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**REPUBLIC OF INDONESIA  
MINISTRY OF PUBLIC WORKS  
DIRECTORATE GENERAL CIPTA KARYA  
DIRECTORATE OF SANITARY ENGINEERING**

**CONTRACT FOR CONSULTANT SERVICES  
FOR  
SURAKARTA WATER SYSTEM  
NO. 01/WS-S/1/AID/78**

**MONTHLY PROGRESS**

**REPORT NO. 32  
MAY 1981**

**BURNS & McDONNELL ENGINEERING COMPANY.  
AND  
TRANS-ASIA ENGINEERING ASSOCIATES, INC.  
A JOINT VENTURE**



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A JOINT VENTURE**

Architect - Engineers      A JOINT VENTURE      Consultants - Planners

Please Reply to: Kotak Pos 105  
Surakarta

132/BM/TAE/SKA/81  
05 June 1981

Mr. Soesanto Morthodiningrat, Director,  
Directorate of Sanitary Engineering  
Directorate General Cipta Karya  
Jl. Pattimura No. 20  
Jakarta Selatan.

Subject : Contract for the Consultant Services for  
Surakarta Water System No. 01/WS-S/I/AID/78  
dated 28 October 1978 as Amended 08 November 1980

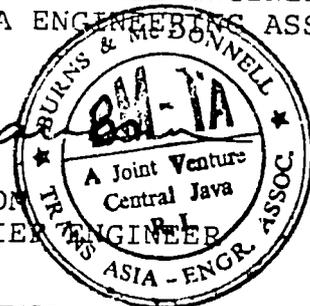
Dear Sir :

In accordance with Section 4.12 and Appendix I of the  
subject Contract, we are pleased to submit fifteen  
copies of the Monthly Report No. 32 for the month of  
May 1981.

We trust that this report will meet with your approval.

Very truly yours,

BURNS & MC DONNELL ENGINEERING CO.  
TRANS-ASIA ENGINEERING ASSOC., INC.

  
  
J.F. BAUCORN  
ACTING CHIEF ENGINEER

cc	: CJWSP	Semarang	(10 copies)
	USAID	Jakarta	( 8 copies)
	BM/TAE	Jakarta	( 2 copies)
	Burns & Mc Donnell	Kansas City	( 1 copy )
	CJWSP I	Surakarta	( 1 copy )
	SWE	Surakarta	( 1 copy )
	Mayor of Surakarta	Surakarta	( 1 copy )
	File		

Encl.

JFB/yp.

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SECTION I  
GENERAL

I-A NARRATIVE SUMMARY

With this being the final full month for the Distribution Design Specialist, high priority was placed on support of his activities by the Consultant. The result has been the realization of tender Documents completed for the final three (3) phases of the expanded distribution system for the Surakarta Water Supply Project. Contract Article II, Paragraph 2.04, as amended 08 November 1980 called for the design of a distribution system serving 20 Kampunges whereas (see Monthly Progress Report No. 23) a priority list was established 06 August 1980 for the design to include up to 22 Kelurahan if time permitted. The Consultant is pleased to report all 22 Kelurahan are included in the three phases of work ready for tender plus the designed work which was constructed during the Project 1980/1981 fiscal year. The Consultant secured the approval of the Chief of Design Water Supply Projects of Cipta Karya for the three phases of distribution design drawings the last week in May then proceeded to procure the required quantity of sets of drawings for tender purposes.

The Consultant provided a list of priorities for the Surakarta Water Enterprise to assist them in planning for the coming intensive leak survey. The SWE has followed the listed priorities closely and made repairs to the  $\phi$  300 mm secondary loop piping installed by the Project in 1977 through 1979. Over eleven (11) kilometers of that line was flushed, chemically cleaned and put into operation after some twenty repairs were completed by SWE. Work was begun to connect Line "A" and Line "Q" to the old transmission main in Jl. Slamet Riyadi. It will be sometime in June before the two

connections are finished. At that time final flushing and cleaning may be done and the loop system finally closed to make it operational. A field lathe for the asbestos cement pipe was borrowed by the Consultant from the Project office in Yogyakarta in order to shape the cut ends of the  $\phi$  300 mm pipe at the Line "A" connection. Contractor P.T. Tukadmas agreed to make the Line "Q" connection while Contractor P.T. Sarana Alam is making the Line "A" tie-in.

The Consultant continued to receive laboratory implements for the Surakarta Water Enterprise. On 15 May 1981 the replacement shipment was received from Clow Corporation. Then the Kennedy valves order arrived at the Port of Semarang 20 May and was off loaded on 23 May 1981. Efforts are being made to clear both the Rohan Co. replacement shipment and the Kennedy valve shipment. A complete material transfer list was provided on 15 May 1981 by the Consultant to the Project. They, in turn are making arrangements to transfer all surplus offshore procurement and installed systems to the Surakarta Water Enterprise. Award was made to the two suppliers for pipe and fittings to complete the work by Cipta Karya on 25 May 1981. The proposals called for delivery to be made not later than ninety (90) days following award. Thus, it is anticipated all materials will be on site before the end of August 1981 provided there is no problem with Customs clearance of the Kennedy valves.

