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

JRAGUNG DAM

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

MONTHLY PROGRESS REPORT
No. 17

JULY 1978

SUBMITTED BY :

ENGINEERING CONSULTANTS, INC.

Denver, Co., USA - Semarang, Indonesia

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1901 SOUTH NAVAJO STREET * DENVER, COLORADO 80223 U.S.A.
TELEPHONE : 303/936-3417 * CABLE : ECIDEN * DENVER, COLORADO

ENGINEERING CONSULTANTS, INC.

CABLE ADDRESS :
ECISEMARANG
SEMARANG
INDONESIA
Tel. : 315061
Telex : ECISEMARANG

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

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

August 12, 1978

Our file: 1196/MR/17
297/78

Attention: Ir. Oesman Djojoadinoto
Director Irrigation.

Subject : Monthly Progress
Report No. 17.

Dear Sir:

We submit herewith fifteen (15) copies of the Monthly Progress Report No. 17 for the month of July, 1978. The report is prepared in pursuance of Section 10.15 of Contract No. KA3. 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
(Attention: Mr. P. Thorn)
with eight (8) copies of
the report.

General Manager PROSIDA
Ten (10) copies

Project Manager
Jratunseluna Basin Project

ECI Denver (SD 238)

ECI Semarang

SAR/ m.

JRAGUNG DAM PROJECT

MONTHLY

PROGRESS REPORT

NO. 17

PERIOD

JULY 1978

CONTRACT NO. KAB. 9/3/12

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

ENGINEERING CONSULTANTS, INC.

DENVER, COLORADO SEMARANG

U.S.A. INDONESIA

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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 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.

During the month of July, for which the progress is being reported, final design activities on the dam and all the major appurtenant structures progressed satisfactorily and the review of design work done at Semarang was initiated by the Consultant's Dam Design Specialist, Mr. Hillis and the Chief Engineer and Vice President, Mr. Kuehl. Results of tests done in North America of part of the foundation and embankment materials for the dam were received and are being studied to determine the final design parameters. The report on Jragung reservoir sedimentation has been prepared based on the appraisal of data and study of sediment transport in the Jragung River at the damsite. The effects on the economics of the Project of higher than the original estimates of the reservoir sedimentation rates are currently being studied.

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

1. The mapping of the damsite and of all the appurtenant structures has been completed. The secondary mapping work and other miscellaneous surveys progressed on schedule.

2. The geological investigation work at the damsite and the structures locations stands concluded, as was stated in the previous month's progress report. The initial draft of the final geology report has now been compiled. The report will be finalized during the next couple of months when all test results of the foundation materials will be available.

3. The design drawings for the Tuntang Diversion Works were completed and were being reviewed by the Chief Engineer at the end of the month. It is expected that these will be submitted to the Ministry and U.S. AID within the month of August.

Based on the design criteria for the Spillway, explained in the June progress report, the design of the structure up to the terminal point of the chute has been completed. For the flip bucket and the stilling basin alternatives stated in the design criteria, model testing continued in the DPMA laboratory at Bandung. After the results of the model testing are available, the design of the remaining part of the structure will be completed. However, type designs of both the schemes have been prepared.

A further slight change in the dam alignment has been considered necessary to remove one reverse curve and also to allow the dam to be raised to crest elevation 135.0. The reasons for this change in the dam height are discussed in paragraph 5 of this section. The alignment of the river diversion tunnel will also be adjusted accordingly. However, the design of the River Diversion Works submitted earlier will not change.

The drawings which need revision are being drafted and will be submitted for review during August.

The preparation of construction drawings of the structures progressed on schedule. During the period being reported, work continued on the River Diversion Works. It is estimated that the construction drawings for this work will be prepared by the end of the next month.

4. The design of the dam is presently being reviewed by Messrs. Kuehl

and Hillis. Results of the initial stability analysis of the originally proposed section, being done on ECI's computer at Denver, have been received. Some adjustments in the design section of the dam are contemplated because more information is now available on the characteristics of the fill and the foundation materials and quantities of different types of fill materials. The final section of the dam thus being developed during the review of design will be presented in our next monthly report.

Detailed reports on progress achieved in the design of various components of the Project are given in Sections IV-A and IV-B of this report.

5. Appraisal of data and study of sediment transport in the Jragung River at the damsite have been completed by the Consultant's River Regime Specialist, Dr. M.A. Stevens. These are based on the actual measurement of sediment transport made at the Borangan Bridge during the 1977-78 rainy season. A part of the report prepared by Dr. Stevens relating to reservoir sedimentation is appended to this section of the progress report. A discussion on the revised estimate of reservoir sedimentation and its impact on the Project along with the Consultant's recommendations are presented in the following:

Reservoir Capacity and Rates of Sedimentation

Background

When ECI undertook, in the years 1975-76, to upgrade the feasibility studies for the Project done earlier by others, data on sediment transport in the Jragung River to estimate reservoir sedimentation were not available. The only information that could be found was an estimate of sediment transport in the Jragung River made in the year 1907 when it was thought that approximately 2 millimeters of erosion per year was occurring in the Jragung Watershed. This would amount to an annual transport rate of 500,000 tons at the proposed damsite.

In their feasibility studies during the year 1972-73, NEDECO assumed that the transport rate in the Jragung River at the damsite would be approximately 280,000 cubic meters per year and that two-thirds of that sediment would be trapped in the reservoir. The sedimentation rate was thus estimated at 6 MCM in 30 years.

During the rainy season of 1976, the Jratunseluna Project office carried out a sediment data collection program at the Jragung River streamgaging station. The sediment samples obtained from the four floods which then occurred did not provide any correlation between discharge and sediment concentration. However, quite heavy concentrations of sediment were recorded; of the order of 33,000 ppm, during one of the floods. These measurements indicated that the sediment transport rate in the Jragung River at the proposed damsite could be as large as 1.5 million tons per year. This estimate by ECI was about 5 times greater than that of NEDECO. Recognizing the fact that there was lack of correlation between water discharge, measured rainfall and suspended sediment concentration, the projections based on a small number of measurements were considered very approximate. It was, therefore, stated by ECI in the Feasibility Report that considering the size of the proposed investment in the Jragung Dam and the uncertainty in the estimated sediment transport rate in the river, it would be prudent to continue sediment measurements in future.

Concerning provision for sediment storage in the sizing of the Jragung Reservoir, the following observation was made in the ECI's Upgraded Feasibility Report.

"Sediment accumulation within the reservoir is a problem which requires more measurements and analyses. Too few measurements have been made thus far to make a reliable estimate. This is vividly pointed out by the large difference between estimates made by NEDECO prior to 1973 and those made by ECI in 1976. The few recent measurements indicate the amount of suspended sediment might be as much as six times greater than was previously anticipated.

It is commonly agreed that the sediment in most of the rivers of Java is increasing. This is because increased population pressure has made it necessary to farm more of the upland slopes each year. At this point none of the sediment estimates for the Jragung Reservoir is considered reliable; however, some storage must be allocated.

The allocation is based on an intermediate number and is equal to a total 50 year accumulation in the reservoir of 27 MCM. The reservoir operation studies were performed with about half of this sediment in place thus representing conditions 20 to 30 years after construction. If future measurements indicate a significant difference from this estimate the project analyses should be reviewed."

Design Stage Investigation

ECI, with the cooperation of the Jratunseluna Project authorities continued to collect and analyze hydrologic data taken in the watershed upstream from the Jragung Dam including measurement of rainfall, runoff and sediment yield. A well-equipped and properly staffed sediment and discharge measurement station was established at the Borangan Bridge about a kilometer downstream from the damsite. The data collected up to and including May 1978 are included in a report prepared by Dr. M.A. Stevens, the Consultant's River Regime Specialist, the relevant portions of which are appended hereto.

