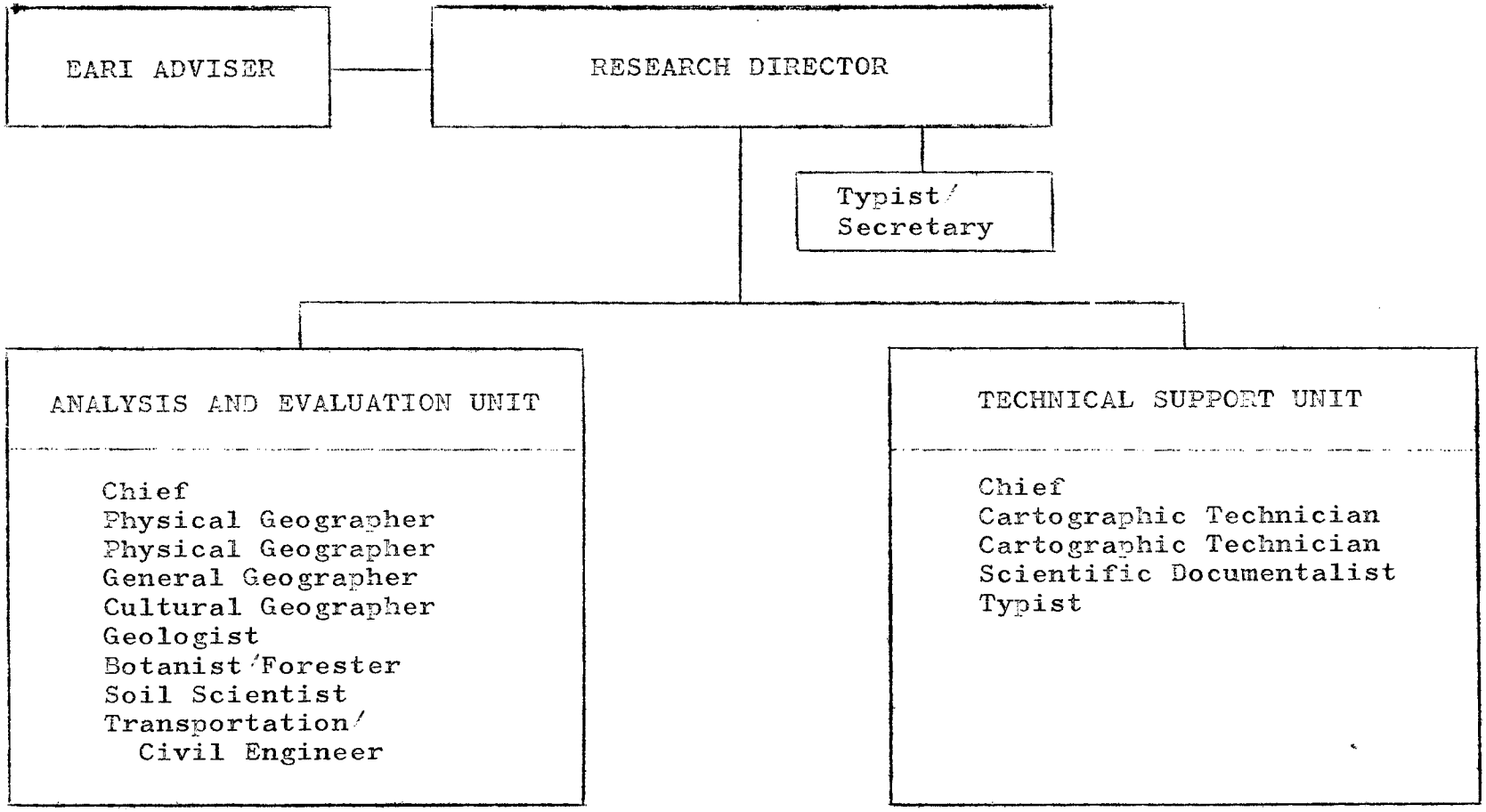
GUIDANCE MANUAL FOR RESOURCES INVENTORY STUDIES

JUNE 1971

A.S.R.C.T. ORGANIZATION CHART 1971



APPENDIX B.



ORGANIZATION CHART - RESOURCE INVENTORY GROUP - ASRCT - JUNE 1971

APPENDIX C

(Omitted)

APPENDIX D

RESOURCES INVENTORY GROUP

JOB DESCRIPTIONS

APPENDIX D

Resources Inventory Group

Job Descriptions

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Environmental and Ecological Research Institute; Resources Inventory Group

Job Title: Research Director

SUPERVISORY CONTROLS

Serves under the general administrative direction of the Managing Director, Environmental and Ecological Institute, ASRCT, who provides policy guidance. Incumbent is given widest possible latitude for exercise of own initiative and judgment, and is held responsible for mission accomplishment of approved course of action.

MAJOR DUTIES

Serves as Research Director, Resources Inventory Group, and as an advisor and consultant, with responsibility for providing technical services in support of national development and defense programs. Basic to the Group's operation is a unique system of cooperative resources data collection, active field research, and the blending of a variety of analytical and production abilities. In its work, the Group calls upon the talents of many experts including geographers, economists, geologists, civil engineers, soil scientists, foresters, cartographers and photogrammetrists.

1. Plans, organizes, directs and controls a unique program, involving execution by subordinate supervisors, to perform special evaluative and feasibility studies, resources inventories, planning assistance and geographic and engineering support to agencies ranging from the Office of the Prime Minister to the Ministry Defense and Supreme Command, MRDC and other MOD elements, other governmental agencies and international organizations. Effort performed is in support both of non-military strategic program planning for physical, social and economic development in selected areas of Thailand, and of military programs involving special evaluative studies of

support requirements to strengthen internal defense and stability in specific geographic regions.

a. Subject to approval by the Director General of the Environmental and Ecological Institute, establishes specific organizational and functional structures to assure full coverage of all required technical fields and operations.

b. Selects and approves introduction of methods, procedures and techniques for Group operations.

c. Establishes appropriate contacts and lines of communications with national and international development institutions, various governmental agencies, research institutions, educational institutions, and government and private organizations in foreign countries to assure the receipt and exchange of information pertinent to the existence, location and availability of developmental resources data. Arranges for formal and informal agreements with organizations to obtain access to appropriate information which can be utilized in providing completed studies to meet user requirements.

d. Reviews, evaluates, and makes or recommends modifications to proposed programs submitted by governmental agencies or agencies outside the government. Provides advisory opinions on the adequacy of coverage, feasibility, and need for the proposals in the light of existing information, or studies in process by various organizations.

e. Recommends priority and time phasing of effort to assure integration of various studies and to preclude overlap or duplication of effort. Recommends coordination and cooperation between governmental and private organizations which can provide mutual assistance in the development and conduct of studies. Evaluates the feasibility of projects from the standpoint of time, funds, and personnel limitations.

2. Participates in high level planning conferences involving key personnel of governmental agencies, representatives of scientific and research organizations, representatives of foreign countries, and appropriate personnel from private industry. Assists in the discussion of mutual problems, potential data sources, and proposed cooperative efforts. Provides authoritative information as to technical requirements, production techniques, and

time and cost phases for producing data necessary for planning and evaluation purposes. Acting as an official ASRCT representative, recommends and, upon approval, insures meeting of commitments for the Group in connection with proposed cooperation with other agencies or for producing specific projects. Assures that proper coordination and approval are obtained in connection with related activities of ASRCT and other responsible elements or contractors.

3. Makes major decisions affecting program plans, content, budget, and economy of operations. Examples covering these categories are:

a. Preparation of program and project proposals, which upon submittal and approval are binding upon the ASRCT and which specify scope, content, and scheduling of effort to be performed, as well as manpower and funding resources to be committed in the performance of the program.

b. Technical and administrative management on a continuing basis of programs in support of The Office of the Prime Minister and other agencies including responsibility and authority to budget project funds and manpower resources and to reprogram as necessary to effect economy of operations.

4. Exercises directly, or indirectly through subordinate supervisors, continuing personnel management responsibility that includes keeping employees advised of policies, objectives, regulations and procedures; setting performance standards and evaluating performance of subordinates; interviewing, selecting employees and initiating personnel actions; assuring an adequate organizational and position structure; identifying and providing developmental and training needs; informally resolving complaints and grievances; and investigating disciplinary problems and applying established corrective or administrative procedures.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Headquarters

Title: Secretary/Typist

SUPERVISORY CONTROLS

Works under the general supervision of the Research Director, Resources Inventory Group. Performs duties independently, following instructions of the Director or various technical specialists who originate material to be typed for publication. Work is performed in accordance with policies and procedures established by RIG and based on ASRCT requirements. Completed work is reviewed for overall accuracy from a technical standpoint, but incumbent is relied upon for detailed accuracy and completeness.

MAJOR DUTIES

Works as a secretary to the Research Director, RIG and performs a variety of typing and clerical duties for other RIG personnel. Utilizes knowledge of English and Thai languages, required formats, technical terminology and reproduction requirements in the performance of assigned duties.

1. Receives and types all the Director's correspondence and a variety of technical material in over thirty-two different scientific and technical fields for the Group. Checks material in detail for accuracy of spelling, punctuation, format, clarity and consistency. Assures that proper abbreviations, symbols, and technical terminology are utilized; that references and citations are correct; and that all English translations are consistent with the Thai equivalent text, and structurally, grammatically, and idiomatically accurate. Reviews Thai/English legends and notations for maps and overlays to assure accuracy of translations. Calls any gaps or omissions to attention of the analysts and requests clarification of questionable material.

2, Types material in two languages, setting up large, complex tabular forms so that the written text in two languages is placed in proper relationship and that the final visual effect is clear, neat, and in appropriate sequence. Assures that all written text pertains to the map overlays or graphs which are explained or discussed. Revises drafts to incorporate additional material, rearranges the locations or sequence, and assures that final product will fit into required space and format. Proofreads final material with great care to assure accuracy. Final typing must be without error in order to assure clear registry in reproduction.

3. Types a variety of technical material in many languages, including bibliographies, library reference cards, briefing material, correspondence, and reports. Refers to technical reference books to check technical terminology, symbols, references, and foreign language spelling. Types correspondence, requests for travel orders, travel vouchers, and trip reports in final form for the Group. Proofreads material to assure its completeness and accuracy.

4. Answers telephone, takes and relays messages for Group personnel. Establishes and maintains reference files, including own reference material, such as regulations and directives pertaining to reproduction and publication requirements. Sets up and maintains systems for controlling reports and studies initiated within the Group, publications loaned to, and borrowed from, other agencies. Receives and distributes mail.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Chief

SUPERVISORY CONTROLS

Under the administrative and technical control of the Research Director, Resources Inventory Group, who provides general guidance and policy interpretation. Makes decisions at the Unit level within the framework of these general guidelines; decisions having possible effects beyond the Unit level are referred to and discussed with the Research Director of the Group. Also serves as a resources specialist with full technical responsibility for research and evaluation of source data and for providing advisory and consultative service to appropriate agencies in connection with the availability, reliability and validity of technical and scientific data pertaining to subjects in his field of specialization.

MAJOR DUTIES

Serves as Chief of the Analysis and Evaluation Unit, responsible for the preparation of a variety of interpretive studies and reports covering a wide range of physical sciences, social science, economic, and engineering subjects related to the total resources of areas being studied. The program involves simultaneous preparation of several major studies, as well as providing data in response to requests for information or for assistance.

1. Provides the necessary administrative functions, direction and control over Analysis and Evaluation Unit staff of scientists, engineers, and technical specialists to accomplish assigned mission. Plans and schedules work programs. Appraises work in progress to insure that deadlines are met. Directs maintenance of control records and production of status reports on assigned work as essential for a ready appraisal of the overall workload. Recommends selection of personnel, orients and assists staff members,

prepares performance ratings. Reviews studies produced by the Unit prior to submittal to the Research Director of the Group.

2. Serves as an assistant and advisor to the Research Director, RIG, on matters relating to the M&E Unit, including:

a. Recommendations on specific annual programs and forecasts for the production of studies.

b. Development and application of new concepts and methods for the preparation and presentation of studies.

c. Prepares and assists in the presentation of lectures and briefings given by the Research Director of the Group. May occasionally deliver such lectures and briefings.

d. Serves as Acting Research Director, RIG, during the absences of the Research Director.

3. Maintains contact with government, academic, and other scientific organizations engaged in resources planning and development in order to keep informed of the nature of research and current trends in the field. Contacts cover national and international resources organizations and activities.

4. Serves as a resources specialist with full technical responsibility for research and evaluation of source data and for providing advisory and consultative service to appropriate agencies in connection with the availability, reliability and validity of technical and scientific data pertaining to the field of resources inventories.

5. Provides technical advice and guidance to ASRCT and other governmental agencies on the evaluation of proposals and programs submitted by agencies outside the government for countrywide or specific area programs or projects to meet developmental needs. Recommends to ASRCT such aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined

effort of the government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus necessitating full coordination with top level representatives from the Ministries and representatives of the foreign or international agencies, when applicable, in evaluating total country programs involving short- and long-range activities. These latter programs will involve development of basic resources data required to make decisions and to establish development or defense programs and projects.

6. Participates in conferences at the national or international level to supply technical advice and guidance to organizations, to assist ASRCT in preparing position papers on various matters, or to coordinate economic and cultural aspects of program with technical fields. As required, travels to foreign countries on short-term assignments for the purpose of discussions with international organizations and host country organizations on matters relating to programs and projects being conducted at RIG and their relationship with country programs and projects. Recommends modification to projects to meet objectives and contingencies.

7. Supervises the development and production of studies by L&E Staff members who:

a. Conduct research at Thai Government agencies, other agencies and facilities to acquire data for production of studies.

b. Analyze and evaluate the data and prepare materials in final compilation form, or prepare specifications for the modification of existing materials to meet study specifications.

c. Determine gaps in information which must be filled, incorporating data filling these upon receipt.

8. Prepares specifications for production of studies within various subject fields, coordinating aspects with other staff members. Assures full consideration of aspects in other fields that have an impact on his own, and vice versa. Effects operational level coordination with other agency representatives, through necessary channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to studies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Geographer (Physical, Cultural or General)

SUPERVISORY CONTROLS

Works under the general administrative supervision of the Chief, Analysis and Evaluation Unit, who provides general guides and policy interpretation. Work is reviewed only from the standpoint of meeting scheduled program objectives, and conformance to general guides and policy.

MAJOR DUTIES

Serves as a Geographer with full technical responsibility for research, analysis and evaluation of source data and for providing advisory and consultative service to other appropriate agencies in connection with availability, reliability, and validity of technical and scientific data pertaining to the broad field of physical, social and economic geography to include but not limited to such subject matter as population, urban areas, industries, education, health, surface configuration, climate and water sources.

1. Makes significant contributions to the production of studies, reports, and a wide range of background data required for accelerated strategic program planning of physical, social, and economic resources of the country or region. This involves using own initiative and ingenuity in conducting research within governmental agencies, international and foreign organizations to acquire data. Analyzes and evaluates the data and prepares materials for publication, or prepares specifications for the modification of existing materials to meet specifications. Determines gaps in information which must be filled, and incorporates new data into specifications upon receipt. In preparing specifications, assures full consideration of aspects in other fields that have an impact on his own, and vice versa.

a. Effects operational level coordination with other agency representatives, through channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to subject field.

b. May serve as a project coordinator responsible for the effective coordination of research, writing and editing in order to meet the requirements of a highly professional study or report. Also, may serve as the leader of a field investigation team on temporary assignment.

2. Advisory services.

a. Serves as an advisor, in field of geography to Unit Chief on matters relating to development and application of new concepts and methods and in the preparation and presentation of lectures and briefings.

b. Within subject field, provides advice and guidance to other governmental agencies on the evaluation of proposals and programs submitted by foreign country missions or agencies outside the government for countrywide or specific area programs or projects to meet development and defense needs. Recommends to such aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined effort of the government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus necessitating full coordination with top level representatives from Ministries and foreign and international missions, when applicable, in evaluating total country programs involving short- and long-range activities.

c. Participates in conferences at the national level to supply technical advice and guidance to organizations, to assist other governmental agencies in preparing position papers on various matters, or to coordinate economic and cultural aspects of programs with other technical fields. Recommends modification to projects to meet objectives and contingencies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Geologist

SUPERVISORY CONTROLS

Works under the general administrative supervision of the Chief, Analysis and Evaluation Unit, who provides general guides and policy interpretation. Work is reviewed only from the standpoint of meeting scheduled program objectives, and conformance to general guides and policy.

MAJOR DUTIES

Serves as a Geologist with full technical responsibility for research, analysis and evaluation of source data and for providing advisory and consultative service to other appropriate agencies in connection with availability, reliability, and validity of technical and scientific data pertaining to the broad field of geology to include such subject matter as hydrogeology, engineering geology, and construction materials.

1. Makes significant contributions to the production of studies, reports, and a wide range of background data required for accelerated strategic program planning of physical, social, and economic resources of the country, or region. This involves using own initiative and ingenuity in conducting research within governmental agencies and international and foreign organizations to acquire data. Analyzes and evaluates the data and prepares materials for publication, or prepares specifications for the modification of existing materials to meet specifications. Determines gaps in information which must by filled, and incorporates new data into specifications upon receipt. In preparing specifications, assures full consideration of aspects in other fields that have an impact on his own, and vice versa.

a. Effects operational level coordination with other agency representatives, through channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to subject field.

b. May serve as a project coordinator responsible for the effective coordination of research, writing and editing in order to meet the requirements of a highly professional study or report. Also, may serve as the leader of a field investigation team on temporary assignment.

2. Advisory Services.

a. Serves as an advisor, in field of geology, to Unit Chief on matters relating to development and application of new concepts and methods and in the preparation and presentation of lectures and briefings.

b. Within subject field, provides advice and guidance to other governmental agencies on the evaluation of proposals and programs submitted by foreign country missions or agencies outside the government for countrywide or specific area programs or projects to meet development or defense needs. Recommends on such aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined effort of government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus necessitating full coordination with top level representatives from Ministries and foreign or international missions, when applicable, in evaluating total country programs involving short- and long-range activities.

c. Participates in conferences at the national level to supply technical advice and guidance to organizations, to assist other governmental agencies in preparing position papers on various matters, or to coordinate economic and cultural aspects of programs with other technical fields. Recommends modification to projects to meet objectives and contingencies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Forester/Botanist

SUPERVISORY CONTROLS

Works under the general administrative supervision of the Chief, Analysis and Evaluation Unit, who provides general guides and policy interpretation. Work is reviewed only from the standpoint of meeting scheduled program objectives, and conformance to general guides and policy.

MAJOR DUTIES

Serves as a Forester/Botanist with full technical responsibility for research, analysis and evaluation of source data and for providing advisory and consultative service to other appropriate agencies in connection with availability, reliability, and validity of technical and scientific data pertaining to the broad field of forestry to include such subject matter as land use and forest industries classification.

1. Makes significant contributions to the production of studies, reports, and a wide range of background data required for accelerated strategic program planning of physical, social, and economic resources of the country, or region. This involves using own initiative and ingenuity in conducting research within governmental agencies and international and foreign organizations to acquire data. Analyzes and evaluates the data and prepares materials for publication, or prepares specifications for the modification of existing materials to meet specifications. Determines gaps in information which must be filled, and incorporates new data into specifications upon receipt. In preparing specifications, assures full consideration of aspects in other fields that have an impact on his own, and vice versa.

a. Effects operational level coordination with other agency representatives, through channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to subject field.

b. May serve as a project coordinator responsible for the effective coordination of research, writing and editing in order to meet the requirements of a highly professional study or report. Also, may serve as the leader of a field investigation team on temporary assignment.

2. Advisory services.

a. Serves as an advisor, in field of forestry/botany, to Unit Chief on matters relating to development and application of new concepts and methods and in the preparation and presentation of lectures and briefings.

b. Within subject field, provides advice and guidance to other governmental agencies on the evaluation of proposals and programs submitted by foreign country missions or agencies outside the government for countrywide or specific area programs or projects to meet development and defense needs. Recommends on aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined effort of the government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus necessitating full coordination with top level representatives from Ministries and foreign or international missions, when applicable, in evaluating total country programs involving short- and long-range activities.

c. Participates in conferences at the national level to supply technical advice and guidance to organizations, to assist other governmental agencies in preparing position papers on various matters, or to coordinate economic and cultural aspects of programs with other technical fields. Recommends modification to projects to meet objectives and contingencies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Soil Scientist

SUPERVISORY CONTROLS

Works under the general administrative supervision of the Chief, Analysis and Evaluation Unit, who provides general guides and policy interpretation. Work is reviewed only from the standpoint of meeting scheduled program objectives, and conformance to general guides and policy.

