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FEASIBILITY ANALYSIS PROCEDURES MANUAL

BENEFIT-COST EVALUATIONS - WATER AND LAND USE PROJECTS

January, 1976

FEASIBILITY ANALYSIS PROCEDURES MANUAL

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FEASIBILITY ANALYSIS PROCEDURES MANUAL

A. INTRODUCTION

1. Feasibility Analysis

A feasibility analysis is a series of planned investigations and studies to determine if a proposed activity or project is economically, technically, and commercially sound.

The feasibility analysis manual covers procedures that may be used by experts or a firm acting as advisor to or agent for a borrower/grantee who expects to seek financing for a project from one or more sources. Accordingly, it does not cover subject matter on financial analyses that may vary depending upon the policies or techniques used by different donors. However, it does cover A.I.D. policies and requirements that are believed consistent with the interests of a developing country.

Many A.I.D. support activities involving technical services or small construction projects can be investigated in a relatively short time period and at low cost outlay, and such studies are used initially to test all proposed activities and projects. Consequently, the feasibility analysis for complex projects may be well advanced before the need arises for more time consuming and usually expensive investigations and studies. The following chart illustrates the feasibility analysis procedures leading to project authorization.

**CHART OF PROJECT FEASIBILITY ANALYSIS PROCEDURES
--TYPES OF ESTIMATES NORMALLY REQUIRED**

Formulation Stage	Feasibility Analysis Procedure and Type of Cost Estimate	Basis of Cost Estimate
Project Identified for analysis	Testing alternatives using initial cost comparisons.	Approximate estimate, largely judgemental in character.
Project analysis continued	Preliminary appraisal or prefeasibility study and order-of-magnitude cost estimate (See notes <u>1/</u> and <u>2/</u>)	Estimate based upon rough layouts and sketches, site overview, practical experience and judgment. Expected to be within range of 75% to 125% of true cost.
Project analysis completed to support a loan/grant request.	Feasibility Study and preliminary cost estimate (See note <u>3/</u>)	Based upon feasibility study, general plans and layouts, tentative design, experience and judgement. Meets FAA requirements.

- 1/ May satisfy feasibility analysis requirements for a technical services, research, or small construction project.
- 2/ The cost of this phase of the feasibility analysis would rarely exceed five percent of the expected project cost.
- 3/ The cost of a detailed feasibility analysis ordinarily ranges from fifteen percent of the estimated cost of a small project to under five percent of the estimated cost of a very large project.

2. Legislative Criteria

a. The Foreign Assistance Act of 1961 (FAA), as amended, established certain general feasibility criteria for development assistance. These are:

- (1) The economic and technical soundness of the activity to be financed;
- (2) The relationship of the activity to other development activities being undertaken or planned and its likely contribution to realizable long-range objectives;
- (3) The likelihood of the activity contributing to the achievement of self-sustaining growth;
- (4) The likelihood of the activity contributing to the development of either or both of the following:
 - (a) educational or other institutions and programs directed toward social progress,
 - (b) economic resources or the increase of productive capacities in furtherance of development assistance.

b. Each feasibility analysis supporting a request for A.I.D. financing (whether it covers technical assistance, research, construction, or resource development activities) should be undertaken by appropriately skilled individuals and must include consideration of the above criteria. The extent and depth of investigations and studies considered necessary to arrive at sound conclusions will vary depending upon the type and size of the activity.

c. For problems in those sectors which affect the lives of the majority of people in LDC's (food production; rural development and nutrition; population planning and health; and education, public administration, and human resource development) the FAA

host country
Act as amended also established a cost sharing requirement of not less than 25 percent (funds and/or in-kind) participation in the entire program, project, or activity and a time limitation of thirty-six consecutive months for disbursement of grant assistance without further justification to the Congress and efforts being made to obtain financing from other sources.

- d. Other criteria which relate to specific project activities (capital projects) are given in G. Construction and Resource Development.

3. Analytical Methods

There are accepted analytical techniques for performing feasibility studies that have proven effective, and for certain types of projects the methods of study are directed by existing legislation. Examples of the latter are the analytical methods required for evaluating water and related land-use projects and environmental effects.

Other methods utilized will vary by sectors (health, education, power, industry, etc.) as well as the nature of the activity (technical assistance, construction, resource development, etc.).

4. Terminology

- a. Feasibility analysis and economic and technical soundness analysis are equivalent terms.
- b. Foreign Assistance Act of 1961 is termed FAA.
- c. Less Developed Country is termed LDC.
- d. Intermediate Credit Institution is termed ICI.
- e. A commercially sound project is one that is useful, has wide popular appeal and will foster future development.

B. PURPOSE OF THE MANUAL

This manual provides guidance and suggestions as to the kinds and extent of information which must be presented by a borrower/grantee to demonstrate project feasibility in support of a request for a loan or grant. The manual is not intended to direct or prescribe methods to be used in carrying out the analysis, but rather to relate the procedural collection, arrangement, and content of material pertinent to the soundness of a project or support activity. Considering the wide variation of A.I.D. support activities, attainment of this objective requires some knowledge of A.I.D.'s planning and approval procedures and other related A.I.D. publications.

As pointed out under A. Introduction above, analysis of a proposed project may be accomplished in one or two steps depending upon the type and complexity of the activity. The preliminary appraisal which examines the broad economic and technical factors becomes a part of the feasibility analysis without change. The additional studies undertaken to complete the feasibility analysis for more complex activities are intended to develop information on project details that will facilitate preparation of a reasonably firm estimate of the costs to be incurred.

C. RELATED A.I.D. PUBLICATIONS

Publications by A.I.D. that have a direct bearing upon the planning and approval process and discuss analytical techniques that collectively lead to conclusions as to the economic and technical soundness of a project activity are:

Handbook No. 3 - Project Assistance, August, 1975. This handbook provides an overview of the many considerations involved in planning an A.I.D. support activity.

Appraisal Guidelines for Development, September, 1971. This document discusses techniques for examining the economic soundness of alternative projects.

Environmental Assessment Guidelines Manual, September, 1974, revised _____, 1975. Techniques and considerations involved in studying environmental aspects of a project are presented in this manual.

Handbook No. 4 - Non-Project Assistance, August, 1975.

Suggested method and formats for cost estimating are contained in two annexes to Handbook No. 3 cited above. The handbook also contains an annex on social soundness aspects of development activities.

D. APPLICABILITY

Development support activities financed by A.I.D. are generally definitive projects. There are, however, other types of activities that warrant feasibility studies. The activities and projects are summarized as follows:

1. Development Support Activities

The analysis outlined in this manual is pertinent to all projects that have reached the preliminary appraisal stage at which providing the requested assistance is being seriously considered. It applies directly to support activities being considered for dollar financing from A.I.D. appropriated funds (all appropriation categories) or from U.S.-owned local currencies in those cases where A.I.D. is responsible for the authorization of the uses of such currencies. A.I.D. should also encourage the use of these techniques in planning development projects financed with country-owned local currencies generated from external assistance programs. For the purpose of application of these procedures, development activities include the broad categories described below:

- (a) Technical Assistance - Includes all types of personal services made available to an LDC; e.g., educational, agricultural, health, etc., to bolster a particular sector or project,
- (b) Research - Usually applied research aimed at solving a particularly troublesome problem that cannot be dealt with using available conventional techniques or equipment; e.g. agricultural experiment station for field crop testing.

- (c) Commodity Support - The financing of an LDC's procurement of badly needed goods and related services; e.g., automotive equipment, food, materials used in small industries, etc. from U.S. or other approved source.
- (d) Training - Usually involves on-the-job training to develop or upgrade skill in a particular trade; e.g., mechanics, foremen, well drillers, bookkeepers, etc., or aptitude for professional services.
- (e) Project Planning - Seldom a discrete project in itself but an element of most A.I.D. support activities, particularly in capital development projects where the planning process involves an intense study of the technical, economic and financial feasibility as well as possibly overriding human resources or environmental factors. The maintenance and operation of facilities under consideration should also be adequately covered in project planning. Such planning is sometimes financed by A.I.D. upon request because another donor is interested in financing the construction.
- (f) Construction - May involve construction of a facility for which A.I.D. financed the planning or participation as a non-managing donor. Collectively, such projects may be termed capital projects.
- (g) Resource Development - Includes activities such as mining, farming, manufacturing, etc. and related construction and managerial assistance needed to develop indigenous resources.

2. Sector Programs

Sector programs are groupings of two or more of the above development support activities, e.g., technical assistance, training, and commodity support, designed to bolster development of a major sector such as transportation or agriculture. Such programs must be evaluated to determine whether they, in fact, merely constitute a series of "projects" in a sector, in which case the "projects" will be considered under 1. above.

If, upon examination, the sector loan or grant involves local cost or foreign exchange financing with respect to or in support of a sector-wide program of diverse policy, institutional or investment actions by the assisted government or agency, the proposed procedures would also apply.

3. Intermediate Credit Institutions, Development Banks

loans or grants to intermediate credit institutions (ICI's) and/or regional development banks for relending : for development projects should also be examined to determine whether or not the procedures contained herein apply. If the relending will cover a myriad of small local impact projects and the feasibility implications are the result of second- or third-level actions, it would be difficult if not impossible to make or control the making of a feasibility analysis for each separate small project. If, however, the relending is for ^a small number of large development projects which can be identified well enough to judge that a feasibility analysis would be desirable, a provision should be inserted in the loan or grant agreement requiring such an analysis, and the

intermediate credit institution or development bank should be encouraged to follow these guidelines in conducting the appraisal.

In differentiating between the two extremes and the range of project possibilities in between, judgement and a realistic appraisal will have to be made, case by case.

E. INDICATORS OF MEETING GENERAL FAA CRITERIA

A development activity (project) should meet the general feasibility criteria described in paragraph 2 of A. Introduction, above. These determinations are made as follows:

1. Economic and Technical Soundness

a. A project is considered technically sound if:

- (1) All pertinent technical aspects have been examined in the analysis, and it is expected that the project objectives can be met using normally accepted professional or trade standards and practices usually insisted upon by a discriminating client;
- (2) The project can be adequately serviced in a timely manner with respect to manpower, transportation, utilities, etc.
- (3) The estimated cost of the project is appropriate.

b. The economic soundness of a project must be analyzed according to the type of project, as follows:

- (1) Technical assistance, training, or research projects are considered economically sound if it can be demonstrated that estimated project costs will be offset by a tangible improvement in efficiency or an operational or process change that will make better use of a country's resources.
- (2) Commodity support, development bank, and Sector Programs are considered economically sound if it can be demonstrated that the project will result in general business activity which is expected to produce quantifiable benefits that will at least offset project costs.

(3) Construction and Resource Development projects of the types enumerated below are considered to be economically sound if the indicated expectations are met:

(a) Revenue Producing Projects: Revenue must be sufficient to cover fixed charges, amortization, and maintenance and operating costs, and produce an adequate return on the investment.

(b) Non-Revenue Producing Projects: There must be a reasonable likelihood that the value of the benefits to the national economy will equal or exceed the total costs of construction, operation and maintenance or, if applicable, the loan service payments.

(c) Non-profit Revenue Producing Projects: Non-profit projects which produce revenue may or may not be completely self-liquidating. The total revenue and other economic benefits which can be quantified must exceed the total life cycle costs of the project.

Relationship to Other Development Activities

This criterion relates primarily to the appropriateness of the project as one segment of the development being planned to meet long range objectives. It is met in part by economic and technical soundness and in part by the likelihood that the project will beneficially contribute to the attainment of one or more of the following objectives:

- a. Enhancement of the lives of people in a region or of the poor;
- b. Exploitation of human or physical resources not previously utilized;

- c. Favorable realignment of available sector services such as communications, power, health, education, agriculture, etc.
- d. Replacement of an outdated facility, institution, procedure or process;
- e. Other.

3. Contribution to Self-Sustaining Growth

Much of the information needed to satisfy

this criterion will be available from the analyses made for criteria 1 and 2 above. Other information to serve as the basis for "spot" appraisals which will support the conclusion reached must be sought independently. Examples are:

- a. Technical assistance, training or research projects--Can the intended effect or product be expected to spread either within the organization or area or laterally to other organizations or areas? (Each element of the implementation process should be appraised separately.)
- b. Commodity support, development banks and sector programs--Same as above and, in addition, an evaluation of the type and duration of any anticipated continued need for assistance.
- c. Construction and resource development projects--The overall project purpose is appraised, and, in addition, elements of the implementation process are appraised separately as follows:
 - (1) Preparation of contract documents (detailed plans, specifications, invitations for bid, etc.) and conduct of the bidding and award of contracts.

- (2) Supervision of contractors and direct hire workmen, including preparation and use of job control and scheduling techniques as appropriate.
- (3) Procurement of materials, equipment and supplies and related activities such as expediting, accounting, auditing, shipping, warehousing, and maintenance when required.
- (4) On-the-job training in journeyman skills, etc.
- (5) Effect of operation and maintenance requirements on encouraging the upgrading of existing or establishing new supply sources, etc.

4. Reasonable Promise of Contributing to Development This criterion must be analyzed for the following types of projects:

- a. Development of educational or other institutions and programs directed toward social progress--Relates to the likelihood that the project will directly or indirectly foster development of related infrastructure such as railroads, highways, docks, electric power, water supply, communications, etc. and in related service fields such as health, education, police and fire protection, technical, engineering and management, etc. Considerations pertinent to a social soundness analysis are set forth in detail in Annex 3, Chapter 4, of the Project Assistance Handbook.
- b. Development of economic resources or the increase of productive capacities--Relates to exploitation of human and natural resources and increases in productivity from existing facilities of any nature. Whether or not one or both of these possibilities exist should be examined in the feasibility analysis. The likelihood that the proposed project will ^{also} have a negative influence on either or both should/ be examined.

The pro and con technique may be used in the analysis by weighing anticipated effects on such factors as the labor force (displacement or relocation, wages, tenure, etc.) foreign currency earnings, and need for service facilities or imported personnel.

Paragraphs 2, 3, and 4 above are tests of the commercial soundness of the project. The studies should be carefully planned and conducted to obtain the best possible response at all levels of the host government. In some instances it may be practical to foster the use of interdepartmental or public meetings to obtain the information needed.

5. Water and Related Land Resource Projects

The 1974 Appropriation Act affirmed the intent of the Congress that water and related land resource projects must conform to the memorandum of the President dated May 15, 1962. That memorandum, which approved a statement on policies, standards, and procedures for use by U.S. Government Departments and the Bureau of the Budget, does not, however, nullify the need to meet the FAA criteria discussed in 1, 2, 3, and 4 above. (See also G., Construction and Resource Development, below.) The May 15 memorandum is attached to Supplement No. 1, entitled, Benefit-Cost Evaluation - Water and Land-Use Projects, of this manual.

E. WHO PERFORMS THE FEASIBILITY ANALYSIS

Considering the standards and legislative criteria that must be met, normally more than one or two individuals must become involved in the performance of a feasibility study. Because of their familiarity with conditions and problems in developing countries, A.I.D. personnel who have expertise in a given field such as education, agriculture, etc. are usually better qualified to conduct the analysis than contract personnel. Consequently, it may be desirable to merely engage short term specialists to work with A.I.D. employees in analyzing small projects. In any case, individuals who undertake a significant aspect of the feasibility study should possess certain educational and experience qualifications.

These are:

1. Educational background, whether formal or informal in nature, should pertain specifically to the principal field under study by that individual.
2. Experience background should be such that the individual has familiarity with most other aspects of the activity to be assessed. He may be the expert analyst in one field because of his education and technical background and also serve as feasibility study leader because of his broad experience.
3. He should also know how to examine and, if appropriate, test the validity of records and other information, synthesize data using analogous source material, and establish the systems needed to fill continuing future needs for information in his field of expertise.
4. He should have the ability to communicate at all social levels and, as appropriate, possess proficiency in the language of the borrower/grantee country.

5. He should have an appreciation of the personal qualities required in himself and other members of the team and of the need for each member to arrive at conclusions in his aspect of the study based upon all pertinent information.

9. CONSTRUCTION AND RESOURCE DEVELOPMENT

1. Section 611 of the FAA

Because of their complexity and cost,

development assistance projects that involve construction or development of a natural resource are treated specifically in the FAA Act. The Act requires that:

"(a) No agreement or grant which constitutes an obligation of the United States Government in excess of \$100,000 that requires substantive technical or financial planning...." shall be made for any assistance "...until engineering, financial, and other plans necessary to carry out such assistance, and a reasonably firm estimate of the cost to the United States Government of providing such assistance have been completed; and if such agreement or grant requires legislative action within the recipient country, unless such legislative may reasonably be anticipated to be completed in time to permit the accomplishment of the purposes of such agreement or grant.

"(b) Plans required under subsection (a) of this section for any water or related land resource construction project or program shall include a computation of benefits and costs made insofar as practicable in accordance with the procedures set forth in the Memorandum of the President dated May 23, 1962, with respect to such computations.

"(c) To the maximum extent practicable, all contracts for construction outside the United States made in connection with any agreement or grant subject to subsection (a) of this section shall be made on a competitive basis.

"(d) Subsection (a) of this section shall not apply to any assistance furnished for the sole purpose of preparation of engineering,

financial, and other plans.

"(c) In addition to any other requirements of this section, no assistance authorized under this Act shall be furnished with respect to any capital assistance project estimated to cost in excess of \$1,000,000 until the head of the agency primarily responsible for administering the Act has received and taken into consideration a certification from the principal officer of such agency in the country in which the project is located as to the capability of the country (both financial and human resources) to effectively maintain and utilize the project taking into account among other things the maintenance and utilization of projects in such country previously financed or assisted by the United States."

Following are suggested procedures as they relate to the foregoing requirements.

2. Engineering Plans. This refers to preliminary plans, sufficiently complete to provide the basis for a reasonably firm estimate of cost.

The feasibility analysis should include:

- a. Preliminary investigations and surveys sufficient to identify all significant technical problems, establish the project location, and fix general criteria and standards of construction which will have a major effect on the final cost.
- b. A justification for the specific location and criteria and standards recommended, as compared with available alternatives.
- c. Preliminary designs in sufficient detail to permit a reasonably accurate estimate of work quantities.
- d. An analysis of the construction operations in sufficient detail to provide a sound basis for the cost estimate.

The preliminary engineering should extend only as far as required to give reasonable assurance that all foreseeable cost and time factors have been considered.

3. Reasonably Firm Estimate of Cost. This refers to a cost estimate based on the preliminary design discussed in the foregoing paragraph. As with the engineering design, the estimate should be carried only to a point which will insure that all significant cost factors have been taken into account. (See Project Cost Estimating and Cost Estimating Methods Annexes to Handbook 3.)

As indicated in the Cost Estimating Methods Annex, the cost estimate should also include the cost of final engineering design, supervision of construction and management and training services to be provided during construction and initial operation of the facility.

4. Organization for Operations and Maintenance. A major factor in determining the economic and technical soundness of a project is the completeness of planning regarding management and organization for operations and maintenance after completion of construction. With competent management, a project may be successful despite inadequacies in the original concept, but no project, however well conceived, can overcome the handicap of poor management. On the other hand no manager, however competent or experienced, can succeed without the necessary personnel, equipment and materials required for effective operation and maintenance. The feasibility analysis must show that these matters have been given thorough consideration.

If the project involves public works to be operated by a Government Department or Ministry, the analysis should include a discussion of the Department's organization and strength, its budget, and its experience in managing projects of the type in question. In particular, the analysis should bring out in detail the suitability and adequacy of the agency for handling the operation and maintenance of the specific project under consideration, and reference should be made to the availability of maintenance equipment and personnel.

In the case of an industrial or power project, the names, qualifications and experience of the proposed general manager and other key personnel should be included, together with detailed charts and tables showing the proposed operating and maintenance organizations.

Projects involving advanced technology will normally require operation for an extended period under the direction of qualified contract personnel in key positions as a condition of the loan or grant.

Of equal importance as the management and organizational structure is the planning of the manpower, material and equipment requirements for successful operation of the project. Manpower tables should be included showing types and degrees of skill required for both the operating and maintenance functions. The availability of local manpower to fill key positions must be explored, and plans must be developed for hiring and training all required personnel. Provisions must also be made for an adequate supply of special tools, equipment, and spare parts. If operations are dependent upon an uninterrupted flow of some vital material, possible causes of interruption must be analyzed and guarded against.

If plans for handling these and other problems are dependent upon assistance from or actions by other outside agencies, the feasibility analysis should provide assurance that such assistance will be furnished when required, and the cost estimate for the project should indicate the source and amount of funds required to implement these plans.

H. FORM AND CONTENT OF THE FEASIBILITY ANALYSIS

1. General Standard

The feasibility analysis is a compilation of technical studies and supportive information. The technical studies are summarized in a report which relates how the procedural and legislative requirements for investigating and analyzing the project were met, discusses benefits and commercial advantages attainable, and provides estimated costs. The report must include all information needed to make a determination regarding the project's worthiness in the development plans.

2. Use of Existing Documents

Existing studies that bear directly upon the project under consideration and particularly those previously prepared for the preliminary appraisal may be included as supportive information or, for certain projects, may be reviewed and updated as necessary to serve as the feasibility analysis. In any event these documents should be referenced in the final report.

3. Extent and Cost of Feasibility Analysis

The size and type of project usually influences the number and type of technical studies required for the analysis.

- a. One study may be sufficient for analysis of a technical assistance, research, or small construction project that will have no significant effect on the environment, an activity that involves the exercise of professional expertise, or a program having a life cycle cost of less than \$500,000. Care must be exercised to ensure that the general standard given in 1 above is met. The total cost of performing feasibility analyses of such projects, including

A.I.D. direct hire personnel costs and contract costs, may be as much as fifteen percent of the expected implementation cost.

- b. A construction or resource development project usually involves several technical studies, some of which require field investigations that are costly and time consuming. The field investigation may include test borings to establish foundation conditions for structures or to estimate the quality and quantity of an ore body, other engineering surveys, laboratory tests of local materials to determine suitability for construction, market and use surveys, etc. The total cost of performing feasibility analyses of these types of projects varies widely; however, the cost would rarely exceed 10 percent and may be as little as three percent of the expected project implementation cost.

4. Content of the Feasibility Analysis

As discussed in preceding paragraphs, the feasibility analyses for different types of projects have several common requirements. These requirements are presented in outline form only once in this manual. Suggested outlines of the subject matter that should be covered for specific types of projects are contained in annexes to this manual. The feasibility analysis need not be arranged to precisely follow these outlines, and modifications should be made as necessary to better analyze the project, under consideration. Indications that the outlines have been used solely as check lists without consideration of problems peculiar to the specific project may result in delays in authorization of the project.

I. FEASIBILITY ANALYSIS REQUIREMENTS COMMON TO ALL PROJECTS

The topics listed in this section should be considered for all types of projects and, to the extent applicable, covered in an introductory section or in the body of the feasibility analysis. They are normally also considered during performance of a preliminary appraisal, when A.I.D. is examining the projects usefulness in meeting a development goal. If a topic is adequately covered in the preliminary appraisal, it need be summarized only, as the preliminary appraisal will become a part of the feasibility analysis. The topics in outline form are:

1. Applicant

- a. Official name.
- b. Type of entity: individual, corporation, government agency, etc.
- c. Date of establishment.
- d. Principal purpose.
- e. Organization chart.
- f. If the applicant does not itself plan to execute the project, give details of the proposed arrangement with the agency which will have this responsibility and/a description of its organization.

2. Project Worthiness under FAA Criteria

- a. Nature, size and location of project.
- b. Refer to paragraph 2 (a, b, and c) of Section A, INTRODUCTION, of this manual for the applicable legislative criteria and to Section E, INDICATORS OF MEETING GENERAL FAA CRITERIA. The latter describes suggested tests and procedures that may be used in examining the project's worthiness under the criteria and controls contained in the FAA, as amended.

3. Funds and In-Kind Resources Required and Sources

- a. Estimated total cost of the project and the status of work on the project that establishes funding requirements.
Explain escalation and contingency allowances used and identify costs attributable to environmental considerations covered in 9. below. (See cost estimating annexes to Handbook 3.)
- b. Amount and source of funds and in-kind resources supplied or to be supplied by applicant for engineering, land, right-of-way, materials, equipment, labor, or other purposes.
- c. Amount of financing requested from A.I.D.
- d. Source and availability of any additional funds required.
- e. Budget requirements for operations and maintenance.
- f. Extent to which local government will waive or defer payment of direct taxes or import duties affecting project implementation and operating costs.
- g. Nature and amounts of any subsidies or other in-kind resources not covered above, where applicable.
- h. Currency control regulations and effective rate of exchange used in converting local or other foreign currency to U.S. dollars.

4. Present Status of the Project.

The present status of investigations, studies and surveys reflected in the cost estimate

given in 3(a) above. Also, the extent to which contracts have been awarded (documented by tabulations and contract prices) and if international competitive procedures were used in selecting the contractor. The manner in which existing and imminent contracts

will affect the funds requirements should also be noted.

5. Implementation and Funding Schedules

Planned implementation or construction schedule, broken down by major segments of the project, in the form of a performance network or bar chart, with explanations. Schedule of anticipated expenditures in U.S. dollars, local currency and other foreign currencies.

(Procurement and delivery schedules for equipment should be included or shown in a supplement.)

6. Professional Services

Plans for obtaining necessary professional services for project evaluation; advisory functions; preparation of plans, specifications, cost estimates, and other contract documents; evaluation of bids; awarding of contracts; and supervision of construction, including expediting, inspecting, testing and reporting. Note the requirement for any special consultants and discuss responsibilities to be assigned.

7. Procurement of Imported Items

Plans regarding procurement of imported materials, supplies and equipment, recognizing current A.I.D. and Federal procurement regulations.

8. Project Implementation

Plans for implementing the project with specific reference to:

- a. Work to be performed and materials and equipment to be supplied by applicant.
- b. Work to be done by equipment suppliers.
- c. Work to be done by contractors and type of contract anticipated.
- d. Proposed methods of soliciting proposals or bids and awarding contracts.

- e. Requirements for performance bonds.
- f. Expected source and availability of professional personnel and skilled and unskilled labor.
- g. Availability of competent local subcontractors.
- h. Local laws and regulations pertaining to import duties, personal income taxes, security requirements, visas, etc. that will affect project implementation.
- i. Local laws and regulations concerning the employment of local and foreign labor, insurance requirements, taxes on contractors' earnings, and currency exchange restrictions.

9. Environmental Considerations

- a. Areal boundaries within which the present environment will be influenced by the project, and host country laws and regulations prescribing environmental standards, if any.
- b. Anticipated effects that the proposed project or alternatives may have on the present environment.
- c. Effect the project will have on environmental quality objectives, how project complies with existing laws and regulations, and whether effects on the environment are beneficial or adverse. If adverse, are they acceptable?
- d. Alternatives to the project which may eliminate or minimize any foreseeable adverse effects or create environmental benefits where opportunities exist, and the estimated cost thereof.
- e. If project is implemented, do adverse effects on the environment outweigh the economic advantages?

(The Environmental Assessment Guidelines Manual, cited in C., RELATED A.I.D. PUBLICATIONS, should be followed in making this assessment.)

10. Energy Considerations

- a. Source, availability and estimated unit cost of energy to meet motive or process energy needs. Requirements for implementation and operations should be considered separately.
- b. Relationship of energy requirements to host country's national energy policy, if appropriate.
- c. Energy conservation measures proposed for both implementation and operations.
- d. Likelihood of project requirements fostering development of new energy sources or increased outputs from existing sources. Discuss possible effects on the overall national energy economy.

11. Operations and Maintenance

- a. Plans, as appropriate, for operating and maintaining the project, including availability of competent personnel and proposed recruiting and training programs.
- b. Source and availability of local currency and foreign exchange requirements to insure full utilization after completion.

12. Conclusions

Conclusions as to project worthiness based on the detailed analysis.

ANNEX 6FEASIBILITY ANALYSIS - AGRICULTURE AND IRRIGATION PROJECTSA. General

1. This chapter covers the development or expansion of agricultural land, with or without irrigation.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.
3. Soundness is demonstrated by a technical, economic and financial analysis.

B. Summary

1. Location, relation to other agricultural areas, and general plan of project, illustrated by an appropriate map.
2. Scope and magnitude of the project, area of new land served and total area benefited.
3. Major features of proposed development.
4. Principal crops grown and to be grown.
5. Environmental effect on local and regional areas.
6. Benefit/cost ratio, using Supplement No. 1 to the Manual and the Cost Estimating Annexes to Handbook 3, and return on investment.
7. Reference to and specific use made of other applicable reports (attached or readily available elsewhere).

C. Developmental Aspects

1. Present Agricultural Production
 - a. Crops and acreages by types.
 - b. Yields per acre and total.
 - c. Prices received at the farm and total value.
 - d. Farm input costs.

e. Net agricultural yield.

2. Factors Expected to Increase Production

a. Changes in farm sizes, tenure status and method of land allocation.

b. Land and water available for new settlers and improved irrigation service to present farmers.

c. New crops and modified rotation and cropping patterns.

d. Increased use of fertilizers, insecticides, etc.

3. Markets for Additional Crops

a. Location and size of markets and present and anticipated prices.

b. Transportation facilities and costs.

c. Estimated prices obtainable at the farm.

4. Agricultural Production after Completion of Project

a. Crops and yield.

b. Value at anticipated prices.

c. Farm input costs.

d. Net agricultural yield.

5. Benefits to National Economy

a. Gain in total agricultural production.

b. Annual net benefits . (See Supplement No. 1 for suggested form for making calculations.)

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10 of the manual for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Description of Project Area

a. Topography of area and description of physical features , accompanied by a map showing project area in relation to

- mountains, rivers, population centers, utilities and transportation facilities.
- b. Climatological data, including records of precipitation, temperature, humidity, evaporation, wind direction and velocities, sunlight hours per month, and length of growing season.
 - c. Geology of region, with particular reference to water bearing formations, movement of groundwater, presence of harmful minerals and salts, bearing capacity and compressibility of foundation soils and location of suitable construction materials.
 - d. Hydrology, including rainfall rates and frequencies, infiltration, runoff, groundwater storage and depletion, and losses due to evaporation and transpiration.
3. Soil surveys, land classification, and drainage condition of agricultural area.
- f. Present land use in the project area, covering utilization for various crops, pasture and fallow, existing rotation systems and cropping patterns.
 - g. Water usage for various crops and for the area as a whole, quality of irrigation water, existing water rights and customs, laws and regulations concerning water usage.
 - h. Population of local communities and total rural population.
 - i. Farm sizes, land tenure system, farm ownership and farm operating patterns.
 - j. Approximate portion of farm production utilized for family subsistence.

k. Location, capacities and pertinent data on any agricultural processing plants such as sugar mills, natural fibre mills, packing plants, etc.

l. Availability and cost of agricultural credit and extension services to both landlords and tenants.

m. Capabilities of institutions to be involved during construction operations and maintenance.

2. Engineering Surveys, Plans and Data

a. Preliminary studies made in sufficient detail to permit calculation of work quantities for all elements of project, including the following where applicable:

(1) Dams. Most suitable type of dam for location selected, preliminary design, foundation exploration for dam and spillways, spillway size calculations, general features of outlet works, topography of damsite and reservoir basin, tailwater data, capacity-area curves for the reservoir, and location and description of available construction materials, such as earth, sand, gravel and rock.

(2) Wells. Location, extent, depth, character and permeability of water-bearing strata; velocity of underground flow; depth to natural water surface; drawdown; circle of influence; types, locations and capacities of wells to be used; and water quality determinations.

(3) Canals and Laterals. Location; preliminary design, including transverse section with side slopes and longitudinal profile with slopes, velocity and capacity;

calculation of quantities, estimates of water losses, need for lining, and plans for handling silt. If to be used for water borne transportation, describe any special features required for traffic use.

(4) Structures. Location and preliminary design of diversion structures, intakes, weirs, siphons, flumes, wasteways, drops, checks and chutes, highway and railroad crossings, and headgates and water measuring devices, including estimates of types and quantities of materials needed.

(5) Drainage. Location, design and calculation of quantities of project drains to receive all waste or surplus water from main canals and laterals and to collect and remove the surface and underground drainage water produced by seepage and deep percolation losses; typical soil profiles to indicate permeability of soil; and intended use of natural channels as part of drainage system.

(6) Land Development. Preliminary estimates of land area to be irrigated, land leveling to be done, extent of farm irrigation and drainage systems required, type of irrigation/^{system} to be used and auxiliary facilities needed, such as housing, schools, hospitals, experiment stations, etc.

b. Estimated seasonal and total water needs for each crop to be grown and subsequent irrigation delivery requirements:

based on a knowledge of local climatic and soil conditions, production objectives, and irrigation water application techniques. Estimate should take into account irrigation efficiencies, peak demands, evaporation, effective precipitation and water needed to maintain a favorable salt balance.

3. Plans, Specifications, and Construction Schedule

- a. Preliminary plans for the main elements of the project sufficiently complete to permit a reasonably firm cost estimate to be made, including auxiliary features such as access roads and construction camps and roads. (Attach prints with all notes in English).
- b. Outline specifications defining proposed construction standards which will have a major effect on implementation costs, with specific justification for any standards which are unusual in the local situation.
- c. Construction schedule for all major elements of the project.

4. Construction Labor, Materials and Equipment

- a. Manpower requirements, including availability of skilled and unskilled labor and technical and supervisory personnel.
- b. Availability of cement, steel, aggregates, and other major construction materials, with an indication of which materials may be procured locally and which must be imported.
- c. Type of work to be done using labor intensive techniques.
- d. Types and availability of construction equipment required for the work.

e. Provisions for maintenance of construction equipment.