The Consultant began assembling the O. & M Manual for the expanded system of Surakarta Water Enterprise. It is anticipated the manual will be provided to SWE during the month of June 1981 to assist them as they start the leak survey, pipe repair and replacement program.

At the end of this reporting period, a meeting was held in the offices of U.S.A.I.D. in Jakarta for the purpose of an evaluation review of the Project. The result has been agreed to by the parties which has extended the loan period for one year. It is anticipated the Consultant's Contract will also be extended to accommodate the Project's implementation schedule. No additional funds to or from the loan is involved, only reallocation.

#### I-B PROBLEMS AND PROPOSED SOLUTIONS.

As of the close of this reporting period, the replacement shipment from The Rohan Company had still not been cleared by Customs. It is not known exactly what the problem is as the import agent is handling the paperwork. Possibly another letter of guarantee will be required from the Project to expedite release of the shipment.

A similar situation may hold release of the valves which have just arrived at Semarang. Necessary paperwork has been forwarded by Cipta Karya, it is understood, to include the valve order in the importation tax exemption status with the original off-shore procurement.

Receipt of locally purchased PVC and AC piping materials the last of August 1981 will cause construction activities to be stacked into the same time period rather than staggered as originally planned. This will put a severe demand upon the inspection staff of the Consultant. The Project offered to the Consultant free of charge two men and two motor cycles to boost the inspection staff strength (see Appendix VI).

SECTION II  
ADMINISTRATION

II-A SUBMISSIONS/APPROVALS.

Consultant's Invoice No. 32 and Invoice No. 33 for April and May 1981 U.S. Dollar reimbursible expenses was submitted to Cipta Karya on 01 May and on 23 May 1981. Both Invoices were approved by Cipta Karya within the month.

Consultant's Rupiah Invoice No. 15 and 16 submitted to Cipta Karya on 15 April 1981 was approved on 18 April 1981 and payment was received on 15 May 1981.

These submittals are in accordance with the Contract Appendix II, page II-15.

II-B CONTRACT STATUS.

Appendix I shows the continuation of Consultant's effort in man-months from the beginning of the Contract.

Appendix II shows the billings of approved expenditures to date.

II-C PERSONNEL.

The Surakarta Office personnel in May were as follows :

E x p a t r i a t e s

- James F. Baucom, Acting Chief Engineer  
arrived 26 September 1979
  
- Albert G. Ringler, O & M Specialist  
arrived 09 May 1980
  
- Jerry E. Bragdon, Water Distribution Engineer  
arrived 08 June 1980

Indonesian Professional and Technical :

- Mohamad Khalil, Material Coordinator  
arrived 09 October 1978
  
- Mohamad Syarif Lembah, Construction Supervisor  
arrived 01 May 1979
  
- Gatot Bramono, Inspector  
arrived 19 November 1979
  
- Soewanto, Inspector  
arrived 11 March 1980
  
- Suyono, Inspector  
arrived 17 November 1980, completed assignment  
31 May 1981

- Susena, Draftsman.  
arrived 20 October 1980
- Sumardi, Translator  
hired 24 November 1980, Terminated Effective  
23 May 1981
- Sri Sukanti, Accountant  
hired 03 January 1981

Administrative :

- Dradjat Atmardjo, Office Manager  
arrived 02 October 1978
- Maryani Pudyastuti, Secretary  
hired 17 November 1980
- Endang Tri Siwi,  
hired 01 October 1979, Resigned Effective  
31 May 1981
- Rubiyo, Clerk  
hired 01 November 1979
- Chaiz Hidayati, Administrative Clerk  
hired 08 October 1979
- Pamudji Rahardjo, Driver  
hired 02 October 1978
- Sudarno, Driver  
hired 02 October 1979
- Sutrisno, Driver  
hired 02 April 1979

- Puranto, Driver  
hired 17 October 1980
  
- Kentut Aryanto, Driver  
hired 07 January 1981
  
- Mulyatmono, Watchman/Labor  
hired 09 October 1978
  
- Memed Barmawi, Copy Machine Operator/Labor  
hired 23 June 1980, Terminated Effective  
31 May 1981
  
