MINISTRY OF PUBLIC WORKS AND ELECTRIC POWER
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
DIRECTORATE OF IRRIGATION

JRAGUNG DAM

MULTI-PURPOSE IRRIGATION FLOOD CONTROL HYDROELECTRIC AND MUNICIPAL AND INDUSTRIAL WATER SUPPLY PROJECT

QUARTERLY PROGRESS REPORT

No. 5

INCLUDES MONTHLY PROGRESS
REPORT No 16

JUNE 1978

SUBMITTED BY :
ENGINEERING CONSULTANTS, INC.
Denver, Co., USA — Semarang, Indonesia

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FOR JUNE, 1978

PERIOD

APRIL 1, 1978 - JUNE 31, 1978

CONTRACT NO. KAB. 9/3/12

U.S. AID LOAN NO. 497 - T - 040

ENGINEERING CONSULTANTS, INC.

DENVER, COLORADO
U.S.A.

SEMARANG
INDONESI

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JRAGUNG DAM PROJECT
P.O. BOX 220
SEMARANG
CENTRAL JAVA
INDONESIA

July 19, 1978

Director General of
Water Resources Development
Ministry of Public Works
Jalan Pattimura 20/7
Kebayoran Baru
Jakarta Selatan

Our file: 1196/MR/16
265/78

Attention: Ir. Oesman Djojoadinoto
Director Irrigation

Subject : Quarterly Progress
Report No. 5.

Dear Sir:

We submit herewith fifteen (15) copies of the Quarterly Progress Report No. 5 for the period April 1 to June 30, 1978. It may be noted that separate monthly report for the month of June, 1978 has not been prepared; the same is included in this Progress Report.

The report is prepared in pursuance of Section 10.15 B of Contract No. KAB. 9/3/12 between the Directorate General of Water Resources Development and the Engineering Consultants, Inc. for providing engineering services for the design of Jragung Dam Project. The draft of the report was shown to the Jragung Dam Project Management at Semarang before its printing.

Your comments, if any, on the contents of the report are respectfully requested.

Very truly yours,
Engineering Consultants, Inc.

Saeed A. Rana

Saeed A. Rana
Resident Manager

cc. U.S. AID Jakarta
(Attn: Mr. P. Thorn)
with eight (8) copies
of the report

General Manager PROSIDA

Project Manager
Jratunseluna Basin Project

ECI Denver (SD 215)

ECI Semarang

SAR/ m.

TABLE OF CONTENTS

SECTION I
GENERAL

This report has been prepared in pursuance of Section 10.15 of the Contract No. KAB. 9/3/12 dated March 15, 1977 between the Directorate General of Water Resources Development of the Ministry of Public Works and Electric Power, Republic of Indonesia, and the Engineering Consultants, Inc. for consulting services for the Jragung Dam Project. The design job is being financed by the United States of America acting through the Agency for International Development for which a loan No. 497-T-040 dated July 28, 1976 has been obtained by the Government of Indonesia.

The report covers the period April, 1978 through June, 1978. The monthly progress report for the month of June, 1978 is also included in this report.

During the period under report, the design stage investigations for the dam and structures foundations were concluded. Investigations for embankment and other construction materials progressed satisfactorily and now are in the concluding stages. At the main damsite, the geological, foundations and materials investigations and the design work proceeded simultaneously to find out the best alignment and layout of the dam and the most suitable schemes for the River Diversion Works, Spillway and the Irrigation and Power Tunnel. Geological investigations and the design of the Tuntang Diversion Works have been completed. The surveying and mapping of the structures locations and the damsite are now complete.

The events which took place, the actions which were initiated or completed and other points pertinent to the Project design are described in the following.

1. In order to apprise all concerned agencies of the progress on Project design and to explain the finally evolved concepts of the structural

designs, a meeting, arranged by the Consultant, was held at Semarang on April 7. It was attended by authorities of the DGWRD from Jakarta, including the General Manager of PROSIDA, Project Officer of U.S. AID, the Project Manager and staff of the Jratunseluna Basin Project and all expatriate staff of the Consultant. Each member of the Consultant team explained the particular job he had accomplished or was working on and how he planned to complete the final design. All aspects of design and the final scheme of structures were thoroughly discussed and consensus of opinion of all participants was obtained.

A copy of ECI Memo dated April 12, 1978 containing summary of discussions held was appended to Section I of the April monthly progress report.

Another meeting was held with the Director of Irrigation on May 1 at Jakarta to explain the progress of the project design and the proposed construction schedule. It was stated in the meeting that the design work was progressing on schedule and the contract documents would be available in time to complete the contract award actions for construction.

On June 23, 1978 a meeting was held with the local PLN authorities in which description of the Jragung powerplant design was given by the Consultant's Electrical Engineer. Regarding PLN's question concerning the peaking capabilities of the Jragung Powerplant it was stated that without a reregulation reservoir between the Powerplant and the Jragung Diversion Weir, any considerable peaking could not be achieved. The economics of providing any such additional work on the system did not fall within the scope of the current contract and has not been studied. However, for a plant of the size of Jragung powerplant, such a provision does not appear feasible.

2. The topographic mapping of the right abutment of the dam is complete. The mapping of the Tuntang Diversion area has also been completed. The remaining part of the miscellaneous surveys and other secondary mapping work progressed on schedule.

3. The geological investigation work at the damsite and the structures locations was concluded during the quarterly period under report. The areas in which work was done are the damsite, the powerhouse and the Tuntang diversion.

The field work was completed by the resident geologist, Mr. Pyne, whose assignment on the Jragung Project was extended beyond the end of February by a period of two and half months. The Consultant's Chief Engineering Geologist, Mr. Strauss was at Semarang during the months of May and June and carried out the review of the entire job done on the project and prepared the draft of the final report. Some additional work to be done was entrusted to Mr. Borinelli, the Dam Design and Materials Engineer. Field work for this additional work has also been completed and the results will be sent to Denver for including in the draft of the final report.

A detailed description of work done during the period under report to complete the geological investigation on the Project is given in Section IV-A of the Report.

4. It was stated in the last quarterly report that for the finalized alignment of the main dam, it had become necessary to relocate the diversion tunnel and add a cut and cover section in a part of the length of the conduit. The revisions to the River Diversion Works designs thus necessitated have been incorporated in the design drawings. The designs were submitted to the reviewing agencies in the month of June. Some comments on these from U.S. AID have since been received.

The construction drawings for the relocated access roads and the bridge and the technical specifications were submitted by the Consultant for review in March, 1978.

The designs of the Irrigation and Power Tunnel and the Powerhouse were completed in the Consultant's Denver office and the drawings have been submitted to all the reviewing agencies.

The design of Tuntang Diversion Works has been completed and the drafting work is currently in progress. It is expected that the design criteria for these works and the drawings will be submitted by the Consultant for review by the concerned agencies before the middle of August.

The design of the Jragung Spillway entered the final stage. Based on the cost studies of various combinations of chute widths and wall heights and the corresponding quantities of concrete and excavation involved, it has been found that a 12 meter width of the chute will be the most economical. This width of chute has accordingly been tested on model, and its hydraulic performance appears quite satisfactory for the entire range of the operating discharges.

Presently, model testing is continuing at the DPMA Bandung laboratories for determining the best scheme of the stilling basin. Two schemes for this part of the structure are now being considered. One of these is to provide a conventional hydraulic jump stilling basin and the other scheme is to provide a flip bucket instead and achieve energy dissipation in a plunge pool that will be formed at a safe distance away from the toe of the structure. The latter scheme is economical and is, therefore, being preferred. However, the final decision will be based upon their relative costs, the hydraulic performance of the alternatives being considered and the adequacy of the foundation material to ensure safety of the structure.

The inlet to the Spillway chute is a bath-tub type of crest which has successfully been tested on the model. The observed discharge coefficient is such that under P.M.P. flood conditions, there will be about 1.0 meter freeboard at the dam.

The hydraulic design criteria being applied by the Consultant in the design of the Spillway are summarized in the following.

a) The Spillway should be capable of passing a Probable Maximum Precipitation (P.M.P.) flood discharge without endangering the

safety of the main dam. The peak discharge of the P.M.P. flood is 3,000 cubic meters per second and the corresponding discharge at the Spillway (routed through the reservoir starting with the reservoir full at the crest elevation) is 1,400 cubic meters per second. The corresponding reservoir elevation is 129.31.

The above routing was based on the empirical evaluation of the discharge coefficient of the Spillway crest. Model test has, however, shown that the P.M.P. flood discharge could pass over the Spillway with reservoir elevation lower than the above given figure.

b) The chute of the Spillway should be designed for the P.M.P. flood condition.

c) The stilling basin of the Spillway may be designed for a lower discharge but should be able to pass the P.M.P. flood discharge without any damage to the main structure and minimal damage, if any, to the downstream flexible apron.

The aforementioned schemes of the stilling basin are being tested for the conditions given hereinafter.

(i) The hydraulic jump type of stilling basin should handle a discharge of at least 500 cubic meters per second. For discharges higher that that, sweep out should start. The downstream sill of the basin should then act as a flip bucket and throw the jet a safe distance away from the structure to cause a plunge pool and thereby dissipate the energy of flow.

(ii) The Spillway chute terminates into a flip bucket which should be capable of throwing the jets of all flows above 100 cubic meters per second away from the structure. The flip bucket itself should be of such a size that energy of flow of up to 100 cubic meters per second discharge is dissipated in

the formation of hydraulic jump within the bucket and a smooth exit of flow therefrom. Only the higher discharges will be flipped out and the stilling action achieved in the plunge pool. The purpose of such an arrangement is to activate the flip for the minimum possible period of time. If low discharges are flipped out, the jet will not be carried far away from the structure and there may be damage occuring due to scour at the basin terminal point.

Therefore, under the desired conditions of the operation of the Spillway, the flip bucket will function only for discharges which would be exceeded only on a few occasions during any one year. The plunge pool will thus form for the conditions of jet discharging 100 cubic meters per second and above. The possibility of the formation of a plunge pool closer to the structure by low and more frequent discharges will consequently be precluded.

It was stated in the feasibility report for the Jragung Dam Project that there is not enough data available of floods in the Jragung River to carry out flood frequency analysis of long return periods. However, based on the rainfall data, synthesis of hydrographs and the earlier NEDECO studies, it could be said that a 1,000 year frequency flood occuring in the Jragung River at the damsite will cause a maximum discharge of 480 cubic meters per second at the Spillway. The corresponding discharge for a 5,000 year frequency flood would be about 600 cubic meters per second. It may be noted that in all the above routing analyses, it is assumed that at the time of occurrence of any high flood, the reservoir surface is already at the Spillway crest elevation. Computer printouts for routing of P.M.P. flood and the aforementioned floods are given in Annexure VII.

The concept of the Spillway design given above is to ensure the safety of the dam under all conditions of floods including the P.M.P. flood and to economize on the cost of structure by designing the stilling basin for the normal operating conditions. The Spillway is not expected to run continously with discharges more than 100 cubic meters per second for longer periods. A 5,000 year frequency flood is estimated to keep the

Spillway flowing with discharges higher than 100 cubic meters per second for a maximum period of 20 hours and with discharges higher than 500 cubic meters per second for a maximum period of 4 hours. During a 1,000 year frequency flood the spillway will run for 14 hours with discharges above 100 cubic meters per second. Under this flood condition the spillway discharge will not exceed 500 cubic meters per second.

