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Proj. No 386) 233-
PN
PD-ADD-093-B1 (2)

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

INDIA - BEAS DAM PROJECT

386-22-120-233

386-A-126

Reference letter
to
S. G. P. I.
from
A. J. D.

AID-DLC/P-278 Revised

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

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AID-DLC/P-278 REVISED
August 4, 1964

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: India - Beas Dam Project

Attached are the revised recommendations for authorization of a loan in an amount not to exceed \$33,000,000 to assist in financing the foreign exchange costs of goods and services, including associated advisory services, for the construction of a dam at Pong on the Beas River suitable for irrigation and the generation of electric power.

This paper has been revised in the office of NES_A/CDF following the discussion of the loan by the Development Loan Staff Committee at its meeting on July 22, 1964. You will be advised when action is required by the Development Loan Committee.

Helen E. Nelson
Secretary
Development Loan Committee

Attachments:
Summary and Recommendations
Project Analysis
Annexes I-III

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
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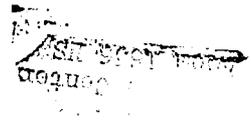
CAPITAL ASSISTANCE PAPER

INDIA - BEAS DAM PROJECT

INDEX

	<u>Page</u>
SUMMARY AND RECOMMENDATIONS	1
INTRODUCTION	1
SECTION I: THE BORROWER AND THE BEAS CONTROL BOARD	2
A. The Borrower	2
B. The Beas Control Board	2
C. Organization for the Beas Dam Project	3
D. Organization for the Rajasthan Canal and Irrigation Unit.	4
SECTION II: BACKGROUND OF THE PROJECT	5
A. The Water Dispute	5
B. The Indus Valley Water Settlement	5
C. Problems with Fulfillment of the DLF Commitment	8
D. Satisfaction of the DLF Conditions	9
E. Refusal of A.I.D. to Finance Unit I	11
SECTION III: DESCRIPTION OF THE PROJECT	12
A. Irrigation Plans in the Punjab and Rajasthan States	12
B. The Beas Dam Project	13
C. Current Status of the Beas Dam Project	16

UNCLASSIFIED



INDEX

Page

SECTION IV: TECHNICAL ANALYSIS OF THE PROJECT	18
A. Background of the Bureau of Reclamation Report	18
B. Highlights of the Bureau's Findings	18
C. A.I.D. Assessment	27
D. Conclusion	28
SECTION V: FINANCIAL ANALYSIS OF THE PROJECT	29
A. Total Cost of the Project	29
B. Foreign Exchange Cost of the Project	30
C. Sources of Funds	30
D. Use of Funds	32
E. Repayment of the A.I.D. Loan in Indian Currency	34
F. Prospects of Repayment	35
G. Conclusion	35
SECTION VI: ECONOMIC ANALYSIS OF THE PROJECT	36
A. Description of the Rajasthan Canal and Irrigation Unit	36
B. Section 611(b)	37
C. Benefit-Cost Calculation	39
D. Pay Out Calculations	42
E. Conclusion	42
F. Comments on Irrigation of the Rajasthan Desert	42

INDEX

Page

SECTION VII: OTHER ASPECTS OF THE PROJECT 44

A. Views of the GOI, the Country Team, and Eximbank . . . 44

B. Impact on the U.S. Economy 44

C. Implementation of the Project 44

ANNEX I - EXHIBITS

ANNEX II - CHECK LIST OF STATUTORY CRITERIA

ANNEX III - DRAFT AUTHORIZATION

INDIA - BEAS DAM PROJECT

SUMMARY AND RECOMMENDATIONS

1. BORROWER: The Government of India (GOI). The Beas Dam Project is being carried out by the Beas Control Board, a government organization which is responsible for development of the Beas River for both irrigation and power purposes.
2. AMOUNT AND USE OF THE LOAN: \$33 million. The A.I.D. loan would be used primarily for the foreign exchange cost of construction equipment including spare parts, plus permanent equipment, necessary to carry out the project. Some consulting services and foreign training also would be financed.
3. TOTAL COST OF THE PROJECT: Total initial cost of the Beas Dam Project is estimated at the equivalent of about \$254 million. The foreign exchange requirement would be met from the A.I.D. loan and funds to be provided by the IBRD and the GOI. The rupee component is being and will continue to be met from annual budgets of the GOI.
4. PURPOSE: The loan would assist India to irrigate desert land for agricultural purposes and to produce hydroelectric power.
5. DESCRIPTION OF THE BEAS DAM PROJECT: The Beas Dam forms part of the development of the Beas River. The dam will regulate the flow of the river for irrigation and electric power purposes. The prime purpose is to provide irrigation in the States of Rajasthan and the Punjab. A secondary and incidental purpose is production of hydroelectric energy as water is released from the reservoir, although costs attributable exclusively to the power element will not be financed under the loan.

The dam will be of earth and gravel fill construction, totaling about 40 million cubic yards in the embankment and well over one million cubic yards of concrete in the power plant and appurtenant structures. The reservoir will have a capacity of 6.55 million acre feet, of which 5.50 million acre feet will be live storage. Most of the water released from the reservoir will pass through a power plant and generate hydroelectric energy. The power plant will have an ultimate capacity of six units totaling 360 megawatts.

6. THE BEAS RIVER DEVELOPMENT: The Beas River development may be subdivided into three major units. The Beas Dam Project forms the so-called Unit II of this development. The A.I.D. loan would finance equipment and services for Unit II, as well as some consulting services concerning irrigation of the Rajasthan desert.

The Rajasthan Canal and Irrigation Unit involves irrigation of a vast desert area of Rajasthan State. The Beas Dam (Unit II) and the Rajasthan Unit are bound together by the fact that the prime purpose of the Beas Dam is to regulate water for irrigation of this desert.

The third unit of the Beas River development is the so-called Beas-Sutlej Link (Unit I), which involves diverting water from the Beas River to the Sutlej River by means of a diversion dam and two diversion tunnels to produce hydroelectric power and irrigate other lands. Unit I can be considered a project unto itself.

A map locating these three units is contained in Annex I of this paper.

7. BACKGROUND: In connection with the important Indus Valley water settlement between India and Pakistan in 1960, the Development Loan Fund (DLF) and the IBRD allocated \$33 million and \$23 million respectively to assist the GOI in meeting the foreign exchange costs of diverting irrigation water from the Beas River and producing hydroelectric power.

DLF's allocation was made subject to certain conditions. These included receipt of information necessary to satisfy our normal loan criteria, including the predecessor section of Section 611 of the Foreign Assistance Act (FAA)*, commitment by the IBRD of a loan for a portion of the foreign exchange costs, ratification by India and Pakistan of the Indus Waters Treaty, entry into force of the Indus Basin Development Fund Agreement, and agreement on methods of administration of the A.I.D. and IBRD funds.

These conditions have been met to the satisfaction of A.I.D. A.I.D. is satisfied that the Beas Dam Project now is technically, financially, and economically sound and feasible, and that the requirements of Section 611 of the FAA are met.

Both A.I.D. and IBRD are proceeding to recommend execution of their respective loans.

8. EXIMBANK CLEARANCE: The Eximbank has cleared this project for A.I.D. consideration. Official date of the clearance is June 23, 1964.

*The predecessor section is Section 517 of the Mutual Security Act. Section 611 and Section 517 are essentially similar.

9. VIEWS OF THE COUNTRY TEAM: The Country Team supports the project and recommends approval of the loan.
10. STATUTORY CRITERIA: All statutory criteria have been met. See Annex II for details.
11. ISSUES: All outstanding issues have been resolved. The important issues were:
 - a. At the time of allocation of the funds by DLF and IBRD (June 29, 1960), no adequate loan application had been submitted. The intent of DLF was that DLF's funds eventually would be administered by the IBRD under IBRD's normal project standards, which would require that the engineering, financial, and other planning requirements of IBRD be satisfied before any funds were disbursed.* No independent DLF analysis was to be performed. Both IBRD and DLF funds were to be used primarily for the purchase of construction equipment.

Subsequently, however, IBRD determined that it was not satisfied with the GOI's planning for the Beas River development as a whole, and was unwilling to proceed in accordance with its normal standards and requirements. IBRD decided to proceed with execution of its loan in satisfaction of its original political commitment, even though its normal standards were not met. At this point, A.I.D. could not look to the IBRD for satisfaction of reasonable project requirements, and it became necessary for A.I.D. to apply its regular standards. A.I.D. thus undertook its own detailed investigation of the project. The Bureau of Reclamation of the U.S. Department of the Interior assisted A.I.D. in this investigation.
 - b. The DLF allocation originally was intended only for use on the Beas Dam (Unit II) of the Beas River development. Subsequently, study by the GOI of Unit I was undertaken, and in 1963 the GOI requested that both A.I.D. and IBRD permit their loan funds to be used for the purchase of construction equipment and services for both Units I and II of the project. A.I.D.'s study of Unit I, however, has indicated that its requirements cannot be considered satisfied at this time. We advised the GOI in February 1964 that we could not consider permitting A.I.D. loan funds to be used for Unit I of the Beas development.
 - c. The prime purpose of the Beas Dam is to divert water of the Beas River for the purpose of irrigating the Rajasthan Desert. Hydroelectric power production is but a secondary purpose of the project. Unit II and the Rajasthan Canal and Irrigation Unit thus are

*This would have been sufficient to satisfy the application requirements of Section 202(c) of the Mutual Security Act as then in effect.

- iv -

functionally bound together, and the A.I.D. accordingly must concern itself with the successful planning and development of this irrigation. The GOI has been advised that any loan for Unit II will include appropriate conditions and covenants relating to irrigation of the Rajasthan desert, although it is not proposed to provide any financing from the loan for the Rajasthan project other than assisting in additional planning through the financing of some consulting services.

- d. The understanding among all parties concerned at the time of allocation of the funds was that repayment of the DLF loan, plus payment of interest, would be made in Indian rupees. This remains the GOI understanding. Accordingly, rupee repayment of this loan is recommended.

The IBRD loan would be repayable in the currencies disbursed, in accordance with IBRD's standard procedure.

- e. It is further recommended that this loan not be counted under the U.S. consortium commitments to India. This has been the general assumption of the parties concerned all along. The IBRD loan also would not fall under the IBRD's consortium commitments to India.

12. RECOMMENDATIONS: It is recommended that a loan in an amount not to exceed Thirty Three Million Dollars (\$33,000,000) be made to the Government of India for the Beas Dam Project, with the following terms:

- a. Repayment by the Government of India in no more than thirty (30) years from the date of the first disbursement under the loan, including a grace period of not to exceed ten (10) years. However, the repayment period and grace period may be reduced if and to the extent necessary to make them, or either of them, coequal with the corresponding period or periods of the loan from the International Bank for Reconstruction and Development (IBRD).
- b. Payment of interest of three and one-half percent (3-1/2%) per annum on all amounts of outstanding principal.
- c. Provision shall be made for repayment of the loan and payment of the interest in Indian rupees, and for appropriate maintenance of value obligations.
- d. Equipment, materials and services financed under the loan shall be procured from the United States.
- e. The terms under which the A.I.D. loan funds are relent to the project authorities shall be acceptable to A.I.D.

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- f. No disbursements shall be made under the loan prior to receipt by A.I.D. of a fully executed and delivered loan agreement satisfactory to A.I.D. providing for a loan from the IBRD to the Government of India of not less than the equivalent of Twenty Three Million Dollars (\$23,000,000), the proceeds of which to be made available to assist in financing the foreign exchange costs of importing equipment for the construction of works for extending irrigation in the States of the Punjab and Rajasthan and for developing hydroelectric power from the Beas River.
- g. Appropriate conditions and/or covenants relating to the further planning and development of irrigation facilities for the Rajasthan desert, and the utilization of such facilities, shall be included in the loan agreement.
- h. Satisfactory assurances shall be provided by the Government of India that such foreign exchange and local currency, additional to that to be made available by the A.I.D. and IBRD loans, as may be necessary to complete and operate the project in an orderly and efficient manner will be made available by the Government of India when necessary.
- i. Satisfactory assurance shall be provided by the Government of India that the recommendations of the Bureau of Reclamation of the U.S. Department of Interior concerning this project have been substantially accepted and will substantially be given effect. The GOI also will assure A.I.D. that it will consider to the satisfaction of A.I.D. any further recommendations on the project made by A.I.D.
- j. The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

CAPITAL ACTIVITY COMMITTEE MEMBERS:

Loan Officer: Raymond C. Malley, NESAs/CDF
Engineer : Kenneth Vernon, NESAs/ENGR
Counsel : Kenneth F. Phillips, GC
India Desk : Seymour Miller, NESAs/SA

DRAFTING OFFICERS:

Raymond C. Malley/Kenneth Vernon/hoa/icc

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ATD-DLC/P-278
August 4, 1964

INDIA - BEAS DAM PROJECT

INTRODUCTION

The Beas River is one of the rivers of the vast Indus Basin system of western India and West Pakistan. India is now developing this river for both irrigation and power purposes. The Beas Dam Project is an important part of the development, and is the specific project that would be assisted by the proposed A.I.D. loan.

The maps attached in Annex I provide useful references for the reader.

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SECTION I: THE BORROWER AND THE BEAS CONTROL BOARD

A. The Borrower

The Borrower would be the Government of India, which would repay the loan to A.I.D. under the recommended terms and conditions.

B. The Beas Control Board

The organization responsible for development of the Beas River is the Beas Control Board, on which is represented the Central Government and the States of the Punjab, Rajasthan, and Himachal Pradesh.

This high level 15 member Board is constituted as follows:

- | | |
|--|----------|
| 1. Governor of the Punjab (Mr. Hafiz Mohd
Abraham at present) | Chairman |
| 2. Lt. Governor of Himachal Pradesh (the
prefix Lt. means Governor of a
smaller State) | Member |
| 3. Chief Minister of the Punjab | Member |
| 4. Chief Minister of Rajasthan | Member |
| 5. Irrigation and Power Minister of the
Punjab | Member |
| 6. Irrigation and Power Minister of
Rajasthan | Member |
| 7. Secretary to Government of India,
Ministry of Irrigation and Power
(Mr. V. Nanjappa at present) | Member |
| 8. Chairman, Central Water and Power
Commission (Mr. M. R. Chopra at
present) | Member |
| 9. Chief Secretary to Government of
Himachal Pradesh | Member |

- | | |
|---|--------|
| 10. Joint Secretary of Finance, Government of India | Member |
| 11. Secretary to Government of the Punjab, Irrigation and Power Development | Member |
| 12. Secretary to Government of Rajasthan, Irrigation and Power Development | Member |
| 13. Secretary to Government of the Punjab, Finance Department | Member |
| 14. Secretary to Government of Rajasthan, Finance Department | Member |
| 15. General Manager, Beas Project | Member |

Members 7 through 15 above make up the Standing Committee of the Beas Control Board, with the Secretary to the Government of India, Ministry of Irrigation and Power, presiding. The Standing Committee acts on behalf of the Board, and generally meets every four to six weeks, or whenever necessary. A group composed of members No. 7, 10, 13, and 15 can take expeditious decisions in cases requiring emergency action.

The General Manager of the Beas Project is Mr. R. S. Gill. There are separate organizational units to carry out both Units I (Beas-Sutlej Link) and Unit II (Beas Dam Project) of the Beas River development, as well as other units for Project Planning and Designs and Administration. An organization chart is contained in Annex I.

C. Organization for the Beas Dam Project

Many of the personnel working on the Beas Dam Project of the Beas River development have been taken from various segments of the Punjab State Public Works Department, Irrigation Branch, and the Punjab State Electricity Board. A good many qualified engineers were secured from the important Bhakra Dam and Nangal Dam Projects, where their work was completed.

The acting Chief Engineer for the Beas Dam Project is Mr. O. P. Kalsy, who also is the Director of Construction for the Project. It is anticipated that Mr. Kalsy will be appointed formally to Chief Engineer in the near future. There are chief directors for Construction, Inspection and Control, and Plant Designs, and these subunits themselves are further divided as appropriate for this type of project. An organization chart for the Beas Dam Project is attached in Annex I.

The organizations described above have been actively at work for some time. The high level membership of the Beas Control Board and the existence of the Standing Committee and emergency group give reasonable assurance that important policy and operational decisions will continue to be taken promptly and effectively, while the experience of the personnel engaged on the Beas Dam Project gives reasonable assurance that this project will be prosecuted in an orderly and effective manner.

D. Organization for the Rajasthan Canal and Irrigation Unit

The Beas Control Board is responsible for Unit I (Beas-Sutlej Link) and Unit II (Beas Dam Project) of the Beas River development. A separate organization is carrying out the Rajasthan Canal and Irrigation Unit. The three man committee responsible for the latter consists of a representative of the Central Government plus the Chief Ministers of the States of the Punjab and Rajasthan. An organization chart is contained in Annex I.

SECTION II: BACKGROUND OF THE PROJECT

A. The Water Dispute

The Indus River and its tributaries rise in the Himalaya Mountains. The total plan for development of the Indus River Basin basically calls for the allocation of the waters of the three eastern rivers (the Beas, Sutlej, and Ravi) to India and the three western rivers (the Indus, Jhelum, and Chenab) to Pakistan. The exceptions to these allocations are clearly defined. The division and utilization of these waters is being accomplished through the construction of a vast network of dams, power facilities, barrages, canals, tubewells, irrigation works, and the like.

The Beas Dam Project is part of the development of the Beas River by the Indians.

The problem of distribution of the Indus waters was a long standing dispute carried on primarily between the provinces of the Punjab and Sind in undivided India. With the formation of Pakistan, the border between India and Pakistan was drawn across the Indus River system, and Pakistan was the downstream riparian on all the rivers. The resultant dispute over division of the waters ranked for years alongside the Kashmir dispute as a chief cause of strained relations between the two countries.

B. The Indus Valley Water Settlement

In 1951, President Eugene R. Black offered the good offices of the International Bank for Reconstruction and Development (IBRD) to the two countries in an attempt to find a solution to the dispute. He suggested that the countries work together with the help of the IBRD to devise a comprehensive plan for use of the waters that would substantially increase the amount of useful water available to both of them. It became evident that strained political relations between the two countries meant that an acceptable plan could not be based on cooperative development, but must merely divide the waters in mutually agreeable manner so that they could be separately developed by the two countries.

Years of work and negotiation ultimately led to a solution in 1960, which was formalized in the Indus Waters Treaty signed September 19, 1960. Waters of the Beas, Sutlej, and Ravi Rivers would be partially diverted by India. To "replace" these waters, Pakistan would construct a series of dams, conveyance canals, and other works on the Indus, Jhelum, and Chenab Rivers. Financial assistance would be provided to Pakistan for this purpose. The estimated total cost of all the works included in the plan was over one billion dollars.