- Tukino, Office Boy/Labor  
hired 10 November 1980

SECTION III  
ENGINEERING AND MANAGEMENT

III-A OFF-SHORE PURCHASED MATERIALS	US.\$ COMMITTED	% PAID (ASSUMED)	US. \$ BAL. DUE
III-A-1 Direct Cipta Karya Procurement Contract			
III-A-1-1 American Cast Iron Pipe Co. Ductile Iron Pipe & Fittings Contract certified complete 01/02/80	2,595,511.60	100	- 0 -
III-A-1-2 Colcorindo Raya Flow Metering Equipment Contract certified complete 07/04/80	3,462.00	100	- 0 -
III-A-1-3 Rohan Corporation Water Meters, Repairs Parts- Tools & Equipment Replacement Parts Awaiting Port Clearance since 23/10/80	669,438.43	90	± 66,943.84
III-A-1-4 Clow Corporation Castings, Autho Air Vents & Valves. Replacement Parts Awaiting Port Clearance since 01/09/80	125,912.00	100	- 0 -
III-A-1-5 Ford Meter Box Company Brass Valves Parts & Acces- sories. Contract certified complete 12/02/81	390,775.15	100	- 0 -
Sub Total	3,785,099.18	98.2	66,943.84



Contractor P.T. Sarana Alam continued off and on to work on the connection of  $\phi$  300 mm Line "A" to the  $\phi$  450 transmission main. After exploratory excavation for sizing elevation and location under Jl. Slamet Riyadi the area was backfill and work began from the AC pipe northward. Completing the crossing under the canal took until the latter part of May. The tie-in should be complete early June.

The unused portion of house services materials was transferred to the Surakarta Water Enterprise by P.T. Palagan. Part but not all public hydrants were painted according to Contract.

### III-C GROUNDWATER EXPLORATION AND WELL DEVELOPMENT PROGRAM.

A final draft of this operational area is nearing completion.

### III-D MANAGEMENT ASSISTANCE PROGRAM.

Completed.

### III-E O & M TRAINING AND ASSISTANCE PROGRAM.

After providing a list of priorities to the Surakarta Water Enterprise, the O & M Specialist worked daily with SWE repair crews training them to correct poor workmanship on the  $\phi$  300 mm AC pipe loop. During May there were approximately twenty leaks repaired and depleted, the stock of  $\phi$  300 repair parts originally purchased for SWE off-shore. The O & M Manual is approximately ninety percent complete and is being assembled with data on materials, tools and equipment being provided in the expanded system. The intent of the manual is for it to be a "living manual", so called because it can forever be added to or sections revised to accomodate changes that occure to the

system in the future. A shutdown of the old transmission main east of BV-39 at Kleco bridge was scheduled for the last week of May. It was rescheduled to 02 June 1981 due to completion status of the construction contractors working on Lines "A" and "Q". During that shutdown the O & M Specialist has planned for SWE to overhaul all  $\phi$  450 mm line valves in the old transmission main between BV-39 and the large market north east of the Pope River. The survey team comprised of USAID, and Cipta Karya personnel began their base line impact study surveys the last of May. The O & M Specialist assisted in setting up the water testing equipment at the new SWE laboratory in preparation for the testing O-J-T.

#### III-F METER REPAIR TRAINING PROGRAM.

Completed.

#### III-G NEW WATER DISTRIBUTION NETWORK DESIGN.

The Consultant received approval from the Chief of Design-Water Supply Projects of DSE on all three phases of the new water distribution network on 27 May 1981. The drawings were immediately sent out for printing in the required quantity for tendering. Work continues on the schedule of quantities upon the request of the Project to incorporate the same intersection details and material list (approximately 380 total in the 3 phases of work) for each to assist the contractor's estimators in their work of costing out the estimates. Seven of ten bath house sites have been selected surveyed and drawn. The other three sites should be selected in early June. Approximately ninety five percent of the 110 public latrines found have been drawn up for the rehabilitation program. A meeting has been requested with Surakarta DPU, who is responsible for latrine maintenance

to verify some location status. A final material quantity listing was forwarded to DSE on 27 April and an award for supply was issued by them to the two suppliers on 25 May 1981. An agreement on the hydraulic reanalysis of the expanded system was reached 04 May (Appendix VI) and the required information was mailed to the offices of Burns & Mc Donnell in Kansas City on 09 May 1981.

### III-H CONFERENCES

No progress meeting was called during the month of May but has been scheduled for 01 June 1981. A meeting regarding the design drawings was held at CJWSP-Semarang on 04 May 1981 (Appendix VI).