5. Work proceeded on the design of the main dam section. Sufficient information is now available on the strengths of available materials and the design parameters. The stability analysis of the dam design section has been initiated and various alternatives are being tested. More information of the material testing currently in progress in Indonesia and North America is becoming available and the design of the dam is in an advanced stage. Design of the filters and the drainage galleries has also been initiated.

A review of the dam design by the Consultant's team of experts is scheduled to take place at Semarang starting at the end of July and will continue till it is completed. It is expected that the design of the main design section will be finalized on schedule by the end of September, 1978.

6. Work on the preparation of construction drawings for the River Diversion Works has been started. The preparation of construction drawings for the other structures will follow. Presently, Consultant's one design engineer and his two counterparts are working full time on this job. The finalization of all construction drawings will require substantial input from the counterparts. It is hoped that required counterpart help will be available to the Consultant for accomplishing the task on schedule.

The detailed reports on the progress achieved by the Consultant in the design of various components of the Project are given in Sections IV-B and IV-C of the Report.

7. The Proyek engineers continued working on the design of the base camp facilities and the main access road. It is emphasized that all this work must be completed by the end of July so the bid documents can be issued to the contractors by September 1, as scheduled.

8. The electrical design of the Jragung Powerplant was discussed with the PLN and the Proyek Authorities. The comments of the PLN authorities on the Consultant's electrical design concepts were also replied by the Consultant. The original comments and the Consultant's reply are given in Annexure VIII of the Report. The drawings and specifications of the system are nearing completion. First draft of the electrical specifications is expected to be issued during the month of July.

9. The material investigation for the dam in the borrow areas has been completed. Laboratory testing of available materials is in progress both at Semarang and in North America. The proposed second and third installments of the soil samples to be tested overseas have been sent in one shipment and the testing has since been started. Some test results have already been received.

10. The status of rock and concrete aggregate for the dam and its appurtenant structures remained the same as described in the Quarterly Progress Reports No. 3 and 4. The available sources of sand are Kali Putih and Kali Krasak and those for good quality rock (basalt) are at Pudak Payung and Gunung Tjentung. The andesite boulders in the borrow areas are of acceptable quality for the dam riprap. Investigations to determine the quantities and characteristics of rock that would thus be available have been started. Also, laboratory testing of rock for coarse aggregate and of sand have been started at the DPMJ facilities at Bandung.

11. The preparation of technical specifications and the contract documents progressed on schedule. The prequalification documents for the River Diversion Works and the Access Road and Base Camp contracts were finalized and were submitted to PROSIDA. These have been issued by that

office and the result of prequalification is scheduled to be issued on August 25. The bid documents for these works have to be issued on September 1.

The drafts of the contract documents for the River Diversion Works and the Relocated Access Roads along with the design drawings have already been submitted. The technical specifications for the Base Camp are being finalized and will be submitted in July. Preparation of the drawings of the Base Camp and the Main Access Road is the direct responsibility of the Jratunseluna Proyek office.

Comments from U.S. AID have been received on the drafts of contract documents and the designs submitted by the Consultant. No comments have so far been received from the Ministry. The Consultant requests that the documents and drawings may please be reviewed and approved early so the issuance of the contract documents can be accomplished according to schedule. As was stated in the previous reports, it is strongly recommended that a review committee should be organized comprising of designated members of the Consultant staff, Ministry engineers and of other concerned agencies. The proposed committee should be charged with the responsibility of reviewing and approving the drafts of reports, design drawings and other documents prepared by the Consultant.

An updated cost estimate for the Project is also being prepared by the Consultant, and this job will be completed in July. The estimate is based on the schemes of structures as finalized at this stage.

A detailed report on the activity of the preparation of contract documents is given in Section IV-D.

12. Appraisal of data and study of sediment transport in the Jragung River at damsite is still being done by Dr. Stevens, the Consultant's River Regime Specialist at Denver. It is based on the actual measurement of sediment transport made at the Borangan Bridge during the 1977-78 rainy season.

13. The study of water and land management practices in the Jragung Watershed has been completed by Mr. Fletcher, the Consultant's Watershed Management Specialist. During his two month stay at Semarang, he held discussions with the farmers in the watershed, authorities of the provincial and local government organizations and other related agencies to make an overall assessment of the problem. Certain recommendations for reducing the excessive erosion in the watershed have been formulated by him in a special report. The draft of this report is presently being reviewed by the Consultant and will be submitted to the Ministry in July for comments and consideration. In its final form, this report will be appended to the Project Design Report.

14. Hydraulic model testing for the Spillway was resumed and continued throughout the report period at the Bandung DPMA facilities. A new model of the final scheme of structure was built and run under different conditions. The inlet of the Spillway and the Chute have already been fully tested and modified to improve the hydraulic performance of these components. The model testing of the stilling basin continued and as stated above, the two alternative schemes are presently being studied.

15. The first group of the four Indonesian Engineers, namely, Messrs. Maryono Bony, Suharto, Sudarno and Harris, who had left on February 6 for the United States as part of the Ministry Personnel Training Program, returned to Indonesia in the first week of June. During their four month assignment at Denver, they participated as counterparts in the design of Irrigation and Power Tunnel and the Powerhouse completed in the Consultant's home office.

Mr. Gayo nominated for training in Part II of the program left for USA in the middle of May. During his overseas stay for a period of three and half months, he will be attending the summer quarter of course work at the Colorado State University at Fort Collins. The remaining trainees of the second group comprising Messrs. Ali, Soedaryanto, Sihombing and Triwasono are scheduled to leave early in July. The last participant of

the training program namely, Mr. Sugianto will leave in the middle of July.

16. Two of the Consultant's principal design engineers, namely Mr. Glen Trowbridge and Mr. J. Hoge worked on the design of major structures at Semarang against the resident position of the Hydropower Design Engineer. Mr. Hoge completed the design of Tuntang Diversion and left in June. Mr. Trowbridge is working on the finalization of the Spillway design and is scheduled to depart in July. Another principal design engineer, Mr. Bartel, also visited Semarang for making certain adjustments in the design of the Irrigation and Power Tunnel and the Powerhouse.

Concerning the manpower so far spent by the Consultant on the design stage investigation and the design work it is stated that due to difficult geological conditions at the damsite and poor foundation conditions at the spillway and other structures locations, considerably more effort had to be put to arrive at safe and efficient designs. With additional investigation becoming necessary, the geologist's time had to be extended by over eight months beyond only three months provided originally in the manpower schedule. Also, additional design effort was needed on the spillway structure for which three different locations were explored. Consequent upon the change in the alignment of the main dam, new designs had to be prepared for the River Diversion Works. For the completion of Irrigation and Power Tunnel and the Powerhouse designs at the Consultant's Denver office, where the Indonesian Engineers participated as counterparts, a concentrated effort had to be made by the Consultant's Denver office design staff to complete the job in a limited period of four months. Expert help was also needed for the Upper Watershed Management studies which was not provided in the original scope of work.

Although, no excess in overall expenditure over the total estimated contract costs because of the aforementioned additional investigations and design work is anticipated of this stage, yet it appears imminent that some adjustments will have to be made in the provisions of dollar costs line items.

Also savings from some of the line items and the Contingency fund will have to be used for the additional manmonths needed in completing the design work. Details of such costs are being worked out and the Consultant will advise the Ministry and U.S. AID of the necessary action in this regard as provided in section 7.01 of the Contract.

The schedule of the expatriate personnel of the Consultant are given in Section II of the Report.

17. The fourth installment of Rupiah payment of Rp. 4,000,000.- was paid by the Proyek on June 13, 1978. The Rupiah and Dollar expenses are being reported in the monthly progress reports. As of the end of June, 1978, the reimbursable Rupiah expenditure amounted to Rp. 25,307,348.- . The reimbursable dollar expenditure up to the end of May, 1978, amounted to $ 932,719.64.

A detailed description of Rupiah and Dollar expenditures is given in Section VII of this Report.

SECTION II

PERSONNEL

A. EXPATRIATE

1. At Semarang on March 31, 1978

Saeed A. Rana	Resident Manager
Carlos Borinelli	Materials and Dam Engineer
Robert McLaughlin	Structural Engineer
Dr. M.A. Stevens	River Regime and Sediment Specialis
James E. Pyne	Resident Geologist
Jeffery P. Frey	Specification Engineer
Glen Trowbridge	Principal Design Engineer
James Hoge	Principal Design Engineer
H. Fletcher	Watershed Management Specialist

2. Arrived in Semarang during April 1 - June 30, 1978

Erwin B. Bartel	Struct ... Design Engineer
Peter L. Strauss	Chief Engineering Geologist
L.S. Boval	Senior Electrical Engineer

3. Departed from Semarang during April 1 - June 30, 1978

Erwin B. Bartel	Structural Design Engineer
James E. Pyne	Resident Geologist
Peter L. Strauss	Chief Engineering Geologist
L.S. Boval	Senior Electrical Engineer
Dr. M.A. Stevens	River Regime and Sediment Specialist
James Hoge	Principal Design Engineer
H. Fletcher	Watershed Management Specialist

4. At Semarang on July 1, 1978

Saeed A. Rana	Resident Manager
Carlos Borinelli	Materials and Dam Engineer
Robert McLaughlin	Structural Engineer
Jeffery P. Frey	Specification Engineer
Glen Trowbridge	Principal Design Engineer

B. COUNTERPART

1. Assigned Full Time as of March 31, 1978

Mr. Maryono Bony M.E.	
Ir. Wisnu Suharto	
Ir. Sudaryanto BS.	
Drs. Hadijono	
Triyono B.E.	(Assistant Counterpart)
Sutardjo B.E.	(Assistant Counterpart)
Ir. Maryono Wardi	
Ir. Sudarmo	
Ir. Supriyo	
Ir. Rustiyanti	(Assistant Counterpart)
Eddy Arifin	(Assistant Counterpart)
Buang Soekardjono	(Assistant Counterpart)
Ir. Muhammad Ali	
Ir. Tri Hardono	
Ir. Yusuf Gayo	
Djasrianasyah Aht	
Ir. Diah Kusumawati	
Harris hMI.	
Ir. Bambang Sujono	
Nursalim B. Sc.	

B. Assigned Full Time During March - June, 1978

Ir. Yusuf Gayo

C. TECHNICAL

During the period under report, the following technical personnel provided by the Proyek worked with the Consultant:

Mr. Mukiyat	Draftsman
Mr. Barleyanto	Draftsman
Mr. Bambang Prayitno	Draftsman
Mr. Aris Mudjianto	Draftsman
Mr. Baryono	Geology Field Supervision

D. ADMINISTRATIVE

On-Hand as of June, 1978

Mrs. Tan Ik Goen	Interpreter I
Miss Dra. Ujoi Sioe Lan	Interpreter II
Mrs. Sri Moenasih Soetikno	Secretary
Miss Dra. L. Murtianingsih	Secretary
Miss Sri Anon	Clerk/Typist
Mr. Subandi	Messenger

Dates of arrival and departure of the Consultant's resident staff, TDY staff, the ministry personnel and the direct hire administrative personnel are given in Annexures I, II and III, respectively.