MAJOR DUTIES

Serves as a Soil Scientist with full technical responsibility for research, analysis and evaluation of source data and for providing advisory and consultative service to other appropriate agencies in connection with availability, and validity of technical and scientific data pertaining to the broad field of agricultural and engineering soils to include such subject matter as land potential, suitability for road construction and soil moisture regimes.

1. Makes significant contributions to the production of studies, reports, and a wide range of background data required for accelerated strategic program planning of physical, social, and economic resources of the country or region. This involves using own initiative and ingenuity in conducting research within governmental agencies, international and foreign organizations to acquire data. Analyzes and evaluates the data and prepares materials for publication, or prepares specifications for the modification of existing materials to meet specifications. Determines gaps in information which must be filled, and incorporates new data into specifications upon receipt. In preparing specifications, assures full consideration of aspects in other fields that have an impact on his own, and vice versa.

a. Effects operational level coordination with other agency representatives, through channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to subject field.

b. May serve as a project coordinator responsible for the effective coordination of research, writing and editing in order to meet the requirements of a highly professional study or report. Also, may serve as the leader of a field investigation team on temporary assignment.

2. Advisor services.

a. Serves as an advisor, in field of soils, to Unit Chief on matters relating to development and application of new concepts and methods and in the preparation and presentation of lectures and briefings.

b. Within subject field, provides advice and guidance to other governmental agencies on the evaluation of proposals and programs submitted by foreign country missions or agencies outside the government for countrywide or specific area programs or projects to meet development or defense needs. Recommends on such aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined effort of government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus, necessitating full coordination with top level representatives from Ministries and foreign or international missions, when applicable, in evaluating total country programs involving short- and long-range activities.

c. Participates in conferences at the national level to supply technical advice and guidance to organizations, to assist other governmental agencies in preparing position papers on various matters, or to coordinate economic and cultural aspects of programs with other technical fields. Recommends modification to projects to meet objectives and contingencies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Analysis and Evaluation Unit

Title: Transportation/Civil Engineer

SUPERVISORY CONTROLS

Works under the general administrative supervision of the Chief, Analysis and Evaluation Unit, who provides general guides and policy interpretation. Work is reviewed only from the standpoint of meeting scheduled program objectives, and conformance to general guides and policy.

MAJOR DUTIES

Serves as a Transportation/Civil Engineer with full technical responsibility for research, analysis and evaluation of source data and for providing advisory and consultative service to AID and other appropriate agencies in connection with availability, reliability, and validity of technical and scientific data pertaining to the broad field of civil engineering to include, but not limited to, such subject matter as transportation, telecommunications, mapping, geodesy, and aerial photography.

1. Makes significant contributions to the production of studies, reports, and a wide range of background data required for accelerated strategic program planning of physical, social, and economic resources of the country or region. This involves using own initiative and ingenuity in conducting research within governmental agencies, international and foreign organizations to acquire data. Analysis and evaluates the data and prepares materials for publication, or prepares specifications for the modification of existing materials to meet specifications. Determines gaps in information which must be filled, and incorporates new data into specifications upon receipt. In preparing specifications, assures full consideration of aspects in other fields that have an impact on his own, and vice versa.

a. Affects operational level coordination with other agency representatives, through channels, on matters relating to studies, and in turn provides technical advice and guidance, upon request, on scope, content and technical matters relating to subject field.

b. May serve as a project coordinator responsible for the effective coordination of research, writing and editing in order to meet the requirements of a highly professional study or report. Also, may serve as the leader of a field investigation team on temporary assignment.

2. Advisory services.

a. Serves as an advisor, in field of engineering, to Unit Chief on matters relating to development and application of new concepts and methods and in the preparation and presentation of lectures and briefings.

b. Within subject field, provides advice and guidance to other governmental agencies on the evaluation of proposals and programs submitted by foreign country missions or agencies outside the government for countrywide or specific area programs or projects to meet development or defense needs. Recommends on such aspects as: priorities for implementation; organizational elements of the government or private organizations which can assist in accomplishment of entire tasks or portions thereof, or indicate the need for a combined effort of the government and private industry; adequacy of funding to accomplish tasks; need for the end products or projects in view of the availability of existing data or data from other projects in work; and feasibility of accomplishment of programs and projects in the given time frame. Provides advice and guidance individually or with other members of the staff when their subject fields are involved, thus necessitating full coordination with top level representatives from Ministries and foreign and international missions, when applicable, in evaluating total country programs involving short- and long-range activities.

c. Participates in conferences at the national level to supply technical advice and guidance to organizations, to assist other governmental agencies in preparing position papers on various matters, or to coordinate economic and cultural aspects of programs with other technical fields. Recommends modification to projects to meet objectives and contingencies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Technical Support Unit

Title: Chief

SUPERVISORY CONTROLS

Under the general administrative supervision of the Research Director, RIG, is responsible for planning and production control over the technical cartographic work to assure publication of resources studies as required. Receives general direction on overall objectives supplemented by advice pertinent to special areas of consideration. Incumbent is responsible for the technical adequacy and accuracy of end products, with performance evaluated in terms of adequacy of cartographic and reproduction services provided.

MAJOR DUTIES

Serves as Chief of the Technical Support Unit responsible for cartographic and reproduction processes and techniques; represents RIG in conferences with other national and foreign government organizations and directs the daily operations of the Technical Support Unit, including planning, executing, and supervising the work.

1. Provides technical advice to Analysis and Evaluation Unit on how to best portray topics, using maps and overlays. Confers with A&E personnel on nature of material to be incorporated into projects, availability of reproduction source material, study texts, maps, etc. Suggests methods which will serve to expedite production, conserve time and money , or result in more effective presentations. Evaluates proposals as to technical feasibility, cost, and time requirements. Develops budget information for proposed and scheduled work projects including estimating of manhour and dollar requirements. Prepares specifications to cover cartographic, reproduction, printing, and binding work which form basis for contract specifications. Selects or recommends contractor, monitors performance, and inspects

completed work for adherence to specifications and acceptability of completed material. Keeps abreast of developments and available services within the fields of cartography, photogrammetry, photography, printing, and reproduction.

2. Plans, schedules, and supervises the Unit operations. Interviews and recommends selection, orients and trains subordinate personnel. Maintains discipline and high morale. Initiates personnel actions and prepares performance evaluation reports. Supervises cartographic technicians engaged in drafting map overlays and other cartographic material. Assures that proper symbols and methods of representation are utilized. Checks material to ascertain most appropriate reproduction methods to be requested and arranged. Supervises clerical personnel who type, edit, and assemble textual material and who prepare layouts and check material to assure coordination of text with pertinent graphics.

3. Provides support necessary to prepare RIC products, including cartographic work, typing, duplication, photography, etc. Receives material from the A&E Unit for incorporation into final studies. Reviews and evaluates material for susceptibility to available techniques. Supervises edit of material to assure accuracy, completeness, and consistency between text and graphics. Arranges for translation service for names and texts to the language of the country or area for which study is prepared. Arranges and monitors the field edit and review of all material as performed by representatives of the regions involved. Supervises the maintenance of production control records and distribution of completed studies to a wide variety of government and private agencies as well as the foreign governments concerned.

4. Confers with representatives of user agencies regarding manner and methods of visually presenting topics required for country or area studies. Advises requesting agency regarding reduction of study size or cost by means such as: eliminating or combining portrayal of topics; utilizing different types of covers and binders; separation of maps and text, etc.

Makes commitments on behalf of RIG with respect to cartographic considerations including such items as depiction of boundaries, quantity and type of detail to be included in portrayals, standardized symbolization, method of cover production, etc. Assists in the development, implementation, and/or revision of schedules and plans for acquisition of suitable photographic coverage and other information sources required for projected studies.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Technical Support Unit

Title: Cartographic Technician

SUPERVISORY CONTROLS

Serves under the general supervision of the Chief, Technical Support Unit, who furnishes guidance and instructions on policy, objectives and scope and nature of projects. Works independently, keeping supervisor informed of activities and actions taken during his absences. Completed projects are subject to review for conformance to requirements and specifications.

MAJOR DUTIES

Serves as a cartographic technician with responsibility for compiling of maps, charts, graphs, and diagrams by employment of cartographic techniques and methods.

1. Utilizes any one of a number of different technical methods to compile maps used in conjunction with studies and reports prepared by RIG. Studies texts to determine the natural and cultural features designated for topographic representation. Examines source material including maps of varying scales and differing degrees of accuracy, schematic drawings, sketches, charts, and narrative reports to find features to be shown on maps. Locates and plots specific symbolizations, depicting over thirty technical topics such as hydrology, cultural features, hypometry, and surface configurations. Prepares overlays to depict on one base map several cultural and natural features. Provides for color separation when the information is too dense for clear delineation with one color. Assembles completed draft of project,

numbers pages, and arranges text and maps in proper sequence. Reviews draft with supervisor and analysts. Revises maps to reflect changes and recommendations of supervisor and responsible research analysts. Assists in the final review of contractor's press proofs (blueline copy) making necessary corrections in appropriate graphic language, and arranges for the reproduction and distribution of corrected drafts.

2. Prepares special purpose maps, charts, diagrams, VU-graphs and briefing boards for the Group and for other organizations in ASRCT. Establishes and maintains contact with other cartographic personnel of other agencies, contractors and customer representatives.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Technical Support Unit

Title: Scientific Documentalist

SUPERVISORY CONTROLS

Supervision recieved consists of specific instructions from Chief, Technical Support Unit. Special difficulties are resolved during performance of work. Completed assignments are subject to review for accuracy and compliance with instructions.

MAJOR DUTIES

Serves as a Scientific Documentalist performing a variety of duties in support of data collection and storage. Reviews, analyzes, and indexes source and reference materials for incorporation into information resources files of RIG or the Thai National Documentation Centre at ASRCT.

1. Reviews and analyzes subject material consisting of texts, maps and aerial photography, determines and recommends extent and depth of descriptive and subject indexing. Assists in the selection and indexing of articles from foreign and domestic technical periodicals and serial publications, making selection in terms of user-requirements and interests. Analyzes content of material; identifies and codes information. In accordance with instructions, updates analysis of old material.

2. Conducts preliminary research of materials leading to the data exchange with other government or private libraries. Establishes contacts for loan materials from other libraries.

3. Reviews, compares, and appraises materials to determine retention value. Determines proper assignment as a source or reference item; establishes number to be indexed; determines retention value and recommends disposition or retention in alternate depositories, such as the Thai Nation Documentation Centre.

Performs other duties as assigned.

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

JOB DESCRIPTION

Office: Resources Inventory Group; Technical Support Unit

Job Title: Typist

SUPERVISORY CONTROLS

Works under the supervision of the Chief, Technical Support Unit, receiving specific assignments from either the Chief or from any of the technical specialists. Completed work is reviewed by the initiator for conformance with pertinent regulations governing format, procedure, administrative and security regulations.

MAJOR DUTIES

Performs typing and clerical duties for the Resources Inventory Group, serving any of the personnel of the organization, as well as official visitors to RIG.

1. Types a variety of material, such as military and nonmilitary correspondence; memoranda, staff and technical studies, reports and materials for publication from handwritten or typed rough draft copy.

a. Types in final form, correspondence involving a wide variety of technical terminology pertinent to the many scientific and specialized subject matter fields with which RIG is involved. Assures the propriety of form and arrangement of material in the final copy in accordance with regulatory and procedural requirements, style manuals, and known preferences of initiator for whom material is typed.

b. Types a wide variety of technical material for publication. Exercises judgment in determining the appropriate form (tabular or narrative), arrangement and spacing of material based upon the specific requirements of the study, speech, briefing, or publication being prepared.

c. Edits draft materials, calling questionable items to attention of originator for clarification prior to typing. Makes corrections necessary to assure proper grammer, correct spelling, punctuation, and capitalization. Proofreads completed material to assure completeness and accuracy prior to submittal to originator.

2. Answers telephone, takes and relays messages for personnel of the Group. Answers inquiries when information is available, using discretion to preclude divulging material to unauthorized personnel or without the proper approval of RIG personnel.

Performs other duties as assigned.

APPENDIX E

TOPIC DETAILS FOR RESOURCES INVENTORY STUDIES

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1. Hypsometry

A. Scope - graphically indicates the land surface at various elevations above or below sea level (usually mean sea level) by gradient tint or contours. For example, a hypsometry map, in fairly rugged areas or at small scale, can show elevations between 0-100 m., 100-500 m., 500-1000 m., etc. while in an area of low relief, elevations can be depicted at 0-50 m., 50-100 m., 100-200 m., etc. The selection of the contour interval will depend on the topography and study specifications.

B. Information details.

(1) Contour interval by line or gradient tint.

(2) Spot heights to give a good representative pattern of relief to include highest and lowest spot elevation.

(3) Names of important landforms.

2. Surface Configuration

A. Scope - covers all significant characteristics of the land surface, such as slope, local relief, elevation, and patterns of landforms, for broad landform regions as well as for individual landforms. A surface configuration map based on computed local relief is prepared for this topic, and includes landform diversions, landform names and critical spot heights.

B. Information Details on Major landform regions.

(1) Names, or other identification.

(2) Location and boundaries.

(3) Location and boundaries.

(4) Areal extent.

C. Information Details on the landform of plains, hills and mountains.

(1) Specific data

(a) Name or other identification.

(b) Location and relationship to other landforms.

(c) Dimensions and areal extent.

(d) Pattern of arrangement (alinement, continuity) of mountains and hills.

(e) Type of plain (low, high, level, rolling, dissected, etc.).

(f) Elevation.

(g) Local relief (indicate basis for determining local relief). Identify Presence of isolated emineness or depressions.

1 Plains - Flat. Local relief less than 15 m. (50 ft.).

Gently rolling. Local relief of 15 to 45 m. (50 to 150 ft.).

Strongly rolling and/or roughly dissected. Local relief of 90 to 150 m. (500 ft.).

2. Hills - Low. Local relief of 150 to 300 m. (500 to 1000 ft.).

High. Local relief of 300 to 600 m. (1000 to 2000 ft.).

3 Mountains - Low. Local relief of 600 to 900 m. (2000 to 3000 ft.).

High. Local relief over 900 m. (3000 ft.).

(h) Slope (in percent, degrees, or ratio). For mountains and hills, state whether near crest, middle, or base and whether strainght, concave, convex, uniform, terraced, etc.

SLOPE

Percent	Degrees	Percent	Degrees	Percent	Degrees
5	2°52'	35	19°18'	80	38°40'
10	5°43'	40	21°48'	90	41°59'
15	8°32'	45	24°13'	100	45°00'
20	11°19'	50	26°34'	120	50°12'
25	14°02'	60	30°58'	150	56°20'
30	16°42'	70	34°59'	200	63°30'

(i) Surface characteristics (rocky, gravelly, smooth, dusty, water-saturated; with caves, moraines, alluvial fans, lakes, lava flow, sand dunes, playas, etc.). Name, location, description and significance, as appropriate.

(j) Special phenomena. Rock slides, earthquakes, volcanic activity, floods, tsunamis, etc. Occurrence or likelihood and period of occurrence.

(2) Passes

(a) Name or other identification.

(b) Location and relationship to adjacent landforms.

(c) Elevation (also of bordering heights).

(d) Approaches (widths, slopes, and whether winding or straight).

(e) Sides: continuous, broken, or terraced.

(f) Surface characteristics (smooth, dusty, water-saturated, gravelly, rocky; terraced, lakes, caves, moraines, alluvial fans; lava flows, etc.). Name, location, description and significance, as appropriate.

(g) Special phenomena. Likelihood and period of occurrence of rock or mud slides, earthquakes, etc.

3. Climate

A. Scope - covers all the significant characteristics of climatic conditions such as temperatures, precipitation, humidity, winds, etc. If the study is to cover the country or a large region, a major climate regions map may be included using the Koppon or Thornthawaite systems of classification. If a relative small area, such as a province, is to be covered then a precipation map using isohyetal lines will be more significant. However, both maps are generally included in a study covering a wide area. The location name of each meteorological and rain gauge station are generally shown on either map.

B. Information details.

(1) Overall description of the climate by seasons.

(2) Specific data.

(a) Precipitation (maximum, mean, minimum, mean number of days with precipitation; per month and year).

(b) Temperature (absolute maximum and minimum, mean maximum and minimum, mean; per month and year).

(c) Relative humidity (absolute maximum and minimum, mean maximum and minimum, mean; per month and year).

(d) Cloudiness (mean amounts in tenths; per month).

(e) Surface wind (prevailing direction, mean speed, maximum speed with direction; per month).

(f) Fog (mean number of days; per month and year).

(g) Haze (mean number of days; per month and year).

(h) Evaporation (mean; per month and year).

4. Geology

A. Scope - covers the significant characteristics of the composition and structure of the earth's crust. The map depicts the geolo-

gic formation and structure of the area.

B. Information details.

(1) General description of the geologic history and structural development of the area.

(2) Specific data.

(a) Age of the formations.

(b) Thickness and geographic variation in composition and thickness.

(c) Structure including faults, folding and dip (attitude of the beds).

(d) Faunal assemblages in the different formations.

(e) Topographic expression, i.e., in temperate climates limestone underlies valleys and other negative topographic forms· in arid regions, they are residual positive features.

5. Engineering Geology

A. Scope - covers a full description of rock types of an area with emphasis on their engineering characteristics and their potential suitability for use as construction materials.

B. Information details.

(1) Physical description.

(a) Rock types (composition, cementing materials, color, hardness).

(b) Permeability.

(c) Fractures (joints and faults) and cavernous openings.

(d) Weathering phenomena (physical and chemical).

(2) Engineering aspects.

(a) Stability (ability of rock to retain original position when adjacent supporting material is absent).

1 In natural exposures subject to continual change or landsides).

2 In cuts, tunnels, and excavations.

(b) Bearing strength (ability of rock to support loads exerted by vehicles and structures or to withstand pressures exerted by rock crushing apparatus).

(c) Workability (case of drilling and blasting and/or cutting and dressing).

(d) Leakage (ability to transmit water through the natural foundations of buildings, bridges, dams, and other structures).

(e) Suitability as support for sustained traffic by heavy vehicles.

(f) Suitability as natural foundation for heavy structures.

(g) Suitability as crushed rock. For base course, surface course, concrete aggregate, bituminous aggregate, ballast, riprap and fill.

(h) Suitability as building stone, roofing slate, roofing, etc.

(i) Suitability for the manufacturer of cement, lime, brick tile etc.

(3) Accessibility.

(a) Potential quarrying sites.

1 Areas of exposed rock (outcrops; no over burden).

2 Areas of unexposed rock (thin overburden; a minimum of soil and weathered rock above firm fresh rock).

(b) Situation of quarrying sites (location with respect to existing or potential roads and railroads).

(4) Environmental consideration.

(a) High water table, solid and liquid waste disposal, zoning, etc.

6. Engineering Soils

A. Scope - covers a full description of the soils of an area in terms of engineering characteristics that affect construction, state of the ground movement, and suitability for construction materials. Each soil type is generally mapped and excluded under three broad categories - course-grained soils, fine-grained soils and course-grained and fine-grained soils, as defined in the Unified Soil Classification System. For each soil type mapped, columnar diagrams should be included in the text to illustrate the vertical arrangement and thickness of the various soil layers. Wherever possible, the profile should include all unconsolidated materials down to bedrock.

B. Information details.

(1) Physical aspects.

(a) Name and location of soil type.

(b) Soil profile data. (thickness of soil, profile characteristics and engineering significance).

(c) Soil particle data.

1 Sizes and shapes of particles; percentage and composition of particles.

2 Composition of constituent particles.

a Hardness of coarse portion of soil.

b. Plasticity of fine portion of soil.

3 Cementing materials.

4 Soil structure (aggregation of particles).

(d) Drainage characteristics (permeability, relation to water table).

(e) Porosity.

(f) Color.

(2) Engineering aspects.

(a) Stability.

1 On natural slopes.

2 In cuts and excavations.

(b) Bearing strength of soil.

1 Natural state.

a Loss of bearing strength if soil structure is destroyed.

b Ease with which soil structure is destroyed.

2 Compacted state.

a Ease of compacting.

b Amount of moisture required for optimum compaction.

(c) Compressibility (differential settling and subsidence).

(d) Shrinkage and expansion (with drying and wetting).

(e) Susceptibility to frost action.

(f) Workability.

1 Ease or difficulty of excavation.

2 Relation to moisture content.

3 Remolding characteristics.

(g) Engineering test data.

(h) Suitability for vehicular movement (capacity of untreated soil in various states (wet, dry, etc.). to support occasional or sustained vehicular movement).