### III-J ACTIVITIES PLANNED FOR NEXT MONTH.

Assist as requested in the preparation for the Dedication Ceremonies presently scheduled between 01 - 17 August 1981. Pursue final inspections on all construction for completion. Continue with OJT for SWE personnel by assisting on repairs to secondary and tertiary distribution mains. Shut down old transmission main in order to repair and overhaul the main line valves and connect  $\phi$  300 mm Line "A" and  $\phi$  200 mm Line "Q" to same. Flush, clean and put both newly connected pipe lines into operation. Start intensive leak survey with OJT in the use of the equipment and methods of conducting the survey, recording findings and correcting deficiencies found. Assist in the impact study and OJT in the water testing laboratory at Surakarta Water Enterprise. Provide assistance in tendering phases I and II distribution piping for construction. Complete all outstanding work to be done relative to the Design Specialist's Charter and demobilize that operational area.

App. I-A

**SURAKARTA WATER PROJECT**  
**REPORT OF MAN-MONTHS EXPENDED BY CONSULTANT**  
**BURNS & McDONNELL / TRANS-ASIA ENGINEERING ASSOCIATES**

CONTRACT NUMBER GI/WS-S/AID/78 AID LOAN 497-U-044	MAN - MONTHS				
	FOR May - 1981	CUMULATIVE THROUGH May - 1981	TOTAL IN CONTRACT SCHEDULE	% OF TOTAL USED PER SCHEDULE	BALANCE
<b>EXPATRIATES</b>					
PROCUREMENT ENG.	0	6.5	14.5	44.8	8
CHIEF ENGINEER	0	26.2	30	87.3	3.8
CONSTRUCTION SPECIALIST	1	20.1	22	91.4	1.9
LIAISON OFFICER	0.09	3.69	5.5	67.1	1.8
PRINCIPAL	0	0.71	2	35.8	1.3
HYDROGEOLOGIST	0	8.1	12	67.5	3.9
DRILLING SPECIALIST	0	10.5	12	87.5	1.5
O & M SPECIALIST	1	27.4	27.5	99.6	0.1
METER SPECIALIST	0	8	8	100	0
MANAGEMENT SPECIALIST	0	20.2	21	96.1	0.8
SPECIALIST	0	0	3	0	3
DESIGN SPECIALIST	1	10.7	12	89.1	1.3
<b>EXPATRIATE TOTAL</b>	<b>3.09</b>	<b>144.01</b>	<b>169.5</b>	<b>84.9</b>	<b>25.5</b>

INDONESIAN PROFESSIONAL & TECHNICAL

DESIGN SPECIALIST	1	10.7	12	89.1	1.3
EXPATRIATE TOTAL	3.09	144.01	169.5	84.9	25.5
INDONESIAN PROFESSIONAL & TECHNICAL					
COUNTERPART CHIEF ENG	0	28.6	33	86.6	3.4
CONSTRUCTION SUPERVISOR	1	10.9	22	49.5	11.1
HYDROGEOLOGIST	0	20.7	26	79.6	5.3
MATERIALS COORDINATOR	1	32	34	94.1	2
INSPECTORS	3	95.4	104	91.7	8.6
DRAFTSMAN	1	43	52	82.7	9
ACCOUNTANT	2	32	32	100	0
TECHNICAL TRANSLATOR	0.8	17.8	18	98.8	0.2
DESIGN ENGINEER	0	6	8	75	2
SPEC / COST ESTIMATOR	0	4.6	3	153.3	(1.6)
SR. SURVEYOR / PLOTTER	0	5.4	5	108	(0.4)
SURVEYOR	0	5	5	100	0
INSTRUMENTMAN	0	6.3	5	126	(1.3)
INDON. PROF. & TECH.	8.8	307.7	347	88.6	39.3
INDONESIAN ADMINISTRATIVE					
OFFICE MANAGER	1	32	34	94.1	2
SECRETARY	1	30.6	34	90	3.4
TYPIST	1	27.2	51	53.3	23.8
CLERKS	2	93.4	74	126.2	(19.4)
DRIVER	5	135.1	186	50.9	50.9
LABORERS	3	157.2	244	64.4	86.6
SECRETARY (BI - LINGUAL)	0	6	6	100	0
RODMEN / CHAINMEN	0	13.8	10	138	(3.8)
ADMINISTRATIVE TOTAL	13	495.3	639	77.5	143.7

App. I  
B

App. II - A

SURAKARTA  
REPORT OF EN  
BURNS & McDONNELL/TRAN

CONTRACT NO. 01/WS-S/AID/78 SIGNED 26 OCT. 1978 START 1 JAN. 1978 END 30 NOV. 1981	COSTS FOR	CUMULATIVE COSTS THROUGH	
	MAY 1981	AMOUNT	% OF TOTAL BUDGET ESTIMATE
REIMBURSABLE EXPENDITURES			
USD			
Salaries and Related Costs	19,938.05	866,615.06	92.4
Transportation	-	56,002.49	51.8
Equipment	-	2,666.19	7.4
Miscellaneous	-	48,427.17	83.3
Training	-	-	-
Contingencies	-	53,470.70	57.2
<b>TOTAL DOLLARS</b>	<b>19,938.05</b>	<b>1,027,180.61</b>	<b>53.1</b>
INDONE			
Salaries	4,050,500	144,605,965	83.1
Transportation	1,442,784	63,477,201	90.3
Housing	-	50,775,000	102.1
Vehicle Costs	918,000	38,069,472	88.2
Equipment Costs	-	23,110,860	95.2
Miscellaneous	1,068,340	66,280,025	92.4
Contingencies	1,356,264	20,773,224	48.0
<b>TOTAL RUPIAH</b>	<b>9,004,888</b>	<b>406,510,747</b>	<b>85.5</b>

