DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

MINISTRY OF LANDS, IRRIGATION AND MAHAWELI DEVELOPMENT

END OF TOUR REPORT

T.A. CERDAN
OPERATIONS & MAINTENANCE ENGINEER
POLONNARUWA RANGE
18 FEBRUARY 1991 – 30 JUNE 1992

SHELADIA ASSOCIATES INC.
15825 SHADY GROVE ROAD
ROCKVILLE, MARYLAND 20850, USA

30 JUNE 1992

END OF TOUR REPORT

T. A. CERDAN - OPERATION & MAINTENANCE ENGINEER

18 FEBRUARY 1991 TO 30 JUNE 1992

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SCOPE OF WORK

OPERATIONS AND MAINTENANCE ENGINEER

1. REHABILITATION OF THE IRRIGATION SYSTEM

o Assist the Irrigation Department in survey, mapping, design and construction of the rehabilitation of the four irrigation systems in the Polonnaruwa District and the Gal Oya Right Bank Systems.

- Recommend additional mapping requirements,if any, necessary for the rehabilitating.

- Based on the information collected in the Diagnostic Analysis studies, other Baseline data collection activities, past rehabilitation experience in Sri Lanka and Irrigation Department data, work with ID to determine appropriate modifications to the main system design, sizing of canals, suitable locations of appropriate measuring structures, checks, drops, drains, etc.

- Periodically review cost data and forecast costs of the Essential Structural Improvements (ESI) rehabilitation program for the four irrigation systems in the Polonnaruwa District and of the Pragmatic Rehabilitation (PR) program for the Gal Oya Right Bank.

- Recommend appropriate system modifications at the field channel level, including design of measuring structures, farm outlets, extension of canal network to include <u>de facto</u> water users, drainage reuse areas, etc.

- Oversee and develop a reporting format to report progress on designs. Review and recommend for approval all design drawings and documents and all as-built drawings.

CHAPTER I

SCOPE OF WORK ASSIGNMENT

The work to be accomplished by the Operation and Maintenance Engineer under the ISMP is divided into three major tasks, as outlined in the Project paper, namely:

1. REHABILITATION OF THE IRRIGATION SYSTEMS

   This involves assisting the Irrigation Department in survey, mapping, design and construction/rehabilitation of the four irrigation systems in the Polonnaruwa District and the Gal Oya Right Bank System in Ampara District. Also guidance is to be provided in monitoring construction to assure quality, determine appropriate site changes and certify completion of project rehabilitation work.

2. DEVELOPMENT OF A PREVENTATIVE MAINTENANCE PROGRAM

   This involves assistance in the development and implementation of annual maintenance plans and the preparation of a Preventative Maintenance Program for the irrigation systems in the Polonnaruwa District and the Gal Oya Right and Left Bank Systems of the Ampara District; and the preparation of annual maintenance plans and a preventive maintenance program for the Ridi Bendi Ela Scheme in the Kurunegala District.

3. IMPROVEMENTS TO IRRIGATION SYSTEM OPERATION

   This involves assistance in the training of Irrigation Department staff in the development of a Water Management Program which will enable the staff of all the schemes within the ISMP area to carry out operations plans and programs in Polonnaruwa, Kurunegala and Ampara ranges.

The details of each of the above three tasks as outlines in the Project Paper, is presented under Exhibit 1-1.

CHAPTER II

STATUS OF O&M COMPONENT AS OF 17 FEBRUARY 1992

2.1 REHABILITATION OF THE IRRIGATION SYSTEMS

Mr. C.F. Leonhardt Sheladia's O&M Engineer from 16 August 1987, officially turned over responsibilities of the O&M component to Mr. T.A. Cerdan on 17 February 1991.

The status of Rehabilitation Works in the seven Schemes of the Project as of 17 February 1991 was essentially the same as reported in Sheladia Quarterly Report No. 14 dated 25 January 1991 for the quarter ending 31 December 1990, as little if any construction was carried out between 1 January 1991 to 17 February 1991. Therefore, the status of survey, design and construction of each of the five Schemes in Polonnaruwa Range, including Bakamuna - Attaragallewa Scheme, is presented on Table II-1-1; the status of water measurement and priority rehabilitation work on the Ridi Bendi Ela scheme in Kurunegala Range is presented on Table II-1-2; and the status of the Pragmatic Rehabilitation on the Gal Oya RB and Preventative Maintenance on the Gal Oya LB in the Ampara Range is presented on Table II-1-3 and II-1-4 respectively. The location of Project Schemes within the Irrigation Systems Management Project is presented in Exhibit II-1-1.

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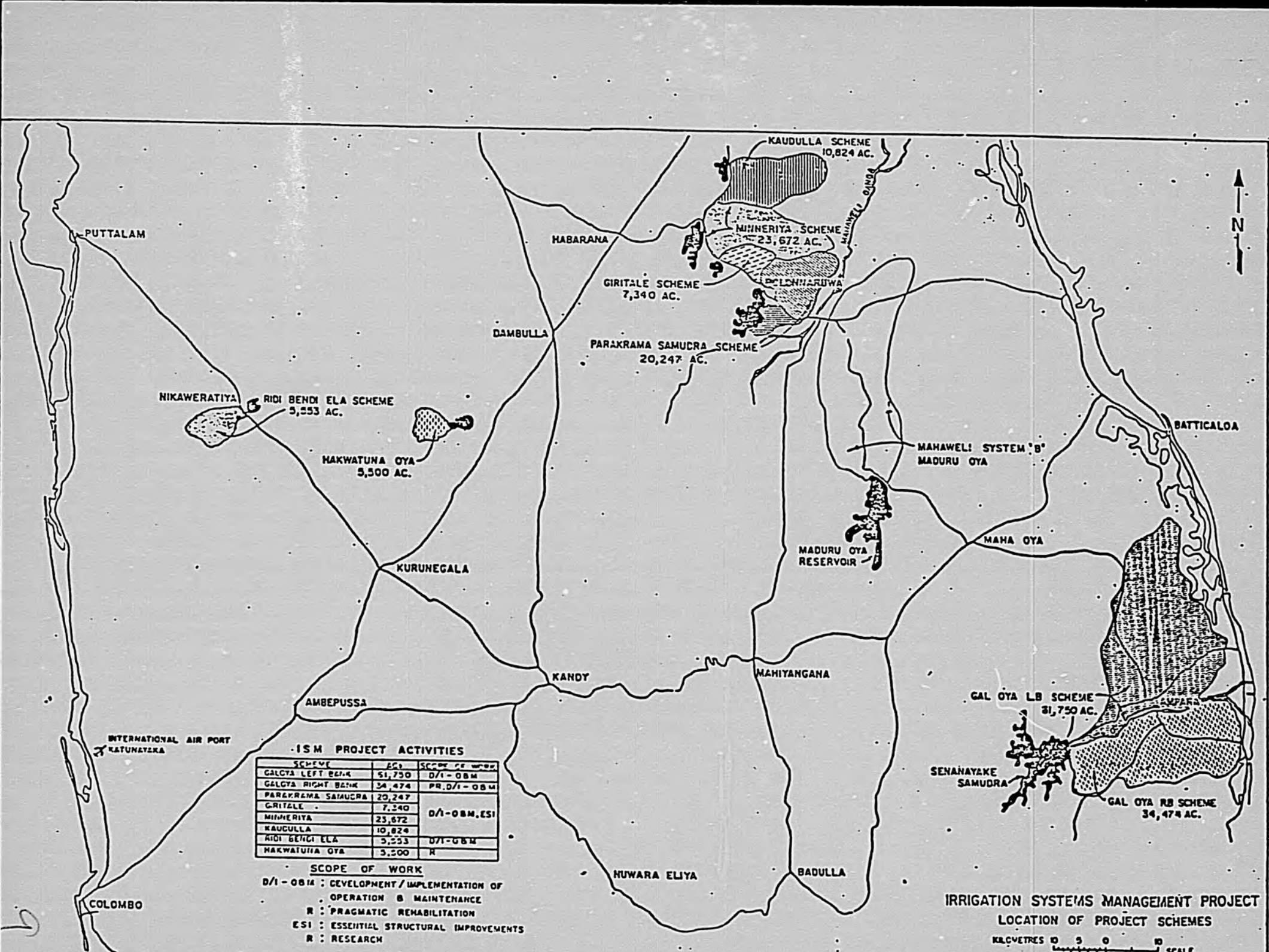

EXHIBIT II-1-1

2.2 DEVELOPMENT OF A PREVENTATIVE MAINTENANCE PROGRAM

The preventative maintenance program for the ISMP Schemes the (planned to be implemented after completion of the Project on 30 June 1992) involved the preparation of the following six major maintenance activities during the LOP.

1. Conduct of Walk-Through Maintenance Survey
2. Preparation Annual Maintenance Plan
3. Preparation Annual Maintenance Costs
4. Preparation Maintenance Diagrams
5. Preparation Schematic Water Distribution Diagrams
6. Prepare Annual Maintenance Report

Under ISMP, the above preventative maintenance activities are to be prepared for (1) the Main System (Headworks, Main/Branch canals) of each of the seven Schemes of the Project and for (2) the 201 DCOFs (Parakrama Samudra 28, Minneriya 20, Giritale 12, Kaudulla 22, RBE 11, GORB 36 and GOLB 72) that will have been formed under those seven Schemes. The Preventative Maintenance Program for the Main System of the seven Schemes will be implemented by the Irrigation Department while the Preventative Maintenance Program for the 201 DCFOs in those Schemes will be implemented by each respective Farmer organization.

As of 31 December 1990, work on the Preventative Maintenance Program was confined primarily to the Main System of the four schemes in the Polonnaruwa Range and the Main System of the Ridi Bendi Ela Scheme in the Kurunegala Range. In the Polonnaruwa Range, the Annual Maintenance Plan was prepared for the Main System facilities that were rehabilitated during 1987 for each of the four Schemes. Table II-2-1 below presents the accomplishments on the 1987 ESI work for the Main Systems of the four Schemes in the Polonnaruwa Range as of 31 December 1990.

TABLE II-2-1

ANNUAL MAINTENANCE PLAN - POLONNARUWA RANGE
FOR 1987 ESI WORKS AS OF 31 DECEMBER 1990

Maintenance Activities	Scheme - % Complete			
	PSS	Giritale	Minneriya	Kaudulla
1. Walk-Thru Maint. Svy	100	100	100	100
2. Annl. Maint. Plan	100	100	100	100
3. Annl. Maint. Cost	100	100	100	100
4. Maint. Diagram	0	100	0	0
5. Sch. Wtr. Dist. Diag.	0	100	0	0
6. Reports	0	100	0	0

For the Main System of the Nidi Bendi Ela Scheme in the Kurunegala Range the Walk-Through Maintenance Survey and the Annual Maintenance Cost Estimate was completed in draft form during 1990 and submitted to O&MM Engineer for review. The completion of all six Maintenance activities in the RBE Scheme was scheduled for early 1991.

The program planned for the 1991 walk-through maintenance survey for the Main System (Headworks / Main / Branch Canals) of six of the seven Schemes in the Project is presented on Table II-2-2.

During 1990 the walk-through maintenance survey, annual maintenance plans, annual maintenance cost estimates, maintenance diagrams, schematic water distribution diagrams and draft reports had been completed for the following DCFOs in the Giritale Scheme by Sheladia Associates.

DCFO No.	1	Puranagama	Completed June 1990
DCFO No.	2	Agbopura	Completed July 1990
DCFO No.	3	Mahasen	Completed August 1990
DCFO No.	4	Kauduluwewa	Completed August 1990
DCFO No.	10	Bendiwewa	Completed November 1990

The program planned for the 1991 walk-through maintenance survey for the distributary canal systems of Parakrama Samudra, Minneriya, Giritale, Kaudulla, RBE and Gal Oya LB and RB Schemes is presented on Tables II-2-3 to II-2-9 respectively.

TABLE D-2-2
WALK THROUGH MAINTENANCE SURVEY
MAIN SYSTEM (HEAD WORKS/MAIN/BRANCH CANALS)

SCHEME	CANAL	TYPE	REACH (KM)	SCHEDULE OF SURVEY
PARAKRAMA SAMUDRA	D-1 NORTH	M/C	8.Ø-1Ø.5	JANUARY 1991
	D-1 NORTH	B/C	1Ø.5-11.69	FEBRUARY 1991
	D-1 EAST	B/C	5.Ø-9.2	MARCH 1991
	D-2 MAIN	B/C	4.25-5.9	MAY 1991
	RB21/D1 NORTH	B/C	Ø.Ø-4.81	MAY 1991
	RB18/D1 NORTH	B/C	Ø.Ø-1.Ø9	JUNE 1991
	INLET CANAL/ HEAD WORKS	B/C	Ø.Ø-8.Ø	NOV/DEC 1991
	D-1 NORTH	M/C	2.86-4.1Ø	NOV/DEC 1991
GIRITALE	RBMC	M/C	Ø.Ø-1.6	APRIL 1991
	RBMC	B/C	Ø.6-6.3	MAY 1991
MINNERIYA	YODA ELA (MYE)	B/C	15.18	MARCH 1991
	D-28/MYE	B/C	Ø.Ø-4.6	APRIL 1991
	D-21/MYE	B/C	Ø.Ø-6.Ø	MAY 1991
KAUDULLA	D-1/LLMC	B/C	Ø.Ø-1.447	JANUARY 1991
	LLMC	B/C	5.Ø-11.3	MAY 1991
	HLBC	M/C	Ø.Ø-Ø.8Ø	FEBRUARY 1991
	HLBC	B/C	Ø.8Ø-7.5Ø	APRIL 1991
RIDI BENDI ELA	RBMC/LBMC/INLET CANAL	M/C-B/C	----	COMPLETED IN 199Ø
GAL OYA	RBMC	M/C	Ø.Ø-3.Ø	JAN. - FEB. 1991
	RBMC	M/C	6.Ø-7.Ø	FEBRUARY 1991
	RBMC	M/C	8.Ø-9.Ø	FEBRUARY 1991
	RBMC	M/C	11.Ø-12.Ø	MARCH 1991
	RBMC	M/C	17.Ø-18.Ø	MARCH 1991
	RBMC	M/C	18.Ø-19.Ø	MARCH 1991
	RBMC	M/C	22.Ø-23.Ø	APRIL 1991
	RBMC	M/C	24.Ø-27.Ø	APRIL 1991
	RBMC	M/C	28.Ø-35.Ø	MAY - JUNE 1991

Note: Gal Oya LBMC not planned for as of 31/12/9Ø

AWWMSMS

TABLE II-2-3
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
PARAKRAMA SAMUDRA SCHEME

No	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	AMBANGANGA	SOMARATNA/PERERA	JANUARY
2	ALUTHWEWA	ARIYAPALA/LOKUSURIYA	JANUARY
3	WEERA PEDESA	ARIYAPALA/LOKUSURIYA	JANUARY
4	2 CHL/WEERAPARAKRAMA	do	FEBRUARY
5	D - 4 CHL	do	FEBRUARY
6	MANIKKAMPATTIYA	ARIYAPALA/LOKUSURIYA	JUNE
7	GALTHAMBARAWA	CHANDRASEKERA/	JANUARY
8	VIJAYARAJAPURA	ATHUKORALA/PIYATILAKE	JANUARY
9	SINHARAJAPURA	do	FEBRUARY
10	PAHALAKALINGAELA	do	MARCH
11	MONARATENNA	do	JUNE
12	DAMANA GEMUNUPURA	CHANDRASEKERA/AMARATUNGA	JULY
13	PALUGASDAMANA	do	FEBRUARY
14	SEWAGAMA	do	JANUARY
15	LAXAUYANA	RAJAPAKSHA/CYRIL	JANUARY
16	VIJAYARAPURA	ATHUKORALA/PIYATILAKE	FEBRUARY
17	SINHAPURA	RAJAPKSHA/CYRIL	JUNE
18	TALPOTHA	RAJAPAKSHA/CYRIL	JULY
19	LANKAPURA	MARASINGHE/SARANELIS	FEBRUARY
20	WEERAPURA	MARASINGHE/SARANELIS	JANUARY
21	THAMBALA(ALHILALPURA)	MARASINGHE/SARANELIS	MARCH
22	GEMUNUPURA	GUNASIRI/KARIYAWASAM	JANUARY
23	MAHASEN	GUNASIRI/KARIYAWASAM	FEBRUARY
24	KEGALUGAMA	do	JUNE
25	SOMAWATHIYA	DE SILVA/PIYADASA	FEBRUARY
26	SUNGAWILA/MOHIDEEN	SILVA/PIYADASA	MARCH
27	PULASTIGAMA	do	JANUARY
28	KALAHAGALA	SOMARATNA/PERERA	FEBRUARY

The Annual Maintenance Plans and preparation of Cost Estimates to be started from February 1991 and be completed by November 1991.