(i) Suitability as natural foundation and subgrade (including the nature, extent, frequency, and severity of known structural failures).

(j) Suitability as base course.

1 Unsorted (natural mixture of particles).

2 Sorted (separated into various particle sizes).

(k) Suitability as surface course (wearing course).

1 Without treatment.

2 With addition of binder.

3 As binder.

(l) Suitability as aggregate.

1 For concrete.

2 For bituminous mixtures.

(m) Suitability for fill and embankments.

(n) Suitability for other construction uses.

7. Suitability for Road Construction

A. Scope - covers all significant environmental characteristics of the earth's surface in respect to its suitability for road construction. A map is generally prepared depicting restrictions to alinements and the degree of difficulty in grading.

B. Information details.

(1) Terrain and alinement.

(a) Surface configuration (flat, gently rolling, rolling or dissected, hilly, mountainous).

(b) Slope (in percent or degrees).

(c) Land use (forested, cultivated, grassland, etc.).

(d) Engineering soil types.

(e) Alinements (unrestricted, partially restricted, severely restricted).

(2) Foundations and drainage.

(a) Foundations rated (good fair, or poor) based on soil characteristics.

(b) Drainage (runoff characteristics, internal drainage, flooding potential, swampy or marshy).

(3) Construction materials and water.

(a) Construction materials (types and uses, location and distance from site).

(b) Water (amounts available and seasonality, location of wells or springs, distances of water sites).

(4) Construction operations.

Grading (amount and degree of difficulty, clearing problems, cut and fill requirements, bridging and subdrainage requirements, climatic problems).

8. Soil Moisture Regions

A. Scope - covers a full description in terms of the areal extent, depth, frequency and duration of wet, moist and dry soils of the area. In temperate and frigid zones, frozen ground and snow cover are included.

Direct factual data on soils moisture regimes are generally difficult to obtain or lacking and, more commonly, they are inferred from information on soils type, surface configuration, vegetation, surface drainage and climate. A map is include to depict the soil moisture regimes.

B. Information details.

(1) Soil moisture regimes.

The areal extent, depth and duration of:

(a) Wet soil - condition of ground when its pore space, to a depth of about 20 cm., is almost or completely filled with water.

(b) Moist soil - condition of soil when its moisture content, to a depth of about 20 cm., is intermediate between those of the wet and dry states.

(c) Dry soil - condition of soil when its pore space, to a depth of about 20 cm., is essentially free of water.

(d) Frozen soil - condition of soil when the water in the pore space, to a depth of about 20 cm., is transformed into ice which binds the soil into a hard solid mass.

(2) Factors influencing the soil moisture regimes:

(a) Precipitation - the location, frequency, and amount of rain, snow and other forms of precipitation.

(b) Temperature - significant seasonal and daily variations, especially the frequency and timing of critical temperature changes (such as those when rain becomes snow or when ground and water surfaces freeze or thaw); the areas affected by these changes.

(c) Humidity and evaporation - the effect of these conditions upon the wet and moist states of the ground due to their ability to prolong or reduce the wetting and softening effect of precipitation, thawing, or inundation.

(d) Winds - the effect of prevailing and/or seasonal winds in directing precipitation against certain exposed areas or in aiding or retarding the drying out of the ground.

(e) The general effect of natural surface conditions such as configuration, altitude, slope, vegetation cover, drainage characteristics, the degree and depth of soil permeability, the nature of soil subdrainage, and the effect of moisture on bearing capacity of soils.

9. Construction Materials

A. Scope - covers the natural, processed, and fabricated materials required by the construction industry for building and maintaining structures and facilities. A map is generally included showing the types and areal distribution of unexploited deposits, types and locations of exploited deposits, types and locations of exploited deposits and processed and fabricated materials installations.

B. Information details.

(1) Natural materials deposits

(a) Unexploited deposits (e.g., rock, clay, sand, gravel, gypsum, limestone, laterite).

1 Location.

2 Areal extent.

3 General quality and quantity of material.

4 Accessibility of deposit.

(b) Exploited deposits (e.g., quarries for building stone, crushed stone and aggregate, stone for cement; clay, sand, gravel, and laterite pits; slag dumps).

1 Name and locations.

2 Areal extent.

3 General quality and quantity of material.

4 Transportation service required for product.

5 General destination of product.

6 Exploiting company.

a Name, location, ownership.

b Number of employees.

c Equipment (type, quantity, condition).

d Normal output.

e Maximum output capacity.

(2) Timber stands.

(a) Unexploited stands (generally covered in the Vegetation topic).

(b) Exploited stands.

1 Classification.

2 Areal extent.

3 Present volume of stand.

4 Transportation service required for product.

5 Destination of output.

6 Logging company (sawmilling and combination sawmilling-logging companies are treated in paragraph (3)(g), below).

a Name, location ownership.

b Number of employees.

c Equipment (type, quantity, condition).

d Normal output.

e Maximum output capacity.

(3) Processed and fabricated materials installations. Types of construction materials installations on which information is to be included are:

(a) Gypsum products plants.

(b) Lime products plants.

(c) Cement plants.

(d) Glass products plants.

(e) Steelworks (structural and reinforcing steel pipe).

(f) Cement and concrete products plants.

(g) Sawmills (including sawmill-logging companies and planning mills).

(h) Brick and tile works.

(i) Bituminous material plants.

(j) Roofing material plants.

(k) Building hardware plants.

10. Mineral resources

A. Scope - covers unexploited and exploited minerals in the area, to include the location, description, and size of metal, rare metal, non-metallic and mineral fuel deposits. A map is included to depict the types and locations of mineral resources.

B. Information details.

(1) Mineral deposits.

(a) Location (province, geographic coordinates, etc.).

(b) General geology and mineralogy.

(c) Production and reserves.

(d) Owner, name of company, operating deposit of organization that made survey).

(e) Type of operation (underground mine, open pit, placer, etc.).

(2) Mineral occurence (surface indication of possible mineral deposit).

(a) Location.

(b) Identifying mineral.

(c) General geology and mineralogy.

(3) Types of minerals (not all minerals are listed).

(a) Iron.

(b) Iron alloys.

1 Chromium.

2 Manganese.

3 Molybdenum.

4 Tungsten.

5 Nickel.

6 Vanadium.

(c) Base metals.

1 Antimony.

2 Copper.

3 Arsenic.

4 Lead

5 Mercury.

6 Tin.

7 Zinc.

(d) Light and precious metals.

1 Aluminum.

2 Lithium.

3 Magnesium.

4 Titanium.

5 Gold.

6 Platinum.

7 Silver.

(e) Rare metals.

1 Beryllium.

2 Germanium.

3 Radium.

(f) Water reactive metals.

1 Calcium.

2 Phosphorus.

3 Potassium.

4 Sodium.

(g) Non-metals.

1 Asbestos.

2 Barite.

3 Boron.

4 Fluorite.

5 Graphite.

6 Gypsum.

7 Phosphate rock.

8 Precious stone.

9 Salt.

10 Sulfur.

11 Talc.

12 Vermiculite.

(h) Mineral fuels.

1 Coal.

2 Natural gas.

3 Peat.

4 Petroleum.

5 Oil Shale.

11. Soils - Agriculture

A. Scope - covers the pedological description of soils of an area with emphasis on their characteristics, use and management problems. A map is included to depict the local soil series units or Great Soil Group units of the area.

B. Information details.

(1) Name of soil unit (local series, great soil group (USDA 1938), 7th Appropriation (USDA 1960).

(2) Physiography and parent material.

(3) Surface configuration and dominant slope.

(4) Drainage characteristics and permeability.

(5) Soil profile characteristics.

(a) Surface soil (color, texture, structure, ph, thickness).

(b) Subsoil (color, texture, structure, ph. thickness)

(c) Depth of limiting layer.

(6) Fertility.

(7) Crops, forage plants, trees.

(8) Management problems.

12. Vegetation

A. Scope - covers the significant characteristics of vegetation regions and their vegetation types. Vegetation is generally considered to comprise four broad classes or types: trees, shrubs, grasses and crops. A map is included depicting either vegetation regions or individual species or crops.

B. Information details

(1) Trees and shrubs.

The following requirements apply to both large and small units within a major vegetation region. (Although trees and shrubs are to be treated as separate subelements,

they are covered jointly here, because of the similarily of information requirements).

(a) Tree (shrub) subareas.

1 Location and areal extent of trees (shrubs) and clearings. Percent of area covered by each.

2 Name, or other identification.

3 Plant associations:

a Principal species (names, proportion in percent, density or average spacing, height range, diameter range).

b Undergrowth species (names, proportion in percent, density or average spacing, height range, diameter range).

4 Canopy: structure (continuous, open, broken) and seasonality (color, defoliation). (For shrubs: Foliage -- density and seasonality).

5 Forest litter: composition, nature and depth of duff; abundance, type and condition of fallen trees, logs and branches; prevalence and condition of dead trees.

6 Management of forests (extent to which improved) and exploitation practices (cutting and replanting). Policy in clearing fire lanes, including their width, spacing, and location.

(b) Principal tree (shrub) species.

1 Name English and botanical).

2 Height (average).

3 Growth form (triangular, ovate, linear, etc.).

4 Diameter (average).

5 Leaves (broadleaf or needleleaf).

6 Period of defoliation.

7 Roots (structure, size, toughness).

8 Suitability for construction.

9 Special factors (toxicity, irritancy, thorniness, edibility).

(2) Grasses.

Plants such as cattails, reeds, rushes, and sedges, which are grass-like in appearance, though not grasses in a botanical sense, are included. The following requirements apply to both large and small units within a major vegetation region.

(a) Grass subareas.

1 Location and areal extent.

2 Name, or other identification.

3 Principal species (names, proportion in percent, density, height range).

4 Seasonality (dates of growth, color).

(b) Principal grass species.

1 Name (English and Botanical).

2 Date of maturity, and height.

3 Life span.

4 Growth habit (even or bunched distribution)

5 Suitability as forage.

6 Special factors (toxicity, irritancy).

(3) Crops.

Crops include plantations, orchards, vineyards, and cultivated fields (including land temporarity follow as part of a crop rotation system), but the term is not to be applied to managed forests, pasture, and arable land suitable for cultivation but not utilized. The following requirements apply to both large and small units within a major vegetation region.

(a) Crop subareas.

1 Location and areal extent.

2 Name, or other identification.

3 Principal crops (names, proportion in percent, density or spacing, height range; if applicable, months planted, cultivated, and harvested); crop rotation practices.

4 Canopy, foliage, or stand (as applicable: structure, color, defoliation, density, dates of growth).

5 Types of farming (irrigated, dry, etc.).

6 Special factors associated with crops (irrigation ditches, flooding, terraces, hedgerows, dikes, stone or other types of fences, stakes, poles and wires): location and characteristics.

(b) Principal crops.

1 Tree and shrub crops. See (1) (b). Principal tree (shrub) species, above; add: month fruit or wood is harvested.

2 Grass and grain crops. See (2) b, Principal grass, above; add: months of planting and harvesting.

13. Land Use

A. Scope - covers the actual and specific use of the land surface to include manmade and natural features. The categories of land use presented below are those developed by the International Geographical Union; these categories and subcategories should be selected, altered, and augmented to fit the scale and area to be studied. The map included should depict the land use categories adapted to the region being studied.

B. Information details

(1) Settlements and associated nonagricultural lands while on the small-scope map it will not be possible to do more than indicate by one symbol, the areas covered by cities and towns, in areas where largescale maps are used it may be desirable to distinguish between different types of settlement on the study maps. According to need, local classifications may be used to distinguish between different phases of urban land use of functional zones. Extensive surface mining areas, including land devastated owing to mine operations, should be indicated and explained in accompanying notes.

(2) Horticulture

This category should be used to include all intensive cultivation of vegetables and small fruits (as distinguished from tree fruits). The category, therefore, covers such agriculture as truck farming in America, market gardening in Britain and other European countries, as well as the production from larger gardens and allotments, whether the crops are grown for sale or not. Where vegetables are grown in rotation with ordinary farm crops the area should be recorded as category (4) cropland. This category of horticulture also includes the "garden

cultivation" of tropical villages - for example, in Thailand, Malaya, etc., where the village compound usually includes mixed vegetables such as yams, potatoes, with fruit and sometimes with small numbers of palm trees, bananas, etc.

(3) Tree and other perennial crops

A very wide range is covered by this category and the land to be included will differ very much from one part of the world to another, so that in each different survey, or on each survey sheet, the crops concerned should be named or indicated by means of symbols. In the tropics there will be included, among others, rubber plantations, cocoa plantations, coffee plantations, tea gardens, palm oil plantations, coconut groves, citrus orchards, cinchona plantations and banana plantations. In middle latitudes the category will include citrus orchards, orchards of deciduous fruits - such as apples, pears, plums, cherries, peaches, apricots, and figs - also olive groves and vineyards of different types. The category should also be used to include the groves of "cork oaks" (as in Portugal) and also such rare cases as plantations of pine trees grown especially for the production of resins and turpentine. The category should also be used to include such perennial crops or cultivations grown without rotation as sisal and manila hemp, but sugar cane or alfalfa, although grown on the same piece of land for a number of years, should be recorded as growing on cropland.

(4) Cropland

(a) Continual and rotation cropping.

(b) Land rotation

The cropland will include both plowed land and land cultivated by hand. By continual crops we mean, for example,

rice, which is often the only crop grown year after year on the same land, also sugar cane and such mono-cultural crops as wheat and corn. By rotation crops we include those grown in a fixed or variable rotation, including fodder grass, clover and alfalfa, which may occupy the land for two or three years. Crop rotation includes "current fallows," that is land which is rested for a short period (not exceeding three years).

By land rotation we understand the system whereby cultivation is carried on for a few years and then the land allowed to rest perhaps for a considerable period before the scrub or grass which grows up is again cleared and the land recultivated. In such areas, however, the farms or settlements from which cultivation takes place are fixed and the cultivation of the land is the dominant occupation. The secondary growth which is allowed to appear has little or no economic importance. This is in contrast to the forest with subsidiary cultivation mentioned later.

(5) Improved permanent pasture (managed or enclosed)
This is a type of land use well understood in countries like New Zealand and Britain where controlled grazing is carried on in small enclosed fields; the grass being managed by manuring, sometimes by reseeding, by liming, or in other ways. Often the grasses, including clovers, have been introduced so that the pasture is not "natural". Some land of this sort is grazed; other is cut for hay or dried grass. In other countries, such as the United States, this category of land is less distinctive but would include land such as the intensively stocked grasslands of the dairy belts.

(6) Unimproved grazing land

This may be described as extensive pasture or range land. It may be enclosed in large units but is not as a rule in small fields. It is not fertilized or deliberately manured though it may be periodically burnt over. The vegetation is that which is native to the locality although the characteristics of the vegetation have often been modified by grazing or occasionally by the introduction of non-local plants.

A great range of vegetation is included, from tropical savanna to arctic tundra and as far as possible the type of vegetation should be described on the map or accompanying notes. For example, this category will include savanna (or grassland with scattered trees where the grass is dominant), tropical grassland (e.g., llanos), steppe land, dry pampas, and short grass prairie. The category will also include such range lands as bunch grass and sage brush and creosote bush, as well as the vegetation of the High Veld and the Karoo of South Africa. It will include the heather moorlands and heath lands and grass moorlands of Europe. It is clear that special care must be taken to distinguish these very varied types.

There are many areas of such land which at present are not used in different parts of the world though they differ but little from those which are used for grazing. They should be noted on the map or in the text.

(7) Woodlands

Forest and woodland will be found to differ very greatly from one part of the world to another. The main categories suggested refer to the morphological character of the forest, independently of the age of the tree.

(a) Dense. Forests where the crowns of the trees are touching.

(b) Open. Where the crowns of the trees do not touch and the land between is occupied by grass or other ground vegetation. Where, of course, the trees are very sparse such land comes into category (6) (grazing land).

(c) Scrub. Is used to designate vegetation such as the maquis of Europe, chaparral of North America, mallee and mulga of Australia and the acacia thorn scrub of Africa and India.

(d) Swamp forests, both fresh water and tidal (mangrove).

(e) Cut over or burnt over forest areas not yet fully reclothed.

(f) Forest with subsidiary cultivation.

1 Shifting cultivation, where patches of land are recleared for cultivation from time to time, usually but not always, by wandering tribes.

2 Forest-crop economy. Somewhat similar is the system, for example in parts of eastern Canada, where holdings consist mainly of woodland but where some cultivation is carried on subsidiary to the working and management by replanting of the forest land.

The type of forest, whether dense, open scrub, can usually be distinguished by symbols into the following: (e) evergreen broad-leaved, (sd) semi-deciduous, (d) deciduous, (c) coniferous, (m) mixed coniferous and deciduous. In addition, in many parts of the world it should be possible to name the dominant

species or groups of trees and indicate the type of undergrowth. It may also be possible to indicate in broad outline where forest land is being commercially exploited.

(8) Swamps and marshes

(9) Unproductive land

A great variety of land is also included in this category. Considered in relation to land use it appears bare, and though it may support lowly forms of plant life is essentially unproductive. Barren mountains, rocky and sandy deserts, moving sand dunes, salt flats, and icefields are examples. Potential use, such as land capable of irrigation, may be indicated and considered but it is the present position which should be mapped.

Important Note

Where land falls into two categories, as olive groves with cultivation of wheat between the trees, this should be indicated by a combination of the appropriate symbols.

14. Land Potential

A. Scope - The land potential or land capability classification system as described here has been developed by the Land Development Department of the Ministry of National Development of Thailand.

This classification system is a type of interpretation that can be made from soil surveys. It is an interpretive grouping of soils made primarily for agricultural purposes. In this system soils are grouped at two levels or categories: Land Potential Classes and Land Potential subclasses. The Land Potential Classes are broadly grouped soils according to the degree of limitation in their use or hazards encountered when they are so used. The Land Potential subclasses are narrowly grouped soils according to the similarity in the types of limitations.

A number of assumptions must be made when soils are to be grouped consistently within the capability classification. The potential classification is an interpretation based on the combined effects of many soil characteristics or risks of soil damage, limitations in use, productive capacity, and soil management. Slope, soil texture, soil depth, effects of past erosion, permeability, water holding capacity, types of clay, etc., are considered permanent soil qualities and characteristics.

This Land Potential Classification system containd Classes I through VIII for upland crops and Classes I through V for paddy. Each class includes many different kinds of soils. A practical level of management is assumed. Clases I through IV include soils for both paddy and upland crops that can be used for cultivation without severe risk of damage to the soil. Some soils are used for growing rice in the rainy season; these soils may be grouped with soils in one class according to hazards and limitations when used for rice, and grouped with soils in another class when used for upland crops. Some soils that are too steep for cultivated crops may be planted to rubber, fruit, or other tree crops, with little disturbance or damage to the soil; in such cases, soils will be classified as Classes VI or VII. However, this does not imply that these steep soils cannot be used for tree crops. Soils suited for cultivation may also be suited to other uses such as pasture or forest. When soils are grouped in Classes I through IV, it does not imply that all soils so grouped should be cleared and farmed.

Soil and water requirements for rice are different than those for unland crops. For this reason a Land Potential System that encompasses both rice and upland crops would be difficult to interpret, and would be too complicated for most people to use. Therefore, this system is separated into a classification for rice and another classification for upland crops.

The land potential classification for upland crops as used in Thailand closely parallels the Land Capability Classification System of the Soil Conservation Service, United States Department of Agriculture.

Both classification systems group soils into eight broad capability classes. The classification for rice was developed in Thailand and it groups soils into five broad classes.

B. Information details*

LAND POTENTIAL CLASSES FOR PADDY

CLASS P-I. Soils very well suited for paddy land

Soils in Class P-I have few limitations that restrict their use for rice.

CLASS P-II. Soils well suited for paddy land

Soils in Class P-II have slight hazards or limitations that restrict their use for rice.

CLASS P-III. Soils fairly well suited for paddy land

Soils in Class P-III have moderate hazards or limitations that restrict their use.

CLASS P-IV. Soils poorly suited for paddy

Soils in Class P-IV have severe hazards or limitations that restrict their use for paddy land.

CLASS P-V. Soils generally not suited for paddy land

Soils in Class P-V have severe limitations, difficult or impossible to correct, that make them unsuited for rice.

LAND POTENTIAL CLASSES FOR UPLAND CROPS

CLASS U-I. Soils very well suited for upland crops

Soils in Class U-I have few limitations that restrict their use. They are suited for growing many plants, and they may be used safely for cultivated crops, pasture or woodland.