II-B

SURAKARTA WATER PROJECT  
 REPORT OF ENGINEERING COSTS  
 BURNS & MCDONNELL/TRANS-ASIA ENGINEERING ASSOC.

ATIVE COSTS THROUGH		CUMULATIVE PAYMENTS THROUGH	
NT	% OF TOTAL BUDGET ESTIMATE	AMOUNT RECEIVED IN MAY 1981	TOTAL AMOUNT RECEIVED THROUGH MAY 1981
US DOLLARS			
5.06	92.4	19,896.25	846,677.01
02.49	51.8	-	56,002.49
6.19	7.4	169.05	2,666.19
27.17	83.3	20.0	48,427.17
-	-	-	-
70.70	57.2	-	53,470.70
80.61	53.1	20,085.30	1,007,242.56
INDONESIAN RUPIAH			
05,965	83.1	19,177,334	92,792,299
77,201	90.3	10,521,094	42,998,688
75,000	102.1	-	50,775,000
69,472	88.2	1,815,000	31,981,472
10,860	95.2	4,231,500	24,365,975
80,025	92.4	2,658,585	53,135,375
73,224	48.0	-	19,416,960
10,747	85.5	38,403,513	314,690,229

From the co

A WATER PROJECT  
ENGINEERING COSTS  
ANS-ASIA ENGINEERING ASSOC.

CUMULATIVE PAYMENTS THROUGH			TOTAL BUDGET ESTIMATE FOR CONTRACT
AMOUNT RECEIVED IN MAY 1981	TOTAL AMOUNT RECEIVED THROUGH MAY 1981	% OF TOTAL BUDGET ESTIMATE	
DOLLARS			
19,896.25	846,677.01	94.8	937,533
-	56,002.49	51.8	108,108
169.05	2,666.19	7.4	641,500
20.0	48,427.17	83.3	58,131
-	-	-	14,544
-	53,470.70	57.2	175,982
20,085.30	1,007,242.56	83.7	1,935,798
INDONESIAN RUPIAH			
19,177,334	92,792,299	53.3	174,029,000
10,521,094	42,998,688	61.2	70,257,600
-	50,775,000	102.1	48,975,000
1,815,000	31,981,472	74.1	43,140,000
4,231,500	24,365,975	100.5	24,253,000
2,658,585	53,135,375	74.1	71,710,000
-	19,416,960	44.9	43,236,460
38,403,513	314,690,229	66.2	475,601,060