Effect of Sedimentation on Project Life

If sedimentation in the Jragung Reservoir took place at the rate estimated by Dr. Stevens, the live storage capacity left in the reservoir at the end of the 50 year period would be only 64 MCM against 106 MCM assumed in the feasibility studies. This would cause the accrual of benefits from the Project to be less than those considered in the economic analysis and might pose a serious question to the economic viability of the Project.

The Consultant is presently carrying out a review of the available storage capacity of the reservoir, the previous allocations for various usages and the effects which the sedimentation will have on the useful life of the Project. The studies which are being made and the actions proposed at this time are summarized in the following.

Reservoir Storage Allocation

The storage capacity of the Jragung Reservoir, as per feasibility report, up to the Spillway Crest elevation of 125.0 was 141 MCM. The estimated dead storage capacity below the intake of the Irrigation and Power Tunnel was 8 MCM. The active storage would, therefore, be 133 MCM.

The allocation of total storage capacity was made in the following manner:

	Initial	After 50 years	Intermediate Operation
Sediment + Dead Storage	8	27	13
Irrigation	97	97	97
Municipal	36	17	31
Sub Total (Below Spillway Crest Elevation)	141	141	141
Flood Storage	25	25	25
Total	166	166	166

In the reservoir operation studies, the evaporation and seepage losses over an annual cycle of operation were assumed to be 8.4 MCM. For the municipal and industrial usages, releases from the reservoir were made at a constant rate of 2.0 cubic meters per second.

Based on the rates of sedimentation in the reservoir estimated by Dr. Stevens, the available storage capacities after periods of 25 years

and 50 years will be 102 MCM and 64 MCM, respectively. The available capacity of the reservoir even after 25 years of operation will not be sufficient to provide storage necessary for the irrigation and municipal and industrial requirements.

For irrigation alone, a storage capacity in the reservoir of 97 MCM is needed which according to the latest estimates of reservoir sedimentation will not be available beyond 28 years of reservoir operation. The allocation of reservoir capacities which was made during the feasibility studies will, therefore, not apply under the conditions of the estimated reservoir sedimentation rates. Revised allocation will have to be decided based on new reservoir operation studies which must be made to take into consideration the reductions in storage capacity caused by sedimentation.

Sedimentation From Tuntang Diversions

The probable contribution to reservoir sedimentation by Tuntang diversion has been estimated by Dr. Stevens at 50,000 tons per year if only low flows are diverted. If only Tuntang flood peaks are diverted, the additional sediment entering the Jragung reservoir could be as large as 500,000 tons per year.

The effect of sedimentation from Tuntang diversions will only be considered if reservoir operations studies show definite need to divert the flood peaks. Adequate sediment control facilities have been designed at the Tuntang Diversion structure to reduce sediment entry into the tunnel. Sedimentation from low flow Tuntang diversions will not be a matter of serious concern.

Recommendations

As stated earlier, the estimated sedimentation in the reservoir will not only reduce the live storage capacity of the reservoir but will also

shorten the useful life of the Project that was assumed as 50 years in the original feasibility studies. Obviously, the benefits expected to accrue from the Project will be less and the economics of the whole scheme will be adversely affected. A cursory check on the economic analysis has revealed that considering the benefits of the original feasibility studies, the Project still has a benefit cost ratio of more than one, even ever in operating period of only 25 years. But the actual position will be known only after the entire reservoir operation studies are reviewed and the benefits are evaluated to account for the available reservoir storage capacities and other known factors.

The actions already being taken in this regard and the recommendations of the Consultant are the following:

a. By incorporating the reservoir sedimentation rates in accordance with the latest estimates (Plate A-1), revised reservoir operation studies are being run on the Consultant's computer in the Denver office.

b. The Consultant considers that the reservoir capacity of Jragung could be increased by raising the crest of the Spillway from elevation 125 to 130 and the top of the dam from elevation 130 to 135. The 5 meter increase in the reservoir water surface elevation will add more than 25 MCM of active storage and will nearly offset the reduction in storage caused by sedimentation.

c. The proposed raising of the reservoir water surface elevation to elevation 130.0 is technically feasible and could be achieved by making minor adjustments in the alignment and location of the dam, the diversion works, and the spillway structure. These adjustments and changes will increase the Project cost by about U.S. $ 1.25 million.

d. After reservoir operation studies for both the cases of normal maximum reservoir levels 125.0 and 130.0 have been completed, the Project benefits for each will be evaluated and the economic analysis done. Based on these studies, it will be decided whether

the dam should be built to the proposed raised elevation of 135.0 now in one stage or it should be built now to elevation 130.0 and raised later to elevation 135.0 in a second stage operation.

e. The sediment measurement program which was initiated by the Consultant during the 1977-78 rainy season must be continued through the coming years to collect more data and refine the analysis and the estimate of reservoir sedimentation.

f. The presently conducted reservoir operation studies shall also investigate the optimum elevation for the crest of the power and outlet tunnel intake. Provisions could be made to either raise the intake initially or to replace the lower trashrack panels with concrete stoplogs to prevent entrance of bed load into the power waterways at a later date.

g. The ongoing studies will include determining the additional benefits which could be derived by producing more hydropower from the higher operating water head. The capacities in the reservoir available over the year to store water for irrigation will also be fully reviewed.

6. The preparation of technical specifications and the contract documents progressed on schedule except for the technical specifications for the Base Camp which are expected to be completed by the end of August.

The results of review by the Ministry of the contract documents for the River Diversion Works and the technical specifications of the Access Road have not yet been received by the Consultant. These documents were submitted for review in February and March this year. For the issuance of the bid documents on September 1 as scheduled, it is important that the documents be finalized and printed by the end of August. The Consultant, therefore, requests an early action by the Ministry, otherwise the contract award actions for these works will fall behind the schedule.

The preliminary revised cost estimate for the Project based on the design of works completed as of the end of July has been prepared. The total project cost is now US $ 56,240,000, details of which are appended to this Section of the report.

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

7. The preliminary draft of the report on the Jragung upstream watershed management prepared by the Consultant has been submitted to the Proyek for initial review. After this review is done, and comments from the local authorities are received, the results of study and the recommendations made by the Consultant will be submitted formally to the Ministry for consideration.

8. All the participants of Part II Ministry Personnel Training Program namely, Ir. Gayo, Ir. Mohammad Ali, Ir. Triwasono, Mr. Sihombing, Ir. Sudaryanto and Drs. Sugianto are now in the U.S.A. Ir. Gayo and Drs. Sugianto are scheduled to return at the end of August. The training period of the other four gentlemen will terminate at the end of July. This will conclude both parts of the Ministry Personnel Training Program.

9. It was stated in the previous month's progress report that additional effort was needed to carry out design stage investigations and many revisions to design due to difficult geological and foundation conditions at the damsite. Consequently, some adjustments would have to be made in the provision of dollar cost items for the resident and TDY staff and savings from some of the line items and the Contingency fund would have to be used for the additional manmonths needed in completing the design work. Details of such costs have been worked out for the conditions known as of now and necessary recommendation in this regard has been sent to the Ministry.

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

10. The reimbursable Dollar expenditure up to the end of June amounted to $ 1,008,866.23. As of the end of July, the reimbursable Rupiah expenditure amounted to Rp. 28,625,979.-

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

Report on Reservoir Sedimentation

by Dr. M.A. Stevens
River Regime Specialist
Engineering Consultants, Inc.