CLASS U-II. Soils well suited for upland crops

* see page 32

Soils in Class U-II have slight hazards or limitations that restrict their use. They are suited for many cultivated crops, and for pasture and woodland. Choice of crops is not as great as it is for Class U-I.

CLASS U-III. Soils fairly well suited for upland crops

Soils in Class U-III have moderate hazards or limitations that restrict their use. Choice of crops may be limited, however, these soils are suited for cultivated crops, pasture or woodland.

CLASS U-IV. Soils poorly suited for upland crops

Soils in Class U-IV have severe hazards or limitations that restrict their use. Many soils in this class are suitable for cultivation for a few years, but when fertility declines, they are abandoned. Some soils in Class U-IV are well suited for special crops, such as fruits, rubber, and coffee.

CLASS U-V. Soils having little or no erosion hazard, but having other limitations that are impractical to remove, making them unsuited for upland crops.

Some soils in Class U-V are flooded for long periods, or are subject to frequent overflows. Some are shallow to laterite. Common crops cannot be grown, but these soils may be suited for pasture, woodland, or other special crops.

CLASS U-VI. Soils having severe limitations that make them generally unsuited for cultivation and limit their use to pasture, woodland, wildlife food and cover, and water supply.

Soils in Class U-VI have limitations that cannot be corrected, or correction is not feasible. Some of these soils can be used for tree crops, or for other crops if unusually intensive management practices are used.

CLASS U-VII. Soils having very severe limitations that make them unsuited for cultivated crops, and that restrict their use largely

to woodland, wildlife food and cover, water supply and recreation.

Soils in Class U-VII have limitations that cannot be corrected.

CLASS U-VIII. Soils and land types having limitations that preclude their use for commercial plant production, and restrict their use to recreation, wildlife food and cover, and water supply.

Badlands, rock outcrops, limestone crags, sandy beaches, river washes, mine tailings, and other nearly barren lands are included in Class U-VIII.

DEFINITIONS OF LIMITATIONS FOR LAND POTENTIAL SUBCLASSES

Capability classes group soils according to the degree of limitations or hazards. Capability subclasses group soils within class according to kinds of limitations.

Eight subclasses or kinds of limitations are recognized

1. Subclass e-erosion. Erosion susceptibility and past erosion damage are major soil factors for placing soils in this subclass.

2. Subclass s-soil limitation in the root zone. This subclass is made up of soils for which major limitations are problems such as shallowness, unfavorable texture, stoniness or low fertility difficult to correct.

3. Subclass m-lack of moisture for plant growth. This subclass consists of soils on which plant growth is severely reduced by lack of moisture after short periods of little or no rain. This limitation is due either to inability of soils to hold sufficient water to maintain plant growth during dry periods, or to lack of water for plants in dry seasons, or both.

4. Subclass t-unfavorable topography. Subclass t is made up of soils whose high topographic position or distinct

micro-relief, such as an abundance of stream channels, limits its use for crops.

5. Subclass f-flooding. This subclass is made up of soils susceptible to flash floods, or in the case of upland crops, prolonged deep flooding, or both, which damage crops or limit choice of crops. In areas where flood water rises slowly and floating rice is the main crop, prolonged, deep flooding is not a limitation for rice.

6. Subclass d-impeded drainage. Subclass d consists of soils whose use for crops is limited by excess water. Wetness is caused by high water table, slow permeability, or slow surface drainage, or combination of all three.

7. Subclass x-salinity or alkalinity. Subclass x is made up of soils for which the major limitation is salinity or alkalinity.

8. Subclass a-soil acidity. Subclass a consists of soils for which strong acidity, difficult to correct is the major limitation in their use for crops.

* For additional details see - Soil Survey Interpretation Handbook for Northeast Thailand, No. 60, Part II - Land Capability Classification (Report SSR-60-1967) by D. L. Gallup, et al.; July 1967, Land Development Department, Bangkok, Thailand.

15. Surface Water Resources

A. Scope - covers the physical characteristics and hydrologic data of all natural and certain artificial drainage features, and the characteristics of those regulatory works which restrain or contain their discharge. Refers to all watercourses (streams, canals, ditches, etc.), standing bodies of water (lakes, inland seas, reservoirs, etc.) and flooded or wet areas (swamps, marshes, irrigated areas, areas sub-

ject to inundation, etc.). The map (maps) depicts the drainage network, drainage basins, gaging stations, meteorological and rainfall stations, dams, reservoirs, swamps and marshes, areas subject to flooding, etc.

B. Information details

(1) General information on major drainage basins, including those which extend beyond the political boundaries of the country.

(a) Major drainage regions.

1. Names, or other identification.

2. Drainage types and general characteristics.

3. Location.

4. Areal extent.

(b) Relationship to other geographic elements, Landforms, climate, vegetation, rocks and soils, culture features, etc.

(2) Drainage features.

(a) Rivers, streams, canals, ditches, etc.

1 Name or other identification, and location.

2 Channel characteristics, (length, profile, gradient of stream bed).

3 Bottom characteristics (composition, depth, firmness, unusual conditions).

4 Flow characteristics.

a Measurements and periods of occurrence at low, high, and mean water of depth, width, volume of discharge, and velocity (minimum, maximum, and mean).

b Special phenomena (crosscurrents, undertows, eddies, floods); periods; area covered; destructive effects. Tidal effects at low, high, and mean tides.

5 Physical and chemical characteristics of water (turbidity, color, odor, taste, temperature, chemical composition, bacterial pollution, seasonal variations).

6 Bank characteristics (composition, stability, height, and slope).

7 Regulatory structures (levees and dams).

8 Islands, bars, shoals, and rapids (name, size, surface roughness, elevation, and pattern).

9 If applicable - ice (earliest, latest, and mean freezing and breakup dates, extent of frozen surface; thickness of ice; carrying capacity; and frequency and location of ice jams).

10 Kind and prevalence of animal and vegetable life.

11 Type and location of crossings (structures, ferries, etc.).

(b) Lakes, reservoirs and ponds.

1 Name or other identification, and location.

2 Length, width, depth and surface area at low, high, and mean water; periods of occurrence of each.

3 Gage locations and periods of record, zero gage elevations, mean and extreme gage heights and periods of occurrence.

4 Shore characteristics (composition, stability, height, and slope).

5 Physical and chemical characteristics of water (turbidity, color, odor, taste, temperature, chemical composition, bacterial pollution, seasonal variation).

6 Bottom characteristics (composition, depth, and firmness of material, unusual bottom conditions, profiles).

7 Regulatory structures.

8 Islands, bars, and shoals (name, size, surface roughness, elevation, and pattern).

9 If applicable - ice (earliest, latest and mean freezing and breakup dates; extent of frozen surface; type and thickness of ice; and carrying capacity).

10 Kind and prevalence of animal and vegetable life.

11 Type and location of crossings (structure, ferries, etc.).

(c) Marshes and swamps.

Information in (b) above, as applicable.

(3) Supporting data.

(a) Hydrographs for reservoirs.

(b) Tabular hydrologic data (daily, mean, maximum, and minimum discharges, runoff during dry season, annual volume, etc.)

(c) Tabular data on dams (location, size, when constructed, use, etc.). See Electric Power.

(d) Gaging station data.

(e) Evaporation statistics.

(f) Seasonal variation of flow characteristics for a wet year, average year and dry year).

(g) Flood probability tables.

16. Ground Water Resources

A. Scope - covers the full descriptions of quantities, qualities, availability, accessibility, and distribution of ground water supplies. Includes both direct factual data on existing ground water resources of an area, and basic allied information that can be used to make interpretations of the ground water potential of an area. Basic allied information includes information on surface configuration, geology and surface drainage. Includes a map depicting the distribution of the potential and existing sources of ground water as to quantity and quality.

B. Information details

(1) Existing water supply sources

(a) Relative importance of ground water in the overall water supply picture.

(b) Relative importance of dug, drilled wells, and springs in supply of ground water.

(c) Wells

1 Distribution, relation to topography; altitudes of collars.

2 Well characteristics.

a Location.

b Diameter and depth.

c Casing or lining used; depth and reason.

d Screen or perforated casing used; depth.

e Materials and aquifers penetrated; well logs.

3 Yield of aquifers tapped by wells.*

a Static level of water, with seasonal variations.

b Initial yield.

i. Initial flow, if flowing well.

ii. Initial yield on pumping at static levels.

c Rates of drawdown at specified yields.

d Sustained yield (after prolonged pumping).

e Maximum drawdown (at specified sustained yield).

f Rate of recovery at static level after pumping.

g Fluctuations in yield.

i. Seasonal fluctuations.

ii. Records of past failure of well.

h Effect on yield of nearby wells tapping same aquifer.

i. Spacing of wells.

ii. Effect on static level of pumping nearby wells.

4 Quality of water tapped by wells.**

a Dissolved solids.

i. Hardness.

ii. Deleterious substances; type of source.

iii. Total dissolved substances; analysis.

* see page 40
** see page 40

iv. pH values.

b Bacterial contamination; sources.

c Turbidity.

d Color, odor, taste.

e Temperature.

f Variations in quality of water.

(d) Springs

1 Locations and spacing; relation to topography.

2 Natural yield and seasonal variation.

3 Yield after development.

4 Method of development.

5 Record of previous reduction or failure of yield.

6 Quality of water tapped by springs (see items in para (1)c.4, above).

(2) Potential Water Supply Sources.

(a) Distribution of potential sources.

(b) Individual potential sources.

1 Location and depth.

2 Expected yield.

3 Expected quality (see items in paragraph (1)c.4, above).

4 Development problems (including special difficulties in areas of hardpan, etc.).

a Ease or difficulty of siting and digging wells and springs and drilling wells; need for reinforcement after digging or drilling.

b Recharge rates; possible artificial recharge.

c Probable hydrostatic pressures; estimate of pumping requirements.

d Probable damage from overpumping.

i. Lowering of water levels.
ii. Encroachment of salt water.
iii. Reduction in aquifer permeability.

(3) Construction Problems.

Problem areas: places where construction is adversely affected by the presence of ground water at or near the surface.

(a) Location of area(s).

(b) Depth of ground water, including:

1 Seasonal fluctuations.

i. In depth.
ii. In occurrence of local perched ground water bodies.

2 Critical depths: levels at which ground water hampers or prevents the construction of roads, airfields, building foundations, underground installations, etc.

(c) Drainage of ground water into specified constructions.

1 Rate of flow.

2 Ease or difficulty in controlling rate of flow.

(d) Chemical effects of ground water on construction materials (corrosion, scaling, flaking, pitting, etc.).

* Quantitative terms:

Large - More than 5,450,000 liters per day (more than 1,000 gallons per minute).

Moderate - From 545,000 to 5,450,000 lpd (100-1,000 gpm).

Small - From 54,500 to 545,000 lpd (10-100 gmp).

Very small - From 5,450 to 54,500 lpd (1-10 gpm).

Meager - Less than 5,450 lpd (less than 1 gpm).

** Qualitative terms:

Brackish - Contains more than 250 p.p.m. either dissolved chlorides or sulfates, contains less than 2,500 p.p.m. total dissolved solids; tastes salty to most people.

Salty - Contains more than 2,500 p.p.m. total dissolved solids; generally importable.

Hardness terminology:

Soft - 0-55 parts per million (p.p.m.) of $CaCO_3$

Slightly hard - 56-100 p.p.m. of $CaCO_3$

Very hard - More than 200 p.p.m. of $CaCO_3$

17. Population

A. Scope - covers the distribution, number, age and sex structure, rate of growth and ethnic composition of the population. The map depicts population density (persons/km^2) by political subdivision and the size of cities. A population distribution map (dot pattern) can be substituted or included in addition to the other map. The latest official census figures or estimate figures should be used.

B. Information details

(1) Date of population survey.

(2) Political subdivision (country, province, etc.).

(a) Name.

(b) Area.

(c) Number of persons by:

1 Age groups.

2 Sex.

3 Ethnic group.

(d) Birth rate, death rate, growth rate.

(e) Density (persons/km^2).

18. Education

A. Scope - covers the characteristics of the educational system and the distribution of facilities. The map depicts the location and type of educational facility; may include the percentage of school age students enrolled by district.

B. Information details

(1) National or local organizational structure of the educational system.

(2) Yearly fiscal investment (national or local budget).

(3) Educational statistics (primary and secondary).

(a) Number, type and location of schools (public, private).

(b) Number of students by sex (public, private).

(c) Number of teachers (public, private).

(4) Universities.

(a) Name.

(b) Number of students by sex.

(c) Number of faculties (professors and number of pupils enrolled by sex).

19. Health

A. Scope - covers the characteristics of the health organizational system and the distribution and type of health facilities. The map depicts health districts and installations (hospitals, health offices, health centers, midwife centers, etc.).

B. Information details

(1) Health organizational structure (national or local).

(2) Yearly fiscal investment (national or local budget).

(3) Health statistics.

(a) Hospitals.

1 Name and location.

2 Type.

3 Number of beds.

4 Number of medical personnel (doctors, nurses, midwives, dentists, veterinarians, etc.).

5 Number of patients treated per year.

(b) Other health facilities (health centers, midwife centers, etc.).

(c) Mobile units.

1 Operational location and type.

2 Types of treatment offered and personnel.

(d) Endemic diseases (type and number afflicted).

20. Urban Areas

A. Scope - covers the pattern of development and relative importance of urban areas within a country or region, and the population, functions, industrial production, physical characteristics, means of access, and services of individual cities. Includes location, identification, and general data on all elements of cities. The map depicts the urban areas selected for treatment by symbolization; if required, a large-scale map or maps (town plans) can be included for specified urban areas to include detailed information.

B. Information details

Countrywide urban areas data

(1) Urbanization.

(a) Present pattern.

1 Ratio of urban to total population; official definition of the classification "urban population".

2 Distribution of urban areas by size, geographic regions, importance in the national economy, and principal functions.

3 Important historical factors leading to present pattern of urbanization.

4 Effect of significant ethnic or religious groups on the character or location of urban areas.

(b) Trends (including causes).

1 Growth or decline of existing towns.

2 Establishment of new towns.

3 Changes in urban population ratio.

(c) Plans for future urban development.

1 National, regional, and local plans and planning agencies.

2 Coordination and implementation of plans.

(2) Main characteristics of urban areas.

(a) Physical characteristics.

1 Layout and site (national, regional, and local similarities or significant differences in town layout and site conditions).

2 Characteristics of buildings and structures (prevailing densities, types of construction including wall and roofing materials, height, depth, and stability of foundations, capacity to resist shock, rubble potential, proportion of window-to-wall area, types of heating systems, susceptibility to conflagration, prevalence of basements and cellars, significant regional and

local differences in construction characteristics).

3. Streets (prevailing types of surface, condition, pattern, width, clearance, significant regional and local differences in characteristics).

(b) Intercity communications.

General quality, adequacy, and relative importance of highways, railways, navigable inland waterways, airways, and coastal shipping; distribution of communications facilities relative to pattern of urbanization; trends.

(c) Urban services.

Availability, quality, and adequacy of urban services by geographic regions and sizes of urban areas.

Individual Urban Areas

(1) General description and importance.

(a) Location (geographic coordinates).

(b) Population. Number and trend.

(c) Principal functions. Description and importance of the functions which give significance to the town. e.g., economic (major industrial center, only port in the country, principal industrial center of a region, regional or national outlet for agricultural products); communications (hub of main railroad lines in the country, site of central railroad repair shops, site of only field for jet aircraft); political (national, state or provincial capital, location of important governmental offices and functions); military ("fortress" town, site of military headquarters or garrison); cultural (university town); religious (seat of church, religious shrines).

(2) Physical characteristics.

(a) Topography and geology of site and environs (including underlying earth structure). Some typical aspects are: restrictions imposed upon urban development and external communications, and liability of the site to inundation, rockslides, etc.

(b) Environs.

1 Location, types of settlement.

2 Alinement and description of roads.

3 Land use.

(c) Climate.

Temperature - mean minimum and maximum and extremes for coldest and warmest months; precipitation - annual mean and mean for wettest and driest months; number of days with snow cover, months of occurrence, and amount of snowfall; mean seasonal relative humidity conditions; cloudiness - number of cloudy days and percentage of cloud cover; fog - months of occurrence and frequency; unusual weather phenomena (tornadoes, hurricanes, thunderstorms, blizzards, etc.) - months of occurrence, frequency, and severity.

(d) Landmarks (natural and manmade).

(e) Extent of built-up areas (present boundaries, recent additions, probable future expansion).

(f) Functional areas (extent of functional segregation; location and extent of commercial, industrial, transportation and storage, governmental - institutional, military, residential including slums, and open areas; trends in expansion or contraction of functional areas). As warranted, relate each of the elements in

the following subparagrphs to functional areas.

(g) Structures.

1 Characteristics of predominant types of buildings (heights, number of stories, existence and depth of basements or cellars (including personnel shelters), proportion of window to wall area, principal construction materials, construction type).

2 Structure density (ratio of roof coverage to gross ground area).

3 Principal buildings.

4 Underground installations. Location, description, and use of underground installations, including caves and mines.

(h) Susceptibility to fire and earthquakes.

Include prevalence of combustible litter and trash, types of heating systems in use and heating season, frequency and causes of past building collapses and major fires.

(i) Damaged or destroyed areas (delineation and general character).

(j) Significant ethnic and religious groupings (delineation and general character).

(k) Streets.

1 Surface, condition, and pattern.

2 Prevailing widths (curb-to-curb and building-to-building).

3 Names, official route numbers, and alinement of through routes and principal streets.

4 Location and characteristics of bridges, tunnels, ferries, and bottlenecks.

(1) Planning (nature and feasibility of any planning which will affect the character of the area).

(3) External communications.

(a) Highways.

Identification of the highways which enter urban area and of the routes which bypass it, and highway distance(s) to nearest important town on each route. The textual notes develop the importance of the highways as avenues of movement for goods and passengers to and from the town; include official route numbers and locate and identify significant highway structures and ferries.

(b) Railways.

Identification of the railways which enter the urban area, and the railway distance(s) to the nearest important town on each railway. The textual notes develop the importance of the railways as arteries of movement for goods and passengers to and from the town; identify significant railway structures and crossings (bridges, tunnels, and ferries), and such railway facilities as passenger and freight stations, yards and sidings, repair shops, turntables, and wye track.

(c) Navigable inland waterways.

Identification of each navigable water route (river, lake, or canal) which borders or passes through the urban areas, and the waterway distance(s) to the nearest important upstream or downstream port. Textual notes develop the importance of each water route

as an avenue of movement of goods and passengers to and from the town; identify important waterway structures and shipyards (building and repair). Information on shipyards is included with that on the industries of the urban area.

(d) Airways.

The location and identification of commercial airfields serving the urban area and military airfields and airstrips, if beyond the limits of the city map. Textual notes indicate the adequacy of the existing air service, list each commercial airline which serves the area, and provide information on the frequency of service.

(e) Coastal and maritime shipping.

The location and identification of port areas are included. Textual notes identify the principal freight and passenger lines serving the urban area, and provide information on frequency and adequacy of service.

(4) Urban services and facilities.

In addition to the elements listed below, information showing condition, adequacy, and improvement (planned or underway) should be recorded for all urban services. Alternate services and facilities potentially available from nearby urban areas, military installations, etc. should be mentioned.

(a) Water supply.

1. Sources, including potential and disused (name, location, type, capacity, and quality); extent of reliance on private sources (e.g., wells, roof catchments, etc.).

2 Treatment plants (number, type, capacity, and location).

3 Storage (name, location, type, capacity).

4 Distribution (method, areal extent of service, and quality of distributed water).

5 Consumption (in terms of minimum and average requirements per person per day; whether any rationing is practiced and during what periods; annual consumption).

(b) Sewage disposal (sanitary, storm, industrial waste).

1 Collection (methods, type, adequacy, areal extent of service, percentage of household connections within the area served).

2 Treatment plants (type, location, effectiveness, location of discharge points or outfalls and resultant pollution problems, if applicable).

3 Disposal (methods; location of dumps or incinerating plants; extent of private disposal methods (septic tanks, cesspools).

(c) Health and public sanitation.

1 Adequacy and enforcement of municipal sanitary regulations.

2 Endemic diseases (incidence, special control measures).

3 Garbage and trash disposal (collection methods including area served, responsible municipal or private agencies, collection equipment, frequency of collection; adequacy, frequency, and extent of area served by street cleaning; treatment plants including type, location, and effectiveness; dis-

posal methods including location of dumps, incinerators, etc.).

4 Rodent and insect control (extent, adequacy, and effectiveness).

(d) Hospitals.

1 Name, location and specialization, if any.

2 Bed capacity.

3 Age and condition.

(e) Electric power (also see Electric Power topic).