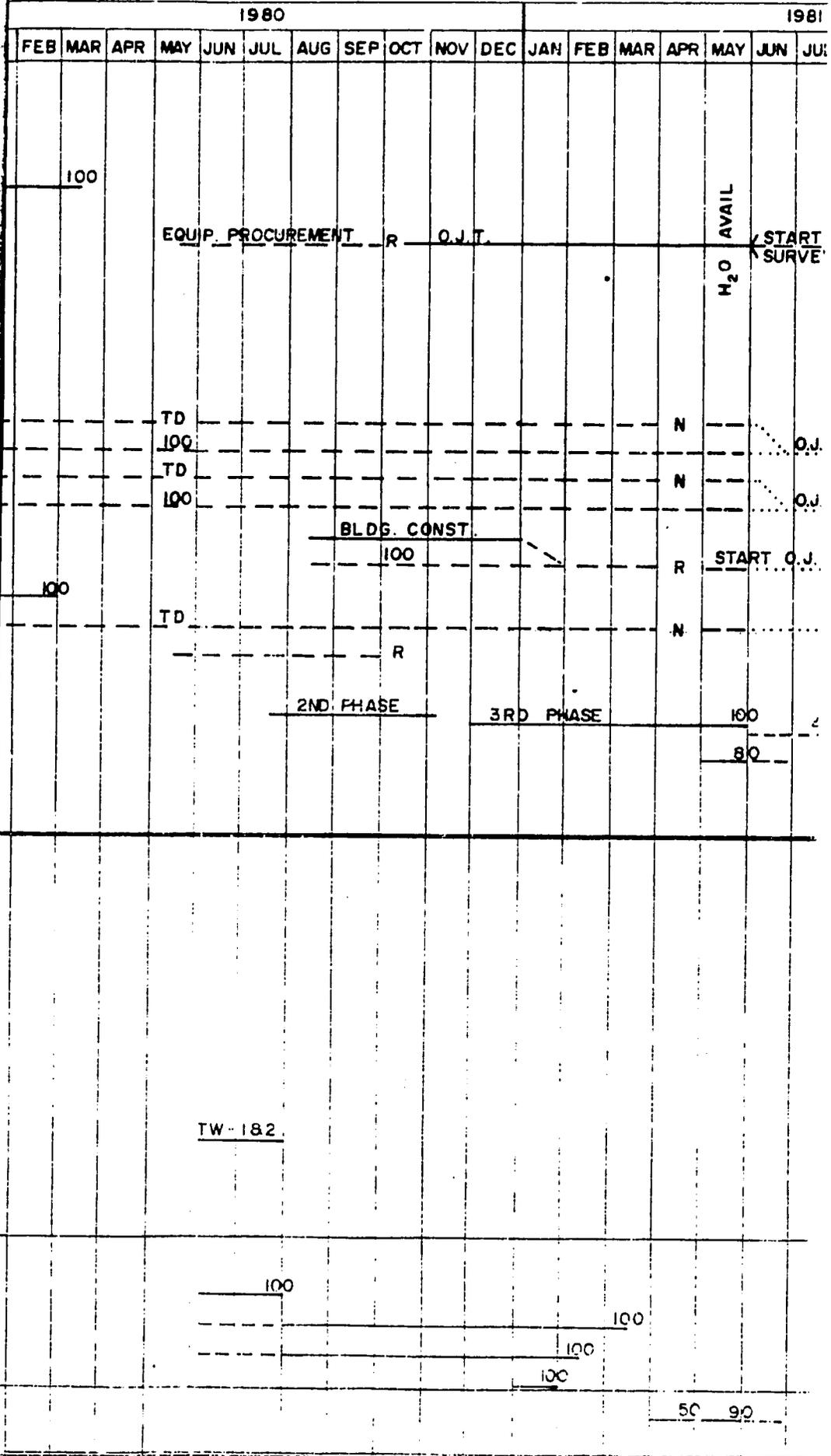




# JAKARTA WATER PROJECT TECHNICAL WORK APPROACH

III-B

AMENDMENT NO. 1

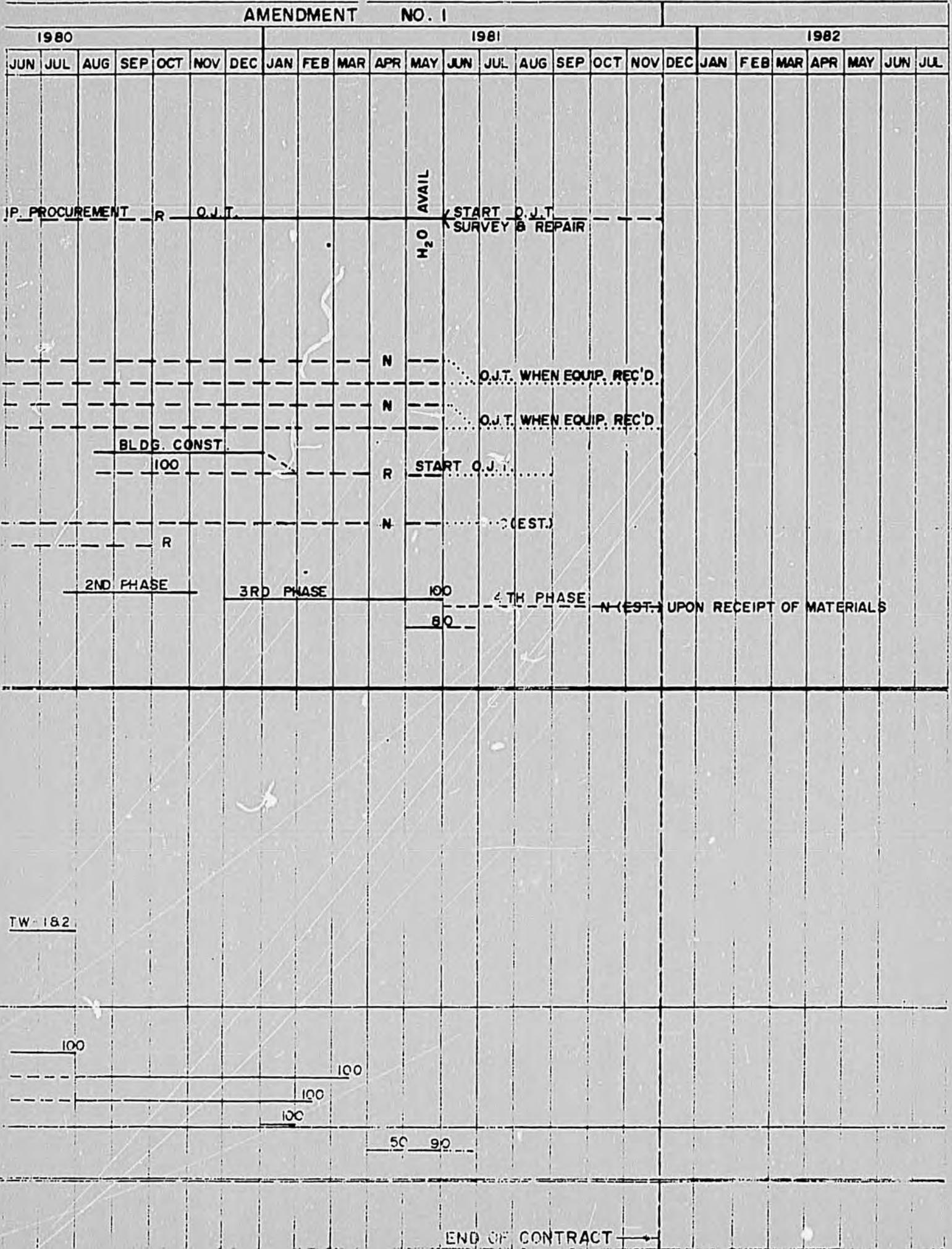


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END C

# WATER PROJECT WORK APPROACH

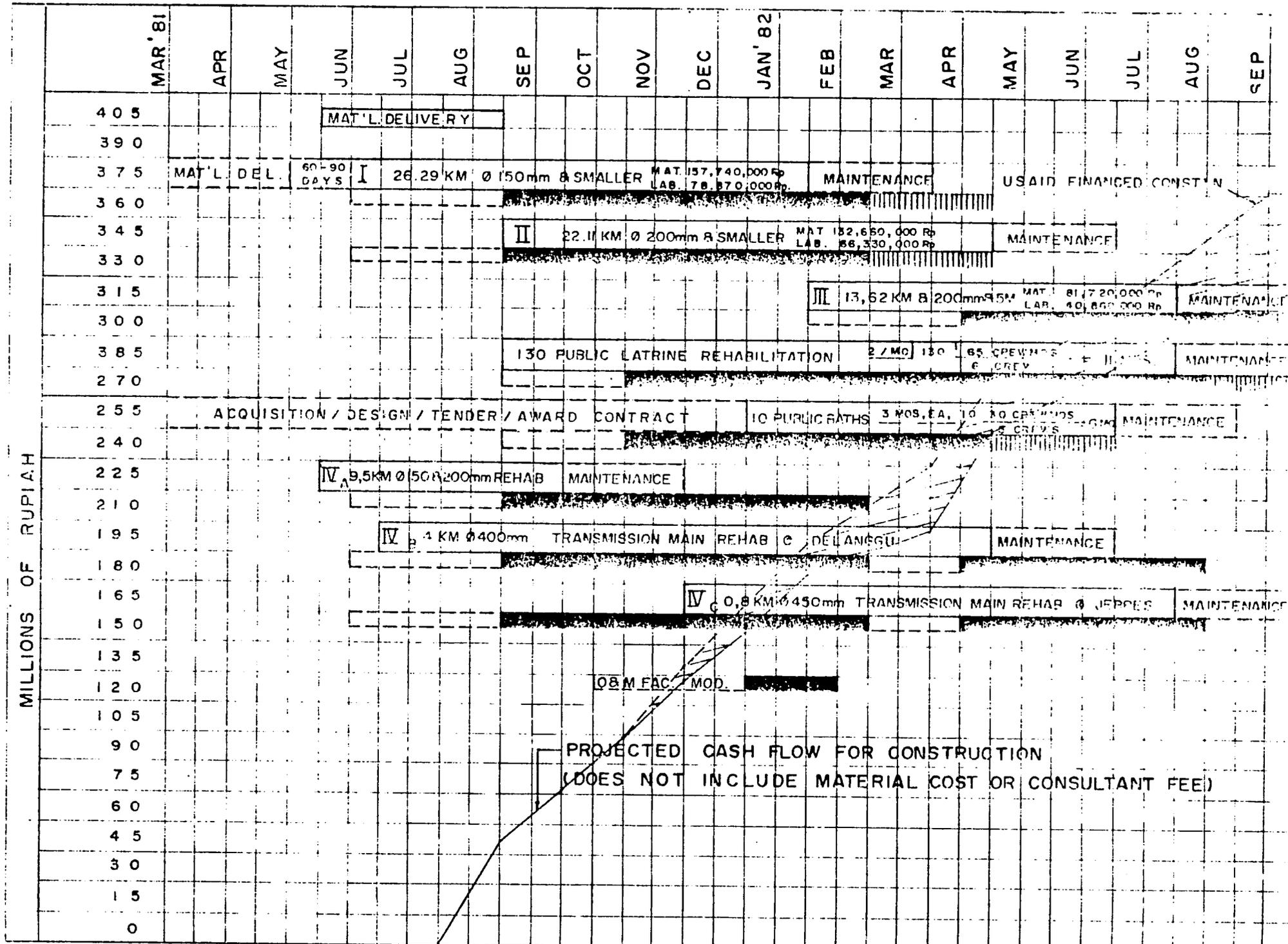
9











01 OCT

12 NOV

24 DEC  
1982

4 FEB

18 MAR

29 APR

10 JUN

22 JUL

2 SEP

PHASE I DISTRIBUTION PIPING 25.9 KM

MAINTENANCE

Ø 150 1.9 KM Ø 100 13.0 KM Ø 75 11.0 KM

PHASE II DISTRIBUTION PIPING 22.6 KM

MAINTENANCE

Ø 200 1.0 KM Ø 150 1.4 KM Ø 100 12.2 KM Ø 75 8.0 KM

FY 1981 / 1982

FY 1982 / 1983

PHASE IV REPLACEMENT PROGRAM

FLOAT

Ø 400 0.9 KM Ø 300 4.0 KM Ø 200 2.0 Ø 150 0.8 KM

BALANCE NOT COMPLETED FY 1981 / 1982

U.S.A.I.D. FINANCED PUBLIC LATRINE REHABILITATION PROGRAM ± 140 EA.

FLOAT

U.S.A.I.D. FINANCED PUBLIC BATH HOUSES 10 EA.

FLOAT

O & M FAC. MOD

PHASE III DISTRIBUTION PIPING 13.75 KM

Ø 200 0.35 KM Ø 150 1.3 KM Ø 100 6.0 KM Ø 75 5.1 KM

MEMORANDUM OF MEETING  
CONSTRUCTION DRAWINGS - PH I & PH II

Location : CJWSP Office Semarang  
 Date : 04 May 1981  
 Time : 0900 - 1030  
 Attended by : Ir. Rahardjo DSE  
                   Ir. Krisno D. CJWSP  
                   Ir. Sumaryati CJWSP  
                   Ir. Waluyo Tossin CJWSP  
                   Ir. Hari Wahyuadi PAB-I  
                   Mr. J.F. Baucom BM/TAE  
                   Mr. J.E. Bragdon BM/TAE