SECTION III

MEETINGS CONFERENCES AND MAJOR EVENTS

Date	Place	Event	Participation	Organization
April 7, 1978	Semarang	Consultant-DGWRD Meeting Explained Project Designs and progress.	Ir. Soewasono, Ir. David Suleiman.	PROSIDA
			Ir. Hartopo, Ir. Bambang, Counterparts.	Jratunseluna Proyek
			Mr. Paul Thorn.	U.S. AID
			Resident Staff.	ECI
April 13, 1978	Tuntang	Visit to Jelok and Timo Power Plants	Rana	ECI
			Ir. Hartopo, Djasriansyah.	PLN
April 15-16, 1978	Gombong	Administrative and Account Matters	Rana, Rogers.	ECI
April 19, 1978	Semarang	Meeting with PLN for determining operating procedures Tuntang power plants	Rana	ECI
			Gayo	Jratunseluna Proyek
			Engineers of Operation Section Semarang	PLN
April 24, 1978	Semarang	Discussion Project Matters	Rana	ECI
			Ir. Bambang, Drs. Toto Suglanto.	Jratunseluna Proyek
April 27, 1978	Semarang	Discussion Ministry Personnel Training Program	Rana	ECI
			Ir. Bambang	Jratunseluna Proyek
May 1, 1978	Jakarta	Discussion Project Design Schedules	Ir. Oesman Djojoadinoto, Ir. Catot, Drs. Muhammad Nur.	DGWRD
			Rana	ECI

Date	Place	Event	Participation	Organization
May 8, 1978	Semarang	Discussion Project Matters	Ir. Bambang	Jratunseluna
			Rana	ECI
May 12-13, 1978	Jakarta	Review Drafts of Prequalification Documents First Stage Works	Ir. Habibuddin and Staff	PROSIDA
			Rana	ECI
			Frey	
May 19, 1978	Jakarta	Lecture on Erosion and Sedimentation by Dr. M.A. Stevens	Technical Staff	DGWRD
May 20, 1978	Jakarta	Discussion of First Stage Construction Supervision	Ir. Habibuddin	PROSIDA
			Rana	ECI
May 24, 1978	Jragung Damsite	Discussion Project Geology, Foundation and Structures Designs	Strauss, Hoge, Rana, Pyne, Borinelli, Trowbridge, Frey.	ECI
May 25, 1978	Semarang	Lecture on Jragung Watershed Management Practices by Mr. H. Fletcher of ECI	Technical Staff	Jratunseluna
				NEDECO
				SMEC
				ECI
June 6, 1978	Bandung	Observation Jragung Model Testing	Messrs. Thorn and Edy.	U.S. AID
			Mr. Rana	ECI
			Mr. Ahmed	UNDP
			Mr. Hamed and staff.	DPMA
June 19, 1978	Jakarta	Discussion Project Matters	Ir. Habibuddin	PROSIDA
			Mr. Rana	ECI
June 20, 1978	Bandung	Observation Jragung Model Testing	Mr. Hamed and staff	DPMA
			Mr. Rana	ECI
June 21, 1978	Jakarta	Discussion Project Matters	Mr. Muhammad Nur	DGWRD
			Mr. Rana	ECI

Date	Place	Event	Participation	Organization
June 23, 1978	Semarang	Meeting with PLN - Discussion Jragung Electrical Design	Messrs. Rana, Boval	ECI
			Messrs. Maryono, Suharto.	Jratunseluna
			Ir. J. Siringo-Ringo, Ir. Doddy I. Widada, Ir. Soedibyo, Slameto BPE, Djasriansyah Aht, Ir. Hartopo, Ir. Rahang Sirait	PLN

In addition to the above reported events, regular field visits were made by the Consultant's resident and TDY staff to the damsite and project area.

SECTION IV
PROGRESS REPORT BY ACTIVITIES

A brief description of work being done in the major fields of activity on the Project was given in Section I. A detailed description of the work involved and the progress achieved during the period under report are given in the following.

A. Geology

A project meeting was held on April 7 where the semi final geologic maps were presented and the complex site geologic conditions discussed, particularly with regard to their effect on proposed engineering structures. In order to avoid time consuming and costly construction problems related to the presence of faulting, fracturing, shearing, and their indirect influence on permeability and slope stability, it was pointed out that the dam axis was being adjusted and revised alignments of the diversion and power tunnels were being studied. Also, a slight adjustment in the spillway arrangement was being considered.

Diversion Tunnel

A suggested revised alignment for the diversion tunnel was received from Denver, early in April. A portion of the alignment was investigated by excavating and logging 5 new test pits. Detailed measurements of fracturing, shearing, and bedding were taken. Also, samples were retained for laboratory testing. In connection with the new tunnel alignment, some clean out work was completed in Trench No. 6. A geologic cross section and geologic map for the revised tunnel location were prepared.

Power and Irrigation Tunnel

A suggested revised alignment for the power and irrigation tunnel was also received from Denver in April. The field work indicated the alignment

to be favorable, particularly with regard to construction in the tunnel outlet and power house area. More detailed field work and drilling were done during May and completed in June by the Chief Engineering Geologist.

Tuntang Diversion Tunnel

On April 19, a field trip was conducted by Mr. Pyne and Mr. Hoge, for the purpose of inspecting the tunnel intake area. The foundation conditions that would be encountered in and across the Tuntang River were discussed. The presence of fracturing, shear zones, and probable faulting in the tunnel portal area were also pointed out. The optimum tunnel alignment was selected by the design engineer.

General

Work was completed during May and early part of June by the ECI project geologist consisted of mapping the newly excavated Tuntang trench, preparing a geologic map of the area, and finalizing a geologic cross section along the proposed tunnel alignment that had been selected by the design engineers. Geologic cross sections were also completed along the proposed power and irrigation tunnel alignment and along the centerline of the spillway, which has been recently finalized by Mr. Trowbridge, ECI design engineer.

During the later part of May and early part of June, Mr. Peter Strauss, ECI Chief Geologist from Denver, reviewed the site geology and design aspects of the various engineered structures, including tunnels, spillway and dam foundation. Other items of review consisted of reservoir rim geology, abutment ridge stability, grouting, foundation treatment, drainage galleries, results of laboratory testing, permeability data, and groundwater. Mr. Strauss and the ECI project geologist cooperated in preparing the draft final Design Geology Report for the Jragung Dam Project.

The detail of design stage borings drilled in tne last three months is as follows.

Boring No.	Location	Depth (m)	Remarks
EC-37D	U/S Embankment Foundation	40	Inclined 45°
EC-38D	U/S Embankment Foundation	40	Vertical
EC-39D	U/S Embankment Foundation	40	Inclined 45°
EC-40D	U/S Embankment Foundation	40	Inclined 45°
EC-41D	D/S Left Ridge Slope	30	Vertical
EC-42D	D/S Embankment Foundation	55	Inclined 45°
EC-43D	Power Tunnel Portal	30	Vertical
EC-44D	U/S Embankment Foundation	40	Inclined 45°
EC-45D	Power House	30	Vertical
EC-46D	Power Tunnel Intake	40	Vertical
EC-47D	Diversion Tunnel	30	Vertical
EC-48D	Stilling Basin	30	Vertical

The final geology report containing the loggings of all bore holes and other data will be included in the Project Design Report.

B. Structural Design

Work during the period under report continues to progress satisfactorily. The following is a description of the work progress of the appurtenant structures from the last quarterly report to the present condition.

Spillway

Work on the spillway is described as follows. Alternative II, out of the three under consideration, was finally selected and set up for model testing in Bandung. Most of the calculations and corresponding quantities have been done.

The model testing of the various parts of this structure is still continuing. The hydraulic design and location of the upper or inlet area has been worked out; some details still remain. The entrance channel to the bath-tub inlet is now 52 meters wide with three to one side slopes; and the length of the bath-tub itself is now 88 meters. These results have changed compared to last month's report. Also, the flow is now directed into a 20-meter wide chute which then narrows to a 12-meter wide chute; this chute then diverges to 20-meters again, at the stilling area. Design and model test work continues on the stilling basin and the 30-meter wide excavated channel from the basin to the river. It is expected that the final design on this structure will be completed during the next period.

Diversion Tunnel

As was mentioned in the last quarterly report the location of this structure was moved, the new alignment set and information sent to Denver for design of cut and cover sections. The redesign of the tunnel portion was completed during the quarter in the Semarang office as was the design of the cut and cover section in the Denver office. The entire design of this structure is now complete. At the end of this quarter the construction drawing phase is underway and drafting of construction drawing layouts will begin shortly.

Tuntang Diversion Works

During the previous quarter some preliminary design work had been done. In the period under report, one of three alternatives considered was selected, and geological and survey information was completed for use in final design work. Final design work has been completed to about ninety percent. Those minor details, yet incomplete, will be done at a later date. The construction drawing phase will begin in the next quarter.

Power and Irrigation

Work on this structure in the previous quarter was being done in Denver. During this quarter locations for powerhouse and tunnel were finalized and all final design work was completed and sent to Semarang. The total length of the tunnel is 552 meters and includes 245 meters of steel lining. The construction drawing phase will begin during the next quarter.

C. Dam Design

Geotechnical Damsite Subsurface Exploration Program

Thirteen holes have been drilled in the last three months to study the embankment and the structures foundation conditions. The last borings drilled are EC-44D under the upstream embankment area, EC-45D in the power house area, EC-46D in the intake power tunnel area, EC-47D in the River Diversion Tunnel area, EC-48D in the stilling basin area. At the present time boring EC-49D is being drilled in the spillway area. Several of these borings have been water pressure tested and one piezometer was installed. Three more piezometer are going to be installed. The water pressure equipment will also be calibrated.

Overseas Embankment and Foundation Materials Shearing Strength Testing

The second shipment of samples to U.S.A., including embankment and foundation materials, was picked up from the Jragung Project Laboratory

during the first part of April. All the samples were processed, basic testing performed, and ready to be sent overseas at the end of March.

The testing program for these samples, including testing instructions, was prepared and sent to Denver office.

Embankment and Foundation Materials Testing

Materials were taken for testing to the DPMA and DPMJ laboratories in Bandung. The materials include core samples from borings and materials for the embankment. The testing to be performed included basic testing, unconfined compression, swelling,shrinkage and consolidation tests. Additional testing was and is being performed in the Jragung Project Soils Laboratory.

Borrow Area Drilling Subsurface Exploration Program

At present, the Project's rig is drilling in Sambiroto Borrow Area. A total of 14 borings have been drilled so far. Drilling was completed in Pondok Sampu and Penawangan Borrow Pit.

ACE Contractor will perform 350 meters of drilling in Candirejo and Larangan Borrow Pits as soon as work is finished in the damsite.

Design

a) Dike Design. One alternative of the dike was designed a second alternative will be prepared.

b) Reservoir Rim. The reservoir rim is being surveyed in one 400 meters long area of the left side. Field cross sections every 25 meters will be surveyed. The condition of the reservoir rim will be in that way checked there.

c) Parameters values were assumed and others selected for all the embankment and foundation materials. Three Cross Sections for stability Analyses

were prepared and sent to Denver. Initial Computer runs were started in Denver.

d) The cross sections were designed for all the 1,600 meters long embankment different conditions. The dam internal drainage and surface drainage were designed. Quantity determinations for all the different items were prepared.

e) At the present time the drainage gallery is being designed.

f) All the water pressure tests are being computed. Value of "k" is determined in centimeter per second and lugeons. Cross sections will be prepared along and across the embankment foundation and the left and right ridges. Permeability values will be plotted and the representative foundation permeability will be chosen. The permeability information will also be used to design the grout curtain and the drainage gallery.

D. Specifications

During the second quarter of 1978, specifications' work has been concentrated on the preparation of contract documents for the River Diversion Works and Access Roads and Base Camp contracts. Prequalification Questionnaires for these contracts were finalized in late May and were subsequently issued on June 5, 1978. Both contracts are open for International Bidding. The proposed schedule for preconstruction activities calls for the issuance of Bid Documents on September 1, 1978.