1 Sources (name, location, capacity of power stations, indication if hydro, steam, diesel or other type of prime mover).

2 Physical characteristics, extent and adequacy of distribution system. If electricity is received from a distant source, similar data, as pertinent are also required on transmission lines serving urban area.

3 Current characteristics (AC or DC, voltage, cycles).

4 Number and type of consumers.

5 Restrictions or limitations, if any, on use of electricity or regularity of service.

6 Yearly consumption.

(f) Gas.

1 Type.

2 Sources (name, location, capacity).

3 Storage (type, location, capacity).

4 Physical characteristics, extent and adequacy of distribution system. If gas is received from a distant source, similar data, as pertinent, are also required on transmission line serving urban area.

5 Number and type of consumers.

6 Yearly consumption.

(g) Telecommunications (telephone and radiotelephone, telegraph and radiotelegraph, broadcast and direct radio, communication facilities, television, cable).

1 Adequacy of connections and service.

2 Type (automatic, manual) and capacity of telephone exchanges, number of telephones.

3 Number, ownership, and function of radio and television stations.

4 Location of principal radio and television transmitters, telephone and telegraph centrals, and cable landing stations.

(h) Storage (open, covered, cold, POL, explosive, and special). For buildings or facilities, give outside dimensions, building materials, and type of construction. Information on the following types of storage is given:

1 Open. Large open areas within or adjoining the town suitable for use as open storage and supply dumps.

2 Covered. Warehouses and sheds.

3 Cold. Refrigerated storage. Make appropriate cross-reference to ice plants having cold-storage facilities.

4 POL. Include the number of tanks or reservoirs at each location; give capacities.

5 Special storage. Type and capacity of facilities for storing grain, cement, solid fuels, etc. For solid fuel give type stored (lignite, bituminous coal, peat, etc.).

(i) Ice-manufacturing plants.

1 Name.

2 Location.

3 Capacity.

(j) Internal transit systems

1 Type.

2 Extent and gage (where applicable).

3 Capacity and adequacy of each system.

4 Equipment.

5 Location of main terminal and maintenance facilities.

6 For subways: Type and dimensions of tunnels and depth below ground; location of stations.

(k) Municipal police protection.

1 Organization and manpower of municipal police department.

2 Location and identification of police stations.

3 Supplementary forces available in an emergency.

(l) Municipal fire protection.

1 Organization and manpower of fire department.

2 Location and identification of fire stations.

3 Equipment (quantity, by type).

4 Warning system.

5 Efficiency.

6 Fire-fighting organizations and equipment serving industrial installations, port areas, etc.

(m) Real estate.

1 Place of official record (recorder of deeds, land office, cadaster, etc.).

2 Acquisition procedures.

3 Restrictions and trespass rights (customs, prohibited shrines or other areas).

(n) Repair and maintenance facilities (garages, foundries, etc.).

(5) Industry.

(a) Major industrial activity.

For each important industry in the urban area (see Industries topic):

1 Type.

2 Number of plants.

3 Number of employees.

4 Importance.

(6) Significant installations.

(a) Type. Scientific, cultural, political, security, and other installations or institutions of significance such as laboratories, research facilities, major libraries, monuments, shrines, museums, institutional headquarters, government buildings

(national, state, and local), police headquarters, penal facilities, embassies and foreign missions, etc.

(b) Location and building data.

For each installation, regardless of building size, give location and building characteristics.

(c) Importance (nationally, regionally, and locally).

21. Industry

A. Scope - covers the significant characteristics of industries with emphasis on major facilities. The map depicts the type and location of each major industry; the total number of all industries may be symbolized for each political subdivision.

B. Information details.

(1) Countrywide data.

(a) Overall industrial data, including general level of development, availability of raw materials and of an industrial labor supply.

(b) Extent of industrialization to cover the degree of centralization or dispersion, self-sufficiency for raw materials and parts supply and data on the most heavily industrialized centers.

(c) Agencies responsible for administration of production, manufacturer's syndicates or associations, government controls, etc.

(2) Industrial installations.

(a) Name, ownership, location.

(b) Type of industrial facility and significance.

(c) Plant area (size and number of buildings).

(d) Number of employees.

(e) Production analysis.

1 Products.

2 Quantity.

3 Capacity and rate of production.

4 Disposition of end product.

22. Electric Power

A. Scope - covers all characteristics of the electric power system, and all available information on development, construction and maintenance. "Electric power" comprises all aspects of the production, transmission,distribution, and consumption of electricity; it includes all structures, machinery, devices and related facilities, such as atomic energy plants used in generating electricity, and dams and reservoirs connected with powerplants. The map depicts the types of electric power generating stations, substations, transmission lines, dams, reservoirs, etc.

B. Countrywide Information.

(1) Importance

(a) General.

1 Share of power industry in the national income.

2 Total capital assets of the power industry.

3 Number of employees in the power industry; general level of training and efficiency; whether self-sufficient or dependent on foreign sources for the necessary technical skills.

(b) Extent of electrification. Proportion of homes, farms, industry, and railroads served by electricity.

NOTE: In evaluating the adequacy of the electricity supply to the urban and rural population, conclusions should be based upon local requirements and the accepted standard of living in the country, and not upon the

requirements and standard of living in another country (as in the United States, for example, where the electricity requirements per capita for lighting, heating, and household conveniences are among the highest in the world).

(2) Development.

(a) Trends.

1 Brief digest of the history and pattern of development of the electric power industry. Statistics on the annual growth of capacity and production (by type of generation), and per capita production.

2 Reasons for any abnormalities in past growth.

3 Factors, including use of atomic energy, which may affect future growth.

(b) Expansion plans.

1 Extent and nature. An estimate of the extent of new construction and plant expansion in progress, in terms of the total capacity (in kilowatts), in new plants under construction and the total capacity being added to existing plants; railway electrification projects under way, in terms of total mileages; transmission lines under construction, in terms of mileage for each voltage grouping; substations under construction. Information on planned development should include: a description of the planned development program; the increase in capacity (in kilowatts) it provides through new construction and through plant expansion; the lengths and voltages of planned new transmission lines; and the purpose of the program.

2 Scheduling.

3 Feasibility. If a development scheme is considered infeasible or if there is little likelihood of its accomplishment, the reasons for the conclusion should be given.

(3) Organization and administration.

(a) Government control. Extent and nature of government control of the industry. General import of acts, edicts, regulations, etc. governing electric power generation and supply; the degree to which control is exercised over hydroelectric and thermal power development, plant expansion, integration into power networks, tariffs, supply to consumers, and related matters; effect of such control, whether adverse or favorable and in what respects.

(b) Control and planning organizations. Character and functions of central controlling and planning bodies (government and private).

(c) Ownership. Names of major utility enterprises and their areas of operation.

(d) Foreign investment. Extent and effect of foreign investment in the power industry; controls on foreign ownership.

(4) Statistical data (for selected recent years).

(a) Installed capacity (in kilowatts and number of plants).

1 By area: countrywide, regional, or by major utility enterprises.

2 By function: government, industrial, or private utility.

3 By source of power: hydroelectric (run-of-river, storage, etc.) or thermal (lignite, coal, diesel, atomic, etc.).

4 By operation: base load, peak load, standby.

5 By quality: age, condition, and efficiency.

6 By size range.

(b) Production (in kilowatt-hours).

1 through (4), same as in (a), above.

2 Per capita production.

(c) Consumption (in kilowatt-hours).

1 By area: countrywide or regional.

2 By user group: residential, agricultural, industrial, etc. Include here self-consumption by powerplant, and line losses.

3 By major industrial group (metallurgical, chemical, etc.) giving for each:

a Total amount consumed.

b Amount self-produced.

c Amount purchased.

4 By period: diurnally, monthly, and seasonally (or in percent of total amount consumed).

5 Per capita.

6 Restrictions: Nature, reasons, and consequences.

(d) Import and export.

1 Amount imported and from what country; trend over a period of years.

2 Amount exported and to what country; trend over a period of years.

3 Seasonal aspects of import and export.

(5) Power sources.

(a) Hydroelectric sources. For the country as a whole and for major watersheds or other appropriate regions.

1 Potential installed capacity and estimated annual production of undeveloped hydroelectric potential. Location and amount (in kilowatts or kilowatt-hours per year) of important unharnessed water power favorable to the construction of hydroelectric powerplants.

2 Identity and nature of important hydroelectric potential studies.

(b) Thermal sources. Solid, liquid, gaseous, and nuclear fuels. For each specific type (wood, peat, lignite; bituminous coal; anthracite; diesel fuel; fuel oil; natural, manufactured, blast furnace or waste gas; developed geothermal sources, uranium or other nuclear fuel), provide the following data, as applicable:

1 Potential and developed domestic resources.

a Geographic distribution.
b Quality (good or poor).
c Quantity.
d Total annual production.

2 Dependence on imports.

a Sources. Quantity and quality.
b Problems (including foreign exchange).

3 Consumption of major fuels. For each major fuel (over a period of years):

a Quantity used (total and for electric power generation).

b Thermal value (British thermal units (BTU) or kilocalories per unit of weight or measure).

(6) Generating facilities.

(a) Geographic distribution. General distribution of generating facilities relative to load centers.

(b) Distribution factors. Factors which have affected the distribution of generating facilities, such as location of hyroelectric potential, fuel resources, cooling water, and considerations of defense.

(c) Plant utilization. Average for different plant types (run-of-river, bituminous coal, etc.) in percent or number of hours per year.

(d) Powerplant equipment.

1 General age, condition, and efficiency. Information providing a general understanding of the types of equipment in general use, with sketches, diagrams, photographs, and other illustrative material covering typical powerplants if required. Standards, if any, for powerplant equipment.

2 Supply status.

a Degree of self-sufficiency, including import-export position (from or to whom, what, and in what quantities).

b Principal plants producing equipment. See Industry topic.

(7) Transmission and distribution facilities.

(a) General

1 Degree of integration of power facilities.

2 Total transmission line mileage by voltage and voltage ranges.

3 Characteristics of distribution and consumption current. In developing this information for any particular country, it may be found that distribution voltages and utilization voltages very considerably, and that no general statement will satisfy the requirements of this topic. In such a case, a tabular presentation, giving for selected locations the distribution voltages and utilization voltages for each, is desirable.

(b) International connections. For each connection:

1 Location (including foreign terminal).

2 Amount and direction of power transfer, annually or by season as necessary.

(c) Individual networks. For each major network:

1 Total connected capacity.

2 Load centers.

3 Degree of interconnection within the network.

4 Principal connections with other networks.

5 Location and field of responsibility of load dispatcher.

(d) Equipment.

1 General age and condition. Information providing a general understanding of the types of equipment in general use, with sketches, diagrams, photographs, and other illustrative material covering typical transmission and substation installations if required. Standards for transmission and distribution equipment.

2 Supply status.

a Degree of self-sufficiency, including import-export position.

b Principal plants producing equipment. See Industry topic.

(e) Maintenance.

1 Reasons for and effects of powerline failures.

2 Maintenance problems arising from climate (icing, wet snow, etc.), inadequate original construction, inaccessibility of transmission lines, etc.

C. Individual Installations.

(1) Powerplant data.

(a) Name, location, ownership, type (hydro, thermal, etc.), primary function.

(b) Installed capacity.

(c) Generators (number, rating (Kva/Kw).

(d) Operation (base, peak load, standby).

(e) Plant age, condition, efficiency.

(f) Production (kw.hr.-year).

(g) Current (phase, cycle).

(h) Generating voltage (AC, DC).

(i) Boilers.

(j) Turbines (number, type, head, flow, output).

(k) Head.

(l) Building data (dimensions, materials, etc.).

(2) Substation data.

(a) Name, location, primary function, ownership.

(b) Transformers (number, capacity (Kva), voltage (high-low).

(c) Converters (number, capacity (Kw-Kva), conversion).

(d) Transmission lines - voltage.

(e) Building data.

(3) Transmission line data.

(a) From-to, total length, ownership, significance.

(b) Voltage, number of circuits, phase.

(c) Wire.

1 Material.

2 Cross-section (sq.in., sq.mm., circular mils).

(d) Tower description.

(4) Hydroelectric dam data (also see Surface Water topic).

(a) Location (waterway, geographic coordinates, closest town).

(b) Name of dam and ownership.

(c) Structural data.

1 Purpose.

2 Year completed, condition, type, material.

3 Depth of water at dam.

4 Length, height, width (top, base).

5 Discharge.

a Type (overflow, gate, pipe, tunnel, siphon).

b Size (length and width or diameter).

c Quantity (cubic meters per second), normal and maximum.

(d) Reservoir.

1 Name.

2 Normal pool elevation, normal capacity.

3 Surface area.

4 Backwater distance.

23. Highways

A. Scope - covers all physical characteristics of the existing road system, and the various administrative and operational aspects pertaining to construction and maintenance. The term "highways" has a considerably broader meaning than in everyday usage. It includes all types of roads and tracks, from multilane superhighways to ordinary pack trails and footpaths. In areas with highly developed systems, minor highways and tracks may be omitted, whereas in backward areas every highway may warrant inclusion. All associated structures and facilities necessary for continuity of movement and for protection of the way, such as bridges, ferries, snowsheds and the like, are considered as integral parts of the highway system. The map depicts the selected highways to include surface, width, seasonality, ferries, fords, route numbers, etc.

B. Countrywide Information.

(1) Description.

(a) General geographic distribution (by road classification).

(b) Mileages. Total mileages of highways according to administrative class (main, secondary, minor) and within each class by road surface giving road classification for loose-surface roads.

(c) Density. The density of the highways in terms of miles of road per unit of area of the country.

(d) Signs and markings. Types of stop, warning, regulatory, and guide signs, and dividing lines.

(e) International connections. Location of highway connections with neighboring countries.

(f) General condition of the highways.

(2) Importance.

Importance of highways to the economy of the country, and relative importance in comparison with other transport mediums.

(3) Planned development.

Plans for expansion and improvement on a countrywide or regional basis, including:

(a) Nature and purpose.
(b) Time schedule.
(c) Feasibility of accomplishment.

(4) Standards.

Standards for highway design, such as: cross sections of principal road types; minimum radius of curvature; bridge specifications; minimum sight distances and clearances; maximum speeds; load capacities; grades, etc. Deviations from adopted standards. If there are no official standards in force, record standard practices.

(5) Construction, maintenance, and repair.

(a) Construction.

1 General policy and procedures for new construction and reconstruction.

2 Organization for construction.

3 Extent of construction by contract, forced labor, or otherwise.

(b) Maintenance and repair.

1 General policy and procedures for maintenance and repair. The term "maintenance and repair" shall be considered as covering:

a Routine maintenance. That work ordinarily accomplished by maintenance gangs and machines, such as: patch repairs to the pavement; "blading" (smoothing and scraping towards the crown with a road grader) of gravel on lesser quality roads; minor improvement to side drains and shoulders; repainting of road signs and traffic markings, and methods employed; snow removal.

b Renewals (substantial reconstruction of sections of road).

c Special repairs. As necessitated by floods, washouts, erosion, and other unforeseen causes.

d Repairs to structures. Periodic repairs to culverts, causeways, bridges, guardrails and parapets, etc.

e Painting of steel bridges.

2 Organization for maintenance.

3 Rebuild capabilities under emergency or diaster conditions.

(d) Problems. Problems of construction, maintenance, and repair arising from the various causes listed below:

1 Adverse terrain. Swamps, bogs, lowlands such as delta areas provide special problems of drainage and ditching, necessitate special provision for support of the roadbed, and require the construction of many bridges. Rugged topography results in steep grades and sharp curves, tunneling, bridging, cuts and sidehill location in laying out new roads; sidehill locations and deep cuts require considerable protection against slides (earth, rock, and snow) in the form of retaining walls, cribbing, and snowsheds. Desert terrain requires provision against drifting sand (sand fences, removal of sand drifts). Arctic terrain requires special techniques of construction on permafrost or semipermanently frozen ground.

2 Adverse weather and climate. Excessive rainfall results in washouts and flooding in low areas, and is the cause of earth and rock slides in rugged terrain; lack of rainfall in arid areas presents serious problems of water supply; sustained high temperatures seriously retard construction and maintenance.

3 Original light design or poor construction. Initial design that did not anticipate the increased loads and speeds under which highways would operate, or poor initial construction might result in a number of basic defects that would require either considerable renewals and repair or excessive maintenance to keep the highways in good condition. Among the more common items of this character are unstable subgrade; lack of adequate drainage of subgrade, or slopes; sharp curves; and loose or unsealed wearing surfaces resulting in saturated roadbeds.

4 Lack of regular maintenance. Lack of proper maintenance is evidenced by clogged culverts and ditches; potholed, bumpy, and rutted surfaces; soft and uneven shoulders; and badly worn and cracked pavements. Such conditions impose maintenance problems in excess of those that would arise if regular maintenance were provided.

5 Difficulties in procurement of essential construction and maintenance materials. Maldistribution of sources and variations in quality of materials may impose long hauls or dependence on inferior materials.

6 Sabotage.

7 Special geophysical phenomena, such as earthquakes, volcanic activity, or land subsidence may pose special problems.

(6) Structures, ferries and fords.

(a) General information (on a countrywide or regional basis, or by major highway system):

1 Bridges.

a Total number.

b Total length.

c Prevailing types (including prevailing span lengths applicable to each type).

d General condition (age, state of repair, etc.).

e Load capacity.

2 Culverts: Total number.

3 Tunnels, sheds and galleries: For each type:

a Total number.
b Total length.
c General characteristics.
d General condition.
e Provision for demolition.

4 Ferries:

a Total number.
b Prevailing craft types.
c General condition.

5 Fords:

a Prevalence.
b General characteristics.

C. Individual Highway Data

(1) Description.

(a) Name.

(b) Termini.

(c) Terrain. Elevation, slope, regularity of surface, drainage, forested areas, and natural foundation along and adjacent to highway. Soils comprising the nature foundation are to be classified according to the Unified Soil Classification System.

(d) Length.

(e) General condition.

(f) Surface material. By sections, where there are material changes in type along the route, with the mile station limits of each section: concrete, heavy-duty bituminous, bituminous surface treated, stone block or brick, macadam (water-bound, bituminous) pavement, gravel, stabilized soil, earth, or other; and all-weather, seasonal, or otherwise limited as to trafficability.

(g) Rating of road classification elements.

1 Alinement.
2 Drainage.
3 Foundation.
4 Surface.

(h) Roadbed.

1 Width of traveled way.
2 Type and width of shoulders.

(i) Grades. Maximum grades with mile station between principal junctions, in both directions; also all grades over 6 percent with mile stations.

(j) Sharpest curvature. Radius of sharpest curve (with mile station) between principal junctions.

(k) Significant cuts, fills, defiles, gorges, etc. Location (geographic and grid coordinates); elevation above mean sea level; length, width and height of feature; bypasses. In defiles and gorges, distances of roadway from bottom of slope.

1 Minimum vertical clearance (location and nature of restriction).

2 Minimum horizontal clearance (location and nature of restriction).

(l) Load capacity. Wheel load or axle load that can be sustained under constant traffic without excessive maintenance.

(m) Total number of bridges: load capacity.

(2) Importance.

International, national, and/or local importance of the route with factual justification.

(3) Development.

Planned new construction, extensions, and improvements, including scheduled completion dates.

(4) Standards.

For an individual highway it is necessary to record only the data which differ from the countrywide information.

(5) Construction, maintenance and repair.

For an individual highway it is necessary to record only the data which differ from the countrywide information and the location of significant materials or equipment depots (with quantity and types of items stocked).

(6) Bridges, tunnels, ferries and fords.

(a) Bridges.

1 Route number, location (Km. station, geographic coordinates).

2 Obstacle crossed. Name of stream, highway, or railway crossed; type of natural obstacle: ravine, brook, valley, other.

3 Length. Preferably, distance between abutment faces.

4 Width of roadway. Distance between curbs.

5 Spans, type. Structural type: arch, suspension, girder, beam, or other. Presence of movable span: swing, bascule, retractile, and lift.

6 Width of water gap. Stream width at mean water.

7 Clearances under bridge. Vertical distance to lowest bridge member, preferably at mean water; horizontal clearance for navigation spans only.

8 Capacity. The reported gross load-carrying capacity or the civilian posted allowable loading.

(b) Tunnels.

1 Route number, location (km. station, geographic coordinates).

2 Name.

3 Length, clearance (vertical, horizontal), width of roadway, lining, ventilation.

4 Year completed, condition.

(c) Ferries.

1 Route number, location (km. station, geographic coordinates).

2 Name of water body crossed, length of ferry route.

3 Name or number designation of ferry, condition, type.

4 Number of units, hours of operation.

5 Capacity - passengers, vehicles.

6 Maximum permissible load.

7 Description of docking facilities.

(d) Fords.