5. Special Construction Problems Foreseen

a. Climatic conditions which may affect the construction schedule and equipment use.

b. Necessity of keeping existing canals, highways and railroads in operation during the construction period.

c. Possible landslide problems.

d. Time required to obtain delivery of imports.

6. Management of Completed Project

a. Name and organization chart of responsible agency.

b. Names and qualifications of key personnel.

c. Plans developed to insure expert management throughout the life of the project.

d. Proposed method of assessing and collecting taxes or charges for use of water or other facilities.

7. Operations and Maintenance

a. Description of general method of operation.

b. Schedule showing progressive development of the project, indicating land served and water used annually until project is fully developed.

c. Availability of trained personnel and other required equipment and materials for efficient operation of the system.

d. Ability to effectively maintain the completed system.

- e. Plans for recruiting and training personnel.
- f. Source of funds for meeting operating and maintenance costs prior to the time the project becomes self-supporting.
- g. Source and availability of foreign exchange for importing materials, supplies and spare parts not available locally.

F. Financial Aspects

1. Estimated Capital Cost

- a. Estimates of cost of land, engineering, and construction, prepared in accordance with the Cost Estimating annexes to Handbook 3 cited in Section C of this manual.
- b. Total estimated capital cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed by loan/grant.
- c. Estimated average cost per acre of land benefited.

2. Maintenance and Operating Costs

- a. Annual cost of labor, supervision, equipment operation, operating supplies, spare parts, training, and administration.
- b. Breakdown of dollar and local currency costs.
- c. Annual cost per acre benefited.

3. Estimate of Overall Annual Costs

- a. Annual depreciation and interest on total project investment, based on estimated life of project and appropriate

interest rate for development projects in the host country.

- b. Annual operating and maintenance expenses.
- c. Total annual cost.
- d. Average annual cost per acre benefited.

4. Estimated Revenues

- a. Total annual benefits to landowners (See C above) and average benefit per acre.
- b. Estimate of maximum amount which landowners should be able to pay annually in water charges or land taxes to meet annual cost of project and still realize reasonable returns on their investments.
- c. Proposed schedule of taxes or water charges to be collected from landowners.
- d. Estimated total annual revenue for each of first 10 years following completion of project.

5. Financial Soundness of Project

A financial (cash flow) analysis should be made to test the repayment capacity of project beneficiaries, the agency responsible for operations and maintenance, and other involved parties, as necessary. A farm budget study is usually made to test the viability of an individual farm unit and the repayment capacity of the individual farm family.

G. National Economic Effects (The National Economic Development "Account")

- 1. Explain and evaluate in monetary terms where possible:

- a. The value to the national economy of the increase in goods and services which would result from the project.
 - b. The costs to the national economy attributable to the project.
 - c. Increase in general tax receipts.
 - d. The positive and negative effects on the environment and energy sources; i.e., improvements to or degradation of the environment and impact on the availability or use of an energy source, etc.
2. Costs and benefits in the economic analysis should be adjusted, if necessary, to reflect the costs or benefits to the national economy. This may or may not be a market-determined amount, depending on the existence of controls, subsidies, etc., affecting the market.

ANNEX 7FEASIBILITY ANALYSIS - HIGHWAY PROJECTSA. General

1. This chapter covers the construction, reconstruction, widening or improvement of a highway or any of its component parts such as bridges, tunnels, culverts, pavements and miscellaneous structures and facilities.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed construction or improvement.
2. Relation to other highways and transportation facilities.
3. Description of major features of design.
4. Anticipated effects on environment of local and regional areas.
5. Reference to and specific use made of any applicable reports or long range development plans (attached or readily available elsewhere).
6. Brief statement of conclusions as to relative benefits and costs and return on investment.

C. Developmental Aspects

1. Position of Project in Overall Program
 - a. Present highway system: expressways, primary roads, secondary roads, feeder roads with lengths and type and condition of surfacing.

- b. Present transport systems other than highway (rail, air, water, pipelines, etc.).
- c. Extent to which inadequacies of transport/^{systems}are retarding economic growth.
- d. National program for highway development and priority of project within the program; method of financing the highway development program.
- e. Vehicle weight, source, value, dimension limitations.

2. Relation to Other Transport Systems

- a. Present distribution of traffic among the various types of transport in the project area; cost/ton-mile for each type of transport.
- b. Anticipated effect of project on traffic distribution and on economics of other transport systems.
- c. Tabulation of vehicle registrations and fuel consumption for the last ten years.
- d. Relative availability of vehicles, operating personnel, fuel, servicing, etc.

3. Effect on Development in Project Area

- a. General description of area served (physical and economic, including agriculture, processing, manufacturing, centers of population, topography, geology, vegetative cover, and climate as related to traffic generating economic activity).
- b. Estimate of present volume of surplus commodities requiring transport to outside markets.
- c. Estimate of volume of surplus commodities which will become available because of the completed

facilities and will require transport to outside markets.

- d. General economic effect of additional commerce anticipated as a result of proposed project.

4. Anticipated Revenue and Economic Advantages

- a. Increase in special tax receipts (gasoline, road and bridge tolls, local custom duties, etc.)
- b. Increase in general tax receipts which will result from increased economic activity.
- c. Reduction in transportation costs, including vehicle operating and maintenance costs.
- d. Increased income to area served.
- e. Lower costs of other planned development projects which will be served by this project.
- f. Economic gains from opening new land for settlement by outside population presently unemployed or under-employed.
- g. Direct benefit to local population through local expenditure of project funds for labor, materials, food, rent, etc. (temporary benefit).

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Present and Future Traffic Generating Activities

- a. Size, distribution, and economic activity of the population.
- b. Nature and tonnages of cargo imported into, exported from and passing through the area.

- c. Schools.
- d. Population trends.
- e. New types and amounts of traffic expected to develop as a result of project.
- f. Projections of future traffic, with and without proposed project.

2. Traffic Capacities

- a. Theoretical capacity of present highway (number of vehicles, tonnage and maximum loads).
- b. Present use of highway (based on traffic counts or other means of estimating).
- c. Estimated future use projected to end of proposed loan period.
- d. Relation of present and estimated future use to present and future theoretical capabilities.

3. Rationale for the Scope of Improvement

- a. On basis of maximum load and traffic volume requirements.
- b. On basis of general development of the country.
- c. On basis of savings to traffic.

4. Design Criteria

- a. Average daily traffic (ADT), pavement and bridge loadings, and design speed.
- b. Maximum grade, minimum radius of curvature, minimum sight distance and minimum length of vertical curve.
- c. Number of traffic lanes and by-passes and turn-outs, if required.
- d. Width of lanes, shoulders and right-of-way.
- e. Maximum height of embankments (to limit length of culverts).

and width of clearing).

- f. Criteria used to determine types of stream crossings (pipe culverts, box culverts, masonry arch bridges, steel bridges, etc.).
- g. Minimum and maximum side slopes for cuts and fills.
- h. Unit stresses for structural design.

5. Surveys and Preliminary Plans

- a. Description of extent of preliminary studies and surveys used to determine proposed location.
- b. Map noting preliminary alignment based on ground surveys, aerial surveys, topographic maps or other sources.
- c. Preliminary plan-profile drawings with established grades and general drainage schemes, sufficient to permit reasonably firm estimates of earthwork quantities. (Only in exceptional cases is detailed cross-sectioning considered necessary for this purpose.)
- d. Rainfall and runoff data and calculations of streamflow estimates, sufficient to permit rational design of drainage structures.
- e. Sketches, diagrams or photographs of typical existing drainage works, tunnels, bridges, retaining walls and other significant structures.
- f. Location sketches for major new structures.
- g. Preliminary plans for modification of existing structures and for construction of typical new structures, culverts,

drainage ditches, etc., in sufficient detail to permit reasonably firm estimate of work quantities.

- h. Preliminary schedule of drainage structures by type, giving approximate numbers and total length of each type and size.
- i. Preliminary plans of any proposed major safety features, such as median dividers, grade separations, interchanges, etc.
- j. Results of soils and subsurface investigations for determination of quality of foundations for fills and major structures and for location of quarries and borrow pits.
- k. Sufficient soil sampling along proposed alignment for determination of soil types and quantities of various types of excavation.

6. Construction Standards

Outline specifications defining the proposed standards of construction which will have a major effect on the cost of construction (specific justification for any unusual standards which are adopted to fit the local situation and conform with local standards).

7. Availability of Local Resources and Equipment

- a. Skilled and unskilled labor, including "trainability".
- b. Technical and supervisory personnel.
- c. Training requirements for maintenance personnel.
- d. Major construction materials: cement, aggregates, water, base course material, steel, pipe.
- e. Housing, food, fuel and lubricants, repair shops, etc.
- f. Suitable sites for construction yards or camps.

- g. Construction equipment.
 - h. Local subcontractors.
 - i. Local government budgetary and other administrative arrangements for continued maintenance of facilities to be provided.
Capability of responsible agency to finance and administer new system or facility. Need for legislative, organizational or budgetary changes to accomplish continued supervision and operation of facilities.
8. Special Construction Problems Foreseen
- a. Climatic conditions, especially time and length of wet and dry seasons and periods of daylight, as they affect construction schedule and equipment use and labor force.
 - b. Traffic maintenance during construction.
 - c. Limitations on construction schedule due to long lead-time equipment and materials.
 - d. Evaluation of possible major causes of delay: slides, earthquakes, floods, labor troubles, political disturbances, etc.
 - e. Steps which will be taken to provide specialized tools, test equipment and/or service vehicles together with associated spare parts for a continuing satisfactory operation.
9. Plan for Execution of Project
- a. General sequence of construction operations, including identification of major elements which will control time and cost.
 - b. General plans for grading operations as related to equipment requirements, haul distances, requirements for haul roads and access roads to quarries and borrow pits, etc.

- c. Description of base course, surface course, and general paving /^{operatic}
- d. Construction methods, particularly as regards the use of labor vs. capital intensive methods.
- e. Proposed methods of contracting for engineering, construction and construction supervision.
- f. Phased engineering and construction schedule (attach).

10. Maintenance Organization

- a. Description and acceptability of applicant's present and proposed maintenance organization.
- b. Applicant's ability to provide personnel and finances to adequately maintain completed facility.
- c. Availability of equipment and trained maintenance personnel.
- d. Plan for recruiting and training of required personnel.
- e. Applicant's ability to finance additional improvements required and plans for providing funds at proper time.

F. Financial Aspects

1. Estimated Cost

- a. Estimates of cost of land, engineering and construction, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section C of the manual.
- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed under loan/grant.
- c. Anticipated cost escalation during the contract period.

2. Maintenance and Operation Cost

- a. Annual cost of labor, supervision, equipment operation, operating supplies, spare parts and administration.
- b. Breakdown to show dollar and local currency costs.

-2)

- c. If funds for training of personnel or purchase of additional maintenance equipment or spare parts are included in the requested loan/grant amount, explain in detail.

3. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. The tangible and intangible benefits as described in Section C above.
 - b. Expected effects on commerce and industry in the area served by the facility and ancillary effects that may be anticipated.
 - c. The positive and negative effects on the environment and energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, etc.
2. Compare benefits and costs and estimate rate of return on investment.

ANNEX 8FEASIBILITY ANALYSIS - RAILROAD PROJECTSA. General

1. This chapter covers construction, reconstruction, rehabilitation or extension of a railroad or track, structure, building or other element of a railroad; or the furnishing of rails, rolling stock, or signal, communications or other equipment for use on a railroad.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate.

Others should be included as necessary to demonstrate of the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed project.
2. Relation to applicant's present business and to other railroads transportation facilities.
3. Description of major features of design.
4. Anticipated effect on environment of local and regional areas.
5. Reference to and specific use made of any applicable reports (attached or readily available).
6. Brief statement of conclusions as to relative benefits and costs and return on investment.

C. Developmental Aspects1. Area Served

- a. Map(s) and a description of area to be served, including pertinent information on population, agriculture, natural resources, industries,

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town and cities, and other factors affecting the occurrence or movement of commodities and people in the area.

- b. Principal commodities produced within the area for distribution or export.
- c. Types of commodities imported and distributed.

2. Position of Project in Overall Program

- a. Present railway system. (Include map(s) if possible.)
- b. Present transport systems other than rail (highway, air, water, pipelines, etc.)
- c. Extent to which inadequacies of transport are retarding economic growth.
- d. National or regional program for railway development and priority of project within the program.

3. Relation to Other Transport Systems

- a. Present distribution of traffic among the various types of transport in the project area.
- b. Anticipated effect of project on traffic distribution and on economics of other transport systems.
- c. Relative availability of vehicles, operating personnel, fuel, servicing, etc.
- d. Comparable transportation costs for the various systems.

4. Applicant's Present Operation, If Any

- a. Nature and extent of present operations.
- b. Description of existing facilities.

- c. Profit and loss statements for past five years.
- d. If applicant is a private corporation, provide
 financial information conforming with Attachments I and II
 as appropriate. (Annual reports are usually acceptable
 if essentially same information is included.)

5. Forecast of Future Business

- a. New commodities or traffic patterns expected to develop as a result of the project or as a result of other developments in the country.
- b. Forecast of future freight and passenger traffic for at least 10 years after completion of the project, supported by graphs and statistics and giving justification for assumptions made as to rates of growth.
- c. Breakdown of the projections to indicate traffic that would be drawn from highways or other railways in the surrounding area.
- d. Extent to which forecast is based on general economic factors other than those disclosed by historical records.

6. Character of Anticipated Benefits

- a. Reduction in operating and maintenance costs of existing railway.
- b. Improved delivery of commodities.
- c. Reduction in transportation costs to users.
- d. General economic effect of improved service provided by the proposed project.
- e. Increased income to area served.
- f. Increase in general tax receipts which will result from increased

economic activity in the area.

- g. Lower costs of other planned development projects which will be served by this project.
- h. Economic gains from opening new land for settlement by outside population presently unemployed or underemployed.
- i. Direct benefit to local population through local expenditure of the project funds for labor, materials, food, rent, etc. (temporary benefit).
- j. Collateral benefits should be considered and quantified to the extent possible.

D. Environmental Considerations

See Section I, paragraphs 9 and 10 for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Description and Justification of Project Location

- a. Description of engineering features of the project.
- b. Basis for selection of the project location and comparison with other locations considered, with reference to both economic and physical aspects.

2. Traffic Capacities

- a. Factors limiting capacity of present railway (rolling stock, ruling grades, curves, tunnels, repair facilities, etc.)
- b. Additional capacity required to meet future needs by year, taking into account possible expanded services of existing railways and airlines and possible construction of highways, waterways and pipe lines.
- c. Capacity of railway after completion of proposed project.

3. Rationale for Scope of Project

- a. On basis of relation to estimated future requirements.
- b. On basis of general development of the country.

4. Design Considerations

- a. Maximum train loads, maximum and average speeds.
- b. Ruling grades and curvature.
- c. Number of tracks, frequency of passing tracks, turnaround time.
- d. Weight of rail, bolted or welded.
- e. Type of ties and quality and size of ballast.
- f. Criteria used to determine types of stream crossings (pipe or box culverts, masonry arch or steel bridges, etc.)
- g. Service facilities.
- h. Signal requirements.
- i. Housing for operating personnel.

5. Surveys and Preliminary Plans

- a. Description of extent of preliminary studies and surveys used to determine proposed location.
- b. Map of preliminary alignment based on ground surveys, aerial surveys, topographic maps or other sources.
- c. Preliminary profile drawings with established grades, location of principal bridges, typical road bed sections and general drainage schemes, sufficient to permit reasonably firm estimates of earthwork quantities and haul distances.
- d. Rainfall and runoff data and estimates of streamflow sufficient to permit a reasonably firm estimate of bridge and culvert quantities.
- e. Sketches, diagrams or photographs of typical existing passenger

- 6.
- and freight stations, water and fueling facilities, shops, tunnels, bridges, retaining walls, drainage works and other significant structures.
- f. Location sketches for major new buildings, structures and yards.
 - g. Preliminary plans for modification of existing structures and for construction of typical new stations, yards, signal systems, service facilities, structures, culverts, drainage ditches, etc., in sufficient detail to permit reasonably firm estimate of material and work quantities.
 - h. Preliminary schedule of drainage structures by type, giving numbers and total length of each type and size.
 - i. Results of soil and subsurface investigations for determination of quality of foundations for fills and major structures and for location of quarries and borrow pits.
 - j. Where motive power equipment is to be procured, a survey should be made covering operating characteristics of the line, present level of motive power, additional motive power required, maintenance facilities required, unit operating costs with present equipment, and an estimate of the economies that will result from the use of the motive power proposed.
 - k. Where rolling stock is to be procured, the survey should include an inventory of present car strength, condition, and capacity; the magnitude of freight and/or passenger backlog in appropriate units; percentage distribution of cars per section of line; car turnaround time on each section; number of ad-

ditional cars needed on a daily basis for each section, and a summary of the effect of introducing the proposed new rolling stock.

6. Construction Standards

Outline specifications defining the proposed standards of construction which will have a major effect on the cost of construction, with specific justification for any unusual standards which are adopted to fit the local situation and conform with local standards. (Where motive power or rolling stock is to be procured, outline performance specifications are required.)

7. Availability of Local Resources and Equipment

- a. Skilled and unskilled labor, including "trainability."
- b. Technical and supervisory personnel.
- c. Major construction materials: lumber, ties, ballast, building stone, cement, aggregates, water, metal pipe, etc.
- d. Housing, food, fuel and lubricants, repair shops, etc.
- e. Suitable sites for construction yards and camps.
- f. Construction equipment.
- g. Local subcontractors.
- h. Where motive power or rolling stock is to be procured, the local availability of components and erection facilities should be discussed.

8. Special Construction Problems Foreseen

- a. Climatic conditions, especially time and length of wet and dry seasons as they affect the construction schedule.
- b. Traffic maintenance during construction.

- c. Limitations on construction schedule due to long lead-time equipment and materials.
- d. Evaluation of possible major causes of delay: slides, earthquakes, floods, labor troubles, political disturbances, etc.

9. Plan for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. General plans for grading operations as related to equipment requirements, haul distances, requirements for haul roads and access roads to quarries and borrow pits, etc.
- c. Plan for production of ballast and aggregate.
- d. Description of track laying and ballasting operations.
- e. Construction methods, particularly as regards the use of labor vs. capital intensive methods.
- f. Proposed methods of contracting for engineering, construction, and construction supervision.
- g. Phased engineering and construction schedule showing timing and duration of major work items.
- h. Where motive power or rolling stock is to be procured, indicate method of inspection during manufacture, delivery method and schedule, and plan for erection.

10. Maintenance Organization

- a. Description of applicant's present and proposed maintenance and operating organization.
- b. Applicant's ability to adequately maintain and operate the new railway facility.

- c. Availability of equipment and trained personnel required for operation and maintenance.
- d. Plans for recruiting and training.
- e. Applicant's ability to finance the additional maintenance and operating costs and plans for providing funds at proper time.
- f. Where motive power is to be procured, provisions should be made for training of maintenance and operating personnel at the supplier's facilities in the U. S.

F. Financial Aspects

1. Estimated Cost

- a. Estimates of cost of land, engineering, construction, and rolling other stock and/equipment, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section C of the manual.
- b. Total estimated cost in U. S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed under loan/grant.
- c. Anticipated cost escalation during the contract period.

2. Working Capital Requirements

- a. Amount required at start-up and at the end of the first, second and third years of operation, to cover fuel stocks, operating supplies, maintenance materials, accounts receivable and cash on hand.
- b. Anticipated occurrence of peaks in working capital requirements and method contemplated to meet such peaks.

3. Total Initial Capital Requirements

- a. Initial capital cost.
- b. Working capital at start-up of operation.

c. Total capital requirement.

4. Maintenance and Operating Cost

a. Estimate of annual cost of operation and maintenance including labor, fuel, supplies, power, spare parts, supervision and administration, broken down into local currency and foreign exchange costs.

b. Comparison with the maintenance and operating costs of the present railway or other railways in the country or elsewhere.

5. Annual Operating Costs

a. Estimates of annual operating costs, projected through the proposed amortization period, including:

(1) Maintenance and operation.

(2) Depreciation on structures and equipment.

(3) Interest on loans.

(4) Taxes (property, income, etc.)

(5) Total.

b. Extent to which above estimates have included any governmental preferences, such as, tax remissions, tax deferments or subsidies.

6. Annual Revenues

a. Proposed fares and freight rates and comparison with existing rail, airline and highway transport rates.

b. Estimated annual income from fares, freight charges and other sources, projected through the proposed amortization period.

c. Comparison with present annual revenues of the existing rail-

way, indicating increase brought about by completion of the project.

7. Profitability

- a. Projected profit and loss statement, conforming generally with Annex E.
- b. Estimated return, by year, on total cost and on owner's investment.
- c. General conclusion as to profitability of the enterprise.

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. The tangible and intangible benefits as described in C6 above.
 - b. Expected effects on commerce and industry in the area served by the facility and anticipated ancillary effects.
 - c. The positive and negative effects on the environment or energy sources; i.e., improvements to or degradation of the environment and impact on the availability or use of an energy source, etc.
2. Compare benefits and costs and estimate rate of return on investment.

INDUSTRIAL OR COMMERCIAL
PROJECT

BALANCE SHEET

Attach comparative balance sheets for the past five years, according to the following breakdown:

Assets

1. Current Assets:

- a. Cash
- b. Marketable securities
- c. Notes Receivable (show separately amounts owed by subsidiaries; directors, shareholders, their families and agents; all other amounts other than normal commercial debts.)
- d. Accounts Receivable from customers
- e. Inventories
- f. Other Assets (describe)

2. Investments:

- a. In subsidiaries
- b. Other Investments (describe)

3. Capital Assets:

- a. Land
- b. Buildings and Site Facilities
- c. Machinery and Equipment
- d. Construction in Progress
- e. Other Capital Assets (describe)

4. Gross Assets: (1 thru 3)

5. Depreciation Reserves (state method of amortization)

6. Net Capital Assets (3 - 5)

7. Intangibles (patents, licenses, good will, trademarks, formulas, franchises, etc.)

8. Other Assets: (specify)

9. Total Assets (6 thru 8)

Liabilities

10. Current Liabilities (due within one year)

a. Notes Payable

- to banks or other short-term lending agencies
- to holders of long-term debt maturing within one year
- to directors, shareholders, their families, and agents

b. Accounts payable to commercial creditors

c. Contractors' bid and performance bonds

d. Royalties

e. Other Current Liabilities (describe)

11. Long-term Debt (over one year) (indicate terms)

12. Construction Costs Payable

Capital and Surplus

13. Capital (authorized, issued and paid-in)

14. Reserves: (describe)

15. Surplus:

a. Revaluation Surplus

b. Earned Surplus (or Deficit)

c. Net Surplus or Deficit)

16. Total Liabilities and Capital

(10 thru 14 minus or plus 15)

ATTACHMENT 2
INDUSTRIAL OR COMMERCIAL
PROJECT

FINANCIAL INFORMATION

1. Capital Structure (present and planned)
 - Authorized Capital
 - Issued Capital
 - Subscribed Capital
 - Paid-up Capital
 - Capital Surplus (if any) arising from asset revaluation

2. Distribution of Shares

<u>No. Issued</u>	<u>Total Nominal Amount</u>	<u>Total Paid-up Amount</u>	<u>No. of Votes per Share</u>
-------------------	-------------------------------------	-------------------------------------	---------------------------------------

Ordinary
 Preference
 Deferred

3. Indicate number and type of shares held by any individuals and/or group controlling more than one-fifth of the votes. Indicate relationship of such individuals and/or group to the company. If held by a holding company or other industrial enterprise, provide balance sheets, profit and loss statements, and capital structure information on such enterprises. If held by individuals, provide general and financial information on such individuals.
4. Outstanding debentures (term of issue and redemption, interest rate, etc.)
5. Outstanding mortgages and other long-term debt (terms of issue and repayment, interest rate, etc.)
6. Bank borrowings. Give details of amounts owed, interest rates, terms, renewal arrangements and unused credit limits.
7. Pending litigation either by or against the company.
8. Contingent liabilities, guarantees or endorsements.
9. Method of valuation of inventories. Note any departure from stated procedure affecting past profits as shown in attached statements.
10. Book value and estimated current market value of inventories for the past four years, adjusted to a comparable basis.
11. Give the book value of fixed assets for the past four years according to the following breakdown:

ATTACHMENT 2 (Cont'd)

Book value of fixed assets at beginning of year (describe basis of valuation)

plus acquisitions during the year, at cost
minus retirements during the year, at book value
minus normal depreciation (state normal depreciation method and rates used by major categories of assets)
minus extraordinary depreciation or write-offs (or plus any shortfall below normal depreciation)
plus revaluation of fixed assets

Book value of fixed assets at end of year.

- 12. (a) Give the average annual amount written off on bad debts during the past four years;
- (b) Give the total amount of claims overdue as of the date of the latest balance sheet and percentage of nominal value at which claims are recorded in the balance sheet.

ANNEX 9

FEASIBILITY ANALYSIS - SCHOOL OR HOSPITAL PROJECTS**A. General**

1. This chapter covers construction, reconstruction or enlargement of a school, college, university, hospital or medical center, and auxiliary buildings and facilities in connection therewith.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate.

Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and size of proposed school or hospital project.
2. Relation to the existing school system or present medical facilities in the community.
3. Description of major features of design.
4. Estimates of benefits and costs and return on investment.
5. Anticipated effect on environment of local and regional areas.
6. Reference to and specific use made of any applicable reports, particularly reports on community school programs and requirements and reports on existing medical facilities and general hospital planning (attached or readily available elsewhere).

C. Developmental Aspects

1. Description of the Community and Facility
 - a. Climate, average rainfall, temperature, and elevation.
 - b. Population and principal occupations.

- c. School enrollment in relation to total population and general level of literacy.
- d. General level of health and sanitation.

2. Present School System

- a. Number and types of schools in the community (primary, elementary, secondary, etc.).
- b. Type and age of building in each case, capacity, and present condition.
- c. Number of pupils in each grade.
- d. Location of schools with regard to residential centers, accessibility and environment.
- e. Availability of recreation areas.
- f. Availability of land for construction of new buildings or additions to existing buildings.

3. Present Hospital Facilities

- a. Existing public hospitals and other medical, nursing and treatment facilities.
- b. Total number of beds in relation to community population.
- c. Existing private facilities for diagnosis, hospitalization and treatment.
- d. Availability of land for construction of new buildings or additions to existing buildings.
- e. Adequacy of present staff and required additions to staff.

4. Position of Project in Overall Program

- a. Extent to which inadequacies of community schools and hospitals are retarding economic growth of the community.

- b. National, regional or community program for development of schools and hospitals and priority of the project within this program.
- c. Demand for graduates from school with type curriculum proposed.

5. Anticipated Benefits

- a. Anticipated increase in the education and health of the local population.
- b. General economic effect of improved or expanded school or hospital facility.
- c. Direct benefit to local population through local expenditures of the project funds for labor, materials, food, rents, etc. (temporary benefit).

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Requirements Analysis

1. Factors Creating Demand for Schools or Hospitals

- a. Size, description and economic activity of the population.
- b. Forecast of population growth, giving basis for prediction.

2. Basic Data for School Project

- a. Results of surveys that have been made to determine program needs, school enrollments, and needed additional school plant.
- b. Survey coverage and by whom made.
- c. School age population data, past trends and future projections, by age levels and by percentage of adults of child bearing age.
- d. School enrollments in past years in public and private schools, trends by grade levels, effects of community industrial activity, influence of transportation facilities and traffic barriers, and effects of new housing developments.

- e. Forecase of future enrollments by area and grade level.
 - f. Requirements for new school or additions:
 - (1) Grade levels covered and size of classes.
 - (2) Special facilities for vocational training or teaching of handicapped children.
 - g. List of classrooms and special rooms.
 - h. Space required for other services.
 - i. Facilities for community use for summer classes or recreation, adult classes, adult recreation, community meetings and community libraries.
 - j. Special facilities for food services, health services, libraries, etc.
 - k. Types of equipment and furnishings to be provided.
3. Basic Data for Hospital Project
- a. Need for additional hospital facilities.
 - b. Number of beds to be provided.
 - c. Types of services to be offered.
 - d. Extent of out-patient service.
 - e. Community welfare activities to be accommodated.
 - f. Special requirements for power, light, heat, and air conditioning.
 - g. Description of surrounding environment.
 - h. Orientation of buildings to take best advantage of sunlight and prevailing wind.
 - i. Types of equipment and furnishings to be provided.
4. Design Considerations
- a. Space requirements per pupil or bed.

- b. Reliability of water and power supplies.
- c. Noise limitations.
- d. Structural safety.
- e. Total number of pupils or patients.
- f. Type of school (academic level, trade school, etc.).
- g. Type of hospital (general purpose or teaching).
- h. Minimum areas for which heat or air conditioning must be provided.
- i. Extent of food service to be provided.
- j. Requirements for athletic facilities.
- k. Requirements for auditorium.
- l. Requirements for dormitories.
- m. Requirements for library.
- n. Requirements for administrative rooms.

F. Architectural-Engineering Aspects and Technical Soundness

I. Preliminary Studies and Plans

- a. Location map showing boundaries of the community and location of existing and proposed school and hospital facilities.
- b. Project site studies, including:
 - (1) Topography and present use.
 - (2) Access roads or streets.
- c. Results of subsurface investigations for determination of foundation conditions.
- d. Location of existing utilities.
- e. Availability of potable water and water for fire protection and other uses.

of site

- f. Suitability/ from standpoint of accessibility, noise, smoke odors and proximity to breeding grounds for flies and mosquitoes.
- g. Comparison with possible alternate sites.
- h. Preliminary plans for buildings and structures in sufficient detail to permit a reasonably firm estimate of quantities of work.
- i. Schedules showing space provided for various types of rooms (classrooms, laboratories, libraries, wards, operating rooms, nurse stations, administrative offices, etc.) and elsewhere. comparison with space provided in similar installations /
- j. Plans for site grading, access and interior roads, landscaping and parking lots.
- k. Preliminary plans for utilities, including sewage disposal system.
- l. List and location of all major built-in equipment, and fixtures, including water treatment, heating and ventilating, electrical, kitchen, plumbing, lighting, etc.
- m. List of movable furniture and equipment, including essential hospital equipment.
- n. List of supplies needed for initial operation.
- o. Anticipated use of consultants on specialized phases of final design.

2. Construction Standards

Outline specifications for equipment and construction standards which will have a significant effect on the cost of construction, with specific justification for any unusual standards proposed.

3. Construction Labor, Materials and Equipment

- a. Manpower requirements and availability, including skilled and unskilled labor and technical and supervisory personnel.
- b. Local availability of cement, steel, aggregates, water for concrete, building stone, lumber and other construction materials.
- c. Types of construction equipment required for the work, with an indication of what equipment is available locally and what must be imported.

4. Special Construction Problems Foreseen

- a. Climatic conditions, especially time and length of wet and dry seasons, which will likely affect the construction schedule and equipment use.
- b. Necessity of keeping an existing school or hospital in service during construction.
- c. Time required to obtain delivery of imported materials and equipment.

5. Plan for Execution of Project

- a. General construction plan.

- b. Proposed methods of contracting for engineering, construction and construction supervision.
- c. Tests to be performed on installed equipment.
- d. Equipment guarantees to be required.
- e. Engineering and construction schedule (attach).

6. Maintenance and Operating Organization

- a. Applicant's present and proposed staff and ability to finance additional personnel needed.
- b. Applicant's present and proposed maintenance organization.
- c. Applicant's ability to adequately maintain new facilities to be provided.
- d. Availability of trained teachers and hospital and administrative personnel.
- e. Plans for recruiting and training.

G. Financial Aspects

1. Estimated Cost

- a. Estimates of cost of land, engineering and construction, prepared in accordance with the annexes to Handbook 3 cited in Section C of the manual.
- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed under loan/grant.

2. Maintenance and Operating Costs

- a. Estimate of annual cost of maintenance including labor, supplies, power, spare parts and supervision, broken down into local currency and foreign exchange costs.

- b. Comparison with the maintenance and operating costs of present community facilities or similar facilities elsewhere.

3. Annual Operating Costs

- a. Estimate of the costs incident to use of the facility during initial years.
 - (1) Maintenance and operation of plant.
 - (2) Estimated cost of equipment and supplies, including vehicles.
 - (3) Depreciation on structures and equipment.
 - (4) Interest on loans.
 - (5) Taxes, if any.
 - (6) Personnel costs.
- b. Extent to which above estimates have been or may be affected by governmental subsidies or support.

H. National Economic Effects

- 1. Explain and evaluate in monetary terms where possible:
 - a. The tangible and intangible benefits described in C.5 above.
 - b. Expected effects on commerce and industry in the area to be served by the facility and anticipated ancillary effects.
 - c. The positive and negative effects on the environment or energy sources; i.e., improvements to or degradation of the environment and impact on the availability or use of an energy source, etc.

ANNEX 10

FEASIBILITY ANALYSIS - MUNICIPAL WATER AND SEWAGE PROJECTSA. General

1. This chapter covers the construction, extension or improvement of water supply and distribution systems, sanitary sewer systems, water treatment plants, sewage treatment plants and any combination thereof.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed construction or improvement.
2. Relation to existing water and sewer systems in the community.
3. Description of major features of design.
4. Estimates of benefits and costs and return on investment.
5. Anticipated effect on environment of local and regional areas.
6. Compliance with criteria outlined in Supplement No. 1 to this manual.
7. Reference to and specific use made of any applicable reports (attached or readily available elsewhere).