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The Indus Waters Treaty did not include specific mention of financial assistance to India. However, the IBRD had conducted discussions with the U.S. Government on this point, and the promise of such assistance was recognized as a "quid pro quo" to India in obtaining ratification of the treaty.

The Indian works on the Beas River contemplated construction of a dam at a site called Pong for irrigation and power purposes, which project is now called the Beas Dam Project. The U.S. Government, through the Development Loan Fund (DLF), agreed to lend an amount of not to exceed \$33 million to the GOI to assist in this project once certain requirements were met, while the IBRD agreed to lend the equivalent of \$23 million. The GOI would fund the local currency costs of the project.

Following extended conversations between the GOI, IBRD, and DLF, the Board of Directors of the DLF on June 29, 1960, took the following action as recorded in the Board minutes:

India - (Indus Basin) Beas Dam Project

The recommendations [. . .] for authorization of an allocation of DLF funds in an amount not to exceed \$33,000,000 [. . .] were considered by the Board. The Chairman noted the reasons underlying this recommended action, and stated that if the Board approved the recommended action it was proposed to advise the IBRD accordingly. The Board of Directors indicated its willingness to participate in the financing of the foreign exchange costs of the Indian works by the making of a dollar loan, repayable in local currency, in the amount not to exceed \$33,000,000 subject to the conditions set forth [. . .] and, after full discussions by members of the Board and upon motion duly made, seconded and unanimously carried, the Board approved the allocation of \$33,000,000 of available DLF funds on its books for purposes of such a loan.

On the same day, Mr. C. Douglas Dillon, Undersecretary in the Department of State, sent a letter to Mr. Black as follows:

"We understand that the Government of India has requested from you assurances with respect to the availability of financing contemplated by your memorandum of July 13, 1959, for the Indian Development Works comprised within the plan developed by the International Bank for Reconstruction and Development for settlement of the Indus Waters question, and that the Government of India has indicated that it wants to receive such assurances before execution of the Indus Waters Treaty.

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We further understand that you are giving the Government of India the requested assurance with respect to the availability of financing contemplated from the International Bank for Reconstruction and Development, and you have asked us to furnish you with an assurance for transmittal to the Government of India with respect to the availability of the financing from the Government of the United States for the Indian Development Works contemplated by your memorandum.

"This will advise you that the Board of Directors of the Development Loan Fund has affirmed its willingness to participate in the financing of such Indian works by the making of a dollar loan, repayable in local currency, in the amount of not to exceed \$33,000,000, to meet a portion of the foreign exchange costs of the construction of such works, subject to the following: (i) the receipt by the Development Loan Fund of a detailed application satisfactory to it and containing the information required by Section 517 of the Mutual Security Act, (ii) ratification by the Governments of India and Pakistan of the Indus Waters Treaty, (iii) entry into force of the Indus Basin Development Fund Agreement, (iv) authorization by the International Bank for Reconstruction and Development of a loan to the Government of India for purposes of financing an appropriate portion of the foreign exchange costs of construction of the Indian works (\$23,000,000 on the basis of present cost estimates), and (v) working out by the Government of India, the Development Loan Fund and the International Bank for Reconstruction and Development of detailed terms and conditions for the administration of funds to be disbursed pursuant to the Development Loan Fund loan and the International Bank for Reconstruction and Development loan.

"The Development Loan Fund has formally allocated \$33,000,000 of its available funds on its books for purposes of such a loan.

"The Government of the United States will, furthermore, as in the past, maintain its interest in the economic development of India and will hope to continue in the future to make such contributions towards such development as its resources permit, in addition to its contributions with respect to Indus Waters."

A copy of the above letter was transmitted to the GOI by the IBRD. This letter, together with other assurances of the willingness of the U.S. Government to participate in the financing of the settlement plan, constituted a firm commitment by the U.S., and helped make possible the final execution of the Indus Waters Treaty between India and Pakistan.

C. Problems with Fulfillment of the DLF Commitment

As the above letter indicates, the DLF commitment was made conditional on the fulfillment of several factors, notably satisfaction of Section 517 of the Mutual Security Act, the predecessor of Section 611 of the Foreign Assistance Act (FAA).

It was well known at the time that planning for the Beas Dam Project had not been completed, and that a formal application for a loan could not be made by the GOI for possibly 18 to 24 months. The DLF was proceeding on the assumption that the project would be under the supervision of the IBRD and would involve the satisfaction of IBRD's requirements, standards, and procedures concerning completion of plans and cost estimates and determination of feasibility (in accordance with Section 404 of the Mutual Security Act as then in effect, the predecessor provision of Section 303 of the FA*). Thus it would not be necessary for DLF to apply its own regular project requirements. DLF also assumed that all the funds for financing the Beas development, including those of DLF, ultimately would be handled by the IBRD under normal IBRD standards. This indeed has been and is the case on the Pakistan side, where the Indus Basin Development Fund, which includes DLF and ICA monies, is administered by IBRD.

These assumptions continued until a meeting between representatives of A.I.D. and IBRD held in October 1962 ostensibly for the purpose of formalizing DLF's understanding that IBRD would administer the funds for Beas. At this meeting, IBRD indicated that it did not intend to exercise its usual procedures or apply its usual standards in review and surveillance of the project, but intended merely to lend India \$23 million toward the foreign exchange costs of the Beas River development without evaluation of the feasibility of the development or any individual portion of it or close review of the manner in which the loan funds were being utilized.

*Sec. 303. "INDUS BASIN DEVELOPMENT.-- In the event that funds made available under this Act (other than part II) are used by or under the supervision of the International Bank for Reconstruction and Development in furtherance of the development of the Indus Basin through the program of cooperation among South Asian and other countries of the free world, which is designed to promote economic growth and political stability in South Asia, such funds may be used in accordance with requirements, standards, or procedures established by the Bank concerning completion of plans and cost estimates and determination of feasibility, rather than with requirements, standards, or procedures concerning such matters set forth in this or other Acts; and such funds may also be used without regard to the provisions of section 901(b) of the Merchant Marine Act, 1936, as amended (46 U.S.C. 1241), whenever the President determines that such provisions cannot be fully satisfied without seriously impeding or preventing accomplishment of the purposes of such programs: Provided, That compensating allowances are made in the administration of other programs to the same or other areas to which the requirements of said section 901(b) are applicable."

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IBRD gave the following reasons for its position:

1. It was merely fulfilling a financial commitment made at the time of negotiation of the Indus Waters Treaty;
2. Technical planning of the Beas Dam Project was not acceptable to IBRD technical staff;
3. Adequate irrigation planning data were not available for areas in which the Beas River waters would be used; and,
4. Financial relationships between the project authorities and the State and Central Governments relating to repayment of irrigation costs had not yet been clearly established.

Following the October 1962 meeting, A.I.D. determined that, in view of IBRD's position, it would be necessary for A.I.D. itself to independently investigate the feasibility of the Beas Dam Project for purposes of a possible project loan. A.I.D. therefore undertook a review of available material to assess the situation regarding the project. This review indicated that there might be serious shortcomings in detailed planning, and that on the basis of such information as A.I.D. had, appropriate findings could not be made under Section 611 of the Foreign Assistance Act (FAA). It was apparent, however, that planning work had continued on the project in India, and that considerably more information was probably available at the headquarters of the Beas authorities.

D. Satisfaction of the DLF Conditions

A.I.D. in early 1963 requested the Bureau of Reclamation of the U.S. Department of the Interior to provide a team of up to six specialists to visit the project, review the plans, evaluate the organization, and render an engineering, and economic evaluation thereon. The details of this assignment are set forth in PIO/T No. 386-Z-99-AA-2-30049, dated April 5, 1963 (reprinted in Annex I). The Bureau of Reclamation supplied a team of six men having the requisite skills in dam design, construction, flood hydrology, electric power engineering, and agricultural economics. The Team was headed by Mr. Oscar L. Rice, Chief Designing Engineer of the Bureau. It arrived in India on April 26, 1963, and remained until May 25, 1963. A report was prepared by the Team after its return to the U.S. and was made available to A.I.D. on September 24, 1963.

The GOI at all levels cooperated fully to make the visit of the Bureau Team fruitful. Team members had conversations in depth with officials of the Central Government, the State Governments, and numerous officers of the Beas, Bakhra, and Rajasthan Canal and Irrigation Projects. In anticipation of the Team's visit, the Beas Control Board prepared a comprehensive report on the Beas Dam Project, providing up-to-date information and setting forth the latest decisions regarding project design.

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- 10 -

This report proved very valuable in simplifying the work of the Team, particularly since it eliminated much of the burden anticipated in obtaining basic information.

The report of the Bureau of Reclamation was instrumental in enabling A.I.D. to satisfy itself on the technical, financial, and economic feasibility of the Beas Dam Project. The GOI has made other necessary information available to A.I.D. in recent months at A.I.D.'s request, and also has prepared compilations of data upon request. Discussions on the project have been held with GOI officials.

The five conditions of Mr. Dillon's letter to Mr. Black have been fulfilled to the satisfaction of A.I.D. Section 517 of the Mutual Security Act -- the predecessor of Section 611 of the Foreign Assistance Act -- is satisfied. The Indus Waters Treaty and the Indus Basin Development Fund Agreement have been ratified by the Governments of India and Pakistan and are in full force and effect. Talks have been held among A.I.D., IBRD and GOI personnel regarding administration of the loan funds, and details will be finalized in the course of developing and negotiating the Loan Agreement and implementation procedures for the A.I.D. loan.

Regarding IBRD's participation, Mr. Dillon's letter required "authorization by the International Bank for Reconstruction and Development of a loan to the Government of India for purposes of financing an appropriate portion of the foreign exchange costs of construction of the Indian works (\$23,000,000 on the basis of present cost estimates)". The term "works", although somewhat ambiguously described, could be construed to consist only of the Beas Dam, essentially what we now call Unit II of the Beas River development. As mentioned earlier, the IBRD now plans to permit its loan funds to be used on any aspect of the Beas River development, and not only on Unit II. It could, therefore, be argued that since IBRD funds will not be used only on the "works" as originally envisaged, this condition is not satisfied.

The DLF condition need not, however, be narrowly construed. The IBRD funds will be made available in the full contemplated amount (\$23,000,000) for the Beas River development. To insist at this time in limiting them to Unit II would result in an uneconomic use of available foreign exchange resources. The IBRD's funds are not needed for the Beas Dam Project as such to make this project financially sound (See Section V: Financial Analysis of the Project). Furthermore, it is significant that the concept of the Beas "works" has been expanded since the original commitments were made to include all activities associated with the Beas River development rather than only the present Beas Dam Project. In light of these factors, A.I.D. has determined that this particular condition of

UNCLASSIFIED

UNCLASSIFIED

- 11 -

Mr. Dillon's letter will be reasonably satisfied by the conclusion of an IBRD loan of \$23 million for development of the Beas River, even though such loan is not specifically limited to or only used for the Beas Dam Project. The IBRD is expected to authorize its loan shortly, and no disbursement of A.I.D. loan funds will be permitted until that loan has been made.

E. Refusal of A.I.D. to Finance Unit I

As noted above, the DLF allocation originally was intended only for use on the Beas Dam Project of the Beas River development. Subsequently, the GOI undertook serious study of Unit I of the development, which involves diverting water from the Beas River to the Sutlej River by means of a diversion dam and two diversion tunnels to produce hydro-electric power and irrigate certain lands in the Punjab. In mid-1963 the GOI requested both A.I.D. and IBRD to permit utilization of their funds for both Units rather than for Unit II alone.

A.I.D.'s study of Unit I, however, indicated that our requirements could not be considered satisfied. Accordingly, we advised the GOI orally that A.I.D. would not consider permitting our loan funds to be used for Unit I, and indicated both orally and by a letter dated February 13, 1964, that we would continue to consider a loan for Unit II (the Beas Dam Project), and that such a loan would contain "appropriate conditions and covenants relating to both that Unit and the Rajasthan [desert]". This matter thus is settled. A copy of the pertinent letter is attached in Annex I.

As we have seen previously, however, the IBRD proposes to permit its loan funds to be utilized for the purchase of equipment for use on any phase of the Beas River development, including Units I and II plus the Rajasthan Canal and Irrigation Unit. IBRD's approach will not interfere with that of A.I.D.

UNCLASSIFIED

SECTION III: DESCRIPTION OF THE PROJECT

A. Irrigation Plans in the Punjab and Rajasthan States

Large areas of land in the Punjab and Rajasthan States presently are unused because of lack of irrigation water. Since 1947, a major effort has been underway by India for improving irrigation and power development in these areas. The important Bhakra Canal System is already complete, and extension of irrigation and increased utilization of river water has been effected on the Western Jumna Canal system, the Sirhind Canal system, the Upper Bari Doab, and the Eastern and Gang Canals. The construction of the Rajasthan Canal and Irrigation Project was started on the basis of the canal being operated initially on the uncontrolled water supplies available, and later on the controlled and stable water supplies available from storage dams to be constructed. The Beas Dam will be part of the comprehensive system of works which will conserve and control the water which will be diverted through this canal.

A general plan of development of the water and power resources of the Beas, Sutlej, and Ravi rivers -- the rivers allocated to India under the Indus Waters Treaty -- has been formulated between the Central Government and the State Governments of the Punjab, Rajasthan, Himachel Pradesh, and Kashmir. As a result of an interstate conference held in 1955, Rajasthan has been allocated 8 million acre feet out of the 15.85 million acre feet of the unutilized waters of the Beas and Ravi Rivers, after meeting prepartition requirements. The Punjab is allocated 7.2 million acre feet, and Kashmir the remaining 0.65 million acre feet.

The plan drawn up to harness these rivers encompasses a complex series of dams and canals. Power generation facilities also are included wherever practicable. The major elements of this plan and the current status of each element are as follows:

1. Bhakra Dam and power plant on the Sutlej River. The dam and the first power house are completed and in operation. The second power house is nearly completed.
2. Beas Dam at Pong and power plant on the Beas River. Construction has started. The Beas Dam is the project that would be financed from the loan under review.
3. Madhopur-Beas Link Canal (connecting the Beas and Ravi Rivers). Construction is completed.
4. Beas-Sutlej Link Conduit and power plant. This is in the planning stage.
5. Storage dam on the upper reaches of the Beas River. This is being investigated.

- 13 -

6. Storage dam on the upper reaches of the Ravi River. This too is being investigated.
7. Exploitation of other electric power generation potentials on the several rivers. This is under investigation.
8. Canal systems below Bhakra Dam. Construction is completed.
9. Harike Headworks (diversion structure in the Sutlej River for the Rajasthan Canal System). Construction is completed.
10. Rajasthan Feeder Canal and Rajasthan Project Canal systems. The feeder canal is completed and various other canals are under construction and/or investigation.

B. The Beas Dam Project

1. General

The Beas Dam will regulate the flow of the Beas River for irrigation and power purposes. The prime purpose is to provide irrigation in the States of Rajasthan and the Punjab. A secondary and incidental purpose is production of hydroelectric energy as water is released from the reservoir, although costs attributable exclusively to the power element will not be financed under the loan.

Consideration of a dam on the Beas River at the Pong site, near the village of Mukerian, began in the early 1920's. However, reports at that time concluded that a number of conditions made construction of a dam unattractive. The major problems related to the character of the geologic formations of the area, the known strong seismic activity, and the extremely high magnitude of flood flows during the monsoon season. Later, however, investigations showed that with advancements in the art of building earth and rock-fill type dams, and particularly with improvements in earth-moving machinery, construction of a dam at Pong would be practicable. Geologic factors, seismic activity, and flood flows no longer offer unusual problems.

2. Description of Physical Facilities

The Beas Dam Project is now underway. It involves construction of an earth and rock-fill dam 330 feet high above river bed, with a maximum length of 5750 feet. The crest of the dam will be at elevation 1430 feet mean sea level, with the normal maximum reservoir level at elevation 1400 feet. The top width of the dam will be 45 feet. A roadway will be constructed across the top of the dam. The maximum base width of the dam at existing river bed level will be approximately 2000 feet.

UNCLASSIFIED

- 14 -

The embankment of the dam will consist of a central impervious earth-core with gravel and rock shells upstream and downstream of the central core. The original plan required approximately 35 million cubic yards of embankment in the dam. A recommendation made by the Bureau of Reclamation will increase this to about 40 million cubic yards. More than 1.2 million cubic yards of concrete will go into the powerhouse and appurtenant structures.

There will be five concrete lined tunnels of 30 feet finished inside diameter constructed through the left abutment of the dam at river level. Initially these tunnels will divert normal flood flows around the work site, but later they will be equipped with appropriate gates and structures so that two of the tunnels can be used to discharge irrigation water to the river and three can be used as power penstocks leading to the powerhouse structure to be located at the downstream side of the dam. The two irrigation tunnels will be approximately 4400 feet long each, and the three power tunnels 2438, 2564, and 2680 feet long respectively. The irrigation diversion tunnels are called T₁ and T₂, and the penstock tunnels P₁, P₂, and P₃.

An overflow type gated spillway will be constructed, also on the left abutment of the dam. The originally planned dimensions of this spillway will be revised and enlarged in accordance with the Bureau of Reclamation's recommendations. There will be a curved inlet channel leading to the crest structure, on which will be mounted large steel radial type gates to control water flow through the spillway. A bridge will be constructed across the crest structure to contain the gate operating mechanisms. A concrete-lined chute structure will conduct overflow water away from the crest of the dam to a concrete jump-type stilling basin structure. The side retaining walls of the stilling basin were planned to be approximately 80 feet high. The design for the spillway is subject to change, however, in accordance with recommendations of the Bureau of Reclamation.

A powerhouse (called the Pong Power Plant) will be constructed to contain six-60 megawatt generating units when finished. Four units will be installed to give an initial capacity of 240 megawatts. The last two will be installed later when the integrated power system can absorb their output at peak load times. The ultimate power capacity thus will be 360 megawatts.

The power units are designed for a rated water head of 210 feet, although in actual operation the head will vary between 156 feet and 300 feet. The turbines for the power plant are to be vertical shaft, Francis type, with a rated output of 85,000 B.H.P. and a speed of 150 R.P.M. Generators are to be of the vertical shaft, umbrella type, and have a rated

UNCLASSIFIED

capacity of 67,000 KVA. There will be two such turbine-generator machines on each of the power tunnels. Pressure relief valves of the Howell-Bunger type will be installed on each unit as protective devices, but these valves will also be designed to act as supplemental irrigation release valves during times of low power generation.

Ancillary facilities required for the dam include a 24 mile extension of the railway from Mukerian to the dam, an extension of the highway, and construction of a complete town site to house approximately 35,000 persons, of which 10,000 to 11,000 will be workers.