Suspended Sediment

As described in a separate report, the suspended sediment load in the Jragung River at the Borangan Bridge (drainage area is 101 square kilometers) was measured during the 1977-78 wet season. A summary of these measurements is given below:

1977-78 Wet Season

Month	Basin Rainfall (mm)	Runoff ($10^6 m^3$)	Suspended Sediment Load (metric tons)
November	168	1.3	17,000
December	302	9.4	386,000
January	361	15.6	175,000
February	392	21.3	514,000
March	194	9.9	33,000
April	164	5.7	57,000
	1,581	63.2	1,182,000

In comparison to the long-term averages, the 1977-78 wet season was the second driest on record. Basin rainfall was 20 percent below normal and runoff was 37 percent below normal.

A study of the suspended sediment discharged during storms throughout the wet season indicated that suspended sediment concentrations are much greater for a given size of storm in November than in later months.

The interpretation is that: at the end of the dry season, the soil is loose and relatively unprotected by vegetation. Thus, the first storms of the wet season erode the landscape to a much greater extent than storms in March, for example.

The suspended sediment loads measured during the 1977-78 wet season were adjusted to reflect the fact that this wet season was very dry. The adjustment was made by assuming that the same average monthly concentrations would be obtained during a normal year and a dry year. The estimate of the average long-term wet season (November through April) suspended sediment load is 1,800,000 tons.

The suspended sediment load for the dry season (May through October) is less than 1 percent, on the average, of that discharged during the wet season, and can be ignored.

Bed Load

The bed load in the Jragung River is almost entirely gravel. The river is not totally alluvial in form as the bed degrades down to bedrock in some reaches during parts of the year.

Calculations of bed load using 5 different bed load formulas, and assuming a plentiful supply of bed material indicate the load is in the range of 50,000 to 300,000 tons per year. These values are but a small fraction of the measured suspended load. A value of 200,000 tons per year is used for the estimate of sediment yield.

Sediment Yield

The total yield of sediment from the Jragung watershed upstream from the Borangan Bridge is the sum of the suspended and bed loads. Our estimate of annual sediment yield is 2,000,000 tons or, approximately 20,000 square kilometers per year. This estimate is based on one year of record of

suspended load.

It must be emphasized that one year of record is not considered a suitable record to estimate long-term sediment yield. In the first place, sediment yield can vary greatly from year to year even when the rainfall and land use remain relatively constant. In these cases, ten to thirty years of record are required to obtain an accurate estimate of average sediment yield. Secondly, changes in land use in the future can affect the sediment yield by a very large factor. A sound watershed management program has been recommended to direct the use of the land so that the sediment yield does not fill the Jragung Reservoir prematurely.

The total sediment yield at the Jragung Damsite is less than at the Borangan Bridge because the drainage area is less at the damsite. Here the drainage area contributing sediment is 88 square kilometers, the area of the watershed minus the surface area of the reservoir. The yield at the damsite is approximately 1,800,000 tons per year. This load represents an average sediment concentration of 15,000 milligrams per liter.

On the basis of measurements made to date, it is estimated that sand and gravel comprise 20 percent of the sediment yield. The rest is silt and clay.

Reservoir Sedimentation

As the tributary flows enter the reservoir, the gradual decrease in velocity results in the deposition of sediment transported by the rivers. In general, the longer the water remains in the reservoir before being passed on downstream, the more sediment is deposited. The factors influencing the mode of deposition are the reservoir shape, sediment yield to reservoir volume ratio, sediment characteristics and method of reservoir operation.

The major engineering considerations for reservoir sedimentation are:

1. Reduction of active water storage capacity.
2. Elevation to which sediment accumulates at the dam in a given period of time.
3. Deposits of sediment in the upper reaches of the reservoir.

Reservoir Characteristics

As a result of reservoir operation and project optimization studies, the following values have been assigned for the Jragung Reservoir:

Full reservoir supply level, 125 meters
Intake crest level, 85 meters
Depth of water at base of dam, 60 meters

The initial area and capacity are given in the table below.

The reservoir level durations obtained for the simulation period indicate that the reservoir will be drawn down to its minimum level many years. Thus, most of the sediment will be deposited in the conservation pool below the full supply level.

Reservoir Area and Capacity of Proposed Jragung Reservoir

Elevation (m + S.P.)	Surface Area (ha)	Volume ($10^6 m^3$)
65	.05	.001
70	7.54	.1
75	34.5	1.1
80	72.5	3.6
85	117.5	8.4
90	165	15.4
95	214	24.9

Elevation (m + S.P.)	Surface Area (ha)	Volume ($10^6 m^3$)
100	267	36.9
105	320	51.6
110	376	69.0
115	438	89.3
120	510	113
125	590	141

The Jragung Reservoir is classified as hill type. For this type, more of the incoming sediment is deposited in the lower portion of the reservoir than in the upper portion.

Density of Deposits

Based on measurements made of deltaic sediment at the mouth of the Cimanuk River, it is estimated that the Jragung Reservoir deposits will have an average consolidated dry unit weight of 1.1 tons per cubic meter.

Trap Efficiency

Because most of the sediment load in the Jragung River is very fine particles of silt and clay, it is estimated that, initially, approximately 4 percent of the fine sediment will pass through the reservoir. Then, in the first years of operation, 96 percent of the annual sediment load will remain in the reservoir. This value is called the trap efficiency of the reservoir. As the reservoir fills with sediment, the trap efficiency decreases. For this study, Brune's efficiency relation was employed.

Volume of Sediment

If there is no diversion of water from the Tuntang River into the Jragung Reservoir, then, based on the measurements made during the 1977-78 wet season, the supply of sediment to the reservoir would be, on the average,

1,800,000 tons per year. This is 1,640,000 cubic meters per year. The volume deposited in the reservoir is shown in Plate A-1. For example, the amount of sediment deposited in the reservoir during the 25 years of operation is estimated to be nearly 40 x 10^6 cubic meters. This represents a loss of capacity of approximately 1 percent per year.