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TABLE II-2-4
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
MINNERIYA SCHEME

DCFO No.	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	RAJA ELA	D.M.G.B. DISSANAYAKE/ R.H. RAJAPAKSHA	FEBRUARY 1991
2	KOTALAWELA	N.D.W. PALLIYAGURU N.P. KRUNARATHNA	FEBRUARY
3	ULPATHWEWA	D.M.G.B. DISSANAYAKE R.H. RAJAPAKSHA	MARCH
4	HATHAMUNA	K.A.S.K. PERERA A.B.F. RANASINGHE	MARCH
5	HINGURAKA	EJMTB. JAYASUNDARA A.D.N. AMARASINGHE	MARCH
6	HINGURAKDAMANA	K. DISSANAYAKE K. JAYATUNGA	MARCH
7	KOTIGAHAPITIYA	----- -----	-----
8	KUMARAGAMA	H.N.C. RANASINGHE H.D.J. PERERA	FEBRUARY
9	GOVT. FARM	--------	MAY
10	YODA ELA	R.M.J.K. MUWANWELLA S. SOMAPALA	FEBRUARY
11	YATIGALPOTHANA	K.H.B. NANDIMITRA	MARCH
12	KAUDULLA	R.A.J. PERERA H. RATNAYAKE	JANUARY
13	SANSUNGAMA	K. WIJETUNGA D.T. SOMAPALA	FEBRUARY
14	KUSUMPOKUNA	B.L. ARIYASIGHE P.B. AMARASENA	FEBRUARY
15	KUSUMPOKUNA MAHASEN	B.L. ARIYASINGHE P.B. AMARASENA	JANUARY
16	DIVULANKADAWELA	M.L.R. FERNANDO P.R. TILAKARATNA	MARCH
17	VIHARAMAWATHA	B.L. ARIYASINGHE P.B. AMARASSENA	MARCH
18	GALAMUNA GEMUNU	------	
19	GALAMUNA PERAKUM	K.G.WIMALASENA I.A. PREMARATNA	FEBRUARY
20	GALAMUNA WIJAYA	K. G. WIMALASENA I. A. PREMARATNA	MARCH
21	NISSANKA	--------	

TABLE II-2-5
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
GIRITALE - SCHEME

No.	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	PURANAGAMA	W.M. DAYARATNA	COMPLETED JUN 1990
2	AGBOPURA	W.M. DAYARATNA	COMPLETED JUL 1990
3	PARAKUM	B.A.L. De SILVA	JANUARY 1991
4	KADAWALA WEWA	B.A.L. De SILVA	COMPLETED AUG 1990
5	BENDIWEWA	B.A.L. De SILVA	NOVEMBER 1990
6	JAYANTHIPURA	B.A.L. De SILVA	DECEMBER 1990
7	MAHASEN	W.S.C. EKANAYAKE	COMPLETED AUG 1990
8	PURANA MUSLIM	W.S.C. EKANAYAKE	COMPLETED AUG 1990
9	NAGAPOKUNA (PULASTI)	W.S.C. EKANAYAKE	FEBRUARY 1991
10	UNAGALAWEHERA	R.J. GUNAWARDENA	DECEMBER 1990
11	CHANDANAPOKUNA	R.J. GUNAWARDENA	JANUARY 1991
12	HATASISATA	R.J. GUNAWARDENA	FEBRUARY 1991

Note: All twelve DCFO Annual Maintenance Plans and Cost Estimates will be completed for Giritale Scheme in March 1991.

TABLE II-2-6
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
KAUDULLA SCHEME - STAGE I

DCFO No	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	EKSATH	BANDULA/WICKRAMARATNA	JANUARY 1991
2	C.P PURA PERAKUM	do	MARCH
3	KALINGA ELA	do	FEBRUARY
4	MANDALAGIRI	BANDULA/WICKRAMARATNA	MAY
5	SUHADA EKSATH	WANNINAYAKA/SIRIWARDENA	JANUARY
6	SRI NAGA	do	FEBRUARY
7	VIJITHA	WANNINAYAKE/SIRIWARDENA	MAY
8	VIJAYAPURA VIJAYA	do	MARCH
9	SANAGI	do	JUNE
10	MENIK HOROWWA	AMUNUGAMA/UKKUBANDA	JANUARY
11	SAMA	do	FEBRUARY
12	GOVISETHA	do	MARCH
13	MAHAWELI	do	JULY
14	MAHINDAPURA	AMUNUGAMA/UKKUBANDA	MAY
15	PRAGATHI	AMUNUGAMA/UKKUBANDA	JUNE
16	PUBUDU	AMUNUGAMA/UKKUBANDA	AUGUST
17	D.S. SENANAYAKE	KODITUWAKKU/VANSES	JANUARY
18	NAGARAPURA SAHANA	do	JULY
19	WEERA KEPPETIPOLA	do	JUNE
20	SRI VIJAYA	do	FEBRUARY
21	EKSATHGOVI	do	MAY
22	MAHASEN	do	MARCH

Annual Maintenance Plans and preparation of Cost Estimates will commence from January - 1991 and will be completed by November 1991.

TABLE II-2-7
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
RIDI BENDI ELA SCHEME

No.	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	KATAGAMUWA (INLET CANAL)	MUWANWELLA	JANUARY 1991
2	MAGALLEGAMA	W. B. GUNADASA	FEBRUARY
3	CENTRAL CANAL	do	MARCH
4	DANDUWAWA	do	APRIL
5	THARANAGOLLA	do	JANUARY
6	DANGAHAWELAYAYA	W. I. T. CROOS	FEBRUARY
7	HEELOGAMA	K.A.T.NANAYAKKARA	MARCH
8	DIVULLEWA	do	APRIL
9	BUDUMUTTAWA	W.I.T. CROOS	JANUARY
10	BALANGOLLAGAMA	W. B. GUNADASA	MAY
11	IBBAWELA	do	JUNE

TABLE II-2-8
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
GAL OYA LBMC

No	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	LB 1A BATAHIRA DUNGALA	AMC FERNANDE/V IMPARAJAH	JANUARY
2	LB 1,2,& 3 ALIGALE	do	JANUARY
3	LB 4 - SANGVIDANAYA	do	FEBRUARY
4	LB 6 - SANGVIDANAYA	do	FEBRUARY
5	LB 7 - IHALA KOTTASAYA	do	MARCH
6	LB 7 PAHALA KOTTASAYA	do	MARCH
7	LB 7 - SANVIDHANAYA	do	MARCH
8	LB 10 - SANVIDHANAYA	AMARASEKERA/DHARMADASA	JANUARY
9	LB 11 - SANVIDHANAYA	do	JANUARY
10	LB 11A &B SANVIDHANAYA	do	JANUARY
11	LB 12 - SANGVIDHANAYA	do	JANUARY
12	LB14 - EKAMUTU	do	JANUARY
13	LB 15 - EKSATH	do	JANUARY
14	LB 16 - WALAGAMBA	do	JANUARY
15	UB 1 - GALATITIYAGODA	do	FEBRUARY
16	UB 2 SAMAGI UDARIGAMA	do	FEBRUARY
17	UB 5 -DEMATAMALPELASSA	do	FEBRUARY
18	UB 7 - UDAYA	do	FEBRUARY
19	UB 8-UHANA TISSAPURA EKSATH	do	FEBRUARY
20	UB 9&10 EKABADDAEKSATH	do	MARCH
21	UB 11-TISSAPURA	do	MARCH
22	UB 12-KUMARIGANA	do	MARCH
23	UB 13-SAGVIDHANAYA	do	MARCH
24	KIRIPATTIYA	AMARASEKERA/JAYAWARDENA	JANUARY
25	UB 17- SANGVIDANAYA	do	JANUARY
26	M 1 SAGVIDHANAYA	do	JANUARY
27	M2, ,,	do	JANUARY
28	M 5 ,,	do	FEBRUARY
29	M 5.2 ,,	do	FEBRUARY
30	M 5.4 ,,	do	FEBRUARY
31	M6.7 ,,	do	FEBRUARY
32	M 8 ,,	do	FEBRUARY
33	M 9.11 - GEMUNU	do	MARCH
34	M 12 SANGVIDHANAYA	do	MARCH
35	M 16 ,,	do	MARCH
36	M 13 ,,	do	MARCH
37	G2&LB27 SANGVIDHANAYA	RA MAITHRIPALA	JANUARY
38	G4 SANGVIDHANAYA	do	JANUARY
39	G4 SANGVIDHANAYA	do	JANUARY
40	G5 SANGVIDHANAYA	do	JANUARY
41	G6 KITHSIRI	do	JANUARY
42	G9&12 SANGVIDHANAYA	do	FEBRUARY
43	G10 IHALA KOTASA	do	FEBRUARY
44	G10 PAHALAKOTASA	do	FEBRUARY
45	G 13 PERAKUM	do	FEBRUARY
46	LB19&20 SANGVIDHANAYA	do	MARCH
47	LB22 SANGVIDHANAYA	do	MARCH
48	LB23,24,&25 SANGVIDHANAYA	do	MARCH
49	LB 29-G1 SANGVIDHANAYA	do	MARCH

Note: Canals where there is no Farmer Org. are not included.

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TABLE II-2-9
SCHEDULE FOR WALK THROUGH MAINTENANCE SURVEY OF DCFOs
GAL OYA RBMC

No	NAME OF DCFO	NAME OF TA/WS	SCHEDULE
1	VILLAGE 23 A	NO PROGRAM PLANNED	NO PROGRAM PLANNED
2	MORAGAHALAMA		
3	GALMADU BC		
4	MAHENGALA		
5	VILLAGE 5		
6	DAMANA		
7	RB 20		
8	IRRAKKAMA		
9	5A COLONY		
10	SIRUNEETHAI		
11	AMBALATHARU		
12	IDA COLONY		
13	ILLUKKUCHENAI D/S		
14	NEETHAI		
15	ILLUKKUCHENAI		
16	WIPIRIYA		
17	NEDONTHUDDAM		
18	PAVANKAI		
19	NIRICHOLAI		
20	THILLAIARU		
21	RB 36		
22	A1 & 5		
23	AK 6		
24	AK 9		
25	AK 10		
26	VILLANKADU MEL		
27	VILLANKADU LILAL		
28	VR 6		
29	VR 7		
30	KL 6		
31	KLI/RB25		
32	DEEGAWAPI		
33	KL 20		
34	KL 24		
35	PERIYAVELIPIDDY		
36	MODAYAVELI		

Note: Establishment of DCFOs on RBMC area of Gal Oya not finalized. The Walk-Through-Maintenance Survey is planned after DCFO Boundaries established and DCFOs officially formed.

2.3 IMPROVEMENTS TO IRRIGATION SYSTEMS OPERATIONS

The Action Plan setup to improve the system operations under the ISMP was originally outlined in a letter from Sheladia Associates to W.N.N. Botejue, Project Director ISMP on 18 March 1988. It involved 12 major activities as indicated below:

1. Identification and establishment of Field Operation Units and Sub-Units and the development of Water Management Organization and job-description for that organization.

2. Establishment of two way communications between Operation Centers and Field Operation Units.

3. Up-dating of Issue Trees and preparation of Schematic Water Distributary Diagrams.

4. Installation of Rain Gauge Network.

5. Establishment of Control and Measuring Devices in Main and Branch Canals.

6. Establishment of Control and Measuring Devices at Boundaries of DCFOs.

7. Establishment of Control and Measuring Devices in D-Canals.

8. Establishment of Control and Measuring Devices in F-Canals.

9. Assessment of Canal Losses, Seepage and Percolation in the Systems.

10. Establishment of Meteorological Station in Polonnaruwa.

11. Development of Three Computer Models.

    - o Reservoir Operation Model
    - o Systems Operation Model
    - o Seasonal Water Report Model

12. Refinement of System Operation Model

The status of work on the above twelve activities under the Systems Operation Action Plan as of 31 December 1990 is presented as follows:

Most of the activities identified in the Action Plan could not be fully achieved due to the very low priority given to the water management improvements program at the early stage of its development. The accomplishments as of 31 December 1990 are set out below according to the twelve major activities identified under the Action Plan:

1. Identification and establishment of Field Operation Units and Sub-Units and the development of a Water Management Organization, and Staff Job Descriptiona for this organization.

   Status: Field Operation Units and Sub-Units established for all Schemes. Development of Water Management Organizations and Job Descriptions for each Scheme not yet started.

2. Establishment of two-way communications between Operation Centers and Field Operation Units.

   Status: Two way radio (Walkie-talkie) communication could not be implemented due to the conditions in the Country and restrictions by the Military on use of short-wave radios. However, transmittal of Water Measurement data was initiated by use of bicycles travelling between Field Operation Units and sub-units and the Division Operation Center in the Giritale Scheme.

3. Up-dating of Issue Trees and preparation of Schematic Water Distributary Diagrams.

   Status: Up-dating of the Issue Trees was completed as of 31 December 1990. However, Control and Issue Diagrams (Schematic Water Distribution Diagram with locations of control and monitoring points) were prepared for Giritale, PSS, Minneriya, Kaudulla and RBE.

4. Installation of Rain Gauge Network.

   Status: Rain gauges have been installed in the four Polonnaruwa Schemes as envisaged in the Action Plan. Gauges remained to be installed in RBE and Gal Oya Schemes.

5. Establishment of Control and Measuring Devices in Main and Branch Canals.

   Status: As a result of operation surveys carried out in the RBE Scheme and in the four Polonnaruwa Schemes, locations and types of control and measuring devices considered adequate for effective control and monitoring of canal deliveries were identified on the Main System of those Schemes. In the Gal Oya RB Scheme the measuring devices in the Main and Branch Canals and their off-takes were identified and proposals incorporated into the pragmatic rehabilitation estimates.

6. Establishment of Control and Measuring Devices at Boundaries of DCFOs.

Status: This had yet to be accomplished as the Computer Model was not programmed for this at the time of development. Adjustments to the program will be up-dated in 1991-92 to accommodate this important monitoring effort.

7. Establishment of Control and Measuring devices in D-Canals.

Status: Planned to be accomplished in 1991-92.

8. Establishment of Control and Measuring Devices in F-Canals. Planned to be accomplished in 1992, 1993 and 1994.

9. Calibration of Measuring Devices and the assessment of Canal Losses, Seepage and Percolation in the Systems.

Status: Technical Assistants had been trained on the job in the measurement of canal deliveries and procedures for calibration of measuring. In addition they were well trained in determination of canal losses, seepage and percolation.

10. Establishment of a Meteorological Station in Polonnaruwa.

Status: A meteorological station was set up in Polonnaruwa for monitoring rainfall, sunshine, temperature, wind, humidity, etc.

11. Development of Three Computer Models.

Stauts: Computers had been installed at the DDIs headquarter office in Polonnaruwa and at the IEs office in Polonnaruwa, Hingurakgoda, and Kaudulla Divisions in the Polonnaruwa Range and at Nikaweratiya in the Kurunegala Range.

The following computer models had been developed and field tested:

- Reservoir Operations Model - For pre-season planning and for establishing a rule curve for operating the reservoir during the season.

- Systems Operation Model - For scheduling of canal deliveries taking into consideration such factors as extents actually cultivated, crop grown, crop staggers, stage of crop growth, soil properties, rainfall, canal losses, drainage inflows, etc. The model also provides management with an evaluation of the performance of the delivery system at each monitored point on a daily, weekly or periodic basis as required.

- o Seasonal Water Report - For recording seasonal data and for evaluating the performance of the irrigation scheme as a whole.

12. Refinement of System Operation Model

Status: The refinement to the System Operation Model was pending the introduction of more monitoring and discharge measurement points and modification to the program. Refinement will begin in 1992.

In addition to the 12 items above, the following system operation exercises were also accomplished from 1987 to 30 December 1990.

Training in the use of micro-computers for water management has been given to Irrigation Engineers and Technical Assistants at Utah State University and at Polonnaruwa.

An attempt was made to implement computer assisted water scheduling in the Giritale Scheme with a very limited number of monitoring points (9). A computer printout obtained during this exercise indicates that the water management indices for these 9 monitors points for the week 6 July to 12 July 1990 are less than unity, thus indicating that the actual releases are less than the calculated values. This is probably due to over estimation of on-farm losses (seepage and percolation).

Estimation of on-farm requirements and an assessment of on-farm water requirements for lowland paddy in Polonnaruwa was made based on Diyasenpura evapo-transpiration data, probable monthly rainfall and average seepage and percolation values. A program for computing the theoretical on-farm water requirements is incorporated in the Seasonal water keport computer model. This program takes into account time of planting, number of stages, percentage area in each stagger, land preparation period, land preparation water requirements and field losses.

A preliminary assessment of the costs of operation of the main and distributary system was developed by the System Operations Engineer during his assignment. This was done in order to determine the magnitude of operation costs. An initial attempt was made to assess the operation costs of the Giritale Scheme, and a more detailed study on this will be initiated in 1991-1992.

CHAPTER III

ACCOMPLISHMENTS DURING ASSIGNMENT

3.1 REHABILITATION OF THE IRRIGATION SYSTEMS

The status of Rehabilitation Works in the seven schemes in Polonnaruwa, Kurunegala and Ampara Ranges at the time of take over by Mr. T.A. Cerdan from Mr. C.F. Leonhardt on February 17, 1991 are presented in Exhibits II-1 to II-4. Since then, considerable accomplishmenta were achieved in the rehabilitation of the schemes. The rehabilitation of various irrigation facilities in the Schemes were programmed and implemented using regular contractors for the bigger canals and structures, while the DCFOs were involved in the rehabilitation of the smaller canals and structures. In field canals, only small pipe outlets, small drops and other canal structures were rehabilitated / constructed but no earthwork was involved. Some of these structures were not properly backfilled because the TAs said earthwork is not a pay quantity.

During the Life of Project, some changes have been made. Some portions of canals which were programmed for rehabilitation have been deleted while some canals not programmed initially have been included in the program. These changes brought about the difference in the total length of canals at the start and at the end of the Project. At the start of the ISMP, the five Schemes within the Polonnaruwa Range programmed a total of about 1,630 kms of canals to be rehabilitated. Within the Range there have been trouble spots where contractors were not able to even start their work so that by the end of 1990 only about 490 Kms of canals have been rehabilitated.

In 1991, Project Management started involving the DCFOs in the rehabilitation of the canals within their respective areas. Being new in this undertaking, the DCFOs were confused and disorganized. They have to select from among themselves carpenters, masons and skilled laborers to undertake rehabilitation work and this has delayed implementation of rehabilitation in their respective areas.