A change in the alignment of the River Diversion Works dictated by geologic conditions necessitated the revision of the draft drawings documents, previously submitted as "River Diversion Works, Volume II of II, Drawings". Recomputation of the quantities involved in the Diversion Works was also required. The revised drawings were completed in May. A revised draft document, "River Diversion Works, Volume II of II, Drawings", dated April, 1978 was submitted on June 7, 1978 along with a revised Bill of Quantities for the final River Diversion Works alignment.

The shift in alignment of the River Diversion Works was accompanied by a change in design from a tunnel to a cut and cover conduit and tunnel. A review of the General and Technical Specifications, "River Diversion Works, Volume I of II", was carried out in June to incorporate the new design ideas into the specifications documents. These changes will be issued in the form of errata pages during the month of July. It is hoped that a review of the River Diversion Works contract documents by a team composed of members from the Proyek, PROSIDA and the Consultant, can be accomplished in July, also.

An early completion of the design of the powerhouse and power and irrigation tunnel was accomplished in the Denver office. Final revisions of the drawings based on the latest geological information were made in Semarang. The resulting set of drawings for the "Power and Outlet Facilities" were submitted for review to the Proyek, PROSIDA and AID on June 14, 1978.

SECTION V

PREPARATION OF REPORTS

The schedule of submittals and the current status of all the reports required to be prepared by the Consultant is stated in the following:

Name of Report	Date due	Status	Date Submitted
1. Inception Report (draft)	May 15, 1977	Completed	May 12, 1977
2. Final Design Report (draft)	November 15, 1978		
3. Final Completion and Engineering Report on Construction Contracts	March 15, 1979		
4. Monthly Progress Reports	10th Day of the following month	Schedule being met	
5. Quarterly Progress Reports	20th Day of the following month	Schedule being met	
6. General Design Criteria Civil Works			July 8, 1977
7. Appendix I to (6) Dam and Dikes Design Criteria			August 1, 1977
8. Advance Notice of Intent to Invite Bids and Pre-qualification Instructions		Draft	January 25, 1978
Submitted Revised Draft			March 15, 1978
9. Contract Documents River Diversion Works		Draft	February 23, 1978
Revised Bill of Quantities and Drawings River Diversion Works			June 8, 1978

Name of Report	Date due	Status	Date Submitted
10. Technical Specifications and Drawings Access Roads and Bridge		Draft	March 13, 1978
11. Drawings Irrigation and Power Tunnel and Powerhouse			June 14, 1978

SECTION VI

PROBLEM AREAS

During the earlier part of the quarterly period under report, due to mechanical problems with the bulldozers, the trenching work was slow and caused slippage behind the schedule. However, the situation improved during May and the work which was scheduled to be done in April was completed during the second half of the quarter.

At this point in time there is no problem in the design stage investigation work.

SECTION VII

FINANCIAL

Dollar Accounts

Due to the reasons explained in monthly progress report no. 2, the Dollar accounts are being reported for the period up to the end of the month of May, 1978. The expenditure to that date as well as the budget amounts are shown in Annexure IV included in the report.

Rupiah Accounts

Up to the end of the month under report, a total amount of Rp. 25,397,348.- was spent. This represents 35.76 percent of the total Rupiah reimbursable costs provided in the Contract. The corresponding percentage of the contract elapsed is 64.6.

The summary of the Rupiah budget and costs is given in Annexure No. V.

Annexure I

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period : Ending June, 1978

Assignment of Resident and TDY Staff

NAME	NATIONALITY	JOB TITLE	PROJECT ASSIGNMENT		MANMONTHS IN INDONESIA	
			ARRIVAL	DEPARTURE	SCHEDULED	ACTUAL
1. Saeed A. Rana	Permanent Resident U.S.A.	Resident Manager	March 16, 1977		24	15.5
2. James Rollins	U.S.A.	Geologist	March 16, 1977	June 30, 1977	3.5	3.5
3. Robert McLaughlin	U.S.A.	Structural Design Engineer	April 5,		23	14.9
4. Carlos Borinelli	Permanent Resident U.S.A.	Materials Dam Engineer	June 4, 1977		18	12.9
5. James E. Pyne	U.S.A.	Resident Geologist	September 1, 1977	May 1, 1978	8.5	
			May 21, 1978	June 4, 1978		8.5
6. Jeffery P. Frey	U.S.A.	Specifications Engineer	December 18, 1978		12	6.45
7. Glen Trowbridge	U.S.A.	Design Engineer	February 7, 1978		18	4.75
8. James Hoge	U.S.A.	Design Engineer	March 23, 1978	June 20, 1978		3.00

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Resident and TDY Staff

NAME	NATIONALITY	JOB TITLE	PROJECT ASSIGNMENT		MANMONTHS IN INDONESIA	
			ARRIVAL	DEPARTURE	SCHEDULED	ACTUAL
9. E.B. Bartel	U.S.A.	Design Engineer	November 12, 1977	December 20, 1977		
			May 4, 1978	May 13, 1978		1.60
10. Cecil M. Langford	U.S.A.	Project Director	August 6, 1977	August 12, 1977	1.5	
			January 23, 1978	January 31, 1978		0.52
11. M.K. Kuehl	U.S.A.	Chief Engineer	June 27, 1977	July 2, 1977	1.5	
			February 4, 1978	February 12, 1978		0.50
12. Paul Otter	U.S.A.	Project Engineer	March 16, 1977	March 18, 1977	1.5	
			March 1, 1978	March 4, 1978		0.23
13. Peter Strauss	U.S.A.	Chief Geologist	March 16, 1977	March 18, 1977	4	
			June 13, 1977	July 1, 1977		
			February 4, 1978	February 7, 1978		
			May 21, 1978	June 4, 1978		1.5

Annexure I
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Resident and TDY Staff

NAME	NATIONALITY	JOB TITLE	PROJECT ASSIGNMENT ARRIVAL	PROJECT ASSIGNMENT DEPARTURE	MANMONTHS IN INDONESIA SCHEDULED	MANMONTHS IN INDONESIA ACTUAL
14. William Wenger	U.S.A.	Electrical Engineer	March 16, 1977	March 21, 1977	4	0.50
15. Ralph Goodrich	U.S.A.	Electrical Engineer	January 20, 1978	February 15, 1978		0.90
16. Larry Boval	U.S.A.	Electrical Engineer	June 15, 1978	June 25, 1978		0.37
17. M.A. Stevens	Canada	River Regime Sediment Specialist	March 20, 1977	March 23, 1977	3	
			October 21, 1977	December 15, 1977		
			March 20, 1978	May 20, 1978		3.30
18. W. Stevens	U.S.A.	Surveyor	April 4, 1977	May 31, 1977	7.5	
			August 1, 1977	January 15, 1978		7.25
19. S.F. Hillis	Canada	Chief Materials	June 26, 1977	July 18, 1977	3	
			February 2, 1978	February 12, 1978		1.15

Annexure I
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Resident and TDY Staff

NAME	NATIONALITY	JOB TITLE	PROJECT ASSIGNMENT		MANMONTHS IN INDONESIA	
			ARRIVAL	DEPARTURE	SCHEDULED	ACTUAL
20. Robert Campbell	U.S.A.	Assistant Chief Engineer	November 7, 1977	November 10, 1977		
			November 28, 1977	December 12, 1977		0.63
21. John Ismert	U.S.A.	Chief Mechanical Engineer	January 27, 1978	February 12, 1978	4	0.77
22. Dr. W. Burke	U.S.A.	Geologist Consultant	February 4, 1978	February 12, 1978		0.30
23. Mr. H. Fletcher	U.S.A.	Watershed Management	March 31, 1978	June 1, 1978	3	2.1

Annexure II

JRAGUNG DAM PROJECT

Engineering Consultants, Inc.

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Counterparts and Technical Personnel

NAME	EXPERTISE	WORK ASSIGNMENT	PROJECT ASSIGNMENT DATES STARTING	ENDING	MAN MONTHS WORKED
Counterparts					
1. Ir. Martopo	1. Project Management 2. Project Planning	November 1, 1975	March 16, 1977		15.5
2. Ir. Bambang Soedjono	1. Project Management 2. Project Planning	November 1, 1975	March 16, 1977		15.5
3. Maryono Bony M.E.	1. Project Planning 2. Dam Design Engineer	November 1, 1975	March 16, 1977		15.5
4. Ir. Wisnu Suharto	Hydraulic Structures	November 1, 1975	March 16, 1977		15.5
5. Ir. Soedaryanto Hs.	Geologist	January 1, 1977	March 16, 1977		15.5
6. Drs. Pedjiono	Hydrologist	January 1, 1977	March 16, 1977		15.5
7. Susanto B.Sc	Geologist	November 1, 1975	March 16, 1977	March 31, 1977	0.5
8. Ir. Sudarno	Civil Structures Engineer	March 16, 1977	March 16, 1977		15.5
9. Ir. Muhammad Ali	1. Dam Design Engineer 2. Soil Mechanics/Material	January 1, 1976	March 16, 1977		15.5

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Counterparts and Technical Personnel

NAME	EXPERTISE	WORK ASSIGNMENT	PROJECT ASSIGNMENT DATES STARTING	ENDING	MAN MONTHS WORKED
10. I. Soedjono BEE	Electrical Engineer	March 16, 1977	March 16, 1977		15.5
11. Djasriansyah Aht	Electrical Engineer	March 16, 1977	March 16, 1977		15.5
12. Ir. Hartopo	Hydro Power Engineer	March 16, 1977	March 16, 1977		15.5
13. Harris BME	Mechanical Engineer	March 16, 1977	March 16, 1977		15.5
14. Ir. Supriyo	Specification Engineer	September 16, 1977	September 16, 1977		9.5
Assistant Counterpart					
1. Triyono BE	Geologist	June 1, 1976	March 16, 1977		15.5
2. Sutardjo BE	Geologist	December 1, 1976	March 16, 1977		15.5
3. Bambang Gunadi B.Sc	Hydrologist	January 1, 1976	March 16, 1977	November 1, 1977	15.5

Annexure II
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Assignment of Counterparts and Technical Personnel

NAME	EXPERTISE	WORK ASSIGNMENT	PROJECT ASSIGNMENT DATES STARTING	ENDING	MAN MONTHS WORKED
4. Ir. Tri Hardono	Dam Design Engineer	March 16, 1977	March 16, 1977		15.5
5. Ir. Rustiyanti	Hydraulics Structures	March 16, 1977	March 16, 1977		15.5
6. Buang Sukardjono	Hydrologist	January 1, 1977	March 16, 1977		15.5
7. Edy Arifin Aht	Civil Structures	April 1, 1976	March 16, 1977		15.5
8. Ir. Diah Kusumawati	Hydro Power Engineer	December 1, 1976	February 15, 1978		4.5
Draftsmen					
1. Mukiyat	Draftsman	March 1, 1976	March 16, 1977		15.5
2. S.V. Barleyanto	Draftsman	November 1, 1975	March 16, 1977		15.5
3. Bambang Prayitno	Draftsman	February 1, 1976	March 16, 1977		15.5
4. Aris Mudjianto	Draftsman	December 16, 1977	December 16, 1977		15.5

Annexure III

JRAGUNG DAM PROJECT

Engineering Consultants, Inc.