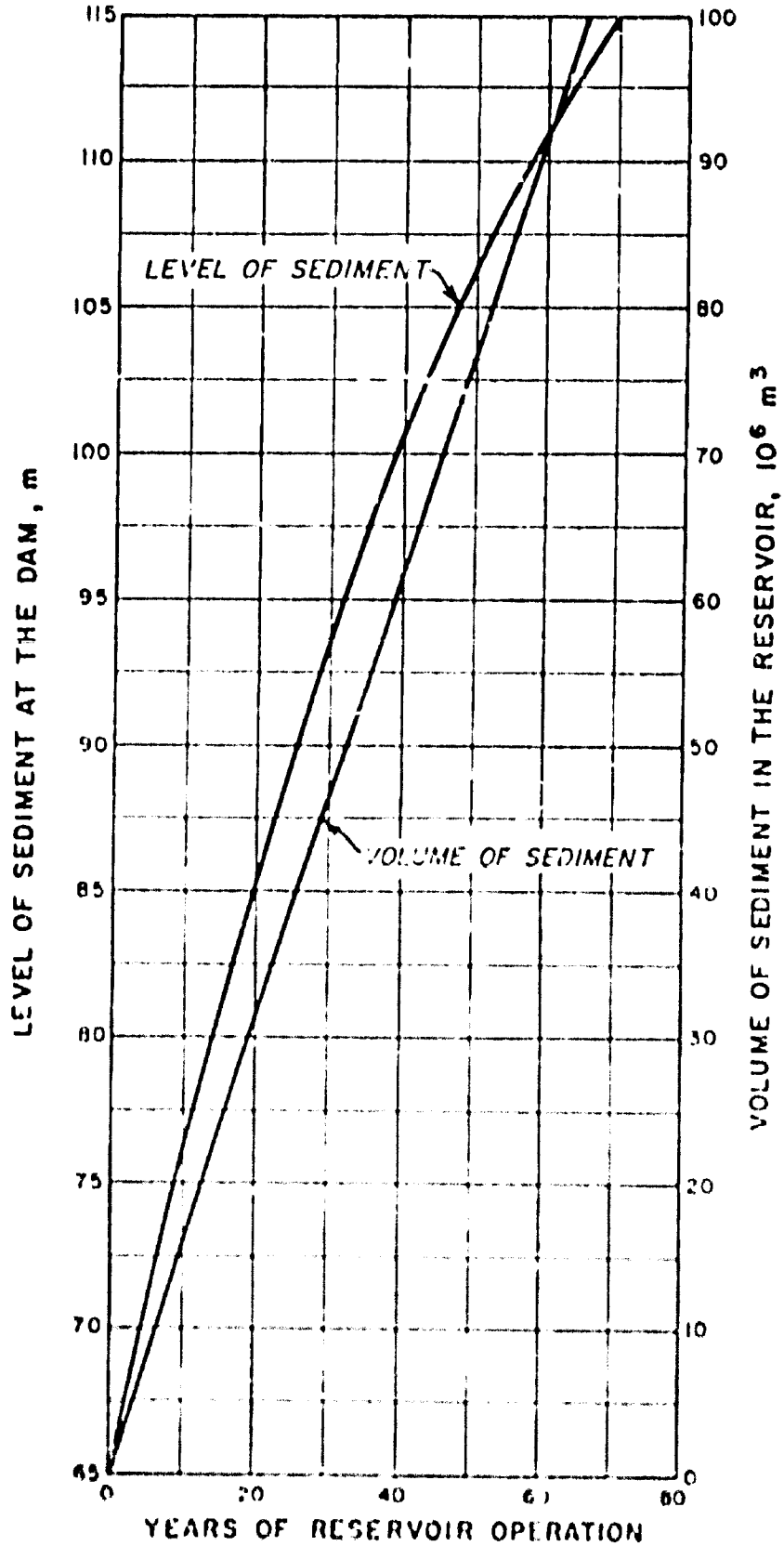
Level of Sediment

The estimates of the level of sediment at the face of the dam are also shown in Plate A-1. The curve indicates that the sediment will reach the intake crest level of Elevation 85.0 meters in approximately 20 years. Thereafter, erosion due to sediment passing through the penstock and turbines could become excessive. There will be increased maintenance costs at the power plant and in the irrigation system downstream.

Tuntang Sediment

The water brought into the Jragung Reservoir from the Tuntang River through the transbasin diversion tunnel will carry with it sediment. The amount of sediment depends on whether it is low-flow or flood water being diverted, and on the amount of water being diverted.

It is estimated that the additional sediment load on the reservoir resulting from the transbasin diversion will be approximately 50,000 tons per year if only low-flows are diverted. If only flood peaks are diverted the additional load could be as large as 500,000 tons per year. This amount of additional sediment cannot be accomodated in the Jragung Reservoir without a large decrease in project benefits.



JRAGUNG DAM PROJECT

RESERVOIR SEDIMENTATION RATES

SUMMARY OF INITIAL ENGINEER'S ESTIMATE

July 1978

A summary of the initial Engineer's Estimate for all features of the Jragung Dam Project is given below:

Item	Domestic Cost (Thousand Rupiah)	Foreign Cost (U.S. $)	Total Cost (Equiv. U.S. $)*
River Diversion Works	303,755	662,624	1,394,564
Access Roads and Bridge	266,422	-	641,980
Base Camp	518,750	-	1,250,000
Power Plant	489,701	4,660,699	5,840,701
Power and Irrigation Tunnel and Intake Structure	218,136	574,586	1,100,215
Spillway	1,640,530	2,039,195	5,992,280
Dam Embankment	6,049,053	14,337,134	28,913,165
Tuntang Diversion Works	242,888	520,375	1,105,647
			46,238,552
D/S Cofferdam and Care of River	51,875	125,000	250,000
Reservoir Land Cost	352,750	-	850,000
Subtotal Direct Features	10,133,860	22,919,613	47,338,552
Contingencies (10%)	1,013,386	2,291,961	4,733,855
Total Construction Cost	11,147,246	25,211,574	52,072,407
Engineering and Administration (8%)	891,780	2,016,926	4,165,793
	12,039,026	27,228,500	56,238,200

* Rupiah conversion rate, U.S. $ 1.00 = Rp. 415.00

SECTION II
PERSONNEL

A. EXPATRIATE

1. At Semarang on June 30, 1978

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

2. Arrived in Semarang during July, 1978

M.K. Kuehl	Chief Engineer and Vice President
S.F. Hillis	Materials and Dam Design Engineer

3. Departed from Semarang during July, 1978

None

4. At Semarang on August 1, 1978

Saeed A. Rana	Resident Manager
Carlos A. Borinelli	Materials and Dam Engineer
Robert G. McLaughlin	Structural Engineer
Jeffery P. Frey	Specification Engineer
Glen Trowbridge	Principal Design Engineer
M.K. Kuehl	Chief Engineer and Vice President
S.F. Hillis	Materials and Dam Design Engineer

B. COUNTERPART

1. Assigned Full Time as of July 31, 1978

Mr. Maryono Bony M.E.	
Ir. Wisnu Suharto	
Ir. Sudaryanto HS	
Drs. Redjiono	
Triyono B.E.	(Assistant Counterpart)
Sutardjo B.E.	(Assistant Counterpart)
Ir. Haryono Wardi	
Ir. Sudarno	
Ir. Supriyc	
Ir. Rustiyanti	(Assistant Counterpart)
Eddy Arifin	(Assistant Counterpart)
Buang Sukardjono	(Assistant Counterpart)
Ir. Muhammad Ali	
Ir. Tri Hardono	
Djasriansyah Aht	
Ir. Diah Kusumawati	
Harris BME	
Ir. Bambang Sujono	
Nursalim B.Sc	

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 July, 1978

Mrs. Tan Ik Goen	Interpreter I
Miss Dra. Djoa Sioe Lan	Interpreter II
Mrs. Sri Moenasih Soetikno	Secretary
Miss Dra. L. Murtianingsih	Secretary
Miss Sri Anon	Clerk/Typist
Mr. Suhandi	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
July 4-5, 1978	Bandung	Spillway Model Test Runs and Discussion	Ir. Memed	DPMA
			Ir. Bambang, Mr. Bony Ir. Wisnu	Jratunseluna
			Rana Trowbridge	ECI
July 11, 1978	Jakarta	Discussion Project Matters	Mr. Nur	DGWRD
			Rana	ECI
July 25-26, 1978	Semarang	Dam Design Review Meetings	M.K. Kuehl S.F. Hillis S.A. Rana C.A. Borinelli	ECI
July 27-28, 1978	Damsite	Field Inspections	M.K. Kuehl S.F. Hillis S.A. Rana C.A. Borinelli J.E. Pyne	ECI
July 29-31, 1978	Semarang	Dam Design Review Meetings	M.K. Kuehl S.F. Hillis S.A. Rana C.A. Borinelli J.E. Pyne	ECI

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 decription of the work involved and the progress achieved during the period under report are given in the following.