3. Electrical Transmission System

A switchyard will be located on the right side of, and fairly close to, the powerhouse. Facilities will be installed to step up the generation voltage of 11 KV to transmission voltage of 220 KV. A double circuit 220 KV transmission line, approximately 60 miles long, will connect with the integrated transmission grid system at the town of Jullundur. The transmission line will be operated initially at 132 KV, and converted to 220 KV operation when load on the system has increased to the stage that the fifth and sixth generating units at the dam are installed.

4. Hydrology

The Beas River is the principal tributary of the Sutlej River. It rises in the high Himalaya Mountains and flows in a southwesterly direction, entering into the plain of the Indus immediately below the dam site. The river has a total length of 247 miles, of which 143 miles is above the dam site at Pong. The moisture catchment area above the dam site is 4850 square miles, of which only 300 square miles is under permanent snow.

There is a wide variation of rainfall over the catchment area. The minimum rainfall of 31 inches was recorded at Banjur in 1931, and the maximum of 171 inches at Dharamsala in 1943. The average annual rainfall over the area is about 70 inches, of which approximately two-thirds occurs during the three monsoon months July to September. A study of rainfall data shows that heaviest rainfall is not in the highest areas, but lower down in the vicinity of Dharamsala and Palampur. The fan-shape of the catchment area and the rainfall pattern are the principal factors which lead to a large incidence of high flood flows.

Mean annual flow of the Beas River at the Pong site over a 40-year period was 12.84 million acre feet, varying from a minimum of 8.29 million in 1928 to a maximum of 17.70 million in 1955.

The annual flow pattern is characterized by relatively low flows during October through May, with much higher flows during the monsoon season. There normally is at least one extremely high flood flow of only a few days duration during the monsoon season. In the period 1935-62, the maximum recorded flow of 600,000 cusecs occurred on September 26, 1947. There was one flood in the 500,000 - 600,000 cusec range, five in the 400,000-500,000 cusec range, and fourteen in the 200,000 - 400,000 cusec range. These extremely high rates of flood flows were not accompanied by high volume. The maximum volume of water passing the site during a flood was 1.71 million acre feet, while the flood having the maximum rate of flow discharged a total volume of 1.38 million acre feet.

The capacity of the reservoir of the Beas Dam Project at the selected normal maximum water surface of elevation 1400 feet is planned at 6.55 million acre feet. The level of the dead storage pool is set at elevation 1260 feet, which gives a volume of 1.05 million acre feet. Thus the reservoir will have a normal live storage (useful capacity) of 5.50 million acre feet.

Operational studies of this reservoir in conjunction with the Bhakra Reservoir show that in a "mean synthetic year" (a legitimate statistical abstraction for study purposes), 4.92 million acre feet of the live storage space would be required. Operation studies of the Pong Power Plant, made in conjunction with Bhakra on an integrated transmission system, show monthly variation in generating capability between a minimum of 59 megawatts in June to 240 megawatts during September to November.

C. Current Status of the Beas Dam Project

The status of work on the Beas Dam Project at the moment is as follows:

1. Construction

Work is in progress on all five tunnels. On the two irrigation diversion tunnels (T_1 and T_2), full-bore excavation is proceeding from both ends of each tunnel. On the three penstock tunnels (P_1 , P_2 , and P_3), work has started on the upstream faces only. An excavation of about 1.5 million cubic yards was completed before starting excavation of these tunnels.

2. Exploration

Detailed survey of the dam area is being carried out. Some 45,000 feet of drilling has been completed for geological investigation. Material investigations are at an advanced stage, and test pits at various places have been excavated.

3. Job Facilities

Job facilities comprising the following have been completed: sedimentation tank with a capacity of 500,000 gallons; thermal powerhouse; cooling tank; oil storage area; store and office; water tanks; processing plant; batching and mixing plant; tractor repair shop; auto shop; carrier shop and welding shop; structure fabrication shop; washing platform; pumping stations; lubrication stores area; and sheet metal shop.

Work is in progress on an electric and machine shop at Sansarpur, two miles from the dam, a fire station, bit and drill repair shop, canteen, rigger loft, pipe shop, servicing shop, and a telephone exchange.

4. Communication Facilities

Work is in progress on a seven mile rail and road link between the dam site and the base camp at Talwara. About two million cubic yards of excavation has taken place. Four bridges along the way have been completed. Construction of a 17 mile railway line from Talwara to the existing railroad head at Mukerian also is in progress.

5. Construction Camps

About 4,000 houses of various types for supervisory staff and labor are completed. Schools and other facilities also have been built. Construction of more such housing and facilities is in progress.

SECTION IV: TECHNICAL ANALYSIS OF THE PROJECT

A. Background of the Bureau of Reclamation Report

As indicated earlier in this paper, following the reluctance of IBRD to make a finding regarding the feasibility of the project, A.I.D. engaged the services of an expert team from the Bureau of Reclamation to assist it in arriving at an engineering and economic evaluation. A participating Agency Service Agreement between A.I.D. and the Department of the Interior was entered into which included an appropriate scope of services and a budget of \$33,000 in U.S. Dollars and Rupees 95,200. This agreement is reprinted in Annex I.

The Bureau Team was in India from April 26, 1963, to May 25, 1963. It reassembled at the Bureau's headquarters in Denver, Colorado, in late June of 1963 to finalize its report. The report was received by A.I.D. on September 24, 1963.

B. Highlights of the Bureau's Findings

1. Review of Project Features

a. Dam: The Team favors flatter slopes for the dam than those envisaged by the Indians. The recommended changes would increase the embankment quantities by about 5 million cubic yards, from about 35 to 40 million cubic yards. Present Indian plans of riprap protection against wave action on the upstream face are considered inadequate by the Team against waves of 3-4 foot height. Studies of other special types of protection are recommended which might result in increases in cost. The modifications suggested probably would result in a sounder project. Contingency amounts provided in the Indian cost estimate should be adequate to cover all the recommendations of the Team with the exception of the two items just mentioned.

b. Power Plant: The proposed ratings of the turbines and generators and the numbers of units and assumed load factors are considered satisfactory by the Team. The additional water available in all years above the minimum design years can be utilized to generate more power. Therefore, transformers should have ratings 10% to 15% above the generator ratings to avoid being bottlenecks in the transmission of power. The proposed transmission system is considered adequate, although as load pattern develops some strengthening and minor additions may be required.

c. Spillway: Assuming that the present reservoir capacity is adopted, a change of design of the spillway will be required. Design studies should consider different schemes for various sizes and arrangements of the affected portions of the spillway structure. The Team confirms the need for detailed hydraulic model testing to ensure the best flow conditions.

d. Irrigation Outlets: The Beas Dam Project organization proposes to use gates of the same size as those installed at the Bureau of Reclamation's Glen Canyon Dam. Due to lack of actual operating data at Glen Canyon Dam, information is lacking on the interrelation of the three passageways and their effects on the concrete of the passageways and the tunnel area downstream. The Team confirms the need for hydraulic model testing before finalizing the design.

e. Reservoir Sedimentation: The Beas River carries a large sediment load of alluvial material which may reduce the gross capacity of the reservoir by 35% over the course of a 100-year period, and thus cause a reduction of about one-third in the useful storage capacity of the reservoir. Upstream developments probably will not reduce the sediment load. The provision of additional reservoir capacity is not essential to the feasibility of the project, but in the opinion of the Team might ensure the useful and unimpaired functioning of the reservoir for a longer period of time. Sediment distribution in the reservoir will not encroach on the presently established elevations of the power plant intakes.

f. Town Site: Actual construction of the town site is well advanced. Plans provide for necessary facilities to accommodate 10,000 to 11,000 employees, and a total population of about 35,000 people. The Team judges that adequate facilities, including schools and recreation facilities, will be provided.

g. Transportation Facilities: A new wide gauge railway extension and a new heavy duty highway are under construction from Mukerian to the dam site. The Team says that these appear adequate to serve construction needs.

2. General Geologic Features

a. Areal Geologic Factors: Data reviewed by the Bureau Team indicates that disturbances such as a major thrust fault (Satlitta) and other thrust faults in the area do not pose conditions at the dam site needing special attention, since the fault planes lie at considerable depth below the ground surface or at a distance from the dam site. However, local effects will be present and should be taken into account.

b. Specific Geologic Factors Relating to Design of Project Features: The numerous minor folds, shears, and faults will require specific attention during design and construction of the project, but they do not cast doubt on the adequacy of the foundations for the earth dam or the appurtenant structures.

c. Construction Materials: The Team notes that considerable work on investigation and selection of the best sources for construction materials has been performed. Adequate quantities of the various types of embankment materials have been located within reasonable haul distance of the dam. Some selectivity of use of materials from the various sources must be practiced in relation to the location and function of those materials in the dam.

Because of the possibility of foundation settlement and earthquake activity, the Team says that close control of the moisture content of the embankment during placement and compaction must be followed.

While rocks available for protection of the dam against wave action are of generally excellent quality, they are of smaller size than generally desired and of rounded shape, which will tend to reduce their effectiveness in dissipating the energy of wave action. The Team says that special care might be taken by the Indians to place the largest rocks in the upper portions of the dam facing. Because of these factors, the Team suggests that further studies and analyses of other special types of protection be undertaken.

Adequate quantities of suitable materials for the manufacture of concrete have been found and tested. No tests for alkali content of the aggregates have been performed; however, informal indications were that Type II cement (a low heat of hydration and relatively high sulphate resistant cement) would be utilized. It is anticipated that cement will be supplied by the same mill that supplied cement for Bhakra Dam.

3. Hydrology

a. Water Supply: Analyses by the Team of data concerning the combined operation of the Bhakra and Beas reservoirs showed that in 39 years of record there occurred with respect to established requirements:

A maximum shortage of 39% in the year 1940-41.

Full requirements were met in 22 years.

Some carry-over storage occurred in 21 years.

An average of 1.8 million acre feet of spill occurred in the maximum year.

It was not possible in the carry-over operation study to separate the functioning of the Beas and Bhakra reservoirs, but it was noted that in the mean year operation study the Beas reservoir is emptied

and refilled each year, thus indicating that there will be surplus water in each year above a mean year unless water demands are increased. These studies suggest to the Team that increased capacity of the Beas reservoir may be desirable to increase controlled water supplies for irrigation and power production. The Team recommends that coordinated reservoir and power operation studies for the entire system of the Beas, Sutlej, and Ravi Rivers be prepared before the final capacities of reservoirs and power plants are established.

b. Spillway Design Flood: The Team found that the project design flood as adopted was less than that normally acceptable to U.S. Government agencies, and it recommended utilization of procedures which would develop an estimate of the maximum probable flood. This suggestion was accepted, and the Beas Control Board undertook such a study under the guidance of the Team. The results of the study were reviewed and revised in the central engineering office of the Bureau of Reclamation. The inflow design flood hydrograph as so revised has a peak discharge of 1,185,000 cusecs and a 6-day volume of 4,000,000 acre feet, which are considered satisfactory.

c. Spillway Design: The original Beas Dam spillway design called for a spillway crest of six bays of 37 feet width (222 feet clear waterway). This spillway required the water surface in the reservoir to rise to elevation 1411.5 feet and discharge 250,000 cusecs of water to cope with the original design flood.

The Bureau investigated several possible arrangements of the spillway crest for handling the revised design flood. With a 300 foot clear waterway (6 bays at 50 foot clear opening), the water surface in the reservoir rose to elevation 1419.3 feet (remaining freeboard 10.7 feet) and required a spillway discharge of about 475,000 cusecs. The Team recommends that appropriate further studies be made to derive the most economical combination of surcharge capacity (including possible change in the height of the dam) and spillway discharge capacity utilizing the revised inflow design flood.

The Team further observed that a wider crest width of the spillway than that provided in the previous design should be favored, and the present stilling basin walls should be considered about the maximum height practicable. The importance of detailed hydraulic model testing to determine best flow conditions for final designs was stressed by the Team.

d. Diversion Plans: Plans for care and diversion of the river during the construction period have been based upon handling flows occurring during the wettest year on record, which is 1942. A design flood which had a peak discharge of 770,000 cusecs and a volume of 2,406,000 acre feet was used in planning the diversion operations. This is considered satisfactory by the Team.

4. Construction Schedule

a. Major Work Items: According to the original plans, construction of the dam and appurtenant works will involve the following:

Excavation for permanent works	22,000,000 cubic yards
Embankment, all classes	34,700,000 cubic yards
Concrete, permanent works	1,190,000 cubic yards
Steel: reinforcing, structural, and plate	83,000 long tons

These capacities are subject to some change as the recommendations of the Team are considered.

b. Program: Project construction operation plans and equipment requirements are based on completion of the earth dam in the seventh year and completion of all work on the project by the end of the ninth year from the date of starting excavation of the diversion tunnels.

c. Comments: The most critical elements of the construction program are the handling and diversion of the river during the annual monsoon floods, plus the quantities of excavation and embankment materials to be handled to avoid unscheduled overtopping of the completed work. The construction program is predicated upon the possibility of a flood having a peak flow of 770,000 cusecs and a volume of 2.4 million acre feet during any of the three critical seasons. The operations as planned during the critical period are as follows:

After the third flood season, the low river flows will be diverted through irrigation tunnels T₁ and T₂, which are expected to be completed.

Following the river diversion, the foundation area for the section of the dam in the river area will be excavated, the foundation grouted, and the embankment placed to elevation 1105 feet.

As the capacity of the two completed tunnels will be insufficient to handle the anticipated flood flows, flood water will be permitted to pass over the completed portion of the embankment. Some rock protection work will be needed to avoid damaging erosion.

After the fourth flood season, sufficient embankment will be placed to raise the top to elevation 1288 feet and power tunnels P₁, P₂, and P₃ will be completed. If all tunnels are not available for the fifth flood season, a serious period will occur because the discharge capacity of two tunnels is 89,000 cusecs with a water surface elevation of 1285

- 23 -

feet, and the discharge of the five tunnels is some 231,000 cusecs at elevation 1288 feet. If the five tunnels are available, the water surface should not rise above elevation 1273 feet.

After the fifth flood season, the embankment will be raised to elevation 1390 feet.

The Team points out that embankment operations in the fourth and fifth years call for the placing of approximately 8.5 million cubic yards each year. Considering the variability of the length of the dry season, these quantities require an average monthly placement rate of at least 1.0 million cubic yards. These rates require a carefully prepared work program with all equipment and manpower conditioned for optimum production. This could best be accomplished by the Beas Dam Project authorities with the assistance of a man well qualified in the supervision of earth dam construction.

5. Cost Estimates

a. General: The Beas Control Board prepared a complete re-estimate of the cost for the Team. The estimate of the total direct cost of the Beas Dam Project is the equivalent of \$233 million. It should be noted that this is a cost estimate, and not an indication of potential total financing requirements, since credit is taken for estimated residual or salvage value for plant and equipment items and this reduces the funding requirements. Total financing requirements total \$254.48 million equivalent, as is indicated in Section V: Financial Analysis of the Project. The foreign exchange portion of this cost estimate is estimated to be \$54.85 million equivalent. These estimates are considered reasonable.

b. Comments: The cost estimate includes figures for facilities other than the dam proper, such as purchase of lands, access roads, extension of the railroad, construction of a small city with permanent type buildings, relocation of about 60,000 people from the reservoir area, and indirect costs.

The Team prepared a separate estimate for the dam proper (\$133 million equivalent) based upon current costs for similar work in the U.S. This estimate was considerably higher than that of the Beas authorities, the main difference being in unit costs for excavation (22 million cubic yards) and concrete work (1.19 million cubic yards). Unit costs for this type of work in the U.S. run 2 to 2-1/2 times those costs used by the Indian engineers. The Bureau lists other comparisons of similar costs, and finds many Indian costs lower than those in the U.S. Its conclusion is as follows:

"In view of the foregoing discussion of costs, and since labor may well be assumed to constitute at least 45% of the cost of this earth dam and that Indian labor costs are substantially less than comparable labor classifications on American standards, the cost of the dam in India would be less than in the United States. Adequate allowances for contingency appear to have been included."

The Bureau estimates that increasing the capacity of the spillway and flattening the slopes of the dam, in accord with its recommendations, might add the equivalent of about \$10 million to the cost estimate.

The Bureau also reviewed the list of construction equipment that the Indians propose to purchase abroad, and found it generally adequate. However, it found that the number of some types of units that may be purchased should be reviewed before final ordering. For example, the 66-15 cubic yard hauling units might be replaced with a smaller number of larger units, and more than two water sprinklers will probably be required. Also, the list does not include sheepsfoot rollers, heavy duty trucks, and trailer units. Some other small equipment also is not listed. However, an adequate contingency item has been provided in the estimate.

For spare parts, the Team concludes that the estimate is excessive compared to that for similar work in the U.S., but in view of the difficulty and delay in obtaining spare parts in India a large stock seems warranted.

Regarding construction accessories, the Team concludes that the project estimate is reasonable for work of this magnitude. For permanent equipment in the dam, it concludes that the estimate is adequate. For power plant requirements, it concludes that the total estimates for both mechanical and electrical equipment is reasonable; however, domestic production of some of the electrical and mechanical items is practicable.

The key conclusion is that the over-all total cost and foreign exchange component requirement, as presented by the Beas Control Board, makes a reasonably sound estimate of the cost of the project in the opinion of the Bureau Team. This conclusion is shared by A.I.D.

6. Adequacy of Methods, Processes and Procedures Used in Planning for Water and Power Utilization

a. Water Use Planning: The Team made only a brief inspection of the Rajasthan Canal and Irrigation Project. It notes that for an irrigation covering 4-1/2 million acres of land, it would be necessary for the Bureau to spend many years in making various types of investigations before recommending specific development. The Team further observes that, in its opinion, further investigations would have been highly desirable before the Indians undertook construction; however, the GOI had apparently concluded that sufficient information was available to justify proceeding with the project.

The view of the Team may be summed up by quoting from its report:

"Soils study and land classification work done thus far on the Rajasthan Project are of a reconnaissance nature, where construction of the Rajasthan Canal is well underway. Even though the reconnaissance survey appears to provide useful information, there is need for more definite information upon substrata conditions as related to drainage and reclamation of alkali lands, saline and sodic conditions within the soil profile, the soil conditions as related to water requirements, and the provision for stabilization against drifting and desiccating effects of winds. The reconnaissance grade survey was undoubtedly at a very low intensity of soil profile examination and measurement of the more critical properties. To provide an adequate reconnaissance appraisal of the suitability of the land resource, additional consideration would need to be given to the integrated effects of water quality, amount and quantity of drainage effluent to be removed from the project area, farm delivery requirements, drainage requirements, and preliminary layout of the distribution system. Such considerations should also involve an economic evaluation based on local goals and the requirements essential to obtain assurance of financial success."

b. Power Planning: The Team notes that considerable work has been done during recent years in power load forecasting and area power planning in India.