Ir. Rahardjo opened the meeting by stating he had a few general comments about the drawings that he would like to have incorporated ; (i) State the type of pipe to be installed on each sheet; (ii) Define the materials/accessories in details by having a detail sheet and number each to correspond with the number given the detail on the plan (this was later revised by Ir. Rahardjo so that an additional material list can be placed adjacent to each existing detail shown on the various sheets); (iii) show piping to which new piping is to be connected on the general layout. It was agreed there would be no air release valves on the stream crossings which are included in this work because of their small diameter. Ir. Sumaryati expressed the possible need for a flush opening at stream crossings but it was determined that using a fire hydrant would be sufficient. Ir. Rahardjo advised the blow off box covers should be cast with an angle iron frame to keep them from chipping or breaking during removal and/or replacement. Ir. Rahardjo advised CK had standard symbols which should be used to clarify details, that Ir. Hari would provide a copy to the Consultant. After the corrections are made, the originals are to be sent to Cipta Karya for Ir. Rahardjo's supervisor Ir. Suratmo, to sign them before Tenders.

Schedules were discussed and it was noted delay in the procurement of materials will cause delivery to be in August 1981 at the ear-

liest. This has impacted the construction activities due to the time constraint so that each Phase plus latrine, rehab and bath house construction should all start about the same time. The Consultant pointed out that Cipta Karya has indicated that a total of five inspectors including the Construction Supervisor can be hired by the Consultant. Ir. Rahardjo, with agreement from both Ir. Krisno and Ir. Hadi, said the Project would provide two inspectors with motor cycles to the Consultant free of charge and further agreed the two inspectors would receive their instructions and direction solely from the Consultant. Mr. Baucom agreed to those conditions. The Project will see that there is a Prime contractor for each Phase of piping and that each Prime will employ a minimum of two (2) subcontractors. In that way, it will take four (4) inspectors to watch the piping construction while the other three (3) will inspect the latrine and bath house work.

The final topic of discussion regarded the hydraulic reanalysis of the Surakarta Water System. Ir. Rahardjo and Mr. Bragdon agreed to use the projected 1985 population for demand. The two gentlemen also agreed to consider the distribution network as would probably exist at that time. In other words, those future loops on the far northern and eastern extremities would not be included.