A. Structural Design

The progress of design work on the appurtenant structures for the Jragung Dam for the period under report is as follows:

Spillway

Final detail design work on this structure is in progress. All of the main design work is complete save for the model testing program in Bandung; this work continues on the stilling area, and determination of the most economical arrangement is sought. A flip bucket is presently being considered at the end of the spillway from where the jet of flow will plunge into a pre-excavated pool for dissipation of energy. In the meantime the final design drawings for the other portions of the spillway are being drafted for the contract documents. There are six design drawings and two geology drawings connected with this structure.

Diversion Tunnel

Construction drawings are now being prepared for the diversion tunnel. Excavation layouts, concrete layouts, and reinforcement layouts are presently being worked on by the design engineer and two counterparts. Drafting on some drawings has begun. Approximately ten percent of this work is complete. Much design time will be concentrated on finalizing these construction drawings in the next period.

Tuntang Diversion Works

During the period under report, the final design drawings were completed and drafting started. The structural design includes layout of the inlet works (which is comprised of a 2.5 meter high weir, a sluice way and entrance chutes), the cut and cover portions (approximately 60 meters), the tunnel (550 meters in length) and the outlet works. These are presently being reviewed by the Chief Engineer and it is hoped that after making necessary corrections, the drawings will be issued for review by the Ministry and U.S. AID within the next 4 to 6 weeks.

Power and Irrigation

After making a change in the draft tube from a straight conical shape to an elbow the design drawings are now complete. These drawings are now ready for the construction drawing phase, which according to the work schedule will not begin until early October.

B. Dam Design

Geotechnical Damsite Subsurface Exploration Program

The "Subsurface Exploration Program" has been completed. The last boring drilled was EC-49D located in the spillway area. Three more piezometers have been installed one each in borings EC-46D, EC-47D, and EC-49D. In addition the water pressure test equipment was calibrated.

Foundation Material Testing

Core samples and Pitcher samples for testing were selected from the last boring drilled. Testing programs and instructions were prepared. They were sent with the materials, to the DPMA and DPMJ laboratories in Bandung. The main testing to be run are unconfined compression, consolidation, swelling-shrinkage and basic testing. In addition, foundation materials testing is continuing in Jragung Proyek Laboratory.

Concrete Material Testing and Concrete Mix Design

The following materials were sent to the DPMJ Construction Laboratory in Bandung:

400 kilograms basalt, 150 kilograms of sand, 40 kilograms of "Nusantara" portland cement and 20 liters of Jragung river water.

The laboratory will perform complete concrete mix designs for the Jragung Project, with all the required back up testing.

Borrow Area Drilling Subsurface Exploration Program

Twelve borings have been drilled in Borrow Area VII, Candirejo Borrow Pit.

Design

a) Dike Design. A second alternative for the dike was designed.
b) Reservoir Rim. The reservoir rim topographic cross sections every 25 meters were drawn for the left side area that required to be checked. The reservoir rim condition was analized and a low area on the downstream side will have to be backfilled using claystone and sandstone from the spillway headworks excavation.
c) Drainage Gallery. Extended cross sections of the left and right ridges, every 25 meters apart are being prepared. The sandstone beds are being drawn. This information will allow us to define properly the location of the drainage gallery and the areas where it is required.
d) Dam Foundation and Ridges Permeability. Water pressure tests are being computed. Values of k are determined in centimeters per second and lugeons. Cross sections are being prepared along and across the embankment foundation and left ridges.
e) Review of Design. The design is being reviewed by Mr. Max Kuehl, ECI Vice President and Chief Engineer and Mr. Sidney Hillis.

C. Specifications

During the month of July, an initial Engineer's Estimate was prepared for the Jragung Dam Project. The estimate includes all features of the dam, power plant, spillway, diversion works, Tuntang River diversion facilities, access roads and base camp. The quantities computed for the various work items are based on the latest designs and drawings available for each of the Project features. The design of the power plant, spillway, diversion works and Tuntang River diversion are nearly finalized and no significant difference in quantities is anticipated from those used in this initial estimate. Quantities and cost figures used for the dam embankment and access roads and base camp are as yet preliminary. Any adjustment which may later be required will be incorporated prior to the final Engineer's Estimate to be issued in November 1978. A summary of the initial Engineer's Estimate is appended to Section I of this report and will be presented to the Ministry and other agencies during the design review meetings scheduled to be held in August.

The Electrical Design Criteria and the Specifications of Electrical Equipment for the Jragung Power Plant were submitted, in draft form, to the Proyek, PROSIDA, Director Irrigation and U.S. AID in July 10, 1978. This early submittal of power plant electrical documents is intended to allow as much time as possible for review of these documents by the concerned agencies.

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
Submitted 130 copies		Final	June 1, 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
12. Electrical Design Criteria and Specifications of Electrical Equipment		Draft	July 10, 1978

SECTION VI
PROBLEM AREAS

A perusal of Section V would show that reports serial number 9 - 12 were submitted by the Consultant for review during the period March through July. These have not yet been reviewed by the Ministry and therefore cannot be finalized.

The Consultant had recommended in the monthly progress report for January 1978 that a review committee, comprising representatives drawn from the offices of the DGWRD, U.S. AID, Proyek and the Consultant, should be designated. This committee should be charged with the responsibility of reviewing draft of various reports and documents prepared by the Consultant. The reviewing action would thus be expedited and the issuance of the final reports and documents on schedule would be possible.

The proposed review committee has not yet been formed. The completion of some of the documents especially those relating to the River Diversion Works and the Access Road has already slipped behind the schedule. The Consultant requests an immediate action in this regard.

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 June, 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. 28,625,979.- was spent. This represents 40.45 percent of the total Rupiah reimbursable costs provided in the Contract. The corresponding percentage of the contract elapsed is 68.8.

The summary of the Rupiah budget and costs is given in Annexure V.

Annexure I

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 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	16.5
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	15.9
4. Carlos Borinelli	Permanent Resident U.S.A.	Materials Dam Engineer	June 4,. 1977		18	13.9
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	7.45
7. Glen Trowbridge	U.S.A.	Design Engineer	February 7, 1978	July 20, 1978	18	5.40
8. James Hoge	U.S.A.	Design Engineer	March 23, 1978	June 20, 1978		3.00

Annexure I
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 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		1.83
10. Cecil M. Langford	U.S.A.	Project Director	July 8, 1978	July 14, 1978		
			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		0.73
12. Paul Otter	U.S.A.	Project Engineer	July 25, 1978			
			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

Monthly Progress Report No. 17
Period: Ending July, 1978

Assignment of Resident and TDY Staff

NAME	NATIONALITY	JOB TITLE	PROJECT ASSIGNMENT		MANMONTHS IN INDONESIA	
			ARRIVAL	DEPARTURE	SCHEDULED	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. Lawrence 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		1.44
			July 23, 1978			

Annexure I
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 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.

Monthly Progress Report No. 17
Period: Ending July, 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		16.5
2. Ir. Bambang Soedjono	1. Project Management 2. Project Planning	November 1, 1975	March 16, 1977		16.5
3. Maryono Bony M.E.	1. Project Planning 2. Dam Design Engineer	November 1, 1975	March 16, 1977		16.5
4. Ir. Wisnu Suharto	Hydraulic Structures	November 1, 1975	March 16, 1977		16.5
5. Ir. Soedaryanto Hs.	Geologist	January 1, 1977	March 16, 1977		16.5
6. Drs. Redjiono	Hydrologist	January 1, 1977	March 16, 1977		16.5
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		16.5
9. Ir. Muhammad Ali	1. Dam Design Engineer 2. Soil Mechanics/Material	January 1, 1976	March 16, 1977		16.5

Annexure II
(Continued)

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 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		16.5
11. Djasriansyah Aht	Electrical Engineer	March 16, 1977	March 16, 1977		16.5
12. Ir. Hartopo	Hydro Power Engineer	March 16, 1977	March 16, 1977		16.5
13. Harris BME	Mechanical Engineer	March 16, 1977	March 16, 1977		16.5
14. Ir. Supriyo	Specification Engineer	September 16, 1977	September 16, 1977		10.5
Assistant Counterpart					
1. Triyono BE	Geologist	June 1, 1976	March 16, 1977		16.5
2. Sutardjo BE	Geologist	December 1, 1976	March 16, 1977		16.5
3. Bambang Gunadi B.Sc	Hydrologist	January 1, 1976	March 16, 1977	November 1, 1977	16.5

Annexure II
(Continued)

JRAGUNG DAM PROJECT

Engineering Consultants, Inc.