C. Developmental Aspects

1. Description of the Community
 - a. Geography, topography, type of soil, seismic activity and climate.
 - b. Population and principal occupations.
 - c. Number of industries by type.
 - d. Prevalence of water-borne diseases.

2. Present Water System

- a. Extent of water system including area and population served.
- b. If several systems involved, indicate area served by each and type of water delivered (potable, industrial, fire protection, etc.)
- c. Sources of supply and description of existing wells, dams, pumps and conduits.
- d. Quality of water and amount of dependable supply.
- e. Description and condition of existing treatment facilities.
- f. Main features of distribution system, including tanks, reservoirs, pumping plants and type and extent of pipe network.
- g. Adequacy of service within area supplied.
- h. Demand for increased or improved service.

3. Present Sanitary Sewer System

- a. Extent of sewer system, including area and population served.
- b. Local customs and usage as they affect amount and nature of sewage.
- c. Number of house connections and comparison to the number of water services.
- d. Types of pipe and present condition.
- e. Extent to which sanitary system also carries stormwater runoff.
- f. Description of existing sewage treatment facilities.
- g. Location and adequacy of effluent disposal areas.
- h. Methods used to dispose of sewage in areas not served by the sewer system.
- i. Complaints about sanitary sewage overflow.

4. Position of Project in Overall Program

- a. Extent to which inadequacies of the water and/or sewer systems constitute a health hazard and tend to retard economic growth of the community.
- b. National or regional program for development of water and sewer systems and priority of project within this program.

5. Anticipated Benefits

- a. Increase in revenues from water and sewer charges.
- b. Reduction or elimination of present costs of obtaining water and sewage disposal service.
- c. Estimate of volume of new local business and residential construction which may develop as a result of the project.
- d. General economic effect of improved water supply and/or sewage disposal systems.
- e. Increase in general tax receipts which will result from increased property values and general economic activity in the community.
- f. Lower insurance rates resulting from improved facilities for fire protection.
- g. Removal of health hazards and savings in cost of health services.
- h. Direct benefit to local population through local expenditures of the project funds for labor, materials, food, rent, etc. (temporary benefit).

11. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Factors Affecting Water Supply and Sewerage Requirements

- a. Size, distribution and economic activity of the population.
- b. Forecast of population growth, giving basis of prediction.
- c. Contemplated changes in zoning or land use.
- d. Demand for additional housing.
- e. Anticipated industrial or commercial development.

2. Capacities of Water and Sewer Systems.

- a. Present and anticipated water consumption rate per capita and comparison with other similar communities.
- b. Total water demand and number of water connections required to serve the community.
- c. Total volume of sanitary sewage anticipated and comparison with water demand.

3. Rationale of Scope of Project

- a. Desirability of construction by stages.
- b. Areas to be served by initial stage.
- c. Capacities to be provided in relation to theoretical or ultimate requirements.
- d. Scope of project in relation to development of the community.

4. Design Considerations

- a. Reliability of water supply.
- b. Initial capacity of water mains in relation to estimated future requirements.
- c. Maximum and minimum water pressures at service connections.
- d. Degree of water purification required for potable or industrial supply.

- e. Minimum velocity in sanitary sewers.
- f. Minimum size of sewers.
- g. Permissibility of using sanitary sewers for stormwater runoff.
- h. Degree of sewage treatment required.

5. Construction Standards

Outline specifications defining standards of construction which will have a major effect on the cost of construction (specific justification to be given for any unusual standards proposed).

6. Preliminary Studies and Plans

- a. Location map showing contours, sources of water supply, main conduits, boundaries of the community, service areas in first stage of development, location of water and sewage treatment plants, and outfall for sewage effluent.
- b. Rainfall and runoff data and calculation of flows sufficient to demonstrate adequacy of water supply.
- c. Results of subsurface investigations for determination of character of foundation soils for major structures and character of material to be excavated for pipe trenches.
- d.. Information concerning other major elements of the project as follows:
 - (1) Water supply and treatment
 - (a) Sources of supply (lake, river, fresh or brackish wells, reclaimed water).
 - (b) Preliminary plans for dams, intakes, pumping stations, well fields and transmission lines (attach prints).

- (c) Preliminary layout of water treatment or desalinization plant, flow diagram and preliminary plans of major features (attach prints).
- (2) Water distribution system
- (a) Street plan showing location and sizes of water mains and laterals, and location and capacity of reservoirs, storage tanks and booster pumping stations.
 - (b) Determination as to separate systems for potable and nonpotable water or a single system for all uses.
 - (c) Basis for determination of capacities.
 - (d) Calculations of pressures at faucets, fire hydrants, etc.
 - (e) Explanation of provisions for expansion or extension of the system in later stages of development.
 - (f) Inclusion of water meters in project.
 - (g) Schedule of pipe sizes and quantities.
 - (h) Preliminary plans for typical structures.
- (3) Sewage collection and treatment
- (a) Street plan showing location and sizes of collection, intercepting and main sewers and location of sewage treatment plant.
 - (b) Type of system (separate or combined sanitary and storm).
 - (c) Basis for determination of sewer sizes.
 - (d) Explanation of provisions for future expansion and extension.
 - (e) Schedule of pipe sizes and quantities and location of manholes.

- (f) Preliminary plans for typical structures.
- (g) Basis for selection of treatment plant site.
- (h) Preliminary layout of sewage treatment plant, flow diagram and preliminary plan of major features.
- (i) Description of stream or body of water which will receive effluent and capacity to accept the quantity and quality of flow to be discharged.

7. Construction Labor, Materials and Equipment

- a. Availability of skilled and unskilled labor, including "trainability".
- b. Availability of technical and supervisory personnel.
- c. Major construction materials: water and sewer pipe, cement, aggregates, water for concrete, structural and reinforcing steel, castings, etc.
- d. Housing, food, fuel and lubricants, and repair shops.
- e. Suitable sites for construction yards or camps.
- f. Construction equipment.
- g. Local subcontractors.

8. Special Construction Problems Foreseen

- a. Climatic conditions, especially time and length of wet and dry seasons, which will likely affect the construction schedule and use of equipment and labor.
- b. Soil conditions and groundwater.
- c. Traffic maintenance during construction.
- d. Limitations on construction schedule due to long lead-time equipment and materials.

- e. Evaluation of possible major causes of delay: floods, labor troubles, procurement of right-of-way, etc.

9. Plans for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. Construction methods, particularly as regards the use of labor intensive techniques.
- c. Proposed methods of contracting for engineering, construction, and construction supervision.
- d. Phased engineering and construction schedule (attach).

10. Maintenance and Operating Organization

- a. Description of applicant's present and proposed maintenance and operating organization.
- b. Applicant's ability to adequately maintain new facilities to be provided.
- c. Availability of trained maintenance and operating personnel and equipment.
- d. Applicant's ability to finance maintenance and operating costs and plans for providing funds at proper time.
- e. If funds for training of personnel or procurement of additional maintenance equipment or spare parts are included in the requested loan/grant amount, explain plan in detail.

F. Financial Aspects

1. Estimated Cost

- a. Estimates of cost of land, engineering and construction, prepared in accordance with the annexes to Handbook 3 cited in Section C of the manual.
- b. Total estimated cost in U.S. dollars and local currency:

- (1) To be financed by applicant.
- (2) To be financed by loan/grant.

2. Maintenance and Operating Costs

- a. Estimate of annual cost of maintenance and operations including labor, supplies, power, spare parts, supervision, and administration, broken down between local currency and foreign exchange costs.
- b. Comparison with the maintenance and operating costs of present community facilities or similar facilities elsewhere.

3. Estimated Revenues

- a. Proposed schedule of water rates for domestic and industrial use or special taxes on land served.
- b. Proposed schedule of charges for sewage disposal service based on water use or quantity of effluent.
- c. Estimates of annual income for first 10 years based on forecast of water consumption at rates proposed.

4. Operation Test

Ability of project to meet costs, demonstrated by proforma profit and loss statement showing anticipated revenues compared to maintenance and operating costs, interest, and depreciation or amortization of loan for 10 years after completion of project.

G. National Economic Effect

1. Explain and evaluate in monetary terms where possible:
 - a. Tangible and intangible benefits described in C5 above.
 - b. Expected effects on commerce and industry in the area served by the facility and anticipated ancillary effects.

- c. The positive and negative effects on the environment and energy sources; i.e. improvement to or degradation of the environment and impact on availability or use of an energy source, etc.
2. Compare benefits and costs and estimate rate of return on investment. For water supply systems, compute benefit/cost ratio determined in accordance with Supplement No. 1 to this manual:
 - a. Benefits measured by the cost of achieving the same results by the most likely alternative means that would be utilized in the absence of the project. Where such an alternative is not available or would not be economically feasible, benefits may be evaluated on the basis of the value of water to users or the average cost of raw water (for comparable units of dependable yield) from municipal or industrial water supply projects planned or recently constructed in the same general area.
 - b. Benefits resulting from improvement of water quality control.
 - c. Economic costs of the project, including induced costs; amortization of investment, including interest, operating and maintenance costs; and equipment replacement charges.

ANNEX 11FEASIBILITY ANALYSIS - MUNICIPAL STREET AND STORM SEWER PROJECTSA. General

1. This chapter covers construction or improvement of public streets within a city, town or village, with or without concurrent installation of gutters, catch basins, storm water inlets, and storm sewers.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed construction or improvement.
2. Relation to work previously done.
3. Description of major features of work.
4. Anticipated effect on environment of local and regional areas.
5. Reference to and specific use made of any applicable reports (attached or readily available elsewhere).
6. Brief statement of conclusions as to relative benefits and cost and return on investment.

C. Developmental Aspects

1. Position of Project in Overall Program
 - a. Present extent and condition of street system, including percentage paved, and extent of storm sewer system.
 - b. Extent to which inadequacies of streets and storm sewers are retarding economic growth of the community.

- c. Program adopted for development of a municipal street and drainage system and priority of project within program.

2. Present Storm Sewer System

- a. Extent of storm sewer system.
- b. Area served, present capacity and adequacy.
- c. Types of pipe and present condition.
- d. Existence and adequacy of pumping plants.
- e. Conditions at present outfall.
- f. Extent to which storm sewers are used for sanitary sewage.
- g. Complaints received about flooding.

3. Effect of Improvement on Development in Project Area

- a. General description of area including economic activity, topography, and climate.
- b. Estimate of volume of new business or residential construction which might develop as a result of completion of the project.
- c. General economic effect of improved traffic circulation to be provided.

4. Evaluation of Anticipated Benefits

- a. Increase in general tax receipts which will result from increased property values and general economic activity in the community.
- b. Reduction in street maintenance and flood control costs.
- c. Savings in vehicle operating costs.
- d. Other benefits to be derived from more efficient movement of people and commodities.

- e. Direct benefit to local population through local expenditures of the project funds for labor, materials, food, rent, etc. (temporary benefit).

D. Environmental and Energy Considerations

See Section I, paragraph 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Present and Future Traffic Generating Factors

- a. Forecast of population growth and basis for prediction.
- b. Contemplated changes in zoning or land use.
- c. Anticipated industrial, commercial and residential growth.

2. Traffic Capacities

- a. Theoretical capacity of present streets (number of lanes and maximum loads).
- b. Present use of streets (based on traffic counts or other estimates) and projected use.

3. Rationale for Scope of Proposed Project

- a. Need for project in relation to traffic requirements and prevention of flooding.
- b. Relation to overall development of the community.

4. Design Criteria

- a. Maximum grade and minimum radius of curvature.
- b. Number of traffic lanes and maximum loads.
- c. Widths of roadways and walkways.
- d. Criteria used to determine flow capacities of gutters, culverts, storm sewers and bridges.

5. Construction Standards

Outline specifications defining proposed standards of

construction which will have a major effect on the cost of construction (specific justification to be given for any unusual standards proposed).

6. Surveys and Preliminary Plans

- a. General location map and master plan for street development.
- b. Preliminary street plan showing proposed work.
- c. Land and right-of-way acquisition.
- d. Plan for clearing right-of-way and removing existing buildings.
- e. Preliminary plan-profile drawings with established grades, typical cross-sections, and location of present and proposed sewers and utility lines in sufficient detail to permit reasonably firm estimates of earthwork, pavement, and other work quantities.
- f. Rainfall and runoff data and calculation of flows sufficient to permit rational design of storm sewer facilities.
- g. Sketches, diagrams or photographs of typical existing storm sewers, culverts, bridges, retaining walls and other significant structures.
- h. Location sketches for major new structures.
- i. Preliminary plans for modification of existing structures and for construction of typical new structures, storm sewers, culverts, drainage ditches, pumping plants, etc., in sufficient detail to permit a reasonably close estimate of work quantities.

- j. Preliminary schedule of sewer pipe and drainage structures, giving approximate numbers and lengths by type and size.
- k. Results of subsurface investigations to determine character of foundation soil for pavements and major structures and type of material to be excavated for pipe trenches.
- l. Description of conditions at outfall and any measures required to prevent backwater and/or downstream damage.

7. Construction Labor, Materials and Equipment

- a. Skilled and unskilled labor, including "trainability".
- b. Technical and supervisory personnel.
- c. Major construction materials: cement, asphalt, aggregates, water, base course material, structural and reinforcing steel, culvert pipe, sewer pipe, castings, etc.
- d. Housing, food, fuel and lubricants, repair shops.
- e. Suitable sites for construction yard.
- f. Construction equipment.
- g. Local subcontractors.

8. Special Construction Problems Foreseen

- a. Climatic conditions, particularly length of wet and dry seasons, which may affect construction schedule and use of equipment and labor.
- b. Traffic maintenance during construction.
- c. Limitations on construction schedule due to long lead-time equipment and materials.
- d. Evaluation of possible major causes of delay: floods, labor

disputes, political disturbances, procurement of right-of-way, relocation of utilities, etc.

9. Plan for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. General description of grading and trenching operations as related to equipment requirements and haul distances.
- c. Construction methods, particularly as related to the use of labor intensive techniques.
- d. Proposed method of contracting for engineering, construction, and construction supervision,
- e. Phased engineering and construction schedule showing timing and duration of major work items.

10. Maintenance Organization

- a. Description of applicant's present and proposed maintenance organization.
- b. Applicant's ability to adequately maintain new facilities to be provided.
- c. Availability of equipment and trained maintenance personnel.
- d. Plans for recruiting and training.
- e. Applicant's ability to finance maintenance costs and plans for providing funds at proper time.
- f. If funds for training of personnel or procurement of maintenance equipment or spare parts are included in the requested loan/grant amount, explain requirements in detail.

F. Financial Aspects

1. Estimated Cost

- a. Estimate of cost of land, engineering and construction, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section C of this manual.
- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed under loan/grant.
- c. Cost escalation during the contract period.

2. Annual Maintenance Cost

- a. Annual cost of labor, supervision, equipment operation, supplies, spare parts, and administration.
- b. Breakdown to indicate dollar and local currency costs.

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. The tangible and intangible benefits described in C.4. above.
 - b. Expected effects on commerce and industry in the area served by the facility and anticipated ancillary effects.
 - c. The positive and negative effects on the environment and energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, etc.
2. Compare benefits and costs and estimate rate of return on investment.

ANNEX 12

FEASIBILITY ANALYSIS - TELECOMMUNICATIONS PROJECTS

1. General

1. This chapter covers the installation, extension or improvement of a system providing message and other services over open wire lines, cable, microwave, or radio, as normally provided by communications common carriers under defined rate schedules.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular undertaking.
3. For special applications of telecommunication facilities, see Section H of this annex.

1. Summary

1. Location, nature and extent of proposed installation or improvement.
2. Relation to existing telecommunications systems.
3. Relation of proposed project to long-range telecommunications plans.
4. Description of major features of design.
5. Anticipated effect on environment of local and regional areas.
6. Reference to and specific use made of any applicable reports (attached or available elsewhere).
7. Brief statement of conclusions as to relative benefits and cost and return on investment.

1. Developmental Aspects

1. Position of Project in Overall Program

- a. Present telecommunications systems and identities of owners or operators.

- b. Extent to which inadequacies in communications system are retarding economic growth.
- c. National program for telecommunications development and priority of project within the program.
- d. Responsibilities of telecommunications organization in related communications activities such as broadcasting, monitoring frequency assignments, etc.
- e. Coordination with other users such as police, transportation agencies and other utilities.

2. Effect on Development in Project Area

- a. General description of area served (physical and economic including agriculture, processing, manufacturing, centers of population, topography and climate as related to generation of communications traffic).
- b. Estimate of increase in communications traffic which would develop as a result of completion of the project.
- c. General economic effect of improved communications.

3. Applicant's Present Operations, If Any

- a. Nature of present operations.
- b. Profit and loss Statements for last five years.
- c. If applicant is a private corporation, provide financial information conforming with Attachments 1 and 2, as applicable. (Annual reports are usually acceptable if essentially the same information is included.)

- d. Present capacity for various communication services.
- e. Projected traffic in each type of service for next five years, with and without proposed project.

4. Anticipated Revenue and Economic Advantages

- a. Increase in tolls and service charges.
- b. Increase in general tax receipts which will result from increased economic activity.
- c. Increased business income in area served.
- d. Contribution of improved communications service to other planned development projects.
- e. Direct benefit to local population through local expenditures of project funds for labor, materials, food, rent, etc. (temporary benefit).

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Long-Range Plans for Telecommunications Development (15-20 years)

- a. Scope of existing plans.
- b. Backbone toll and truck routes.
- c. Toll switching centers
- d. Numbering plan.
- e. International circuits.

2. Estimated Market

- a. Size, distribution, and economic activity of the population.
- b. Population trends.
- c. Nature and relative numbers of various types of communication systems.

- d. New types of communications expected to develop as a result of project.
- e. Types of surveys conducted in the service area.
- f. Forecast of market by category of user and type of service for each communications center, or other defined area, and for each inter-area connection for a 10 year period, supported by graphs and statistics as to rate of demand growth.
- g. Relationship of forecast to historical trends and known new demands.
- h. Comparison with usage in similar areas elsewhere.
- i. Consideration given to large users and special service installations.
- j. Extent to which forecast is based on general economic data not disclosed by historical trends.

3. Existing Telecommunications in the Area

- a. Description of present organizations rendering telecommunication services.
- b. Map showing system boundaries, license or franchise limitations, major communications centers and inter-connections.
- c. Description of existing facilities, including types of switching; wire line; radio and terminal equipment for the various services provided; points between which such services are provided; and age, condition, and adequacy of the facilities.
- d. Tabulation showing pattern of development for the past five years by type of service and category of user (residential,

Industrial, commercial, governmental, institutional) and total annual usage in each case.

4. Rationale for Proposed Scope of Improvements

- a. Description of major elements of the project as to type, initial and ultimate capacity, and operating features.
- b. Basis for selection of system layout and proposed equipment.
- c. Relationship of capacity of new or extended system to present usage and forecast of future usage.
- d. Necessity for new or expanded facilities.

5. Design Criteria and Standards

- a. Design objectives for quality and grade of service required, including transmission objectives.
- b. Standards for materials and equipment to be incorporated into the project.
- c. Technical limitations on system location.
- d. Applicable laws and regulations governing frequencies.
- e. Operating and maintenance practices and standards.
- f. Type of construction proposed.
- g. Special characteristics and availability of required power.

6. Surveys and Preliminary Plans

- a. Map of system layout indicating connections with existing systems owned by the applicant or others.
- b. Schematic drawings showing number and types of circuits (open wire, cable, carrier, radio) and switching arrangements.

- c. Comparison with alternate means of providing similar service.
- d. Field investigations such as path surveys, loss calculations, and field intensity measurements for radio equipment.
- e. Compatibility of proposed equipment with existing equipment to be retained.
- f. Diagrams showing frequency allocations and channeling for radio and carrier equipment and coordination with other equipment in operation or to be installed in the area.
- g. Arrangements made for circuits terminating outside the project area, such as international circuits.
- h. Description of method of operating present and proposed facilities to meet system requirements determined by demand forecast.

7. Construction Labor, Materials and Equipment

- a. Skilled and unskilled labor, including "trainability".
- b. Technical and supervisory personnel.
- c. Major construction materials: cement, aggregates, steel, poles, wire, electrical materials, etc.
- d. Housing, food, fuel and lubricants, repair shops.
- e. Suitable sites for construction camps.
- f. Construction equipment.
- g. Local subcontractors.

8. Special Construction Problems Foreseen

- a. Climatic conditions, especially length of wet and dry seasons, which will likely affect construction schedule and use of equipment and labor.

- b. Maintenance of communications traffic during construction of new facilities.
- c. Limitations on construction schedule due to long lead-time equipment and materials.
- d. Evaluation of possible major causes of delay: floods, labor disputes; political disturbances, etc.

9. Plan for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. Plan for receiving, storing and distributing materials and equipment to points of use.
- c. Construction methods, particularly as related to the use of labor intensive techniques.
- d. Proposed method of contracting for engineering, construction and construction supervision.
- e. Requirements for equipment and system tests.
- f. Phased engineering and construction schedule (attach).

10. Maintenance Organization

- a. Description of applicant's present and proposed maintenance organization.
- b. Applicant's ability to adequately maintain the new or expanded communications system to be provided.
- c. Availability of equipment and trained maintenance personnel.
- d. Plan for recruiting and training.
- e. Applicant's ability to finance maintenance costs and plans for providing funds at proper time.

- f. If funds for training of personnel or procurement/^{of} maintenance equipment or spare parts are included in the requested loan amount, explain requirements in detail.

F. Financial Aspects

1. Estimated Cost

- a. Estimates of cost of land, engineering and construction, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section 3 of this Manual.
- b. Total estimated cost in U.S. dollars and local currency:
- (1) To be financed by applicant.
 - (2) To be financed under loan/grant.

2. Working Capital Requirements

- a. Amount required at end of construction period and at the end of the first, second and third years of operation to cover operating and maintenance costs, accounts receivable and cash on hand.
- b. Anticipated peaks in working capital requirements and provisions for meeting these peaks.

3. Maintenance and Operating Cost

- a. Annual cost of labor, supervision, equipment operation, operating supplies, spare parts, and administration.
- b. Breakdown to show dollar and local currency costs.

4. Annual Income

- a. Schedule of rates to be adopted for various types of communications services and basis for determination.

- b. Explanation of changes from present schedule and justification for proposed future changes.
- c. Income based on market forecast for each of next 10 years (see E above).

5. Profitability

- a. Analysis of projected profit and loss and forecast of earnings and expenditures, prepared as per Attachment 3.
- b. General conclusion as to commercial profitability of the enterprise, including rate of return on total investment and on owner's equity.

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. Tangible and intangible benefits listed in C.4. above.
 - b. Expected effect on commerce and industry in the areas served and anticipated ancillary effects.
 - c. Positive and negative effects on the environment and energy sources; i.e., improvement to or degradation of the environment and impact on availability or use of an energy source, etc.
2. Compare benefits and costs and estimate return on investment.

H. Special Applications of Telecommunications Facilities

1. Telecommunication facilities are also employed for a variety of special applications other than the normal message service, e.g., educational television and/or radio, agricultural services radio networks, railroad communications and dispatching networks, road construction and maintenance radio networks, etc.
2. Appropriate sections of this Annex should be considered as they relate to such special applications.

Attachment 1
INDUSTRIAL OR COMMERCIAL
PROJECT

BALANCE SHEET

Attach comparative balance sheets for the past five years, according to the following breakdown:

Assets

1. Current Assets:

- a. Cash
- b. Marketable securities
- c. Notes Receivable (show separately amounts owed by subsidiaries; directors, shareholders, their families and agents; all other amounts other than normal commercial debts.)
- d. Accounts Receivable from customers
- e. Inventories
- f. Other Assets (describe)

2. Investments:

- a. In subsidiaries
- b. Other Investments (describe)

3. Capital Assets:

- a. Land
- b. Buildings and Site Facilities
- c. Machinery and Equipment
- d. Construction in Progress
- e. Other Capital Assets (describe)

4. Gross Assets: (1 thru 3)

5. Depreciation Reserves (state method of amortization)

6. Net Capital Assets (3 - 5)

7. Intangibles (patents, licenses, good will, trademarks, formulas, franchises, etc.)

8. Other Assets: (specify)

9. Total Assets (6 thru 8)

Liabilities

10. Current Liabilities (due within one year)

a. Notes Payable

- to banks or other short-term lending agencies
- to holders of long-term debt maturing within one year
- to directors, shareholders, their families, and agents

b. Accounts payable to commercial creditors

c. Contractors' bid and performance bonds

d. Royalties

e. Other Current Liabilities (describe)

11. Long-term Debt (over one year) (indicate terms)

12. Construction Costs Payable

Capital and Surplus

13. Capital (authorized, issued and paid-in)

14. Reserves: (describe)

15. Surplus:

a. Revaluation Surplus

b. Earned Surplus (or Deficit)

c. Net Surplus or Deficit)

16. Total Liabilities and Capital

(10 thru 14 minus or plus 15)

Attachment 2
INDUSTRIAL OR COMMERCIAL
PROJECT

FINANCIAL INFORMATION

1. Capital Structure (present and planned)
 - Authorized Capital
 - Issued Capital
 - Subscribed Capital
 - Paid-up Capital
 - Capital Surplus (if any) arising from asset revaluation

2. Distribution of Shares

	<u>No. Issued</u>	<u>Total Nominal Amount</u>	<u>Total Paid-up Amount</u>	<u>No. of Votes per Share</u>
Ordinary				
Preference				
Deferred				

3. Indicate number and type of shares held by any individuals and/or group controlling more than one-fifth of the votes. Indicate relationship of such individuals and/or group to the company. If held by a holding company or other industrial enterprise, provide balance sheets, profit and loss statements, and capital structure information on such enterprises. If held by individuals, provide general and financial information on such individuals.
4. Outstanding debentures (term of issue and redemption, interest rate, etc.)
5. Outstanding mortgages and other long-term debt (terms of issue and repayment, interest rate, etc.)
6. Bank borrowings. Give details of amounts owed, interest rates, terms, renewal arrangements and unused credit limits.
7. Pending litigation either by or against the company.
8. Contingent liabilities, guarantees or endorsements.
9. Method of valuation of inventories. Note any departure from stated procedure affecting past profits as shown in attached statements.
10. Book value and estimated current market value of inventories for the past four years, adjusted to a comparable basis.
11. Give the book value of fixed assets for the past four years according to the following breakdown:

Attachment 2 (Cont'd)

Book value of fixed assets at beginning of year (describe basis of valuation)

plus acquisitions during the year, at cost
minus retirements during the year, at book value
minus normal depreciation (state normal depreciation method and rates used by major categories of assets)
minus extraordinary depreciation or write-offs (or plus any shortfall below normal depreciation)
plus revaluation of fixed assets

Book value of fixed assets at end of year.

12. (a) Give the average annual amount written off on bad debts during the past four years;
- (b) Give the total amount of claims overdue as of the date of the latest balance sheet and percentage of nominal value at which claims are recorded in the balance sheet.

Attachment 3
INDUSTRIAL OR COMMERCIAL PROJECT

FORECAST OF EARNINGS, RECEIPTS AND EXPENDITURES

	Present Operation			Construction Years			Operative Years					
	1959	1960	etc.	1962	1963	etc.	1964	1965	1966	1967	1968	etc.
A. EARNINGS FROM OPERATIONS												
<u>Revenue (Separately for each major product or category of sales)</u>												
1.												
2.												
3.												
4.												
5.												
<u>Cost of Operation, Net Income & Profit</u>												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
B. SOURCES OF FUNDS												
13.												
14.												
15.												
16.												
17.												
18.												

Attachment 3 (Cont'd)

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc</u>	<u>1962</u>	<u>1963</u>	<u>etc</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>etc</u>
C. <u>USE OF FUNDS</u>												
19. Construction Expenditures:												
a. This A. I. D. Project												
Foreign currency												
Local currency												
Total A. I. D. Project												
b. Other Construction												
c. Total construction expenditures												
20. Current Assets (minimum expected) (See Annex C)												
21. Fixed, Intangible & other Assets (See Annex C)												
22. Debt Service:												
a. Amortization of Principal												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
b. Interest												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
23. Other expenditures (describe)												
24. Total Expenditures (19 thru 23)												
D. <u>CASH FLOW</u>												
25. Annual Cash Surplus (or Deficit) (Item 12)												
26. Cash to Reserves												
27. Cash to Dividends												
28. Cash Balance, End of Period (25 - 26 & 27)												
E. <u>BALANCE SHEET, END OF PERIOD</u>												
<u>Assets</u>												
29. Current Assets (See Annex C)												
30. Investments												
31. Capital Assets (See Annex C)												
32. Gross Assets (29 thru 31)												
33. Accumulated Depreciation												
34. Net Fixed Assets (32 - 33)												
35. Intangible Assets (See Annex C)												
36. Total Assets, end of period (34 + 35)												
<u>Liabilities</u>												
37. Current Liabilities (due within 1 year)												
38. Share Capital (authorized, issued, paid-in)												
39. Reserves (describe)												
40. Surplus: a. Re-evaluation surplus												
b. Earned Surplus or deficit												
41. Total Liabilities (37 thru 39 + or - 40)												

Attachment 3 (Cont'd)

ANNEX 13FEASIBILITY ANALYSIS - INDUSTRIAL PROJECTSA. General

1. This annex covers industrial plants that use basic raw materials and produce a finished or semi-finished product. Both natural resources and energy are normally consumed in the production process,

2. All topics in this outline and in Section I of the Feasibility / Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Type of plant and kind and quantities of commodities to be produced.
2. Location, illustrated by map showing surrounding area and proximity of plant to existing transportation and utility systems.
3. Distance to source of raw materials and markets.
4. Relation of project to applicant's present operations, if any.
5. Local and regional effects on the environment.
6. Benefits, costs and profitability.
7. Reference to and specific use made of any applicable reports (attached or readily available elsewhere).

C. Commercial Aspects1. Markets

- a. Local or regional market trends during past five years for each major product and any closely related products, tabulated to show:

- (1) Domestic production.
- (2) Imports and exports.
- (3) Net local consumption and anticipated increase in local demand.

b. Present per capita consumption in country and comparison with other countries.

c. Local laws, regulations or customs which will likely affect marketing of proposed products, including import and export duties, tariffs, quotas, restrictions, and subsidies.

d. If part of proposed production is intended for export, show for each major product:

- (1) Number of units expected to be exported.
- (2) Proposed markets, transport costs, and import duties.

2. Applicant's Present Operations, If Any

a. Description of present operations, including those of subsidiary or parent companies.

b. Complete financial statements including balance sheets, profit and loss statements and dividends paid for past five years (see Attachments 1, 2, 3). Annual reports are usually acceptable if essentially the same information is provided).

c. Present production capacity for each product.
market

d. Sales volume and/value of each product for past five years (show separate figures for domestic and export sales).

e. Domestic and export prices, f.o.b. plant, for past five years.

f. Estimated production of each major product in present plant

for next five years.

- g. Estimated additional production/^{capacity}required to meet overall demand for next five years, including intended exports.

3. Competitors

- a. Names, location, present and anticipated future output, production costs, and selling prices of local competitors.
- b. Information as to any anticipated changes in position of competitors, such as expansion, modernization, new products, etc.
- c. Information as to foreign competition and any anticipated changes in laws or regulations which might affect volume of imports.

4. Competitive Position

- a. Selling prices to be met in domestic and export markets.
- b. Estimated transportation costs and other export expenses.
- c. Maximum competitive selling prices, f.o.b. plant.
- d. Competitive advantages of proposed project:
 - (1) Relative availability and cost of labor.
 - (2) Availability and quality of raw materials.
 - (3) Efficiency of modern production equipment and processes.
 - (4) Quality of products.
 - (5) Dependability of supply to consumers.

5. Summary of Commercial Prospects

- a. Forecast of sales in domestic and export markets and percentage of total.

- b. Justification of proposed plant capacity.

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10 for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Design

- a. Plant layout, including storage for raw materials and finished products and provisions for expansion, if anticipated.
- b. Access to transportation systems.
- c. Description of major structures and installed equipment with justification for the selection of units and processes.
(Avoid both obsolete and experimental technology.)
- d. Function performed by each major unit.
- e. Process flow sheet.
- f. Auxiliary requirements (standby, transport, and materials handling equipment and spare parts.)
- g. Patents and licenses required.
- h. Planned capacity and build-up of output after start-up.
- i. Estimated output as percentage of plant capacity for each of first five years of operation.
- j. Anticipated use of specialized consultants for final project design.

2. Utilities Available or to be Provided

- a. Requirements, source, availability, cost and reliability of

all required utilities. Pertinent data on each system and justification for selection of source in each case, including comparative advantage of outside procurement versus in-plant production.

- b. Power requirement in peak KW demand and annual KWH consumption, initial and future.
- c. Electrical system shown by single line diagram covering major power uses.
- d. Fuel for heat, steam and plant processes.
- e. Water balance of plant, where applicable. Problems relating to water treatment and disposal of liquid and/or gaseous effluents, including any which may be noxious.

3. Materials for Use in Manufacturing Processes

- a. Quantity, specifications, source and availability of raw and semi-finished materials required.
- b. Proven reserves of raw materials.
- c. If semi-processed materials are to be obtained from another plant, discuss the technical and economic soundness of such plant.
- d. Estimated procurement costs, anticipated cost escalation, and custom duties.
- e. Details of any preliminary agreements or executed contracts for the supply of raw materials.
- f. Available facilities for handling and storing raw or semi-finished materials.

4. Plans and Specifications

- a. Preliminary plans in sufficient detail to permit reasonably accurate computation of work quantities.