However, a difficulty inherent in projecting future power requirements in Punjab State is lack of a firm historic base. A marked characteristic of the power system is the heavy effect of rapid load growth pushing against the depressant effect of inadequate generation capacity. For example, in 1947-48, the maximum demand was only 29.8 megawatts, and in 1961-62 it reached 337.5 megawatts. Such fluctuations mean that the pattern of energy and capacity requirements of the system cannot yet be clearly established.

The Team observes that if the programs of installation of additional generating capacity and general area electrification are followed the system will develop true characteristics in coming years. It believes that the pattern of power demand will be similar to that in the southwestern United States today. If this is so, a portion of the power which has been considered by the Beas authorities to be non-firm could be marketed as firm power and have a beneficial effect on power revenues, possibly increasing projected power revenues by as much as 10%.

- 26--

Assessment of the contribution of the Beas Dam power plant to the system is complicated by the varying heads available for power production, the schedule of water releases for irrigation, and the varying monthly requirements on the system for power. Although the name plate capability of the Bhakra power plants is 1,050 megawatts, and that of the Beas Dam will initially be 240 megawatts, the Bureau estimates the following fluctuating power capabilities during the indicated periods:

AVERAGE AND PEAK CAPABILITIES - MEAN YEAR*

<u>Period</u>	<u>Beas Dam at Pong Site</u>		<u>Bhakra</u>		<u>Total</u>	
	<u>Average 1/ Megawatts</u>	<u>Peak Megawatts</u>	<u>Average 1/ Megawatts</u>	<u>Peak Megawatts</u>	<u>Average 1/ Megawatts</u>	<u>Peak Megawatts</u>
June 1-10	59 ^{1/}	110 ^{2/}	767 ^{3/}	767 ^{3/}	826	877
December	198 ^{2/}	240 ^{2/}	548	930	746	1170
January	178	180	425	930	603	1355
April	67	127	357	825	424	952

AVERAGE AND PEAK CAPABILITIES - DEPENDABLE YEAR**

June 1-10	78	110	470	621	548	658
December	53	176	524	930	577	1106
January	64	173	528	922	592	701
April	50	145	339	610	389	755

The Team accepted the Beas Dam Project power data and operating expense records, because direct observations showed them to be essentially representative of actual conditions. It observes that conditions will change as the years pass, however.

*Mean Year: A hypothetical year in which the mean discharge for any 10-day period is equal to the mean of all the corresponding 10-day mean discharges of the period of record.

**Dependable Year: A hypothetical year in which the mean discharge of any 10-day period is equal to or exceeded by the corresponding 10-day mean discharge of 67% of the years of record.

- 1/ Using all available water.
 2/ Using standby unit.
 3/ Limited by plant capability (no overload).

7. Management

The general observations of the Bureau Team regarding personnel were that the engineers associated with Beas Dam Project are competent and capable of handling the work. The supervisory personnel are essentially the same as built Bhakra Dam, and therefore the organization has experience in construction of a large and difficult concrete dam. While experience is lacking in the construction of a large earth and gravel fill dam such as the Beas Dam, the Bureau is of the opinion that the present organization is capable of handling the design and construction aspects of the project.

The Team recommends that the Beas Control Board obtain the services of a construction superintendent well qualified in the construction of earth dams to assist it in the selection of equipment best suited for the work, to formulate construction procedures, and to assist in keeping the work on schedule.

C. A.I.D. Assessment

1. Design Recommendations

The Bureau of Reclamation has made several major and numerous minor recommendations to improve the design soundness of the Beas Dam Project. The GOI has informally accepted these recommendations. NESI concurs in these recommendations. A condition of the A.I.D. loan will be that the GOI, to the satisfaction of A.I.D., formally consider and substantially accept these recommendations and put them into prompt and effective operation.

2. Construction Recommendations

The Team has made several suggestions regarding construction procedures and methods. The GOI also, as a condition of the loan, must consider these recommendations and substantially accept and put them into prompt and effective operation, to the satisfaction of A.I.D.

3. Project Organization

Normally A.I.D. requires that for a major project such as the Beas Dam Project there be a consulting engineering organization responsible for design and supervision of construction, and that a major construction contractor organization be responsible for management and execution of the actual construction. However, based on first hand observations and evaluations available from a variety of sources, A.I.D. in this case is of the opinion that:

a. The Beas Project design staff is competent to do the project design work, supplemented by strengthened liaison with the Bureau of Reclamation's central design organization and frequent scheduled visits of senior Bureau engineers to the project work site. Support by the Bureau should be on a stronger and broader relationship than now exists. A condition of the loan will be that the GOI agree to a broader and stronger relationship with the Bureau on this project than is now in effect, this relationship to be satisfactory to A.I.D.

b. The quality of workmanship being performed at the Beas Dam indicates that considerable competence exists in supervisory categories. Therefore, from a practical point of view, performance of the work by government forces is acceptable to A.I.D. However, because of the complexities and close timings involved in the construction schedule for the dam, the Beas Dam Project authorities also should arrange for adequate backstopping in the U.S. regarding equipment selection and utilization. This point will be pursued with the GOI during negotiation of the loan.

D. Conclusion

A.I.D.'s conclusion is that the Beas Dam Project now is technically sound.

SECTION V: FINANCIAL ANALYSIS OF THE PROJECT

A. Total Cost of the Project

The current GOI estimate of the total net cost of the Beas Dam Project is the equivalent of \$233 million (Rupees 11,079 lacs). The details of this cost estimate are contained in an exhibit in Annex I.

With one exception, the Bureau of Reclamation Team and A.I.D. consider this current cost estimate to be reasonable. The exception involves the Team's recommendation that the capacity of the spillway of the dam be increased and the slopes of the dam flattened to provide a greater factor of safety. These changes would increase the estimated cost of the project by another \$10 million equivalent, bringing the estimated current cost to \$243 million equivalent. The GOI is considering these recommendations, and agrees that they would increase the estimated project cost by about the stated amount.

The Beas Dam Project authorities contemplate sale in India of some of the still-useful construction equipment when it is no longer needed on the project. It is estimated that such sales could amount to the equivalent of about \$11 million, and credit of this amount has been taken in arriving at the \$233 million estimate. However, full funding might be needed to finance the original expenditures, even though the Beas Dam Project authorities have assumed that sales will occur at such times that the proceeds of the sales can be substituted for budgetary financing. When added to the \$243 million, the \$11 million figure brings the total initial current cost of the project to the equivalent of about \$254 million, a figure considered reasonable by A.I.D.

This figure does not take account of possible price and cost rises due to general inflation either in internal costs and/or in the costs of imported equipment. Inflationary cost rises presumably would effect primarily the rupee component of the cost, and would of course be taken into account in the annual budget requests of the Beas Control Board. Foreign exchange to be provided from GOI sources also would have to be increased if foreign exchange costs rose due to inflation of prices. For illustrative purposes, if total project costs rose by 2% a year due to inflation, the \$254 million current cost estimate would be almost \$310 million equivalent at the end of 10 years. Ten years is the estimated construction period of the project.

B. Foreign Exchange Cost of the Project

The foreign exchange component of the project's total estimated cost of \$254 million equivalent is estimated at \$54.85 million if all equipment and materials going to make up this estimate had to be ordered in the near future.

Actually, however, the electrical equipment for the power portion of the project will not have to be ordered for some years. The GOI believes that indigenous capacity to produce much if not all of this equipment will exist by the time that orders have to be placed, and therefore expenditure of foreign exchange will not be required. A.I.D. agrees that it is likely that at least some of the equipment that would have to be imported if bought today will be produced in India by the time it has to be ordered, and that the current foreign exchange estimate of \$54.85 million thus might prove somewhat too high. This electrical equipment alone is estimated to cost \$13.67 million, so that the foreign exchange cost of the project would dip to about \$41.18 million if the GOI's full expectations proved accurate.

C. Sources of Funds

The foreign exchange costs of the Beas Dam Project will be met from three sources -- the A.I.D. loan, a portion of the IBRD loan to be made to the GOI for the Beas River development, and India's own foreign exchange resources. The rupee component will be met completely by the Indians.

Using the original GOI figure of \$233 million equivalent as the total cost and \$41.18 as the foreign exchange cost, the sources and anticipated disbursement dates by years are as indicated in the following table. The estimated \$10 million equivalent increase in cost due to the Bureau of Reclamation recommendations and the \$11 million credit taken for equipment sales are not allocated by years. It has been assumed that both of these items will fall within the rupee component of the cost, and that both will be funded by the GOI.

BEAS DAM PROJECT

SOURCES AND DISBURSEMENT OF FUNDS

<u>Year of Disbursement</u>	<u>Foreign Exchange Component</u>				<u>Rupee Component</u>	<u>Total</u>
	<u>From A.I.D.</u>	<u>From IBRD</u>	<u>From GOI</u>	<u>Total</u>	<u>From GOI</u>	
	(In Millions of \$U.S.)					
1959-60	--	--	--	--	\$ 0.34	\$ 0.34
1960-61	--	--	--	--	0.63	0.63
1961-62	--	--	--	--	6.41	6.41
1962-63	--	--	\$ 2.03	\$ 2.03	10.47	12.50
1963-64	--	--	3.18	3.18	10.15	13.33
1964-65	\$ 6.55	\$ 3.87	-5.20	5.22	14.57	19.79
1965-66	4.02	--	--	4.02	15.70	19.72
1966-67	10.69	--	--	10.69	32.38	43.06
1967-68	5.31	--	1.95	7.26	34.54	41.80
1968-69	2.84	--	1.04	3.88	28.60	32.48
1969-70	1.85	--	0.68	2.53	20.05	22.58
1970-71	1.21	--	0.44	1.65	17.25	18.91
1971-72	0.31	--	0.11	0.42	5.95	6.37
1972-73	0.15	--	0.05	0.20	1.77	1.97
1973-74	0.08	--	0.03	0.11	-5.66	-5.56
1974-75	--	--	--	--	-0.84	-0.84
TOTALS	\$ 33.00*	\$ 3.87	\$ 4.31	\$ 41.18	\$ 192.30	\$ 233.48
Cost Increase Due to Bureau of Reclamation Recommendations					10.00	10.00
Credit for Salvage Value of Equipment					11.00	11.00
TOTALS	\$ 33.00	\$ 3.87	\$ 4.31	\$ 41.18	\$ 213.30	\$ 254.48

*A small amount of this sum may be used to finance consulting services concerning irrigation of the Rajasthan desert. In such case the GOI foreign exchange component would have to be increased by a corresponding amount to make up the resultant shortfall in foreign exchange for the Beas Dam Project. This point will be discussed and negotiated with the GOI.

Note: Totals may not add due to rounding.

The A.I.D. loan of \$33 million would fund about 80% of a total foreign exchange cost of \$41.18 million. The GOI itself would be financing from its own funds (out of annual budgetary allocations) 86% of the project's estimated total current cost, including some of the foreign exchange component. The A.I.D. loan amounts to about 13% of the total cost of \$254 million equivalent.

The GOI already has informally assured A.I.D. that it will provide the additional foreign exchange needed to fund the project from a combination of IBRD funds and its own funds. It also has assured A.I.D. that it will continue to provide all the rupees necessary. Prior to any disbursement of funds from the A.I.D. loan, the GOI will have to provide formal assurances to A.I.D. that all the currencies necessary to complete the project in an orderly and efficient manner will be made available. These assurances will necessarily have to take account of possible price and cost rises resulting from inflation.

As mentioned earlier in the paper, the Beas Dam Project is already well underway. This is reflected by the monies disbursed during the period 1959-60 to date. Some of the funds spent since 1962-63 have been in foreign exchange from the GOI's own holdings. A.I.D. and IBRD during 1962 and 1963 respectively advised the GOI in writing that each would reimburse the GOI for equipment purchases made if its loan eventually was authorized, Loan Agreements executed, and all conditions precedent to disbursement of funds satisfied. Reimbursements by A.I.D. could of course be only for purchases made in the U.S., only for equipment for the Beas Dam Project, and only for orders placed after July 27, 1962, which is the date of the first of the two A.I.D. letters on this matter. These letters are reprinted in Annex I. A.I.D. competitive bidding requirements also would have to have been met. The negative items in the sources and disbursements of funds table under the GOI foreign exchange component column for the year 1964-65 reflect expected reimbursement of foreign exchange already expended by the GOI.

D. Use of Funds

The rupee funds would be used primarily for labor and indigenously produced materials and equipment.

The foreign exchange funds, including the A.I.D. loan, would be used for:

1. Main construction equipment, such as: shovels, tractors, hauling units, compaction machinery, motor graders, rock drilling equipment, exploratory equipment, belt conveyor

for aggregate materials, cement handling equipment, concreting equipment, rigging equipment, and workshop, compressor, pumping, railway, electrical, grouting, and road maintenance equipment.

2. Construction accessories, such as drill steel for excavation, detonators, drilling accessories, accessories for x-ray and radiography, electric cables, and miscellaneous items such as special tools.
3. Spare parts for the main construction equipment and construction accessories.
4. Permanent equipment and imbedded material for the project, such as tubes, gauges, cross arms, pipes, slide gates, frames, radial gates, a hoist, a motor crane, and transmission lines.
5. Foreign consultants and training of Indian staff abroad.

The approximate estimated cost of each of the above categories of foreign exchange expenditure is as follows:

BEAS DAM PROJECT
ESTIMATED FOREIGN EXCHANGE
REQUIREMENT BY USES
(In Millions of \$ U.S.)

1. Main Construction Equipment	\$18
2. Construction Accessories	3
3. Spare Parts for the Above	15
4. Permanent Equipment	2
5. Consultants and Training	<u>3</u>
TOTAL:	\$41

Only the foreign exchange cost of the above items is included in the estimates. For example, customs duties and transportation of the equipment within India will be financed in rupees from the rupee portion of the total project cost estimate.

E. Repayment of the A.I.D. Loan in Indian Currency

The DLF commitment mentioned earlier in this paper was set forth in Secretary Dillon's letter to Mr. Black of the IBRD, which expressly provided that the loan would be "repayable in local currency". At all times since, the parties concerned have assumed that the loan would be made on this basis. The DLF commitment, as noted previously, was a major inducement to the GOI to enter into the Indus Waters Treaty and participate on the Indus Basin Development Fund.

Authority for proceeding with the present loan on a local currency repayable basis, notwithstanding the dollar repayment requirements of Section 201(b) of the FAA, as amended, derives from Section 643(c) of the FAA, which provides as follows:

"Funds made available pursuant to provisions of law repealed by Section 642(a) [which section repealed the applicable provision of the Mutual Security Act of 1954] shall, unless otherwise authorized or provided by law, remain available for their original purposes in accordance with the provisions of law originally applicable thereto, or in accordance with the provisions of law currently applicable thereto."
[Underlining added.]*

The subject funds having been reserved by virtue of the DLF Board resolution of June 29, 1960, and pursuant thereto committed to the GOI, Section 643(c) thus authorizes A.I.D. to proceed with the loan "in accordance with provisions of law originally applicable thereto," that is, on a local currency repayable basis.

It is recommended that the A.I.D. loan for the Beas Dam Project be repayable, and that interest be payable, in Indian rupees as contemplated by the DLF commitment.

*Section 643(c) rather than Section 202(d) of the Act is applicable, in that the funds at issue were committed by the DLF to the GOI. Section 202(d) provides: "Except as otherwise provided in this part, the United States dollar assets of the corporate entity known as the Development Loan Fund which remain unobligated and not committed for loans repayable in foreign currencies on the date prior to the abolition of such Fund shall be available for use for purposes of this title." [Underlining added.]

UNCLASSIFIED

- 35 -

E. Prospects of Repayment

A.I.D. considers that the GOI has the capacity to repay this loan at a reasonable rate of interest, and that there are reasonable prospects that it will be repaid, especially since repayments will be permitted in local currency.

G. Conclusion

A.I.D. 's conclusion is that the financial plan for the Beas Dam Project is sound.

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SECTION VI: ECONOMIC ANALYSIS OF THE PROJECT

A. Description of the Rajasthan Canal and Irrigation Unit

As indicated previously, technical and financial planning for the Beas Dam Project is now considered satisfactory by A.I.D. However, to make an economic evaluation of the project it is necessary to take into account the Rajasthan Canal and Irrigation Unit, since the source of the primary economic justification for the Beas Dam is irrigation of the Rajasthan desert.

The Rajasthan Canal and Irrigation Unit originates on the Sutlej River at the Harike diversion works, which is the intake of the Rajasthan feeder canal. In addition to the main canal, a distribution system as required will be constructed to serve about 4.5 million acres. It has been estimated by Indian engineers that only about 3.5 million acres would be irrigated in any one year.

A diversion dam at Harike has been constructed for the intake of the canal. The main canal consists of the Rajasthan Feeder, 134 miles in length, and the Rajasthan Canal, which extends an additional 292 miles, for a combined length of 426 miles. The main canal has a capacity of 18,500 cubic feet per second in the intake, and is reduced in size to allow for seepage losses and diversions to the distribution system.

Construction of the main canal is underway, approximately 180 miles having been completed. At the present rate of progress, about 16 miles of this canal is being completed per year. About half of the earthwork is being accomplished with human labor and donkeys, and about half with mechanized equipment. It is reported that the cost of moving material by either method is about the same.

The main canal and the larger canals of the distribution system will be lined with brick and mortar to conserve the limited available supply of water. Concrete aggregate is available only at long distances from the canal and the cost of this material is prohibitive for use in lining canals. As an alternative, kiln brick tile is being manufactured at convenient locations along the canal route. This procedure has proven satisfactory and economical in India.

The area to be placed under cultivation is raw desertland located near the India-West Pakistan border. The land is owned by the State of Rajasthan and is purchased for development by the project authorities. The project authorities design and construct the main canals and distribution system and subdivide the land into squares or tracts not to exceed 15-5/8 acres. An individual is permitted to purchase no more than two tracts. The authorities construct the canals and distribution system as required for the delivery of water to the tracts. The individual landowner must level the land and construct the conveyance ditches needed in his own land. In

addition to purchasing the land, the individual pays a water charge each year which includes assigned construction and operation and maintenance costs.

Irrigation already is being introduced into the upper reaches of the project area with water diverted from uncontrolled flows of the Beas, Sutlej, and Ravi Rivers. This permits non-perennial irrigation, and thus provides for less than complete development to the areas being irrigated. Divertible water supplies are dependent upon the highly variable annual monsoon, and winter season cropping is often highly doubtful. Because of the wide variability of uncontrolled water supplies under the present system, it is not realistic to consider this level of development as more than a step in the process toward the stable development which will result following completion of the Beas Dam Project.

B. Section 611(b)*/ **/

Section 611(b) of the Foreign Assistance Act (FAA) states that water or related projects or programs "shall include a computation of benefits and costs made insofar as practicable in accordance with the procedures set forth in Circular A-47 of the Bureau of the Budget with respect to such computations". Circular A-47 has been replaced by Senate Document No. 97, titled "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources". Document 97 does not differ in any important way from Circular A-47. It sets forth the considerations and procedures to be applied in benefit-cost calculations. Both measurable (tangible) benefits and non-measurable (intangible) benefits are to be considered.