Monthly Progress Report No. 17
Period: Ending July, 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		16.5
5. Ir. Pustiyanti	Hydraulics Structures	March 16, 1977	March 16, 1977		16.5
6. Buang Sukardjono	Hydrologist	January 1, 1977	March 16, 1977		16.5
7. Edy Arifin Aht	Civil Structures	April 1, 1976	March 16, 1977		16.5
8. Ir. Diah Kusumawati	Hydro Power Engineer	December 1, 1976	February 15, 1978		4.5
Draftsman					
1. Mukiyat	Draftsman	March 1, 1976	March 16, 1977		16.5
2. S.V. Barleyanto	Draftsman	November 1, 1975	March 16, 1977		16.5
3. Bambang Prayitno	Draftsman	February 1, 1976	March 16, 1977		16.5
4. Aris Mudjianto	Draftsman	December 16, 1977	December 16, 1977		16.5

Annexure III

Engineering Consultants, Inc.

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 1978

Direct-hire Indonesian Personnel

NAME	POSITION	PERIOD OF SERVICE		MAN/WOMAN MONTHS	
		DATE STARTED	DATE ENDED	PROVIDED	SPENT
1. Mrs. Tan Di Goen	Interpreter/Translator I	March 16, 1977		24	16.5
2. Miss Dra. Djoa Sioe Lan	Interpreter/Translator II	May 16, 1977		24	14.5
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			15.0
5. Mrs. Sri Moenasih Soetikno	Clerk/Typist	March 16, 1977	July 31, 1977	24	4.5
	Secretary	August 1,		19.5	12.5
6. Miss Sri Anon	Clerk/Typist	March 16, 1977		24	16.5
7. Mr. Suhandi	Messenger	March 16, 1977		24	16.5

Annexure IV

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending June, 1978

Summary of U.S. Dollar Expenditures

COST ITEMS	AMOUNT AVAILABLE US $	EXPENDITURE PRIOR	EXPENDITURE DURING PERIOD REPORTED	EXPENDITURE UP TO DATE	PERCENTAGE EXPENDITURE	PERCENTAGE TIME ELAPSED
1. Resident Staff Base Salaries	181,360.00	105,804.38				64.6
2. Overseas Differential	45,340.00	26,419.43				
3. Overhead Resident Staff (75% base salaries)	136,020.00	79,461.68				
4. TDY & Denver Staff Salaries Including Overseas Differential	215,250.00	193,574.34				
5. Overhead TDY & Denver (95% base salaries)	196,365.00	183,895.59	35,658.66	624,814.08	80.7	
6. Fixed Fee	138,000.00	80,500.-	5,175.-	85,675.-	62.10	
7. Travel and Per Diem	73,120.00	39,711.87				
8. Transportation (Relocation)	12,000.00	11,150.-				
9. Other Direct Costs & Miscellaneous Expenses	53,800.00	41,156.84				

Annexure IV

Continued

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending June, 1978

COST ITEMS	AMOUNT AVAILABLE US $	EXPENDITURE PRIOR	EXPENDITURE DURING PERIOD REPORTED	EXPENDITURE UP TO DATE	PERCENTAGE EXPENDITURE	PERCENTAGE TIME ELAPSED
10. Ministry Personnel	60,000.00	30,514.62)				
11. Special Purchases	190,000.00	140,530.89)	19,343.18	282,407.40	72.6	64.6
12. Contingencies	70,000.00	-	15,969.75	15,969.75	22.81	
Total Dollar Costs	1,371,255.00	932,719.64	76,146.59	1,008,866.23	73.57	64.6

Annexure V

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 1978

Summary of Rupiah Expenses

COST ITEMS	BUDGET ALLOCATION (Rp.)	EXPENDITURE PRIOR	EXPENDITURE PERIOD REPORTED	EXPENDITURE TO DATE	PERCENTAGE EXPENDITURE	PERCENTAGE TIME ELAPSED
I. PER DIEM						
Jakarta	3,300,000.-	1,774,000	41,250	1,815,250	55.01	68.8
Bandung & Semarang	18,000,000.-	5,210,000	335,000	5,545,000	30.81	
Other	1,800,000,-	615,650	12,000	627,650	34.87	
Family	230,000.-	80,000	-	80,000	40.00	
Sub Total	23,330,000.-	7,679,650	388,250	8,067,900	34.58	
II. OTHER DIRECT COSTS						
Cable & Telephone	2,000,000.-	978,889	76,920	1,055,809	52.79	
Postage	2,000,000.-	395,120	25,545	420,665	21.03	
Reproduction & Printing	15,000,000.-	4,168,640	504,594	4,673,234	31.15	
In Country Transportation	2,000,000.-	1,639,751	74,825	1,714,576	85.73	
Supplies & Materials	6,000,000.-	1,173,605	27,000	1,200,605	20.01	
Miscellaneous	7,000,000.-	2,080,567	2,785,437	4,866,004	69.51	
Sub Total	34,000,000.-	10,436,572	3,494,321	13,930,893	40.97	68.8