Quarterly Progress Report No. 5
Period: Ending June, 1978

Direct-hire Indonesian Personnel

NAME	POSITION	PERIOD OF SERVICE		MAN/WOMAN MONTHS	
		DATE STARTED	DATE ENDED	PROVIDED	SPENT
1. Mrs. Tan Ik Goen	Interpreter/Translator I	March 16, 1977		24	15.5
2. Miss Dra. Djoa Sioe Lan	Interpreter/Translator II	May 16, 1977		24	13.5
3. Mrs. Ariati Haryono	Secretary I	March 16, 1977	July 31, 1977	24	4.5
4. Miss Dra. L. Murtianingsih	Clerk/Typist	March 16, 1977	April 30, 1977	24	1.5
	Secretary	May 1, 1977			14.0
5. Mrs. Sri Moenasih Soetikno	Clerk/Typist	March 16, 1977	July 31, 1977	24	4.5
	Secretary	August 1,		19.5	11.5
6. Miss Sri Anon	Clerk/Typist	March 16, 1977		24	15.5
7. Mr. Suhandi	Messenger	March 16,		24	15.5

Annexure IV

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

Summary of U.S. Dollar Expenditures

COST ITEMS	AMOUNT AVAILABLE US $	EXPENDITURE			PERCENTAGE	
		PRIOR	DURING PERIOD REPORTED	UP TO DATE	EXPENDITURE	TIME ELAPSED
1. Resident Staff Base Salaries	181,360.00	79,769.46	26,034.92	105,804.38	58.34	60.4
2. Overseas Differential	45,340.00	19,910.70	6,508.73	26,419.43	58.30	
3. Overhead Resident Staff (75% base salaries)	136,020.00	59,935.49	19,526.19	79,461.68	58.42	
4. TDY & Denver Staff Salaries Including Overseas Differential	215,250.00	118,582.11	74,992.23	193,574.34	89.93	
5. Overhead TDY & Denver (95% base salaries)	196,365.00	112,652.97	71,242.62	183,895.59	93.65	
6. Fixed Fee	138,000.00	63,250.-	17,250.-	80,500.-	58.33	
7. Travel and Per Diem	73,120.00	32,557.16	7,154.71	39,711.87	54.31	
8. Transportation (Relocation)	12,000.00	11,150.-	-	11,150.-	92.91	
9. Other Direct Costs & Miscellaneous Expenses	53,800.00	27,198.53	13,958.31	41,156.84	76.50	

Annexure IV

Continued

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending May, 1978

Summary of U.S. Dollar Expenditures

COST ITEMS	AMOUNT AVAILABLE US $	EXPENDITURE PRIOR	EXPENDITURE REPORTING PERIOD REPORTED	EXPENDITURE UP TO DATE	PERCENTAGE EXPENDITURE	PERCENTAGE TIME ELAPSED
10. Ministry Personnel	60,000.00	6,091.22	24,423.40	30,514.62	50.86	
11. Special Purchases	190,000.00	51,361.16	89,169.73	140,530.89	73.96	
12. Contingencies	70,000.00	-	-	-	-	
Total Dollar Costs	1,371,255.00	582,458.80	350,260.84	932,719.64	58.02	60.4

Annexure V

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978
Summary of Rupiah Expenses

COST ITEMS	BUDGET ALLOCATION (Rp.)	EXPENDITURE			PERCENTAGE	
		PRIOR	PERIOD REPORTED	TO DATE	EXPENDITURE	TIME ELAPSED
I. PER DIEM						
Jakarta	3,300,000.-	1,452,250	453,750	1,906,000	57.76	64.6
Bandung & Semarang	18,000,000.-	2,890,000	3,180,000	6,070,000	33.72	
Other	1,800,000,-	591,650	33,000	624,650	34.70	
Family	230,000.-	80,000	-	80,000	34.78	
Sub Total	23,330,000.-	5,013,900	3,666,750	8,680,650	37.21	
II. OTHER DIRECT COSTS						
Cable & Telephone	2,000,000.-	743,119	263,730	1,006,849	50.34	
Postage	2,000,000.-	306,425	69,380	375,805	18.79	
Reproduction & Printing	15,000,000.-	2,975,968	1,211,214	4,187,182	27.91	
In Country Transportation	2,000,000.-	1,297,451	375,600	1,673,051	83.65	
Supplies & Materials	6,000,000.-	877,885	385,655	1,263,540	21.06	
Miscellaneous	7,000,000.-	1,476,739	434,630	1,911,369	27.31	
Sub Total	34,000,000.-	7,677,587	2,740,209	10,417,796	30.64	

Annexure V

Continued

JRAGUNG DAM PROJECT

Quarterly Progress Report No. 5
Period: Ending June, 1978

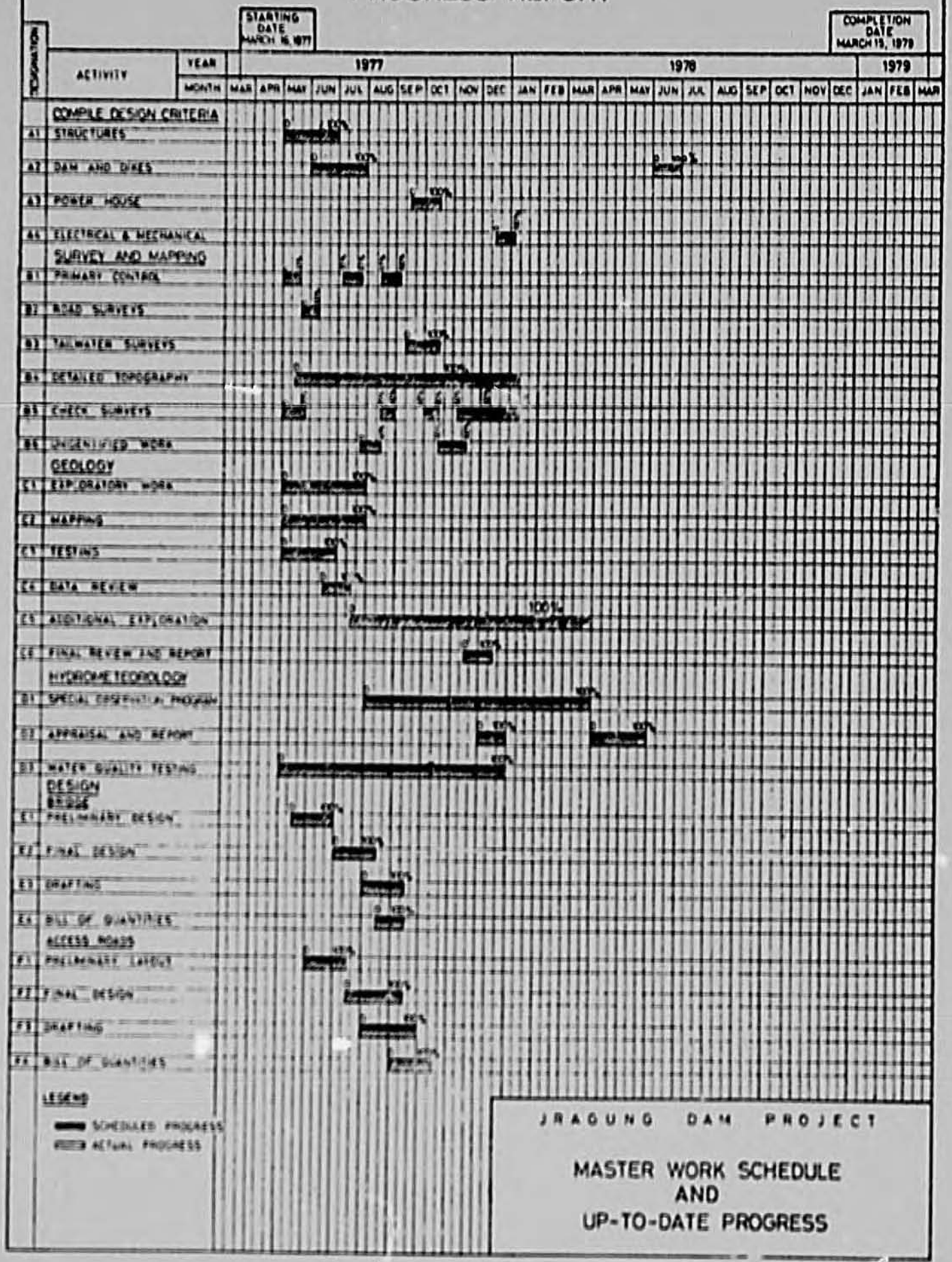
Summary of Rupiah Expenses

COST ITEMS	BUDGET ALLOCATION (Rp.)	EXPENDITURE			PERCENTAGE	
		PRIOR	PERIOD REPORTED	TO DATE	EXPENDITURE	TIME ELAPSED
III. ADMINISTRATIVE PERSONNEL						
Secretaries	3,610,500.-	1,571,941	454,050	2,025,991	56.11	
Interpreters	6,017,500.-	2,077,782	583,638	2,661,420	44.23	
Clerks/Typists	2,402,000.-	1,111,751	219,706	1,331,457	55.32	
Messenger	373,500.-	128,600	61,434	190,034	50.88	
Severance Pay	1,037,500.-	-	-	-	-	
Sub Total	13,446,000.-	4,890,074	1,318,828	6,208,902	46.18	
Grand Total	70,776,000.-	17,581,561	7,725,787	25,307,348	35.76	64.6

SUMMARY OF REIMBURSEMENT

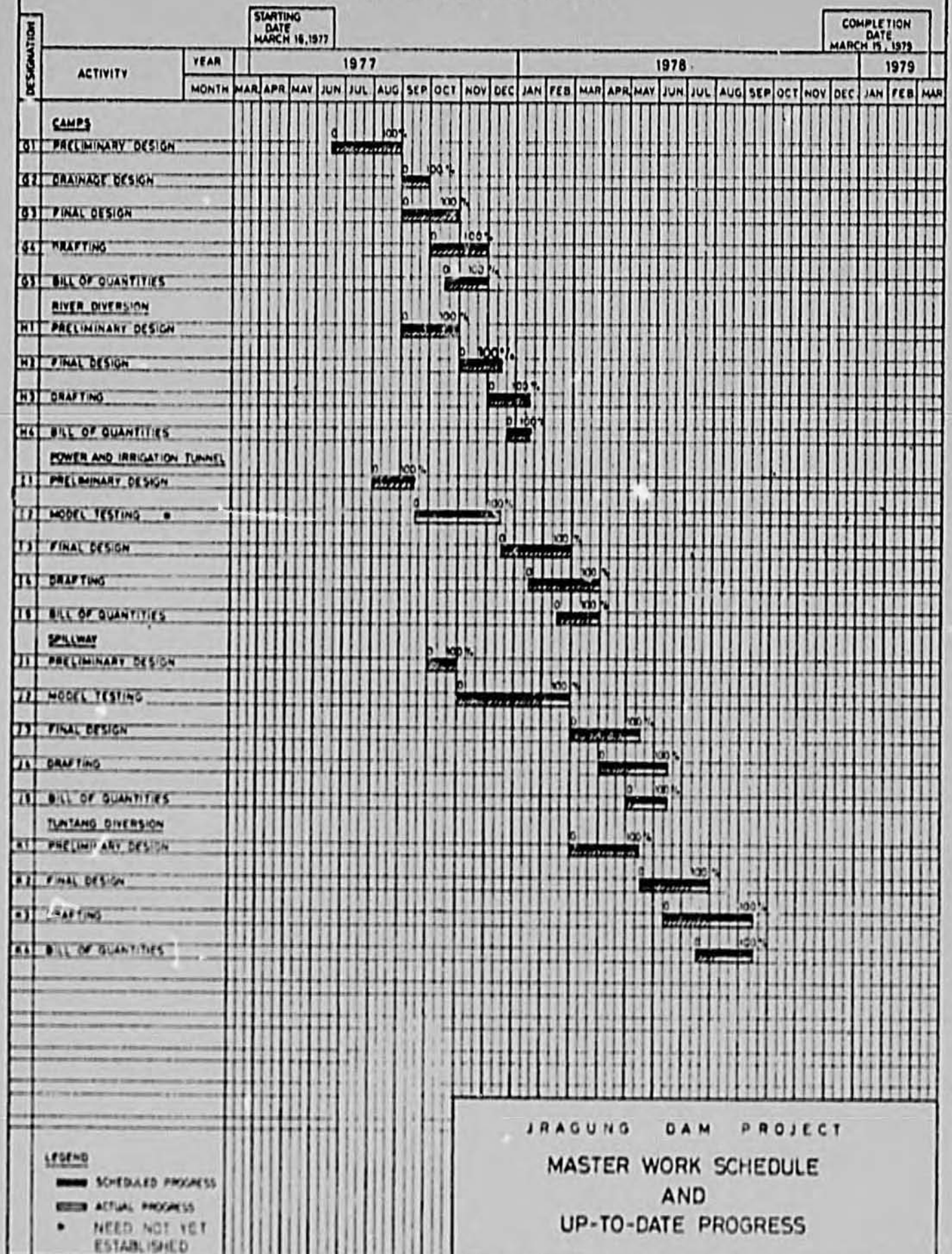
Rupiah Payments Received by Consultant from Ministry up to the end of Report Period	=	35,685,381
Rupiah Expenditure by Consultant Approved for Reinbursement	=	25,307,348
Balance	=	10,378,033