- b. Outline specifications for equipment and construction defining standards which will have a significant effect on the cost of construction, with specific justification for any unusual standards proposed.

5. Construction Labor, Materials and Equipment

- a. Manpower requirements and availability, including skilled and unskilled labor and technical and supervisory personnel.
- b. Local availability of cement, steel, aggregates, water for concrete, building stone, lumber and other construction materials.
- c. Types of construction equipment required for the work, with an indication of equipment available locally and equipment which must be imported.

6. Special Construction Problems Foreseen

- a. Climatic conditions, especially length of wet and dry seasons, which may affect construction schedule.
- b. Necessity of keeping an existing plant in service.
- c. Time required to obtain delivery of imported materials and equipment.

7. Plan for Execution of Project

- a. General construction plan.
- b. Proposed methods of contracting for engineering, construction, and construction supervision.
- c. Start-up tests to be performed on completed plant.
- d. Equipment guarantees required.
- e. Engineering and construction schedules (attach).

8. Operating Organization and Quality of Management

- a. Description of organization which will manage and operate the plant, accompanied by organization chart, present and projected.
- b. Number and qualifications of management and technical employees.
- c. Experience records of key management and technical personnel presently employed.
- d. Number, qualifications and availability of required operating employees.
- e. Plans for recruiting and training.
- f. Provisions for adequately managing and maintaining the project throughout the life of the proposed loan.

9. Overall Technical Soundness

- a. Justification for selection of location.
- b. Proven reliability of plant processes and equipment.
- c. Superiority of adopted processes.
- d. Analysis of any adverse factors and measures proposed to overcome them.
- e. Assurance that plant described will produce the quantity and quality of products specified on a continuing and dependable basis.

F. Financial Aspects

1. Estimated Cost

- a. Estimated cost of land, engineering and construction, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section C.
- b. Total estimated cost in U.S. dollars and local currency:

(1) To be financed by applicant

(2) To be financed by loan/grant.

2. Working Capital Requirements

- a. Amount required at start-up and at the end of the first, second, and third years of operation to cover raw materials, spare parts, auxiliary materials, goods in process, finished goods, accounts receivable and cash on hand.
- b. Source and availability of local currency and foreign exchange required.
- c. Anticipated occurrence of seasonal peaks in working capital requirements and provisions for meeting peak demands.

3. Production Costs (local currency and foreign exchange costs)

- a. Estimate of unit production costs for each major product and/or intermediate product, supported by detailed calculations. (See Attachment 4 for suggested format).
- b. Wage rates and production factors used in cost analysis, taking into account legal wage and salary scales, including fringe benefits such as social security, vacation pay, medical allowances, severance pay, travel pay, etc.
- c. Provisions for other benefits such as transportation, housing, subsistence, recreation, medical care, etc.

4. Financial

- d. Number of shifts per day and days of operation per year used in calculations, and basis for determination.
- e. Anticipated governmental subsidies considered such as:

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- (1) Exemption from or deferment of general or specific taxes on commodities produced.
 - (2) Exemption from or deferment of corporate or local taxes.
 - (3) Special depreciation allowances for tax purposes.
- f. Anticipated effect of wide fluctuations in cost factors included in computations.
- g. If applicant is producing the same or similar products in an existing plant, show present production costs using same format.
- h. Availability of foreign exchange to finance imported materials and supplies required.
4. Costs of Distributing and Selling
- a. Method and cost of distributing and marketing products.
 - b. Advertising costs.
 - c. Administrative expenses.
5. Selling Prices
- a. Proposed selling price in domestic and export markets.
 - b. Deduction for marketing costs.
 - c. Net selling price at the plant and adjustments that could be made in case of wide fluctuation in any of the cost factors.
6. Profitability
- a. Analysis of predicted profit and loss statement and forecast of earnings, receipts and expenditures, prepared as per Attachment 3.
 - b. Estimated level of production and sales at break-even point.
 - c. Estimate of net annual foreign exchange earnings from exports, if any.

d. General conclusions as to commercial profitability of the enterprise, including rate of return on total investment and on owner's equity.

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:

a. Benefits which will accrue to the economy, in addition to profits earned, such as:

(1) Taxes to be paid to the government and import tariffs included in proposed sale prices of products.

(2) More efficient utilization of labor as compared with other available activities.

(3) Provision of a market for local raw materials.

(4) Foreign exchange earnings if products are to be exported, after taking into account any foreign exchange production costs.

(5) Benefits to consumers (lower prices or more dependable supply of goods).

(6) Stimulation of other industrial development.

(7) Manpower training in factory operation and management.

b. Positive and negative effects on the environment or energy sources;

6. Profitability
i.e., improvement to or degradation of the environment and impact

a. Analysis on the availability of use of an energy source.

BALANCE SHEET

Attach comparative balance sheets for the past five years, according to the following breakdown:

Assets

1. Current Assets:

- a. Cash
- b. Marketable securities
- c. Notes Receivable (show separately amounts owed by subsidiaries; directors, shareholders, their families and agents; all other amounts other than normal commercial debts.)
- d. Accounts Receivable from customers
- e. Inventories
- f. Other Assets (describe)

2. Investments:

- a. In subsidiaries
- b. Other Investments (describe)

3. Capital Assets:

- a. Land
- b. Buildings and Site Facilities
- c. Machinery and Equipment
- d. Construction in Progress
- e. Other Capital Assets (describe)

4. Gross Assets: (1 thru 3)

5. Depreciation Reserves (state method of amortization)

6. Net Capital Assets (3 - 5)

7. Intangibles (patents, licenses, good will, trademarks, formulas, franchises, etc.)

8. Other Assets: (specify)

9. Total Assets (6 thru 8)

Liabilities

10. Current Liabilities (due within one year)

- a. Notes Payable
 - to banks or other short-term lending agencies
 - to holders of long-term debt maturing within one year
 - to directors, shareholders, their families, and agents
- b. Accounts payable to commercial creditors
- c. Contractors' bid and performance bonds
- d. Royalties
- e. Other Current Liabilities (describe)

11. Long-term Debt (over one year) (indicate terms)

12. Construction Costs Payable

Capital and Surplus

13. Capital (authorized, issued and paid-in)

14. Reserves: (describe)

15. Surplus:

- a. Revaluation Surplus
- b. Earned Surplus (or Deficit)
- c. Net Surplus or Deficit)

16. Total Liabilities and Capital

(10 thru 14 minus or plus 15)

FINANCIAL INFORMATION

1. Capital Structure (present and planned)
 - Authorized Capital
 - Issued Capital
 - Subscribed Capital
 - Paid-up Capital
 - Capital Surplus (if any) arising from asset revaluation

2. Distribution of Shares

	<u>No. Issued</u>	<u>Total Nominal Amount</u>	<u>Total Paid-up Amount</u>	<u>No. of Votes per Share</u>
--	-------------------	-----------------------------	-----------------------------	-------------------------------

Ordinary
 Preference
 Deferred

3. Indicate number and type of shares held by any individuals and/or group controlling more than one-fifth of the votes. Indicate relationship of such individuals and/or group to the company. If held by a holding company or other industrial enterprise, provide balance sheets, profit and loss statements, and capital structure information on such enterprises. If held by individuals, provide general and financial information on such individuals.
4. Outstanding debentures (term of issue and redemption, interest rate, etc.)
5. Outstanding mortgages and other long-term debt (terms of issue and repayment, interest rate, etc.)
6. Bank borrowings. Give details of amounts owed, interest rates, terms, renewal arrangements and unused credit limits.
7. Pending litigation either by or against the company.
8. Contingent liabilities, guarantees or endorsements.
9. Method of valuation of inventories. Note any departure from stated procedure affecting past profits as shown in attached statements.
10. Book value and estimated current market value of inventories for the past four years, adjusted to a comparable basis.
11. Give the book value of fixed assets for the past four years according to the following breakdown:

Attachment 2 (Cont'd)

Book value of fixed assets at beginning of year (describe basis of valuation)

- plus acquisitions during the year, at cost
- minus retirements during the year, at book value
- minus normal depreciation (state normal depreciation method and rates used by major categories of assets)
- minus extraordinary depreciation or write-offs (or plus any shortfall below normal depreciation)
- plus revaluation of fixed assets

Book value of fixed assets at end of year.

12. (a) Give the average annual amount written off on bad debts during the past four years;
- (b) Give the total amount of claims overdue as of the date of the latest balance sheet and percentage of nominal value at which claims are recorded in the balance sheet.

Attachment 3
INDUSTRIAL OR COMMERCIAL PROJECT

FORECAST OF EARNINGS, RECEIPTS AND EXPENDITURES

	Present Operation			Construction Years			Operative Years					
	1959	1960	etc.	1962	1963	etc.	1964	1965	1966	1967	1968	etc.
A. EARNINGS FROM OPERATIONS												
<u>Revenue</u> (Separately for each major product or category of sales)												
1.	Annual Sales (Units per year)											
2.	Unit Sales Price											
3.	Gross Revenue from Sales (1 x 2)											
4.	Other Income (describe)											
5.	Total Income (3 + 4)											
<hr/>												
<u>Cost of Operation, Net Income & Profit</u>												
6.	Operating Expenses:											
a.	Manufacturing											
b.	Maintenance											
c.	General Administration											
d.	Distribution & Marketing											
e.	Short-term Interest											
7.	Depreciation Allowances (Show basis)											
8.	Taxes (describe)											
9.	Total Cost of Operation before interest on Long-term Debt (6 thru 8)											
10.	Net Income before interest on Long-term Debt (5 - 9)											
11.	Interest on Long-term Debt											
12.	Net Profit (or Loss) (10 - 11)											
<hr/>												
B. SOURCES OF FUNDS												
13.	Net Income before Interest (Item 10)											
14.	Depreciation Allowance (Item 7)											
15.	Increase in Paid-in Share Capital											
16.	Borrowings:											
a.	Existing DLF or A. I. D. Loans)											
b.	A. I. D. Loan proposed herein)											
c.	Other Long-term borrowings) (show terms)											
	(Each loan separately))											
d.	Anticipated short-term loans)											
17.	Other receipts (describe)											
18.	Total Receipts (13 thru 17)											

Attachment 3 (Cont'd)

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc</u>	<u>1962</u>	<u>1963</u>	<u>etc</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>et.</u>
C. <u>USE OF FUNDS</u>												
19. Construction Expenditures:												
a. This A. I. D. Project												
Foreign currency												
Local currency												
Total A. I. D. Project												
b. Other Construction												
c. Total construction expenditures												
20. Current Assets (minimum expected) (See Annex C)												
21. Fixed, Intangible & other Assets (See Annex C)												
22. Debt Service:												
a. Amortization of Principal												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
b. Interest												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
23. Other expenditures (describe)												
24. Total Expenditures (19 thru 23)												
D. <u>CASH FLOW</u>												
25. Annual Cash Surplus (or Deficit) (Item 12)												
26. Cash to Reserves												
27. Cash to Dividends												
28. Cash Balance, End of Period (25 - 26 & 27)												
E. <u>BALANCE SHEET, END OF PERIOD</u>												
<u>Assets</u>												
29. Current Assets (See Annex C)												
30. Investments												
31. Capital Assets (See Annex C)												
32. Gross Assets (29 thru 31)												
33. Accumulated Depreciation												
34. Net Fixed Assets (32 - 33)												
35. Intangible Assets (See Annex C)												
36. Total Assets, end of period (34 + 35)												
<u>Liabilities</u>												
37. Current Liabilities (due within 1 year)												
38. Share Capital (authorized, issued, paid-in)												
39. Reserves (describe)												
40. Surplus: a. Re-evaluation surplus												
b. Earned Surplus or deficit												
41. Total Liabilities (37 thru 39 + or - 40)												

PRODUCTION COST

Cost per unit of output (pound, ton, thousand, etc.

based on ___ units per day or ___ units per year)

<u>Item</u>	<u>Quantity Required per Unit</u>	<u>Price</u>	<u>Cost per Unit of Product</u>
Labor (classes and rates)			
Raw materials (list)			
Power			
Fuel			
Utilities			
Supplies			
Supervisory and technical salaries (classes and rates)			
Other direct costs			
Total Direct Plant Cost			

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ANNEX 14

FEASIBILITY ANALYSIS - MINING AND EXTRACTIVE PROJECTS

A. General

1. This chapter covers the development of all types of mines and plants for / ^{primary} extractive processes such as smelting, metal separating, ore up-grading and concentrating, and combinations thereof.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered insofar as appropriate. Others should be included as necessary/^{to} demonstrate the soundness of the particular project.

B. Summary

1. Type of mine or plant and proposed daily, monthly and yearly production of all intermediate and final products.
2. Estimated quantity of ore reserves.
3. Location map showing surrounding area and indicating proximity to transportation and utility systems.
4. Method of transport and distance from mine or plant to markets and supply sources and between mine and extractive plant.
5. Relation of project to applicant's present operations, if any, with indication of applicant's interest in land, mineral rights, and other natural resources, whether as owner, lessee, or other holder of title.
6. Anticipated effect on local and regional environment.
7. Benefits, costs and return on investment.

8. Reference to and the specific use made of any applicable reports
(attached or readily available elsewhere).

c. Commercial Aspects

1. Ore Reserves

a. Description of known and indicated reserves of the commodity to be exploited, including measurements, quantities, grades, and sampling and testing methods used, supported by calculations, maps, cross sections, drill hole data, survey test results, and samples.

b. Statement as to percentage of recovery anticipated with the exploitation method planned.

c. If underground or open pit mining operations are contemplated, submit detailed information regarding shape, attitude and grade of ore body.

2. Market Situation

a. Local, regional and worldwide market trends during past five years, as applicable, for each major product and any competing products, illustrated by a tabulation showing:

- (1) Domestic production and value, f.o.b. mine or plant.
- (2) Quantity of imports and exports and value, c.i.f. or f.o.b.
- (3) Net local consumption and value.

b. Present consumption in country and comparison with consumption in other countries.

c. Local laws, regulations or customs affecting marketing of proposed products, including import and export duties, tariffs, quotas, restrictions, price controls, subsidies and tax exemptions.

3. Market for Proposed Products

- a. Projected market trend for each product showing estimated quantity and value of imports, exports, domestic production, and domestic consumption for the next five years.
- b. Trends in use of present or prospective competing products.
- c. Market analysis for each product; including f.o.b. and c.i.f. price studies on evaluation of foreign markets, and proposed marketing methods and costs.
- d. Survey and analysis of existing and potential users of the several products.
- e. Evidence of salability of the product in the form of sales contracts or intentions to purchase.
- f. If part of proposed production is intended for export, show for each major product:
 - (1) Number of units to be exported.
 - (2) Proposed markets and cost of transport.

4. Applicant's Present Operations, If Any

- a. Nature of present operations and results of operations to date, including period of operation, method of production, and volume and quality of product.
- b. Present production capacity for each product.
- c. Description of existing stage of development, organization, buildings, equipment, and general condition.

3. Market for Proposed Products

- d. Statement as to whether or not products require further treatment, the nature of such treatment, and the place where such treatment is given.
- e. Complete financial statement, including balance sheets, profit and loss statements and dividends paid for past five years.
- c. Market analysis for each product, including annual reports (See Attachments 1 and 2.) Annual reports are usually acceptable if essentially the same information is provided.
- f. Sales volume and total value of each commodity produced for past five years, showing separate figures for domestic and export sales.
- g. Domestic and export prices, f.o.b. mine or plant, for past five years.
- h. Estimated production of each major product for next five years, with and without expansion or improvement proposed.
- i. Estimated additional production required to meet projected demand for next five years, including intended exports.

5. Competitors

- a. Names, location, present and anticipated future output, production costs and selling prices of existing competitors.
- b. Information as to any anticipated change in position of competitor, and quality of product, including expansion, modernization, new plants, new products, etc.
- c. Evaluation of foreign competition and any anticipated changes in buildings, equipment, and general condition. laws or regulations which might affect volume of imports.

6. Competitive Position

- a. Selling prices which must be met in domestic and export markets.
- b. Estimated transportation costs and other export expenses.
- c. Maximum competitive selling prices, f.o.b. mine or plant.
- d. Competitive advantages of proposed project:
 - (1) Relative availability and cost of labor.
 - (2) Modern production equipment and processes.
 - (3) Transportation costs.
 - (4) Dependability of supply.

7. Summary of Commercial Prospects

- a. Forecast of sales volume for domestic^{and}/export markets and the percentage of the total market claimed in each case, with detailed explanation of projections.
- b. Justification of proposed plant capacity.

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10 for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Design

- a. Description of engineering features of the project.
- b. Justification for selection of mining method and extractive or treatment process proposed and comparison with possible alternatives.
(Avoid both obsolete and experimental technology).
- c. Descriptions of other elements of project as follows:

(1) For mining projects, submit a scale map of applicant's property or concession, showing boundaries, topography, principal geological features, existing mine workings and structures, ore outcrops, exploratory pits, drill holes, etc.; also submit geologic and engineering reports, assay maps, and other information pertinent to the economic and technical feasibility of the project. (Geologic reports should cover not only the property in question but also other aspects of regional geology which may have some bearing on the origin, nature and extent of mineral deposits in the area.)

(2) For underground mining, describe mining method proposed, underground and surface plant and equipment requirements, and plans for pre-production development, and indicate the planned daily productive capacity.

(3) For open pit operations, describe operating procedure proposed and indicate equipment requirements, as illustrated on preliminary plans; also indicate and justify the overall stripping ratio, the contemplated cut-off grade of the ore, and the planned productive capacity.

(4) For ore treatment plants to be built in conjunction with a mining operation or as an independent enterprise, describe the mill and production process, related facilities, and equipment and plant requirements, and indicate proposed daily capacity. Include layout plan of plant and process flow sheet.

(5) For ore handling and transportation, indicate various types of transport (rail, truck, tramway, barge) to be used between mine and market or port and note structures and equipment required at transfer points, including ports.

Discuss alternatives considered and reasons for rejection.

- d. Patents and licenses required.
- e. Planned arrangements for access to transport systems.
- f. Estimated total output of each product as percentage of design capacity for each of the first five years of production.

2. Utilities Available or to be Provided

- a. Requirements, source, availability, cost and reliability of utilities; include pertinent data on each system and indicate reasons for selection of source in each case, including comparison of outside procurement versus in-plant production.
- b. Power requirements in peak KW demand and annual KWH consumption, initial and future.
- c. Fuel for heat, steam and plant processes.
- d. Water supply and disposal of effluents (liquid and gaseous), including any which may be noxious.

3. Specifications

Outline specifications for equipment and construction defining standards which will have a significant effect on the cost of construction, with specific justification for any unusual standards proposed.

4. Construction Labor, Materials and Equipment

- a. Manpower requirements and availability, including skilled and unskilled labor and technical and supervisory personnel.
- b. Local availability of cement, steel, aggregates, and other construction materials.
- c. Types and availability of construction equipment required for the project.

5. Special Construction Problems Foreseen

- a. Climatic conditions, particularly length of wet and dry seasons, which may affect the construction schedule.
- b. Necessity of keeping existing mine or treatment facilities in service during construction.
- c. Time required to obtain delivery of imported materials and equipment.

6. Plan for Execution of Project

- a. General construction plan.
- b. Proposed methods of contracting for engineering, construction and construction supervision.
- c. Proposed breakdown of work into several contracts.
- d. Tests to be performed on installed equipment.
- e. Equipment guarantees required.
- f. Phased engineering and construction schedule (attach).

7. Operating Organization and Quality of Management

- a. Description of organization which will manage and operate the facility, illustrated by an organization chart, present and projected.
- b. Number, qualifications, and availability of personnel for each major phase of operation.
- c. Qualifications of management and technical personnel.
- d. Experience records of key management and technical personnel presently employed.
- e. Plans for recruiting and training.
- f. Provisions for adequately managing and maintaining the facility throughout the life of the proposed loan.

8. Overall Technical Soundness

- a. Justification for location of facility.
- b. Proven reliability of plant processes and equipment.
- c. Superiority of processes proposed.
- d. Compatibility of processes proposed with capability of organization to manage, operate, and maintain the facility.
- e. Analysis of any adverse factors and measures proposed to overcome them.
- f. Assurance that plant described will produce the quantity and quality of products specified on a continuing and dependable basis.

F. Financial Aspects

1. Estimated Cost

- a. Estimated cost of land, engineering and construction, prepared in accordance with the Cost Estimating Annexes to Handbook 3

cited in Section C.

- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed by loan/grant.

2. Working Capital Requirements

- a. Amount required at start-up and at the end of the first, second, and third years of operation, to cover supplies, spare parts, auxiliary materials, products in process, finished products, accounts receivable and cash on hand.
- b. Sources and availability of local currency and foreign exchange required.
- c. Anticipated occurrence of seasonal peaks in working capital requirements and provisions for meeting peak demand.

3. Production Cost (local currency and foreign exchange costs)

- a. Production estimates showing tonnage and grade of run-of-mine ore produced and milled, tonnage and grade of mill products, and percentage of mill recovery.
- b. Estimate unit production costs for each major product and/or intermediate product, for mining and milling operations separately, supported by detailed calculations. (See Attachment 4 for suggested format.)
- c. Estimate of pre-operating cost prorated to production cost.
- d. Wage rates and production factors used in cost analysis, taking into account legal wage and salary scales, including fringe benefits such as social security, vacation pay, medical allowances, severance pay, and travel pay.

- e. Provisions for other benefits such as transportation, housing, subsistence, recreation, medical care, etc.
 - f. Number of shifts per day and days of operation per year used in calculations, and basis for determination.
 - g. Anticipated governmental subsidies considered such as:
 - (1) Exemption from or deferment of general or specific taxes on commodities produced.
 - (2) Exemption from or deferment of corporate or local taxes.
 - (3) Special depreciation allowances for tax purposes.
 - h. Anticipated effect of wide fluctuations in cost factors included in computations.
 - i. If applicant is producing the same or similar products in an existing plant, ^{calculate} / present production cost using format shown under/ ^{Attachment 4.}
 - j. Breakdown of unit production costs into local currency and foreign exchange.
 - k. Availability of foreign exchange to finance imported materials and supplies required.
4. Costs of Distributing and Selling
- a. Method and cost of distributing and marketing products.
 - b. Advertising costs.
 - c. Administrative expenses.
5. Selling Prices
- a. Proposed selling price in domestic and export markets and relationship to current price.
 - b. Deduction for marketing costs.
 - c. Net selling price at the plant and adjustments that could be made in case of wide fluctuation in any of the cost factors.

6. Profitability

- a. Analysis of predicted profit and loss statement and forecast of earnings, receipts and expenditures, as per Attachment 3.
- b. Estimated level of production and sales at break-even point.
- c. Estimate of net annual foreign exchange earnings from exports, if any.
- d. General conclusion as to commercial profitability of the enterprise, including rate of return on total investment and on owner's equity.

G. National Economic Effects

- 1. Explain and evaluate in monetary terms where possible:
 - a. The benefits which will accrue to the national economy, in addition to the profits earned by the owner, such as:
 - (1) Taxes to be paid by the industry and import tariffs included in proposed selling price.
 - (2) More efficient utilization of labor as compared with other available activities.
 - (3) Provision of a market for local natural resources.
 - (4) Foreign exchange earnings if products are exported, after taking into account any foreign exchange production costs.
 - (5) Benefits to consumers (lower prices or more dependable supply of goods).
 - (6) Stimulation of other industrial development.
 - (7) Manpower training in factory operation and management.
 - (8) Positive and negative effects on the environment or energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, etc.

2. Compare benefits and costs and estimate rate of return on investment.

Attachment 1
INDUSTRIAL OR COMMERCIAL
PROJECT.

BALANCE SHEET

Attach comparative balance sheets for the past five years, according to the following breakdown:

Assets

1. Current Assets:

- a. Cash
- b. Marketable securities
- c. Notes Receivable (show separately amounts owed by subsidiaries; directors, shareholders, their families and agents; all other amounts other than normal commercial debts.)
- d. Accounts Receivable from customers
- e. Inventories
- f. Other Assets (describe)

2. Investments:

- a. In subsidiaries
- b. Other Investments (describe)

3. Capital Assets:

- a. Land
- b. Buildings and Site Facilities
- c. Machinery and Equipment
- d. Construction in Progress
- e. Other Capital Assets (describe)

4. Gross Assets: (1 thru 3)

5. Depreciation Reserves (state method of amortization)

6. Net Capital Assets (3 - 5)

7. Intangibles (patents, licenses, good will, trademarks, formulas, franchises, etc.)

8. Other Assets: (specify)

9. Total Assets (6 thru 8)

Liabilities

10. Current Liabilities (due within one year)

- a. Notes Payable
 - to banks or other short-term lending agencies
 - to holders of long-term debt maturing within one year
 - to directors, shareholders, their families, and agents
- b. Accounts payable to commercial creditors
- c. Contractors' bid and performance bonds
- d. Royalties
- e. Other Current Liabilities (describe)

11. Long-term Debt (over one year) (indicate terms)

12. Construction Costs Payable

Capital and Surplus

13. Capital (authorized, issued and paid-in)

14. Reserves: (describe)

15. Surplus:

- a. Revaluation Surplus
- b. Earned Surplus (or Deficit)
- c. Net Surplus or Deficit)

16. Total Liabilities and Capital

(10 thru 14 minus or plus 15)

Attachment 2
INDUSTRIAL OR COMMERCIAL
PROJECT

FINANCIAL INFORMATION

1. Capital Structure (present and planned)
 - Authorized Capital
 - Issued Capital
 - Subscribed Capital
 - Paid-up Capital
 - Capital Surplus (if any) arising from asset revaluation

2. Distribution of Shares

	<u>No. Issued</u>	<u>Total Nominal Amount</u>	<u>Total Paid-up Amount</u>	<u>No. of Votes per Share</u>
--	-------------------	-------------------------------------	-------------------------------------	---------------------------------------

Ordinary
Preference
Deferred

3. Indicate number and type of shares held by any individuals and/or group controlling more than one-fifth of the votes. Indicate relationship of such individuals and/or group to the company. If held by a holding company or other industrial enterprise, provide balance sheets, profit and loss statements, and capital structure information on such enterprises. If held by individuals, provide general and financial information on such individuals.
4. Outstanding debentures (term of issue and redemption, interest rate, etc.)
5. Outstanding mortgages and other long-term debt (terms of issue and repayment, interest rate, etc.)
6. Bank borrowings. Give details of amounts owed, interest rates, terms, renewal arrangements and unused credit limits.
7. Pending litigation either by or against the company.
8. Contingent liabilities, guarantees or endorsements.
9. Method of valuation of inventories. Note any departure from stated procedure affecting past profits as shown in attached statements.
10. Book value and estimated current market value of inventories for the past four years, adjusted to a comparable basis.
11. Give the book value of fixed assets for the past four years according to the following breakdown:

15

Attachment 2 (Cont'd)

Book value of fixed assets at beginning of year (describe basis of valuation)

plus acquisitions during the year, at cost
minus retirements during the year, at book value
minus normal depreciation (state normal depreciation method and rates used by major categories of assets)
minus extraordinary depreciation or write-offs (or plus any shortfall below normal depreciation)
plus revaluation of fixed assets

Book value of fixed assets at end of year.

12. (a) Give the average annual amount written off on bad debts during the past four years;
- (b) Give the total amount of claims overdue as of the date of the latest balance sheet and percentage of nominal value at which claims are recorded in the balance sheet.

Attachment 3
INDUSTRIAL OR COMMERCIAL PROJECT

FORECAST OF EARNINGS, RECEIPTS AND EXPENDITURES

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc.</u>	<u>1962</u>	<u>1963</u>	<u>etc.</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>etc.</u>
A. EARNINGS FROM OPERATIONS												
<u>Revenue (Separately for each major product or category of sales)</u>												
1. Annual Sales (Units per year)												
2. Unit Sales Price												
3. Gross Revenue from Sales (1 x 2)												
4. Other Income (describe)												
5. Total Income (3 + 4)												
<u>Cost of Operation, Net Income & Profit</u>												
6. Operating Expenses:												
a. Manufacturing												
b. Maintenance												
c. General Administration												
d. Distribution & Marketing												
e. Short-term Interest												
7. Depreciation Allowances (Show basis)												
8. Taxes (describe)												
9. Total Cost of Operation before interest on Long-term Debt (6 thru 8)												
10. Net Income before interest on Long-term Debt (5 - 9)												
11. Interest on Long-term Debt												
12. Net Profit (or Loss) (10 - 11)												
B. SOURCES OF FUNDS												
13. Net Income before Interest (Item 10)												
14. Depreciation Allowance (Item 7)												
15. Increase in Paid-in Share Capital												
16. Borrowings:												
a. Existing DLF or A. I. D. Loans)												
b. A. I. D. Loan proposed herein)												
c. Other Long-term borrowings) (show terms)												
(Each loan separately))												
d. Anticipated short-term loans)												
17. Other receipts (describe)												
18. Total Receipts (13 thru 17)												

Attachment 3 (Cont'd)

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc</u>	<u>1962</u>	<u>1963</u>	<u>etc</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>etc</u>
C. <u>USE OF FUNDS</u>												
19. <u>Construction Expenditures</u>												
a. <u>This A.I.D. Project</u>												
Foreign currency												
Local currency												
<u>Total A.I.D. Project</u>												
b. <u>Other Construction</u>												
c. <u>Total construction expenditures</u>												
20. <u>Current Assets (minimum expected) (See Annex C)</u>												
21. <u>Fixed, Intangible & other Assets (See Annex C)</u>												
22. <u>Debt Service:</u>												
a. <u>Amortisation of Principal</u>												
(1) Existing DLF or A.I.D. Loans												
(2) A.I.D. Loan proposed herein												
(3) Other borrowings												
b. <u>Interest</u>												
(1) Existing DLF or A.I.D. Loans												
(2) A.I.D. Loan proposed herein												
(3) Other borrowings												
23. <u>Other expenditures (describe)</u>												
24. <u>Total Expenditures (19 thru 23)</u>												
D. <u>CASH FLOW</u>												
25. <u>Annual Cash Surplus (or Deficit) (Item 12)</u>												
26. <u>Cash to Reserves</u>												
27. <u>Cash to Dividends</u>												
28. <u>Cash Balance, End of Period (25 - 26 & 27)</u>												
E. <u>BALANCE SHEET, END OF PERIOD</u>												
<u>Assets</u>												
29. <u>Current Assets (See Annex C)</u>												
30. <u>Investments</u>												
31. <u>Capital Assets (See Annex C)</u>												
32. <u>Gross Assets (29 thru 31)</u>												
33. <u>Accumulated Depreciation</u>												
34. <u>Net Fixed Assets (32 - 33)</u>												
35. <u>Intangible Assets (See Annex C)</u>												
36. <u>Total Assets, end of period (34 + 35)</u>												
<u>Liabilities</u>												
37. <u>Current Liabilities (due within 1 year)</u>												
38. <u>Share Capital (authorized, issued, paid-in)</u>												
39. <u>Reserves (describe)</u>												
40. <u>Surplus: a. Re-evaluation surplus</u>												
b. <u>Earned Surplus or deficit</u>												
41. <u>Total Liabilities (37 thru 39 + or - 40)</u>												

Attachment 4
INDUSTRIAL PROJECT

PRODUCTION COST

Cost per unit of output (pound, ton, thousand, etc.)

based on ___ units per day or ___ units per year)

<u>Item</u>	<u>Quantity Required per Unit</u>	<u>Price</u>	<u>Cost per Unit of Product</u>
Labor (classes and rates)			
Raw materials (list)			
Power			
Fuel			
Utilities			
Supplies			
Supervisory and technical salaries (classes and rates)			
Other direct costs			
Total Direct Plant Cost			

ANNEX 15FEASIBILITY ANALYSIS - PORT DEVELOPMENT OR STORAGE PROJECTSA. General

1. This chapter covers the construction, enlargement or improvement of a sea or inland port or any of the facilities built or operated in connection therewith; or any warehouse, tank or other facility for the storage of commodities; but limited to ports or facilities which offer services to the general public under defined rate schedules.
2. All topics in this outline and in Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed construction, enlargement or improvement.
2. Relation to other ports or storage facilities and to applicant's present operations, if any.
3. Description of major features of design.
4. Proposed increase in port or storage capacities.
5. Anticipated effect on local and regional environment.
6. Benefits, costs and return on investment.
7. Reference to and the specific use made of any applicable reports (attach).

C. Commercial Economic Aspects

1. Area Served

- a. Description and maps of area to be served, including pertinent information on population, agriculture, natural resources, industries, highways, railroads, and other factors affecting the occurrence or movement of commodities.
- b. Principal commodities produced within the area served by the facility.
- c. Types of commodities imported.

2. Present Port and Storage Facilities

- a. Map and description of present ports and major storage facilities in the country.
- b. A map and description of the road, rail, inland waterway, and pipeline systems connecting the port with its service area and the source of utilities such as water, electric power, or gas supplied to the port.
- c. Hydrographical chart of the port, its approaches, and its limits.
- d. Names of any existing organizations, agencies, or companies providing shipping and/or storage service in the project area.
- e. Description of existing port and storage facilities, including capacity for handling and storing various types of commodities.
- f. Present volume of commodity movements and/or storage within the project area.
- g. Extent to which inadequacies of port or storage facilities are retarding economic growth.

3. Applicant's Present Operations, If Any

- a. Nature of present operation.
- b. Profit and loss statements for past five years. (See Attachment 3.)
- c. If applicant is a private corporation, provide financial information conforming with Attachments 1 and 2, as appropriate.
- d. Present capability to provide various services.
- e. Estimated volume of business in each type of service for next five years, with and without proposed improvement. (See Attachment 3).