Annexure V

Continued

JRAGUNG DAM PROJECT

Monthly Progress Report No. 17
Period: Ending July, 1978

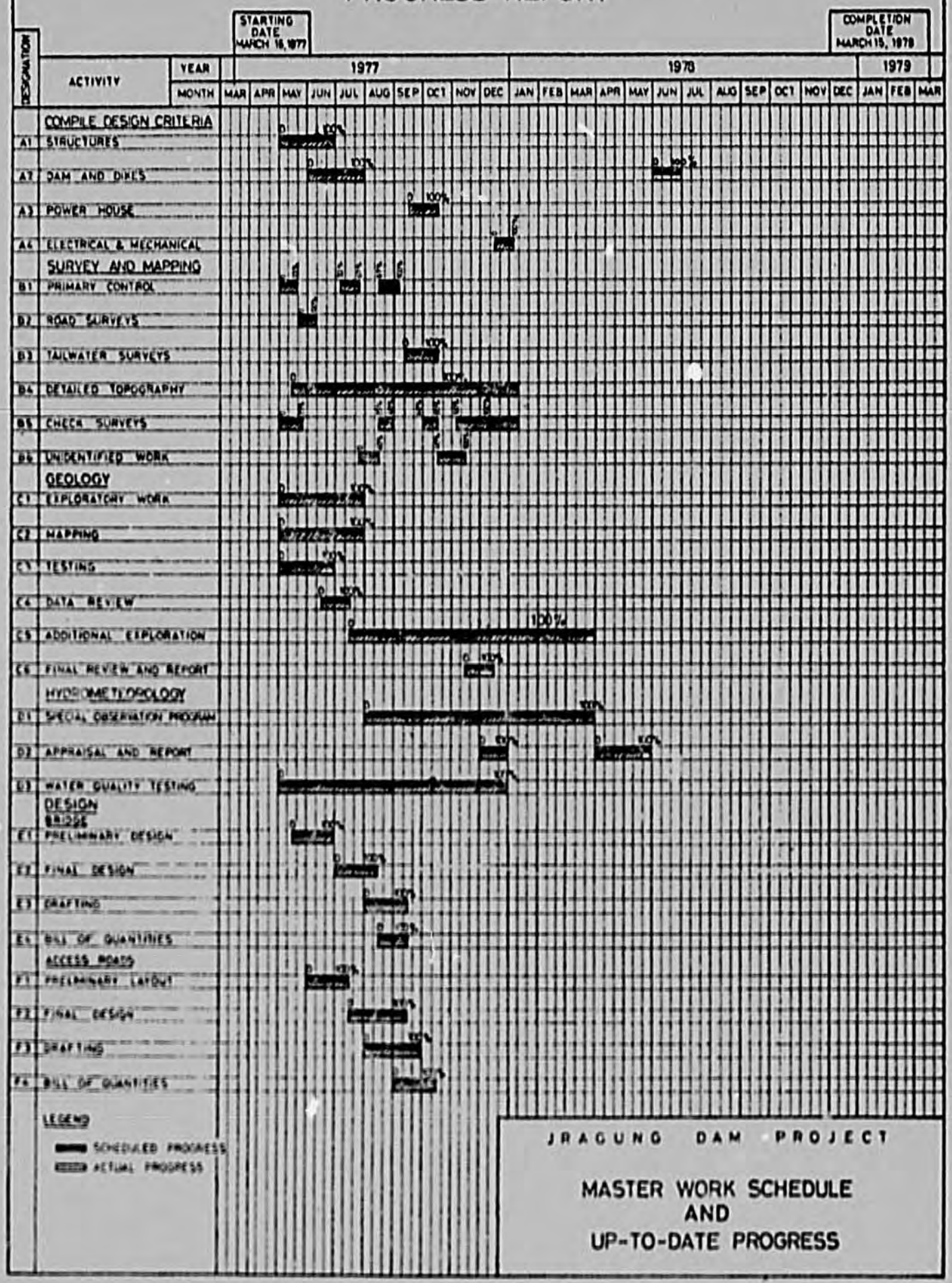
Summary of Rupiah Expenses

COST ITEMS	BUDGET ALLOCATION (Rp.)	EXPENDITURE PRIOR	EXPENDITURE PERIOD REPORTED	EXPENDITURE TO DATE	PERCENTAGE EXPENDITURE	PERCENTAGE TIME ELAPSED
III. ADMINISTRATIVE PERSONNEL						
Secretaries	3,610,500.-	2,024,996	152,000	2,176,996	60.30	68.8
Interpreters	6,017,500.-	2,660,936	201,500	2,862,436	45.57	
Clerks/Typists	2,402,000.-	1,330,092	71,600	1,401,692	58.36	
Messenger	373,500.-	172,962	13,100	186,062	49.82	
Severance Pay	1,037,500.-	-	-	-	-	
Sub Total	13,446,000.-	6,188,986	438,200	6,627,186	49.29	
Grand Total	70,776,000.-	24,305,208	4,320,771	28,625,979	40.45	68.8

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 Reimbursement	=	28,625,979
Balance	=	7,059,402