JRAGUNG DAM PROJECT
PROGRESS REPORT



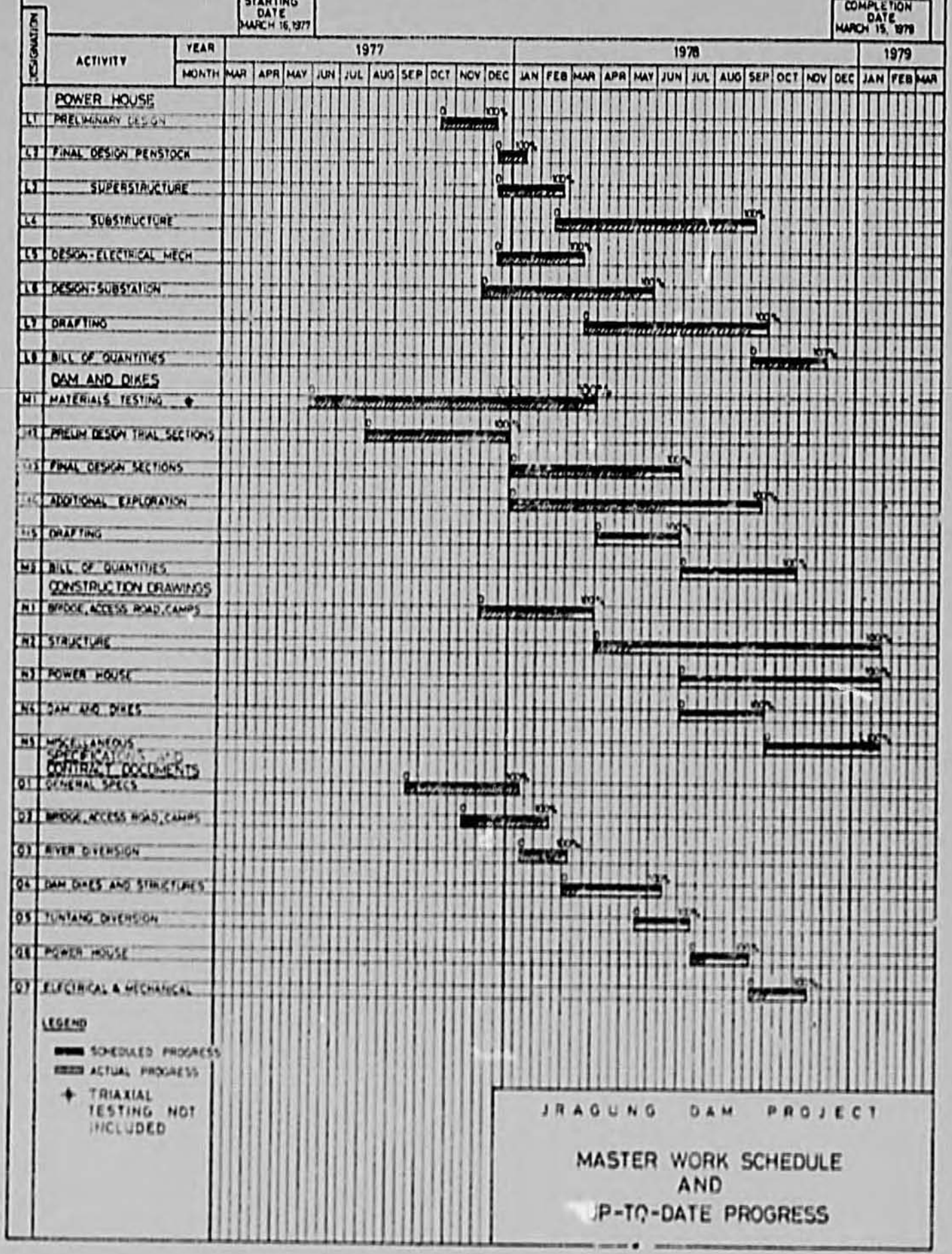
ANNEXURE VI

JRAGUNG DAM PROJECT
PROGRESS REPORT



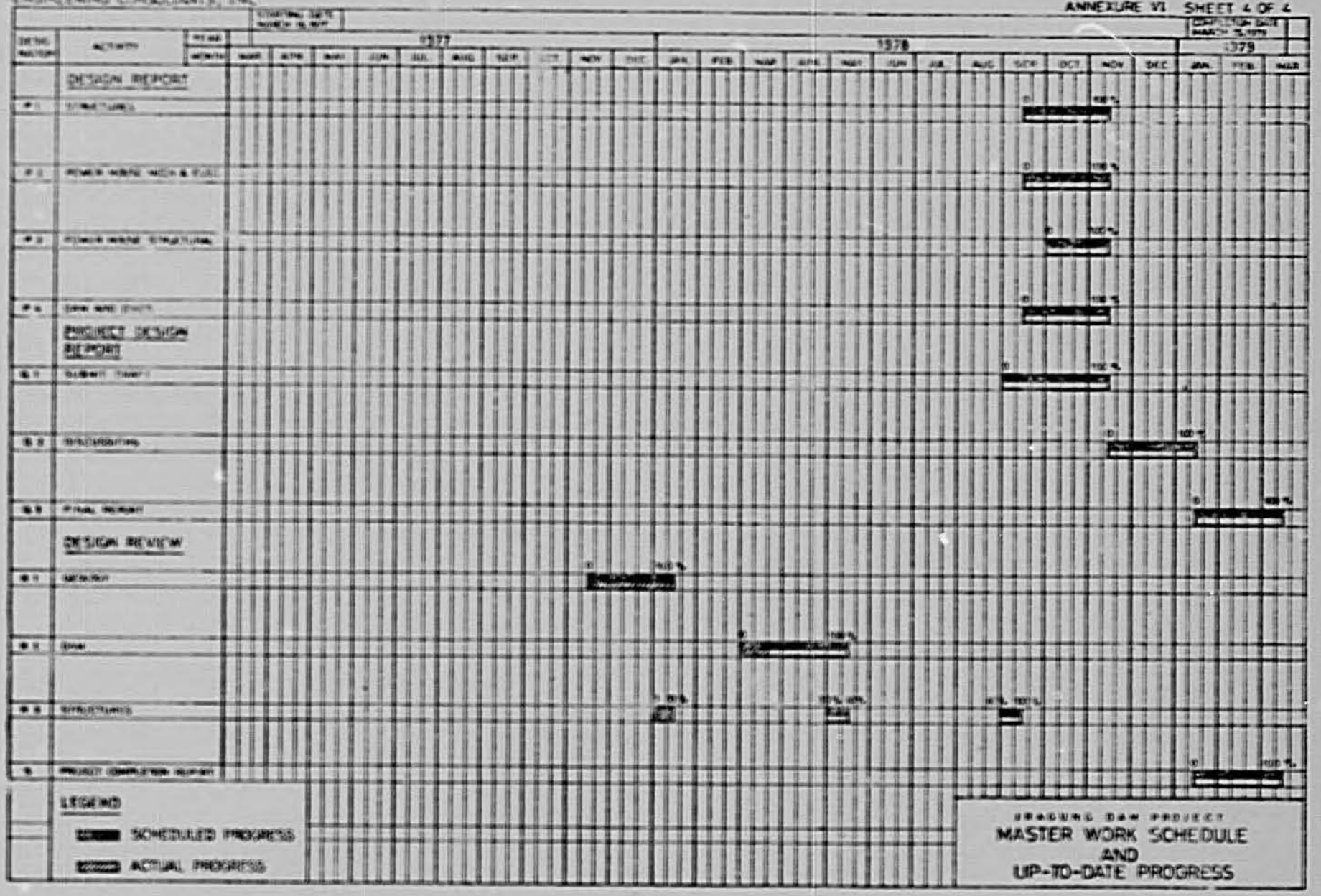
ANNEXURE VI

JRAGUNG DAM PROJECT
PROGRESS REPORT



ENGINEERING CONSULTANTS, INC

ANNEXURE VI SHEET 4 OF 4



DRAGUNA DAM PROJECT

MASTER WORK SCHEDULE AND UP-TO-DATE PROGRESS

FLOOD ROUTING STUDY

JHAGUNG DAM SPILLWAY PMP FLOOD JUNE 1978

1.0 UNGATED MAIN SPILLWAYS 0.0 M WIDE BY 0.0 M HIGH

SILL ELEVATION AT ELEV 125.00 M

MAXIMUM OPERATION LEVEL AT ELEV 130.00 M (FROM MAIN SPILLW
MINIMUM OPERATION LEVEL AT ELEV 120.00 M

ROUTING STARTS AT ELEV 125.00 M , ENDS AT ELEV 125.00 M

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
0	0		125.00			
		0.				
0	0		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		150.				
0	2		125.05	5.	0.	0.
		500.				
0	2		125.23	23.	0.	0.
		1100.				
0	3		125.61	77.	0.	0.
		2300.				
0	3		126.37	263.	0.	0.
		2900.				
0	4		127.26	598.	0.	0.
		3000.				
0	4		128.05	973.	0.	0.
		2800.				
0	5		128.59	1183.	0.	0.
		2500.				
0	5		128.95	1311.	0.	0.
		2200.				
0	6		129.20	1380.	0.	0.
		1750.				
0	6		129.31	1404.	0.	0.
		1250.				
0	7		129.26	1394.	0.	0.
		1000.				
0	7		129.15	1368.	0.	0.