The Technical Assistants of the Irrigation Department have to assist them technically to get them oriented and started on this new undertaking. At first the progress was slow and the quality of the work was quite poor. But as they gained experience the progress picked up and the quality of work improved.

Now, except in some areas where technical assistance is still needed, the DCFOs already work on their own. The TAs covering these areas just supervise them and see to it that work is being undertaken as per plans and specifications.

By the end of March 1992, about 669 Kms of canals have been rehabilitated, most of which are the bigger canals, ie., Main Canals, Branch Canals and Distributary Canals. The length of Field Canals programmed was about 1,004 Kms or about 62% of the total length of canals involved. Only construction / rehabilitation of field canal structures and no earth work has been programmed in these canals. The structures are mostly pipe outlets and other small canal structures which involve only a small amount of work, but bringing materials to the sites is difficult. So the contractors have given less priority to these works over the other bigger structures. The Scheduled and Actual Progress for ESI works in the Polonnaruwa Range is presented as Exhibit III-1-1. The status of Survey, Design and Construction of each of the five schemes in the Polonnaruwa Range, including the Bakamuna - Attaragallewa Scheme is presented as Table III-1-1.

Water measurement structures are essential in the operation of the system. Priority was given in the determination of the suitable location of these structures at the boundaries of DCFOs and at the headgates of D-Canals. Construction of these measurement structures with some Priority Rehabilitation works have been programmed for the Ridi Bendi Ela Scheme in the Kurunegala Range. During the middle of 1991, rehabilitation of the Inlet Canal was also programmed. By the end of March 1992, the first program for the construction of water measurement structures in RBE Scheme was 100% completed while the Priority Rehabilitation Program was 95% completed. The location of the completed Water Measurement structures in presented in Exhibit III-1-2. The rehabilitation of the Inlet Canal was 15% complete. In order to improve water management in the RBE Scheme, additional water measurement structures have to be constructed in 1992. The physical and financial status for the construction of water measurement structures, priority rehabilitation and rehabilitation of the inlet canal in the RBE Scheme is presented in Table III-1-2.

The planned Pragmatic Rehabilitation Works in the Gal Oya RBMC suffered some delays due to the prevailing peace and order conditions in the area. This situation continued and necessitated revision of the planned works for 1991. Since work could only be undertaken in selected areas, the progress was quite slow. At the end of 1991, of the 119.20 Kms of canals programmed for rehabilitation, only about 53.10 Kms have been accomplished. Due to the major setback encountered, the work had been re-programmed to complete about 177 Kms by the end of 1992. As of the end of the First Quarter of 1992, the accomplishment was only 53.70 Kms. The Planned Program and Actual Progress for the Pragmatic Rehabilitation Works in the Gal Oya RBMC is presented as Exhibit III-1-3 and Status of Survey, Design and Construction Rehabilitation on the GORB system and the Preventive Maintenance Work on the GOLB system in the Ampara Range are presented in Table III-1-3 and Table III-1-4 respectively.

Monitoring and certification inspections for reimbursement of expenditures for completed and partially completed Sub-Projects within the seven Schemes with the ISMP area were also undertaken. In some instances work in an area under the jurisdiction of a TA is not undertaken or supervised by him, but by a TA from another unit of the Scheme. During certification inspection the TA who supervised the work usually accompanies the Inspection Team even if the TA of the unit area is present because he has no knowledge of what was undertaken in his area of jurisdiction.

The system of Certification for Reimbursement used in the ISMP is that if a Sub-Project is found to be less than 50% complete, it is not certified for reimbursement. If a Sub-Project is found to be more than 50% but less than 75% complete it is certified based on the actual percentage complete. Sub-Projects found to be 75% or more but less than 100% complete are certified only for 75% reimbursement, while those found to be 100% complete are certified for 100% reimbursement. Deficiencies found during the inspection are noted and the recommendations on the findings are transmitted to the IEs concerned using the Form shown as Exhibit III-1-4. For monitoring purposes, the Form shown as Exhibit III-1-5 is used. This form is completed by IEs and submitted to the O&M Specialist in all phases of rehabilitation work.
To keep track of the status and progress of certification for reimbursement, all Sub-Projects with Project Implementation Letters (PILs) have been listed and closely monitored. This is also used as a basis for reminding the IEs concerned of the Status of Progress of Work within their respective Schemes. The first Progress Status Report prepared for this purpose by the O&M Engineer upon his take over was for the period ending March 31, 1991 is shown as Exhibit III-1-6 (6 sheets).

As work progressed, the above mentioned progress Status Report was subsequently revised and improved to show not only the amount reimbursed but also the balance to be reimbursed when 100% completion is attained. A summary of the Progress Status Report as of 31 March 1992 shows that, of the 168 Sub-Projects listed, there are 61 at 100%; 25 at 75%; 50 at more than 50% complete and 32 Sub-Projects found to be less than 50% complete or not yet started. The Summary of the Status of Sub-Project Certification by Range as of 31 March 1992 is presented as Exhibit III-1-7.

IRRIGATION SYSTEMS MANAGEMENT PROJECT - POLONNARUWA RANGE — TABLE III-1-1

MONITORING SURVEYS, DESIGNS AND CONSTRUCTION

OF

PARAKRAMA SAMUDRA, MINNERIYA, GIRITALE, PAIMULLA, BALAMUNA - ATTAPAGALLENA SCHEMES - AS OF 31 MARCH 1992

CANAL		TOTAL LENGTH (Km)	COMPLETED AS OF 31 MARCH 1992			REMAINING FOR 1992 PROGRAM			REMAINING FOR LIFE OF PROJECT		
			SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	PSS	27.74	27.74	27.74	19.74	--	--	8.00	--	--	--
	MIN	15.00	15.00	15.00	15.00	--	--	--	--	--	--
	GIR	5.60	1.60	1.60	1.60	4.00	4.00	4.00	--	--	--
	KAU	7.17	7.17	7.17	7.17	--	--	--	--	--	--
	TOTAL	55.51	51.51	51.51	43.51	4.00	4.00	12.00	--	--	--
B.C	PSS	19.89	19.89	19.89	19.89	--	--	--	--	--	--
	MIN	16.77	16.77	15.93	15.50	--	0.84	1.27	--	--	--
	GIR	10.70	10.70	10.70	10.70	--	--	--	--	--	--
	KAU	19.45	19.45	19.45	19.45	--	--	--	--	--	--
	TOTAL	66.81	66.81	65.97	65.54	0.00	0.84	1.27	--	--	--
D.C	PSS	176.00	163.00	157.00	80.00	13.00	19.00	17.00	--	--	79.00
	MIN	90.31	90.31	83.56	65.06	--	14.75	32.45	--	--	--
	GIR	38.96	38.96	27.27	21.00	--	11.69	17.27	--	--	--
	KAU	73.27	73.27	69.60	62.27	--	3.67	11.00	--	--	--
	ATA	13.00	11.00	11.00	9.00	2.00	2.00	4.00	--	--	--
	TOTAL	399.54	384.54	348.43	238.16	15.00	51.11	82.38	--	--	79.00
FC	PSS	266.34	202.20	160.10	12.50	63.54	105.24	29.50	--	--	224.34
	MIN	247.70	247.70	180.62	99.38	--	66.93	148.62	--	--	--
	GIR	118.85	118.85	100.34	54.30	--	17.71	63.75	--	--	--
	KAU	312.53	296.90	281.27	145.45	15.63	31.26	58.31	--	--	108.77
	ATA	14.00	10.00	10.00	3.40	4.00	4.00	11.60	--	--	--
	TOTAL	958.62	875.45	732.53	314.73	83.17	226.07	311.78	0.00	0.00	333.11
DRN	PSS	45.00	10.00	10.00	3.00	34.20	34.20	5.00	--	--	37.00
	MIN	65.00	26.00	5.36	4.00	6.00	16.64	6.00	33.00	43.00	55.00
	GIR	--	--	--	--	--	--	--	--	--	--
	KAU	35.00	--	--	--	15.00	15.00	10.00	20.00	20.00	25.00
	ATA	2.00	0.50	0.50	--	1.50	1.50	2.00	--	--	--
	TOTAL	147.00	37.30	16.66	7.00	56.70	67.34	23.00	53.00	63.00	117.00
TOTAL	PSS	534.97	424.23	375.53	135.13	112.74	159.44	59.50	0.00	0.00	340.34
	MIN	442.78	403.78	309.67	199.44	6.00	97.11	188.34	33.00	43.00	55.00
	GIR	173.31	169.31	139.91	87.63	4.00	33.40	85.66	--	--	0.00
	KAU	447.42	396.79	377.49	234.34	30.63	49.93	79.31	20.00	20.00	133.77
	ATA	29.00	21.50	21.50	12.10	7.50	7.50	17.60	0.00	0.00	0.00
	TOTAL	1627.48	1415.61	1215.10	668.74	159.87	347.38	430.41	53.00	63.00	529.11

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REHABILITATION OF RBE SYSTEM UNDER ISMP
WATER MEASUREMENT STRUCTURES,
PRIORITY REHABILITATION AND REHAB. INLET CANAL
FINANCIAL STATUS REPORT AS OF 31 MARCH 1992

NATURE OF WORK	ALLOCATION UPTO DEC. 91	APPROXIMATE EXP. UPTO 5-92	BALANCE CARRYOVER	NEW ALLOCATION FOR 1992	TOTAL ALLOCATION FOR 1992
WATER MEASUREMENT STRUCTURES 1989-1990	2,000,000	1,970,438	260,000	---	260,000
PRIORITY REHAB. WORKS 1991	3,000,000	1,773,371	740,000	---	740,000
REHAB. OF INLET CANAL	9,200,000	5,598,827	---	10,000,000	10,000,000
PRIORITY REHAB. WORKS 1992	---	62,164	---	1,500,000	1,500,000
TOTAL	14,200,000	9,404,800	1,000,000	11,500,000	12,500,000

REHABRBc

REHABILITATION OF RBE SYSTEM UNDER ISMP
WATER MEASUREMENT STRUCTURES,
PRIORITY REHABILITATION AND REHAB. INLET CANAL
PHYSICAL STATUS REPORT AS OF 31 MARCH 1992

NATURE OF WORK	PERCENTAGE COMPLETED UPTO 31-3-92			PERCENTAGE REMAINING FOR LOP		
	SURVEYING	DESIGN	CONSTRUCTI	SURVEYING	DESIGN	CONST.
1989-1990 WATER MEASUREMENT STRUCTURES	100	100	100	0	0	0
PRIORITY REHAB. 1989-1990	100	100	95	0	0	5
REHAB. OF INLET CANAL	100	100	15	0	0	85
WATER MEASUREMENT STRUCTURES 1992	100	100	0	0	0	100

REHABRBc

IRRIGATION SYSTEMS MANAGEMENT PROJECT - AMHARA RANGE
MONITORING SURVEYS, DESIGNS AND CONSTRUCTION
OF PRAGMATIC REHABILITATION WORKS
GAL OYA RIGHT BANK SYSTEM
AS OF 31 MARCH 1992

TABLE III-1-3

CANAL	TOTAL LENGTH (Km)	COMPLETED AS OF 31 MARCH 1992			REMAINING FOR 1992 PROGRAM			REMAINING FOR LIFE OF PROJECT		
		SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	35.20	35.20	35.20	33.44	--	--	1.76	--	--	--
B.C	84.80	84.80	79.83	20.16	--	4.28	63.84	--	--	--
D.C	175.00	131.25	18.93	--	43.75	156.10	35.00	--	--	140.00
F.C	227.40	13.60	--	--	113.70	68.22	22.74	100.10	159.18	204.66
DRN	100.00	--	--	--	--	--	--	100.00	100.00	100.00
TOTAL	621.60	264.05	133.70	53.60	157.45	228.52	123.34	200.10	259.18	444.66

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IRRIGATION SYSTEMS MANAGEMENT PROJECT - AMPARA RANGE
MONITORING CONSTRUCTION OF PREVENTATIVE MAINTENANCE WORKS
GAL OYA LEFT BANK SYSTEM
AS OF 31 MARCH 1992

TABLE III-1-4

CANAL	TOTAL LENGTH (Km)	COMPLETED AS OF 31 MAY 1992			REMAINING FOR 1992 PROGRAM			REMAINING FOR LIFE OF PROJECT		
		SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	78.49	--	--	66.30	--	--	4.19	--	--	--
B.C	36.49	--	--	29.19	--	--	7.30	--	--	--
D.C	281.22	--	--	126.55	--	--	7.00	--	--	154.67
F.C	362.40	--	--	54.36	--	--	126.84	--	--	181.20
DRN	---	--	--	--	--	--	--	--	--	--
TOTAL	758.60	--	--	276.40	--	--	145.33	--	--	335.87

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3.2 DEVELOPMENT OF A PREVENTATIVE MAINTENANCE

3.2.1 INTRODUCTION

The accomplishments on the Preventative Maintenance Program up to 31 December 1990 were covered under the previous O&M Engineers (Mr. C.F. Leonhardt) End Of Tour Report. A Summary of the work accomplished on the Preventative Maintenance Program up to 31 December 1990 follows. This summary will provide continuity with this Report which covers the period from 1 January 1991 to 30 June 1992 under the new O&M Engineer T.A. Cerdan.

Summary of Preventative Maintenance Accomplishments as of 31 December 1990

- As of 31 December 1990 work on the Preventative Maintenance Program was confined primarily to the Main System of the four Schemes in the Polonnaruwa Range and the Main System of the Ridi Bendi Ela Scheme in the Kurunegala Range. In the Polonnaruwa Range, the Annual Maintenance Plan was prepared for the Main System facilities that were rehabilitated during 1987 for each of the four Schemes. Table III-2-1 below presents the accomplishment on the 1987 ESI Works for the Main System of the four Schemes in the Polonnaruwa Range as of 31 December 1990.

TABLE III-2-1

ANNUAL MAINTENANCE PLAN - POLONNARUWA RANGE
FOR 1987 ESI WORKS AS OF 31 DECEMBER 1990

Maintenance	Scheme - % Complete			
	PSS	Giritale	Minneriya	Kaudulla
1. Walk-Thru Maint. Svy.	100	100	100	100
2. Annl. Maint. Plan	100	100	100	100
3. Anl. maint. Cost	100	100	100	100
4. Maint. Diagram	0	100	0	0
5. Sch. Wtr. Dist. Diag.	0	100	0	0
6. Report	0	100	0	0

- For the Main System of the Ridi Bendi Ela Scheme in the Kurunegala Range, the Walk-Through-Maintenance Survey, the Annual Maintenance Plan and the Annual Maintenance Cost Estimate were completed in draft form during 1990 and submitted to the Consultant for review. The completion of all six maintenance activities in the RBE Scheme was scheduled for early 1991.

- During 1990 the Walk-Through Maintenance Survey, Annual Maintenance Plans, Annual Maintenance Cost Estimates, Maintenance Diagrams, Schematic Water Distribution Diagram and dratt Reports were completed for the following DCFOs in Giritale Scheme by the O&M Specialist:

DCFO No 1	Puranagama	Completed June 1990
DCFO No 2	Agbopura	Completed July 1990
DCFO No 3	Mahasen	Completed August 1990
DFCO No 5	Kauduluwewa	Completed August 1990
DCFO No 10	Bendiwewa	Completed November 1990

3.2.2 ACCOMPLISHMENTS IN POLONNARUWA RANGE 1/1/91 - 30/6/92

During this period, major accomplishments were achieved in the Development of the Preventative Maintenance Program in the Polonnaruwa Range. A Summary follows:

A. ANNUAL MAINTENANCE PLAN - MAIN SYSTEM

The Annual Maintenance Plans for the Main Systems (Inlet Canal, Headworks, Main and Branch Canals) of the Parakrama Samudra, Giritale, Kaudulla and Minneriya Scheme were developed and completed during this period. A detailed Report on the Giritale Main System Annual Maintenance Plan was prepared and submitted to ID/IMD on 21 August 1991. To illustrate the requirements needed to improve the Annual Maintenance Plan for the four Schemes in the Polonnaruwa Range, samples of exhibits from the Giritale Main System Annual Maintenance Plan follows:

Exhibit III-2-1	-	Annual Maintenance Plan Giritale Scheme Main System - Estimate Criteria (2 sheets)
Exhibit III-2-2	-	Annual Maintenance Plan Giritale Scheme Quantative - Estimate (9 sheets)
Exhibit III-2-3	-	Annual Maintenance Plan Giritale Scheme - Cost Estimates (6 Sheets)
Exhibit III-2-4	-	Annual Maintenance Plan Giritale Scheme - Main System
Exhibit III-2-5	-	Giritale Scheme Main System - Maintenance Diagram
Exhibit III-2-6	-	Giritale Scheme Main System Schematic Water System Distribution Diagram (2 sheets)

A summary of the Annual Maintenance Costs for the Main Systems of the four Schemes in the Polonnaruwa Range is presented on the Table III-2-2 below:

TABLE III-2-2
POLONNARUWA RANGE
ANNUAL MAINTENANCE COST OF MAIN SYSTEM COMPONENTS

SCHEME	COMMAND AREA (AC)	TOTAL ANNUAL COST (RS.)	ANNUAL COST/AC (RS/AC)
Giritale	7,340	1,028,195	140
PSS	20,247	2,507,296	124
Minneriya	23,672	2,113,526	89
Kaudulla	10,824	2,117,589	196
Total PN Range	62,083	7,766,606	125

B. ANNUAL MAINTENANCE PLANS - DISTRIBUTARY SYSTEM

In the four Schemes of the Polonnaruwa Range there are 81 DCFOs. During the period from 1 January 1991 to 30 June 1992 the Annual Maintenance Plans for all 81 of these DCFOs were essentially completed. In the Giritale Scheme the O&M Specialist completed the Annual Maintenance Plans for all 12 DCFOs and submitted detailed Reports to the ID / IMD as indicated on Table III-2-3 below:

TABLE III-2-3
GIRITALE SCHEME - DCFO - ANNUAL MAINTENANCE PLANS

DCO NAME		DATE REPORT SUBMITTED
1.	Puranagama	July 8, 1991
2.	Agbopura	September 27, 1991
3.	Mahasen	February 25, 1992
4.	Javanthipura	February 20, 1992
5.	Kadawala Wewa	February 25, 1992
6.	Unagalawehera	September 27, 1991
7.	Chandana Pokuna	September 10, 1991
8.	Puranagama Muslim	March 25, 1992
9.	Parakum	September 10, 1991
10.	Bendi Wewa	March 25, 1992
11.	Nagapokuna	February 6, 1992
12.	Hatalisata	February 6, 1992

Typical examples of the Annual Maintenance Plan requirements for the Distribtuary Canal System is presented on the following Exhibits:

Exhibit III-2-7	Annual Maintenance Plan Puranagama DCFO Giritale Scheme - Estimate Criteria (3 sheets)
Exhibit III-2-8	Annual Maintenance Plan Puranagama DCFO Giritale Scheme - Quantity Estimate (6 sheets)
Exhibit III-2-9	Annual Maintenance Plan Puranagama DCFO Giritale Scheme - Cost Estimate (3 sheets)
Exhibits III-2-10	Annual Maintenance Plan Puranagama DCFO Giritale Scheme
Exhibits III-2-11	Annual Maintenance Plan Puranagama DCFO Giritale Scheme - Maintenance Diagram
Exhibits III-2-12	Annual Maintenance Plan Puranagama DCFO Giritale Scheme - Schematic Water Distribution Diagram

The remaining 69 DCFOs, the Walk-Through Maintenance Surveys, Cost Estimates, Maintenance Plans and Issue Trees had been prepared and completed. Only the preparation of the detailed Maintenance Diagrams on up-dated Blocking Out Plans (BOP) remain to be done. Translations of the Maintenance Plan in Sinhala had been accomplished for all of the DCFOs that officially took over the D-Canals from the ID. Exhibit III-2-13 (4 sheets) presents the status of DCFO Annual Maintenance Plans in the four Polonnaruwa Schemes.