A.I.D. has made an analysis based on the GOI presentation and other source material. A.I.D.'s broad conclusion is that the plans of the GOI for construction and development of the Beas Dam and Rajasthan desert are consonant with the policies set down in Document 97. The plans are integral elements of a large basin-wide scheme, and fit in with international and interstate agreements. The objectives of the plan meet high

*/ Section 611(b) of the Foreign Assistance Act of 1961, as amended, is identical to Section 517(b) of the Mutual Security Act of 1954, as amended, except for a conforming change.

**/ Section 101 of the Appropriation Act of 1964 provides in part that funds appropriated in that act shall not 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." In this connection, Section 102 of the Mutual Security Appropriations Act of 1960, which was in effect at the time of the DLF action of June 29, 1960, contained language which was substantially the same except that it referred to criteria in Circular A-47 of the Bureau of the Budget. These criteria do not differ in any material respect from those in the President's Memorandum, which was, in effect, a memorandum forwarding to interested Departments and Agencies Senate Document No. 97 referred to in Section VI B.

In the Senate Appropriations Committee Report of September 8, 1959, which commented on the predecessor of Section 101 (and a suggested revision which enunciated the same general principle) it was stated in part:

Footnote **/ continued

"The committee expects that in complying with this provision, the executive branch will apply the basic principles of Circular A-47 of the Bureau of the Budget to the maximum extent permitted by conditions abroad. In particular, the executive branch should prepare an evaluation of the costs and benefits of each project to which Circular A-47 would apply domestically".

A.I.D. has examined the project with reference to the standards and criteria set forth in the President's Memorandum (which are essentially the same as in the former Circular A-47). A.I.D. concluded that the Beas Dam project is technically, financially, and economically sound and feasible. In reviewing these questions, A.I.D. also calculated a benefit-cost ratio in the light of the best available information and to the maximum extent permitted by conditions abroad under the circumstances. Accordingly, A.I.D. considers that, as a result of these analyses and calculations and the conclusions derived therefrom, the proposed project meets, to the maximum extent permitted by conditions abroad in this instance, the standards and criteria used in determining the feasibility of such projects as set forth in Section 101.

priority objectives of the GOI in providing for a greater economic use of water and land resources, and will result in increased economic opportunities for a portion of the underfed and underemployed landless peasant population of India. The plan also should result in greater amounts of indigenously produced food supplies, thus reducing dependence on imported supplies.

The GOI has not followed certain of the detailed procedures and methods described in Document 97 that would have been followed by the Bureau of Reclamation if the project was in the U.S. The following were not and have not been done:

1. Comparison of alternative plans to the Beas Dam and Rajasthan irrigation to accomplish equivalent benefits, together with costs and estimated benefits of these alternative plans.
2. Comparative analysis of the individual purposes (irrigation, power, etc.) of the project plans to demonstrate that the net benefits of each purpose at least equals its cost.
3. Calculations to insure that the scope of the development provides the maximum net benefits.
4. Determination of the value of the Beas Dam for control of floods downstream.

In considering the above points, it must be recognized that many of the economic standards appropriate in the United States are not applicable in the economy of India. For example, in the U.S., where labor costs are high and there are numerous alternative opportunities for worthwhile investments, it is relatively easy to reduce to monetary terms the evaluation of the relative costs of services required and the value of goods produced. However, in India, with its mass of underemployed and underfed population and its lack of variety and numerical strength in trained manpower, what is the value of the loss of a million man days of potentially gainful employment of otherwise unemployed people at tasks within their competence? Each million man days so lost is a total economic loss because there are no alternatives.

The detailed planning of water and land use presents another area where U.S. standards are not directly applicable. In the Rajasthan scheme, irrigation benefits will not be maximized in monetary terms. The GOI is planning to provide less water supply for each acre of irrigated land than

that required to produce the maximum yields. There will be a total fixed quantity of water. Thus the irrigation will extend over many more acres and have a higher total cost than it would if it were designed to produce the maximum amount of crops from each acre irrigated. Likewise, insufficient water will be provided to each farm to permit large scale growing of higher valued crops, since higher valued crops also are the greatest consumers of water.

The GOI has decided on this approach because of the problem of the mass of underemployed and landless population, and has thus provided for only a small amount of higher valued crops, and has further provided only that amount of water to each acre which if an additional inch of water would be provided, that additional inch would produce less gain in crop yield than the last previous inch depth. In general, the amounts of water to be provided (about 18" in depth per annum) are about 60% of the amounts required for maximum yields.

The advantage to India in this approach is that more people will be employed on the land and be raising their own food supply. It also means, at least theoretically, that the greatest amount of food is being produced for the total quantum of water. Likewise, since land taxes are paid on the amount of irrigated land, the greatest amount of revenue will be collected. Conversely, in terms of U.S. standards, the GOI approach means that direct net benefits are not maximized because the gross value of crops grown per farm are less than maximum, while costs of production are proportionately higher than the costs of production associated with maximum production.

As a separate problem, not easy of evaluation, the smaller supplies of water tend to delay the time when drainage works will be required, but since those supplies of water are inadequate for flushing the soil, they hasten the salinization of the soil with its depressant effect on crop yields. Measures will have to be taken in the future to cope with this problem, and it will be the subject of discussions between A.I.D. and the GOI in the course of implementation of the loan, as mentioned later in this section. A covenant in the Loan Agreement will be directed at this and similar points regarding irrigation of the Rajasthan.

C. Benefit-Cost Calculation

The benefit-cost ratio on the irrigation portion of the Beas Dam and Rajasthan Canal and Irrigation Unit of the Beas River development is calculated by A.I.D. at 1.06:1 based on present Indian plans for water allocation. In other words, 1.06 units of calculable irrigation benefit will derive from each unit of cost expended for this irrigation.

The reader should be aware that this ratio is calculated only from the numerically measurable benefits and costs of the project. Intangible benefits are not considered in calculating this ratio, even though they have real value, because they are not measurable in numerical terms and thus are incapable of being analyzed numerically. As suggested in the prior section, such intangible benefits in the case of the Rajasthan Canal and Irrigation Unit are considered by the GOI to be exceptionally significant. For example, the increase in the well-being of millions of otherwise landless and unemployed peasants obviously is of tremendous social benefit to India. Such a benefit cannot be measured numerically however. Nevertheless, it would seem that a project of this type in India probably has a far greater amount of intangible but real benefits than it has intangible costs. If this is true, the "real" benefit-cost ratio might be said to be much more favorable than the measurable ratio of 1.06:1.

The 1.06:1 ratio was calculated as follows:

1. Benefits.

There are two identifiable direct benefits from the project - irrigation and power. There may be a third benefit, flood control, but the GOI does not have information adequate to judge this.

The generally accepted method of evaluating irrigation benefits is to consider the difference between the net value of the crops raised in the area before the advent of the project and the net value of the crops raised after the project is completed and functioning. Net value is the gross value of the crops less their cost of production.

For purposes of analysis of this project, it may be considered that the Rajasthan desert has no net value of crop production without irrigation. While this isn't strictly true, the area has a rainfall of only 5" to 8" annually, and there are many years with practically no effective precipitation. The area currently is sparsely occupied by nomadic herdsmen who often grow a little fodder after a rainstorm. The value of such fodder appears to be so low on an average annual basis that to attempt to assign a value to it would contribute little if anything to the analysis and would be beyond the accuracy of other estimates involved in the computation.

There are no reliable figures available regarding the gross value of the anticipated crops from the project. Any estimate is affected to a large extent by the percentage of high value crops per acre that may be grown. For example, a 1% shift in acreage from wheat to sugar cane might increase the gross value of crops by over 3%. The Bureau of Reclamation Team presents data that indicates that the average per acre value of crops may be as low as Rupees 173 per acre or as high as Rupees 229 per acre. The Presidential Scientific Advisory Commission Report on Water Logging and Salinity Control in the Punjab area of Pakistan, which is

close by the area of this project, includes data indicating that in areas just across the border average gross crop values may be between Rupees 150 and Rupees 200 per acre. The GOI has not furnished any comparable data. However, for purposes of this computation an average value of rupees 180 per acre seems reasonable, and is used.

Regarding the per acre costs of crop production, A.I.D. has used Rupees 100 per acre, which is the figure developed in the feasibility study for the SCARP Project No. 2 in West Pakistan. The net benefit per acre then is Rupees 80 (Rupees 180 minus Rupees 100).

Calculations then were made in line with A.I.D.'s guideline "Benefit-Cost Evaluations as Applied to A.I.D. Financed Water or Related Land Use Projects". It was assumed, in accordance with GOI plans, that the dam is completed in 1971 and the irrigation system is completed and land brought to irrigation on a steadily increasing basis over the course of 30 years following completion of the dam. Full production of the last block of irrigation was assumed to commence in the 31st year and to continue for 50 years. Thus an 80 year total period of analysis was used. On the present worth basis, the total annual equivalent benefit works out to Rupees 17.1 Crores.

With respect to power, the GOI has not made studies of the lowest justifiable alternative investment, which is the usual method of assigning numerical values for measurement of power benefits. Because of both this and the fact that irrigation is the prime purpose of the Beas Dam Project and the Rajasthan Canal and Irrigation Unit, no calculations of the power benefits and costs have been possible or have been made. We can assume that the benefits and costs of the power element cancel each other out. However, it seems more likely that benefits would exceed costs somewhat, so that the benefit-cost ratio calculated herein might be more favorable if it were possible to make calculations for power.

It should be noted that the forecast revenues derived from the power sales will pay out the separable costs of the power installation in about 16 years.

2. Costs

The costs of the project have been calculated on a present value method using the A.I.D. guidelines, with amortization spread over 80 years and the power element excluded. A.I.D. added Rupees 20 Crores to the capital cost of the desert irrigation for future drainage works. Operations and maintenance expenditures for the canal system have been assumed at Rupees 2 per acre per annum, in accordance with Indian experience. The total annual equivalent cost works out to Rupees 16.2 Crores.

3. Benefit-Cost Ratio

The benefit-cost ratio thus works out to 1.06: (Rupees 17.1 Crores of benefits divided by Rupees 16.2 Crores of costs). Details of the calculation are shown in Annex I.

4. Bureau of Reclamation Conclusion

The Bureau of Reclamation Team did not study the Rajasthan Canal and Irrigation Unit in depth. However, it does state that: "Based upon the available data, inspection of the area, and a comparison with somewhat similar developments in the United States, the Team is of the opinion that a cost benefit ratio for the proposed . . . development would exceed 1:1."

D. Pay Out Calculations

Funds for the project are being loaned to the project authorities by the GOI. The rupee loans contemplate repayment over a period of 30 years including a 10 year grace period, with interest at 5-1/4% per annum. It also is presumed that the A.I.D. and IBRD loans would be amortized over 30 years including a 10 year grace period, with interest at 3-1/2% per annum.

The current GOI repayment plan indicates that a period of 50 years, beginning in 1957, will be required to pay out the project. This plan results in an accumulation of large deficits for a number of years, since the repayments due exceed the revenues derived from the project. The annual net deficit varies from 9.1 Crore in the 12th year to 4.4 Crore in the 30th year. Surpluses begin accruing in the 31st year. The total accumulated deficit is wiped out by the 50th year.

The repayment plan indicates a number of items which the A.I.D. intends to pursue further with the GOI during discussions following authorization of this loan. These include:

1. The GOI may want to consider making the repayment terms of the rupee loans softer, so that large deficits do not have to be funded;

2. The scope of the project seems to be too high, resulting in a higher capital cost than seems necessary;

3. The inclusion of the many acres in the project and the lower production per acre due to the inadequate water supply does not permit a realistic assessment of water charges against each irrigated acre. For example, if the scope of the project were reduced by 1/3 in area, the capital cost might be reduced by 1/4 and the repayment ability increased substantially.

- 42a -

A.I.D.'s own assessment of the pay out of the complex indicates that a period of 90 years might be more realistic.

E. Conclusion

A.I.D.'s conclusion is that the Beas Dam Project and the Rajasthan Canal and Irrigation Unit are economically feasible, and that the requirements of Section 611 of the FAA have been met.

A more efficient project might result, however, if the GOI reduced the extent of the planned irrigable area so as to provide additional water to each acre. As a condition of the loan, A.I.D. will require that appropriate conditions and/or covenants relating to the further planning and development of the irrigation facilities for the Rajasthan desert, and the utilization of such facilities, be negotiated with the GOI and included in the Loan Agreement. Key matters at which these conditions and covenants would be directed are suggested by the comments below, and are covered in more detail in the Supplement to this Capital Assistance Paper.

F. Comments on Irrigation of the Rajasthan Desert

Irrigation of the Rajasthan desert is a major undertaking. The following matters will be discussed in detail by A.I.D. with the GOI in the course of negotiating the loan for the Beas Dam Project.

1. In order to maintain a salt balance and prevent salts from accumulating in the root zone of the soil, the application of irrigation water must exceed the ~~transpiration~~ and evaporation requirements of the crops. The excess water and salts will percolate down to the ground water. As the ground water builds up and approaches the root zone, it must be removed by drainage. Drainage facilities add to the cost of the project of course, but nevertheless must be constructed to maintain productivity of the soil. On the Rajasthan Canal and Irrigation Unit, rates of water deliveries related to soil types and drainage plans have not yet been firmed up. This planning should be completed as quickly as possible. The Bureau of Reclamation says that for developing an overall coordinated plan the services of a highly qualified U.S. drainage expert may be required. A.I.D. will finance from its loan for the Beas Dam Project the foreign exchange costs of this and similar kinds of consulting assistance to the GOI concerning irrigation of the desert, such services to be approved by A.I.D. as a condition of financing.

- 43 -

A.I.D. will insist upon satisfactory assurances that irrigation water will be so allocated, or other sufficient steps taken, to avoid potential problems of salinization and water logging implicit in the present Indian approach.

If A.I.D.'s recommendations are agreed to, the benefit-cost ratio of the project as now calculated (1.06:1) might be increased to as much as 1:25:1.

2. Proper settlement of the lands to be irrigated presents many problems which will require considerable work, determination, and patience by the settlers. Many obstacles will be encountered and have to be overcome.

Both A.I.D. and the Bureau of Reclamation Team are of the opinion that the GOI and the State of Rajasthan should give early consideration to the formulation and putting into effect of a program of training and educating potential settlers. Also, master plans for population distribution and community living patterns, farm credit requirements, transportation networks, and the like, must be finalized.

3. Soils study and land classification work done on the desert thus far are of a reconnaissance nature, whereas construction of the Rajasthan Canal is well underway. Even though the reconnaissance survey provides useful information, there will be need for more definite information upon substrata conditions as related to drainage and reclamation of alkali lands, saline and sodic conditions within the soil profile, soil conditions as related to water requirements, and provision for stabilization against drifting and desiccating effects of winds.

The reconnaissance survey already performed was at a very low intensity of soil profile examination and measurement of more critical properties. Additional consideration needs to be given to the integrated effects of water quality, amount and quality of drainage effluent to be removed from the project area, farm delivery requirements, drainage requirements, and preliminary layout of the distribution system. Such considerations also should involve an economic evaluation based on local goals and the requirements essential to obtain assurance of financial success of the project.

A.I.D. thus will urge the GOI to greatly accelerate and intensify land classification studies and other appropriate studies of the desert.

If A.I.D.'s recommendations are agreed to, the benefit-cost ratio of the project as now calculated (1.06:1) might be increased to as much as 1:25:1.

SECTION VII: OTHER ASPECTS OF THE PROJECT

A. Views of the GOI, the Country Team, and Eximbank

The GOI is of course anxious that A.I.D. formalize the DLF commitment of funds for Beas. The IBRD funds for the Beas River development also will not be available to the GOI until A.I.D. takes appropriate action. Conversely, disbursement of the A.I.D. funds is dependent on appropriate action by IBRD. Both organizations thus are moving in tandem.

The Country Team supports this loan. The Eximbank has cleared the project for A.I.D. consideration.

B. Impact on the U.S. Economy

A loan for the Beas Dam Project will benefit the U.S. economy since all of the loan funds will be expended for the purchase of goods and services in the U.S. Some of the IBRD funds for the Beas development also will be spent in the U.S.

The U.S. balance of trade will be favorably affected, but the immediate effect on the balance of payments will be neutral since the export of goods and services will be matched in value by the export of capital funds.

The Beas Dam Project, by its very nature, does not directly involve competition with U.S. enterprise.

C. Implementation of the Project

It is expected that the loan for the Beas Dam Project will be implemented promptly and effectively. Following reaffirmation of the DLF commitment, A.I.D. representatives will enter into discussions with the GOI concerning the conditions and covenants of the loan, as has been discussed throughout this paper. Once these discussions have been successfully terminated, a Loan Agreement will be executed, conditions precedent to the disbursement of loan funds will be satisfied by the GOI, and disbursement of funds will commence. Some reimbursements of foreign exchange expenditures already made in the U.S. by the GOI for the project will be made, as mentioned in Section V: Financial Analysis of the Project.

IBRD loan funds for the Beas development also will begin to flow. Some reimbursements of foreign exchange already spent by the GOI will be made from the IBRD loan.