1 Route number, location (km. station, geographic coordinates).

2 Stream.

a Name.

b Width, depth, velocity, at normal water level.

c Bottom and bank characteristics.

d Seasonal aspects.

24. Railroads

A. Scope - covers all physical characteristics of the existing system, and all available information on development, construction, and maintenance. The term "railroad" includes all fixed property belonging to a line, such as land, permanent way, and bridges, tunnels, and other structures.

B. Information details Countrywide Information.

(1) Description

(a) General geographic distribution.

(b) Ownership (government or private).

(c) Distances (by gage).

1 Total route-kilometers of single, double, and multiple track.

2 Total kilometer-miles.

(d) Density. The density of the railroad network in terms of kilometers of track per unit of area of the country.

(e) International connections. Location; gage change, if any.

(f) General condition of the railroad network.

(2) Importance.

Importance of railroad transport to the economy of the country, and importance in comparison with other transport mediums.

(3) Planned development.

Plans for expansion and improvement on a countrywide or regional basis:

(a) Nature. (such as double-tracking, electrification, track and tie renewals, curve and grade reduction, strengthening of bridges for heavier loadings, etc.) and purpose.

(b) Schedule.

(c) Feasibility of accomplishment.

(4) Standards.

(a) Official standards (if any); conventional standards. If required, typical cross section of roadbeds, axle and wheel-loading diagrams used for design purposes, and line drawings and photographs of standard ties, tie plates, rails, rail fastenings, and other materials.

(b) Departures from official standards (if any).

(5) Electrification.

(a) General policy.

(b) Extent (route-distance and track-distance, by gage).

(c) Power food (type in general use, third rail or overhead wire).

(d) Current characteristics (voltage; whether direct or alternating; if alternating, the cycle and phase).

(e) Sources of power. Specify whether from grid or powerplants, also whether owned by railroad.

(6) Construction, Maintenance, and Repair.

(a) Construction.

1 General policy and procedures for new construction and reconstruction.

2 Organization for construction.

3 Extent of construction by contract, forced labor, and otherwise.

(b) Maintenance and repair.

1 General policy and procedures for maintenance and repair.

2 Organization for maintenance of way. Maintenance of way covers the maintaining in repair of track and fixed installations within rights-of-way. Among the more common maintenance operations are: rail and tie replacements; tamping ties to maintain tracks in correct surface and line; corrections to gage ("track gaging"); raising low spots to the original uniform surface; stabilizing the slope surface of cuts and fills; keeping ditches and pipe drains open; controlling weeds along the roadway; bringing heaved track back to normal surface; cleaning, oiling, and painting bridge members; and snow and ice removal.

3 Frequency of route and structure inspection, overhauling, repair, and renewals.

4 Effectiveness of maintenance of way.

5 Seasonal features.

(c) Materials, Equipment, and Labor.

1 Availability and quality of materials, equipment, and labor for construction and maintenance to include inventory of heavy equipment such as track-laying, pile-driving, and ballasting equipment. Amount of material acquired annually and amount normally stockpiled by the area's railways.

2 Degree of self-sufficiency or reliance on foreign sources of supply.

3 Rebuilding capability under emergency or disaster conditions.

(d) Problems. Problems of construction, maintenance, and repair arising from the various causes listed below:

1 Adverse terrain. Swamps, bogs, and delta areas provide special problems of drainage and ditching, necessitate special provision for support of the roadbed, and require the construction of many bridges. Rugged topography results in steep grades and sharp curves, much tunneling, bridging, cuts, and sidehill locations in the laying out of new railway lines; sidehill locations and deep cuts require considerable protection against slides (earth, rock, and snow) in the form of sheds, retaining walls, and cribbing. Desert terrain requires provision against drifting sand (sand fences, removal of sand drifts).

2 Adverse weather and climate. Excessive rainfall results in washouts and flooding in low areas, and is the cause of earth and rock slides in rugged terrain; sustained high temperatures and lack of rainfall in arid areas seriously retard construction and maintenance, and present problems of water supply, etc.

3 Original light design or poor construction. Initial design that did not anticipate the increased loads and speeds under which the railroads would operate, or inadequate or poor initial construction results in a number of basic defects that would require either considerable reconstruction and repair, or excessive maintenance, to keep the lines in condition for efficient operation. Among the more common defects of this charcter are unstable subgrade, lack of adequate drainage, light rail, poor ballast, and untreated ties.

4 Lack of regular maintenance. Lack of regular maintenance is evidenced by uneven roadbeds, improperly tamped ties, loose fastenings; badly worn rail, uncleared side and cross-drains, etc. Such conditions impose maintenance problems in excess of those that would arise if regular maintenance were provided.

5 Difficulties in procurement of essential construction and maintenance materials. Maldistribution of sources and variations in quality of materials may impose long hauls or dependence on inferior materials.

6 Sabotage.

7 Special geophysical phenomena. Earthquakes, volvanic activity, and local or regional land subsidence may pose special problems.

(7) Structures and ferries

(a) General information (on a countrywide or regional basis, or by major railway system):

1 Bridges (by gage):

a Number.

b Total length.

c Prevailing types (including prevailing span lengths by types).

d General condition.

e Load capcity.

2 Tunnels including snowsheds and galleries (by gage):

a Total number.

b Total length.

c General condition.

3 Ferries: total number.

4 Culverts: total number.

(b) Loading and clearance diagram if required.

C. Individual Railroad Data

(1) Description.

(a) Name.

(b) Termini.

(c) Terrain. (elevation, slope and regularity of surface, drainage, natural foundation, and wooded areas adjacent to the roadway).

(d) Length, number of tracks, gage.

(e) Motive power (steam, diesel-electric, electric, other).

(f) General condition.

(g) Line load capacity in tons as established by:

1 Bridges.

2 Permanent way (track and roadbed).

(h) Rails (weight, type, length, condition).

(i) Ties (kind, condition, number per kilometer).

(j) Ballast (kind, condition).

(k) Grades (ruling nd maximum, with kilometer stations) between all junctions (in both directions).

(l) Sharpest curvature (radius or degree, with kilometer stations (between all junctions.

(m) Significant embankments, cuts, retaining walls, defiles, gorges, etc. Location (geographic coordinates); elevation above mean sea level; length, height, and width of feature. In defiles and gorges, distance of tracks from bottom of slope.

(n) Load and structure clearances. Record only if different from those governing on a countrywide basis.

(o) Facilities.

1 Yards and sidings. For each: location, type, layout, number and length of tracks.

2 Repair facilities and freight, passenger, fueling, and watering stations. For each: type of facility, capacity, and equipment. For major facilities: location (geographic coordinates); elevation above mean sea level; construction materials, types and dimensions of buildings.

(2) Importance.

International, national, and/or local importance of the line, with factual justification.

(3) Development.

Planned extensions and improvements, including changes in existing gage and gage standarization programs, and scheduled completion dates.

(4) Standards.

For an individual line, it is necessary to record only data which differ from the countrywide information.

(5) Electrification.

(a) Length and location of electrified section.

(b) Current characteristics.

(c) Power feed (third rail, overhead).

(d) Source of power. Specify whether from grid or separate powerplant; also whether owned by railroad.

(6) Construction, Maintenance, and Repair.

For an individual line, it is necessary to record only data which differ from the countrywide information. For materials and equipment, also give location and type.

(7) Structures and ferries (Treat similarly to Highways).

25. Airfields

A. Scope - covers the physical characteristics of the existing airfields. Map depicts location and type of airfield, surface, orientation, etc. Airfields range in size and function from short landing strips consisting of little more than a cleared area suitable for light liaison planes or helicopters to large permanent air bases with many complex supporting installations. The simplest form of operational airfield consists essentially of a runway, usually oriented in the direction of prevailing winds; one or more perimeter taxiways, with warmup aprons located where they join the ends of the runway; and hardstands to accommodate one or more groups of aircraft. The runway may

or may not be surfaced. In addition, there will be a minimum of other facilities, such as access and service roads, fuel storage, other storage, and a control tower. The particular characteristics will depend upon the type of aircraft that will use the field.

B. Information Details

(1) Location and name (map coordinates, elevation, distance and direction from nearest city or town, principal landmarks, name if any).

(2) Category (emergency landing strip, refueling strip, national or international field, military field, heliport, or civilian secondary airport).

(a) Users.

(b) Owner, operator.

(3) Characteristics of site (type of terrain, character of soils, special aspects of weather and terrain differing from country-wide or regional conditions).

(4) If appropriate, detailed layout (sketch) of runways, taxiways, parking and service areas.

(5) Runways.

(a) Indentification.

(b) Length of runway and overrun; extensibility.

(c) Width of runway, overrun, shoulders.

(d) Type and depth of surfacing and base.

(e) Type and adequacy of drainage (ditches, subsurface drains).

(f) Load capacity (in pounds, or aircraft type).

(g) Gradient.

(h) Present condition.

(6) Taxiways and parking (dimensions, type and depth of surface material and base, load capacity, condition).

(7) Detailed description of operating area; improvements planned or under construction.

(8) Facilities.

(a) Buildings (type, material, dimensions).

(b) Maintenance and repair (number and extent of buildings and number and types of equipment used for airfield maintenance).

(c) Fueling (number and capacity of tanks, above or below ground).

(d) Electricity supply.

(e) Water supply.

(9) Related transportation (railroad, road, water; details about type, location, and capacities of transportation facilities available).

26. Inland Waterways

A. Scope - covers all the information dealing specifically with the navigability of all rivers, canals, lakes, or inland seas used as avenues of transport; it excludes their physical characteristics, covered under Surface Water Resources, and their port facilities, covered under Ports. The map depicts the name and location of the navigable waterway and includes such other data as termini and junctions, Km. stations, locks, dams, landing facilities, navigation limitations, etc.

B. Information details. Countrywide Information.

(1) Description

(a) General geographic distribution. Geographic distribution of the waterways and their relationship to major economic regions (agricultural, industrial, etc.).

(b) Kilometrages:

1 Total kilometers of inland waterways (mileages of waterways constituting part of the national boundary should be included).

2 Total kilometers of inland waterways by tonnage class of operating vessels.

(c) International connections. Extent of waterway connections with neighboring countries and of waterways under joint sovereignty with neighboring countries.

(d) General condition of the waterway network (good or bad, and why).

(2) Importance.

Importance of waterways to the economy of the country, and relative importance in comparison with other transport media.

(3) Planned Development.

Plans for expansion and improvement on a countrywide or regional basis, including:

(a) Nature and purpose.
(b) Time schedule.
(c) Feasibility of accomplishment.

(4) Standards.

Design standards for canals, locks, dams, and other construction features. Deviations from adopted standards. If there are no official standards, record standard practices.

(5) Construction, Maintenance, and Repair.

(a) Construction.

1 General policy and procedures for new construction and reconstruction.

2 Organization for construction.

3 Extent of construction by contract, forced labor, or otherwise).

(b) Maintenance and repair.

1 Gereral policy and procedures.

2 Organization for maintenance of waterways.

3 Frequency of inspections, planned maintenance, and repair.

4 Effectiveness of maintenance.

5 Seasonal features (channel dredging, etc.).

(c) Materials, Equipment, and Labor.

1 Availability and quality of materials, equipment, and labor for construction and maintenance, to include inventory of heavy equipment.

2 Degree of self-sufficiency or reliance on foreign sources of supply.

3 Rebuild capabilities under emergency or disaster conditions.

(d) Problems. Problems of construction, maintenance, and repair arising from the various causes listed below:

1 Adverse terrain (landslides, etc.).

2 Adverse weather and climate (floods, ice, droughts, etc.).

3 Channel shifting.

4 Original poor construction (basic defects).

5 Lack of regular maintenance (formation of sandbars, channel silting, etc.).

6 Difficulties in procurement of essential construction and maintenance materials.

7 Sabotage.

8 Special geophysical phenomena such as earthquakes, volcanic activity, or land subsidence.

(6) Structures and improvements.
General information (on a countrywide or regional basis, or by major waterway system):

(a) Locks (including ship lifts):

1 Number.
2 Prevailing dimensions.
3 Prevailing type of gates

(b) Dams:

1 Number.
2 Prevailing types.

(c) Aqueduct bridges:

1 Number.
2 Total length.
3 Prevailing types.
4 General condition.

(d) Waterway tunnels:

1 Number.
2 Total length.
3 General condition.

(e) Grard gates:

1 Number

(f) Groins: Total length of sections provided with groins.

C. Information Details. Individual Waterways Data

(1) Description

(a) Rivers and canals.

1 Name.

2 Termini.

3 Terrain (generalities on the land adjoining the waterway).

4 Navigable length and controlling depth. If comprised of more than one operating reach, the length, controlling depth, and limits by stations of each reach.

5 Vessel tonnage class for each reach.

6 Importance (international, national, or local).

7 General condition (good or bad, and why).

8 Controlling clearances for entire waterway or by reach (preferably at mean water; otherwise state level):

a Vertical (with identification and location of limiting feature (s)).

b Horizontal (with identification and location of limiting feature (s)).

9 Locks (including ship lifts):

a Total number.

b Controlling chamber dimensions (entire waterway or by reach):

1/ Length.

2/ Width.

3/ Depth over sill.

c Lock gates. Prevailing type (mitering, singleleaf, doubleleaf, lift, tumble, rolling, other); material (steel, wood, concrete, other); method of operation (manual, hydraulic machinery, other means).

10 Design characteristics (for canals only):

a Width.

b Depth.

c Lining and embankment protection.

11 Towage system, if other than powered craft.

(b) Lakes and inland seas.

1 Name.

2 Importance (national and local).

3 Vessel tonnage class.

4 Controlling depth, with location.

5 Established channels.

a Location.

b Width.

c Depth.

(2) Importance.

International, national, and/or local importance of the waterway with factual justification.

(3) Development.

Planned extensions and improvements, including scheduled completion dates and feasibility of accomplishment.

(4) Standards.

For an individual waterway it is necessary to indicate only the data which differs from the countrywide information.

(5) Construction, Maintenance, and Repair.

For an individual waterway it is necessary to indicate only data which differs from the countrywide information.

(6) Structures and improvements.

(a) Locks.

1 Name, number, location (geographic coordinates).
2 Type.
3 Lift, locking time.
4 Material, condition, year completed.
5 Construction details - chambers, gates (number, size, depth over sill, etc.)

(b) Dams (use applicable data as given under Electric Power).

(c) Aqueduct bridges and tunnels. (use applicable data as given under Highways).

(d) Other features. Data on guard gates, landing facilities, groins, jetties, etc. are covered to the extent indicated below:

1 Guard gates.

a Location (distance and direction from nearest town, geographic and grid coordinates, map series, and sheet number).

b Type.
c Material.
d Method of operation.
e Horizontal clearance.
f Purpose.

2 Landing facilities.

a Name.

b Location (as in 1 a, above).

c Description.

3 Groins, jetties, training walls, etc. Description of the improvement, including, as applicable:

a Name.

b Location.

c Length.

d Width.

e Height.

f Material.

g Other.

27. Telecommunications

A. Scope - covers the characteristics of the telecommunications system to include services, equipment, transmission lines, frequencies, administration and control, volume of traffic, local and international connections. The map depicts radio and T.V. stations; telephone and telegraph stations; centers and transmission lines.

B. Information details

(1) Administration and control.

(a) Government organizations.

1 Name or agency.

2 Organizational setup.

3 Role in the telecommunication pattern.

(b) Commercial organizations.

1 Name.

2 Organizational setup.

3 Role in the telecommunication pattern.

(c) International organizations.

1 Name.

2 Organizational setup.

3 Role in the telecommunication pattern.

(2) Domestic facilities.

(a) Public intercity networks.

1 Telephone.

a Transmission facilities.

1/ Terminal equipment (location, type, source of supply, efficiency, points connected).

2/ Transmission lines (length, overhead or underground).

b Switching facilities (location, types of switchboards-manual or automatic, number of lines).

c Volume of traffic (calls per day, month or year; peak and low periods).

d Reliability of system and vulnerability to damage by storms, climate, etc.

2 Telegraph.

a Transmission facilities.

1/ Terminal equipment (location, type, source of supply, efficiency).

2/ Transmission lines (length, overhead or underground, points connected).

b Switching facilities (location, types, number of lines).

c Volume of traffic (messages per day, month or year; peak and low periods.

d Reliability of system and vulnerability to damage by storms, climate, etc.

3 Radiotelephone/Radiotelegraph

a Transmission facilities (location, type, source of supply, efficiency).

b Receiving facilities (location, type, source of supply, efficiency).

c Points connected and volume of traffic (messages per day, month or year; peak and low periods).

4 Other telecommunication facilities (telex, teletype, TWX, radio facsimile, satellite, microwave - develop as above).

(b) Special systems (those operated by non-telecommunication agencies such as police, army, navy, airforce, air transport, etc. - develop as above).

(3) International facilities.

(a) Type of facility (telephone, telegraph, radio).

(b) Ownership/control.

(c) Location (transmitter, receiver, transmission lines or cables).

(d) Points served (terminal and intermediate).

(e) Volume of traffic (by day, month, or year).

(f) Reliability and vulnerability to damage, by storms, climate, etc.

(4) Broadcast and television.

(a) Relationship to government (regulated, controlled, administered, operated).

(b) AM and FM radio.

1 Location of station.

2 Call letters.

3 Frequency.

4 Power.

5 Ownership and control.

6 Programming.

7 Equipment of transmitter.

(c) Television.

1 Location of station.

2 Call letters.

3 Channel.

4 Power.

5 Ownership and control.

6 Programming.

7 Equipment of transmitter.

(d) Wired broadcast.

1 Number of speakers.

2 Location of speakers.

3 Ownership and control.

4 Programming.

5 Equipment.

28. Pipelines

A. Scope - covers the characteristics of pipelines to include pumping and booster stations, terminal facilities, storage facilities, and processing plants. The map depicts the alinements, size, pumping and booster stations, and terminal facilities.

B. Information details.

(1) Pipelines systems.

(a) Pipelines.

1 Line number, name, type, from-to, ownership.

2 Present status. Planned, under construction, in operation, year completed.

3 Diameter. Inside or outside diameters in inches or centimeters.

4 Length.

5 Material. Steel (seamless, welded, etc.), wrought iron, cast iron, etc.

6 Rated capacity. In barrels or metric tons.

7 Throughput. The barrels or metric tons. a pipeline during a stated period of time (give dates).

8 Terrain traversed. General character of terrain through which pipeline is constructed and of ground on or in which laid.

9 Construction details. Description of connections (ball-and-spigot coupling, screw joints, welded joint, mechanical coupling), supporting structures, submarine crossings, anticorrosion protection, etc.

10 Operating pressure and number of pumping/booster stations.

11 Condition. Condition (date) of pipeline with reasons if of substandard condition.

(b) Pipeline pumping and booster stations. Data on these facilities are to include location, elevation above mean sea level, physical characteristies of the structure housing the installation; number, type, and rated operating pressure of pumps; number, type, and horsepower of prime movers; number, construction characteristics purpose, and capacity of fuel tanks; description of automatic controls.

(c) Pipeline terminal facilities. Data on these facilities are to include location, elevation above mean sea level, type of terminal (land or water), purpose (dispensing, receiving, transfer), products handled, extent of area; number, material, diameter, and capacity of loading and unloading lines; other loading and unloading equipment; handling capacity of terminal.

(2) Bulk Storage Installations.

(a) Name. Specific name applied to tank farm or name of town.

(b) Installation number. Single number applies to all tanks within the tank farm.

(c) Condition. Condition (date) and reasons for sub-standard conditions.

(d) Storage tanks. Type (above or below ground); shape (cylindrical, spherical, spheroid); roof (flat-topped, peak-type, floating top).

(e) Distribution transport media. Pipelines, railway, highway, and waterway media with major destinations of products given for each medium.

(3) Processing Plants (See Industries).

29. Ports

A. Scope - covers all physical characteristics and facilities of port areas and information on development, construction, and maintenance. It includes port and harbor data on all property, facilities, and equipment which contribute to or affect local movement of vessels and loading, unloading, storage, and transhipment of ship cargo. The map depicts the location of major, secondary and minor ports. Detailed, large-scale maps of selected ports may be included.

B. Information details. Countrywide Information.

(1) Description.

(a) General geographic distribution, emphasizing important port complexes and significant regional groupings.

(b) General physical characteristics, countrywide or regional, of characteristic port layouts.

(c) General condition of the port system (including reason for condition).

(2) Importance.

Significance of the port system to the general economy of the country (or larger area).

(3) Planned Development.