The Annual Maintenance Cost of each of the DCFOs in Giritale (12), Minneriya (19), Parakrama Samudra (28) and Kaudulla (22) are presented on Exhibit III-2-14 (4 sheets). The average cost of Annual Maintenance for these 81 DCFOs in the Polonnaruwa Range was found to be Rs. 220/Ac.

3.2.3 ACCOMPLISHMENTS IN KURUNEGALA RANGE 1/1/91 - 30/6/92

A. ANNUAL MAINTENANCE PLAN

The preparation of the Annual Maintenance Plans and related documents of RBE Scheme main System were completed during the Fourth Quarter of 1991. These documents were reviewed during the First Quarter of 1992 and finalized. Based upon the Annual Maintenance Costs developed under the Annual Maintenance Plan for the Main System the following Table III-2-4 presents the costs and cost per acre were developed for the Total System, Anicut Headworks , Inlet Canal and Main System respectively.

TABLE III-2-4

TOTAL ANNUAL MAINTENANCE COST RBE SYSTEM (5553 Ac)

A.	RBE Anicut/Headworks		34,835
B.	Inlet Canal		468,216
C.	Magalle Tank Headworks		62,037
D.	RB Main Canal		517,784
E.	LB off RBMC		169,004
F.	LB Main and RB BR Chl.		137,337
	Sub-Total		1,309,213
	Contingencies @ 7.23%	=	100,440
	Sub-Total (67%)	=	1,489,653
	Dept. O/H (33%0	=	739,710
	Total Annual Cost	=	2,223,363 = 339 Rs./Ac.

ANNUAL MAINTENANCE COST ANICUT/HEADWORK/INLET CANAL

A.	RBE Anicut / Headworks	=	34,835
B.	Inlet Canal	=	468,216
	Sub-Total	=	503,051
	Contingencies @ 7.23%	=	36,370
	Sub-total (67%)	=	539,321
	Dept O/h (53%)	=	265,685
	Total Annual Cost	=	805,106 = 123 Rs./Ac.

ANNUAL MAINTENANCE COST MAIN IRRIGATION SYSTEM

C.	Magalle Tank/Headwork	=	62,037
D.	RB Main Canal	=	517,784
E.	LB of RBM Canal	=	169,004
F.	LBMC/LB off LBMC	=	137,337
	Sub-Total	=	886,162
	Contingencies @ 7.23%	=	64,070
	Sub-Total (67%)	=	950,232
	Dept. O/H @ 33%	=	468,025
	Total Annual Cost	=	1,418,257 = 216 Rs/Ac.

Operation and Maintenance Units of the RBE Scheme were made operational and officially opened during February 1992. With the aid of the Annual Maintenance Plans, the implementation of Preventative Maintenance Program of the Main System Components can be implemented in June 1992.

B. ANNUAL MAINTENANCE PLAN - DISTRIBUTARY CANAL SYSTEM

There are eleven DCFOs in the Ridi Bendi Ela Scheme. As of 30 June 1992, the Annual Maintenance Plans, Cost Estimates, Water Distribution Diagram (Issue Trees) for all eleven DCFOs have been completed.

The preparation of the Maintenance Diagram based upon up-dated BOPs were in the process of being developed as of 30 January 1992. Sinhala translations of five of the Annual Maintenance Plans have been completed.

The status of Annual Maintenance Plans for the eleven DCFOs in the RBE Scheme as of 30 June 1992 is shown on Exhibit III-2-14. Exhibit iII-2-15 presents the Annual Maintenance Cost of these eleven DCFOs. The average cost of Annual Maintenance for the 11 DCOs was found to be Rs. 130/Ac. for the Distributary and Field Canals.

C. PREVENTATIVE MAINTENANCE PROGRAM

Under the Project a Preventative Maintenance Program is being carried out on the Ridi Bendi Ela Scheme in the Kurunegala Range. The Ridi Bendi Ela Scheme was rehabilitated between 1978 - 1983 but the system had deteriorated during the intervening period so a program of Preventative Maintenance Works was initiated in 1989.

In the Ridi Bendi Ela Scheme, the Preventative Maintenance Program is being carried out by priority rehabilitation of the LB, RB and Center Canal Systems. The status of the Preventative Maintenance work on RBE as of the end of June 1992 is shown on Table III-2-5.

TABLE III-2-5

RIDI BENDI ELA
STATUS OF PREVENTATIVE MAINTENANCE WORK

SP NO.	DESCRIPTION WORK	% COMPLETE AS OF 30/6/92
1	PR & WM Work LBMC	68.7
2	PR & WM Work RBMC / Central Canal	61.5
3	PR & WM Work Inlet Canal	83.2
4	Modification to /Inlet Canal	100.0
5	Modification to /Inlet Canal	86.3
6	Modification to /Inlet Canal	73.6
7	Modification to /Inlet Canal	20.0
8	Modification to /Inlet Canal	15.0
9	Modification to /Inlet Canal	0.0
10	Modification to /Inlet Canal	0.0
11	Modification to /Inlet Canal	0.0
12	PR Field Canal RBMC	97.2
13	PR F/C LBMC	67.8
14	PR D/C & F/C Inlet Canal	72.7
15	PR F/C Center Canal	75.0
16	PR LB off RBMC	0.0
17	PR LB off LBMC	100.0

3.2.4 ACCOMPLISHMENTS IN AMPARA RANGE - 1/1/91 - 30/6/92

A. ANNUAL MAINTENANCE PLAN - MAIN SYSTEM

Under the Gal Oya Left Bank Scheme the development of the Annual Maintenance Plan for the Main System component was completed and finalized by 30 March 1992 including the Headworks of Senanayake Samudra, LBMC, Branch Canals and Inlet canals to the Headwork for the Tanks along the Canal. The Annual Maintenance Cost for the Left Bank Main Canal System is presented on Table III-2-6.

TABLE III-2-6

ANNUAL MAINTENANCE COST OF THE MAIN SYSTEM COMPONENT
GAL OYA LEFT BANK SYSTEM (61,750 Ac.)
(31 MARCH 1992)

			ANNUAL COST (RS.)
A.	Headworks / Senanayake Samudra	=	215,425
B.	LB Main Canal	=	1,331,500
C.	Branch Canal off LBMC	=	2,600,000
	Sub-Total	=	4,146,925
	Contingencies @ (7.23%)	=	299,823
	Sub-Total (67%)	=	4,446,748
	Dept. O/H (33%)	=	2,190,189
	Total-Annual Cost	=	6,636,937
		= Rs.	107.5/Ac.

The progress on the development of the Annual Maintenance Plan for the Main System Components of the Gal Oya Right Bank was completed by 30 June 1992. By 31 March 1992, the Walk-Through Maintenance Survey and Cost Estimates and other related documents were completed for the RB main Canal from station 0+000 to station 35+208. Work on the Walk-Through Survey for the intermediate Tanks and ten Branch Canals totalling 90 kilometers was initiated in early April and completed by 31 May 1992. Annual Maintenance Cost of the Main System Components for the Gal Oya Right Bank System as of 30 June 1992 is presented on Table III-2-7.

TABLE III-2-7

AMPARA RANGE
ANNUAL MAINTENANCE COST OF MAIN SYSTEM COMPONENTS
GAL OYA RIGHT BANK SYSTEM (34,474 AC) AS OF 30/6/92

			ANNUAL COST
A.	RB Main Canal (Km 0.0-Km 35.2)	=	1,745,000.00
B.	Branch Canal off LBMC	=	2,529,000.00
	Sub-Total	=	4,274,000.00
	Contingencies @ (7.23%)	=	309,010.20
	Sub-Total (67%)	=	4,583,010.20
	Dept. O/H Indirect Costs 33%	=	2,237,303.540
	Total Annual Cost	= Rs	7,820,312.70
			Rs.198.42/Ac.

B. ANNUAL MAINTENANCE PLAN - DISTRIBUTARY SYSTEMS

The preparation of the Annual Maintenance Plans for the requested 54 DCFOs on the Left Bank and the 36 DCFOs on the Right Bank were in progress as of 30 June 1992. As of that date, work in only 34 DCFOs of the 54 DCFOs on the Left Bank have been surveyed and only 11 of the 36 DCFOs in the Right Bank surveyed. Exhibit III-2-17 (3 sheets) presents the Status of Annual Maintenance requirement as of 30 June 1992.

Only in one DCO on the Left Bank has the complete Annual Maintenance Plan been finalized. This was prepared by Sheladia's Ampara Engineering Assistant for use by the ID as a guide for completing the Annual Maintenance Plans for the remaining 53 DCFOs on the Left Bank and 36 DCFOs on the Right Bank.

C. PREVENTATIVE MAINTENANCE PROGRAM - GAL OYA LB

Under the Project, a Preventative Maintenance Program is being carried out on the Gal Oya LB System in the Ampara Range. The Gal Oya LB was rehabilitated between 1980 - 1985 and the system has deteriorated during the intervening period, so a program of Preventative Maintenance works was initiated in 1989.

The main goal of the Preventative Maintenance Program under the ISMP is to bring the system up to a condition where it will be possible to sustain the System after ISMP is over without further need for major rehabilitation by implementing the long term Preventative Maintenance Program developed under the Project.

On the Gal Oya Left Bank Preventative Maintenance Program, the status of completion of work is presented on the following Table III-2-8 as of 30 June 1992.

TABLE III-2-8

GAL OYA LEFT BANK
PREVENTATIVE MAINTENANCE WORK

SP NO.	DESCRIPTION OF WORK	COMPLETED AS OF 30/6/92
1	LBMC (Km 3.5;Km 24.34.3) D. Chl LB-22.12 Km	73.7
2	UBC (Km 0-14);(MB (Km 0-15.4)	55.9
3	UB 7, 9, 11 & M5-4, M8, 11, 12	62.5
4	LBMC LB-2, LB1A, LB-10-12, G-4, G13	0.0
5	Kalgurai 2-3 & 3-4	81.3
6	Sananinuvai 1-2, 2-4, 4-5, 5-7, 7-8 & 9-12	63.6

3.3 IMPROVEMENTS TO IRRIGATION SYSTEMS OPERATIONS

The implementation of the Action Plan set up at the inception of the Project to improve operations under the ISMP as outlined in Chapter II was stepped-up upon my assumption as the new SAI O&M Engineer for the Project. As mentioned earlier, most of the activities programmed under the Action Plan could not be fully achieved due to the low priority given to Water Management Improvement Programs at the early stage of the Project. The Action Plan was reviewed and the necessary steps to be taken had been mapped out for the implementation of the Plan. As of the end of my assignment, most of the programs under the Action Plan have been implemented.

3.3.1 IDENTIFICATION AND ESTABLISHMENT OF FIELD OPERATION UNITS AND SUB-UNITS AND THE DEVELOPMENT OF WATER MANAGEMENT ORGANIZATIONS, AND STAFF JOB DESCRIPTION FOR THE ORGANIZATION.

The five Field Operations Units (FOU) for the Giritale Scheme have been established. These are the Giritale FOU, Jayanthipura FOU, Dambalawewa FOU, Chandana Pokuna FOU and the Main Canal FOU. Each FOU is under the supervision of a TA and serves three DCFOs.

A Functional Chart is presented as Exhibit III-3-1 and the Organization Chart of the Scheme Water Management Cell is presented as Exhibit III-3-2. Scheme, Layout maps, Control and Issue Tree Diagrams and the Scheme Water Management Operations Chart are on display in each of the five Field Operations Units. A log book for daily gauge height and rain gauge readings are also provided and kept in these FOU offices.

The Job Descriptions of all the staff members of the Organization have been prepared not only for the Giritale Scheme but for all the other six Schemes as well. The Job Descriptions for the staff of the Giritale Scheme Organization Chart is presented as Exhibit III-3-3.

In the Ridi Bendi Ela Scheme in the Kurunegala Range, the three Field Operation Units needed for field operations have already been established. These are the Katagamuwa FOU, Kebellawa FOU and the Balagallagama FOU. The displayed visual aids in the FOUs in the Giritale Scheme are also displayed in the FOUs of the RBE Scheme.

In the Kaudulla Scheme, the location of the four FOUs have already been identified and are being readied for operation very soon. In the Minneriya, Parakrama Samudra and Gal Oya RB and Gal Oya LB Systems, the existing Field Operations Units are being utilized but these have to be up graded to the Giritale and RBE standards.

3.3.2 ESTABLISHMENT OF TWO-WAY COMMUNICATIONS BETWEEN OPERATION CENTERS AND FIELD OPERATIONS UNITS

The original plan was to use a two-way (walkie-talkie) communication system to transmit field data from FOUs to the Division Operation Centers. This would have been the fastest means of transmitting field data but due to local conditions in some parts of the country, the plan was dropped and instead the use of bicycles and telephones where available are being used.

In the Giritale Scheme, transmittal of water gauge height, rain gauge, cropping data, etc, is being done by Patrol Labourers based on the Scheme Water Management Operation Chart presented as Exhibit III-3-4. Based on this chart, a more detailed procedure on how field data is collected and transmitted to the Field Operations Units and to the Division Operations Center was developed. This detailed procedure for the Giritale and Minneriya Schemes is presented as Exhibit III-3-5.

Scheme Water Management Operations Charts have been prepared for all the seven Schemes within the Project area but detailed data collection procedures were prepared only for Giritale, Minneriya and Gal Oya Schemes. The other Schemes have not as yet completed the preparation of this procedure.

3.3.3 UPDATING OF ISSUE TREES AND PREPARATION OF SCHEMATIC WATER DISTRIBUTARY DIAGRAMS.

Control and Issue Trees / Schematic Water Distributary Diagrams showing the location of control, monitoring and outflow / inflow points have already been prepared for all the Schemes. The boundaries of the coverage of each DCFO have also been demarcated and the code number for the monitor, inflow and outflow nodes have been indicated. These Control and Issue Tree Diagrams are displayed in FOU offices and at the Division Operations centers. The up-dated Control and Issue tree Diagram for the Giritale Scheme is presented as Exhibit III-3-6.

3.3.4 INSTALLATION OF RAIN GAUGE NETWORK

Rain gauges have been installed in all the Schemes within the ISMP area. In the Giritale and RBE Schemes, rain gauges are installed in the vicinity of the FOU offices to ensure that readings are taken daily. Data on exceptionally heavy rains are transmitted to the Division Operations Centers immediately so adjustments in the flow in the canals could be made accordingly. Rain gauge readings are collected daily from the FOU offices by the Gauge Readers assigned to collect field data which are fed into the Computer Assisted Operations Model (CASOM) everyday.

3.3.5 ESTABLISHMENT OF CONTROL AND MEASURING DEVICES IN THE MAIN AND BRANCH CANALS AND AT BOUNDARIES OF DCFOs

The location and type of water measurement devices for the Main and Branch Canals identified during walk-through operations surveys carried out in the Schemes within the Polonnaruwa Range and in the Ridi Bendi Ela Scheme in the Kurunegala Range have been established. With the formation of DCFOs within each Scheme additional locations for measuring devices at the boundaries of these DCFOs have been identified and established. These measurement devices are identified as Monitor Nodes with corresponding code numbers for purposes of entering the gauge height reading in the CASOM. The location of measuring devices at the boundaries of the DCFOs in all seven Schemes within the ISMP area have already been identified. Those established are in Giritale, Kaudulla High Level Canal, and Ridi Bendi Ela.