UNCLASSIFIED

- 45 -

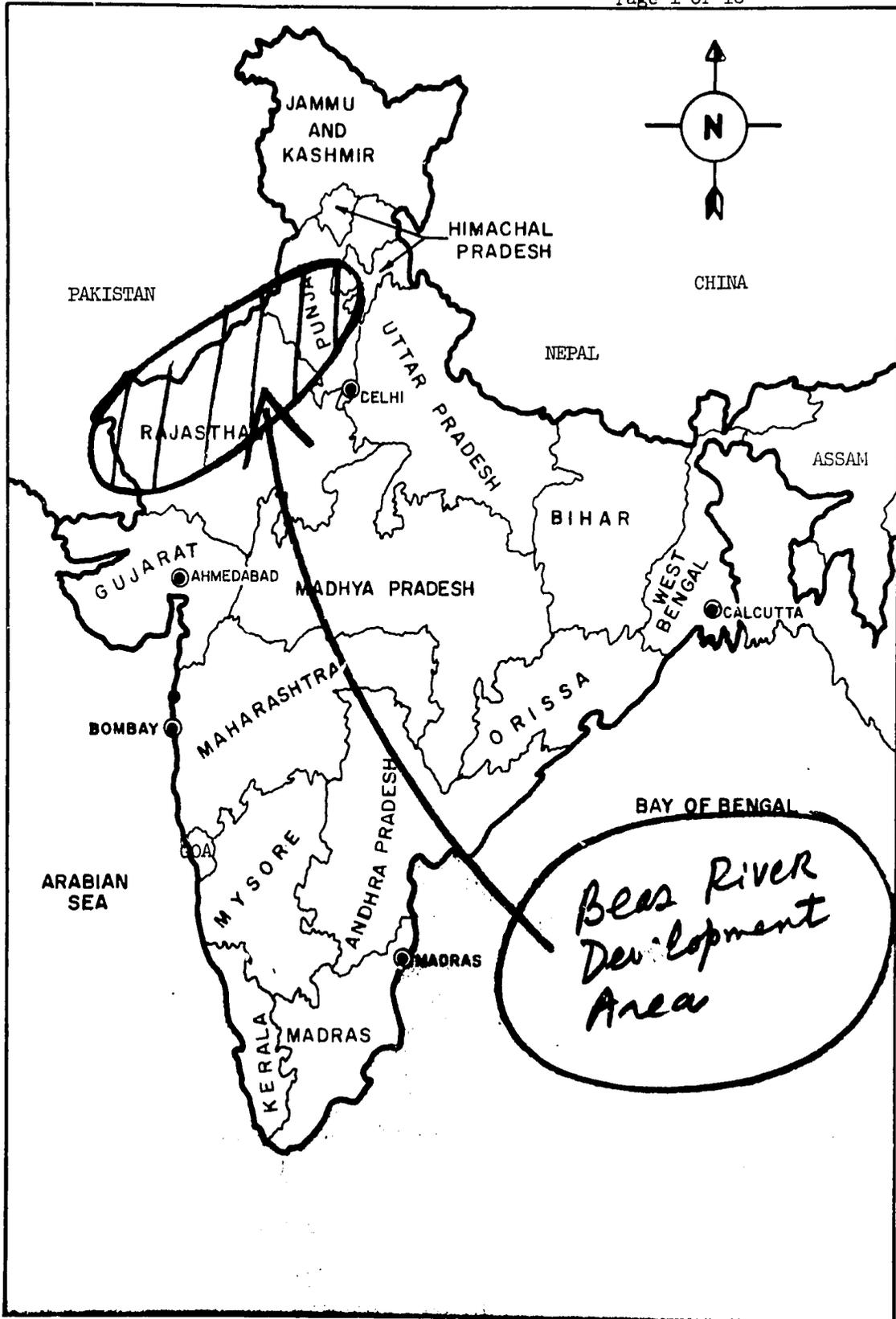
The A.I.D. will, of course, assure itself that the Beas Dam Project and the Rajasthan irrigation project are being implemented effectively through use of its normal procedures. These include periodic site visits, discussions with the project authorities, required progress reports, and the like.

UNCLASSIFIED

ANNEX I - EXHIBITS

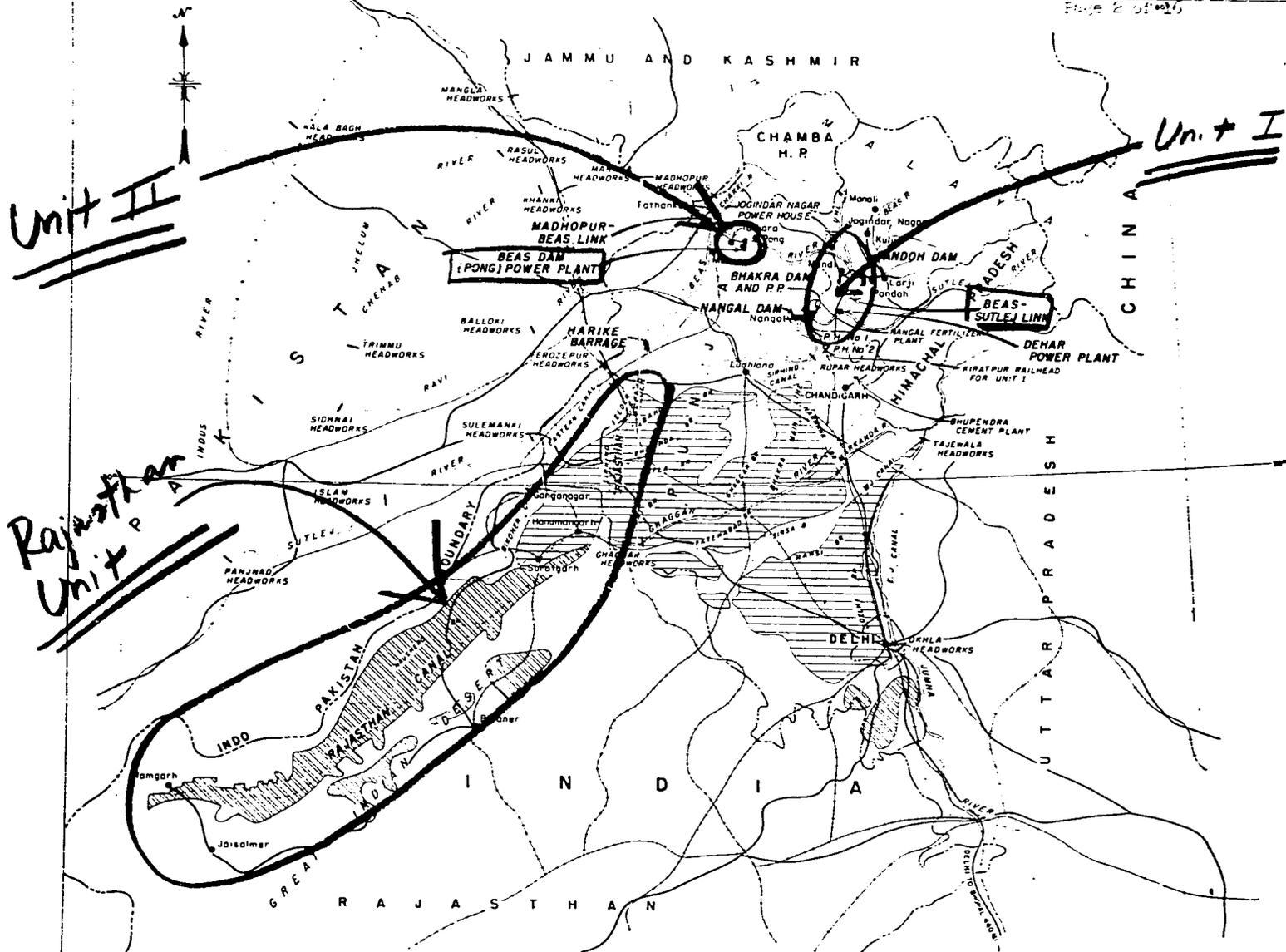
INDEX

<u>Exhibit Number and Title</u>	<u>Page</u>
1. Map of India	1
2. Map of the Beas River Development Area	2
3. Beas Control Board - Organization Chart	3
4. Beas Dam Project - Organization Chart	4
5. Rajasthan Canal and Irrigation Unit - Organization Chart	5
6. A.I.D.-Bureau of Reclamation Understanding - PIO/T No. 386-Z-99-AA-2-30049	6
7. A.I.D. Letter to GOI of February 13, 1964	11
8. Beas Dam Project - Cost Estimate	12
9. A.I.D. Letters to GCI Regarding Reimbursements of Foreign Exchange Expenditures	13
10. Beas Dam Project - Benefit-Cost Calculation for Irrigation	15



MAP OF THE BEAS RIVER DEVELOPMENT AREA

ANNEX 1, EXHIBIT 2
Page 2 of 25



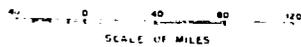
Unit II

Unit I

Rajasthan Unit

EXPLANATION

-  NEW AREAS PROPOSED TO BE IRRIGATED BY BEAS PROJECT UNIT I AND II
-  EXTENSION AND IMPROVEMENT OF IRRIGATION ON BHAKRA, SRININD CANAL AND W. C. AREAS FROM BEAS PROJECT UNIT I AND II
-  ROADS
-  TRANSCANDALIA RAILROAD
-  NARROW GAUGE RAILROAD
-  CANAL



BEAS CONTROL BOARD

ORGANIZATION CHART

BEAS CONTROL BOARD

Chairman, Hafez Mohd Abraham, Government of the Punjab

STANDING COMMITTEE
President - V. Nanjappa

GENERAL MANAGER
R. S. Gill

Financial advisor and
Chief Accounts Officer

Under Secretary Beas
O. P. Mehta

Superintending Engineer Procurement
T. K. Kalia

UNIT I
Beas-Sutlej Link

Chief Engineer

PROJECT PLANNING
and
DESIGNS

ADMINISTRATION

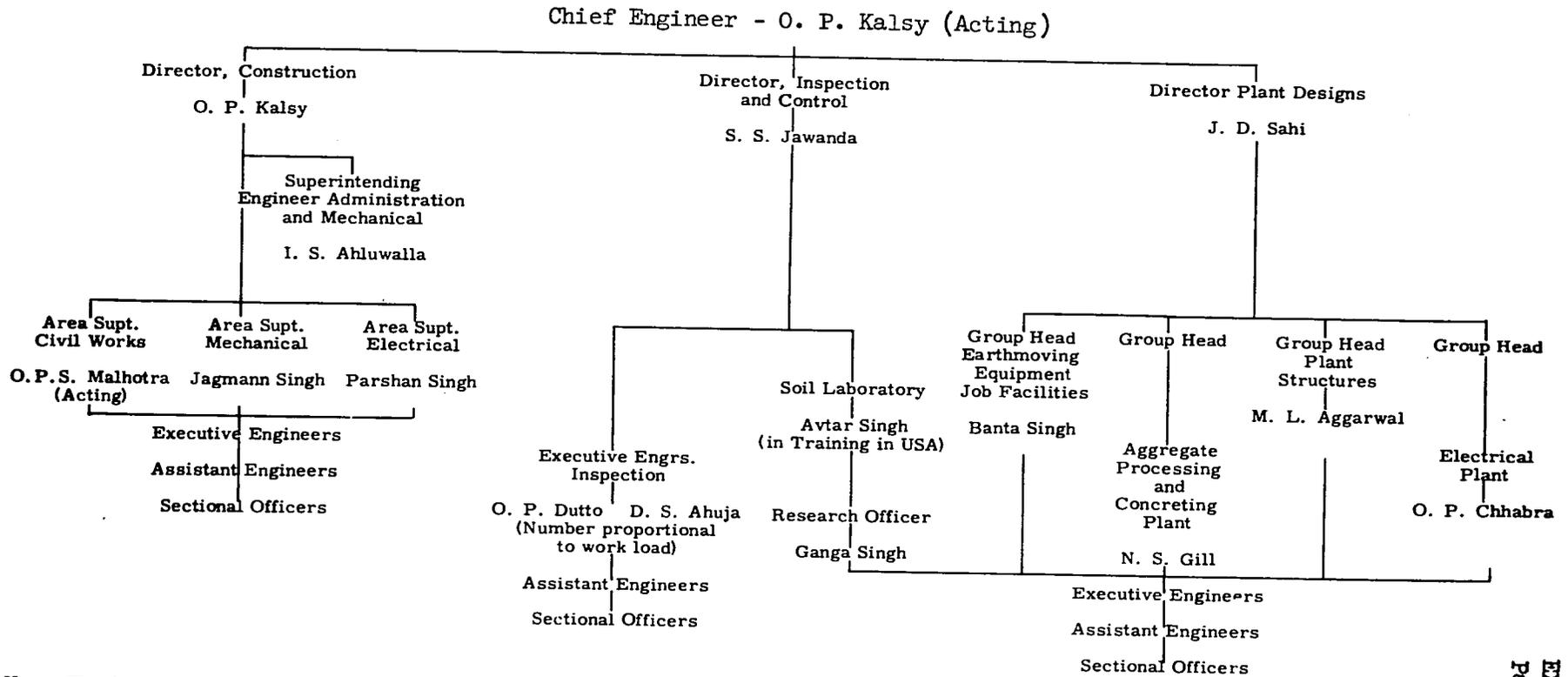
UNIT II
Beas Dam at Pong

Chief Engineer

Construction Plant Design Inspection

Inspection Plant Design Construction

BEAS DAM PROJECT
ORGANIZATION CHART



Note: The Assistant Engineers are graduates in engineering. The Sectional Officers are technical school qualified.

RAJASTHAN CANAL AND IRRIGATION UNIT

ORGANIZATION CHART

COMMITTEE OF DIRECTION

Minister for State - Central Government, Chairman
Mr. Alagesan

Chief Minister, Punjab, Member

Chief Minister, Rajasthan, Member

RAJASTHAN CANAL BOARD

CHIEF ENGINEER
R. N. Chowdhary

SUPERINTENDING ENGINEERS

EXECUTIVE ENGINEERS

ASSISTANT ENGINEERS

SECTIONAL OFFICERS

Note: The Assistant Engineers are graduates in engineering. The Sectional Officers are technical school qualified.

WORK SHEET ISSUANCE

AID 12-1
(4-59)

PROJECT IMPLEMENTATION ORDER

Technical Services

PIO/T

AGENCY FOR INTERNATIONAL DEVELOPMENT
UNITED STATES OF AMERICA

1. COOPERATING COUNTRY
INDIA

2. PIO NUMBER
386-Z-99-AA-2-30049

3. PROJECT TITLE
Review of Plans for Beas Dam

4. APPROPRIATION SYMBOL
Mixed (See Block 14)

5. ALLOTMENT SYMBOL & CHARGE
Mixed (See Block 14)
 AID/W USAID

6. OBLIGATION STATUS
 ADMINISTRATIVE RESERVATION
 OBLIGATION SUB OBLIGATION

7. ORIGINAL
AMENDMENT NO

8. NUMBER OF TECHNICIANS
7

9. DESIRED EFFECTIVE PERIOD
FROM: April 1, 1963
TO: May 1, 1963

10. DURATION (MONTHS) FY 1963
OF SERVICES: 3
OF FINANCING: 3

11. TYPE OF ACTION

(A) AID CONTRACT

(C) COUNTRY CONTRACT

(B) SERVICE AGREEMENT

(D) OTHER

IMPLEMENTING AGENT

AID/W through Bureau of Reclamation, Department of the Interior

FINANCING	PREVIOUS (A)	INCREASE (B)	DECREASE (C)	TOTAL TO DATE (D)
12. AID \$		53,000		53,000
13. COOP. \$ COUNTRY \$1.=				

14. INSTRUCTIONS TO IMPLEMENTING AGENT

Appropriation	Allotment	Previous Financing	Increase	Decrease	Total to Date
72-1131004	354-50-386-54-69-31		33,000		33,000
72-FT-575	547-50-386-05-69-00		20,000		20,000
			(Rs 95,200)		(Rs 95,200)

USAID REFERENCES

GOI has applied to the IBRD and to AID for loans totalling \$56 million to finance the foreign exchange costs of the proposed Beas Dam at the Panjval Site. IBRD has tentatively agreed to loan GOI \$23 million towards purchase of equipment. (Continued)

15. SPECIAL PROVISIONS

A. Except as specifically authorized by AID/W or when local hire is authorized under the terms of a contract with a U.S. supplier, services authorized under this PIO/T must be obtained from U.S. sources.

B. Except as specifically authorized by AID/W, the purchase of commodities authorized under this PIO/T will be limited to countries listed in Geographic Code 901. (Continued)

(JS:

DATE	USAID CLEARANCES	DATE
	DATE OF ORIGINAL ISSUANCE April 5, 1963	DATE OF THIS ISSUANCE April 5, 1963

FOR THE COOPERATING COUNTRY

FOR THE DIRECTOR, AID

The terms and conditions set forth herein are hereby accepted.

Russell Siltz

DATE

SIGNATURE

WORK SHEET ISSUANCE

PAGE 2

AID 12-1A (4-59)	PROJECT IMPLEMENTATION ORDER Technical Services Scope of Work AGENCY FOR INTERNATIONAL DEVELOPMENT UNITED STATES OF AMERICA	1. COOPERATING COUNTRY INDIA	2. PIO NUMBER 386-Z-99-AA-2-30049
		3. PROJECT TITLE Review of Plans for Beas Dam	
PIO/T/S			

16. SCOPE OF TECHNICAL SERVICES (including local recruitment, procurement & training):

The Bureau of Reclamation will furnish all of the personnel, equipment and material, except for local travel and expenses in India and international travel, to carry out the review and the preparation of the report.

The agreed upon scope of work to be undertaken by USBR is as follows:

1. Review the over-all project plan for the Beas Dam, including the Dam, power plant, spillway and allowance for reservoir sedimentation and the auxiliary facilities such as the town site, road and other transportation facilities and plans for such other works as may be or should be included in the GOI application for a loan from AID.

2. Review the over-all geologic data in its generality as it may establish governing criteria for the design of structures including watertightness of the reservoir, and in its particularity as it may affect the detailed design of the various elements of the project, such as the dam proper, the spillway, the power house, and the diversion tunnels.

(Continued)

AID FINANCING	COOPERATING COUNTRY FINANCING
33,000 plus equivalent of 20,000 in Indian Rupees	

17. SCOPE OF ACCESSORY SERVICES (i.e., procurement & training outside cooperating country):

None

	PROCUREMENT	TRAINING
AID FINANCING		
C. C. FINANCING		

18. TECHNICIANS (number, kinds, periods of assignments):

The Bureau of Reclamation estimates that a maximum of 7 engineers and/or other personnel will be required for a period of about 90 days for the work covered by this PIO/T.

WORK SHEET ISSUANCE

AID 12-1B (4-59)	PROJECT IMPLEMENTATION ORDER Technical Services Scope of Work - Continued	1. COOPERATING COUNTRY	2. PIO NUMBER
		INDIA	386-Z-99-AA-2-30049
PIO/T/C	AGENCY FOR INTERNATIONAL DEVELOPMENT UNITED STATES OF AMERICA	3. PROJECT TITLE Review of Plans for Beas Dam	

19. PROGRAM REPORTS (kinds by content, frequency, no. of copies, languages, recipients, etc.):

Final: 15 copies to AID/W
 Progress: None
 Other: Monthly report on obligations and expenditures

20. TIME SPAN AND LOCATION OF SERVICES:

Three (3) months following the effective date of this PIO/T, including work in India and report preparations after return.

21. RELATIONSHIP TO COOPERATING COUNTRY AND AID:

The services to be performed by the Bureau of Reclamation are for the purposes of advising AID regarding the project proposed for consideration for an AID Loan Application.

The Bureau of Reclamation will need to consult with appropriate Government of India and Punjab Public Works Department representatives for information during the course of the review.

C. C. Liaison Official:

22. AVAILABILITY OF BACKGROUND INFORMATION:

To be provided by the Bureau of Reclamation.

ACCESS REQUIRED	Security information:	Normal security clearance is adequate.
	Restricted premises:	None.

23. LOGISTIC SUPPORT IN KIND (by types, extent and contributing parties, privileges):

USAID/India will provide for local travel, per diem, stenographic services and other such support.