4. Forecast of Future Business

- a. New traffic patterns expected to develop as a result of the project.
- b. Estimate of volume of new business which should develop as a result of the project.
- c. Forecast of future port and storage services for 10 years following completion of the facility, supported by graphs and an estimate of the rate of increase in demand for such services.
- d. Breakdown of forecast to indicate business that would be drawn from existing facilities in the surrounding area and business which should be generated by this and other development projects which may be contemplated.
- e. Extent to which forecast is based on economic factors other than those disclosed by historical trends.

5. Additional Capacity Required

- a. Additional port and storage capacities required to meet the forecast of future traffic by years, taking into account possible expanded services of existing facilities.
- b. Recommended location of additional facilities to meet future requirements.

6. National Program

Description of national program for development of ports and storage facilities and the specified priority of the project within this program.

7. Character of Anticipated Benefits

- a. Increases in port and storage charges, custom duties, etc.
- b. Reduction in operating and maintenance costs of any existing facilities.
- c. Increase in general tax receipts which will result from increased economic activity in the area.
- d. Increased income to area served.
- e. Faster and cheaper delivery of commodities.
- f. General economic effect of additional services provided by the proposed facility.
- g. Direct benefit to local population through local expenditure of the project funds for labor, materials, food, rent, etc. (temporary benefit).

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Description and Rationale

- a. Basis for selection of location and comparison with alternative sites considered, with reference to both economic and physical aspects. (If facility is to be located in an area having a history of earthquake activity, a detailed seismologic study will be required.)

- b. Description of engineering features of the project, including type, initial and ultimate capacity, and operating features of any major equipment required.
- c. Justification for special provisions for handling or storing large volumes of bulk commodities.
- d. Relationship of capacity of the proposed facility to present services rendered and forecasts of future services.

2. Design Criteria and Construction Standards

- a. Design objectives, quality and type of service to be rendered.
- b. Outline specifications for materials and equipment to be incorporated into the facility.
- c. Outline specifications defining standards of construction which will have a major effect on the cost of construction, with specific justification for any unusual standards proposed.
- d. Impact and earthquake factors to be used in structural design.

3. Surveys and Preliminary Plans

- a. Results of preliminary surveys of project site, including pertinent meteorological, oceanographical, hydrological, geological and seismological data and information on salinity and presence of wood borers.
- b. Results of test borings and soundings.
- c. Master development plan indicating stage construction, if contemplated.
- d. Preliminary plans for docks, piers, wharfs and buildings and outline specifications for cargo handling equipment.

- e. Preliminary design and layout of railways, roads, and utilities serving the facility.
- f. Sketches, diagrams or photographs of existing structures and equipment.
- g. Description of plans for connecting new facilities with existing structures and for operating the combined facility.

4. Construction Labor, Materials and Equipment

- a. Availability of skilled and unskilled labor, including "trainability".
- b. Availability of technical and supervisory personnel.
- c. Source of major construction materials: cement, aggregates, steel, etc.
- d. Local availability of housing, food, fuel, lubricants, repair shops, etc.
- e. Suitable sites for construction camps.
- f. Construction equipment requirements and source.
- g. Availability and adequacy of local subcontractors.

5. Special Construction Problems Foreseen

- a. Climatic conditions, including length of wet and dry seasons, currents, tides, typhoons, etc., which may affect the construction schedule.
- b. Maintenance of existing port or storage operations during construction.
- c. Limitations on construction schedule due to long lead-time, equipment and materials.
- d. Evaluation of possible major causes of delay: floods, labor disputes, political disturbances, etc.

6. Plan for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. Construction methods, particularly as related to the use of labor intensive techniques.
- c. Proposed methods of contracting for engineering, construction, and construction supervision.
- d. Phased engineering and construction schedule (attach).

7. Operating Organization

- a. Description of organization which will manage and operate the facility, accompanied by an organization chart, present and projected.
- b. Qualifications of key management and technical personnel.
- c. Experience records of key management and technical personnel presently employed.
- d. Plans for recruiting and training.

F. Financial Aspects

1. Estimated Cost

- a. Estimated cost of land, engineering and construction, prepared in accordance with the Cost Estimating annexes to Handbook 3 cited in Section C.
- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed by loan/grant.
- c. Anticipated cost escalation during contract period.

2. Working Capital Requirements

- a. Amount required at start-up and at the end of the first, second and third years of operation to cover operating and maintenance supplies, spare parts, accounts receivable and cash on hand.
- b. Anticipated occurrence of seasonal peaks in working capital requirements and provisions for meeting these peaks.

3. Total Initial Capital Requirements

- a. Initial Capital Cost.
- b. Working capital at start-up of operation.
- c. Total capital requirement by time period and type of currency.

4. Maintenance and Operating Costs

- a. Estimate of annual cost of maintenance and operations including labor, supplies, power, fuels, spare parts, supervision and administration, broken down between local currency and foreign exchange costs.
- b. Comparison with the maintenance and operating costs of existing facilities at the project site or other similar facilities in the country.

5. Total Annual Cost

- a. Estimates of annual costs, including:
 - (1) Maintenance and operations.
 - (2) Depreciation on structures and equipment.
 - (3) Interest on loans.
 - (4) Taxes (property, income, etc.).
 - (5) Total by year and type of currency.
- b. Extent to which above estimates have taken into consideration governmental preferences such as tax remissions, tax deferments

of other facilities.

6. Annual Revenues

- a. Estimated annual income from port and dockage fees, handling charges, storage charges, etc., for each of first five years following project completion.
- b. Comparison with present annual revenues, if any.

7. Profitability

- a. Estimate of profit and loss for each of first five years following completion of facility (see Attachment 3).
- b. Estimated return by year on total capital cost and on owner's investment.
- c. General conclusion as to profitability of the enterprise.

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. All tangible and intangible benefits noted under C.7.
 - b. Probable effect on commerce and industry in the area served and anticipated ancillary effects.
 - c. Positive and negative effects on the environment or energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, etc.
2. Compare benefits and costs and estimate rate of return on investment.
(For harbor development portion of the project, analysis should be based on procedures contained in Supplement No. 1.)

Attachment 1
INDUSTRIAL OR COMMERCIAL
PROJECT

BALANCE SHEET

Attach comparative balance sheets for the past five years, according to the following breakdown:

Assets

1. Current Assets:

- a. Cash
- b. Marketable securities
- c. Notes Receivable (show separately amounts owed by subsidiaries; directors, shareholders, their families and agents; all other amounts other than normal commercial debts.)
- d. Accounts Receivable from customers
- e. Inventories
- f. Other Assets (describe)

2. Investments:

- a. In subsidiaries
- b. Other Investments (describe)

3. Capital Assets:

- a. Land
- b. Buildings and Site Facilities
- c. Machinery and Equipment
- d. Construction in Progress
- e. Other Capital Assets (describe)

4. Gross Assets: (1 thru 3)

5. Depreciation Reserves (state method of amortization)

6. Net Capital Assets (3 - 5)

7. Intangibles (patents, licenses, good will, trademarks, formulas, franchises, etc.)

8. Other Assets: (specify)

9. Total Assets (6 thru 8)

Liabilities

10. Current Liabilities (due within one year)

a. Notes Payable

- to banks or other short-term lending agencies
- to holders of long-term debt maturing within one year
- to directors, shareholders, their families, and agents

b. Accounts payable to commercial creditors

c. Contractors' bid and performance bonds

d. Royalties

e. Other Current Liabilities (describe)

11. Long-term Debt (over one year) (indicate terms)

12. Construction Costs Payable

Capital and Surplus

13. Capital (authorized, issued and paid-in)

14. Reserves: (describe)

15. Surplus:

a. Revaluation Surplus

b. Earned Surplus (or Deficit)

c. Net Surplus or Deficit)

16. Total Liabilities and Capital

(10 thru 14 minus or plus 15)

Attachment 2
INDUSTRIAL OR COMMERCIAL
PROJECT

FINANCIAL INFORMATION

1. Capital Structure (present and planned)
Authorized Capital
Issued Capital
Subscribed Capital
Paid-up Capital
Capital Surplus (if any) arising from asset revaluation

2. Distribution of Shares

<u>No. Issued</u>	<u>Total Nominal Amount</u>	<u>Total Paid-up Amount</u>	<u>No. of Votes per Share</u>
-------------------	-------------------------------------	-------------------------------------	---------------------------------------

Ordinary
Preference
Deferred

3. Indicate number and type of shares held by any individuals and/or group controlling more than one-fifth of the votes. Indicate relationship of such individuals and/or group to the company. If held by a holding company or other industrial enterprise, provide balance sheets, profit and loss statements, and capital structure information on such enterprises. If held by individuals, provide general and financial information on such individuals.
4. Outstanding debentures (term of issue and redemption, interest rate, etc.)
5. Outstanding mortgages and other long-term debt (terms of issue and repayment, interest rate, etc.)
6. Bank borrowings. Give details of amounts owed, interest rates, terms, renewal arrangements and unused credit limits.
7. Pending litigation either by or against the company.
8. Contingent liabilities, guarantees or endorsements.
9. Method of valuation of inventories. Note any departure from stated procedure affecting past profits as shown in attached statements.
10. Book value and estimated current market value of inventories for the past four years, adjusted to a comparable basis.
11. Give the book value of fixed assets for the past four years according to the following breakdown:

Book value of fixed assets at beginning of year (describe basis of valuation)

plus acquisitions during the year, at cost
minus retirements during the year, at book value
minus normal depreciation (state normal depreciation method and rates used by major categories of assets)
minus extraordinary depreciation or write-offs (or plus any shortfall below normal depreciation)
plus revaluation of fixed assets

Book value of fixed assets at end of year.

12. (a) Give the average annual amount written off on bad debts during the past four years;
- (b) Give the total amount of claims overdue as of the date of the latest balance sheet and percentage of nominal value at which claims are recorded in the balance sheet.

Attachment 3
INDUSTRIAL OR COMMERCIAL PROJECT

FORECAST OF EARNINGS, RECEIPTS AND EXPENDITURES

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc.</u>	<u>1962</u>	<u>1963</u>	<u>etc.</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>etc.</u>
A. <u>EARNINGS FROM OPERATIONS</u>												
<u>Revenue (Separately for each major product or category of sales)</u>												
1. Annual Sales (Units per year)												
2. Unit Sales Price												
3. Gross Revenue from Sales (1 x 2)												
4. Other Income (describe)												
5. Total Income (3 + 4)												
<u>Cost of Operation, Net Income & Profit</u>												
6. Operating Expenses:												
a. Manufacturing												
b. Maintenance												
c. General Administration												
d. Distribution & Marketing												
e. Short-term interest												
7. Depreciation Allowances (Show basis)												
8. Taxes (describe)												
9. Total Cost of Operation before interest on Long-term Debt (6 thru 8)												
10. Net Income before interest on Long-term Debt (5 - 9)												
11. Interest on Long-term Debt												
12. Net Profit (or Loss) (10 - 11)												
B. <u>SOURCES OF FUNDS</u>												
13. Net Income before interest (Item 10)												
14. Depreciation Allowance (Item 7)												
15. Increase in Paid-in Share Capital												
16. Borrowings:												
a. Existing DLF or A. I. D. Loans												
b. A. I. D. Loan proposed herein												
c. Other Long-term borrowings (Each loan separately)												(show terms)
d. Anticipated short-term loans												
17. Other receipts (describe)												
18. Total Receipts (13 thru 17)												

Attachment 3 (Cont'd)

	<u>Present Operation</u>			<u>Construction Years</u>			<u>Operative Years</u>					
	<u>1959</u>	<u>1960</u>	<u>etc</u>	<u>1962</u>	<u>1963</u>	<u>etc</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>etc</u>
C. <u>USE OF FUNDS</u>												
19. Construction Expenditures:												
a. This A. I. D. Project												
Foreign currency												
Local currency												
Total A. I. D. Project												
b. Other Construction												
c. Total construction expenditures												
20. Current Assets (minimum expected) (See Annex C)												
21. Fixed, Intangible & other Assets (See Annex C)												
22. Debt Service:												
a. Amortisation of Principal												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
b. Interest												
(1) Existing DLF or A. I. D. Loans												
(2) A. I. D. Loan proposed herein												
(3) Other borrowings												
23. Other expenditures (describe)												
24. Total Expenditures (19 thru 23)												
D. <u>CASH FLOW</u>												
25. Annual Cash Surplus (or Deficit) (Item 12)												
26. Cash to Reserves												
27. Cash to Dividends												
28. Cash Balance, End of Period (25 - 26 & 27)												
E. <u>BALANCE SHEET, END OF PERIOD</u>												
<u>Assets</u>												
29. Current Assets (See Annex C)												
30. Investments												
31. Capital Assets (See Annex C)												
32. Gross Assets (29 thru 31)												
33. Accumulated Depreciation												
34. Net Fixed Assets (32 - 33)												
35. Intangible Assets (See Annex C)												
36. Total Assets, end of period (34 + 35)												
<u>Liabilities</u>												
37. Current Liabilities (due within 1 year)												
38. Share Capital (authorized, issued, paid-in)												
39. Reserves (describe)												
40. Surplus: a. Re-valuation surplus												
b. Earned Surplus or deficit												
41. Total Liabilities (37 thru 39 + or - 40)												

ANNEX 16FEASIBILITY ANALYSIS - ELECTRIC POWER PROJECTSA. General

1. This chapter covers the construction or expansion of electric generating plants, transmission and distribution systems, or any combination thereof.
2. All topics in this outline, and Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Scope and magnitude of project and area served.
2. Location and relation to existing electric facilities, illustrated on map of area.
3. Local and regional effects on environment.
4. Major features of project.
5. Estimate of cost and return on investment.
6. Reference to and specific use made of any applicable reports.
7. Compliance of proposed hydroelectric projects with criteria in Supplement No. 1.

C. Power System Development1. Power Market

- a. Number of present consumers by classification (residential, commercial, industrial, governmental, etc.), power demand and consumption, and past and estimated future rates of growth for each category.
- b. Requested or potential service to large or special consumers.

- c. Forecast of future KW demand and KWH energy requirements, by year, for 10 years, properly related to historical trends and present demand and supported by appropriate graphs and statistics.
- d. System characteristics such as frequency, phase, voltages, power factors, diversity factors, load factors, plant factors, hours of service per day, seasonal variations, etc.
- e. Typical daily load patterns for annual peak and minimum demand periods presently experienced, anticipated when project goes into commercial operation, and anticipated when project fully utilized.
- f. Reference to and summary of information from area power users, market surveys, and other pertinent studies or reports.

2. Present Power System

- a. Brief description of the service area, illustrated by maps and diagrams showing location of present and planned transmission and distribution systems, power sources, major substations, switching stations and interconnections with other systems.
- b. Description of existing facilities which provide electric power service in the area, including capacity and reserves of each system. Also include list of plants, major power lines and substations, indicating ownership, purpose served, condition and age.
- c. Discussion of pertinent laws, regulations, codes, licenses and franchises, the existence or lack of which may limit use of new, more efficient equipment or methods and may affect the design and cost of the proposed facilities.

- d. Inadequacies of present systems such as low voltage, insufficient capacity, low reliability, excessive outages, etc.
- e. Current planning in support of or in conflict with the proposed system.
- f. Valuation of existing facilities and how and when established.
- g. Present indebtedness and losses carried forward.
- h. Adequacy of present rate structures and methods of collection.
- i. Compatibility of the design of the present system with existing equipment and materials.
- j. Description of major units of existing systems, including the following at minimum:
- (1) For each generating plant, indicate location, type (steam, diesel or hydro), KW rated capacity (name-plate and capability); type of fuel used, date each unit installed, normal utilization (base load, peaking or standby service), KWH generated, and peak KW demand for each of the past five years.
 - (2) For each hydroelectric plant, include the firm or dependable KW and peak KW capacity and the annual KWH energy output broken down into dependable and secondary energy for normal, wet and dry years.
 - (3) For each transmission system, indicate design criteria; operating voltage; points connected; length of circuit; type of structures; type, size and spacing of conductors; and date system was built.

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- (4) For each substation, indicate area served, incoming and outgoing circuits, type of structure, number of power transformers, KVA rated capacity and voltages, and type of capacitors, synchronous condensers, and switching, metering, relaying, and communication facilities, etc.
 - (5) For primary and secondary distribution systems, indicate design criteria, consumer densities, voltage levels and regulation, type of circuits (number of conductors, underground, overhead, etc.), materials used for conductors and poles, miles of system, sectionalizing, metering, and sizes and total capacity of distribution transformers.
 - (6) For interconnections with other systems where power is purchased or sold, give data on purpose, KW and KWH transferred, and rates and contract arrangements as appropriate.
 - (7) For general plant, describe other ancillary facilities such as warehouses with equipment and material, headquarters offices, laboratories, computers, dispatching facilities, communications equipment, vehicles, and major construction and maintenance equipment.

3. Plan for Meeting Future Requirements

- a. Proposed long-range plan showing how projected power requirements will be met and how proposed project will fit into this plan and be integrated into the existing system. Attachment 1 shows suggested form for tabulating the results of the load forecast and the plan to meet it. The following supporting details should be included and/or described:

- (1) Assignment of the demand (KW) and energy (KWH) requirements to the various power sources (present, proposed and future) to obtain the optimum use of all facilities for base load, peaking, off-peak and standby service; give attention to system power and energy losses including generating station service, transformation, transmission and distribution losses, and system reserve requirements.
- (2) Where hydro-generation is involved, indicate the estimated output on an average annual water year basis, the method of serving system requirements through a dry year and utilization of excess hydro-energy during periods of maximum flow.
- (3) Interim system requirements during construction of the proposed facilities.
- (4) Retirement and disposal of obsolete facilities not needed for standby or peaking service.
- (5) Annual load duration curve of the system, showing the output of each source of power during the year the proposed project goes into operation and for the last (10th) year of the system load projection. Where hydro plants are involved, show how power sources will be utilized during normal, wet and dry years.
- (6) Discuss standards of service such as allowable voltage drop, reserves required, and plans for meeting expected load growth.
- (7) Describe and evaluate previous pertinent studies and reports such as market surveys, area economic studies, power studies, and statistical data utilized in support of the proposed project.

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Design

- a. Describe engineering features of the project and indicate the basis on which the project location, design, and type and size of major elements were selected.
- b. Provide a general layout and preliminary engineering drawings (attach prints).
- c. Extent to which the characteristics and capacities of existing facilities may be affected by the proposed project, such as interrupting capacities of circuit breakers, fuel storage and handling, transmission system, etc.; also discuss retirement of facilities or changes in basic purpose or use of existing plant, e.g., an existing power plant used as a primary source of power is displaced to secondary use when a new plant goes into service.
- d. Design and construction standards which will apply, including any local codes, regulations and ordinances which may be applicable.
- e. Information about major project features as follows:
 - (1) Generating Stations (all types)
 - (a) Description of site.
 - (b) Means used to deliver plant output into the power system and to consumers.
 - (c) Reports on soil tests for foundations.
 - (d) Significant geological, meteorological, seismological and lightning data.
 - (e) Required site improvements and access to highway, railroads, waterways, etc.

(2) Hydroelectric Projects

- (a) Selection of proposed site in lieu of possible alternatives.
- (b) Stream runoff records available, period covered, and location of gaging and meteorological stations.
- (c) Water rights and present and planned upstream and downstream uses.
- (d) Details of water availability and utilization, including storage, draw-down and estimated monthly KWH generation under various flow conditions.
- (e) Dependable and secondary power output of the project, supported by appropriate analysis.
- (f) Geological studies and site borings for dams, tunnels, canals and major structures.
- (g) Basis on which decisions were made as to type and height of dam, size of reservoir, number and size of generating units, capacity of spillway, diversion tunnels, penstocks, gates and other major features of the project.
- (h) Capacity-area curve for the reservoir.
- (i) The extent and results of studies of reservoir sedimentation and downstream channel effects resulting from project operation.
- (j) Required acquisition of land, reservoir clearing, and relocation of roads, railroads, etc.

- (k) Design allowances for floods, earthquakes and other special conditions.
- (l) Availability of material for construction.
- (3) Thermal Plants (steam, diesel, gas turbine, etc.)
 - (a) Description of site with suitable drawings showing ground surface contours and location of principal structures.
 - (b) Detailed information on fuel, including sources, availability, analysis, caloric value, means of delivery and delivered price.
 - (c) Provisions for fuel storage and handling at the plant.
 - (d) Estimated heat rate of the plant and basis on which estimate was made. (Should be the average heat that could reasonably be expected based on normal operation of the plant in serving its share of the system load).
 - (e) Heat balance studies.
 - (f) Source, quality and availability of plant cooling water and boiler make-up water.
 - (g) Solution of special problems, such as ash and effluent disposal, smoke and fly ash generation, and prevention of site flooding.
- (4) Transmission and Distribution Systems
 - (a) Basis on which design was made, considering power losses (I^2R , corona, etc.), voltage drop allowance, system stability, economic loading, etc., including scope and results of network studies made.

- (b) Describe power sources if not part of the project. Elaborate on such items as experience, standards of operation, reliability, policy regarding reserves, planning to meet future needs, rate schedules and existing or proposed contractual arrangements.
- (c) Type of design and materials to be used for supporting structures, protective treatment of wood structures, average span lengths and conductor size, type and spacing.
- (d) One-line diagrams showing proposed system and its relation to the existing system.
- (e) Right-of-way requirements covering any problems such as conformance with laws governing condemnation of property, clearing, long overwater spans, etc.
- (f) Special measures to overcome effects of deposits on insulators.
- (g) Description of method to be used for sectionalizing and communication.

(5) Substations and Switching Stations

- (a) Location and purpose of each station, with KVA and voltages, type of structure (steel, aluminum or wood) and number of circuits.
- (b) Type of transformers (tap changing, cooling method, voltages, etc.).
- (c) Major circuit breakers and regulating equipment such as capacitors, synchronous condensers and voltage regulators.

(d) Special relaying and metering equipment.

2. Specifications

Outline specifications for equipment and construction defining standards which will have a significant effect on the cost of construction, with specific justification for any unusual standards proposed.

3. Construction Labor, Materials and Equipment

- a. Manpower requirements.
- b. Skilled and unskilled labor and technical and supervisory personnel available.
- c. Local availability of cement, steel, aggregates, poles, crossarms and other construction materials.
- d. Types of construction equipment required for the work, with an indication of equipment available locally and equipment which must be imported.

4. Special Construction Problems Foreseen

- a. Climatic conditions, especially length of wet and dry seasons, which may affect construction schedule.
- b. Geological conditions.
- c. Necessity of keeping existing power facilities in service.
- d. Local transport of materials and equipment.
- e. Time required to obtain delivery of imported materials and equipment.

5. Plan for Execution of Project

- a. General construction plan.
- b. Proposed methods of contracting for engineering, construction, and construction supervision.
- c. Tests to be performed on completed works.
- d. Equipment guarantees required.
- e. Engineering and construction schedules (attach).

6. Operating Organization and Quality of Management

- a. Description of management organization, including an organization chart and names and qualifications of key officials.
- b. Number and qualifications of management and technical personnel required.
- c. Number, qualifications and availability of required operating personnel.
- d. Plans for recruiting and training.
- e. Availability of necessary office facilities and transport equipment.
- f. Provisions for adequate management and maintenance throughout the life of the proposed loan.

7. Overall Technical Soundness

- a. Proven reliability of proposed equipment.
- b. Assurance that proposed system will produce and transmit power at rates stated on a continuing and dependable basis, with full consideration of load and plant factors.
- c. Analysis of any adverse factors and measures proposed to overcome them.
- d. Steps taken to conduct additional studies or obtain specialized

advice, if required, for final design.

F. Financial Aspects

1. Estimated Cost of Project

- a. Estimated cost of the project, prepared using the Cost Estimating Annexes to Handbook 3 cited in Section C. Costs should be broken down by major items, as suggested in Attachment 2, and by local currency and foreign exchange costs tabulated under the various sources of financing. Costs of owner-supplied (in-kind) material, equipment, supervision, engineering and force-account work should be included, as well as working capital required for start-up and for first, second and third years of operation. Contingencies should be indicated separately.
- b. Estimates should be sufficiently detailed to enable an independent reviewer to recognize the scope of each item and be able to check and verify the costs. Supporting data should be included.

2. A.I.D. Financed Items

Detailed breakdown which indicates the estimated cost of specific items to be procured or contracted for utilizing the requested A.I.D. funds.

3. Annual Costs

- a. Estimated annual cost of power and energy, broken down into production, transmission and distribution costs, for each significant year (See suggested format in Attachment 3), including the first year of operation and the first year of full utilization. Include details on computations of following costs:

- (1) Operating and maintenance labor, materials and spare parts, operating supplies, water, lubricants, chemicals, etc.
 - (2) Fuel.
 - (3) Supervision and administration.
 - (4) Taxes, insurance, etc.
 - (5) Depreciation charges based on design life of various elements.
 - (6) Interest on loans.
- b. Where necessary for evaluation purposes, give an additional breakdown to show production costs broken down into KW capacity and KWH energy components so that cost may be compared with demand and energy components in rate schedules or to establish the KW capacity necessary to compute the value of peak capacity.
- c. Portion of the annual cost covering supplies, spare parts and technical supervision which must be imported together with a statement as to source and availability of foreign exchange required to cover such imports.

4. Annual Income

- a. Applicable laws and regulations governing the establishment of rate schedules and allowable return on investment (attach copies).
- b. Rate schedules to be adopted for each major class of consumers with an explanation of the basis for adoption, taking into account the ability of consumers to pay.
- c. Average rate per unit of power and energy sold over the past several years and the estimated average rates for the next 10 years, with recent major changes explained.
- d. Explanation of any anticipated changes in rate schedules.
- e. Estimate of power to be sold during each year of next 10 years.
(from C above).

f. Estimated annual gross revenue from power sales.

5. Economic Justification and Profitability

a. Proforma balance sheet showing the financial position of the owner upon completion of the project. (See Attachment 4)

b. Financial projection showing the profit and loss and cash flow for each year beginning with the present year and extending through a minimum of 10 years. (See Attachment 5 for a suggested format.)

c. Analysis and comparison of costs of power production.

d. Analysis of financial statements to indicate that revenues will provide an adequate return on investment and that sufficient funds will be generated to cover all operating costs, including interest, taxes and depreciation or amortization of debt (whichever is larger); to provide reserves for replacement and renewal; and to finance expansion of the facilities in the service area to meet future demand.

e. Comparison of net profit of proposed project with estimated profit of one or more possible alternate plans for meeting power system requirements.

f. For hydroelectric projects, compare benefits and costs in accordance with procedures set forth in Supplement No. 1. If power produced is the only benefit to be considered, the cost of power from the alternative source most likely to be used in the absence of the project normally provides a measure of the power benefits. The ratio should be based on equivalent power and energy from the hydro and alternative source delivered to the same load centers by including transmission and transformation losses and costs. Annual costs should include operation, maintenance,

interest and depreciation, with depreciation rates commensurate with the estimated economic life of the facility. The comparison should be supplemented by sufficient details to support the conclusion. (See Supplement No. 1.)

G. National Economic Effects

1. Explain and evaluate in monetary terms where possible:
 - a. Benefits which will accrue to the national economy, in addition to the profits earned by the project owners, such as:
 - (1) Taxes paid by the industry.
 - (2) More efficient utilization of labor as compared with other available activities.
 - (3) Provision of a market for local fuels and other raw materials.
 - (4) Benefits to consumers (lower prices or more dependable supply of power).
 - (5) Stimulation of other industrial development.
 - (6) Manpower training in power operations and management.
 - b. Positive and negative effects on the environment or energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, etc.

Attachment 1
ELECTRIC POWER PROJECT

SYSTEM REQUIREMENTS-POWER & ENERGY SOURCES

<u>Calendar Years</u>	<u>Last Year of Record</u>	<u>For Minimum of 10 years by Year</u>
A. <u>SYSTEM DEMAND MW</u>		
By substations, Areas or load centers		
TOTAL DEMAND, MW		
Demand Diversity Factor - %		
Coincidental Demand MW		
System Losses MW		
Net System Demand MW		
B. <u>SYSTEM ENERGY, MWH</u>		
By substations, Areas or load centers		
TOTAL MWH SALES		
Transmission & Distribution Losses, MWH		
Net MWH Supplied		
System Load factor %		
C. <u>POWER SOURCES</u>		
Show installed KW for each plant or other power source, to provide requirements (including reserves)		
Less Total Reserves, MW		
NET SYSTEM DEMAND, MW		
D. <u>ENERGY SOURCES</u>		
Show MWH supplied from each of above sources accounting for base load, peaking and standby require- ments to equal requirements supplied		
NET MWH SUPPLIED		

Attachment 2
ELECTRIC POWER PROJECT

CAPITAL COST AND INVESTMENT

(Provide Separate Tabulation for
Each Source of Financing)

<u>Item</u>	<u>Local Currency</u>	<u>U. S. Dollars</u>	<u>Total</u>
1. <u>Generating Plant - Thermal</u>			
a. Land and Land Rights			
b. Structures and Improve- ments			
c. Fuel Storage and Handling			
d. Cooling Water Supply			
e. Boiler Plant Equipment			
f. Turbine-generator Plant Equipment			
g. Engine-generator Plant Equipment			
h. Plant Step-up Substation			
i. Misc. Power Plant Equipment			
j. Other (explain)			
Sub-total, Generation (thermal)			
<hr/>			
1a. <u>Generating Plant - Hydro</u>			
a. Land and Land Rights			
b. Structures and Improve- ments			
c. Reservoirs, Dams and Waterways			
d. Turbines and Generators			
e. Accessory Electric Equipment			
f. Plant Step-up Substation			
g. Accessory Mechanical Equipment			
h. Roads, Railroads and Bridges			
i. Other (explain)			
Sub-total, Generation (hydro)			
<hr/>			

(Provide Separate Tabulation for Each Source of Financing)

<u>Item</u>	<u>Local</u> <u>Currency</u>	<u>U.S.</u> <u>Dollars</u>	<u>Total</u>
2. <u>Transmission</u> (show each voltage class and circuit separately)			
a. Right-of-Way Procurement and Clearing			
b. Poles, Towers and Fixtures			
c. Overhead Conductors			
d. Underground Cable & Conduit			
e. Insulation and Hardware			
f. Other (explain)			
Sub-total, Transmission			
3. <u>Substations</u> (show each sub-station separately)			
a. Land and Land Rights			
b. Structures			
c. Conduit, Wiring & Busses			
d. Protective & Auxillary Equipment			
e. Switchgear			
f. Transformers			
g. Other (explain)			
Sub-total, Substation			
4. <u>Distribution</u> (show each area separately)			
a. Right-of-Way Procurement & Clearing			
b. Poles, Towers and Fixtures			
c. Overhead Conductors			
d. Underground Conductors, Conduit and Devices			
e. Line Transformers			
f. Services			
g. Meters			
h. Other (explain)			
Sub-total, Distribution			

(Provide Separate Tabulation for Each Source of Financing)

<u>Item</u>	<u>Local Currency</u>	<u>U. S. Dollars</u>	<u>Total</u>
5. <u>General</u>			
a. Land and Land Rights			
b. Office Buildings, Warehouses, Garages and other Misc. Structures			
c. Office Furniture and Equipment			
d. Transportation Equipment			
e. Shop			
f. Laboratory Equipment			
g. Tools and Work Equipment			
h. Communication and Dispatching Equipment			
i. Computers			
j. Other (explain)			
Sub-total, General			
6. <u>Improvements & Replacements</u> (explain and itemize)			
Total Direct Cost			
7. <u>Engineering</u>			
8. <u>Administration</u>			
9. <u>Contingency</u>			
10. <u>Other</u> (explain)			
Total Construction Cost			
11. <u>Interest during Construction</u>			
12. <u>Working Capital</u>			
13. <u>Overhead and Indirect Costs</u>			
Total Investment			

ANNUAL PRODUCTION COSTS
(Proposed Facilities)

	<u>First Year's Operation</u>	<u>Year Facility Fully Utilized</u>
Plant Capability, MW		
Station Usage %		
Net Station Heat Rate, BTU/KWH		
Gross Generation MWH		
Net Generation MWH		
 <u>Production Expenses</u>		
Direct Production Expense		
Operating Labor and Supervision		
Operating Supplies & Equipment		
Maintenance Labor & Expenses		
Maintenance Material		
Fuel		
Other, explain		
Sub-total		
 <u>Indirect Production Expenses</u>		
Replacement (not included in maintenance)		
Depreciation		
Interest		
Taxes		
Insurance		
Other, explain		
Sub-total		
 Total Production Expense		

	<u>First Year's Operation</u>	<u>Year Facility Fully Utilized</u>
<u>Transmission Expenses</u>		
O&M (by voltage class and circuit)		
O&M, Step down substations		
Taxes		
Insurance		
Depreciation		
Interest		
Replacement (not included in O&M)		
Other, explain		
Sub-total	_____	_____
Distribution Expenses (same breakdown as Transmission)		
Sub-total	_____	_____
<u>General Plant Expenses</u>		
Depreciation		
Interest		
Inventories and Spare Parts		
Replacement		
Administrative & General		
Taxes		
Insurance		
Other, explain		
Sub-total	_____	_____
Total Cost		
Unit Cost/KWH		

Attachment 4
ELECTRIC POWER PROJECT

BALANCE SHEET

(Show Comparative Balance Sheet for Past Five Years)