In the other Schemes, some measuring devices have been established while the others that are already in place will have to be improved or replaced with the new plastic gauges.

3.3.6 ESTABLISHMENT OF CONTROL AND MEASURING DEVICES IN DISTRIBUTARY CANALS.

Headgates of Distributary Canals have been provided by screw type sliding steel gates to control the flow of water into the D-Canals. Different type plans for the installation of turnout Steel Gates were used in the different Schemes within the ISMP area. The type of turnout structures constructed which are considered most economical but essentially sturdy for the purpose are those constructed in the Ampara Range and Kurunegala Range. Some of these types of structures have also been constructed in some D-Canals of the Parakrama Samudra Scheme in Polonnaruwa Range. Photos of these type of structures are presented as Exhibit III-3-7. Measuring devices in distributary canals have been located and established. Most of these measurement structures are installed near the headgate of the D-Canals where the flow is already stable or no longer turbulent. In places where the flow is no longer turbulent at the downstream portion of the headgate structure the plastic gauges are installed in these places. In places where a drop structure is constructed a few meters downstream of the location of these measuring devices, it was suggested to calibrate these drop structures and use them as measuring devices and / or to check the accuracy of the calibration of the measuring device upstream of the drop structure. Where no structures are available near the headgate of the D-Canal or if at the downstream end of the headgate structure, the flow is still turbulent a gauge post is installed or retaining walls are constructed on both sides of the canal and a plastic gauge is installed on one side. This becomes a gauging station for the D-Canal with a regular area and calibration would be easier and more accurate. Where the drop in water surface is sufficient to warrant free flow condition, a cut throat flume is usually constructed. The location and type of measuring devices installed in the Giritale Scheme is presented in Exhibit III-3-6.

3.3.7 ESTABLISHMENT OF CONTROL AND MEASURING STRUCTURES IN FIELD CANALS

To control the flow of water to Field canals, pipe outlets were constructed at off-takes of F-Canals. Wooden gates with provision for locking the gates are provided. In some cases, where the pipe outlets are only 3 inches in diameter, the wooden gates are left with the DCFO concerned for installation since it is the DCO Jalapalaka assisted by the F-Canals representative who attends to the water distribution in these canals. No measurement structures have yet been installed in Field canals, but these canals will be calibrated once a year with the use of a portable cut throat flume which rates will be used as data to be entered into the CASOM.

3.3.8 CALIBRATION OF MEASURING DEVICES AND ASSESSMENT OF CANAL LOSSES, SEEPAGE AND PERCOLATION IN THE SYSTEMS.

The Technical Assistants from all the seven Schemes who have been trained to undertake calibration of measuring devices, assessment of canal losses, seepage and percolation have undertaken calibration of measuring devices in their respective Schemes. In the Giritale Scheme calibration of all the 78 measuring points identified have been completed. In the Kaudulla Scheme High Level Canal 24 measuring points have been calibrated while in Ridi Bendi Ela Scheme in the Kurunegala Range 25 measuring points have been calibrated and is continuing. In the other Schemes calibration of measuring devices is still on-going. Assessment of canal losses is still going on in all the Schemes. Results of previous percolation losses from previous researches in the Polonnaruwa Range are being used in the absence of results of new researches on percolation losses.

3.3.9 ESTABLISHMENT OF A METEOROLOGICAL STATION IN POLONNARUWA

A Meteorological Station was set up in Polonnaruwa for monitoring rainfall, sunshine, temperature, wind, humidity, etc. This station had been the source of data used in programming the Computer Assisted System Operation Model. Monitoring of the various parameters in the Station is continuing and should there be variations in the previous data used in the CASOM the new data should be used in the Model. The data being recorded and compiled could be used to forecast weather condition sin the area which could be used in pre-seasonal planning for the on-coming cultivation season.

3.3.10 DEVELOPMENT OF THREE COMPUTER MODELS

Computers have been installed at the Range Operation Center at the DDI Polonnaruwa Range Office. In the Division Operation Centers for the Hingurakgoda and Kaudulla Divisions in the Polonnaruwa Range and in Nikaweratiya Division, Kurunegala Range computers have also been installed. In Ampara, a new Computer was also installed to replace the old computer being used in that Scheme. The three computer models previously developed have been installed in all these computers as stated in Chapter II.

3.3.11 REFINEMENT OF THE SYSTEM OPERATION MODEL.

As mentioned in Chapter II, Irrigation Engineers from ISMP were sent to Utah State University for training in the use of micro Computers for water management. They, in turn, trained Technical Assistants of the different Schemes on this subject. The TAs trained in the use of the micro-computers for water management were assigned to head the Division Operation Centers and the

Irrigation Engineers were assigned to head the Range Operation Centers and to coordinate the utilization of the CASOM in the Division Operation Centers within the Range. The Computer Assisted Systems Operation Model in Giritale was utilized during Yala season 1991 and Maha Season 1991-1992. In 1990 when the CASOM was first tested, only 9 measuring points were entered. In the Maha season 1991 - 1992, 61 measuring points were entered consisting of 15 monitor nodes but only 11 were monitored and 46 outflow modes of which 24 points were monitored.

Some problems have been encountered in the use of the CASOM. In the sorting of nodes, the monitor nodes could not be inserted where they should be inserted without undesirable effects on the screen. This is necessary in order to determine the amount of water flowing at the boundary of each DCFO. This and other problems encountered and some suggestions for the refinement of the model were transmitted to Dr. Gary P. Merkley who programmed the model. The letter to Dr. Merkley is presented as Exhibit III-3-7 and his letter regarding the refinements he made to the program is presented as Exhibit III-3-8. Other refinements to the program are being undertaken. Additional measuring devices have been installed and entered into the CASOM. The Weekly Water Management Evaluation Report printout are being analyzed by the Divisional Assistant / Additional IE and the Head of the Range Operation Center.

Canals or measuring points indicating higher or lower water management indices are analyzed and field verified jointly by the IA and the DCFO Water Master (Jalapalaka) concerned. Based on the results of their findings, they quantify the actual water requirement for such nodes jointly verified and make necessary recommendations to the DA / Add'l IE / Head of the Range Operation Center for refinement of the Model. The result of the joint walk-thru field verification may be compared to the theoretical water requirement as incorporated in the Seasonal Water Report Computer Model. The estimated water requirements for low land paddy in Polonnaruwa was based on the Diyasenpura evapo-transpiration data, probable monthly rainfall and average seepage and percolation values. A printout of the Weekly Water Management Evaluation Report for the Giritale Scheme is presented as Exhibit III-3-9 and the Seasonal Water Report for the Yala Season 1991 is presented as Exhibit III-3-10.

3.3.12 ASSESSMENT OF OPERATIONS COST OF OPERATION FOR THE MAIN SYSTEM AND DISTRIBUTARY SYSTEM

The source of the Annual Operation and Maintenance Funds for Irrigation Schemes within the ISMP area is the Irrigation Management Division and the Irrigation Department. The funds are given in lump sum to the Deputy Director of Irrigation of the Range who allocates the funds to the various Schemes within the Range. In the assessment of the operations cost for the Main

System in the Giritale Scheme, a TA works full time on operations activities. He supervises all the activities of the operation phase of O&M including the operation of the Division Operation Center and the Field Operation Units. He is supported by TAs, WSs and PLs assigned to the various FOUs. In the assessment made, the time spent for operations by each member for the FOU was taken into consideration since these personnel play dual roles for operation as well as maintenance. In the assessment where salaries of TAs was included, the estimated cost was about Rs. 75 per acre. If the salaries of TAs was excluded the cost would be only about Rs. 63 per acre. The Irrigation Department provides salaries of Work Supervisors and permanent laborers, so if these items are also excluded the operations cost would be very much less since the salaries of WSs and PLs would be about 57% of the cost per acre per year. The allowances of TAs and WSs and the overtime pay of laborers are not considered as salaries, hence, they are included in the computation.

In the assessment of the operations cost for the Distributary Canal System, a DCO Water Master (Jalapalaka) was considered to be working full time for 8 months during a year and is compensated as such. He is also allotted a bicycle allowance so he could be mobile. FCRs assisting him will are compensated based on the time they spend for operation, equivalent to about 1.5 hours per day for 8 months. With these considerations, the estimated cost for operations within the D-Canal System would amount to about iRs. 32.00 per acre. The assessment of the Operations Cost for the Main System and the Distributary System in the Giritale Scheme is presented as Exhibit III-3-11.

IRRIGATION SYSTEMS MANAGEMENT PROJECT

POLONNARUWA RANGE

REHABILITATION WORK PROGRAM 1987 – 1992

SCHEDULED AND ACTUAL PROGRESS

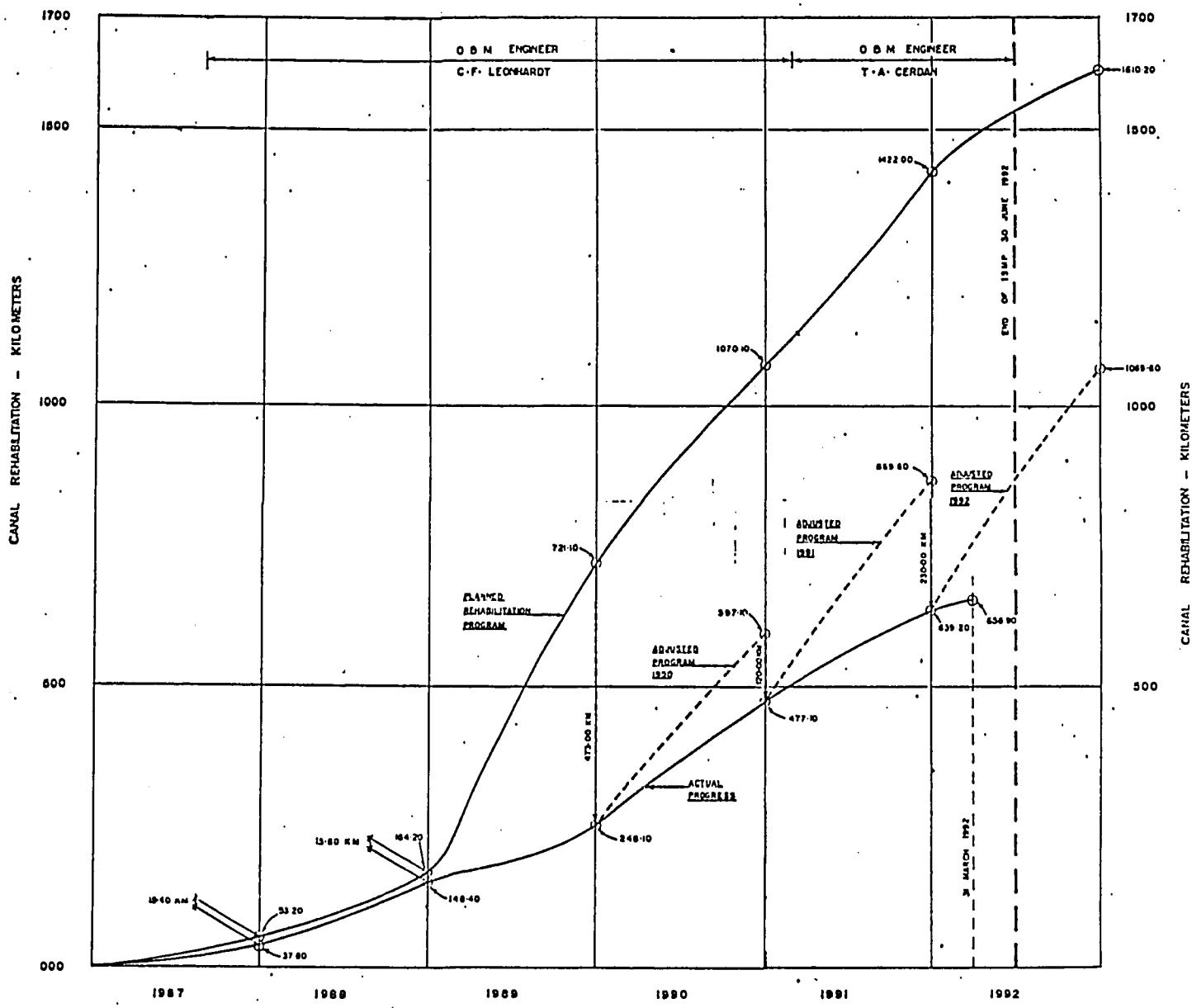
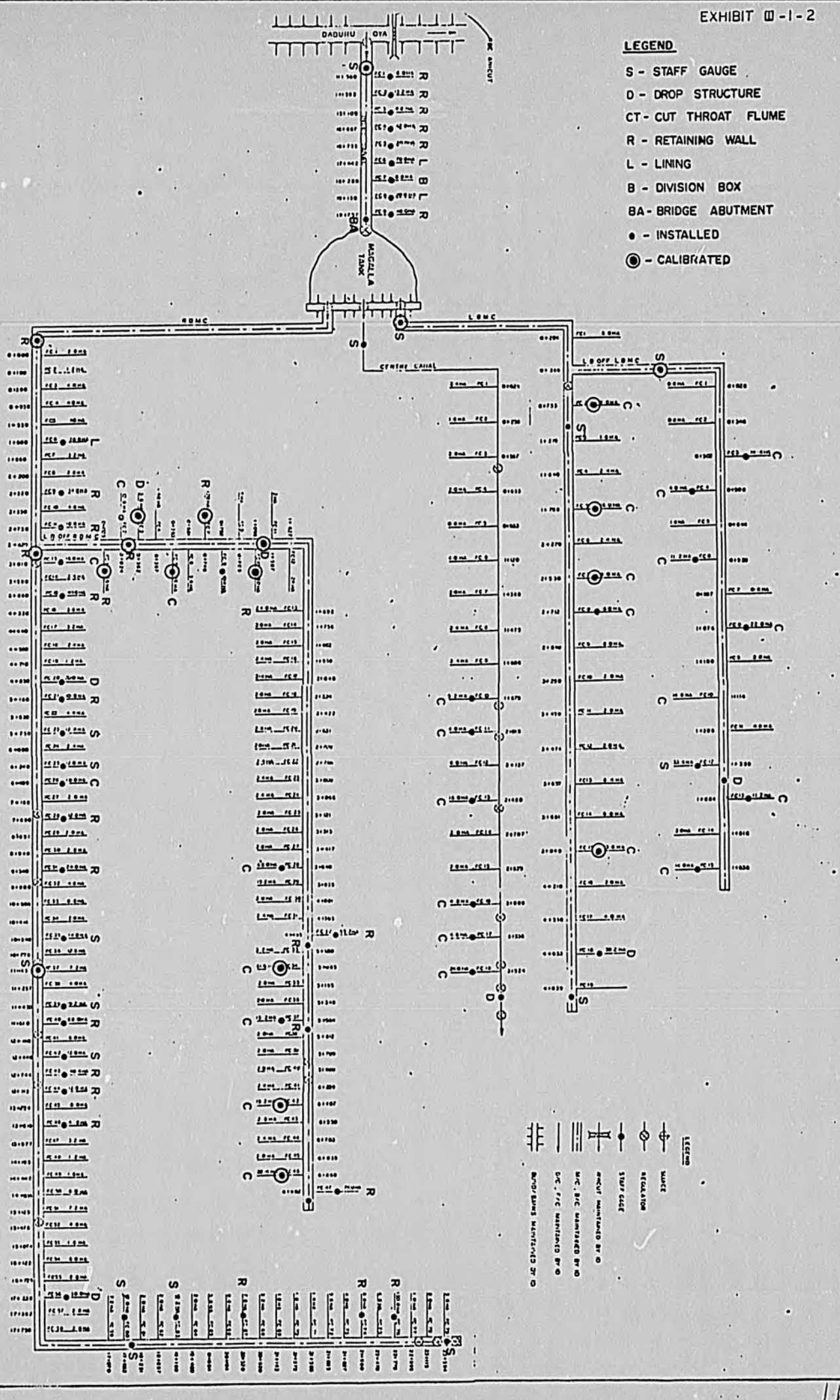