TIME		AVG. INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
		700.				
0	8		128.96	1315.	0.	0.
		500.				
0	8		128.74	1238.	0.	0.
		300.				
0	9		128.47	1140.	0.	0.
		200.				
0	9		128.20	1054.	0.	0.
		100.				
0	10		127.91	905.	0.	0.
		50.				
0	10		127.63	765.	0.	0.
		0.				
0	11		127.38	648.	0.	0.
		0.				
0	11		127.16	555.	0.	0.
		0.				
0	12		126.97	479.	0.	0.
		1750.				
0	12		127.40	658.	0.	0.
		1250.				
0	13		127.60	748.	0.	0.
		1000.				
0	13		127.68	788.	0.	0.
		700.				
0	14		127.65	774.	0.	0.
		500.				
0	14		127.56	731.	0.	0.
		300.				
0	15		127.42	665.	0.	0.
		200.				
0	15		127.26	597.	0.	0.
		100.				
0	16		127.09	528.	0.	0.
		50.				
0	16		126.93	463.	0.	0.
		0.				
0	17		126.78	402.	0.	0.
		0.				
0	17		126.64	352.	0.	0.
		0.				
0	18		126.52	311.	0.	0.
		0.				
0	18		126.42	277.	0.	0.
		0.				
0	19		126.32	248.	0.	0.

TIME		AVG. INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
0	19	0.	126.24	223.	0.	0.
0	20	0.	126.16	202.	0.	0.
0	20	0.	126.09	183.	0.	0.
0	21	0.	126.03	167.	0.	0.
0	21	0.	125.97	153.	0.	0.
0	22	0.	125.92	141.	0.	0.
0	22	0.	125.87	129.	0.	0.
0	23	0.	125.83	120.	0.	0.
0	23	0.	125.78	111.	0.	0.
1	0	0.	125.75	103.	0.	0.
1	0	0.	125.71	96.	0.	0.
1	1	0.	125.68	89.	0.	0.
1	1	0.	125.65	84.	0.	0.
1	2	0.	125.62	78.	0.	0.
1	2	0.	125.59	74.	0.	0.
1	3	0.	125.56	69.	0.	0.
1	3	0.	125.54	65.	0.	0.
1	4	0.	125.52	61.	0.	0.
1	4	0.	125.49	58.	0.	0.
1	5	0.	125.47	55.	0.	0.
1	5	0.	125.46	52.	0.	0.
1	6	0.	125.44	50.	0.	0.
1	6	0.	125.42	47.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
		0.				
1	7		125.40	45.	0.	0.
		0.				
1	7		125.39	43.	0.	0.
		0.				
1	8		125.37	41.	0.	0.
		0.				
1	8		125.36	39.	0.	0.
		0.				
1	9		125.34	37.	0.	0.
		0.				
1	9		125.33	35.	0.	0.
		0.				
1	10		125.32	34.	0.	0.
		0.				
1	10		125.31	32.	0.	0.
		0.				
1	11		125.29	31.	0.	0.
		0.				
1	11		125.28	30.	0.	0.
		0.				
1	12		125.27	28.	0.	0.
		0.				
1	12		125.26	27.	0.	0.
		0.				
1	13		125.25	26.	0.	0.
		0.				
1	13		125.24	25.	0.	0.
		0.				
1	14		125.24	24.	0.	0.
		0.				
1	14		125.23	23.	0.	0.
		0.				
1	15		125.22	22.	0.	0.
		0.				
1	15		125.21	21.	0.	0.
		0.				
1	16		125.20	20.	0.	0.
		0.				
1	16		125.20	19.	0.	0.
		0.				
1	17		125.19	19.	0.	0.
		0.				
1	17		125.18	18.	0.	0.
		0.				
1	18		125.18	17.	0.	0.

FLOOD ROUTING STUDY

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
		0.				
1	18		125.17	17.	0.	0.
		0.				
1	19		125.17	16.	0.	0.
		0.				
1	19		125.16	15.	0.	0.
		0.				
1	20		125.15	15.	0.	0.
		0.				
1	20		125.15	14.	0.	0.
		0.				
1	21		125.14	14.	0.	0.
		0.				
1	21		125.14	13.	0.	0.
		0.				
1	22		125.13	13.	0.	0.
		0.				
1	22		125.13	12.	0.	0.
		0.				
1	23		125.13	12.	0.	0.
		0.				
1	23		125.12	11.	0.	0.
		0.				
2	0		125.12	11.	0.	0.

TOTAL INFLOW VOLUME	52.	MCM
TOTAL DISCHARGE VOLUME	52.	MCM
MAXIMUM WATER SURFACE ELEVATION	129.31	M

AFTER APPROXIMATELY 0 DAYS AND 6 HOURS.

MAXIMUM DISCHARGE OVER MAIN SPILLWAY	1404.	CMS
MAXIMUM TOTAL INFLOW	3000.	CMS
MAXIMUM TOTAL DISCHARGE	1404.	CMS

FLOOD ROUTING STUDY
****

JRAGUNG DAM SPILLWAY 750 CMS FLOOD JUNE 1978

1.0 UNGATED MAIN SPILLWAYS 0.0 M WIDE BY 0.0 M HIGH

SILL ELEVATION AT ELEV 125.00 M

MAXIMUM OPERATION LEVEL AT ELEV 130.00 M (FROM MAIN SPI
MINIMUM OPERATION LEVEL AT ELEV 120.00 M

ROUTING STARTS AT ELEV 125.00 M , ENDS AT ELEV 125.00 M

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
0	0		125.00			
		0.				
0	0		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		0.				
0	2		125.00	0.	0.	0.
		0.				
0	2		125.00	0.	0.	0.
		0.				
0	3		125.00	0.	0.	0.
		25.				
0	3		125.01	1.	0.	0.
		50.				
0	4		125.03	2.	0.	0.
		230.				
0	4		125.11	10.	0.	0.
		325.				
0	5		125.22	22.	0.	0.
		475.				
0	5		125.36	42.	0.	0.
		600.				
0	6		125.57	71.	0.	0.
		680.				
0	6		125.79	111.	0.	0.
		700.				
0	7		125.99	157.	0.	0.
		730.				
0	7		126.19	208.	0.	0.

FLOOD ROUTING STUDY

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
		750.				
0	8		126.37	263.	0.	0.
		730.				
0	8		126.53	314.	0.	0.
		720.				
0	9		126.67	361.	0.	0.
		700.				
0	9		126.78	403.	0.	0.
		665.				
0	10		126.87	437.	0.	0.
		630.				
0	10		126.94	463.	0.	0.
		565.				
0	11		126.97	477.	0.	0.
		500.				
0	11		126.98	480.	0.	0.
		435.				
0	12		126.96	479.	0.	0.
		405.				
0	12		126.94	473.	0.	0.
		325.				
0	13		126.89	446.	0.	0.
		300.				
0	13		126.83	426.	0.	0.
		250.				
0	14		126.78	404.	0.	0.
		220.				
0	14		126.72	381.	0.	0.
		190.				
0	15		126.66	357.	0.	0.
		175.				
0	15		126.60	336.	0.	0.
		150.				
0	16		126.53	314.	0.	0.
		130.				
0	16		126.47	294.	0.	0.
		115.				
0	17		126.41	274.	0.	0.
		100.				
0	17		126.35	256.	0.	0.
		90.				
0	18		126.29	239.	0.	0.
		80.				
0	18		126.24	223.	0.	0.
		75.				
0	19		126.19	209.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
0	19	70.	126.14	196.	0.	0.
0	20	65.	126.10	184.	0.	0.
0	20	60.	126.05	173.	0.	0.
0	21	55.	126.01	163.	0.	0.
0	21	50.	125.97	153.	0.	0.
0	22	45.	125.94	144.	0.	0.
0	22	40.	125.90	136.	0.	0.
0	23	35.	125.86	128.	0.	0.
0	23	30.	125.83	121.	0.	0.
1	0	25.	125.80	114.	0.	0.
1	0	20.	125.76	107.	0.	0.
1	1	20.	125.73	101.	0.	0.
1	1	20.	125.71	95.	0.	0.
1	2	20.	125.68	90.	0.	0.
1	2	20.	125.66	86.	0.	0.
1	3	20.	125.63	81.	0.	0.
1	3	20.	125.61	78.	0.	0.
1	4	20.	125.59	74.	0.	0.
1	4	20.	125.57	71.	0.	0.
1	5	20.	125.55	68.	0.	0.
1	5	20.	125.54	65.	0.	0.
1	6	20.	125.52	62.	0.	0.
1	6		125.51	60.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
1	7	20.	125.49	58.	0.	0.
1	7	20.	125.48	56.	0.	0.
1	8	20.	125.47	54.	0.	0.
1	8	20.	125.46	52.	0.	0.
1	9	20.	125.44	51.	0.	0.
1	9	20.	125.43	49.	0.	0.
1	10	20.	125.42	48.	0.	0.
1	10	20.	125.41	47.	0.	0.
1	11	20.	125.40	45.	0.	0.
1	11	20.	125.40	44.	0.	0.
1	12	20.	125.39	43.	0.	0.
1	12	20.	125.38	42.	0.	0.
1	13	20.	125.37	41.	0.	0.
1	13	20.	125.36	40.	0.	0.
1	14	20.	125.36	39.	0.	0.
1	14	20.	125.35	38.	0.	0.
1	15	20.	125.34	37.	0.	0.
1	15	20.	125.34	36.	0.	0.
1	16	20.	125.33	36.	0.	0.
1	16	20.	125.33	35.	0.	0.
1	17	20.	125.32	34.	0.	0.
1	17	20.	125.32	34.	0.	0.
1	18		125.31	33.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
1	18	20.	125.31	32.	0.	0.
1	19	20.	125.30	32.	0.	0.
1	19	20.	125.30	31.	0.	0.
1	20	20.	125.29	31.	0.	0.
1	20	20.	125.29	30.	0.	0.
1	21	20.	125.29	30.	0.	0.
1	21	20.	125.28	30.	0.	0.
1	22	20.	125.28	29.	0.	0.
1	22	20.	125.28	29.	0.	0.
1	23	20.	125.27	28.	0.	0.
1	23	20.	125.27	28.	0.	0.
2	0	[illegible]	125.27	28.	0.	0.

TOTAL INFLOW VOLUME 24. MCM
TOTAL DISCHARGE VOLUME 23. MCM

MAXIMUM WATER SURFACE ELEVATION 126.98 M

AT [illegible] APPROXIMATELY 0 DAYS AND 11 HOURS.