Assets and Other Debits

1. **Electric Utility Plant:**
 - a. **Production Plant**
 - b. **Transmission Plant**
 - c. **Substations**
 - d. **Distribution Plant**
 - e. **General Plant**
 - f. **Construction in Progress**
 - g. **Other Utility Property (describe)**
 - h. **Intangible Plant**
 - Total , Utility Plant
 - i. **Accumulated Provision for Depreciation and Amortization**
 - Net, Utility Plant
2. **Non-utility Property Less Accumulated Provision for Depreciation and Amortization**
3. **Investment in Associated Companies**
4. **Other Investments**
5. **Special Funds**
- Total , Other Property and Investments
6. **Cash**
7. **Special Deposits**
8. **Temporary Cash Investments and Marketable Securities**
9. **Accounts Receivable - Customers**
10. **Other Receivables (show separately, amounts owned by subsidiaries, directors, shareholders, their families or agents; all other amounts other than normal commercial debts).**
11. **Inventories : supplies, materials and fuels**
12. **Prepayments**
13. **Other Current and Accrued Assets**
- Total , Current and Accrued Assets
14. **Unamortized Debt Discount and Expense**
15. **Extraordinary Property Losses**
16. **Preliminary Survey and Investigation Charges**
17. **Clearing Accounts**
18. **Other Deferred Debits**
- Total , Deferred Debits
19. **Other Assets (specify)**
- Total , Assets and Other Debits

Liabilities and Other Credits

- 20. Capital Stock, Authorized, issued and paid in
- 21. Other Capital Stock Items (specify)
- 22. Surplus:
 - a. Earned surplus or deficit
 - b. Revaluation surplus
 - c. Other surplus (specify)
 - Total , Surplus
 - Total , Proprietary Capital
- 23. Bonds
- 24. Advances from Subsidiaries
- 25. Other Long-term Debts (specify terms)
 - Total , Long-term Debt
- 26. Current Liabilities (due within one year):
 - Rates payable:
 - a. To banks or other short-term lending agencies
 - b. To holders of long-term debt maturing within one year
 - c. To directors, shareholders, their families and agents
- 27. Accounts Payable to Commercial Creditors
- 28. Contractor's-Bid and Performance Bonds
- 29. Dividends Declared
- 30. Other Current and Accrued Liabilities
 - Total , Current and Accrued Liabilities
- 31. Deferred Credits (specify)
- 32. Operating Resources (specify)
- 33. Other Liabilities and Credits (specify)
 - Total , Liabilities and Other Credits

Attachment 5
ELECTRIC POWER PROJECT

FINANCIAL PROJECTION

Current Projection by Years
Minimum 10 Years

I. STATEMENT OF OPERATIONS

A. Revenue (Provide detailed calculations from each category of sales for a sample year)

- 1. Annual Sales (KWH per year)
- 2. Unit Sales Price
- 3. Gross Revenue from Sales(1x2)
- 4. Other Income (describe) _____
- 5. Total Income (3+4) _____

B. Cost of Operations

1. Production Expenses (show each plant separately)

a. Steam Plants (Name)

- (1) Net generation (KWH per year)
- (2) Operation and maintenance
- (3) Fuel
- (4) Other

Sub-total, steam plants _____

b. Hydro Plants (Name)

- (1) Net generation (KWH per year)
- (2) Operation and maintenance
- (3) Other

Sub-total, hydro plants _____

c. Other Power Plants (Name)

- (1) Net generation (KWH per year)
- (2) Operation and maintenance
- (3) Fuel
- (4) Other

Sub-total, other power plant _____

d. Purchase Power (show each major source)

- (1) Net energy purchased (KWH per year)
- (2) Unit cost of purchase power _____

Cost of purchase power _____

Attachment 5 (Cont'd)

	<u>Current</u>	<u>Projection by Years</u> <u>Minimum 10 Years</u>
e. System Control & Dispatching		
f. Other Power Supply Expenses (explain)		
2. Total Production Expense		
3. Transmission Expenses		
a. Operation and Maintenance		
b. Other		
Sub-total, Transmission		
4. Distribution Expense		
a. Operation and Maintenance		
b. Other		
Sub-total, Distribution		
5. Other Expenses (explain)		
6. Total Operating Expenses		
C. <u>Fixed Charges</u>		
1. Depreciation		
2. Taxes		
3. Insurance		
4. Administrative and General		
5. Consumer Accounts and Sales		
6. Other Charges (explain)		
7. Total Fixed Charges (before interest)		
D. Total Production Cost (B6 + C7)		
E. Net Profit or Loss (before interest) (A5-D)		
F. Interest		
G. Net Profit or Loss (E-F)		

CurrentProjection by Years,
Minimum 10 Years**II. CASH FLOW****A. Cash Receipts**

1. Net Profit Before Interest (Item I E)
2. Depreciation Taken (Item I C 1)
3. Other (explain)
4. Increase in Paid-in Share Capital
5. Borrowings:
 - a. Existing A. I. D. or DLF Loans
 - b. A. I. D. Loan Requested
 - c. Other Long-term Borrowing (give terms)
 - d. Finance Future Additions Required
to Provide for Long Range Plan
(See Chapter III, Section II C)
6. Sale of Assets (explain)
7. Decrease in Accounts Receivable
8. Decrease in Inventories
9. Decrease in Other Assets (explain)
10. Increase in Accounts Payable
11. Increase in Other Liabilities
12. Other Receipts (explain)
13. Total Receipts

B. Cash Disbursements

1. Net Loss Before Interest (Item I E)
2. Construction Expenditures:
 - a. This A. I. D. Project
 - b. Other Construction
 - c. Future Additions (See A 5 d above)

Attachment 5 (Cont'd)

<u>Current</u>	<u>Projection by Years, Minimum 10 Years</u>
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3. **Current Assets (Minimum Expected) (See Annex J)**

4. **Fixed, Intangible and Other Assets (See Annex J)**

5. **Debt Service:**

a. **Amortization of Principal**

- (1) Existing A.I.D. and D.L.F. loans
- (2) A.I.D. loan requested
- (3) Other long-term borrowing
- (4) Borrowing for future additions

b. **Payment of Interest**

- (1) Existing A.I.D. and D.L.F. loans
- (2) A.I.D. loan requested
- (3) Other long-term borrowing
- (4) Borrowing for future additions

6. **Other Expenditures (describe)**

7. **Increase in Accounts Receivable**

8. **Increase in Inventories**

9. **Increase in Other Assets (explain)**

10. **Decrease in Accounts Payable**

11. **Decrease in Other Liabilities
(Exclude Borrowing)**

12. **Other Disbursements (explain)**

13. **Total Disbursements**

14. **Increase (Decrease) in Cash**

15. **Cash Balance Beginning of Year**

16. **Cash Balance End of Year**

III. BALANCE SHEET, END OF PERIOD

A. Assets

1. **Current Assets (see Annex J).**

Attachment 5 (Cont'd)

	<u>Current</u>	<u>Projection by Years, Minimum 10 Years</u>
2. Investments		
3. Capital Assets (see Annex J)		
4. Gross Assets (add 1, 2 and 3)	_____	_____
5. Accumulated Provision for Depreciation	_____	_____
6. Net Fixed Assets (4 + 5)		
7. Intangible Assets (see Annex J)	_____	_____
8. Total Assets End of Period	_____	_____
B. <u>Liabilities</u>		
1. Current Liabilities (due within one year)		
2. Long-term Debt (due more than one year)		
3. Share Capital (authorized, issued and paid-in)		
4. Reserves (describe)		
5. Surplus:		
a. Revaluation Surplus		
b. Earned Surplus or Deficits		
6. Total Liabilities and Capital	_____	_____

ANNEX 17FEASIBILITY ANALYSIS - AVIATION GROUND FACILITY PROJECTSA. General

1. This chapter covers the construction, enlargement, conversion or improvement of an airport or related facilities. In addition to the runways, taxi strips, roads and parking areas, airport facilities (buildings, utilities, fuel systems, and other technical requirements), airway facilities (communications, navigational aids and meteorological stations), air traffic control installations, search and rescue facilities, and associated training in all aviation categories may be included in the project.
2. All topics in this outline and Section I of the Feasibility Analysis Procedures Manual should be considered, as appropriate. Others should be included as necessary to demonstrate the soundness of the particular project.

B. Summary

1. Location, nature and extent of proposed construction, enlargement, conversion or improvement.
2. Relation to other airports and airway facilities, national and international.
3. Description of major features of design.
4. Anticipated effect on environment of local and regional areas.
5. Reference to and specific use made of any applicable reports or long range development plans (attached or readily available elsewhere).
6. Brief statement of conclusions as to relative benefits and cost and return on investment, including improvements in safety and regularity

and efficiency of operations; increases in volume of traffic that can be handled, size of aircraft that can be accommodated, and aircraft utilization; and direct and indirect contributions to economic infrastructure, nation building, and social and economic development.

C. Developmental Aspects

1. Position of Project in Overall Program

- a. Map and brief description of present airway system.
- b. Present transport systems other than air (rail, highway, water, pipelines, etc.).
- c. Extent to which development of air transport will stimulate economic growth.
- d. Value of aviation facilities during national emergencies.
- e. Relationship between civil and military aviation infrastructure.
- f. National program for airport development and priority of project within this program.
- g. Extent to which project will facilitate national and international movement of people and commodities and promote international commerce and understanding.

2. Relation to Other Transport Systems

- a. Present distribution of traffic between the various transport systems.
- b. Anticipated effect of project on such distribution and on economics of other transport systems.
- c. Relative availability of vehicles, operating personnel, fuel servicing, etc.

- d. Estimated or actual comparable transportation costs for the various systems.
- c. Capital and operating costs of the surface transport system that would be the most likely alternative system.

3. Effect on Development in Project Area

- a. General description of area served (physical and economic, including agriculture, industry, centers of population, and climate, as related to air traffic generating activities).
- b. Estimate of volume of passenger and air freight business which will develop over next five years as a result of completion of the project, and improvements in social, cultural, government and trade sectors which will be achieved.

4. Anticipated Revenue and Economic Benefits

- a. Operating revenues of existing airport for the past five years and forecast of operating revenues for five years following completion of project.
- b. Increase in general tax receipts which will result from increased economic activity.
- c. Increased foreign exchange earnings through tourism, commercial travel, and freight handling.
- d. Increased business income in area served by facility, if any.
- e. Reduction in airline operating and maintenance costs.
- f. Social, political and other indirect economic benefits. (Examples might include more direct routes as a result of the installation of additional navigational aids, decrease in aircraft maintenance problems and operating costs as a result of paving a landing area, or increase in aircraft utilization from the installation

of instrument landing or lighting systems).

- g. Faster and cheaper delivery of perishable or emergency commodities.
- h. Direct benefit to local population through local expenditure of project funds for labor, materials, food, rent, etc. (temporary benefit).

5. Safety Benefits and Protection of U.S. Lives and Property

- a. Extent to which project will result in added safety and security to U.S. nationals flying on foreign air carriers.
- b. Extent to which project will result in added safety and security to U.S. air carriers operating abroad.

D. Environmental and Energy Considerations

See Section I, paragraphs 9 and 10, for topics to be covered.

E. Engineering Aspects and Technical Soundness

1. Present and Future Air Traffic

- a. Size, distribution, and economic activities of population, as affecting air traffic generation.
- b. Population trends.
- c. Number of passengers and type and volume of freight arriving at and departing from present airport.
- d. Type and volume of air traffic utilizing present airway system.
- e. Projected increases in passenger and freight traffic expected to be generated as a result of the project.
- f. Summary of present traffic, including average and maximum density of landings and take-offs, broken down between military, commercial and general aircraft, and maximum size and weight of planes accommodated.

- g. Projected traffic for next five years, with same breakdown as above, with and without the proposed improvements.

2. Traffic Capacity of Airport

- a. Theoretical capacity of present airport as to number of plane movements, number of passengers, and maximum loads on pavements.
- b. Capacity of runway and airport facilities required to accommodate anticipated plane movements and pavement loadings.
- c. Relation to capacity of proposed facilities to future theoretical requirements.

3. Rationale of Proposed Scope of Improvements

- a. Basis for selection of airport site, including relation to sources of traffic, access, and existence of required utilities. Compare with possible alternatives.
- b. Justification for runway and taxiway extensions or improvements based on number of plane movements and size and weight of planes to be accommodated.
- c. Necessity for improved airport and/or airway facilities to accommodate projected passenger and freight traffic.
- d. Justification for project on the basis of safety, efficiency, and regularity of operations.

4. Design Criteria

- a. Design criteria selected for the improvements, based on those established by the International Civil Aviation Organization (ICAO) or the U.S. Federal Aviation Agency (FAA), including particularly the following:

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- (1) ICAO runway code letter and/or other authoritative classification.
 - (2) Runway dimensions, elevations and effective gradient.
 - (3) Inclusion of instrument landing system or other navigational or approach aids, including lighting, and ICAO or FAA criteria on which design is based.
 - (4) Pavement type and design loadings.
 - (5) Required dimensions of taxiways, holding areas, warm up and terminal aprons, clear zones, end zones, etc.
- b. Criteria for determining whether obstructions should be removed, marked or lighted.
 - c. Criteria used for design of required drainage facilities.
 - d. Characteristics of fuel storage and refueling system.
5. Surveys and Preliminary Plans
- a. General description of extent of preliminary surveys and studies used to determine the location proposed.
 - b. Master plan showing general layout of the ultimate development of the airport and depicting stage construction, if contemplated.
 - c. Map indicating existing facilities and new work proposed, including landing strips, runways, taxiways, aprons, buildings, utility services, parking areas, access roads, off-site communications, meteorological facilities, etc.
 - d. Map showing nature and location of obstructions in the approach zones, any penetrations of the horizontal or conical surfaces, and any work contemplated in removing or marking such obstructions; also describe limitations on flight paths imposed by the surrounding

terrain and limitations on future expansion dictated by existing drainage patterns.

- e. Preliminary plans and profiles of new runways, taxiways, and aprons, showing established grades, typical cross-sections, shoulders and drainage system, in sufficient detail to permit reasonably firm estimates of earthwork and pavement quantities.
- f. Sketches, diagrams, or photographs of existing structures, including fuel storage and delivery, and plans for modifications or additions in sufficient detail to permit preparation of reasonably accurate cost estimates.
- g. Sketches of instrument landing systems or other facilities to be installed to accommodate expansion at a later date.
- h. Details of stabilized or bound shoulders and special treatment of runway ends and parking areas to resist solvents or jet blasts.
- i. Results of soil and subsurface investigations to determine strength and compaction characteristics of subgrade, ground water level, and foundation requirements for major structures.
- j. Quality and location of available borrow, gravel, stone or other local construction materials suitable for use on the project.

6. Construction Standards

Outline specifications defining the proposed standards of construction which will have a major effect on the cost of the project, with specific justification for any unusual standards proposed.

7. Availability of Local Resources and Equipment

- a. Skilled and unskilled labor, including "trainability".
- b. Technical and supervisory personnel.
- c. Training requirements for development, operations and maintenance.
- d. Major construction materials: cement, asphalt, aggregates, water, base course materials, steel, pipe, lumber, plumbing fixtures, hardware, etc.
- e. Housing, food, fuel and lubricants, repair shops, etc.
- f. Suitable site for construction camp.
- g. Construction equipment.
- h. Local subcontractors.
- i. Budgetary and other arrangements for continued maintenance and operation of facilities to be provided. Capability of responsible to agency/administer operations. Need for legislative, organizational or budgetary changes.

8. Special Construction or Installation Problems Foreseen

- a. Climatic conditions, especially length of wet and dry seasons, which will likely affect construction or installation schedule.
- b. Maintenance of air traffic during construction, if required.
- c. Limitations on construction schedule due to long lead-time equipment and materials.
- d. Steps which must be taken to provide specialized tools, test equipment, fitted maintenance or crash/rescue vehicles, runway sweepers, and associated spare parts.

- e. Evaluation of potential major causes of delay such as slides, earthquakes, floods, labor disputes, political disturbances, or delay in providing access to land, local currency contributions, or trained or trainable personnel.

9. Plans for Execution of Project

- a. General sequence of construction operations, including identification of major elements which will control time and cost.
- b. General plan for earthwork operations, reflecting equipment requirements, haul distances, requirements for constructing and maintaining haul roads to borrow pits, etc.
- c. Construction methods, particularly as related to the use of labor intensive techniques.
- d. Proposed method of contracting for engineering, construction, installation, and construction supervision services.
- e. Phased engineering and construction schedule (attach).

10. Operation and Maintenance Organization

- a. Description of applicant's present and proposed organization.
- b. Applicant's ability to provide personnel and funds to adequately maintain the airport or other aviation facilities when completed.
- c. Availability of equipment and trained operating and maintenance personnel.
- d. Plan for recruiting and training personnel.
- e. Applicant's ability to finance additional improvements required and plans for providing funds at proper time.

F. Financial Aspects

1. Estimated Cost

- a. Estimated cost of land, engineering, construction, and installation of equipment, including the cost of delivery to site, prepared in accordance with the Cost Estimating Annexes to Handbook 3 cited in Section C of this manual. (Separate estimates should be prepared for each phase of the project, if stage construction is contemplated.)
- b. Total estimated cost in U.S. dollars and local currency:
 - (1) To be financed by applicant.
 - (2) To be financed by loan/grant.
- c. Anticipated cost escalation during the contract period.

2. Maintenance and Operating Cost

- a. Annual cost of labor, supervision, equipment operation, spare parts, miscellaneous supplies, and administration.
- b. Breakdown to show foreign exchange and local currency costs.
- c. Detailed plans for training of personnel or procurement of additional maintenance equipment and spare parts, regardless of whether loan/grant or applicant funds are to be utilized.

G. National Economic Effects

- 1. Explain and evaluate in monetary terms where possible:
 - a. Tangible and intangible benefits as described in C.4. above.
 - b. Expected effects on commerce and industry in the area served by the facility and anticipated ancillary effects.

- c. Positive and negative effects on the environment and energy sources; i.e., improvement to or degradation of the environment and impact on the availability or use of an energy source, ecc.
2. Compare benefits and costs and estimate rate of return on investment.

BENEFIT-COST EVALUATIONS - WATER AND LAND USE PROJECTSA, Introduction1. General

The standards and criteria used to determine the eligibility of water or related land use projects for A.I.D. financing were first introduced by the 1963 Foreign Aid Appropriations Act. That Act required that A.I.D. employ the same standards and procedures established in the Memorandum of the President dated May 15, 1962, which relates to the feasibility of projects proposed for construction within the United States. (See Attachments 1 and 2)

The 1974 Appropriation Act affirmed the intent of the Congress as follows: "Sec. 101. None of the funds herein appropriated . . . shall be used to finance the construction of any new flood control, reclamation, or other water or related land resource project or program which has not met the standards and criteria used in determining the feasibility of flood control, reclamation and other water and related land resource programs and projects proposed for construction within the United States of America as per Memorandum of the President dated May 15, 1962."

2. Purpose

This Supplement describes methods and standards to be used in computing benefits and costs and the benefit-cost ratio for water or related land use projects. Examples of the required computations for four hypothetical projects are given for illustration. In addition, the Supplement describes the method to be used in allocating the costs of multipurpose projects to the respective purposes. If a new project consists of additions to an existing project or system, the determination of a benefit-cost ratio is based on economic benefits and cost of the new project only.

It is the responsibility of the borrower/grantee to prepare the economic analysis of the proposed project.

3. Benefits

Benefits are evaluated from the standpoint of the economy of the country where the project is located. In computing the benefit-cost ratio, the benefits used should be tangible benefits, primary or secondary, which can be accurately estimated in monetary terms. If secondary benefits are included, they must be listed separately. Intangible benefits may be cited as supplementary justification. Benefits are generally expressed as an annual equivalent over the established period of the analysis.

In those cases where benefits accrue at their full value immediately upon completion of the project, the annual equivalent will be the same as the estimated benefit for the first year. If, on the other hand, benefits increase gradually or do not commence at all for several years, the annual equivalent benefit must be computed using compound interest factors.

4. Costs

Economic costs of the project used in computing the benefit-cost ratio should include:

- a. Land and right-of-way, engineering, construction, installation, construction supervision, and interest during the construction period.
- b. Operations, maintenance and replacement. Funds provided for operating, maintenance, and replacement costs must be adequate to ensure that the effective capacity of the facility, and hence the level of benefits claimed, are maintained throughout the established period of analysis.
- c. Induced costs resulting from the project, such as resettlement of people or relocation of highways may be included as economic costs or deducted from primary benefits.

All costs are reduced to equivalent annual amounts by amortization over the period of analysis. Costs for investigations, surveys, and plans incurred prior to commitment for a project are not included.

Comparison with Alternatives

If, for a particular project, direct evaluation of benefits is difficult or impossible, e.g., hydro-power or water supply, benefits are normally assumed to be equal to the cost of the most economically attractive alternative activity which will produce the same product or render the same service. In these instances, the cost of the alternative must be estimated in the same manner as the cost of the project proposed.

R. Factors to be Used in all Analyses

1. Period of the Analysis

The analysis should encompass that period of time over which the project will usefully serve its intended purpose. In no case should the period exceed 50 years.

The following list provides estimates of the useful lives (in years) of typical equipment and structures under normal conditions:

Dams, earth or concrete	50
Pumps (large)	25
Canals and ditches	50
Wells and well pumps	15 (maximum)
Treatment plant tanks	35
Pipe, reinforced concrete	50
Water tanks, steel	30
Warehouses	50
Factory buildings	50
Diesel generators:	
high speed	10
low speed	20

Power plant structures	50
Hydraulic turbines and generators	35
Penstocks	50
Turbo-generators, steam	30
Transformers	25
Transmission towers	
steel or concrete	50
treated wood	20-35

In many cases, related equipment may be assigned a group life. The limiting time of 50 years will be applied to all water and related land resource projects. To justify this period, it may be necessary to consider the cost of interim replacement of certain elements of the project, in addition to normal maintenance costs.

2. Interest Rates

The interest rate for amortizing Federal costs and for discounting benefits is determined annually in July by the Treasury Department from a formula based on the average rate on outstanding U.S. Government interest-bearing marketable securities running for 15 years or more. Changes in the rate are limited to a maximum of 1/4 of 1% per year under present regulations. The most recent determination by the Treasury Department in August, 1975, has fixed this rate at 6 1/8 percent. This is the basic risk-free rate established for the purpose of benefit-cost studies for projects in the United States. The same rate is not necessarily applicable to projects in foreign countries where a higher rate due to investment risk may be appropriate.

For A.I.D. benefit-cost computations, an interest rate of 7 percent is established for amortizing U.S. dollar costs. The application of this rate will tend to depress benefit-cost ratios slightly, but it is still low enough to give suitable encouragement to foreign water and related land resource development projects.

The above rate is applicable only to the U.S. dollar portion of project costs. Local costs and the cost of future additions or replacements are treated on the basis of local interest rates. This rate will also apply to benefits which accrue only to the local economy. The appropriate rate should, if possible, be based on the interest rate applicable to outstanding government interest-bearing marketable securities of 15 years or more maturity. If local rates are unreasonably high or low or an accurate rate cannot be determined, the rate of 10 percent per annum will be used.

3. Conversion of Costs to Common Currency

The computation of a benefit-cost ratio requires that all costs be expressed in one currency, and for this purpose, U.S. dollars are used. The local component of installation, maintenance, and operating costs, as well as the monetary value of projected benefits, shall be converted to U.S. dollars at the effective rate of exchange at which U.S. dollars are sold or offered for sale in the applicant's country.

4. Taxes

Taxes are included as an item of cost only when comparing the cost of the proposed project with the cost of an alternative, either operating or proposed, where taxes are applicable.

C. Application of Compound Interest

Present worth and capital recovery factors at various interest rates are shown on the following pages. More extensive tables appear in several mathematical handbooks and in Compounding and Discounting Tables for Project Evaluation, Edited by J. Price Gittinger, International Bank for Reconstruction and Development, 1973.

1. Amortization of Installation Cost

The total installation cost is converted to an equivalent uniform annual amount over the period of analysis by applying the Capital Recovery Factor (T-3). This computation reveals the amount required to retire a debt at interest by a series of equal end of year payments and is referred to as amortization.

T-1
Single Payment-Present Worth Factor
 $\frac{1}{(1 + i)^n}$

This factor is the present value of a \$1.00 payment which is to be made n years from now, assuming money compounds annually at the interest rate used. For example, the present value of \$1.00 to be spent 10 years from now is \$0.5584, if interest compounds at 6 per cent. This means that I must set aside \$0.5584 today at 6 per cent interest in order to have the \$1.00 I will need 10 years from now.

The use of this factor is referred to as discounting.

n year	Interest Rate-i							
	3 1/2%	4%	4 1/2%	5%	5 1/2%	6%	7%	8%
1	0.9756	0.9709	0.9663	0.9616	0.9524	0.9434	0.9316	0.9259
2	0.9518	0.9428	0.9335	0.9243	0.9070	0.8900	0.8774	0.8573
3	0.9286	0.9151	0.9019	0.8860	0.8638	0.8396	0.8163	0.7903
4	0.9050	0.8885	0.8714	0.8549	0.8227	0.7921	0.7629	0.7350
5	0.8839	0.8628	0.8420	0.8219	0.7835	0.7473	0.7130	0.6806
6	0.8623	0.8375	0.8135	0.7903	0.7462	0.7050	0.6663	0.6302
7	0.8413	0.8131	0.7860	0.7599	0.7107	0.6651	0.6227	0.5835
8	0.8207	0.7894	0.7594	0.7307	0.6768	0.6274	0.5820	0.5403
9	0.8007	0.7664	0.7337	0.7026	0.6446	0.5919	0.5459	0.5032
10	0.7812	0.7441	0.7089	0.6756	0.6130	0.5584	0.5083	0.4632
11	0.7621	0.7224	0.6849	0.6496	0.5847	0.5268	0.4751	0.4299
12	0.7436	0.7014	0.6618	0.6246	0.5565	0.4970	0.4440	0.3971
13	0.7254	0.6810	0.6394	0.6006	0.5303	0.4688	0.4150	0.3677
14	0.7077	0.6611	0.6178	0.5775	0.5051	0.4423	0.3873	0.3395
15	0.6905	0.6419	0.5969	0.5553	0.4810	0.4173	0.3624	0.3152
16	0.6728	0.6212	0.5767	0.5339	0.4581	0.3936	0.3387	0.2919
17	0.6572	0.6030	0.5572	0.5134	0.4363	0.3714	0.3166	0.2703
18	0.6412	0.5854	0.5384	0.4926	0.4155	0.3503	0.2959	0.2502
19	0.6255	0.5673	0.5202	0.4746	0.3957	0.3305	0.2765	0.2317
20	0.6103	0.5507	0.5026	0.4564	0.3769	0.3118	0.2584	0.2136
21	0.5954	0.5337	0.4856	0.4386	0.3589	0.2942	0.2415	0.1937
22	0.5809	0.5179	0.4692	0.4220	0.3413	0.2775	0.2257	0.1739
23	0.5667	0.5027	0.4533	0.4057	0.3255	0.2615	0.2100	0.1593
24	0.5529	0.4879	0.4377	0.3901	0.3061	0.2420	0.1907	0.1407
25	0.5394	0.4736	0.4231	0.3751	0.2933	0.2300	0.1792	0.1300
26	0.5262	0.4597	0.4088	0.3607	0.2812	0.2183	0.1682	0.1202
27	0.5134	0.4452	0.3935	0.3448	0.2678	0.2054	0.1559	0.1092
28	0.5009	0.4317	0.3797	0.3305	0.2551	0.1936	0.1447	0.1000
29	0.4887	0.4183	0.3657	0.3159	0.2429	0.1816	0.1334	0.0873
30	0.4767	0.4110	0.3563	0.3053	0.2314	0.1701	0.1224	0.0754
31	0.4651	0.4000	0.3442	0.2925	0.2204	0.1593	0.1129	0.0650
32	0.4539	0.3853	0.3286	0.2851	0.2099	0.1500	0.1047	0.0552
33	0.4427	0.3770	0.3213	0.2741	0.1999	0.1402	0.1002	0.0459
34	0.4319	0.3660	0.3105	0.2636	0.1904	0.1309	0.0902	0.0369
35	0.4214	0.3554	0.3000	0.2534	0.1813	0.1201	0.0807	0.0276
40	0.3724	0.3086	0.2526	0.2033	0.1420	0.0972	0.0668	0.0460
45	0.3202	0.2644	0.2127	0.1712	0.1113	0.0727	0.0476	0.0313
50	0.2669	0.2291	0.1791	0.1407	0.0872	0.0543	0.0339	0.0213

to be treated on the basis of the local interest rates. This will also apply to the benefits as they accrue only to the local economy. The appropriate rate should be established for the particular country and if possible should be based on the interest rate applicable to outstanding government interest-bearing marketable securities of 15 years or more maturity. In cases where local rates are unreasonably high or low or where an accurate rate cannot be determined, the rate of 4 per cent per annum will be used.

3. Conversion of Costs to Common Currency

The computation of a benefit-cost ratio requires that all factors be expressed in one currency and for this purpose U.S. dollars shall be used. The local component of installation costs and the maintenance and operation costs, as well as the monetary value of the benefits, shall be converted to U.S. dollars at the effective rate of exchange at which U.S. dollars are sold or offered for sale in the Applicant's country.

4. Taxes

Taxes shall be used as an item of cost only when it is necessary to compare the cost of a project with the cost of an alternate project, either operating or proposed, where taxes are applicable.

C. APPLICATION OF COMPOUND INTEREST

Tables of commonly used factors at various interest rates are shown on the following pages.

1. Amortization of Installation Cost

The total installation cost is converted to an equivalent uniform annual amount over the period of analysis by applying the Capital Recovery Factor (T-3). This computes the amount required to retire a debt at interest by a series of equal end of year payments and is referred to as amortization (of the installation cost).

T-2
Uniform Series-Present Worth Factor

$$\frac{(1+i)^n - 1}{i(1+i)^n}$$

Given a uniform annual series of one dollar per year for n years, this factor is the corresponding value at the beginning of the series. For example, a benefit of \$1.00 to be received each year for 50 years is worth \$15.76 today, if money compounds at 6 per cent. This means that if \$15.76 is invested at 6 per cent it will yield payments of \$1.00 each year for 50 years.