EXHIBIT E-1-2



CONTROL & ISSUE DIAGRAM - RIDI BENDI ELA SCHEME

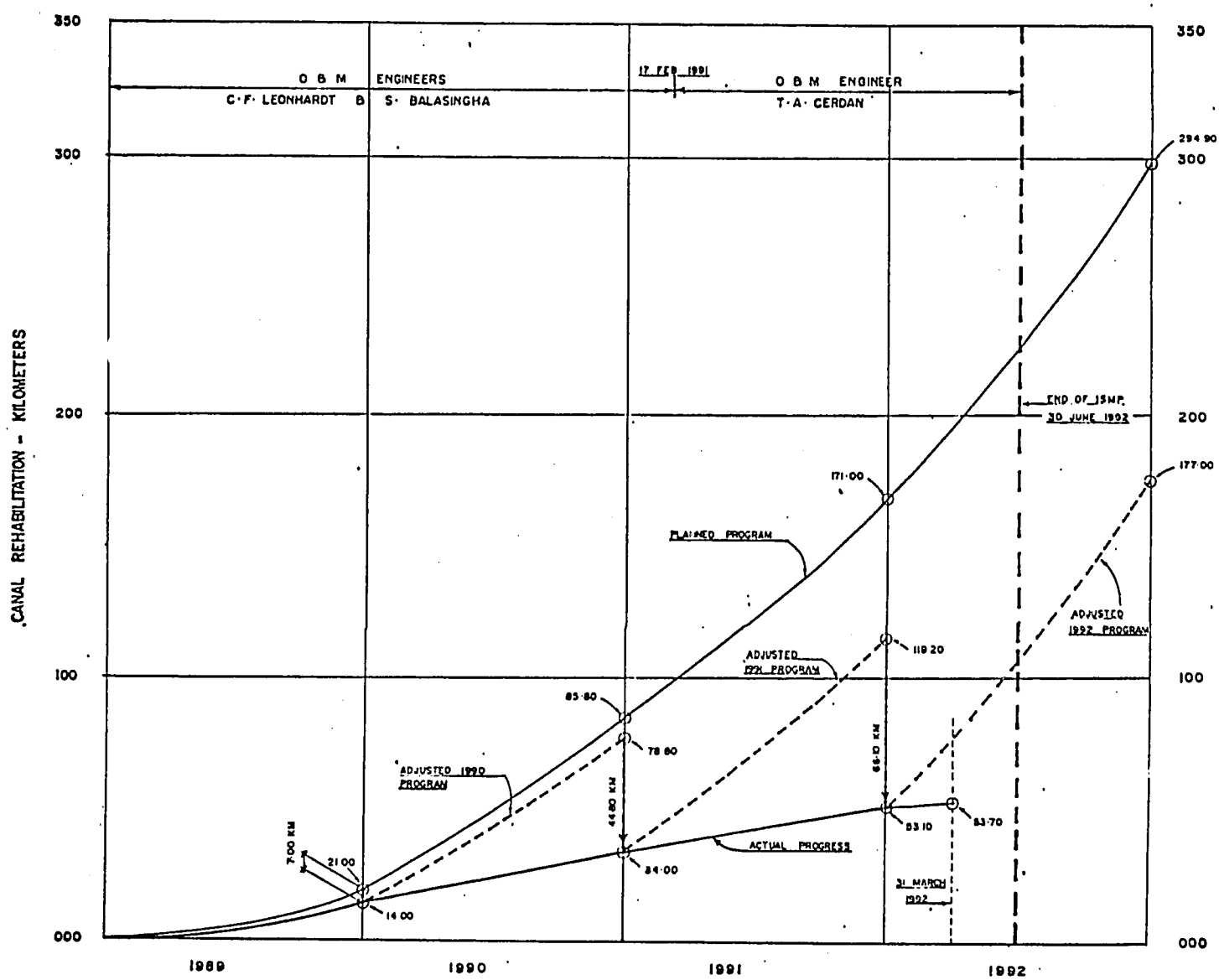
IRRIGATION SYSTEMS MANAGEMENT PROJECT

AMPARA RANGE

PRAGMATIC REHABILITATION WORKS GAL OYA RBMC

1989 TO 1992

PLANNED PROGRAM & ACTUAL PROGRESS



Irrigation Systems Management Project
New Town Polonnaruwa
Certificataion Inspection Report on SP - 20
Defficiencies found and Recommendations Made

Date: 27 June 1991

SI	STN	Description of Work	Acomp. % Repo.	Fond	Defficiencies Found	Recommendations
2		Imp to D1 Chl 3.0-3.975Km				
		Imp to bund with R/wall and earth filling	100	80	E/work incomplete	Back filling should be done
6,7		Imp to FC 10				
8,9						
		Construction of FTO	100	75	One FTO not done	Pls. consult the FTO
		Imp to FC 12		0	Work not commenced up to 12/6/91	Pls. commence work,
		Imp to FC 16				
3		1:3:6 Concrete		95	Coller concreting not done	Coller concreting should be done to prevent leak & heavy damages to bund
4		Supplying & fixing of wooden gates		0	Gates were not fixed	Supply and fix the gates.
6		Back filling around structures		50	Insufficient earth work	Back filling should be done
9		1:3:6 Concrete		95	Coller concreting not done	Coller concreting should be done to prevent leak & heavy damages to bund
10		Back filling around structures		50	Insufficient earth work	Complete back filling should be done
		Imp to FC 18				
1-5		Construction of FTO		75	2 FTOs not constructed. Fareers not using the FTOs to divert water, they cut the bund.	Pls. construct the FTOs. This practice should be stopped and encourage the farmers to use the FTOs.

CIRSP-20.WK1

Irrigation Systems Management Project
New Town Polonnaruwa
Certificataion Inspection Report on SP - 20
Defficiencies found and Recommendations Made

SI	STN	Description of Work	Acomp. % Repo.	Fond	Defficiencies Found	Recommendations
		Imp to FC 19				

3		1:3:6 Concrete		90	Coller concreting not done	Immediate action necessary to stop leaking.
6		Back filling around structures		50	Insufficient earth work	Complete back filling should be done.
		1:3:6 Concrete		90	H/W Concreting not done	Please complete Head Wall concreting work.
		Imp to FC 22			Work not commenced up to 12/6/91	
		Imp to FC 22A			Work not commenced up to 12/6/91	These 5 sructures must be constructed
		Imp to FC 26			Work not commenced up to 12/6/91	otherwise 100% certification could not be done. There is only one construction
		Imp to FC 21			Work not commenced up to 12/6/91	seson left to complete all these works.
		Imp to FC 27			Work not commenced up to 12/6/91	

CIRSP-20.WK1

EXHIBIT III-1-5

IRRIGATION SYSTEMS MANAGEMENT PROJECT

NEW TOWN , POLONNARUWA

MONITORING SURVEYS, DESIGNS AND CONSTRUCTION

SCHEME : GIRITALE

QUARTER ENDING: 31ST MARCH 1992

CANAL	TOTAL LENGTH (Km)	COMPLETED AS OF LAST QUARTER			COMPLETED THIS QUARTER			COMPLETED AS OF THIS QUARTER			REMAINING FOR 1992 PROGRAM			REMAINING FOR LIFE OF PROJECT		
		SURVEY	DESIGN	CONST-RUCTION	SURVEY	DESIGN	CONST-RUCTION	SURVEY	DESIGN	CONST-RUCTION	SURVEY	DESIGN	CONST-RUCTION	SURVEY	DESIGN	CONST-RUCTION
M.C.	5.60	1.60	1.60	1.60	–	–	–	1.60	1.60	1.60	4.0	4.0	4.0	–	–	–
B.C.	10.70	10.70	10.70	10.70	–	–	–	10.70	10.70	10.70	–	–	–	–	–	–
D.C.	38.96	38.96	22.62	20.64	–	4.65	0.39	38.96	27.27	21.03	–	11.69	17.93	–	–	–
F.C.	118.05	118.05	88.55	53.12	–	11.79	1.18	118.05	100.34	54.30	–	17.71	63.75	–	–	–
DRN.					NO PROGRAM FOR 1992											
TOTAL	173.31	169.31	123.47	86.06	–	16.44	1.57	169.31	139.91	87.63	4.00	33.40	85.68	–	–	–

PROJECT PROGRESS STATUS REPORT
PARAKRAMA SAMUDRA SCHEME
AS OF 31, MARCH 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
	1987 WORK					
2	D1 Main (km 1-5.7)	1,464,750	5.66	100	5.66	1,464,750
3	D1 North (km 0-3.0)	945,000	3.65	100	3.65	945,000
4	D1 North (km 3.0-4.0)	---	---	---	---	---
5	D1 North (km 4.0-8.0)	1,260,000	4.86	100	4.86	1,260,000
7	D1 East(km0-3.59)	1,130,850	4.37	100	4.37	1,130,850
8	D2 Main (km 0-4.25)	1,000,875	3.86	100	3.86	1,000,875
9	D1 East (km 3.57-5.0)	332,100	1.28	100	1.28	322,100
	1988 WORK					
6	D/1 North (km8.0-10.5)	496,125	1.92	63	1.21	496,125
10	D1 North (km10.5-11.69)	213,665	0.82	57	0.47	213,665
11	D/1North(km11.69-13.95)FC55	463,010	1.79	54	0.97	232,580
12	D1 East (km5.0-9.20)	1,323,000	5.11	75	3.83	992,250
14	D2 Main(km4.25-5.80)	488,250	1.89	65	1.23	315,930
16	RB21/D1 North	1,782,550	6.88	75	5.16	1,136,360
18	LB2/RB21(km0-1.44)	441,000	1.7	75	1.28	330,750
19	LB2/RB21(km1.44-6.22)	867,020	3.35	65	2.18	548,745
23	LB3/D1 East (km0-3.22)FC143					
	LB3/D1E FCC 1,2,4-7	971,235	3.75	66	2.48	640,640
	1989 WORK					
1	D1 Main (km0-1.0)	315,000	1.22	100	1.22	315,000
13	D1 East (km9.20-12.8)	687,600	2.65	69.15	1.83	475,475
15	D2 Main(km5.79-8.46) >					
	RB6/D2 Main(km0-2.80) >	1,877,410	7.25	52.2	3.78	532,700
	RB9/D2 Main(km0-1.04) >					
17	RB21/D1 North(km4.8-8.72)	748,720	2.89	75	2.17	561,540
20	LB1/D1 East (km0-4.83)	922,530	3.56	75	2.67	691,898
21	Off D1East B10/LB1(0-2.625)					
	FC1-7 B10/LB1	565,215	2.18	64.19	1.4	362,812
22	B11/LB1/D1 East(km1.0-2.71)	326,610	1.26	0		
24	RB18/D1 North(km0-1.09)	343,350	1.33	63.17	0.84	218,714
25	RB18/D1N(km1.09-3.185)	400,145	1.55	61	0.95	244,088
26	D1/RB18/D1N(km0-3.30)	630,300	2.43	0		
27	D2/RB18/D1N(km0-3.37)	643,670	2.49	0		
28	LB1/RB18/D1N(km0-4.585)	875,735	3.38	0		
30	FC9/LB1/RB18/D1N(km0-0.615)					
	FC11/FC9/LB1/RB18D1N(0-1.05)	266,505	1.03	0		
	FC4/LB1/RB18/D1 N(0-1.6)					
31	FC1/RB18/D1N(0-0.55)					
	FC21/RB18/D1N(0-0.790)					
	FC26/RB18/D1 N(0-0.39)	110,010	0.42	0		
	FC23/RB18/D1 N(0-0.20)					

PPSRc

PROJECT PROGRESS STATUS REPORT
PARAKRAMA SAMUDRA SCHEME
AS OF 31 MARCH 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
32	RB17/D1 N(0-2.848)					
	FC-14/RB17/D1 N(4.63k)	1,027,790	3.97	0		
33	RB9/D1 E(0-2.0)					
	FCO/RB9/D1 E (0-1.04)					
	FCOA/FCO/RB9/D1 E(0-0.54)					
	FCOB/FCO/RB(/D1 E(0-0.296)					
	FC1-3,5,5A/RB9/D1 E(2.533)	778,760	3.01	0		
34	RB10/D1 E(0-2.515)					
	RB12/D1 E (0-1.672)	799,717	3.09	75	2.32	600,000
35	D3 North (km0-2.81)	536,710	2.07	59.4	1.23	318,800
36	D3 South(km0-4.525)	864,275	3.34	56	1.87	483,994
	Total	25,899,482	100		63	15,835,641

PPSRc

Note: 0-Certifitation Pending
Sub-Project 4+29 - Estimate Pending

PROJECT PROGRESS STATUS REPORT
MINNERIYA SCHEME
AS OF MARCH 31, 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
	1987 WORKS					
	==========					
1	Yoda Ela (km 0-5.0)	1,575,000	5.89	100	5.89	1,575,000
2	Yoda Ela (km 5-10.0)	1,575,000	5.89	100	5.89	1,575,000
3	Yoda Ela (km 10-15.0)	1,575,000	5.89	100	5.89	1,575,000
	1988 WORKS					
	==========					
4	Yoda Ela (km15-18)	1,045,500	3.91	100	3.91	1,045,500
5	Yoda Ela(km18-23.193)	869,827	3.25	100	3.25	869,827
6	DC D31(km0-3.0)	750,000		100		750,000
	Dc LB2(km0-3.272)	818,000	5.86	100	5.86	818,000
7	RB2/D31, FCC	554,760	2.07	75	1.55	416,070
8	RB3/D31-T.Amuna,FCC10-12	439,721	1.64	0	0	
9	FCC10-15/LB2,FC3/LB2	224,516	0.84	0	0	
10	RB1/D31,DC&FC	237,314	0.89	55.54	0.49	131,804
11	DC/D37(km0-5.0)	837,500	3.13	75	2.35	628,125
12	DC/D37(km5-8.274)	548,395	2.05	75	1.54	411,296
	FC/D37 off MYE	28,977	0.11	55	0.06	15,938
13	BC-D28(km0-4.6)	1,603,100	5.99	100	5.99	1,603,100
	DC D28 (km4.6 - 5.0)	67,000	0.25	100	0.25	67,000
	1989 WORKS					
	==========					
14	D28(km5-8.0)2.906	486,755	1.82	75	1.37	365,066
15	D3/A,FCC1-12,D32-D3.64	870,696	3.25	0	0	
16	RB1/D37,FC2-10-RB6/D37	940,654	3.52	0	0	
17	LB1-9/D37,RB7/D37,FCC	813,500	3.04	0	0	
18	D22(km0-3.00)	573,000	2.14	75	1.61	429,750
19	D22(km3-7.315)	824,165	3.08	66.2	2.04	545,600
20	D22-27,D29-30	165,642	0.62	0	0	
21	LB1-6/D28,RB1-5a/D28	888,393	3.32	0	0	
22	Yn1,FC12/YN1/D28	1,228,572	4.59	0	0	
23	LB7-8/D28,FC1-9 LB9/D28	936,221	3.5	0	0	
24	RB6/D28,FC1-7,RB12-13/	503,937	1.88	0	0	
25	D21(km0-6.0)	1,890,000	7.06	75	5.3	1,417,500
26	LB1-2/D21,RB1-5/D21,FC	1,129,534	4.22	0	0	
27	D21,LB3/D21/FCC,CPO/19-22	1,508,370	5.64	0	0	
28	D2-20,LB1,RB3-10,LB7-10/D31	1,242,636	4.65	0	0	
	Total	26,751,685	100		53	14,239,576

PPSRc Note: 0-Certification Pending

PROJECT PROGRESS STATUS REPORT
GIRITALE SCHEME
AS OF MARCH 31, 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
	1987 WORKS					

1	RB Main Canal	1,413,000	14.01	100	14.01	1,413,000
	1988 WORKS					

2	RB Main(0-1.6)	412,800	4.09	100	4.09	412,800
3	RB Main(1.6-6.3)	1,102,150	10.93	100	10.93	1,102,150
4	RB Main (6-9)Fr Tambalawewa	564,000	5.59	100	5.59	564,000
5	Pilot Area	880,460	8.73	0	0	
	1989 WORKS					

6	D21,D21a,D20,D22,D22FC	537,171	5.337	71.5	3.81	384,077
7	D19(0-4.65)LB8-12/D19 RB5-12/D19	893,018	8.85	52.57	4.65	469,459
8	LB1/D19,LB2-6/D19,LB7/D19	418,038	4.14	0	0	
9	RB1-4/D19	312,360	3.1	0	0	
10	D14,D14a,D15,D16,D16a D17(0-2.83)D18	637,180	6.32	0	0	
11	D12,D13,D13Fc	825,440	8.18	56.72	4.64	468,189
12	D8,D9,D10,D10FC,D11	945,205	9.37	61.9	5.8	585,081
13	D7(0-6)	1,146,000	11.36	52.73	5.99	604,286
	Total	10,086,822	100		60	6,003,042

PPSRc

Note: 0-Certification Pending

PROJECT PROGRESS STATUS REPORT
KAUDULLA SCHEME
AS OF MARCH 31, 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
	1989 WORKS					
1	RBMC(KM 0-1.0)	1,268,500	9.40	58.10	5.46	737,000
2	RBMC(KM1.0-3.0)	3,579,200	26.53	53.30	14.14	367,350
3	RBMC(KM 6.0-9.0)	1,137,800	8.44	100.00	8.44	1,137,800
4	RBMC(KM9.0-12.0)	809,600	6.00	53.00	3.18	429,100
5	RBMC(KM9.0-12.0)	1,690,600	12.53	63.30	7.93	1,070,150
6	SYPHONE(KM	1,134,400	8.41	0.00	0	0
7	RBMC(KM12.0-15.0)	1,188,800	8.81	100.00	8.81	1,188,800
8	RBMC(KM15.0-18.0)	1,454,800	10.79	61.60	6.64	896,157
9	RBMC(KM18.0-19.0)	568,729	4.22	60.00	2.53	339,400
10	RBMC(KM 21.0-24.0)					
11	RBMC(KM 24.0-28.0)	656,574	4.87	74.00	3.6	485,800
	TOTAL	13,489,003	100		61	6,651,557

Note: * Not included -PIL not available
0- Certification Pending

PROJECT PROGRESS STATUS REPORT
KAUDULLA SCHEME
AS OF MARCH 31, 1991
(BASED ON AID REIMBURSABLE AMOUNT)

Sub-Proj No	Work Area	Total/Aid Reimb. Amt.	Weighted Percent.	S.P % of Accomp.	Weighted % of Accomp	Amt. of Reimb.
	1987 WORKS					

1	HLMC(km0-0.575)	1,753,125	10.07	100	10.07	1,753,125
2	LLMC(km0-5.000)	1,090,000	6.26	100	6.26	1,090,000
	1988 WORKS					

3	LLMC(KM5-11.30)	1,188,338	6.83	100	6.83	1,188,338
4	LLMC(KM11.3-12.2)	248,050	1.43	100	1.43	248,050
	LLBC(km 0-1.15)					
5	HLBC(km0-0.80)	220,000	1.26	100	1.26	220,000
6	HLBC(km0.8-7.50)	1,685,050	9.68	100	9.68	1,685,050
7	HLBC(km 7.5-9.30)	224,090	1.29	100	1.29	224,090
	HLBC(km9.30-9.67)					
8	D1 off LLMC(km0-1.447)	363,921	2.09	100	2.09	363,921
9	D1 off LLMC(km1.447-2.0)	493,559	2.84	75	2.13	370,169
	RB17D1(km0-3.52)					
10	FC/RB1-36,42,15	384,901	2.21	100	0	
11	FCC 1,2,4,7-RBL off D1)	468,911	2.69	100	0	
	1989 WORKS					