CONTINUATION

Page 4

INDIA 386-Z-99-AA-2-J0049

Review of Plans for Beas Dam

Block 14 - Continued

of equipment required in construction of irrigation works on the Beas River and in the Rajasthan Desert. On June 29, 1960, DLF allocated on its books \$33 million for purposes of a loan for Beas Dam provided GOI supplied information adequate to satisfy Sec. 517, MSAc. Review of materials provided to AID/W by GOI indicates that it is inadequate to satisfy Sec. 611, FAA 1961. Since there is a great deal more information available in India, and in order to save time, AID/W has requested the Bureau of Reclamation to undertake a review of the project plans and provide AID/W with a report on its findings and recommendations.

USBR estimates that a team of up to 7 experts will be required to encompass the necessary skills. USBR estimates that a total time period of 90 days may be required -- 60 days for the team in India, and 30 days for the team in the U.S. preparing the required report.

Block 15 - Continued

C. If, to implement this agreement, a contract is entered into for the performance of services outside the United States by U.S. citizens, the Bureau of Reclamation will take appropriate action to assure compliance with the loyalty and security investigation requirements of Section 111 of the Foreign Aid and Related Agencies Appropriation Act of 1963 (Public Law 87-872, 76 Stat. 1163).

Block 16 - Continued

3. Review the hydrologic data regarding determination of the spillway design flood and advise as to the acceptability of the adopted flood for project design and, if in USBR's judgment the currently adopted design flood is not adequate, to develop and recommend a spillway design flood which would be acceptable in planning by U.S. Government agencies.

4. Review the time schedule for construction with particular attention to the plans for diversion and care of the river during construction operations.

5. Review the construction cost estimate of the project including the foreign exchange component thereof taking into account the probable availabilities of materials scheduled for local procurement.

6. Evaluate the methods, procedures and processes used in planning for its utilization of the water and power developed for Beas Dam and associated works and provide its judgment as to the likelihood of those methods, processes and procedures ultimately producing soundly conceived plans.

7. Evaluate the qualifications of the local organization to plan and carry to completion the construction of Beas Dam and associated works and the over-all project or project system of which Beas Dam is a part, including the ability of the local organization to carry out construction under the schedules that will be necessary.

CONTINUATION

Page 5

INDIA 386-2-99-AA-2-30049

Review of Plans for Beas Dam

Block 16 - Continued

8. Submit a report on the above items (1 through 7), including the Bureau of Reclamation's opinion on the adequacy of the current plans to provide for a safe and sound project and of the ability of the local organization to carry out these plans, including specific recommendations for amendments to current plans, where in its judgment changes are necessary to provide adequate structures, and include a cost estimate of the revised project, both in total cost and foreign exchange requirements that is reasonably adequate as required by Section 611(a), FAA 1961, with lists of construction equipment and permanent equipment with the estimated dates each item will be required.

BUDGET ESTIMATE - FY 1963Funding Requirements to Accomplish Review of
Plans and Estimates - Beas Dam

	<u>U.S. \$</u>	<u>U.S. Equiv. of Rupees</u>
Salaries and Benefits	26,100	-
Per Diem		
In U. S.	900	-
In India	4,200
Transportation		
In U.S.	2,000	~
International	-	8,000
Technical Backstopping	4,000	-
Local Transportation and other miscellaneous costs		7,800
	-----	-----
	\$33,000	\$20,000
		(Rs 95,200)

TOTAL - \$53,000

February 13, 1964

Mr. K. S. Sundara Rajan
Embassy of India
2342 Massachusetts Avenue, N.W.
Washington 8, D. C.

Dear Mr. Rajan:

I refer to your letter No. 6(8)/EF/64, dated February 6, and to conversations between us and members of our staffs, concerning the Beas Project.

Let me confirm that we are proceeding to prepare papers and schedule necessary meetings at an early date at which we will recommend authorization of a loan in an amount not to exceed \$33 million to assist in financing the costs of Unit II (Beas Dam and Long Powerplant) of Beas. We have advised the IBRD of this.

The prime purpose of Unit II is to regulate the flow of the Beas River for irrigation of desert areas of Rajasthan. Thus the A.I.D., in order to proceed with this financing, is required to concern itself with the successful planning and development of this irrigation. Accordingly, any loan for Unit II will include appropriate conditions and covenants relating to both that Unit and the Rajasthan. I expect that the nature of these conditions and covenants will be the subject of intensive conversations between members of our staffs both here and in India in coming weeks.

I remain,

Sincerely yours,

/s/

William S. Gard
Assistant Administrator
Bureau for Near East and South Asia

ANNEX I, EXHIBIT - 8 - Page 12 of 16
BEAS DAM PROJECT -
COST ESTIMATE

<u>Direct charges</u>	<u>Laks of Rupees</u>	<u>Million \$ Equiv.</u>
1. Land and Preliminary works	891.02	18.7
2. Diversion works	1,535.37	32.2
3. Preparation of Foundation	316.46	6.7
4. Earth Dam	1,839.46	38.6
5. Outlet works	229.70	4.8
6. Spillway	862.32	18.1
7. Power Penstocks	537.39	11.3
8. Power Plant Structure	280.38	5.9
9. Power Plant and Switchyard equipment	800.00	16.8
10. Transmission Lines	350.00	7.4
11. Miscellaneous	8.25	0.2
12. Railway & Road tunnel in project area	114.16	2.4
13. Job supporting facilities, stores, etc.	422.35	8.9
14. Buildings	647.21	13.6
15. Plantation and Miscellaneous	124.55	2.6
16. Maintenance and repairs to buildings & works during constr.	144.18	3.0
17. Communications (Railway & Road to project)	403.62	8.5
Total Works	9,506.42	199.6
18. <u>Special Tools & Plant</u>		
a. Capital Cost	1,492.19	
b. (1) Minor Repairs	20.00	
(2) Major Repairs	600.00	
Total (a. & b.)	2,122.19	
c. Credits		
(1) Depreciation (incl. in rates for work)	861.48	
(2) Credit for sales proceeds (residual book value after depreciation)	525.57	
(3) Reserve for major repairs (depreciation accounts kept)	600.00	
Total (c.)	1,987.05	
Net chargeable to job (a.+b.-c.)	135.14	2.8
19. Losses and Unforeseen Expenses	80.00	1.7
20. Establishment	1,506.84	31.6
21. Tools and plant (consumable)	145.82	3.1
22. Other receipts (sale of temporary construction facilities)	-356.77	-7.5
Total Direct Charges	11,017.45	231.4
<u>INDIRECT CHARGES</u>		
23. Loss of Land Tax Revenue	12.70	
24. Audit and Accounts charges $\frac{1}{2}\%$ x Laks 9721.56)	48.61	
25. Total Indirect Charges	61.31	1.3
Total Direct and Indirect Charges	11,078.76	232.7
say		233.5
Cost Increase Due to Bureau of Reclamation Recommendations		10.0
Add Credit for Salvage Value of Equipment		243.5
		11.0
		254.5

Note: Totals may not add due to rounding.

ANNEX I, EXHIBIT - 9 - Page 13 of 16
A.I.D. Letter to GOI
Regarding Reimbursements
of Foreign Exchange
Expenditures

April 19, 1963

Dr. A. K. Ghosh
First Secretary (Economic)
Embassy of India
2342 Massachusetts Avenue, N.W.
Washington 8, D. C.

Dear Dr. Ghosh:

This letter is in furtherance of conversations between representatives of this Agency and your Government concerning the question of orders to be placed for the Beas Dam, for which an A.I.D. Loan has been requested.

Without in any way committing the A.I.D. to financing the proposed project in advance of its appraisal and approval, A.I.D. would have no objection, after the date of this letter, to financing the foreign exchange costs of equipment from the U.S. beyond the original \$3.5 million level, should a loan for the project be ultimately approved. The reimbursement would, of course, be limited to the cost of equipment required for the project ultimately defined by the Loan Agreement.

Sincerely yours,

/s/

William S. Gaud
Assistant Administrator
Bureau for Near East and South Asia

July 27, 1962

Dr. A. K. Ghosh
First Secretary (Economic)
2342 Massachusetts Avenue, N.W.
Washington 8, D. C.

Dear Dr. Ghosh:

With respect to the Beas Dam program, I refer to your letter of July 14 to Mr. Ulinski and the letter of July 11 from Sir William Iliff of the International Bank for Reconstruction and Development to Mr. M. R. Sachdev, Secretary of the Ministry of Irrigation and Power, Government of India.

Sir William Iliff, by his letter, advises that if the Government of India places orders now for the purchase of certain essential equipment for the program, such action will not jeopardize eventual reimbursement from International Bank funds for the foreign exchange costs of the equipment if and when the Bank extends a loan. However, with the Bank and A.I.D. contemplating cooperation in the financing of foreign exchange costs, it may be that the cost of this equipment will be partially or wholly financed from the proposed A.I.D. loan. Consequently, it is desirable that you also gain assurance that placing of orders now will not jeopardize possible eventual reimbursement from A.I.D. loan funds.

Be advised, therefore, that A.I.D. also has no objection to the placing of orders for the purchase of essential U.S. equipment of the general type listed in the second paragraph of Sir William Iliff's letter, and that A.I.D. will permit reimbursement from A.I.D. loan funds for the reasonable dollar cost of such equipment if the program otherwise moves ahead. Equipment whose purchase price is to be reimbursed from any loan funds extended by A.I.D. will of course have to be procured in the United States. We understand that competitive bidding procedures will be followed in purchasing this equipment.

Sincerely yours,

/s/

William S. Gauá
Assistant Administrator
Bureau for Near East and South Asia

BEAS DAM PROJECT

BENEFIT-COST CALCULATION FOR IRRIGATION

The calculation was made on the basis of the following data and assumptions:

Interest Rate $4 \frac{3}{4}\%$
Beas Dam completed in January 1971
500,000 acres fully irrigated by January 1971 = 4.0 crore annual benefit
Increase production area 100,000 acres per year over a 30 year period
Benefit/acre = R80
Annual benefit = 4.0 crore + 0.8 crore Annual Increase
Eighty Year Period (Thirty years to complete irrigation system plus Fifty years)

1. Benefit Calculation:

Annual Increase = 0.80 crore rupees
Present Worth = $0.80 \times 192.6 = 154$
Annual Equivalent Benefit, over 80 year period, of steadily increasing benefit over 30 year lag period = $154 \times 0.0488 = \underline{7.5}$
Present Worth (from beginning of 31st year through 80th year) = $0.80 \times 30 \times 19.06$ (50 yrs. remaining) = 458
Present Worth (at beginning of first year) = 458×0.250 (30 years) = 114.4
Annual Equivalent Benefit, Fifty Years Full Production, Amortized in 80 years = $114.4 \times 0.0488 = \underline{5.6}$
Total Annual Equivalent Benefit = $4.0 + 7.5 + 5.6 =$
Rupees 17.1 Crores.

2. Cost Calculation:

Total Investment =	333 Crores
Minus Power Capital Costs =	20
Total Irrigation Capital Costs =	<u>313</u>
Minus future capital costs =	74 (2 cr/yr. 30 yrs. + interest)
Irrigation capital costs to 1971 =	<u>239</u> crore
Present Value future capital costs =	40 (2 crore/yr. 30 yrs.)
Present Worth - Irrigation Project =	<u>279</u> (adjusted to beginning first year)

Cap. Cost/yr. = 279 Crores amortized over 80 yr. =	
279 x .0488 =	13.6
Canal O & M @ 2R/acre	0.9
Dam O & M minus 25% for power	0.3
Replacement @ 279 x $\frac{1}{2}\%$	1.4
	<u>16.2</u>

3. Ratio: Benefit/Cost = 17.1/16.2 = 1.06

INDIA - BEAS DAM PROJECT

CHECK LIST OF STATUTORY CRITERIA*

1. FA** Sec. 102. Precautions have been or are being taken to assure loan proceeds are not diverted to short-term emergency purposes (such as budgetary, balance of payments, or military purposes) or any other purpose not essential to the country's long-range economic development. -- The Loan Agreement will provide that the loan funds be used only for the Beas Dam Project, with the exception of some consulting services concerning irrigation of the Rajasthan desert that will also be financed.
2. FA Sec. 201(b). Manner in which loan will promote country's economic development, emphasizing help for long-range plans and programs designed to develop economic resources and increase productive capacities. -- Considered in Sections II, III, and VI of this Capital Assistance Paper.
3. FA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States. -- This loan results from a commitment by the Development Loan Fund made to India in 1960 in connection with the important Indus Valley Water settlement between India and Pakistan. At the same time the International Bank for Reconstruction and Development allocated \$23 million. See Section II.
4. FA Sec. 201(b)(2). Information and conclusion on activity's economic and technical soundness, including the capacity of the recipient country to repay the loan at a reasonable rate of interest. -- Considered in Sections IV, V, and VI. It is concluded that the project is technically sound (Section IV), economically feasible (Section VI), and that the GOI has the capacity to repay this loan at a reasonable rate of interest (Section V).
5. FA Sec. 201(b)(3). Information and conclusion on existence of reasonable promise activity will contribute to development of economic resources or increase of productive capacities. -- Considered in Sections II, III, and VI.

*The statutory check list currently in use under the Foreign Assistance Act of 1961, as amended, has been used as a reference since the relevant statutory requirements and criteria under that Act do not differ in any material respect from those of its predecessor, the Mutual Security Act of 1954, as amended through May 14, 1960, and, if anything, are generally more comprehensive and stringent than those under the earlier Act.

**The following abbreviations are used:

FA - Foreign Assistance Act of 1961, as amended;

APP - Foreign Aid and Related Agencies Appropriation Act, 1964.

6. FA Sec. 201(b)(4). Information and conclusion on activity's relationship to other development activities, and its contribution to realizable long-range objectives. -- Considered in Sections II, III, and VI. It is concluded that the activity is related closely to other development activities and will make an important contribution to long-range objectives, particularly in the fields of irrigation and power.
7. FA Sec. 201(b)(5). Country's self-help measures, including institution of Foreign Assistance Act investment guaranty programs. -- India has been and is taking a wide range of self-help measures. The Investment Guaranty Program is in effect in the country.
8. FA Sec. 201(b)(6). Information and conclusion on possible effects on U.S. economy, with special reference to areas of substantial labor surplus. -- See Section VII B. All purchases financed from the A.I.D. loan will have their source and origin in the U.S. Areas of substantial labor surplus in the U.S. might benefit.
9. FA Sec. 201(b). Information and conclusion on reasonable prospects of repayment. -- Considered in Section V F. It is concluded that there are reasonable prospects that the GOI will repay this loan.
10. FA Sec. 201(d). Information and conclusion on legality (under laws of the country and the U.S.) and reasonableness of lending and relending terms. -- The funds will be lent in compliance with the laws of the U.S. and India. The lending terms are considered reasonable.
11. FA Sec. 201(e). Information and conclusion on availability of an application together with sufficient information and assurances to indicate reasonably that funds will be used in an economically and technically sound manner. -- Considered in Sections II, III, IV, V, and VI. The receipt of a loan application prior to the June 29, 1960, DLF action, as required by Section 202(c)(1) of the Mutual Security Act of 1954, as amended, was obviated through a determination on June 28, 1960, that the use of such funds pursuant to multilateral plans was in the national interest, relying on the authority of Section 202(c)(2) of that Act. There is now an application which provides sufficient information and assurances to satisfy the requirements of Section 201(e) of the FAA.
12. FA Sec. 201(f). If a project, information and conclusion whether it will promote the economic development of the requesting country, taking into account the country's human and material resource requirements and the relationship between the ultimate objectives of the project and the country's over-all economic development. -- Considered in Sections II, III, and VI. It is concluded that the project will promote the economic development of India.

13. FA Sec. 201(f). If a project, information and conclusion whether it specifically provides for appropriate participation by private enterprise. -- The Beas Dam Project is a public sector project. However many private Indian firms will supply services and equipment for the project. Commodities financed from the A.I.D. loan will be from private U.S. firms and U.S. shipping companies will participate in transporting the equipment financed by the loan.
14. FA Sec. 202(a). Extent to which loan will encourage economic development through private enterprise and how. -- Most of the irrigation water will be used by private Indian farmers. Many private Indian firms will supply services and equipment for the project. Much of the power generated from the power facilities will ultimately drive equipment in the plants and factories of private Indian firms.
15. FA Sec. 601. Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions. -- (a) Trade will take place between the U.S. and India since all purchases financed from the loan will have their source and origin in the U.S. (b) Private initiative will be fostered since the irrigation water will be used by private Indian farmers. Also, many private Indian firms will supply services and equipment for the project. (c) The loan might encourage development of the use of cooperatives, credit unions, and savings and loan associations, in the area and amongst the farmers who will utilize the irrigation water. (d) It is unlikely that the loan will have any direct effect in discouraging monopolistic practices. (e) Technical efficiency in agriculture will probably be increased in the area to be irrigated. (f) The loan will not necessarily have any direct effect in strengthening free labor unions.
16. FA Secs. 601, 602. Information and conclusions whether loan will (a) encourage U.S. private trade and investment abroad; (b) encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise); and (c) permit American small business to participate equitably in the furnishing of goods and services financed by it. -- (a) All purchases financed from the loan will have their source and origin in the U.S. Purchases will be from private U.S. firms. (b) All purchases financed from the loan will have their source and origin in the U.S. Purchases will be from private U.S. firms. Transactions will take place primarily through private trade channels. (c) The loan agreement will provide for appropriate participation by U.S. small business.