The use of this factor is referred to as discounting also.

n year	Interest Rate-i							
	2½%	3%	3½%	4%	5%	6%	7%	8%
1	0.970	0.971	0.966	0.962	0.952	0.943	0.935	0.926
2	1.927	1.913	1.900	1.886	1.859	1.833	1.808	1.783
3	2.856	2.829	2.802	2.775	2.723	2.673	2.624	2.577
4	3.762	3.717	3.673	3.630	3.546	3.465	3.387	3.312
5	4.646	4.580	4.515	4.452	4.329	4.212	4.100	3.993
6	5.508	5.417	5.329	5.242	5.078	4.917	4.767	4.623
7	6.349	6.230	6.115	6.002	5.780	5.582	5.389	5.203
8	7.170	7.020	6.874	6.733	6.463	6.210	5.971	5.747
9	7.971	7.786	7.608	7.435	7.103	6.803	6.516	6.247
10	8.762	8.530	8.317	8.111	7.722	7.360	7.024	6.710
11	9.514	9.253	9.002	8.760	8.306	7.897	7.499	7.130
12	10.258	9.954	9.663	9.335	8.863	8.384	7.943	7.526
13	10.983	10.635	10.303	9.986	9.394	8.853	8.358	7.904
14	11.691	11.298	10.921	10.563	9.890	9.295	8.745	8.241
15	12.391	11.938	11.517	11.118	10.380	9.712	9.108	8.559
16	13.055	12.561	12.091	11.652	10.838	10.108	9.447	8.851
17	13.712	13.166	12.651	12.160	11.274	10.477	9.763	9.122
18	14.353	13.754	13.180	12.650	11.690	10.828	10.059	9.372
19	14.979	14.324	13.710	13.131	12.035	11.153	10.336	9.601
20	15.589	14.877	14.212	13.590	12.462	11.470	10.594	9.818
21	16.185	15.415	14.698	14.029	12.821	11.764	10.836	10.017
22	16.765	15.937	15.167	14.451	13.163	12.042	11.061	10.201
23	17.332	16.444	15.620	14.857	13.489	12.303	11.272	10.371
24	17.885	16.930	16.059	15.247	13.799	12.550	11.459	10.529
25	18.424	17.413	16.482	15.622	14.094	12.783	11.624	10.675
26	18.951	17.877	16.890	16.083	14.375	13.003	11.826	10.810
27	19.464	18.327	17.285	16.530	14.643	13.211	11.957	10.936
28	19.965	18.764	17.657	16.963	14.898	13.406	12.137	11.051
29	20.454	19.188	18.036	17.384	15.141	13.591	12.275	11.153
30	20.930	19.600	18.392	17.792	15.372	13.765	12.409	11.253
31	21.395	20.000	18.730	18.183	15.593	13.929	12.532	11.350
32	21.849	20.389	19.059	18.574	15.803	14.084	12.647	11.435
33	22.292	20.760	19.390	18.948	16.003	14.230	12.754	11.514
34	22.724	21.132	19.701	19.311	16.193	14.368	12.851	11.587
35	23.145	21.497	20.001	19.665	16.374	14.498	12.948	11.655
40	25.103	23.115	21.355	19.793	17.159	15.048	13.332	11.925
45	26.833	24.519	22.495	20.720	17.774	15.456	13.603	12.121
50	28.362	25.730	23.456	21.452	18.256	15.762	13.801	12.233

T-3
Capital Recovery Factor

$$\frac{1(1+i)^n}{(1+i)^n - 1}$$

Given a present debt of \$1.00, this factor is the necessary uniform annual payment to be made each year for n years at the applicable interest rate which will retire the debt with interest. For example, to spread a present debt of \$1.00 over the next 50 years with interest at 3-1/2 per cent, it would be necessary to pay \$0.04263 each year. Similarly, with interest at 6 per cent, it would be necessary to pay \$0.06344 each year. This process is called Amortization.

n year	Interest Rate - i							
	2½%	3%	3½%	4%	5%	6%	7%	8%
1	1.01000	1.03000	1.03500	1.04000	1.05000	1.06000	1.07000	1.08000
2	0.51983	0.52261	0.52610	0.52910	0.53780	0.54544	0.55309	0.56077
3	0.37014	0.36353	0.35693	0.35033	0.36721	0.37111	0.38105	0.38703
4	0.27582	0.26903	0.27225	0.27519	0.28201	0.28859	0.29523	0.30192
5	0.21525	0.21836	0.22143	0.22463	0.23097	0.23740	0.24389	0.25016
6	0.18155	0.18460	0.18767	0.19076	0.19702	0.20336	0.20980	0.21632
7	0.16750	0.16051	0.16351	0.16651	0.17282	0.17914	0.18555	0.19207
8	0.15347	0.14646	0.14948	0.15251	0.15872	0.16504	0.17147	0.17790
9	0.12516	0.12843	0.13145	0.13449	0.14059	0.14702	0.15319	0.16003
10	0.11426	0.11723	0.12024	0.12329	0.12950	0.13587	0.14238	0.14903
11	0.10511	0.10808	0.11109	0.11415	0.12039	0.12679	0.13336	0.14009
12	0.09746	0.10046	0.10348	0.10655	0.11283	0.11928	0.12590	0.13270
13	0.09105	0.09403	0.09705	0.10014	0.10646	0.11296	0.11965	0.12652
14	0.08554	0.08853	0.09157	0.09467	0.10102	0.10758	0.11434	0.12100
15	0.08077	0.08377	0.08683	0.08994	0.09634	0.10296	0.10979	0.11683
16	0.07660	0.07961	0.08268	0.08582	0.09227	0.09900	0.10586	0.11293
17	0.07293	0.07595	0.07904	0.08220	0.08870	0.09564	0.10243	0.10963
18	0.03967	0.07271	0.07582	0.07899	0.08555	0.09270	0.09941	0.10670
19	0.06676	0.06981	0.07291	0.07614	0.08275	0.08970	0.09675	0.10413
20	0.06416	0.06722	0.07036	0.07353	0.08024	0.08730	0.09439	0.10185
21	0.06179	0.06487	0.06804	0.07128	0.07800	0.08500	0.09229	0.09983
22	0.05965	0.06275	0.06593	0.06920	0.07597	0.08300	0.09041	0.09803
23	0.05770	0.06081	0.06402	0.06731	0.07414	0.08128	0.08871	0.09642
24	0.05591	0.05905	0.06227	0.06559	0.07247	0.07968	0.08719	0.09482
25	0.05425	0.05743	0.06067	0.06401	0.07095	0.07822	0.08587	0.09363
26	0.05277	0.05594	0.05921	0.06257	0.06956	0.07690	0.08456	0.09251
27	0.05138	0.05456	0.05785	0.06124	0.06829	0.07570	0.08337	0.09145
28	0.05009	0.05329	0.05660	0.06001	0.06712	0.07459	0.08239	0.09049
29	0.04889	0.05211	0.05545	0.05883	0.06605	0.07358	0.08140	0.08962
30	0.04778	0.05102	0.05437	0.05783	0.06505	0.07265	0.08059	0.08883
31	0.04674	0.05000	0.05337	0.05686	0.06413	0.07179	0.07980	0.08811
32	0.04577	0.04905	0.05244	0.05593	0.06328	0.07100	0.07907	0.08745
33	0.04486	0.04816	0.05157	0.05510	0.06249	0.07027	0.07831	0.08685
34	0.04401	0.04732	0.05070	0.05431	0.06176	0.06960	0.07780	0.08630
35	0.04321	0.04654	0.05000	0.05362	0.06107	0.06897	0.07723	0.08580
40	0.03984	0.04326	0.04683	0.05055	0.05829	0.06646	0.07501	0.08386
45	0.03727	0.04079	0.04445	0.04826	0.05626	0.06477	0.07350	0.08259
50	0.03526	0.03887	0.04263	0.04655	0.05478	0.06344	0.07246	0.08174

2. Discounting of a Replacement

When it is anticipated that an element of a project will require replacement during the period of analysis, the estimated replacement cost must be discounted to the present time by applying the Single Payment Present Worth Factor (T-1) and then this discounted value amortized over the full period of analysis in the same manner as the installation cost.

Example: In an irrigation project with economic life of 50 years, a pump, the cost of which was included in the project installation cost, must be replaced at the end of 25 years; estimated cost at that time - \$30,000, interest rate is 6 percent. (1) The present amount required to provide for this future expenditure is $\$30,000 \times 0.2330$ (T-1) or \$6,990. (2) This value is then amortized over 50 years by multiplying by the Capital Recovery Factor (T-3). $\$6,990 \times 0.06344 = \443 . This amount is a part of the annual cost of the project.

Simplified Method: If the cost of the initial pump in the above example was the same as the cost of the subsequent replacement (\$30,000), then the annual cost of the two pumps over the 50 years can be computed by multiplying \$30,000 by the Capital Recovery Factor (T-3) for 25 years, $\$30,000 \times 0.07623 = \2346 . This includes the annual cost of the initial pump investment which if computed separately would be $\$30,000 \times 0.06344 = \1903 . The difference (\$443) is the amount to be added to annual cost of the total initial investment, agreeing with the figure computed in the Example above. It should be noted that this simplified method is strictly applicable only (1) if the initial and replacement expenditures are made by the same investor (2) if the interest rate is the same in both cases, and (3) if the replacement period is an even factor of the number of years in the period of analysis (i. e. 2, 5, 10 or 25 years in a life of 50 years).

3. Discounting of Terminal Salvage Value

Salvage value of land, equipment and facilities which would have value for non-project uses at the end of the period of analysis may be discounted to the present time by applying the

Single Payment-Present Worth Factor and then deducting the discounted value from the installation cost. The value is likely to be small and is frequently disregarded.

Example: Assume that at the end of the 50-year economic life of a project, a piece of equipment will have a salvage value of \$7,500, interest rate is 6 percent. The present value of this amount is $\$7,500 \times 0.0543$ (T-1) or \$407. This amount is deducted from the installation cost before amortization. If the economic life is only 20 years, the present value is $\$7,500 \times 0.3118$ (T-1) or \$2,338.

4. Lag in Accrual of Benefits

a. Complete lag refers to the situation where there are no benefits whatever for several years and the full annual benefit accrues uniformly thereafter. To compute the equivalent annual benefit, the procedure is as follows:

- (1) Multiply by the Uniform Series-Present Worth Factor (T-2) for the period during which the benefits occur; (2) then multiply by the Single Payment-Present Worth Factor (T-1) for the lag period, and finally (3) multiply by the Capital Recovery Factor (T-3) over the period of analysis.

A short-cut method is to apply the Single Payment-Present Worth Factor for the lag period to the annual benefit which accrues thereafter. This yields a slightly higher result, but the difference between the two methods decreases with increasing economic life.

Example: Lag 7 years, interest rate 6 percent, period of analysis 40 years, delayed benefit \$1,000.00.

- 1. **Exact method:** Combined factor is $14.23 \times 0.6651 \times 0.06646 = 0.6290$.
- 2. **Short-cut method:** factor is 0.6651.

The equivalent annual benefit is \$1000 x the factor or \$629.00 by the exact method or \$665.10 by the short-cut method.

b. With straight line lag the benefit increases uniformly over a given number of years until full benefit is reached. To compute the equivalent annual benefit for the lag period, use is made of the accompanying table, which shows the present worth of a uniformly increasing annual series over a stated time period, in this case the lag period.

T-4
Uniformly Increasing Annual Series-Present Worth Factor

<u>Lag Years</u>	<u>4%</u>	<u>5%</u>	<u>6%</u>
1	0.9615	0.9524	0.9434
3	5.4776	5.3580	5.2423
5	13.0065	12.5664	12.1469
6	17.7484	17.0437	16.3767
7	23.0678	22.0185	21.0321
8	28.9133	27.4332	26.0514
9	35.2366	33.2347	31.3785
10	41.9923	39.3738	36.9624
15	80.8539	73.6677	67.2668
20	125.1550	110.9506	98.7004
25	171.7261	148.3215	128.7565
30	218.3539	183.9950	156.1236
40	306.3231	246.7043	201.0031
50	382.6460	296.1707	233.2192

The method is to determine the amount of the annual increase and apply the appropriate factor from the table. The resulting value is then amortized over the period of analysis.

Example: Lag 15 years; full benefit: \$60,000 per year, period of analysis 50 years. Interest rate 6 percent.

Annual increase \$60,000 ÷ 15 = \$4,000 per year.

Present Worth \$4,000 x 67.267 (T-4) = \$269,068.

Amortized for 50 years $\$269,068 \times 0.06344 (T-3) = \$17,070$.

This is the annual equivalent benefit over the 50-year period resulting from the increasing benefits which accrue during the 15-year lag period.

In most cases, after the full benefit is attained, it continues to the end of the period of analysis. The benefits which follow the lag period are converted to an annual equivalent benefit by using the procedure for a complete lag (paragraph 4. a above). This value is then added to the value for the lag period.

Example: In the previous example, the full benefit of \$60,000 per year accrues from the 16th through the 50th year or for 35 years, interest rate 6 percent.

Present Worth at beginning of 16th year,	$\$ 60,000 \times 14.498 (T-2) = \$869,880$
Present Worth at beginning of 1st year,	$\$869,880 \times 0.4173 (T-1) = \$363,000$
Equivalent Value 50 years,	$\$363,000 \times 0.06344 (T-3) = \$ 23,030$
Equivalent annual benefit for straight line lag period (from above)	$\$ 17,070$
Total annual equivalent benefit	$\$ 40,100$

If there is a complete lag preceding the beginning of the straight line increase, an additional step is necessary to obtain the annual equivalent benefit. After obtaining the present worth of the straight line lag, this value must be discounted by the Single Payment-Present Worth Factor for the period of complete lag. The result is then amortized over the period of analysis.

Example: Complete lag 5 years followed by straight line lag 15 years, full benefit \$60,000 per year, period of analysis 50 years, interest rate 6 percent.

Annual increase	\$ 60,000 ÷ 15	= \$ 4,000 per yr.
Present Worth at beginning of 6th year	\$ 4,000 x 67.267 (T-4) =	\$269,068
Present Worth at beginning of 1st year	\$269,068 x 0.7473 (T-1) =	\$201,075
Amortized for 50 years	\$201,075 x 0.06344 (T-3) =	\$12,756
Full benefit from 21st to 50th year		
Present Worth at beginning of 21st year	\$ 60,000 x 13.765 (T-2) =	\$825,900
Present Worth at beginning of 1st year	\$825,900 x 0.3118 (T-1) =	\$257,515
Amortized for 50 years	\$257,515 x 0.06344 (T-3) =	<u>\$16,337</u>
Total Annual equivalent benefit		\$29,093

D. EXAMPLES OF BENEFIT-COST CALCULATION

For the purpose of illustrating the application of the procedures and factors described above, typical examples of water and related land resource projects are presented below. They cover hypothetical projects providing (1) irrigation, (2) domestic water supply, (3) hydroelectric power, and (4) a port development. An example of the method of distributing project costs among several purposes in a multipurpose project is also included.

The Annexes referred to are to be found in the Manual.

E. IRRIGATION PROJECT

1. Project Description

The project includes a storage reservoir to be used for irrigation purposes only and distribution of a regulated flow of water to 10,000 net irrigable acres of cleared land now divided into 50 farms. At present 2,000 acres are receiving a limited supply of

water from wells and the remaining 8,000 acres are used for dry farming and pasture. At full development of the project, there will be 100 farms with water delivery and drainage outlets at farm boundaries. Orchards requiring 7 years to mature will occupy 4,000 acres and general crops will be grown on the remaining 6,000 acres. The irrigation well water system will be abandoned.

2. Estimated Initial Investment

The Applicant will furnish land and right-of-way, relocate roads and utilities in the reservoir area, and contribute available local materials, including concrete for the dam and supplies. The breakdown of main cost items, which incorporate interest during construction, is as follows:

	<u>Local Cost</u> (equivalent U. S. \$)	<u>U. S. \$ Cost</u>
Purchase and clearing of reservoir, land and right-of-way	\$105,000	\$ 30,000
Relocation of roads and utilities	50,000	15,000
Dam, spillway and outlet works	350,000	350,000
Canals and main drains, earthwork:	210,000	90,000
Minor structures	50,000	50,000
Subtotal	<u>\$765,000</u>	<u>\$535,000</u>
Engineering	-	71,000
Contingency	76,500	54,000
Total Initial Investment	<u>\$841,500</u>	<u>\$660,000</u>
Associated Costs:		
Land leveling	\$200,000	
Farm distribution system	100,000	
Farm drainage ditches	50,000	
	<u>\$350,000.</u>	

3. Annual Costs

Maintenance and operation of dam, canals, and structures	\$120,000	
Amortization of Investment Costs		
Local Cost		
841,500, 50 yrs. @ 6% (0.06344)	53,380	
U.S. Dollar Cost		
660,000, 50 yrs. @ 3-1/2% (0.04263)	28,140	
Total Annual Costs		\$201,520

4. Associated Annual Cost Paid by Landowners

Maintenance and operation of distribution and drainage ditches	\$ 22,800	
Amortization of Associated Costs		
350,000, 50 yrs. @ 6% (0.06344)	22,200	
Total Associated Annual Cost		\$ 45,000

5. Primary Benefits to Landowners (See Annex M)

Production at present:

Gross agricultural yield, 10,000 acs.	\$540,000	
Less farm input costs, such as farm labor, power, fertilizer, seeds, fuel, materials, tools, pest control, taxes, insurance, etc.	-300,000	
Net present yield		\$240,000

Estimated production after completion of project:

Orchard products		
(4,000 acs) gross	\$820,000	
Less farm input costs	-140,000	
Net, at full development		\$680,000
General crops		
(6,000 acs) gross	\$690,000	
Less farm input costs	-330,000	
Net		360,000
Total Net Annual Production		\$1,040,000
Gain in net annual production		\$ 800,000
(1,040,000 - 240,000)		

	Brought forward	\$800,000
Segregation of gain:		
Orchard land 4,000 acs	(680,000 - $\frac{4,000 \times 240,000}{10,000}$)	4,000
General 6,000 acs	(360,000 - $\frac{6,000 \times 240,000}{10,000}$)	216,000
Reduced gain on account of lag: (by short-cut method)		
Orchard, 7 yrs. @ 6% \$584,000 x 0.6651		\$388,000
General, no lag		216,000
Total adjusted gain		<u>\$604,000</u>
Gain by elimination of well system operation and allowance for salvage		20,000
Less Associated Costs (see item 4 above)		<u>-45,000</u>
Net Annual Primary Benefits		<u>\$579,000</u>
6. <u>Benefit-Cost Ratio</u>		
Annual Benefit		\$579,000
Annual Cost		\$201,520
Ratio		2.87 to 1.00
7. <u>Secondary Benefits (not used in above computation)</u>		
Increase in land values due to improvements	+ \$140,000	
Offsetting Loss: Former earnings of new farmers on project, 70 @ 500	- \$ 35,000	

F. WATER SUPPLY PROJECT

1. Project Description

The project includes a storage reservoir to be used for water supply only, two pumping stations, a pipeline and a treatment plant. It will supply 20 mgd of potable water to a growing city of 800,000 people. The present supply is of low quality and dependability and averages only 5 mgd (or 6.25 gpcd). The augmented supply will average 25 gpcd for a future population of 1,000,000 people. Revenues from water users will be sufficient to pay costs of operating, maintaining and extending the water distribution system but general tax funds must be used to cover project installation costs.

2. Estimated Installation Cost (Annex A) and Initial Investment

The city will furnish all land and rights-of-way and local concrete pipe will be used. The dam is to be earth fill and all major construction equipment will be imported from the U.S. Breakdown of main cost items including contingencies is as follows:

	<u>Local Cost</u> (equivalent U.S. \$)	<u>U.S. \$ Cost</u>
Purchase of Reservoir land and pipeline right-of-way	\$ 300,000	
Concrete pipe	2,500,000	\$ 500,000
Dam, spillway, and outlet works	1,575,000	2,635,000
Pumping stations (pumps to be replaced in 25 yrs. at a cost of \$180,000)	50,000	200,000
Treatment plant (equipment to be replaced in 25 yrs. at a cost of \$350,000)	240,000	350,000
Engineering	147,000	221,000
Total Installation Cost	<u>\$4,852,000</u>	<u>\$3,906,000</u>
Interest during construction (1)	291,120	136,710
Total Initial Investment	<u>\$5,143,120</u>	<u>\$4,042,710</u>

(1) An acceptable method of computing interest during construction is as follows: $1/2 \times (\text{construction time in years}) \times (\text{interest rate})$. For this project, time is 2 years; for alternate, 2-1/2 years.

3. Annual Costs

Maintenance and operation of project facilities	\$150,000	
Replacement of treatment plant equipment at 25 yrs. 6%		
\$350,000 x 0.2330 x 0.06344	5,200	
Replacement of pumps, 25 yrs. 6%		
\$180,000 x 0.2330 x 0.06344	2,700	
Amortisation of Investment Costs		
Local Cost		
5,143,120, 50 yrs. @ 6%		
(0.06344)	326,280	
U.S. Dollar Cost		
4,042,710, 50 yrs. @ 3-1/2%		
(0.04263)	172,340	
Total Annual Cost	<u>172,340</u>	\$656,520
Average annual supply 20 mgd x 365		7,300 million gals.
Cost of water at delivery point		8.99¢ per 1,000 gals.

4. Cost of Equivalent Supply from Best Alternate Source (Primary Benefit)

The only likely alternate supply of 20 mgd taken from another watershed would cost \$8,342,150, some \$843,680 less than the project installation cost. The earth dam would be smaller and the water would require less treatment. On the other hand, reservoir land would be more expensive, the pipeline longer, the pumps somewhat larger and the operation costs higher. Capital and annual costs are calculated as follows:

a. Estimated Installation Cost and Initial Investment

	<u>Local Cost</u> (equivalent U. S. \$)	<u>U. S. \$ Cost</u>
Reservoir land and right-of way	\$ 700,000	
Concrete pipe	3,000,000	\$1,000,000
Dam, spillway, and outlet works	880,000	1,470,000
Pumping stations (replace pumps in 20 yrs. at a cost of \$250,000)	100,000	250,000
Treatment plant (no replacements)	40,000	60,000
Engineering	139,000	208,000
Total Installation Cost	<u>\$4,859,000</u>	<u>\$2,988,000</u>
Interest during construction (1)	364,425	130,725
Total Initial Investment	<u>\$5,223,425</u>	<u>\$3,118,725</u>

(1) See footnote page 17

b. Annual Costs

Maintenance and operation	\$200,000	
Replacement of pumps		
20 yrs. 6%		
$250,000 \times 0.3118 \times 0.06344$	4,950	
40 yrs. 6%		
$250,000 \times 0.0972 \times 0.06344$	1,540	
(neglect salvage)		
Amortization of Investment Costs		
Local Costs		
5,223,425, 50 yrs. @ 6%		
(0.06344)	331,370	
U.S. Dollar Costs		
3,118,725, 50 yrs. @ 3-1/2%		
(0.04263)	132,950	
Total Annual Cost (Benefit)		\$670,810

Cost of water at delivery point 9 19¢ per 1,000 gals.

5. Benefit-Cost Ratio

Annual Benefit	\$670,810
Annual Cost	\$656,520
Ratio	1.02 to 1.00

The cost per gallon at delivery point compares favorably with the cost of the present water supply and also with costs elsewhere in the vicinity.

6. Secondary Benefits (not used in above computation)

Value of additional residential developments, annual	\$1,000,000
Reduction in fire insurance charges	200,000
Saving in health service costs	50,000

G. HYDROELECTRIC POWER PROJECT

1. Project Description

The project includes a powerhouse at the toe of a dam

(1) See 137

Built to store water for irrigation, a reregulating dam, a step-up substation and a 20-mile transmission line with steel towers terminating at an existing substation at the power load center. Of the total cost of dam, \$1,800,000 has been allocated to power. * The powerhouse will have a rated capacity of 13,600 kw. Irrigation releases will be adequate to maintain a firm capacity of 7,500 kw. Power will be transmitted at 69,000 volts. Estimated useable power delivered is 80 million kwhr per year. There is a market for this power.

2. Estimated Initial Investment (Annexes A and H)

The Applicant will furnish all labor, land and rights-of-way. All materials for the dam with the exception of reinforcing steel are local. Major construction equipment, steel and other materials are to be imported from the U.S. Breakdown by main cost items which include engineering and interest during construction, is as follows:

	<u>Life</u>	<u>Local Cost</u> (equivalent U.S. \$)	<u>U.S.\$ Cost</u>
Dam costs allocated to power	50	\$1,000,000	\$ 800,000
Powerhouse and penstock	50	625,000	1,275,000
Turbines and generators	35	150,000	850,000
Transmission line	50	150,000	280,000
Substation	25	40,000	130,000
Contingency		190,000	330,000
Total Initial Investment		<u>\$2,155,000</u>	<u>\$3,665,000</u>

*Assumed to have been made in accordance with method described hereinafter for allocation of costs of a multipurpose project.

3. Annual Costs

Maintenance and Operation including allocated amount for dam operation	\$100,000
Replacement of turbines and generators at 35 yrs. @ 6% 1,000,000 x 0.1301 x 0.06344	8,250
Replacement of substation equip- ment 25 yrs. @ 6% 170,000 x 0.2330 x 0.06344	2,500
Amortization of Investment Costs	
Local Costs 2,155,000, 50 yrs. @ 6% (0.06344)	136,710
U.S. Dollar Cost 3,665,000, 50 yrs. @ 3-1/2% (0.04263)	156,240
Total Annual Cost	\$403,700

Total power delivery 80,000,000 kwhr

Cost per kwhr at load center \$0.005

At this cost it is economical for the large industrial power users to purchase their power from this source.

4. Cost of Same Amount of Power from Best Alternate Source (Primary Benefit)

The only possible alternate source of power would be a diesel-electric plant using fuel costing 15¢ per gallon. All generating equipment and steel would be obtained from U.S. sources. All other items can be furnished locally. The generating equipment would have to be replaced in 25 years. Annual cost for 80,000,000 kwhr delivered at load center is estimated as follows:

Diesel-electric equipment (U.S. Dollar Cost)	
13,600 kw @ \$200 per kw = 2,720,000	
Amortized, 25 yrs. @ 3-1/2% (0.06067)	\$165,000

	Brought forward	\$165,000
Powerhouse, land, etc.		
Local Costs (equivalent U.S. \$)		
	\$150,000, 50 yrs. @ 6%	
	(0.06344)	9,500
U.S. Dollar Costs		
	\$270,000, 50 yrs. @ 3-1/2%	
	(0.04263)	11,500
Station labor, supervision and		
administration	\$ 90,000	
Maintenance	30,000	
Supplies and general expense	12,000	
Lubricating oil	30,000	
Fuel, 80,000,000 kwhr		
0.076 gals. per kwhr		
@ 15¢ per gal.	912,000	
Total Maintenance and		
Operation	1,074,000	
Total Annual Cost		\$1,260,000
Cost per kwhr (80,000,000 kwhr)		\$0.0158
5. <u>Benefit-Cost Ratio (Annex L).</u>		
Annual Benefit		\$1,260,000
Annual Cost		\$ 403,700
Ratio		3.12 to 1.00
6. <u>Secondary Benefits (not used in above computation)</u>		
Anticipated investment in expanded and		
new industries. annual		\$ 200,000
General increase in related business		
and industry		\$ 100,000

H. PORT DEVELOPMENT

1. Project Description

The project includes enlargement of an entrance channel

from the ocean, navigation aids, a wharf, warehouses, and rail and highway terminal facilities. The project will bring ocean-going vessels to within 5 miles of a growing industrial city, which is now 100 miles by rail from the nearest existing seaport. Annual capacity will be 600,000 tons.

It is estimated that present local production of 300,000 tons per year will be shifted to the new port, thereby eliminating the rail haul to the existing port, also that production will increase from 300,000 tons to 600,000 tons per year in the first 10 years. It is assumed that this new production is a direct result of the new port facility.

2. Estimated Installation Cost and Initial Investment

The local government will furnish all land and rights-of-way, labor, and timber for the wharf. All major materials and equipment for railroads and utilities will come from U.S. sources. In addition, dredging will be done by a U.S. firm. Construction time shall be one year. Breakdown by main cost items including engineering and contingencies is as follows:

	<u>Local Cost</u> (equivalent U.S. \$)	<u>U.S. \$ Cost</u>
5. <u>Benefit-Cost Ratio Annex 1)</u>		
<u>Land and right-of-way</u>	\$ 500,000	1,360,000
<u>Railroad, highway, and utilities</u>	400,000	800,000
<u>Dredging</u>		1,500,000
<u>Navigational Aids</u>	70,000	130,000
<u>Wharf and Warehouses</u>	1,740,000	760,000
6. <u>Port roads, tracks, and utilities</u>	20,000	80,000
<u>Total Installation Cost</u>	<u>\$2,330,000</u>	<u>\$3,270,000</u>
<u>Interest during construction (1)</u>	84,900	2,057,225
<u>Total Initial Investment</u>	<u>\$2,914,900</u>	<u>\$3,327,225</u>
<u>Costs incurred in related business</u>		100,000

(1) See footnote page 17

H. PORT DEVELOPMENT

3. Annual Costs

Maintenance and operation of wharf and shore facilities	\$400,000	
Annual dredging	100,000	
Replacement of navigational aids at 20 yr. intervals (no salvage)		
20 yrs. $200,000 \times 0.3118 \times 0.06344$	3,960	
40 yrs. $200,000 \times 0.0972 \times 0.06344$	1,230	
Amortization of Investment Costs		
Local Costs		
2,914,900, 50 yrs. @ 6% (0.06344)	184,900	
U.S. Dollar Costs		
3,327,225, 50 yrs. @ 3-1/2% (0.04263)	141,800	
Total Annual Cost		<u>\$831,890</u>

Annual Primary Benefits

Saving in cost of hauling of produce now going to existing port		
300,000 tons, 95 miles @ 2¢	\$570,000	
Gain from new production after first 10 years:		
Port charges, 300,000 tons @ \$1.50 = \$450,000		
Worth of 40 annual amounts at beginning of 11th year, 6%		
$450,000 \times 15.046 = \$6,771,000$		
Worth at beginning of 1st year		
$\$6,771,000 \times 0.5584 = \$3,781,000$		
Equivalent value for 50 years		
$\$3,781,000 \times 0.06344$	240,000	
Gain from new production, first 10 years:		
Increase in port charges per year		
$450,000 \div 10 = \$45,000$		
Worth at beginning of 1st year		
$45,000 \times 36.9624 = \$1,663,000$		
Equivalent value over 50 years		
$\$1,663,000 \times 0.06344$	105,500	
Total Annual Benefits		<u>\$915,500</u>

5. Benefit-Cost Ratio

Annual Benefit - contribution of	\$915,500
Annual Cost - contribution of	\$31,890
Ratio - contribution of navigational aids	1.10 to 1.00

6. Secondary Benefits (not used in above computation)

Increase in customs duties, annual	\$40,000
Increase in annual general tax receipts resulting from increased economic activity	\$50,000

\$331,890

L. MULTIPURPOSE PROJECT

Water resources projects frequently provide facilities that will serve several purposes such as a reservoir designed to supply water for irrigation, power and domestic use. In these instances it is necessary to allocate the costs to each purpose to be assured that each segment is justified.

The method adopted by U. S. agencies for making the allocation is known as the Separable Costs-Remaining Benefits Method. Application of this method is described in the Economic Guide for Watershed Protection and Flood Prevention published by the Soil Conservation Service in U. S. D. A., from which this text is quoted, with a few modifications and annotations. This procedure is derived from the publication, "Proposed Practices for Economic Analysis of River Basin Projects" prepared by the Subcommittee on Evaluation Standards in May 1958, often referred to as the "Green Book".

The Separable Costs-Remaining Benefits Method of cost allocation is a procedure for the equitable distribution of the cost of a multiple purpose project among the purposes served. Briefly, it provides for (1) assigning to each purpose its separable cost, i. e., the added cost of including the purpose in the project; and (2) assigning to each purpose a share of the remaining or residual joint cost in proportion to the remaining benefits, i. e.,

the benefits (as limited by alternative cost) less the separable cost. Thus the method provides for an equitable sharing of the savings from multiple purpose development among the various purposes included (see Case 1).

1. Definition of Terms and Their Use in Cost Allocation

a. Alternate Cost

The alternate cost for each purpose is defined as the lowest cost of achieving the same or equivalent benefits in single purpose structures that will accrue to each purpose in the multiple purpose structure. The least costly alternative single purpose means of providing benefits equivalent to those provided by each purpose of the multiple purpose structure should be used in cost allocation. The alternative should be real in the sense that it can be built and if built would produce equivalent benefits. It may, however, be entirely different in physical plan. There is a lack of agreement among economists and others as to whether or not the alternate cost must be figured at a site other than the multiple purpose structure site. For our purposes, it will be permissible to figure the alternate cost at the multiple purpose site.

b. Separable Cost

The separable cost for each project purpose is the difference between the cost of a multiple purpose structure and the cost of the structure with that purpose omitted.

In calculating separable costs, each purpose should be treated as if it were the last increment of a multiple purpose project. This calculation will show the added costs of increased size, changes in design, or other factors that would be necessary to add the purpose to the project.

In those cases where the calculation of separable cost may be unduly burdensome, specific cost as defined below may be used in lieu of separable costs in the Separable Costs-Remaining Benefits Method.

Specific Cost

The specific cost for each project purpose consists of the cost of facilities that exclusively serve only one project purpose. Special outlet works needed for irrigation or municipal water supply, but not needed for flood prevention, is an example of this kind of facility.

All readily identifiable costs of facilities which are clearly for one purpose only should be assigned as specific costs wholly to that purpose in the allocation process. Thus, care should be taken to make sure that all specific costs are properly assigned to each purpose. Separable costs include all specific costs, together with any other additional project costs attributable to the inclusion of a given purpose.

d. Joint Cost

Joint cost is the difference between the cost of the multiple purpose structure and the sum of the separable costs for each purpose. When the estimate of separable costs cannot be made or is unduly burdensome to make, joint costs may be considered to be the difference between the multiple purpose cost and the sum of the specific costs for each purpose.

2. Description of Method

The costs or benefits that are used in the method should be of the same nature for each purpose, i.e., installation costs, primary benefits, etc.

It should be noted that the Separable Costs-Remaining Benefits Method will allocate costs to purposes so that each purpose is economically justified, provided that two requirements of project formulation are met:

The overall benefit-cost ratio is favorable.

The cost of adding each purpose as the last increment (separable cost) does not exceed the benefits derived therefrom.

The Separable Costs-Remaining Benefits Method normally involves the following steps:

(1) Estimate the total cost of the multiple purpose structure including capitalized operation and maintenance costs when necessary.

(2) Estimate the benefits for each purpose.

(3) Estimate the alternate cost (including capitalized operation and maintenance costs when necessary) of achieving the benefits shown in step (2).

(4) Determine the maximum alternative justifiable expenditure for achieving benefits. This is equal to the lesser value of steps (2) and (3).

(5) Estimate separable cost (including capitalized operation and maintenance when necessary) for each purpose.

(6) Determine remaining benefits which are equal to the difference between (4) and (5).

(7) Determine the joint cost. This is the difference between the total cost of the multiple purpose project and the total of the separable costs for all project purposes. The joint cost is then allocated to each purpose in the same proportion as the remaining benefits for each purpose are to the total remaining benefits for all purposes.

(8) Determine total allocated cost for each purpose by adding the separable cost to the allocated joint cost.

3. Example of Cost Allocation - Where benefit for each purpose equals or exceeds its alternate cost.

Data applying to a dual-purpose structure are shown below. O & M costs are the capitalized values in all cases.

Basic Data

Costs of maintaining separate structures

normally involves the following:

<u>Item</u>	<u>Flood Prevention</u>	<u>Municipal Water</u>	<u>Total</u>
Benefits: normally capitalized value of the benefits to be realized when necessary.	\$50,000 (1)	\$45,500 (2) (Equal to Alt. Cost)	

*Alternate Installation Costs are \$35,000 (1) or \$40,000 (2)

*Alternate O&M Costs are \$5,000 (1) and \$5,500 (2) (capitalized operation and maintenance costs when necessary) of achieving

*Separable Installation Costs: 21,000 (3) 28,000 (4)

*Separable O&M Costs are \$2,500 (3) and \$3,000 (4) (able to be separated for achieving benefits). This is equal to the lesser value

Total Installation Costs \$62,000 (5)

Total O&M Costs: separable cost (including capitalized operation and maintenance when necessary) for each purpose. **8,000 (5)**

Notes: (1) Remaining benefits which are equal to the difference between (1) and (5).

* Must be determined by the design engineer.

(1) Alternate is a system of levees. (2) Difference

(2) Alternate is a system of wells and pumps. (3) Total

(3) Cost of elements of the dual purpose structure which can be omitted if flood prevention is not provided.

(4) Cost of elements of the dual purpose structure which can be omitted if municipal water is not supplied.

(5) Applying to the dual purpose structure.

by adding the separable cost to the allocated joint cost.