12	FC2offRB-FC1offRB1	870,060	5	75	3.75	652,545
13	FC8 off B4CHL-FC21 Off FC16	472,808	2.72	74.5	2.02	352,242
14						
15	FC9(900-1691)-FC9(0-900)	1,354,505	7.78	75	5.83	1,015,879
16						
17	FC1 OFF LB7 & LB1 off	822,375	4.72	56.8	2.68	458,400
	D1-NEW CHL					
18	LB5 OFF D1 CHL-LB6A off	719,678	4.13	0	0	
	D1 CHL					
19	FC5 off FC3 off D1 CHL-FC6	944,982	5.43	75	4.07	708,740
20	D1 CHL(3-3.975)-FC224,23etc	651,345	3.74	0	0	
21	D2 CHL(KM0-1.0)-FCC's	962,712	5.53	0	0	
22	FC4,5,6 off D1 CHL-FC16/D2etc	1,111,205	6.38	75	4.78	833,404
23	FC2 Tr8-Br CHL 1A	1,024,747	5.89	75	4.42	768,560
24	D2CHL off Br CHL 1A	351,392	2.02	0	0	0
	TOTAL	17,405,754	100		69	11,932,513

PPSRc Note: PIL Pending
0 - Certification Pending

SUMMARY BY RANGE
STATUS OF SUB-PROJECT CERTIFICATION
(31 MARCH 1992)

EXHIBIT III-1-7
Sheet 1 of 2

SCHEME	YEAR	SUB-PROJ. 100% No.	SUB-PROJ. 100% REIMB. (Rs.)	SUB-PROJECTS 75-100% No.	SUB-PROJECTS 75-100% REIMB. (Rs.)	SUB-PROJECTS 75-100% REMAIN. (Rs.)	SUB-PROJECTS 50-75% No.	SUB-PROJECTS 50-75% REIMB. (Rs.)	SUB-PROJECTS 50-75% REMAIN. (Rs.)	SUB-PROJ. 0-50% No.	SUB-PROJ. 0-50% REMAIN. (Rs.)	TOTAL SUB-PROJECTS No.	TOTAL SUB-PROJECTS REIMB. (Rs.)	TOTAL SUB-PROJECTS REMAIN. (Rs.)
PSS	1987	6	6,133,575	--	--	--	--	--	--	--	--	6	6,133,575	--
PSS	1988	6	5,219,168	1	330,750	110,250	2	1,189,758	854,894	--	--	9	6,739,668	965,144
PSS	1989	6	3,266,455	2	1,072,513	375,504	9	4,098,836	2,626,829	2	593,115	19	5,437,804	3,594,648
PSS	1990	4	712,365	--	---	----	1	237,783	219,492	1	191,800	6	950,168	410,492
TOTALS		22	15,331,575	3	1,403,263	485,754	12	5,526,377	3,700,415	3	784,115	40	22,261,215	4,970,284
GIRITALE	1987	1	1,413,000		---							1	1,413,000	
GIRITALE	1988	3	2,078,950		---		1	534,440	346,020	--	----	4	2,613,390	346,020
GIRITALE	1989	1	312,360		---		6	2,854,831	2,129,183	1	418,036	8	3,167,191	2,547,221
GIRITALE	1990	--	--		---					1	131,990	1	-----	131,990
TOTALS		5	3,804,310				7	3,389,271	2,475,203	2	550,026	14	7,193,581	3,025,231
MINNERIYA	1987	3	4,725,000									3	4,725,000	
MINNERIYA	1988	5	5,800,300	1	416,070	138,690	3	1,189,292	679,841	1	244,516	10	6,605,662	1,063,047
MINNERIYA	1989	4	4,355,320	5	3,342,347	1,187,117	2	1,176,291	457,280	4	4,145,220	15	8,873,958	5,789,617
MINNERIYA	1990	1	230,155	2	1,278,142	426,049	1	520,168	491,832	3	1,737,230	7	2,028,465	2,655,111
TOTALS		13	14,310,775	8	5,036,559	1,671,856	6	2,885,751	1,628,953	8	6,126,966	35	22,233,085	9,427,775

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SUMMARY BY RANGE
STATUS OF SUB-PROJECT CERTIFICATION
(31 MARCH 1992)

EXHIBIT III-1-7
Sheet 2 of 2

SCHEME	YEAR	SUB-PROJ. 100% No.	SUB-PROJ. 100% REIMB. (Rs.)	SUB-PROJECTS 75-100% No.	SUB-PROJECTS 75-100% REIMB. (Rs.)	SUB-PROJECTS 75-100% REMAIN. (Rs.)	SUB-PROJECTS 50-75% No.	SUB-PROJECTS 50-75% REIMB. (Rs.)	SUB-PROJECTS 50-75% REMAIN. (Rs.)	SUB-PROJ. 0-50% No.	SUB-PROJ. 0-50% REMAIN. (Rs.)	TOTAL SUB-PROJECTS No.	TOTAL SUB-PROJECTS REIMB. (Rs.)	TOTAL SUB-PROJECTS REMAIN. (Rs.)
KAUDULLA	1987	2	2,843,125									2	2,843,125	
KAUDULLA	1988	5	2,741,111	2	1,558,507	519,502	1	222,038	162,813	1	468,911	9	4,521,706	1,151,226
KAUDULLA	1989	2	2224565	4	2,635,881	796,443	4	1,808,064	858,142	1	962,712	11	6,668,510	2,617,297
KAUDULLA	1990	4	2,361,874	2	1,150,580	383,526				4	1,469,640	10	3,512,454	1,853,166
		13	10,170,675	8	5,344,968	1,699,471	5	2,030,152	1,020,955	6	2,901,263	32	17,545,795	5,621,689
SUB TOTAL PLN RA		53	43,617,335	19	11,784,790	3,857,081	38	13,831,561	8,825,526	19	10,362,372	121	69,233,676	23,044,979
RIDI BEND ELA	1989			1	167,025	55,675	2	672,841	392,059			3	839,866	447,734
	1990	1	134,615	4	3,093,635	906,540	3	1,242,757	469,505	6	7,690,758	14	4,471,007	9,066,803
SUB TOTAL KNG RA		1	134,615	5	3,260,660	962,215	5	1,915,598	861,564	6	7,690,758	17	5,310,873	9,514,534
GAL OYA R	1989-90	7	7,881,645				11	6,583,817	4,047,796	6	5,746,466	24	13,585,462	9,794,262
GAL OYA L	1989-90			1	262,405	87,469	4	1,649,273	952,807	1	425,363	6	1,911,678	1,465,639
SUB TOTAL AMP RA		7	7,881,645	1	262,405	87,469	15	8,153,090	5,000,603	7	6,171,829	30	15,497,140	11,259,901

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ANNUAL MAINTENANCE PLAN MAIN SYSTEM ESTIMATING CRITERIA
HEADWORKS

	Type of Maintenance	Frequency of Maint.	Unit Rate	Estimating Criteria
	TANK BUND/ANICUT STRC/INLET CANAL			
1	Weeding Tank Bund, Inlet Canal and Access Road	Twice a year	Ha	Actual Area
2	Earth Work on Tank Bund/slope	Once a year	km	30 m^3/km
3	Removal of Ant Hills	Once a year	km	3 Nos/km
4	Gravelling Bund Road	Once a year	km	30 m^3/km
5	Desilting along Inlet Canal	Once in 4 yrs	m^3	50% length;depth 3
6	Repairs to paved Surface	Once a year	km	5% Area
7	Removal of Water Plants along Inlet Canal	Once a year	m^2	20% Area along Canal
8	Painting & Marking Historical Data and other Sign Boards	Once a year	m^2	50% Area
9	Repairs to U/S Rip Rap Protection	Once a year	m^3	3m^3/km
10	Repairs to Toe Filter and Drains	Once in 2 yrs	m^2	Actual Area
11	Repairs to Bathing Steps(1:3:6 Conc)	Once in 5 yrs	m^3	0.1m^3/yr
12	Repairs to R/Walls/Toe walls	Once in 5 yrs	Lm	Rs. 10/Lm
13	Repairs to Inlet Regulator (1:3:6 Conc.)	Once in 5 yrs	m^3	10m^3
	SLUICE STRUCTURE/GATES/LIFTING MECHNISM			
14	Repairs to Struc with 1:3:6 concrete	Once in 5 yrs	m^3	0.2m^3/yr
15	Lubrication of Sluice Gates	Once a year	kg	2kg/gate
16	Cleaning Gate Grooves Guides and Painting with Anti-corrosive paint	Once a year	Lts	2 Lts/gate
17	Painting/White washing Sluice Struct. (2 coats)	Once a year	m^2	Actual Area
18	Painting Sluice Gates/Trash Rack with Anti-Corrosive Paint	Once a year	Lts	3 Lts/Gate
19	Painting Staff Gage on Sluice	Once a year	EA	All faces
	SPILL STRUCTURES/GATES/LIFTING MECHANICM/TAIL CHANNEL			
20	Repairs to Struc with 1:3:6 Conc.	Once in 5 yrs	m^3	0.4m^3/yr
22	Cleaning & Painting Metal Surfaces	Once a year	Lts	10 Lts/gate
23	Lubrication of Lifting Mechanisms/ Bearings & Cables	4 x a year	Kg	2kg/gate
24	Repair/Replacement of Spill Gates Rubber Beadings/Seals	Once in 5 yrs	Lm	-----
25	Replace Stop Logs on Spills	Once in 3.yrs	Set	-----
26	Repairs to Natural Spillway Crest/Road with 1:3:6 Concrete	Once a year	m^3	0.5m^3
27	Clearing Natural Spillway/tail and Approach Channel of Obstructions	Once a year	Lm	1.0 m^3/Lm width

ANNUAL MAINTENANCE PLAN MAIN SYSTEM ESTIMATING CRITERIA
MAIN AND BRANCH CANALS

	Type of Maintenance	Frequency of Maint.	Unit Rate	Estimating Criteria
1	Weeding alog Canal Bund	twice a year	Ha	-----
2	Desilting along Canal Bund (Heavy)	once in 2 yrs	m^3	50% length 3" depth
	Desilting along Canal Bund (Light)	once in 2 yrs		33% length 3" depth
3	Earth work on MC/BC	once a year	km	15m^3/km
4	Lubricating Regulator Gate	1 x year	kg	2kg/gate.
5	Lubricating of T.O gate	4 x year	kg	1/2 kg/gate
6	Replace Stop Log Planks	once in 4 yrs	sest	-----
7	Repairs to Dry Rubble Packing	once in 2 yrs	m^2	Rs. 6/m^2
8	Paint Gates w/Anti-crossive Paint Large/Small	once a year	Lts	2 Lts/gate
9	Painting Number & Station on Struc.	once a year	Lts	0.1 Lt/Struc.
10	Repairing Retaining Walls	once a year	Lm	Rs.5/Lm
11	Gravelling Roads	once a year	km	25m^3/km
12	Removing Water Plants	once a year	m^2	20% Area along chl
13	Removal of Ant Hills From Chl Bunds	once a year	km	2 Nos/km
13	Repairs to Rubble Pitching	once a year	m^2	10% of area
14	Repairs to Structures w/1:3:6 Conc.	varies	m^3	
	Bridges	once in 5 yrs	m^3	0.2m^3/yr
	Regulators	once in 5 yrs	m^3	0.4m^3/yr
	TO Structures	once in 2 yrs	m^3	0.375m^3/yr
	Chl. Profiles	once in 5 yrs	m^3	0.10m^3/yr
	Drops	once in 2 yrs	m^3	0.5m^3/yr
	Bath Steps	once in 5 yrs	m^3	0.05m^3/yr
	Spills/Drain Crossings	once in 5 yrs	m^3	0.2m^3/yr
	Check Structures	once in 5 yrs	m^3	0.1m^3/yr.
15	Clean/Desilt Canal Spill Chl	once a year	m^3	1m^3/Lm width

AMPMAINS

ANNUAL MAINTENANCE PLAN - GIRITALE MAIN SYSTEM
QUANTITY ESTIMATE

A.INLET CANAL TO GIRITALE TANK

1. CLEANING/WEEDING LB BUND AND BANK (twice a year)
   L= 4.7km A= 4,700m x 15m wide/10,000 m^2/ha = 7.0ha x 2=14.0ha

2. GRAVELING ACCESS ROAD (once a year)
   L= 4.7km V= 4.7km x 25m^3/km = 117.5m^3 Say 120m^3

3. REPAIR TO CANAL BUND WITH EARTH FILLING (Once a year)
   V=4.7km x 15m^3/km = 70.5m^3 Say 75m^3/yr

4. REMOVAL OF WATER PLANTS/OBSTRUCTIONS FROM CANAL (once a year)
   Width = 20M
   Assume 20% of area along canal.
   A= 4.7km x 1000m/km x 0.20 x 20 = 18,800m^2/yr

5. REMOVAL OF ANT HILLS ALONG CANAL (once a year)
   3 hills/km x 4.7km = 14.1 Say 15 Ant Hills/yr

6. DESILTING ALONG CANAL (once in 4 years for Inlet canal)
   Assume width = 15m
   Depth = 0.075 - Heavy Silt Load
   Length = 4700m x 50% = 2350m
   V= 2,350 x 15m x 0.075 = 2644
   2644/4=660m^3 Say 660m^3/yr

7. REGULATOR INLET STRUCTURE (once in 5 years)
   Repairs: 10m^3 1:3:6 conc. every 5 years V= 2m^3/yr

8. REPAIRS TO RUBBLE PITCHING (once a year)
   A= 6 x 20m x 2m wide = 240m^2 Assume 10% of
   Area requires repairs; A= 240 x 0.10 = 24m^2

9. REPAIRS TO RETAINING WALLS (once a year)
   L= 20+15+20+10+5+50+2x30=180m Say 200m

10. REPAIRS TO BRIDGES (once in 5 years)
    V=1.0m^3/5yr x 2 Bridge = 0.40m^3/yr Say 0.5m^3/yr

11. REPAIRS TO T.O. STRUCTURES 1:3:6 Con. (once in two years)
    No. Structure 5 EA (6 Gates)
    V=0.75m^3/2 x 5 = 1.875 Say 2.0m^3/yr

12. LUBRICATION OF REGULATOR GATE (4 x a year)
    Wt= 2kg/gate x 4 x 3 gates = 24kg/yr

13. LUBRICATION OF T.O GATES (4 x a year)
    Wt= 1/2kg/gate x 6 gates x 4 = 12kg/yr

14. ANTI-CROSSION PAINT ON REG. AND T.O. STRUC.
    3 gates @ 2 Lt/gate + 6 gates @ 1/2Lt = 9 Lts Say 10 Lts/yr

15. STOP LOGS FOR DIV. WEIR (3 sets) (every 4 years)
    or 0.75 set/yr Say 1.0 set/yr

16. REPAIRS TO DIVERSION. weir. 1:3.6 Conc. (every 5 yr)
    V = 5m^3/5 = 1.0m^3/yr

17. Painting,Number and Station on Structures(Once a year)
    17 Structures x 0.1 Lt/Struct = 1.7 Lts./Yr. Say 2.0 Lts

ANNUAL MAINTENANCE PLAN - GIRITALE MAIN SYSTEM
QUANTITY ESTIMATE

B.GIRITALE TANK/SLUICE/SPILLWAY

1. WEEDING AND CLEANING GIRITALE TANK BUND (twice a year)
   L=550m
   Width = 45m D/S+20m U/S = 65m
   A= 65m x 550m/10,000 m^2/ha = 3.575 x 2 x/year = 7.15 ha/yr

2. REPAIRS TO RIP RAP PROTECTION (once a year)
   L=550m; @ 3m^3 /km/Yr =1.65m^3 /Yr.

3. EARTH EXCAV/BORROW &/E.F. SCOURED SECTIONS (once a year)
   L=550m V = 0.55km x 30m^3/km = 16.5m^3/Yr.

4. REMOVAL OF ANT HILLS ALONG BUND (once a year)
   @ 3 HILL/KM = 3 X 0.55 = 1.65 Say 2 Nos.

5. LUBRICATION OF SLUICE GATES (4 x a year)
   2. GATES 4'-0' x 2-8"
      2 GATES x 2kg/gate x 4 = 16kg/yr

6. CLEANING GATE GROOVER/PAINTING GATES/GUIDE/ (once a year)
   WITH ANTI-CORROSION PAINT(Once a Year)
   2 Gates x 2 Lts/gate = 4 Lts/yr

7. PAINTING SLUICE STRUCTURE WHITE WASH(2 Coats) (once a year)
   Area = H2m x W3m = 6m^2 x 4 x 2 = 48m^2 Wash coats

8. PAINTING STAFF GAGE ON SLUICE WALLS (once ayear)
   1 No.

9. UNGATED SPILLWAY - CLEANING U/S & D/S
   APPROACH AND TAIL CHANNELS (once a year)
   L= 40m V= 40m^3/yr

10. REPAIRS TO SPILLWAY STRUCTURES WITH 1:3:6 CONC. (once in 5 years)
    2.0 m^3/5 Yrs/Struc =0.4 m^3/Yr/Struc.Say =0.50 m^3/Yr.
    V = 50/5yrs = 10m^3/yr