17. FA Sec. 604(a). Compliance with restriction of commodity procurement to U.S. except as otherwise determined by the President and subject to statutory reporting requirements. -- All purchases financed from the loan will have their source and origin in the U.S.
18. FA Sec. 604(b). Compliance with bulk commodity procurement restriction to prices no higher than the market price prevailing in the U.S. at time of purchase. -- The Loan Agreement will contain a provision covering this point.
19. FA Sec. 604(d). Compliance with requirement that marine insurance be purchased on commodities if the participating country discriminates, and that such insurance be placed in the U.S. -- The Loan Agreement will contain a provision covering this point.
20. FA Sec. 611(a)(1). Information and conclusion on availability of engineering, financial, and other plans necessary to carry out the assistance and of a reasonably firm estimate of the cost of the assistance to the United States. -- This requirement has been met. See Sections II, IV, V, and VI, and particularly Subsections IVD, VG, and VII.
21. FA Section 611(a)(2). Necessary legislative action required with recipient country and basis for reasonable anticipation such action will be completed in time to permit orderly accomplishment of purposes of loan. -- No legislative action is necessary to carry out the Beas Dam Project.
22. FA Sec. 611(b); App. Sec. 101. If water or water related land resource construction project or program, information and conclusion on benefit-cost computation. -- The requirements of these sections have been met. (See the appropriate footnote in Section VI of this paper.)
23. FA Sec. 611(c). Compliance with requirement that contracts for construction be made on competitive basis to maximum extent practicable. No construction contracts will be financed from this loan.
24. FA Sec. 619. Compliance with requirement that assistance to newly independent countries be furnished through multilateral organizations or plans to maximum extent appropriate. -- This loan results from a commitment by the Development Loan Fund made to India in 1960 in connection with the important Indus Valley Water settlement between India and Pakistan. At the same time the International Bank for Reconstruction and Development allocated \$23 million. See Section II.
25. FA Sec. 620(a); App. Sec. 107. Compliance with prohibitions against assistance to Cuba and any country (a) which furnishes assistance to Cuba or fails to take appropriate steps by February 14, 1964, to prevent ships or aircraft under its registry from carrying equipment, materials or supplies from or to Cuba; or (b) which sells, furnishes or permits

- any ships under its registry from carrying items on the Battle Act List, or other items of primary strategic significance, or items of economic assistance. -- India currently is not in violation of this Section.
26. FA Sec. 620(b). If assistance to the government of a country, existence of determination it is not controlled by the international Communist movement. -- India is not controlled by the international Communist movement.
 27. FA Sec. 620(c). If assistance to the government of a country, existence of indebtedness to a U.S. citizen for goods or services furnished or ordered where such citizen has exhausted available legal remedies or where the debt is not denied or contested by such government or the indebtedness arises under an unconditional guaranty of payment given by such government. -- India is not ineligible under this Section.
 28. FA Sec. 620(d). If assistance for any productive enterprise which will compete with U.S. enterprise, existence of agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan. -- The irrigation water and the electric power resulting from the Beas Dam Project will not be exported.
 29. FA Sec. 620(e). If assistance to the government of a country, extent to which it (including government agencies or subdivisions) has, after January 1, 1962, taken steps to repudiate or nullify contracts or taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking appropriate steps to discharge its obligations. -- India is not ineligible under this Section.
 30. FA Sec. 620(f); App. Sec. 109. Compliance with prohibitions against assistance to any Communist country. -- India is not a Communist country.
 31. FA Sec. 620(g). Compliance with prohibition against use of assistance to compensate owners for expropriated or nationalized property. -- Assistance made available under this loan will not be used for such purpose.
 32. FA Sec. 620(h). Compliance with regulations and procedures adopted to insure against use of assistance in a manner which, contrary to the best interests of the U.S., promotes or assists the foreign aid projects or activities of the Communist-bloc countries. -- This section is complied with and the Loan Agreement will contain a provision covering it.
 33. FA Sec. 620(i). Existence of a determination that the country is engaging in or preparing for aggressive military efforts. -- No such determination has been made.

34. FA Sec. 620(k). If construction of productive enterprise where aggregate value of assistance to be furnished by U.S. will exceed \$100 million, identification of statutory authority. -- U.S. assistance to the Beas Dam Project will not exceed \$100 million in U.S. dollars.
35. FA Sec. 620(1). Compliance with prohibition against assistance after December 31, 1965, for the government of a country which fails to institute investment guaranty program. -- The Investment Guaranty Program is in effect in India.
36. FA Sec. 636(h). Appropriate steps that have been taken to assure that, to maximum extent possible, country is contributing local currencies to meet the cost of contractual and other services. -- India is contributing local currency and foreign exchange to the Beas Dam project, and a condition precedent to disbursement providing assurance that India will continue to do so will be included in the Loan Agreement. (See Section V.)
37. App. (Section unnumbered). Use of funds to carry out FA Sec. 205, which pertains to IDA. -- No contribution to IDA is involved in this project.
38. App. Sec. 102. Compliance with requirement that payments in excess of \$25,000 for architectural and engineering services on any one project be reported to Congress. -- Any such payments will be reported.
39. App. Sec. 104. Compliance with bar against funds to pay pensions, etc., for military personnel. -- Loan funds will not be provided for such purposes.
40. App. Sec. 111. Compliance with requirement for security clearance of personnel under contracts for services. -- Any such personnel will be cleared.
41. App. Sec. 112. Compliance with requirement for approval of contractors and contract terms for capital projects. -- This section will be complied with.
42. App. Sec. 114. Compliance with bar against use of funds to pay assessments, etc., of UN members. -- No such payments will be made from a loan for the Beas Dam Project.
43. App. Sec. 117. Availability of sufficient funds which have been appropriated or authorized for use by an appropriation Act. -- Funds are available. See Section II.
44. App. Sec. 118. Compliance with regulations on employment of U.S. and local personnel for funds obligated after April 30, 1964. -- No construction contracts will be financed.
45. App. Sec. 601. Compliance with bar against use of funds for publicity or propaganda purposes within U.S. not heretofore authorized by Congress. None of the loan funds will be used for such purposes.

CAPITAL ASSISTANCE LOAN AUTHORIZATION
(Provided from: M.S.A. Development Loan Funds)

INDIA: BEAS DAM PROJECT

Pursuant to the authority vested in the Administrator of the Agency for International Development (hereinafter called "A.I.D.") by the Foreign Assistance Act of 1961, as amended, (the "Act") particularly Section 643 thereof, and the delegations of authority thereunder, and the Mutual Security Act of 1954, as in effect on June 29, 1960 (the "Mutual Security Act"), I hereby authorize the Assistant Administrator, Bureau for Near East and South Asia, or his delegate, to proceed with the loan for which funds were allocated by the Board of Directors of the Corporate Development Loan Fund on June 29, 1960, under Title III of Chapter II of the Mutual Security Act, to the Government of India of not to exceed Thirty Three Million Dollars (\$33,000,000) to assist in financing the foreign exchange costs of goods and services, including associated advisory services, for the construction of a dam at Pong on the Beas River suitable for irrigation and the generation of electric power, this loan to be subject to the following terms and conditions:

1. Interest and Terms of Repayment: The interest shall be three and one half percent (3 1/2%) per annum on the disbursed balance of the loan. The loan shall be repaid within thirty (30) years from the date of the first disbursement thereunder including a grace period of not to exceed ten (10) years; such repayment period and grace period may be reduced, however, if and to the extent necessary to make them, or either of them, coequal with the corresponding period or periods of the loan from the International Bank for Reconstruction and Development ("I.B.R.D.") to the Government of India described in paragraph 3(c) hereof.
2. Currency of Repayment: Provision shall be made for repayment of the loan and payment of the interest in Indian Rupees and for appropriate maintenance of value obligations.
3. Other Terms and Conditions:
 - (a) Equipment, materials and services financed under the loan shall be procured from the United States.

UNCLASSIFIED

ANNEX III, Page 2 of 2

- (b) The terms under which A.I.D. loan funds are relent to the project authorities shall be acceptable to A.I.D.
- (c) No disbursements shall be made under the loan prior to receipt by A.I.D. of a fully executed, delivered and effective loan agreement satisfactory to A.I.D. providing for a loan from the I.B.R.D. to the Government of India of not less than the equivalent of Twenty-Three Million Dollars (\$23,000,000), the proceeds of which to be available to assist in financing the foreign exchange costs of importing equipment for the construction of works for extending irrigation in the Punjab and in Rajasthan and for developing hydroelectric power from the Beas River.
- (d) Appropriate conditions and/or covenants relating to the further planning and development of irrigation facilities for the Rajasthan desert, and the utilization of such facilities, shall be included in the loan agreement.
- (e) Satisfactory assurances shall be provided by the Government of India that such foreign exchange and local currency, additional to that to be made available by the A.I.D. and I.B.R.D. loans, as may be necessary to complete and operate the project in an orderly and efficient manner will be made available by the Government of India when necessary.
- (f) Satisfactory assurances shall be provided by the Government of India that the recommendations of the Bureau of Reclamation of the U.S. Department of Interior concerning this project have been substantially accepted and will substantially be given effect.
- (g) The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.
- (h) Disbursements may be made to finance purchases of equipment made in the United States after July 27, 1962.

Administrator

Date

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

AID-DLC/P-278/1
Revised August 4, 1964

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: India - Beas Dam Project

Attached for your information is a revised supplement to the Capital Assistance Paper for the subject loan (See AID-DLC/P-278). This supplement summarizes the nature of the conditions, covenants and points that may be contained in side letters to be negotiate by A.I.D. with the GOI prior to execution of a loan agreement for the Beas Dam project.

Helen E. Nelson
Secretary
Development Loan Committee

Attachment: As stated.

ASST. SECY. (ECON.)
AUG 11 1964
DEPT. OF STATE

AID-DLC/P-278/1
Revised
August 4, 1964

Supplement to Capital Assistance Paper AID-DLC/P-278,
Titled "India - Beas Dam Project"

Conditions Precedent to Disbursement of Funds, Covenants,
and Side Letters* to be Negotiated by A.I.D. with the GOI
Prior to Execution of a Loan Agreement for the
Beas Dam Project

The Capital Assistance Paper AID-DLC/P-278, titled "India - Beas Dam Project", concludes that the Beas Dam Project is technically, financially, and economically feasible, and recommends that a loan of not to exceed \$33 million be made to the Government of India (GOI) for the project.

The paper also says that certain conditions and covenants will be negotiated by A.I.D. with the GOI. Negotiations on these matters will precede and be concluded to the satisfaction of A.I.D. prior to finalization and execution of the Loan Agreement.

Following authorization of the loan, NESAI intends to have a negotiating team:

(a) first conduct further on-site inspections of the Rajasthan Canal and Irrigation Unit and the Beas Dam Project, especially the former;

(b) then further discuss the projects with appropriate GOI officials, including the Central Government (GOI), the State Governments of the Punjab and Rajasthan States, and the authorities directly responsible for the Rajasthan irrigation and the Beas Dam Project. The core of these discussions will be centered on matters having to do with irrigation of the Rajasthan desert; and,

(c) negotiate with the GOI the conditions precedent to disbursement of funds and the covenants to be included in the Loan Agreement for the Beas Dam Project, including understandings in detail of specific points at which these conditions and covenants are directed. The specific points probably will be contained in side letters* to be exchanged between the GOI and our negotiators. It is expected that the GOI will readily agree to details regarding the Beas Dam Project (see below), and that the core of the negotiations probably will center around matters concerning planning and prosecution of irrigation of the Rajasthan.

* Reference is made to "side letters" herein for illustrative purposes, but understandings also could of course be detailed in "memoranda of conversations", official minutes, and in other mutually agreeable ways.

For illustrative purposes, the nature of the conditions, covenants, and points that may be contained in side letters, are summarized below in more precise fashion than in the Capital Assistance Paper. Negotiation of these and related matters in a manner best suited to fulfill the interests of A.I.D. will be the task of the negotiating team. The results of the negotiation will be discussed with and approved by AA/NESA before the Loan Agreement is executed.

A. COVENANT AND SIDE LETTER RELATING TO THE RAJASTHAN CANAL AND IRRIGATION UNIT

1. Covenant

An affirmative covenant requiring the GOI to develop plans and carry out certain activities with respect to irrigation and settlement of the Rajasthan desert will be negotiated in the Loan Agreement. This covenant will be negotiated in such a way that it will provide reasonable scope for A.I.D. to effectively advise and assist the GOI in the planning and prosecution of the Rajasthan irrigation.

This covenant might state, in appropriate language agreeable to the two parties, that the parties recognize that prompt and fully adequate planning is necessary to successful prosecution of the Rajasthan irrigation project, that the GOI will take steps to insure that such planning is carried out by qualified personnel, including foreign consultants as necessary, and that the reasonable recommendations and actions resulting from such planning will be put into prompt and effective operation by the GOI. A.I.D. will be consulted by the GOI in the course of the development of these plans and consideration of the recommendations resulting from the planning, and will take A.I.D.'s views concerning the recommendations into full account. Recommendations not put into effect will be reported to A.I.D., with the reasons for not following them stated; such recommendations will be the subject of further discussions between A.I.D. and the GOI. The covenant also will provide that the GOI advise A.I.D. on a regular basis of the progress of activities in these matters.

A.I.D. at this time does not contemplate negotiating into the Loan Agreement any condition precedent to disbursement of funds pertaining to the Rajasthan irrigation project.

2. Side Letter

The covenant mentioned above would be written in a general fashion, as is usual with covenants, even though details concerning this covenant are in the minds of the negotiators as the language is agreed upon.

A.I.D. envisages that the specific matters at which the covenant is directed will be detailed in a side letter which will be discussed with the GOI at the same time. By this side letter, A.I.D. will seek to get the GOI to agree to:

- a. Accelerate soils and land classification studies of the Rajasthan desert. This will include consideration of substrata conditions as related to drainage and reclamation of alkali soils, saline and sodic conditions within the soil profile, soil conditions as related to water requirements, provision for stabilization against drifting and desiccating effects of winds, amount and quality of drainage effluent to be removed from the project area, farm delivery requirements, layout of the water distribution system, and the like. Such studies, which apparently are lagging far behind other aspects of the planning and work on the irrigation, will be undertaken by the GOI immediately and prosecuted vigorously in general accord with standards of the Bureau of Reclamation. The findings will be applied in the detailed design and layout of the project, to the satisfaction of A.I.D.
- b. Initiate immediate and thorough investigations concerning the potential problem of salting. Further develop adequate plans for increased water application to prevent such salinization, and plans for drainage systems adequate to control this problem.
- c. Give further serious consideration to expanding water uses for certain kinds of higher valued crops which are larger consumers of water, and consider reducing the total area of the irrigation so that a higher intensity of irrigation may be applied over the smaller area.
- d. Employ foreign consultants or advisers acceptable to A.I.D. to assist with the problems referred to in paragraphs a, b and c above in ways that may be mutually agreed upon by A.I.D. and the GOI. Appropriate Indian authorities will agree to give careful consideration to the recommendations of such consultants or advisers, and to submit reports to A.I.D. indicating the extent to which they were or were not following such recommendations. In those cases in which they were not following such recommendations, the reasons for not doing so will be stated.

- e. Undertake adequate geo-economic studies of the Rajasthan desert area, to develop master plans for population distribution, community living patterns, transportation, crop marketing systems, crop storage, farm credit requirements and how they will be satisfied, etc.
- f. Formulate and put into effect a program of training and education for potential settlers, so as to better assure desirable and profitable settlement of the irrigated lands.

B. CONDITIONS PRECEDENT TO THE DISBURSEMENT OF FUNDS AND SIDE LETTER RELATING TO THE BEAS DAM PROJECT

1. Conditions Precedent to the Disbursement of Funds

- a. The GOI already has informally indicated to A.I.D. that it recognizes the importance of the recommendations on the Beas Dam Project made by the Bureau of Reclamation, and that it is taking them into full consideration. Affirmation of this in writing, and assurance that such recommendations will be substantially put into effect promptly to the satisfaction of A.I.D., will be negotiated as a condition precedent to the disbursement of funds for the Beas Dam Project.

The GOI also will assure A.I.D. that it will consider to the satisfaction of A.I.D. the further recommendations on the project made by A.I.D.

- b. The GOI also has assured A.I.D. that such foreign exchange and local currency, additional to that to be made available by the A.I.D. and IBRD loans, as may be necessary to complete and operate the project in an orderly and efficient manner will be made available by the GOI when necessary. This assurance will be gained in writing as a stated condition precedent in the Loan Agreement.
- c. Also, the GOI will be required to assure A.I.D. in writing that it has a fully executed and delivered loan agreement satisfactory to A.I.D. providing for a loan from the IBRD to the GOI of not less than the equivalent of \$23 million, the proceeds of which are to be made available to assist in financing the foreign exchange costs of importing equipment for the construction of works for extending irrigation in the States of the Punjab and Rajasthan and for developing hydroelectric power from the Beas River.

- d. The terms under which the A.I.D. loan funds are relent to the project authorities will be acceptable to A.I.D.
- e. Other standard A.I.D. conditions precedent to the disbursement of funds, such as receipt of a satisfactory Legal Opinion, names and signatures of personnel authorized to represent the GOI regarding the loan, and the like, also will of course be negotiated into the Loan Agreement.

2. Side Letter

Specific matters in the minds of the negotiators at which the above conditions precedent are directed will be detailed in a side letter to be negotiated with the GOI at the same time. Indication of the kinds of matters that might be covered in such side letter follow.

- a. Further studies with respect to possible dredging of the river downstream from the tailrace of the Beas Dam will be made by the GOI, to determine the extent to which such dredging would be justified. Appropriate modifications in plans for the project would be made if further dredging proved justified.
- b. The revised studies for the maximum probable flood will be adopted, and appropriate modification of the spillway of the dam will be made. The capacity of the spillway will be adjusted in accordance with the hydrologic study made in conjunction with the Bureau of Reclamation.
- c. The GOI will consider undertaking other changes in the design of the dam as recommended by the Bureau of Reclamation.
- d. Coordinated reservoir and power operation studies for the entire system of the Beas, Ravi, and Sutlej Rivers will be prepared before the final capacities of the reservoirs and powerplant are established. It is recognized that increased capacity of the Beas reservoir may be desirable to utilize the full flow of the Beas River; this might be accompanied by increased power production.
- e. Studies will be made to determine if additional storage capacity in the Beas River is economically and technically feasible for holdover reservoir storage.

- f. The Beas Dam authorities will secure for advisory purposes the services of a construction superintendant or equivalent expert well qualified in the construction of earth dams. Among other matters, he will be utilized in the selection of equipment, formulation of construction and procurement schedules, and for such general assistance as is advisable. Consideration will be given to obtaining specialist back-stopping assistance from a U.S. construction organization to assist in these matters.
- g. Thorough model studies of the spillway and outlet works will be made by the GOI to insure satisfactory hydraulic flow conditions in the final design of the Beas Dam.
- h. The GOI will undertake studies relating to delta formations of boulders, cobbles, and gravel, to see if such formations will have any major adverse effect on operation of the project.
- i. Studies will be made to determine if additional storage capacity in the reservoir is feasible for holdover storage, and if additional storage should be provided to compensate for sediment encroachment.
- j. The GOI will consider in more depth, to the satisfaction of A.I.D., how the construction program for the critical years of the construction period of the Beas Dam will be carried out. It is recognized that proper accomplishment of the work during this period requires provision of appropriate equipment, proper staff, and well-organized construction procedures, and that advice from individuals well qualified in the supervision of earth dam construction and the ordering of equipment for such construction may be necessary.
- k. The GOI will accept a stronger working relationship with the Bureau of Reclamation than is now in effect, by which the Bureau will participate more actively in advising on the design and work on the dam.
- l. The GOI will indicate to A.I.D. in detail how it might provide electrical equipment for the project from indigenous sources. The GOI will assure A.I.D., to the satisfaction of A.I.D., that such local or foreign exchange funds as are necessary to procure such equipment will be made available as and when necessary.
- m. Studies will be made to determine whether the capacity of the main step-up transformers at the powerplant should be increased to allow higher plant loading during periods when the hydraulic head is above the turbine rated head.