3. Example of Cost Allocation - Where benefit for each purpose equals or exceeds its alternate cost.

Data applying to a dual-purpose structure are shown below. O & M costs are the capitalized values in all cases.

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<u>Item</u>	<u>Computation</u>		<u>Total</u>
	<u>Flood Prevention</u>	<u>Municipal Water</u>	
1. Benefits	\$50,000	\$45,500 (1)	\$95,000
2. Alternate Costs-Installation	35,000	40,000	75,000
O&M	5,000	5,500	10,500
Subtotal	<u>40,000</u>	<u>45,500</u>	<u>85,500</u>
3. Benefit limited by alternate cost (lesser of 1 or 2)	40,000	45,500	85,500
4. Separable Costs-Installation	21,000	28,000	49,000
O&M	2,500	3,000	5,500
Subtotal	<u>23,500</u>	<u>31,000</u>	<u>54,500</u>
5. Remaining Benefits (3-4)	16,500	14,500	31,000
6. Allocated Joint Costs			
Installation	6,920 (4)	6,080 (5)	13,000 (2)
O&M	1,330 (6)	1,170 (7)	2,500 (3)
Subtotal	<u>8,250</u>	<u>7,250</u>	<u>15,500</u>
7. Total Allocated-Installation	27,920 (8)	34,080 (9)	62,000
O&M	<u>3,830 (10)</u>	<u>4,170 (11)</u>	<u>8,000</u>
TOTAL	\$31,750	\$38,250	\$70,000

Notes:

- (1) For purpose of benefit evaluation, it is considered that water is worth at least its cost to a municipality.
- (2) Total cost (62,000) less separable costs (49,000) = 13,000
- (3) Total cost (8,000) less separable costs (5,500) = 2,500
- (4) Prorated - $16,500 \times 13,000 / 31,000 = 6,920$
- (5) Prorated - $14,500 \times 13,000 / 31,000 = 6,080$
- (6) Prorated - $16,500 \times 2,500 / 31,000 = 1,330$
- (7) Prorated - $14,500 \times 2,500 / 31,000 = 1,170$
- (8) $21,000 + 6,920 = 27,920$
- (9) $28,000 + 6,080 = 34,080$
- (10) $2,500 + 1,330 = 3,830$
- (11) $3,000 + 1,170 = 4,170$

4. Example of Cost Allocation - Where benefit for each purpose is equal to or less than its alternate cost.

Data applying to a triple-purpose project are shown below. O&M costs are the capitalized values in all cases.

Item	Basic Data			
	Flood Prevention	Irrigation	Municipal Water	
Benefits	\$30,000	\$100,000	\$50,000	
*Alternate Installation Costs	35,000	95,000	45,000	
*Alternate O&M Costs	5,000	25,000	5,000	
*Separable Installation Costs	7,000 (1)	35,000 (1)	30,000 (1)	
*Separable O&M Costs	3,000 (1)	15,000 (1)	10,000 (1)	
Total Installation Costs		27,000 (1)	24,000 (1)	\$117,000 (2)
Total O&M Costs				\$ 43,000 (2)

Notes:

- * Must be determined by the design engineer.
- (1) Costs of the elements of the triple-purpose structure which can be omitted if the respective features (flood prevention, irrigation or municipal water) are not provided.
- (2) Applying to the triple-purpose structure.

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Computation

<u>Item</u>	<u>Flood Prevention</u>	<u>Irrigation</u>	<u>Municipal Water Supply</u>	<u>Total</u>
1. Benefits	\$30,000	\$100,000	\$50,000 (1)	\$180,000
2. Alternate Costs				
Installation	35,000	95,000	45,000	175,000
O&M	5,000	25,000	5,000	35,000
Subtotal	<u>40,000</u>	<u>120,000</u>	<u>50,000</u>	<u>210,000</u>
3. Benefits limited by alternate costs (lesser of 1 or 2)	30,000	100,000	50,000	180,000
4. Separable Costs				
Installation	7,000	35,000	30,000	72,000
O&M	3,000	15,000	10,000	28,000
Subtotal	<u>10,000</u>	<u>50,000</u>	<u>40,000</u>	<u>100,000</u>
5. Remaining Benefits (3-4)	20,000	50,000	10,000	80,000
6. Allocated Joint Costs				
Installation	11,250 (4)	28,125 (4)	5,625 (4)	45,000 (2)
O&M	3,750 (5)	9,375 (5)	1,875 (5)	15,000 (3)
Subtotal	<u>15,000</u>	<u>37,500</u>	<u>7,500</u>	<u>60,000</u>
7. Total Allocated Costs (6)				
Installation	18,250	63,125	35,625	117,000
O&M	<u>6,750</u>	<u>24,375</u>	<u>11,875</u>	<u>43,000</u>
TOTAL	\$25,000	\$87,500	\$47,500	\$160,000

Notes:

- (1) For purposes of benefit evaluation, it is considered that water is worth at least its cost to a municipality.
- (2) Total cost (117,000) less separable costs (72,000) = 45,000.
- (3) Total cost (43,000) less separable costs (28,000) = 15,000.
- (4) 45,000 prorated in proportion to Remaining Benefits, Item 5.
- (5) 15,000 prorated in proportion to Remaining Benefits, Item 5.
- (6) Separable cost (Item 4) + Allocated Joint Cost (Item 6).

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LETTER OF PRESIDENT JOHN F. KENNEDY TO THE SECRETARY OF THE INTERIOR; THE SECRETARY OF AGRICULTURE; THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE; AND THE SECRETARY OF THE ARMY

THE WHITE HOUSE,
May 15, 1962.

Your joint response to my memorandum of October 6, 1961, requesting you to review existing standards for the formulation and evaluation of water resources projects and to recommend any necessary changes constitutes a major improvement. You have done a difficult task well.

The statement of "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources" enclosed with your memorandum of today is approved for application by each of your Departments and by the Bureau of the Budget in its review of your proposed programs and projects.

There is need, as you indicate, for up-to-date policies, standards, and procedures relating to cost allocation, reimbursement, and cost sharing, and no doubt other water and related land resource subjects of mutual concern to your four Departments upon which uniformity and consistency would be in the public interest. Consideration of subjects such as these and establishment, with my approval, of necessary policies, standards, and procedures will be the responsibility of the Water Resources Council when it is created. In the meantime, I agree that you should move ahead now to a consideration of those subjects you have indicated need immediate attention.

JOHN F. KENNEDY.

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POLICIES, STANDARDS, AND PROCEDURES IN THE FORMULATION, EVALUATION, AND REVIEW OF PLANS FOR USE AND DEVELOPMENT OF WATER AND RELATED LAND RESOURCES

PURPOSE AND SCOPE

The purpose of this statement is to establish Executive policies, standards, and procedures for uniform application in the formulation, evaluation, and review of comprehensive river basin plans and individual project plans for use and development of water and related land resources. Problems of cost allocation and of reimbursement or cost sharing between the Federal Government and non-Federal bodies will be covered subsequently.

These provisions shall govern, insofar as they are consistent with law and other applicable regulations, all formulation, evaluation, and review of water and related land resources plans. Any proposed variation from these policies and standards shall be specified in planning reports and the reasons therefor indicated.

II. OBJECTIVES OF PLANNING

The basic objective in the formulation of plans is to provide the best use, or combination of uses, of water and related land resources to meet all foreseeable short- and long-term needs. In pursuit of this basic conservation objective, full consideration shall be given to each of the following objectives and reasoned choices made between them when they conflict:

A. Development

National economic development, and development of each region within the country, is essential to the maintenance of national strength and the achievement of satisfactory levels of living. Water and related land resources development and management are essential to economic development and growth, through concurrent provision for—

Adequate supplies of surface and ground waters of suitable quality for domestic, municipal, agricultural, and industrial uses—including grazing, forestry, and mineral development uses.

Water quality facilities and controls to assure water of suitable quality for all purposes.

Water navigation facilities which provide a needed transportation service with advantage to the Nation's transportation system.

Hydroelectric power where its provision can contribute advantageously to a needed increase in power supply

Flood control or prevention measures to protect people, property, and productive lands from flood losses where such measures are justified and are the best means of avoiding flood damage.

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Land stabilization measures where feasible to protect land and beaches for beneficial purposes

Drainage measures, including salinity control where best use of land would be justifiably obtained

Watershed protection and management measures where they will conserve and enhance resource use opportunities

Outdoor recreational and fish and wildlife opportunities where these can be provided or enhanced by development works.

Any other means by which development of water and related land resources can contribute to economic growth and development.

B. Preservation

Proper stewardship in the long-term interest of the Nation's natural bounty requires in particular instances that—

There be protection and rehabilitation of resources to insure availability for their best use when needed.

Open space, green space, and wild areas of rivers, lakes, beaches, mountains, and related land areas be maintained and used for recreational purposes; and

Areas of unique natural beauty, historical and scientific interest be preserved and managed primarily for the inspiration, enjoyment and education of the people.

C. Well-being of people

Well-being of all of the people shall be the overriding determinant in considering the best use of water and related land resources. Hardship and basic needs of particular groups within the general public shall be of concern, but care shall be taken to avoid resource use and development for the benefit of a few or the disadvantage of many. In particular, policy requirements and guides established by the Congress and aimed at assuring that the use of natural resources, including water resources, safeguard the interests of all of our people shall be observed.

III. PLANNING POLICIES AND PROCEDURES

A. National, regional, State, and local viewpoints

1. All viewpoints—national, regional, State, and local—shall be fully considered and taken into account in planning resource use and development. Regional, State, and local objectives shall be considered and evaluated within a framework of national public objectives and available projections of future national conditions and needs. Similarly, available projections of future conditions and needs of regions, States, and localities shall be considered in plan formulation.

2. Significant departures from a national viewpoint required to accomplish regional, State, or local objectives shall be set forth in planning reports by those charged with their preparation. Such reports shall also describe the present economy of the locality, State, and region, changes which can be expected on the basis of current trends, specific economic problems of the area, and the manner in which the project is expected to contribute to the sound economic growth and well-being of the locality, State, and region.

3. Comprehensive plan and project formulation shall be based upon an analysis of the relationship of goods and services to be provided

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by a proposed resource use or development to available projections of national, regional, State, and local requirements and objectives. From a national point of view, the analysis shall include, within practical limits, a comparison of the proposed resource use and development with alternative means available for providing similar goods and services to the area and other areas and an indication of its relationship, if any, to specific considerations of national security.

B. Multiple-purpose planning

Planning for the use and development of water and related land resources shall be on a fully comprehensive basis so as to consider—

(1) The needs and possibilities for all significant resource uses and purposes of development, including, but not limited to domestic, municipal, agricultural, and industrial uses of water; water quality control; navigation in relation to the Nation's transportation system; hydroelectric power; flood protection control or prevention, land and beach stabilization, drainage, including salinity control, watershed protection and management; forest and mineral production; grazing and cropland improvement, outdoor recreation, as well as sport and commercial fish and wildlife protection and enhancement, preservation of unique areas of natural beauty, historical and scientific interest, and

(2) All relevant means (including nonstructural as well as structural measures) singly, in combination, or in alternative combinations reflecting different basic choice patterns for providing such uses and purposes.

C. River basin planning

River basins are usually the most appropriate geographical units for planning the use and development of water and related land resources in a way that will realize fully the advantage of multiple use, reconcile competitive uses through choice of the best combination of uses, coordinate mutual responsibilities of different agencies and levels of government and other interests concerned with resource use. Planning use of water and related land resources, therefore, shall be undertaken by river basins, groups of closely related river basins, or other regions, and shall take full cognizance of the relationships of all resources, including the interrelationship between surface and ground water resources. Despite this primary confinement to an area, the fact should be recognized that such planning also requires consideration of pertinent physical, economic, and social factors beyond the area.

D. Individual project planning

To the extent feasible, programs and projects shall be formulated as part of a comprehensive plan for a river basin or other area, and the report proposing development shall indicate the relationship to the comprehensive plan. When a program or project has been formulated independently and not as part of a comprehensive plan, the report shall indicate, to the extent practicable, the relationship of the program or project to the probable later developments needed or to be undertaken in the basin and the reasons for proposing to proceed with the proposed program or project independently.

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E. Coordination within the Federal Government and with non-Federal interests

1. Federal planning shall be carried out on a coordinated basis from the earliest steps of investigation, survey, and planning through the entire planning and review process. When any Federal agency initiates an investigation or survey, it shall arrange for appropriate coordination and consideration of problems of mutual concern with other Federal agencies and with interested regional, State, and local public agencies and interests. When warranted, joint consideration of such problems shall be arranged. Full advantage is to be taken of all existing organizations and arrangements for coordination, such as river basin commissions, interagency committees, interstate bodies, and State and local agencies.

2. When plans for resource use or development affect the interests and responsibilities of other Federal agencies, the sponsoring agency shall, to the maximum extent practicable, consult with such agency or agencies in the field and at headquarters in conducting its investigation and preparing its report. When specific project proposals are contemplated, each affected agency shall be afforded an opportunity to participate in the investigations and surveys in an effort to develop fully coordinated proposals. Project reports shall include a statement of the extent of coordination achieved.

3. Before a report is submitted to the President and the Congress, each department or independent agency interested in the project and the concerned States shall be provided with copies of the proposed report, and given an opportunity to furnish a statement concerning the project proposal from the viewpoint of its interest and responsibility. Such statements shall be included in the reports submitted by a sponsoring agency. If such statements propose variations from the policies and standards specified herein, the reasons for each variation shall be stated. A sponsoring agency may submit a report without the views of any agency or State when a statement from that agency or State has not been received within 90 days after receipt of the project report or within such other period specified by law.

4. Planning by Federal agencies shall also be carried out in close cooperation with appropriate regional, State, or local planning and development and conservation agencies, to the end that regional, State, and local objectives may be accomplished to the greatest extent consistent with national objectives. When a proposed resource use or development affects the interest and responsibility of non-Federal public bodies, those bodies shall be furnished information necessary to permit them to evaluate the physical, economic, and social effects. Their views shall be sought, considered in preparation of reports and included in the final reports submitted to the President and the Congress or other approving authority.

F. Relation to existing law and executive orders

The policies, standards, and procedures set forth herein shall not be regarded as authorizing any deviation from general or specific requirements of law or Executive order. Whenever a plan or proposal varies from such policies, standards or procedures because of a requirement of existing law or Executive order, the variation shall be indicated, and reference made to the section of law or Executive order imposing such requirements.

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IV. REVIEW OF COMPREHENSIVE PLANS AND PROJECT PROPOSALS

With a view to arriving at general and specific independent judgments upon comprehensive plans, programs and project proposals, and parts thereof, as well as recommendations concerning such plans and proposals, review at all appropriate levels shall be based upon a thorough appraisal of planning reports and upon the following criteria:

- (a) Compliance with the statement of purpose and scope, objectives of planning, and planning policies and procedures set forth herein.
- (b) Compliance with law, legislative intent, and Executive policies and orders
- (c) Compliance with recognized technical standards.
- (d) Compliance with standards for the formulation of plans and evaluation of tangible and intangible effects as set forth herein

V. STANDARDS FOR FORMULATION AND EVALUATION OF PLANS

A. General setting, viewpoint, and procedures

1. Formulation of comprehensive and project plans, and evaluation of tangible and intangible effects shall reflect full consideration of, and adherence to the purpose and scope, objectives of planning, planning policies and procedures and criteria for review, as set forth herein.

2. Formulation and evaluation shall normally be based on the expectation of an expanding national economy in which increasing amounts of goods and services are likely to be required to meet the needs of a growing population, higher levels of living, international commitments, and continuing economic growth. Such an environment will necessitate relatively high and efficient levels of resource employment and a pattern of production in balance with the anticipated demand for goods and services.

3. Formulation and evaluation of plans or alternative plans shall be accomplished in such a way as to permit timely application of standards appropriate to conditions of: (a) Less than "full employment" nationally, and (b) chronic and persistent unemployment or underemployment in designated areas. Standards appropriate to (a) shall be those adopted at the time of existence of such condition and authorized by the President. Standards appropriate to condition (b) shall be used where an area has been so designated under the Area Redevelopment Act of 1961 (75 Stat. 47) or other authorized procedures relating to resource underemployment. In condition (b) project benefits shall be considered as increased by the value of the labor and other resources required for project construction, and expected to be used in project operation, project maintenance, and added area employment during the life of the project, to the extent that such labor and other resources would—in the absence of the project—be unutilized or underutilized. Such benefits should be clearly identified as redevelopment benefits for the purposes of cost allocation, cost-sharing procedures, and to indicate their significance for project justification.

4. A comprehensive public viewpoint shall be applied in the evaluation of project effects. Such a viewpoint includes consideration of all effects, beneficial and adverse, short range and long range, tangible

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and intangible, that may be expected to accrue to all persons and groups within the zone of influence of the proposed resource use or development. The adequacy of the coverage depends on how completely all effects can be traced and evaluated in comparable terms.

5 Full consideration shall be given to the opportunity and need for outdoor recreational and fish and wildlife enhancement in comprehensive planning for water and related land use and development, and project formulation and evaluation. Project plans shall include provision for public acquisition of lands and rights-of-way adjacent to proposed Federal or Federal-assisted water resource projects (additional to those needed for other uses and for public access) for administration by Federal, State, or local public bodies, as appropriate, to insure full ultimate realization of the outdoor recreational, fish and wildlife, and related resource enhancement opportunities of the project area. Plans shall indicate, in appropriate detail, all facilities needed for full development of the recreation and fish and wildlife potential, as well as specific indication of basic facilities required initially for access, health, safety, fire prevention, and use of the area.

6 Full consideration shall also be given in survey, investigation, and planning to the need for acquisition of lands necessary for all purposes of water resource development in advance of construction, so as to preserve these areas from encroachment by residential, commercial, industrial, and other development. Proposals to this end shall be set forth in special reports, or included in regular planning reports, when deemed necessary. Measures proposed should represent the minimum necessary action consistent with the objective of site preservation. Reliance should be placed, where feasible, on zoning and other measures by non-Federal authorities to keep lands on local tax rolls and control development until sites are needed for project purposes. Such measures should also include provisions for advance participation in construction or reconstruction of transportation facilities, when necessary, to avoid increased costs for relocation.

7 When there are major differences among technically possible plans conceived as desirable on the basis of consideration of intangible benefits and costs, in comparison with optimum plans based on tangible benefits and costs, alternative combinations of projects within a river basin or alternative projects, giving expression to these major differences, shall be planned. Comparison of their economic and financial costs shall be set forth in reports to provide a basis for selection among the alternatives by reviewing authorities in the executive branch and by the Congress. Minor differences, with regard to intangible considerations, shall be handled, to the extent practicable and economically feasible, by adjustments in plans. Planning reports shall clearly indicate alternatives, their consequences, and adjustments made to take account of these minor differences.

8. When secondary benefits are included in formulation and evaluation of a project proposal, planning reports shall indicate—

(a) The amount of secondary benefits considered attributable to the project from a national viewpoint. Such benefits, combined with primary benefits, shall be included in the computation of a benefit-cost ratio.

(b) Secondary benefits attributable to the project from a regional, State, or local viewpoint. Such benefits shall also be evaluated, when this procedure is considered pertinent, and an additional benefit-cost ratio computed.

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(c) Presentations in planning reports shall include an explanation of the nature of each type of secondary benefit taken into account from either viewpoint and the methods used in the computation of each of their values. The implications, from the national viewpoint, of considering secondary benefits of the project from a regional, State, or local viewpoint shall be set forth.

B. Specific setting for area under consideration

1. Reports on proposed plans shall include an analysis of present and projected future economic conditions in the project area and the contribution that comprehensive or project development may be expected to make toward the alleviation of problems and the promotion of economic growth and well-being within the zone of influence. Economic projections will be made to provide a basis for appraisal of conditions to be expected with and without the plans under consideration, and an estimate of the contribution that comprehensive development may make to increased national income and welfare, and regional growth and stability. Such analyses will frequently require a general economic study of the area, a study of all of its resources, an assessment of their functional relationships, their development potentials, possible adverse effects, and the locational situation with reference to resources, markets, transportation, climate, and social factors. Analyses should indicate the significance of the locality and the region in producing increased goods and services to meet foreseeable needs.

2. These analyses should be as extensive and intensive as is appropriate to the scope of the project being planned. They should provide essential information for identifying both immediate and long-range needs in economic and social terms and these needs should be expressed in a form useful for program formulation. Presentations in reports should identify—

(a) The relationship between economic development needs and opportunities and potential water and related land resource use and development;

(b) The economic and social consequences of complete or partial failure to satisfy these needs; and

(c) The possible improvements in economic efficiency, alleviation of unemployment, stabilization of production and income, community well-being, and the quality of goods and services that will be forthcoming.

C. Standards for formulation of plans

1. All plans shall be formulated with due regard to all pertinent benefits and costs, both tangible and intangible. Benefits and costs shall be expressed in comparable quantitative economic terms to the fullest extent possible.

2. Comprehensive plans shall be formulated initially to include all units and purposes which satisfy these criteria in quantitative economic terms:

(a) Tangible benefits exceed project economic costs.

(b) Each separable unit or purpose provides benefits at least equal to its costs.

(c) The scope of development is such as to provide the maximum net benefits.

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(d) There is no more economical means, evaluated on a comparable basis, of accomplishing the same purpose or purposes which would be precluded from development if the plan were undertaken. This limitation refers only to those alternative possibilities that would be physically displaced or economically precluded from development if the project is undertaken.

3. Net benefits are maximized when the scope of development is extended to the point where the benefits added by the last increment of scale (i.e., an increment of size of a unit, an individual purpose in a multiple-purpose plan or a unit in a comprehensive plan) are equal to the costs of adding that increment of scale. The increments to be considered in this way are the smallest increments on which there is a practical choice of omission from the plan.

4. Reports or plans shall indicate the scale of development that would result from application of the foregoing criteria considering tangible benefits and project economic costs expressed in comparable terms. This will provide a baseline from which the effect of considering intangibles can be judged.

5. Reports and plans shall also indicate the extent to which departures from that scale of development are proposed in order to take into account intangibles or other considerations warranting a modification in scale not reflected in the tangible benefits and project economic costs. For example, a higher degree of flood protection, particularly in urban areas, than is feasible on the basis of tangible benefits alone may be justified in consideration of the threat to lives, health, and general security posed by larger floods. Also, when long-range water needs are foreseeable only in general terms and where alternative means of meeting the needs are not available and inclusion of additional capacity initially can be accomplished at a significant savings over subsequent enlargement, such considerations may justify the additional cost required. Similarly, long-range power needs, in the light of generally expected economic growth of an area, may justify measures initially to insure later availability of the full power potential.

D) Definitions of benefits

1. Benefits: Increases or gains, net of associated or induced costs, in the value of goods and services which result from conditions with the project, as compared with conditions without the project. Benefits include tangibles and intangibles and may be classed as primary or secondary.

2. Tangible benefits: Those benefits that can be expressed in monetary terms based on or derived from actual or simulated market prices for the products or services, or, in the absence of such measures of benefits, the cost of the alternative means that would most likely be utilized to provide equivalent products or services. This latter standard affords a measure of the minimum value of such benefits or services to the users. When costs of alternatives are used as a measure of benefits, the costs should include the interest, taxes, insurance, and other cost elements that would actually be incurred by such alternative means rather than including only costs on a comparable basis to project costs as is required when applying the project formulation criteria under paragraph V-C-2(d).

3. Intangible benefits: Those benefits which, although recognized as having real value in satisfying human needs or desires, are not

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fully measurable in monetary terms, or are incapable of such expression in formal analysis. Each type of benefit usually has a part which is readily measurable and may have a part which is not measurable or not readily measurable. The significance of this latter part shall be based upon informed judgment.

4. Primary benefits. The value of goods or services directly resulting from the project, less associated costs incurred in realization of the benefits and any induced costs not included in project costs.

5. Secondary benefits. The increase in the value of goods and services which indirectly result from the project under conditions expected with the project as compared to those without the project. Such increase shall be net of any economic nonproject costs that need be incurred to realize these secondary benefits.

E. Types of primary benefits and standards for their measurement

1. Domestic, municipal, and industrial water supply benefits. Improvements in quantity, dependability, quality, and physical convenience of water use. The amount water users should be willing to pay for such improvements in lieu of foregoing them affords an appropriate measure of this value. In practice, however, the measure of the benefit will be approximated by the cost of achieving the same results by the most likely alternative means that would be utilized in the absence of the project. Where such an alternative source is not available or would not be economically feasible, the benefits may be valued on such basis as the value of water to users or the average cost of raw water (for comparable units of dependable yield) from municipal or industrial water supply projects planned or recently constructed in the general region.

2. Irrigation benefits. The increase in the net income of agricultural production resulting from an increase in the moisture content of the soil through the application of water or reduction in damages from drought.

3. Water quality control benefits. The net contribution to public health, safety, economy, and effectiveness in use and enjoyment of water for all purposes which are subject to detriment or betterment by virtue of change in water quality. The net contribution may be evaluated in terms of avoidance of adverse effects which would accrue in the absence of water quality control, including such damages and restrictions as preclusion of economic activities, corrosion of fixed and floating plant, loss or downgrading of recreational opportunities, increased municipal and industrial water treatment costs, loss of industrial and agricultural production, impairment of health and welfare, damage to fish and wildlife, siltation, salinity intrusion, and degradation of the esthetics of enjoyment of unpolluted surface waters, or, conversely, in terms of the advantageous effects of water quality control with respect to such items. Effects such as these may be composited roughly into tangible and intangible categories, and used to evaluate water quality control activities. In situations where no adequate means can be devised to evaluate directly the economic effects of water quality improvement, the cost of achieving the same results by the most likely alternative may be used as an approximation of value.

4. Navigation benefits. The value of the services provided after allowance for the cost of the associated resources required to make the service available. For commodities that would move in the

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absence of the project, the benefit is measured by the saving as a result of the project in the cost of providing the transportation service. For commodities that will move over the improved waterway but would not move by alternative means, the measure of the benefit is the value of the service to shippers; that is, the maximum cost they should be willing to incur for moving the various units of traffic involved. Navigation improvements may also provide benefits in other forms, such as reduction in losses due to hazardous or inadequate operating conditions and enhancement in land values from the placement of dredged spoil.

5. Electric power benefits: The value of power to the users is measured by the amount that they should be willing to pay for such power. The usual practice is to measure the benefit in terms of the cost of achieving the same result by the most likely alternative means that would exist in the absence of the project. In the absence of economically feasible alternative means, the value of the power to users may be measured by any savings in production costs, increase in value of product that would result from its use, or its net value to consumers.

6. Flood control and prevention benefits: Reduction in all forms of damage from inundation (including sedimentation) of property, disruption of business and other activity, hazards to health and security, and loss of life; and increase in the net return from higher use of property made possible as a result of lowering the flood hazard.

7. Land stabilization benefits: Benefits accruing to landowners and operators and the public resulting from the reduction in the loss of net income, or loss in value of land and improvements, through the prevention of loss or damage by all forms of soil erosion including sheet erosion, gulying, flood plain scouring, streambank cutting, and shore or beach erosion, or, conversely in terms of advantageous effects of land stabilization.

8. Drainage benefits: The increase in the net income from agricultural lands or increase in land values resulting from higher yields or lower production costs through reduction in the moisture content of the soil (exclusive of excessive moisture due to flooding), and the increase in the value of urban and industrial lands due to improvement in drainage conditions.

9. Recreation benefits: The value as a result of the project of net increases in the quantity and quality of boating, swimming, camping, picnicking, winter sports, hiking, horseback riding, sightseeing, and similar outdoor activities. (Fishing, hunting, and appreciation and preservation of fish and wildlife are included under par. V-E-10.) In the general absence of market prices, values for specific recreational activities may be derived or estimated on the basis of a simulated market giving weight to all pertinent considerations, including charges that recreationists should be willing to pay and to any actual charges being paid by users for comparable opportunities at other installations or on the basis of justifiable alternative costs. Benefits also include the intangible values of preserving areas of unique natural beauty and scenic, historical, and scientific interest.

10. Fish and wildlife benefits: The value as a result of the project of net increases in recreational, resource preservation, and commercial aspects of fish and wildlife. In the absence of market prices, the value of sport fishing, hunting, and other specific recreational forms of fish

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and wildlife may be derived or established in the same manner as prescribed in paragraph V-E-9. Resource preservation includes the intangible value of improvement of habitat and environment for wildlife and the preservation of rare species. Benefits also result from the increase in market value of commercial fish and wildlife less the associated costs.

11. Other benefits: Justification of the recognition of any other benefits and of the standard used in their measurement shall be set forth in reports. Unless included under one or more of the above categories, reports should show the net economic effects of changes in transportation capability, or changes in productivity of forest, range, mineral, or other resources. A project's contribution toward meeting specific needs for servicing international treaties or for national defense may also be included.

F. Definition of costs

1. Project economic costs: The value of all goods and services (land, labor, and materials) used in constructing, operating, and maintaining a project or program, interest during construction, and all other identifiable expenses, losses, liabilities, and induced adverse effects connected therewith, whether in goods or services, whether tangible or intangible and whether or not compensation is involved. Project economic costs are the sum of installation costs; operation, maintenance, and replacement costs; and induced costs as defined below.

2. Installation costs: The value of goods and services necessary for the establishment of the project, including initial project construction; land, easements, rights-of-way, and water rights; capital outlays to relocate facilities or prevent damages; and all other expenditures for investigations and surveys, and designing, planning, and constructing a project after its authorization.

3. Operation, maintenance, and replacement costs: The value of goods and services needed to operate a constructed project and make repairs and replacements necessary to maintain the project in sound operating condition during its economic life.

4. Induced costs: All uncompensated adverse effects caused by the construction and operation of a program or project, whether tangible or intangible. These include estimated net increases, if any, in the cost of Government services directly resulting from the project and net adverse effects on the economy such as increased transportation costs. Induced costs may be accounted for either by addition to project economic costs or deduction from primary benefits.

5. Associated costs: The value of goods and services over and above those included in project costs needed to make the immediate products or services of the project available for use or sale. Associated costs are deducted from the value of goods and services resulting from a project to obtain primary benefits.

6. Taxes: Allowances in lieu of taxes or taxes foregone will not be included in project economic costs, except as required by law.

G. Time considerations

1. *Period of analysis* —The economic evaluation of a project shall encompass the period of time over which the project will serve a useful purpose. Thus, the period of analysis should be the shorter of either the physical life or the economic life of the structure, facility, or im-

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provement. However, because of the difficulty in defining the more remote future conditions and the discount of long-deferred values, 100 years will normally be considered the upper limit of the period of analysis.

2 *Discount rate* The interest rate to be used in plan formulation and evaluation for discounting future benefits and computing costs, or otherwise converting benefits and costs to a common time basis shall be based upon the average rate of interest payable by the Treasury on interest-bearing marketable securities of the United States outstanding at the end of the fiscal year preceding such computation which, upon original issue, had terms to maturity of 15 years or more. Where the average rate so calculated is not a multiple of one-eighth of 1 percent, the rate of interest shall be the multiple of one-eighth of 1 percent next lower than such average rate.

This procedure shall be subject to adjustment when and if this is found desirable as a result of continuing analysis of all factors pertinent to selection of a discount rate for these purposes.

3 *Price levels.*—The prices used for project evaluation should reflect the exchange values expected to prevail at the time costs are incurred and benefits accrued. Estimates of initial project costs should be based on price relationships prevailing at the time of the analysis. Estimates of benefits and deferred costs should be made on the basis of projected normal price relationships expected with a stabilized general price level and under relatively full employment conditions for the economy. Pending development of mutually acceptable long-term price projections of this type, normalized current price relationships may be used in estimating deferred project effects. When benefits are measured in terms of the cost of an alternative, the prices should be those expected to prevail at the time such costs would have been incurred. Whenever project production is expected to influence prices significantly, the use of a price about midway between those expected with and without the project may be justified to reflect the public values involved. Appropriate price adjustments should be made where there is a limited foreseeable need or demand for the products or services to be provided by the project.

VI. RELATION TO COST ALLOCATION, REIMBURSEMENT AND COST-SHARING POLICIES, STANDARDS, AND PROCEDURES

Cost allocation, reimbursement and cost-sharing policies, standards, and procedures, as indicated in the section on "Purpose and Scope," above, are not generally included herein. Nevertheless, certain such matters of special importance in relation to the foregoing are included, as follows:

(a) All project purposes shall be treated comparably in cost allocation and each is entitled to its fair share of the advantages resulting from the multiple-purpose project or program. Project purposes to which costs may be allocated on a par with all other purposes, without restrictions regarding reimbursement or cost-sharing policies, shall include (but not be limited to) the following:

- Domestic, municipal, or industrial water supply.
- Irrigation.
- Water quality control.
- Navigation.

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Hydroelectric power.

Flood control and prevention.

Land and beach stabilization.

Drainage, including salinity control.

Outdoor recreation development.

Fish and wildlife development.

Other purposes, such as area redevelopment and the servicing of international treaties and national defense when specific, quantifiable benefits are provided for such purposes by a project or program.

(b) Allocated costs, determined in accordance with principles and procedures to be established subsequently, shall provide a basis for consideration of reimbursement and cost-sharing arrangements.

(c) The period of analysis and discount rate established herein for purposes of formulation and evaluation of comprehensive plans and project plans (sec V-G-1 and 2) shall not be construed as establishing the payout period or rate of interest to be used in reimbursement and cost-sharing arrangements.

(d) Planning reports of each department shall include appropriate recommendations covering reimbursement and cost-sharing arrangements and provide a detailed explanation of the basis used in arriving at the recommendations in consideration of the laws and administrative provisions in effect at the time.

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