Programs for expansion and improvements on a countrywide (or regional basis).

(a) Nature and purpose.

(b) Time schedule.

(c) Feasibility of accomplishment.

(4) Structures and Standards of Construction Generalized descriptions of any basic types of port structures, together with the official construction standards (if any) or the standard or conventional practices used in construction.

(5) Construction, Maintenance, and Repair.

(a) Construction.

1 General policy and procedures for planning new construction and reconstruction.

2 Organizations for construction.

3 Extent of construction by contract, forced labor, or otherwise.

(b) Maintenance and repair.

1 General policy and procedures for maintenance and repair, including:

a Routine maintenance. Normal maintenance work, such as scraping, painting, patching, applying preservatives, etc.

b Renewals and normal repairs. The substantial reconstruction and restoration of buildings, wharves, breakwaters, and other port facilities;

the normal frequency of inspection, overhauling, repair, and reconstruction.

c Special repairs. Work necessitated by accidents and unusual conditions, such as severe storms, unusually high tides, maritime accidents (such as ship damage to breakwaters or wharf facilities) and other unforeseen causes.

2 Organization(s) for maintenance.

3 Effectiveness of maintenance.

(c) Materials, equipment, and labor.

1 Availability and quality of materials, equipment, and labor for construction, repair, and maintenance.

2 Dependency on foreign sources of supply.

(d) Problems. Problems of construction, maintenance, and repair based on causes such as:

1 Poor design or basic defects in construction.

2 Adverse weather and climate.

3 Poor maintenance.

4 Poor supply of maintenance materials.

5 Sabotage.

6 Unusual geophysical conditions, including earthquakes, volcanoes, land subsidence, etc.

C. Information Details. Individual Ports.

(1) General Description.

(a) Location.

1 Geographic coordinates.

2 City where located, or distance and direction from nearest city.

(b) Importance (economic and/or strategic).

(c) Population (latest census or official estimate).

(d) Principal industries (type and influence on development of the port).

(2) Harbor.

(a) Type and total area (natural or manmade harbor, size of present and potential anchorages).

(b) Approaches (location, length, controlling widths and depths, hazards to navigation, necessity for pilotage).

(c) Entrances (location, length and configuration, minimum width, controlling depths).

(d) Breakwaters and other protective works (location, type of construction, and dimensions).

(e) Basins and harbor sections (dimensions, water area, depths, shape, and use of each basin or section of the harbor).

(f) Silting (composition of harbor bottom, effect of currents on sediments, liability to silting, frequency of dredging, quantities of sediments removed, etc.).

(g) Anchorages (location, depths, type of holding ground, and holding qualities). Also, the location and number of mooring buoys.

(h) Hydrographic conditions affecting navigation (tides, seas, swell, ice).

(i) Bridges and other obstructions crossing navigable parts of harbor (location, type, and clearance).

(j) Surface and underwater obstructions in navigable parts of harbor (shoals, bars, old pilings, sunken wrecks).

(3) Wharves.

(a) General

1 Layout, grouping, and functions, of operational wharves.

2 Types of construction (most prevalent general types).

3 Length of usable berthing space according to use (commercial and naval) and depths alongside.

4 Emergency facilities (number, type, and condition of non-operational wharves which need repairs or modernization to become operational.

(b) Individual.

1 Location.

2 Use.

3 Type and construction.

4 Loading capacity of deck (in weight per area).

5 Height of deck above water (specify water level).

6 Usable berthing space.

7 Length overall.

8 Depths alongside.

9 Width of apron.

10 Transit sheds (see paragraph (7) (a), below).

11 Railroad clearance (the number and gage of tracks serving wharf).

12 Road clearance (the number, width, and surface of roads serving wharf).

13 Utilities.

a Water supply (see para. (14) (a) below).

b Electric power (see para. (14) (b) below).

(4) Mechanical Handling Facilities.

(a) Cranes (ashore and afloat).

1 Number (also location of shore cranes).

2 Name of owner.

3 Principal use.

4 Motive power.

5 Type and basic motions.

6 Radius (maximum and minimum).

7 Reach beyond wharf or ponton edge.

8 Maximum lift capacity.

9 Maximum vertical lift.

10 Size (height and width (portal clearance) of shore cranes; the gross registered tonnage of floating cranes).

11 Crane support (gage and length of track for shore cranes; the length, beam, and draft of ponton for floating cranes).

12 Manufacturer, date of construction, and condition of crane.

(b) Specialized handling equipment.

1 Location.
2 Number.
3 Use.
4 Type and characteristics.
5 Capacity.
6 Length.

(5) Port Maintenance and Equipment.

(a) Tugs (number, principal use, horsepower, type of motive power, and size).

(b) Dredges (number, type, horsepower of dredge and dredging engines, dredging capacity (depth and tons-per-hour), and ancillary equipment.

(c) Piledrivers (number, type, and capacity).

(d) Salvage equipment (number and size of pontons, floats, type and amount of diving equipment etc.).

(e) Fireboats (number, type, power, and pumping capacity).

(f) Icebreakers (number, type, power and size).

(6) Hards and Unimproved Sites Usable for Cargo Handling. Length, width, surface composition, trafficability, and rail and road service at all undeveloped sites within the harbors where cargo may be transferred ashore. Type and configuration of offshore bottom.

(7) Storage Facilities

(a) General storage and special storage warehouses (general cargo warehouses, transit sheds on wharves, grain elevators, cold storage warehouses, etc.).

1 Location.

2 Commodities normally stored.

3 Type and material of construction for walls, roof, floors, etc.

4 Storage capacity (in bushels for grain elevators).

a Floor load (pounds per square foot).

b Dimensions (feet).

c Number of floors.

d Height between floors.

e Total floor area available or usable.

5 Special equipment (number, capacity, and condition of overhead cranes, monorail systems, and handling equipment for all warehouses; capacities in bushels per hour for equipment in grain elevators; and the nature and capacity of ice-making equipment in cold storage warehouses and iceplants).

6 Clearance facilities (number of roads and railroads serving storage facility - also gage of tracks and the widths and surfaces of roads).

7 Fire protection (nature, extent, and condition of firefighting equipment).

(b) Fuel storage (coal and petroleum).

1 Coal storage.

a Owner and operator.

b Location and area covered.

c Grades and quantities stored.

d Bunkering wharves (means and rate of delivery).

e Bunkering lighters (number and capacity).

2 Petroleum storage.

a Owner and operator.

b Location.

c Number of tanks.

d Total capacity (42-gallon barrels).

e Sources.

f Normal supply maintained (products by grades and quantities).

g Petroleum bunkering wharves.

1/ Location.

2/ Type of facility.

3/ Berthing capacity.

4/ Depths at berth.

5/ Pipelines (number and size).

6/ Bunkering capacity (barrels per hour).

h Petroleum bunkering craft.

1/ Number.

2/ Capacity.

3/ Delivery rates.

(c) Miscellaneous tank storage (location; product stored; number, types, and capacities of tanks; total storage capacity in 42-gallon barrels; wharves served; pipeline size and delivery rates).

(d) Open storage (location, total area, type of surface, drainage, and accessibility by rail, road, and water).

(8) Clearance Facilities in the port.

(a) Physical characteristics and condition of streets and roads providing access to the wharf areas.

(b) Location and characteristics of transportation bottlenecks affecting movement of cargo to and from the wharf areas.

(9) Clearance Facilities from Port to Hinterland.

(a) Rail (description of each line leading to nearest important rail center: general direction, distance, number of tracks, motive power, and overhead clearances).

(b) Highways (description of each route leading to nearest important highway center: general direction, distance, width, construction, condition, and overhead clearances).

(c) Inland waterways (canals and rivers leading to inland points: distance, controlling widths and depths, and overhead clearances).

(d) Oil pipelines (distance to inland terminals or sources, number and diameter of pipelines).

(10) Ship Supplies.

(a) Petroleum supply (see para. (7) (b).

(b) Coal supply (see para. (7)(b) 1.).

(c) Water supply (see para. (14) (a).

(d) Electric power supply (see para. (14) (b). below).

(11) Shipbuilding and Repair Facilities.

(a) General (location, size, principal activities, capabilities, and drydocking facilities of principal and minor shipments).

(b) Graving docks and building slips.

1 Identification (name, owner, and operator).

2 Location on waterfront.

3 Type of construction.

4 Entrance dimensions (width at sill and depth of water over sill at mean high water).

5 Body of dock (length and width at top and bottom; depth over keel blocks at mean high water).

6 Power supply.

a Steam and compressed air (availability and pressure).

b Electric power (availability and characteristics - see para. (14) (b), below).

7 Date built and/or rebuilt.

8 Present condition; repair and improvement work.

9 Handling equipment (see para. (4) (a), above).

(c) Floating drydocks.

1 Identification (name, owner, and operator).

2 Usual location.

3 Construction and number of sections.

4 Dimensions (length overall, length on blocks, width at entrance, minimum depth over blocks).

5 Lifting capacity (displacement tons).

6 Largest vessel handled.

7 Power supply (ability to produce or obtain

steam, compressed air, and electricity; characteristics).

8 Date and place built and/or rebuilt.

9 Present condition.

10 Handling equipment (see para. (14) (a), above).

(d) Marine railways.

1 Owner and operator.

2 Location.

3 Type (end or side haul).

4 Construction (includes overall length and declivity of track).

5 Cradle characteristics (dimensions; depth forward and aft over keel blocks in outboard position).

6 Type of power on winch.

7 Hauling capacity (displacement tons, vessel size and type).

8 Power supply.

a Steam and compressed air (availability and pressure).

b Electric power (availability and characteristics - see para. (14)(b), below).

9 Date built and/or rebuilt.

10 Present condition; repair and improvement work.

11 Handling equipment (see para. 14 a., above).

(e) Supporting facilities. (Availability and nature of adjacent foundries, machine shops, plate mills, network of industrial track).

(12) Planned Development and Improvements.

Extent and type of development and improvements are shown on overlays to the port plan. Elements of information are type of improvement or facility planned, location and owner, estimated date of completion, constructional details, and the possibilities for normal and emergency expansion.

(13) Constructional Data.

(a) Availability of construction materials (sand, gravel, stone, lime, cement, timber, steel, and fill material; methods of transport).

(b) Weather and climate factors affecting construction.

(c) Labor and craftsman factors (availability for normal or emergency recruiting, skills and efficiency of workers, effectiveness of subversive elements, housing, morale).

(d) Foundation conditions (type and load-bearing characteristics of subsoil in the harbor and ashore, and cross sections of foundations for existing wharves).

(e) Fuel (see para. (7)(b).

(f) Water supply (see para. (14)(a).

(g) Electric power (see para. (14)(b).

(14) Water Supply and Electric Power.

(a) Water supply (quality characteristics such as hardness, salinity, pollution; usefulness for drinking, in boilers, for mixing concrete, etc.; number and location of sources, quantity available, methods of transport including pipeline system,

delivery rates; size, location, and nature of storage facilities; and availability at wharves, docks, and warehouses).

(b) Electric power (number and location of sources, type (hydro, thermal, nuclear), alternate or emergency sources, number and location of substations in port areas, availability and characteristics of current at wharves, docks, and warehouses).

30. Geodesy

A. Scope - covers the status of horizontal and vertical control. The map depicts the triangulation and leveling network in the area to include First Order surveys, Lower Order surveys, base lines, magnetic stations, tide gages, etc.

B. Information details.

(1) Triangulation, Travers and Leveling Surveys

(a) Type of survey, by and for what agency.

(b) Date and coverage.

(c) Accuracy (First Order, Second Order, Third Order, etc.).

(d) Location and description of tide gages, astronomic stations and magnetic stations (geographic or grid coordinates).

(e) Large-, medium-, or small-scale maps showing survey lines, stations by name or number, and base lines.

(f) Availability of survey data.

31. Aerial Photography

A. Scope - covers the extent of aerial photographic coverage available in the country or region. The map depicts the different

scales of coverage to include date, photographic agency, availability, etc. A detailed map may be included to show actual flight lines and exposure numbers for each photographic project.

B. Information details.

(1) Specific requirements.

(a) Date flown, by and for what agency.

(b) Photo scale or altitude flown.

(c) Camera focal length.

(d) Type of photography - mapping, reconnaisance, etc.

(e) Exposure type - vertical, oblique, etc.

(f) Photo index or photo mosaic

(g) Availability of photos.

(h) Repository for film.

32. Mapping

A. Scope - covers the extent of topographic mapping available for the country or region. The map depicts the actual sheet lines and number for each map of the individual series; may include town plans.

B. Information details.

(1) Topographic Maps and Town Plans.

(a) Scale (town plans are generally 1:20,000 and larger).

1 Large - 1:75,000 and larger

2 Medium - 1:75,000 to 1:600,000

3 Small - 1:600,000 and smaller

(b) Series name and number; coverage index.

(c) Availability (location of stock and reproduction materials).

(d) Mapping data.

1 Agency.

2 Compilation and print date, edition.

3 Aerial photography used (scale and date).

4 Compilation method (map, photogrammetric, etc.).

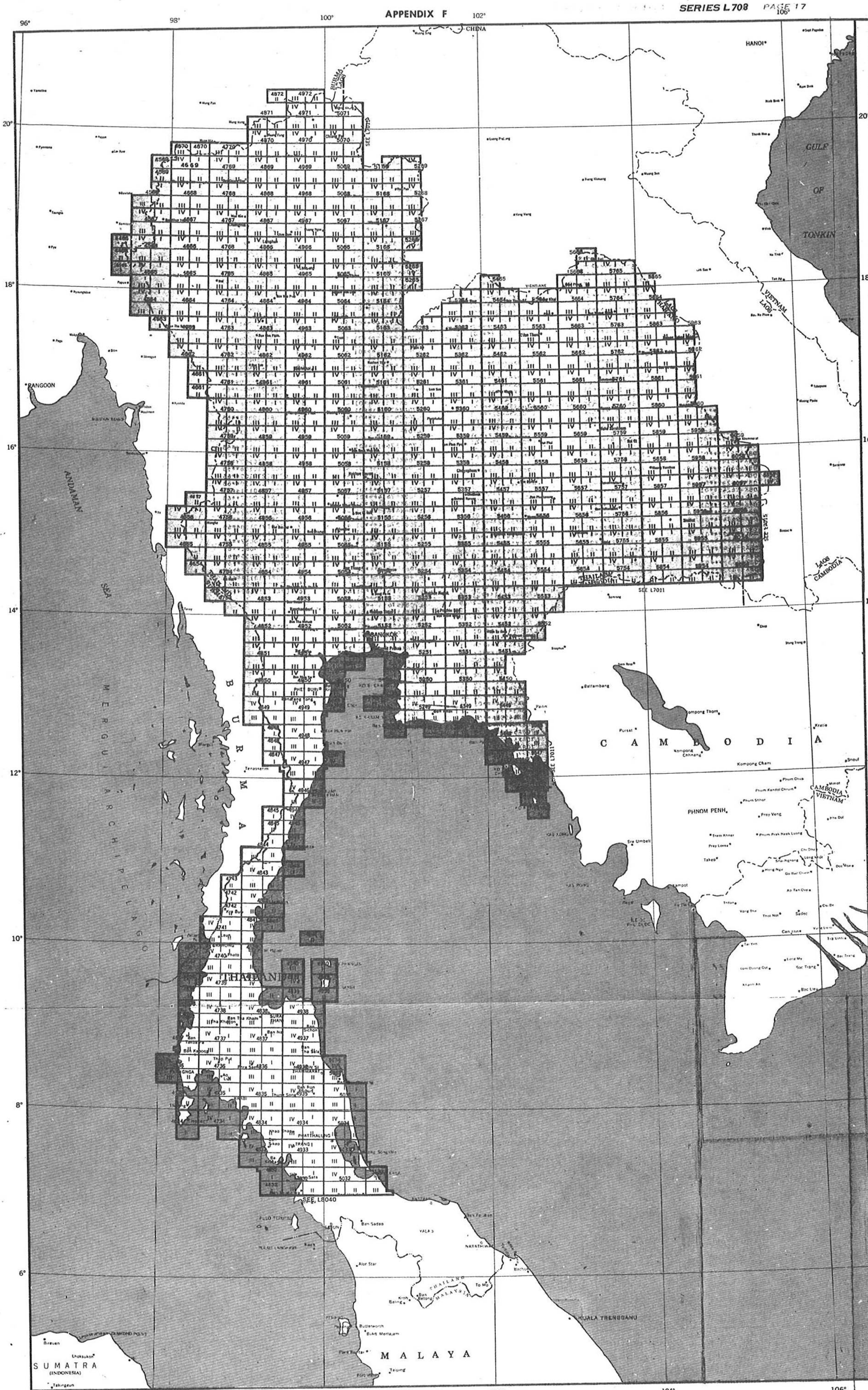
5 Field checked (date).

6 Contour interval.

7 Geodetic adequacy.

8 Map projection.

9 Grid type.



INDEX TO MAPS AND TRIG LISTS OF

THAILAND
1:50,000

LEGEND

MAPS AVAILABLE

ORDER BY STOCK NUMBER

Stock numbers for available maps are listed on reverse of this Index.

THE STOCK NUMBER is a 15-character, alphanumeric identification, constituted as follows:

1. The series number (5 characters). When the series number is less than 5 characters, an X is entered as the 5th character.
2. The sheet number, or name (8 characters).
   a. Roman numerals are converted to Arabic.
   b. If map identification is by name instead of number, those letters beyond 8 are omitted.
   c. If sheet number or name is less than 8 characters, an asterisk is entered in each unused space.
3. The edition number (2 characters). An edition number less than 10 is entered as the 15th character, preceded by a zero in the 14th space.

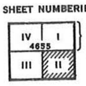
TRIG LIST SECURITY INFORMATION

TRIG LISTS, SINGLY OR IN GROUPS OF FOUR OR LESS, WILL BE PROTECTED AS CONFIDENTIAL—MODIFIED HANDLING AUTHORIZED. TRIG LISTS IN BLOCKS OF FIVE OR MORE LISTS, WHEN TOGETHER AND COVERING A CONTIGUOUS AREA, WILL BE PROTECTED AS CONFIDENTIAL.

TRIG LIST ORDERING INFORMATION

Refer to the index on this page and locate the area of desired trig list information. Using the map sheet number or numbers concerned, obtain the trig list reference number from the reverse of this index. The Trig List Reference listing will provide the stock numbers for available trig lists. The 14th and 15th characters of the trig list stock number indicate the edition number of the trig list. ORDER BY STOCK NUMBER.

SHEET NUMBERING SCHEME



EXAMPLE
465511

SERIES DESCRIPTION

TYPE: Topographic; 5 colors.

FORMAT: 10′ N-S x 15′ E-W; Transverse Mercator Projection; 1,000 meter UTM grid.