MAXIMUM DISCHARGE OVER MAIN SPILLWAY 480. CMS

MAXIMUM TOTAL INFLOW 750. CMS
MAXIMUM TOTAL DISCHARGE 480. CMS

FLOOD ROUTING STUDY
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JHAGUNG DAM SPILLWAY 900 CM/S FLOOD JUNE 1978

1.0 UNGATED MAIN SPILLWAYS 0.0 M WIDE BY 0.0 M HIGH

SILL ELEVATION AT ELEV 125.00 M

MAXIMUM OPERATION LEVEL AT ELEV 130.00 M (FROM MAIN SPI
MINIMUM OPERATION LEVEL AT ELEV 120.00 M

ROUTING STARTS AT ELEV 125.00 M , ENDS AT ELEV 125.00 M

TIME		AVG. INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
0	0		125.00			
		0.				
0	0		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		0.				
0	1		125.00	0.	0.	0.
		0.				
0	2		125.00	0.	0.	0.
		0.				
0	2		125.00	0.	0.	0.
		0.				
0	3		125.00	0.	0.	0.
		30.				
0	3		125.01	1.	0.	0.
		60.				
0	4		125.03	3.	0.	0.
		276.				
0	4		125.13	12.	0.	0.
		390.				
0	5		125.26	27.	0.	0.
		570.				
0	5		125.45	52.	0.	0.
		720.				
0	6		125.69	91.	0.	0.
		816.				
0	6		125.94	145.	0.	0.
		840.				
0	7		126.18	206.	0.	0.
		876.				
0	7		126.41	273.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
AY	HR	CMS	M	CMS	CMS	CMS
0	8	900.	126.62	344.	0.	0.
0	8	076.	126.80	409.	0.	0.
0	9	864.	126.95	470.	0.	0.
0	9	840.	127.08	520.	0.	0.
0	10	798.	127.17	558.	0.	0.
0	10	756.	127.23	586.	0.	0.
0	11	678.	127.27	599.	0.	0.
0	11	600.	127.27	599.	0.	0.
0	12	522.	127.24	588.	0.	0.
0	12	486.	127.21	574.	0.	0.
0	13	390.	127.14	548.	0.	0.
0	13	360.	127.08	522.	0.	0.
0	14	300.	127.01	493.	0.	0.
0	14	264.	126.93	461.	0.	0.
0	15	228.	126.85	430.	0.	0.
0	15	210.	126.78	402.	0.	0.
0	16	180.	126.70	374.	0.	0.
0	16	156.	126.63	347.	0.	0.
0	17	138.	126.56	323.	0.	0.
0	17	120.	126.49	300.	0.	0.
0	18	108.	126.42	279.	0.	0.
0	18	96.	126.36	259.	0.	0.
0	19	90.	126.30	242.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
		84.				
0	19		126.25	226.	0.	0.
		78.				
0	20		126.20	212.	0.	0.
		72.				
0	20		126.15	199.	0.	0.
		66.				
0	21		126.11	187.	0.	0.
		60.				
0	21		126.06	175.	0.	0.
		54.				
0	22		126.02	165.	0.	0.
		48.				
0	22		125.98	155.	0.	0.
		42.				
0	23		125.94	146.	0.	0.
		36.				
0	23		125.90	137.	0.	0.
		30.				
1	0		125.87	128.	0.	0.
		24.				
1	0		125.83	121.	0	0.
		24.				
1	1		125.80	113.	0.	0.
		24.				
1	1		125.77	107.	0.	0.
		24.				
1	2		125.74	101.	0.	0.
		24.				
1	2		125.71	96.	0.	0.
		24.				
1	3		125.68	91.	0.	0.
		24.				
1	3		125.66	87.	0.	0.
		24.				
1	4		125.64	83.	0.	0.
		24.				
1	4		125.62	79.	0.	0.
		24.				
1	5		125.60	75.	0.	0.
		24.				
1	5		125.58	72.	0.	0.
		24.				
1	6		125.56	69.	0.	0.
		24.				
1	6		125.55	67.	0.	0.

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
1	7	24.	125.53	64.	0.	0.
1	7	24.	125.52	62.	0.	0.
1	8	24.	125.51	60.	0.	0.
1	8	24.	125.49	58.	0.	0.
1	9	24.	125.48	56.	0.	0.
1	9	24.	125.47	55.	0.	0.
1	10	24.	125.46	53.	0.	0.
1	10	24.	125.45	52.	0.	0.
1	11	24.	125.44	50.	0.	0.
1	11	24.	125.43	49.	0.	0.
1	12	24.	125.42	48.	0.	0.
1	12	24.	125.41	47.	0.	0.
1	13	24.	125.41	46.	0.	0.
1	13	24.	125.40	44.	0.	0.
1	14	24.	125.39	44.	0.	0.
1	14	24.	125.38	43.	0.	0.
1	15	24.	125.38	42.	0.	0.
1	15	24.	125.37	41.	0.	0.
1	16	24.	125.37	40.	0.	0.
1	16	24.	125.36	39.	0.	0.
1	17	24.	125.35	39.	0.	0.
1	17	24.	125.35	38.	0.	0.
1	18	24.	125.34	37.	0.	0.

FLOOD ROUTING STUDY

TIME		AVG.INFLOW	RESERVOIR EL	MAIN SPILLWAY DISCHARGE	OVERFLOW SPILLWAY DISCHARGE	DIVERSION CONDUIT DISCHARGE
DAY	HR	CMS	M	CMS	CMS	CMS
1	18	24.	125.34	37.	0.	0.
1	19	24.	125.34	36.	0.	0.
1	19	24.	125.33	36.	0.	0.
1	20	24.	125.33	35.	0.	0.
1	20	24.	125.32	35.	0.	0.
1	21	24.	125.32	34.	0.	0.
1	21	24.	125.32	34.	0.	0.
1	22	24.	125.31	33.	0.	0.
1	22	24.	125.31	33.	0.	0.
1	23	24.	125.31	32.	0.	0.
1	23	24.	125.30	32.	0.	0.
2	0		125.30	32.	0.	0.

TOTAL INFLOW VOLUME 29. MCM
TOTAL DISCHARGE VOLUME 28. MCM

MAXIMUM WATER SURFACE ELEVATION 127.27 M

SPILLS APPROXIMATELY 0 DAYS AND 11 HOURS.

MAXIMUM DISCHARGE OVER MAIN SPILLWAY 599. CMS

MAXIMUM TOTAL INFLOW 900. CMS
MAXIMUM TOTAL DISCHARGE 599. CMS

Annexure VIII

STATE'S ELECTRICITY ENTERPRISE
Jl. Pemuda 93 Semarang.

Map No. 4.6.7.

No. M. 360/DEKIT/'78 Semarang, April 13, 1978.
Subject: JRAGUNG PLTA - Operation

JRATUNSELUNA PROJECT
Jl. Gedeh No. 7A
Semarang.

Dear Sir:

Thank you for your Inter Office Memorandum No. 1196/T/5-52/78 of March 8, 1978 signed on Febr. 8, 1978 by Mr. R.D. Goodrich about the Jragung PLTA Operation.

1. According to the concept of operation the Jragung PLTA generation is actually biggest in the dry season (maximum period 6 MW peak) while in the wet season where the discharge from the dam is probably not so vital, the opportunity is then used to fill the dam, so that the PLTA generation is but a small one (minimum period 0.6 MW peak).

2. Without much hampering in above mentioned design, at times the generation design may be more adjustable to the PLN requirement for a possible bigger free choice of MW and MVAR with the following conditions:

   a) The accumulation of daily/weekly/monthly water use by turbine in certain months is not exaggerating your definition. Therefore charge of the generator at peak-hours is possibly regulated for reaching 6 MW peak. This is necessary to increase the intensification of Jragung PLTA participation into the PLN interconnection system.

   b) The various tension of operation will be regulated by PLN (cq dispatcher) so that it will not exaggerate the allowed limit. (between 19 - 23 kV).

3. The load flow study mentioned by Mr. Goodrich is actually not illustrating the situation of operation considering the matter that the present free loads on the network are developing from zero according to the period development.

   So more important is to know how much generating participation can be obtained from Jragung PLTA and how the design will be regulated and relied on.

4. Please note that the existing 20 KV feeder on which the Jragung PLTA later will be interconnected will use the automatic reclosing control system up to 3 times.
   The successively clearing times are set at 10 seconds, 15 seconds and 15 seconds. This characteristic system should of course be calculated in the design of the exact protection system for Jragung PLTA.

5. Considering above mentioned urgences we kindly have to be sent to us:
   a) Dam volume graphic vs proposed water elevation maximum and minimum for operation.
   b) Profile graphic of yearly proposed water elevation required as manual of business.
   c) Grahic of yearly water flow duration (passing the turbine, and total discharge from the dam).
   d) The yearly estimation of KWH production and yearly load factor.
   e) Characteristic generation power (MW, MVAR, vs the Pf.) and mechanical and electrical data constanta.
   f) AC and DC diagram for Jragung PLTA erection.
   g) Instruction manual/operation guide for the PLTA.
   h) And others assumed necessary to be known.

Thus our response for our mutual attention.

STATE'S ELECTRICITY ENTERPRISE
DISTRICT XIII

signed: Ir.Soehardjo
Manager.

INTER OFFICE
MEMORANDUM

June 21, 1978

From : L.S. Boval, ECI Denver

To : S.A. Rana, Resident Manager.

Our file: 1196/T/47
234/78

Subject : Jragung Power Plant - Electrical Features.

The following letter and attachments are in reply to PLN's letter No. M. 360/Dekit/'78 dated April 13, 1978, Semarang.

The answers are numbered in accordance with numbered items in the PLN letter.

1. The interpretation of operation concept is correct.

2. (a) The operation of the plant at 6 MW for peaking period of 5 hours a day for the entire year is not possible.

October, November, December, and January.

During these four months, the releases from the reservoir are approximately 2 cubic meters per second 24 hours a day continuously. This is for the Semarang municipal and industrial water supply system with the water taken from the tailrace of the power house. Therefore, no re-regulation is possible. In the 20 year reservoir operation study, the average generation was 1.5 MW continuously 24 hours a day for these months.

Remaining Eight months.

The criteria for reservoir releases are variable irrigation demands and water supply of 2 cubic meters per second. Any excess water is then available for power generation. Please note that both the irrigation and water supply releases are at a continuous level for 24 hours a day. The releases into the main irrigation canal at

the existing Jragung diversion weir several kilometers downstream from power house must be continuous 24 hours a day. At present there is no appreciable storage at the diversion weir.

The 20 year reservoir operation study shows an average of 1.5 months a year that power output is at least 6 MW continuously through the entire month 24 hours a day.

In order to have 5 hours a day with output at 6 MW for these months, there must be a storage facility for re-regulation of water for releases into the main irrigation canal at the Jragung diversion weir. It might be possible to remodel the Jragung Diversion Weir for providing some storage for re-regulation. But, the peaking capability thus achieved would be only for a part of this eight month period. Since providing peaking capability at the Jragung Powerplant for only part of the year would not add to project benefits as defined in the feasibility study, no futher study has been made or is planned. Power benefits are largely secondary energy to PLN system with only minor firm energy.

2. (b) The voltage level can be regulated by PLN dispatcher to meet system limits.

3. Please find enclosed 3 load flow diagrams (Attachment 1, 2, and 3) which replace the diagrams transmitted in Mr. Goodrich's memo of February 8, 1978.

4. A brief stability study shows that upon full load rejection the Jragung generating units will overspeed rapidly and reclosure of the 20 KV line after a 10 second delay will not be successful. Therefore, after a 20 KV circuit interruption, the generating units will overspeed immediately, gradually return to normal no-load speed, be synchronized to the system voltage and then gradually pick up the load again by manual action of the operator.

The PLN 20 KV feeder from Semarang may be reclosed as planned; however, with the 20 KV circuit breaker at Jragung substation, the above procedure must be followed.

This action is common with small turbine generator units of low inertia and, from discussion with PLN personnel, we understand both Jelok and Timo hydro powerplants operate in same manner.

5. (a) Attachment 4 shows the dam volume versus reservoir elevation.

(b) and (c) Instead of the yearly reservoir elevation and flow duration curves, we have provided the following:
Attachment 5 shows the results of the 20 year reservoir operation study with monthly average megawatt (MW) and gigawatthour (GWH) output.

Attachment 6 shows the average MW generation for each separate month in the 20 year period.

(d) Annual energy production : 29.7 GWH
Annual load factor : 0.57

(e) Attachment 7 is the electrical design criteria for Jragung power plant.

(f) Attachments 8, 9, and 10 are copies of the Electrical-Single Line Diagram, A.C. Station Service-Single Line Diagram, and D.C. System-Single Line Diagram.

The above is in response to the recent communication and we await comments or further questions in regard to the Jragung Power Plant.

Without attachments.

Laurent S. Boval
Senior Electrical Engineer.

LSB/ m.