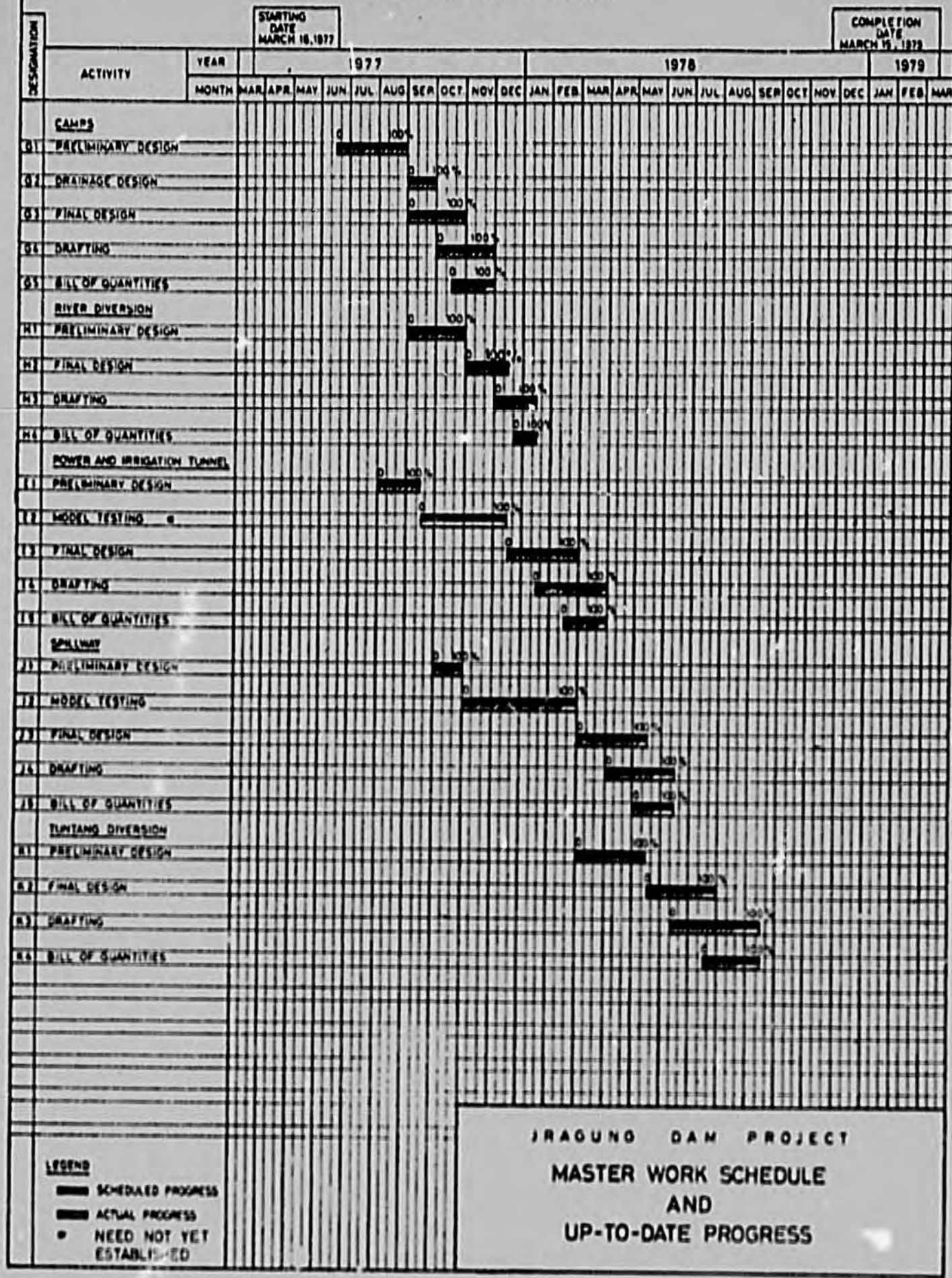
JRAGUNG DAM PROJECT
PROGRESS REPORT



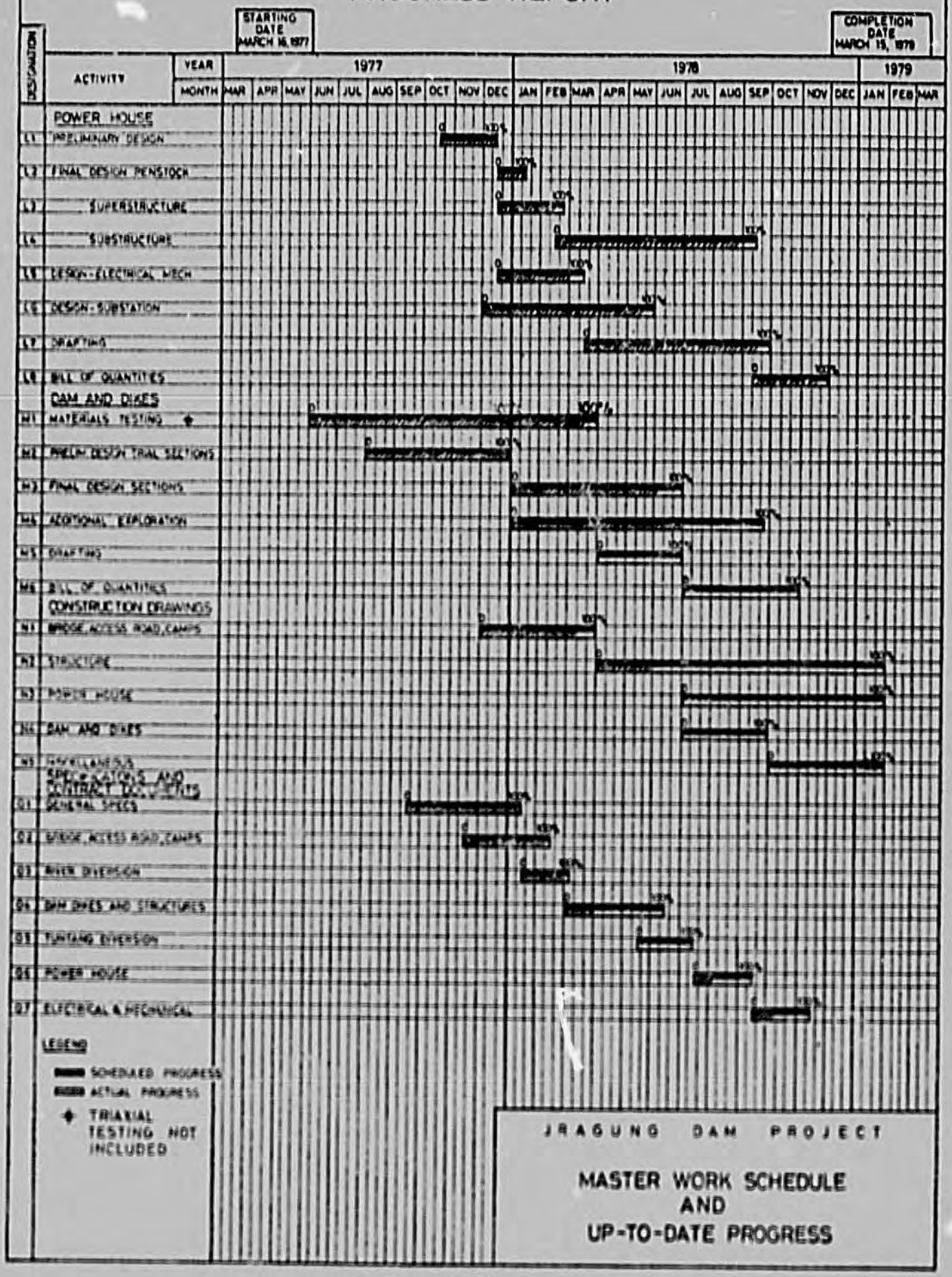
JRAGUNG DAM PROJECT

MASTER WORK SCHEDULE
AND
UP-TO-DATE PROGRESS

JRAGUNG DAM PROJECT
PROGRESS REPORT



JRAGUNG DAM PROJECT
PROGRESS REPORT



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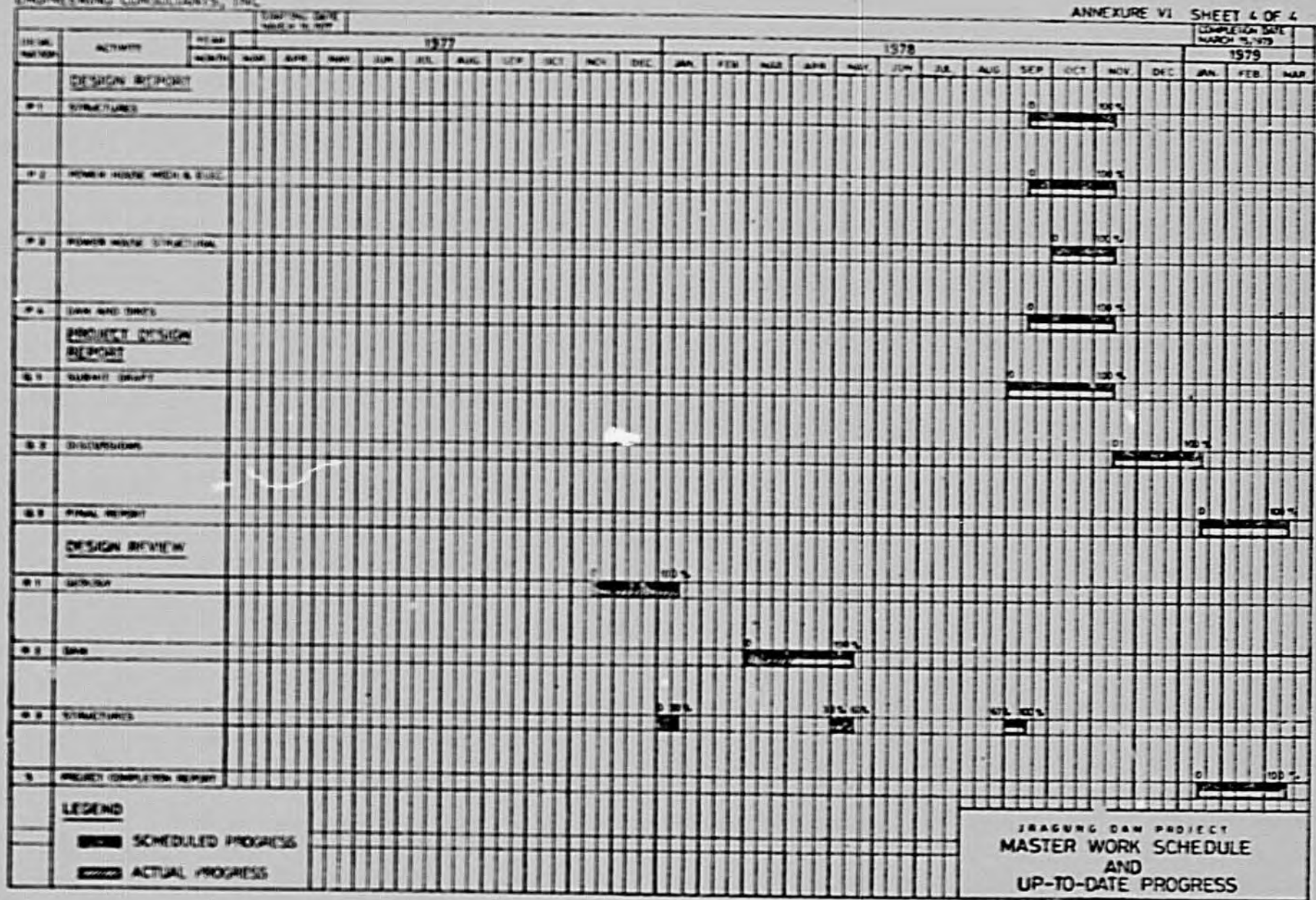
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