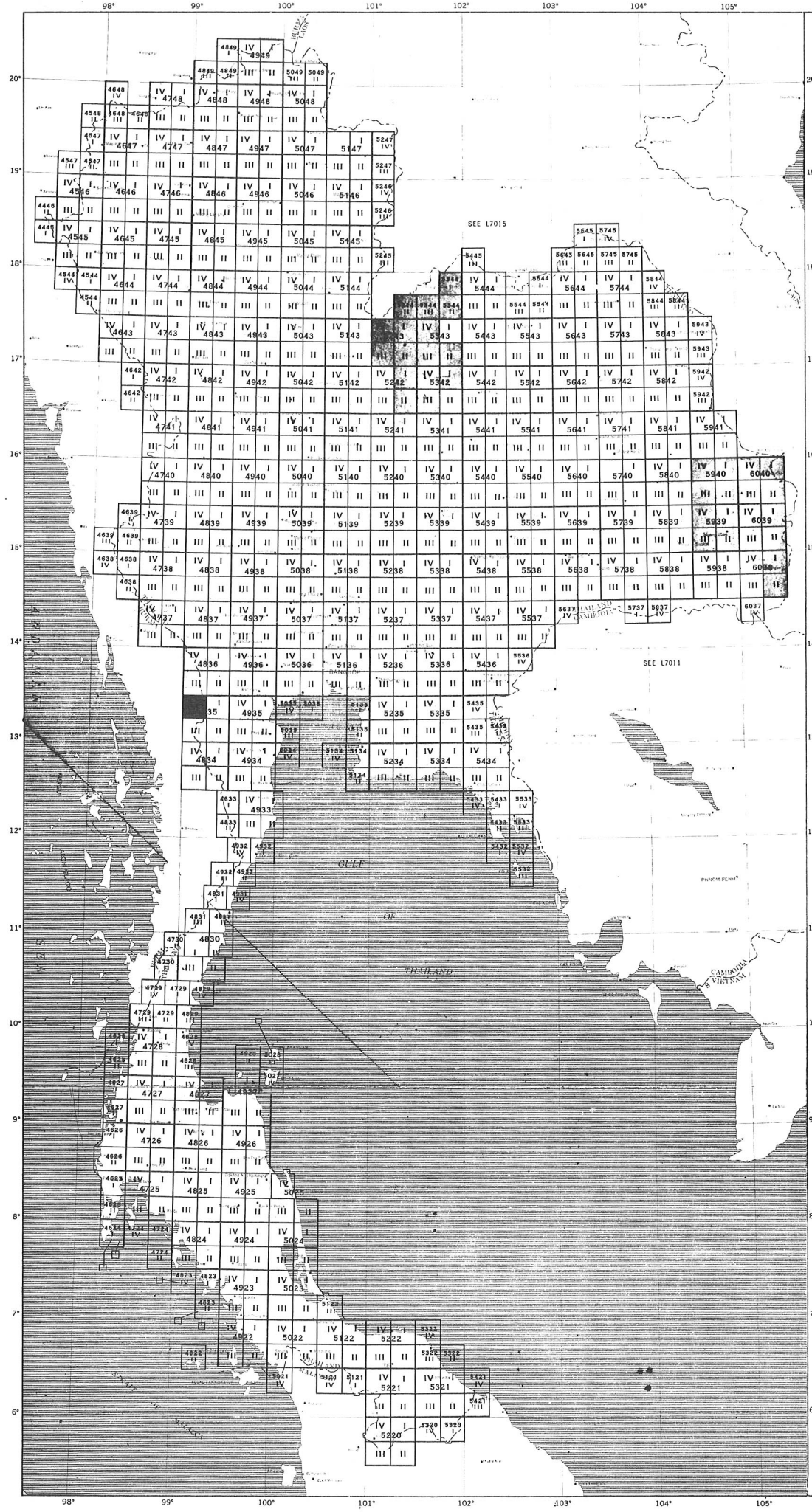
SYMBOLS: AMS.

SOURCE: Compiled by AMS, USAMSFE or RTSD by photogrammetric methods from aerial photography with reference to various Thailand maps.

CHARACTERISTICS: International, changwat, amphoe, and king amphoe boundaries delineated; relief indicated by contours at 20 meter intervals; roads classified by width, surface and weatherability; railroads classified by gauge and number of tracks; woodland shown by green tint; coverage diagram and index to diagrams; bilingual marginal data; maps not field checked.

DELINEATION OF INTERNATIONAL BOUNDARIES MUST NOT BE CONSIDERED AUTHORITATIVE

Printed by the U. S. Army Topographic Command 150743



INDEX TO MAPS OF

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1:50,000

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MAPS AVAILABLE THROUGH U.S. ARMY CHANNELS

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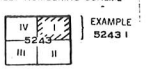
L701760403***01
L701760404***01

TOTAL MAPS 35

SHEET NUMBERING SCHEME



SERIES DESCRIPTION

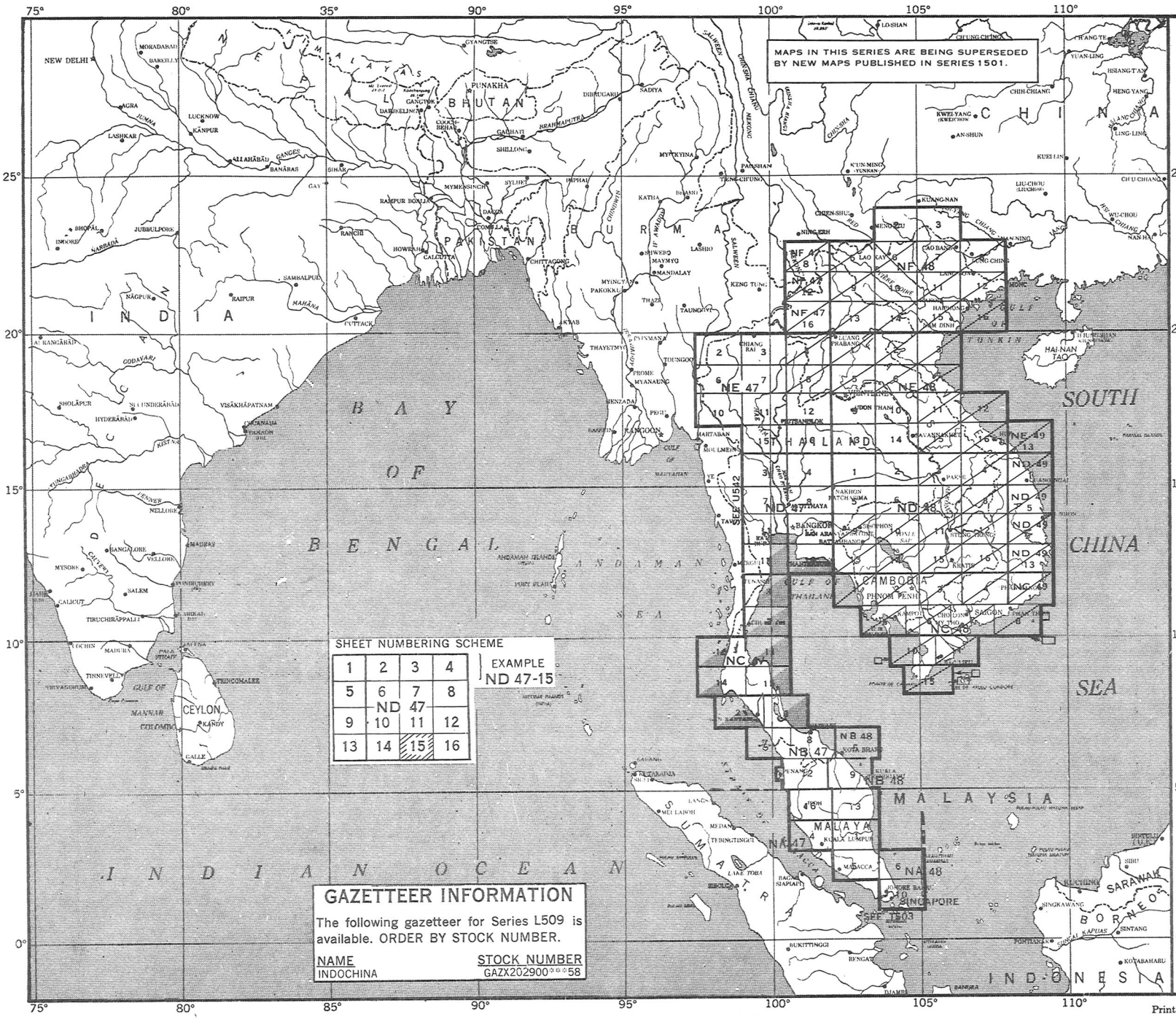
TYPE: Topographic, 5 colors.

FORMAT: 15' N-S x 15' E-W, 1,000-meter UTM Grid; Everest Spheroid, Transverse Mercator Projection.

SYMBOLS: TOPOCOM and Thai.

SOURCE: Thailand north of 7°00'N photo-revision and format conversion by USARPAC, RTSD and TOPOCOM from photogrammetrically compiled Thailand 1:50,000 Series L708, Cambodia 1:50,000 Series L7011 and Laos 1:50,000 Series L7012. Thailand south of 7°00'N compiled by RTSD and TOPOCOM by photogrammetric methods from aerial photography with reference to various sources.

CHARACTERISTICS: International, Changwat, Amphoe and King Amphoe boundaries delineated; relief indicated by contours at 20-meter intervals; spot heights in meters; populated places classified by importance; classified by gauge and number of tracks, airfields delineated and classified by weatherability; vegetation symbolized; drainage pattern shown and classified; foreshore and offshore features delineated; depth curves shown; bilingual geographic names (English and Thai); bilingual margin (English and Thai); glossary.



INDEX TO MAPS OF

INDOCHINA AND THAILAND

1:250,000

LEGEND

MAPS AVAILABLE TO EXTENT OF EXISTING STOCK ONLY

REPRODUCTION MATERIAL AVAILABLE

ORDER BY STOCK NUMBER

Stock numbers for available maps are listed on reverse of this index.

THE STOCK NUMBER is a 15-character, alpha-numeric identification, constituted as follows:

1. The series number (5 characters). When the series number is less than 5 characters, an X is entered as the 5th character.
2. The sheet number, or name (8 characters).
   a. Roman numerals are converted to Arabic.
   b. If map identification is by name instead of number, those letters beyond 8 are omitted.
   c. If sheet number or name is less than 8 characters, an asterisk is entered in each unused space.
3. The edition number (2 characters). An edition number less than 10 is entered as the 15th character, preceded by a zero in the 14th space.

SERIES DESCRIPTION

TYPE. Topographic; 6 colors.

FORMAT: 1°N-S x 1°30'E-W; Transverse Mercator Projection; 10,000 metre UTM grid and/or 10,000 metre British grid; bilingual marginal data.

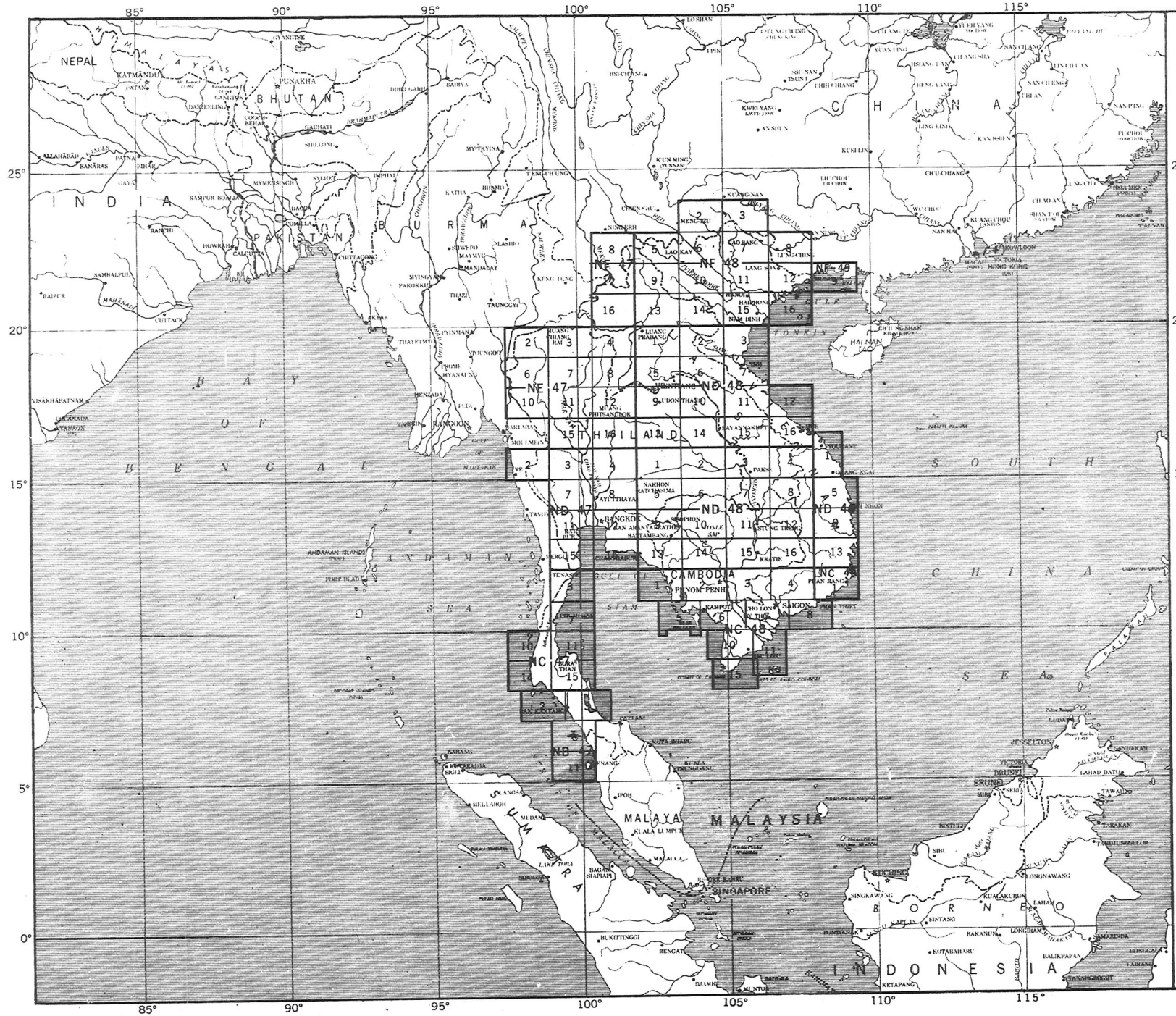
SYMBOLS: AMS.

SOURCE: Compiled by Army Map Service from various sources; planimetry partially revised by photo-planimetric methods from aerial photography.

CHARACTERISTICS. International, regional provincial, changwat boundaries delineated; relief indicated by contours at 50 or 100 metre intervals, by approximate contours, or form lines; heights in metres; populated places shown outlined to shape (with tint) or by symbols, and classified by importance in Indochina and by population breakdown in Burma and Thailand; roads classified by surface, width, and weatherability; railroads classified by gauge, single or double track; woodland shown by green tint; vegetation symbolized; foreshore and offshore detail shown; glossary.

DELINEATION OF INTERNATIONAL BOUNDARIES MUST NOT BE CONSIDERED AUTHORITATIVE

Printed by the U. S. Army Topographic Command



INDEX TO

JOINT OPERATIONS GRAPHIC-(G),(A)

1:250,000

LEGEND

1501G AVAILABLE THROUGH U.S. ARMY AND U.S. NAVY CHANNELS.

1501A AVAILABLE THROUGH U.S. ARMY AND USAF CHANNELS.

BOTH 1501G AND 1501A AVAILABLE.

SERIES DESCRIPTION

TYPE: Topographic, 6 colors or more.

FORMAT: Majority of sheet sizes are standard 1° N-S x 1° 30' E-W or 1° N-S x 2° E-W; non-standard sheet sizes vary; no margins on northern and eastern sheet edges due to extension of map detail beyond sheet limits; Transverse Mercator and Polar Stereographic projection; 10,000 unit appropriate grid; spheroid pertinent to datum and area.

SYMBOLS: Standard U. S. Department of Defense for most sheets.

SOURCE: Prepared under the direction of the U. S. Defense Intelligence Agency; compiled and published by the Army Map Service, Corps of Engineers, U. S. Army, Washington, D. C.; Aeronautical Chart and Information Center, U. S. Air Force, St. Louis, Missouri; U. S. Naval Oceanographic Office, Washington, D. C. from available sources. Also prepared by various foreign cooperative agencies.

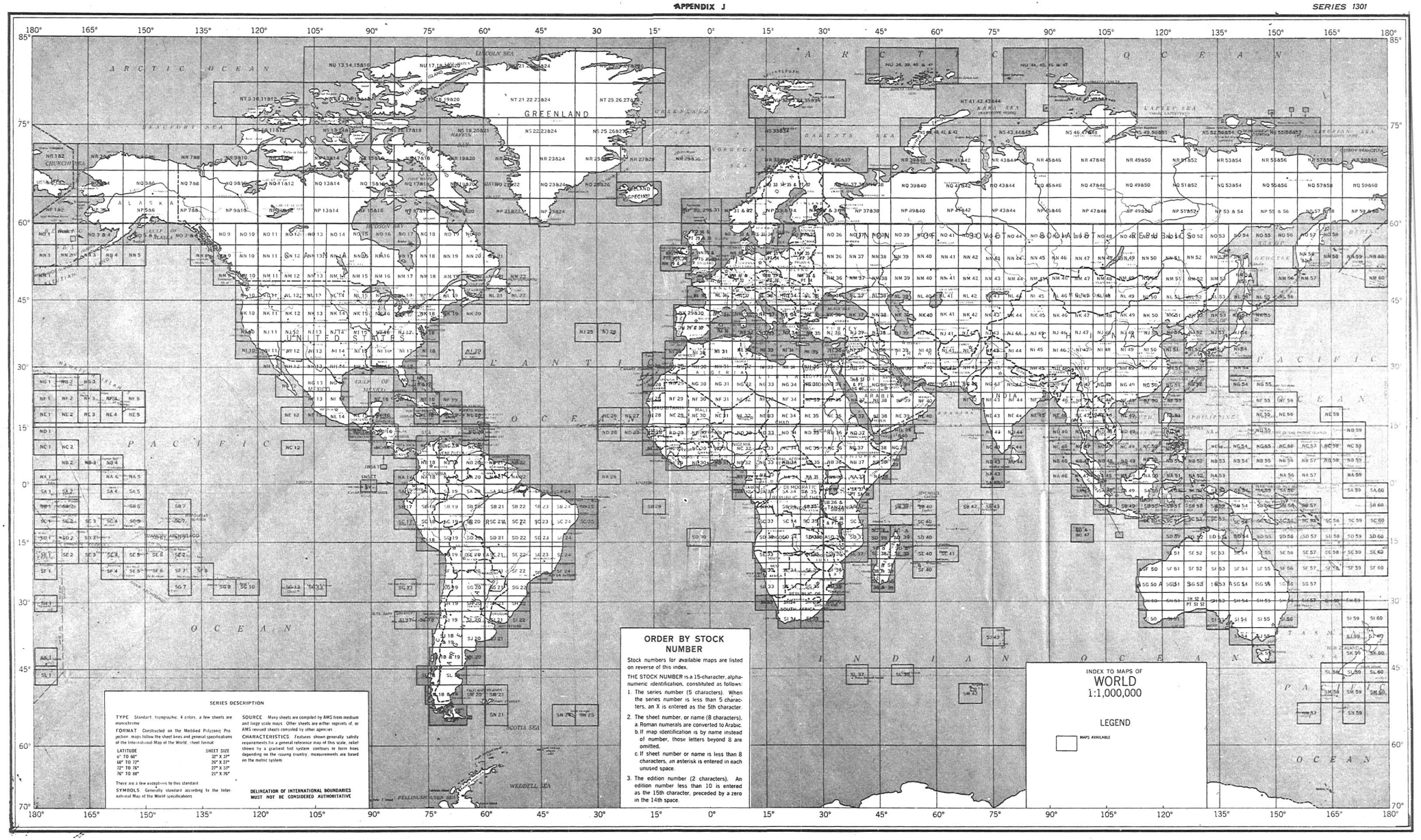
JOG-G

CHARACTERISTICS: International, interterritorial, internal administrative, and reserve boundaries delineated; relief indicated on majority of sheets by contours at 20, 25, 50, 100 or 200 meter intervals, elevation tint and shading; spot heights in meters; cities and towns classified by population and/or importance; roads classified by weatherability, surface, and number of lanes; railroads classified by guage, number of tracks; electrified railroads labelled; airports and seaplane bases indicated; telegraph, telephone, transmission, and pipelines shown; vegetation symbolized; drainage pattern shown and classified as perennial and intermittent; foreshore and offshore features delineated; depth curves and soundings shown; glossary; bilingual or trilingual marginal data as required.

JOG-A same as JOG-G except contour interval is in feet with the highest elevation in each 15 minute quadrangle delineated.

L500 SERIES SHEET REQUIRED TO COMPLETE 1:250,000 COVERAGE OF NORTH VIETNAM. MAP AVAILABLE THROUGH U.S. ARMY CHANNELS

DELINEATION OF INTERNATIONAL BOUNDARIES MUST NOT BE CONSIDERED AUTHORITATIVE



SERIES DESCRIPTION

TYPE Standard, topographic, 4 colors, a few sheets are monochrome

FORMAT Constructed on the Modified Polyconic Projection; maps follow the sheet lines and general specifications of the International Map of the World, 1:1mil format

LATITUDE	SHEET SIZE
0° TO 60°	22° X 37°
60° TO 72°	26° X 27°
72° TO 76°	27° X 33°
76° TO 88°	21° X 76°

There are a few exceptions to this standard.

SYMBOLS Generally standard according to the International Map of the World specifications

SOURCE Many sheets are compiled by AMS from medium and large scale maps. Other sheets are either reprints of, or AMS revised sheets compiled by other agencies.

CHARACTERISTICS Features shown generally satisfy requirements for a general reference map of this scale; relief shown by a gradient tint system; contours or form lines depending on the issuing country; measurements are based on the metric system.

DELINEATION OF INTERNATIONAL BOUNDARIES MUST NOT BE CONSIDERED AUTHORITATIVE

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INDEX TO MAPS OF
WORLD
1:1,000,000

LEGEND

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ENGINEER AGENCY FOR RESOURCES INVENTORIES.

RESOURCE ATLAS PROJECT - THAILAND.