11. REPLACEMENT OF SPILL STOP LOGS (once in 3 years)
    3 BAYS x 0.5m x 1.25m = 1.875 Say 2m^2/3yr.
    Low Level Spill 0.67m^2/yr or 1 Set/yr

12. PAINTING, NUMBER AND STATION OF STRUCTURES
    3 Nos x 0.1 LTS/STRUCT = 0.30 Lts. Say 0.50 Lts/Yr.

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ANNUAL MAINTENANCE PLAN - GIRITALE
QUANTITY ESTIMATE

C.RBMC (ABOVE DAMBALA WEWA)
STA. 0+000 TO STA. 5+922

1. WEEDING/CLEARING ALONG CANAL BUND (twice a year)
   L= 5,922m. Say 5.9km
   Area = 5.922km x 1000 x 10m wide/10,000m^2x2 = 11.8 Say 12ha/yr

2. REPAIRING CANAL BUND W/EARTH FILLING (ONCE A YEAR)
   V = 5.9km x 15m^3/km = 88.5m^3 Say 90m^3

3. DESILTING ALONG CANAL (once in two years)
   Assume heavy desilting required.
   Ave. depth = 0.075m
   Ave. width = 6.0m Assume 50% length
   V = 5,900m x 0.50 x 0.075m x 6.0m = 1327.5m^3 Say 1330m^3/2yrs
   V = 665m^3/year

4. GRAVELLING UNPAVED ROADS (once a year)
   L = 5.9km V = 5.9km x 25m^3/km = 147.5m^3 Say 150m^3

5. REMOVAL OF WATER PLANTS ALONG CANAL (once a year)
   Ave. width = 6.0m
   Assume 20% of length
   5.9km x 1000m/km x 0.20 x 6.0m = 7080m^2/yr Say 7100m^2/yr

6. REMOVAL OF ANT HILLS FORM CANAL BUND (once a year)
   No. = 3 Ant Hills/km x 5.9km = 17.7 Say 18/year

7. REPAIRS TO RETAINING WALLS/LINING = (once a year)
   Length of retaining walls/lining = 1568m Say 1575m

8. REPAIRS TO DRY RUBBLE PACKING (once in two years)
   L = 20m Width = 2.0m
   Area = 20 x 2.0 = 40.0m^2/2 yrs = 20m^2/yr

9. REPAIRS TO STRUCTURES (Sequence varies) 1:3:6 Concrete

Type	No.	Repair Freq.	Vol./yr(m^3)
Drops	2	Every 2 yrs	2x1.0m^3/2 = 1.00
Bath Steps	5	Every 5 yrs	5x0.25/5 = 0.25
Bridges	4	Every 5 yrs	4x1.0/5 = 0.90
Spills	4	Every 5 yrs	4x1.0/5 = 0.90
T.O. Struc.	8	Every 2 yrs	8x0.75/2 = 3.00
Regulators	1	Every 5 yrs	1x2.0/5 = 0.40
	24	Total All Struc.	6.45m^3/yr
			Say 6.5m^3/yr

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C RBMC ABOVE DAMBALA WEWA
STA. Ø+ØØØ TO 5+922 (Cont.)

1Ø. REPAIRS TO RUBBLE PITCHING 1:3mix (once a year)
L = 5+1Ø = 15m
Area = 15m x 2m = 3Øm^2
Assume 1Ø% Requires repairs
A = 3Ø x .1Ø = 3.Øm^2

11. LUBRICATION OF T.O. STRU. GATES (4 x A YEAR)
No of gates 12 each

12 Gates x 1/2kg/gate x 4 times/year = 24kg/year

12. APPLICATION OF ANTI-CORROSION PAINT
ON GATES/GATE STRUCTURES (ONCE A YEAR)
12 GATES x 1/2LT/GATES = 6LTS.

13. REPLACEMENT OF WOODEN PLANKS AT SPILLS (Once in 4 yrs)

4 spills = 1 set/year

14. CLEANING APPROACH/TAIL CHANNEL OF SPILLS (ONCE A YEAR)

4 SPILLS @ 25m^3/Str. = 1ØØm^3

15. PAINTING, NUMBER AND STATION ON STRUCTURES.
24 Nos x Ø.1 Lts/STRUCT = 2.4 Lts. Say = 2.5 Lts/Yr.

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ANNUAL MAINTENANCE PLAN - GIRITALE MAIN SYSTEM
QUANTITY ESTIMATE

D DAMBALA WEWA TANK/SLUICE/SPILLWAY

1. WEEDING AND CLEARING DAMBALA TANK BUND (Twice a year)

   L = 770m
   Width 40 D/S+10m U/S = 50m
   Area = 50x770m/10,000 = 3.85hax2 = 7.7ha/yr

2. REPAIRS TO RIP-RAP SLOPE PROTECTION (ONCE A YEAR)
   L = 770m ;@ 3 m^3/km =0.77 x3 =2.31 m^3/Yr .Say 2.5 m^3/Yr.

3. EARTH EXCAV/BORROW W/EARTH FILLING SCOUR SECTIONS OF BUND(ONCE A YEA
   L = 770 Vol = 0.77x30m^3/km = 23.1m^3

4. REMOVAL OF ANT HILLS ALONG BUND (ONCE A YEAR)
   @ 3 Hills/km = 3x0.77 = 2.31 Say 3 Nos.

5. LUBRICATION OF SLUICE GATE (4xYEAR)
   1-GATE 4'-0"x2'-8" 1 GATE x 2kg/GATE x 4 = 8kg/Yr.

6. CLEANING GATE GROOVES/PAINTING GATES/GUIDES W/ANTI CORROSSION PAINT (ONCE AYEAR)
   1 GATE @ 2-LTR/GATE = 2LTS/YR

7. PAINTING/WHITE WASHING SLUICE STRUCTURES (2 COATS)(ONCE A YEAR)
   AREA = 2x2x4x2 COATS = 32m^2

8. PAINTING STAFF GATE ON SLUICE WALLS (ONCE A YEAR)
   1 No.

   REPAIRS TO SPILL STRUCTURE (ONCE IN 5 YEARS)
   1:3:6 (Concrete) 80 Meters long
   2.0m^3/5Yrs = 0.4m^3/yR Say 0.5M^3/YR

10. REPAIRS TO SPILL STOP LOGS (ONCE IN 3 YEARS)
    6 SETS 2 SETS/YEAR

11. REMOVE OF DEBRIS D/S OF SPILL CHANNEL (ONCE A YEAR)
    L = 80m @ 1.0m^3/m = 80m^3/Year

12. GRAVELLING ON UNPAVED SECTION OF BUND (ONCE A YEAR)
    L = 300m = 0.30km x 30m^3/km = 9.0 m^3/Yr

13. PAINTING, NUMBER AND STATION ON STRUCTURES.
    2 Nos x 0.1 Lts/STRUCT = 0.2 Lts/Yr.

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E.RBMC-BELOW DAMBALAWEWA - STA.6+500 to 15+460@ ENTRANCE TO CHANDANA POKUN

1. WEEDING/CLEARING ALONG CANAL BUND (Twice a year)
   L = 8.960kg Say 9.0 km
   Area = 9.0kg x 1000 x 7.5m/10,000 = 6.75x2=13.5 Say 13.5ha/yr

2. REPAIRS TO CANAL BUND W/EARTH FILL (ONCE A YEAR).
   V = 9.0km x 15m^3/km/Yr = 135m^3 Say 135m^3/Yr

3. DESILTING ALONG CANAL (ONCE IN TWO YEARS)
   Assume 33% of canal length Light desilting reqd.
   D = 0.075m width 3.0
   V = 9,000m x 0.33 x 0.075 x 3.0 = 670m^3/2Yr = 335m^3/Yr

4. REMOVAL OF WATER PLANTS ALONG CANAL (ONCE A YEAR)
   Avg. Width = 6.0m
   Assume 20% of length needs removal
   A = 9.000m x 0.20 x 6.0m = 10,800m^2

5. REMOVAL OF ANT HILLS FROM BUND (ONCE A YEAR)
   @ 3 Hills/km x 9.0 = 27.0 Say 27 Hills/Yr

6. REPAIRS TO RETAINING WALLS (ONCE A YEAR)
   L = 722m

7. REPAIRS TO RUBBLE PITCHING (ONCE A YEAR) 1:3 mix
   L = 347m Area = 347x2.0 = 694m^2 Assume 10% of gross area require repairs A= 694m^2x.10 = 69.4 Say 70.0m^2

8. REPAIRS TO DRY RUBBLE PACKING (ONCE IN TWO YEARS)
   L = 929m Avg. width = 2.0m
   A = 929x2 = 1858m^2/2Yrs = 929 Say 930m^2/Yr

9. REPAIRS TO STRUCTURES (SEQUENCE OF REPAIRS VARIES) 1:3:6 Concrete

Type struc.	No.	Repair Frequency	Vol./Yr (m^3)	
Drop	14	Every 2 Years	14x1.0m^3/strx1/2=7.0m^3/yr	
Bath steps	9	Every 5 Years	9x0.25/5	= 0.45m^3/yr
Regulators	1	Every 5 Years	1x2.0m^3/5	= 0.40m^3/yr
Bridges	14	Every 5 Years	14x1.0/5	= 2.8m^3/yr
Spills(C.P)	1	Every 5 Years	1.0x1.0/5	= 0.25m^3/yr
T.O. Struc.	20	Every 2 Years	20x0.75/2	= 7.50m^3yr
Check Struc.	4	Every 5 Years	4x0.5/5	= 0.30m^3
Chl. Profile	2	Every 5 Years	2x0.5/5	= 0.20m^3
	65	Total	Say 19.0m^3	18.9m^3/yr

10. LUBRICATION OF TURNOUT STRUCTURE GATES REGULATOR(4x A YEAR)
    No. Gates = 3+22 = 25 Gates x 1/2kg/Gates x 4 = 50kg/Yr.

11. APPLICATION OF ANTI-CORROSION PAINT
    To Gates/Gate Structures (once a year)
    25 Gates x 1/2Ltr./Gate = 12.5 Say 13.Lts.

12. PAINTING, NUMBER AND STATION ON STRUCTURES.
    65 Nos x 0.10 Lts/STRUCT = 6.5 Lts /Yr.

ANNUAL MAINTENANCE PLAN - GIRITALE MAIN SYSTEM
QUANTITY ESTIMATE

F.CHANDANA POKUNA TANK/SLUICE/SPILLWAY

1. CLEARING/WEEDING NEED (twice a year)
   L = 500m x 10m = 5000m^2/10,000m^2/ha = 0.5hax2 = 1.0ha/yr

2. REPAIRS TO RIP-RAP PROTECTION (ONCE A YEAR)
   Length=0.50km ; @ 3.0 m^3/km ; V =0.5 x 3m^3/Yr. =1.5 m^3/Yr.

3. EARTH EXCAVATION/BORROW W/E.F. (ONCE A YEAR)
   0.50km x 30m^3/yr/km = 15m^3/yr

4. Removal of Ant Hills
   3 Ant Hills/km x 0.5 = 1.5 Ant Hills/yr Say 2.0 Ant Hills/yr

5. GRAVELLING UNPAVED BUND ROAD (ONCE A YEAR)
   0.50km @ 30m^3/km = 15.0 m^/Yr.

6. REMOVAL OF DEBRIS D/S OF SPILL CHANNEL (ONCE A YEAR)
   1.0m^3/L.M Spill = 1.0 x 10 = 10m^3

G.D-6 CANAL TO KADAWALA WEWA AND KADAWALA TANK/SLUICE/SPILLWAY

1. Clearing/Weeding Canal Bund (Twice a year)
   L = 3.26km
   W = 7.5m Area = 7.50x3260m/10,000 = 2.445hax2 = 4.89ha Say 5.0ha

2. REPAIR CANAL BUND W/EF (ONCE A YEAR)
   L = 3.26km V = 3.26km x 25m^3/km = 81.5m^3 Say 85m^3

3. DESILTING ALONG CANAL (ONCE IN 2 YEARS)
   L = 3.260m (Heavy desilting reqd.)
   W = 2.0m V = 2.0x3260x0.075x0.50=245m^3
   50% of length Say 250m^3/2yr = 125m^3/yr

4. GRAVELLING ACCESS ROAD ALONG CANAL BUND (once a year)
   L = 3.26km V = 3.26kmx25m^3/km = 81.5m^3 Say 85m^3

5. REMOVAL OF WATER PLANTS ALONG CANAL (ONCE A YEAR) 20% OF LENGTH
   A = 3,260x4x.20=2608m^2 Say 2600m^2

6. REMOVAL OF ANT HILLS ALONG CANAL BUND (ONCE A YEAR)
   3 Hills/km x 3.26 = 9.78 Say 10 Ant Hills

7. REPAIRS TO RETAINING WALLS (ONCE A YEAR)
   Length = 20+20+5+5+5+3+14+22+17=111m Say 115m

8. REPAIRS TO RUBBLE PITCHING IN 1:3 CT.MTR Mix.(once a year)
   L = 5m A = 2mx5m = 10m^2x.10 = 1.0m^2 Net
   Assume 10% of Gross Area Requires repairs.

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G.D-6 CANAL TO KADAWALA WEWA AND KADAWALA TANK/SLUICE/SPILLWAY (Cont.)

9. Repairs to Structure 1:3:6 Conc.

Type	No.	Repair Freq.	Volume/Yr		
Bath step	1	Every 5 yrs.	1xØ.25x5	=	Ø.Ø5
Bridges	3	Every 5 yrs.	3x1.Ø/5	=	Ø.6Ø
Spills(Minor)	2	Every 5 yrs.	2xØ.25/5	=	Ø.1Ø
Spills(Major)	1	Every 5 yrs.	1x1.Ø/5	=	Ø.2Ø
Regulators	1	Every 5 yrs.	1x2.Ø/5	=	Ø.4Ø
T.O. Struc.	7	Every 2 yrs	7xØ.75/2	=	2.63
	15	Total		=	3.98m^3
				Say	4.Øm^3/yr

1Ø. LUBRICATION TO GATES (4 x A YEAR)

No. Gates = 7 x 1/2kg/Gate x 4 = 14kg/yr

11. APPLICATION OF ANTI-CROSSION PAINT FOR GATE/GATE STRUC.(ONCE A YEAR)

7 GATES x 1/2 LTS/GATE = 3.5LTS Say 4 Lts/yr

12. REPLACE WOOD PLANKS ON SPILLS/REGULATORS (ONCE IN 4 YRS.)

Spill = 4 sets
Regulators = 2 Sets
6 Sets/4 = 1.5 Sets/Yr

13. KADAWALA BUND CLEARING/ WEEDING (TWICE A YEAR)
L=1150m x20m =23,000m^3/10,000 =2.3 ha x 2 =4.6 ha/Yr.

14. CLEANING D/S SPILL CHANNELS (ONCE A YEAR)
L = 20+20+10 =50 LM x 1.0m^3/m =50m^3 /Yr.

15. REPAIRS TO TANK BUND W/EARTH FILLING (ONCE A YEAR)
30m^3 x 1.15km = 34.5m^3 Say 35m^3/yr.

16. GRAVELLING TANK BUND (ONCE A YEAR)
L = 1.15KM x 30m^3/km = 34.5m^3 . Say 35m^3/yr

17. REMOVE ANT HILLS ALONG TANK BUND (ONCE A YEAR)
3 Hill/km x 1.15km = 3.45 Say 4 Ant Hills/yr

18. CLEANING GATE GROVES/PAINT GATES/GUIDES(ONCE A YEAR)
W/Anti-Crossion paint
2 Gates x 3 Lts/Gate = 6 Lts/yr

19. PAINTING/WHITE WASHING SLUICE STRUCTURE (2 COATS) (ONCE A YEAR)
A = 2m x 2m = 4m^2x3x2 coats = 24 m^2

ANNUAL MAINTENANCE PLAN - GIRITALE MAIN SYSTEM
QUANTITY ESTIMATE

G.D-6 CANAL TO KADAWALA WEWA AND KADAWALA TANK/SLUICE/SPILLWAY (Cont.)

20. PAINTING STAFF GAGE ON SLUICE (ONCE A YEAR)
    1 No.

21. LUBRICATION TO SLUICE GATES (4 x A YEAR)

    2 Gates x 2kg/gate x 4 = 16 kg/yr

22. UNGATED SPILLWAY - CLEANING U/S & D/S CHANNELS (ONCE A YEAR)

    L = 90m x 1.0m^3/1m = 90m^3

23. REPAIRS TO SPILLWAY (ONCE IN FIVE YEARS)
    V = 5.0m^3/5yrs = 1.0m^3/yr

24. PAINTING, NUMBER AND STATION ON STRUCTURES.
    15 Nos x 0.1 Ltr/STRUCT = 1.50 Lts/Yr.

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PAST O&M COSTS ON MAJOR IRRIGATION SYSTEMS IN SRI LANKA

	(1) 1982 cost	(2) Percen-tage	(3) 1988 Cost	(4) Percen-tage	(5) Oper-ation	(6) Percen-tage	(7) Naint-enance	(8) Percen-tage
Maintenance Labour	92.54	46.27	185.11	48.08	51.86	49.24	133.25	47.64
Supervision	5.04	2.52	11.45	2.97	3.47	3.29	7.98	2.85
Drivers & Operators	5.55	2.78	8.23	2.14	2.54	2.41	5.69	2.03
Travelling & Com. allow.	2.68	1.34	3.63	0.94	1.68	1.52	2.03	0.73
Fuel & Repairs to Vehicles	10.85	5.43	15.36	3.99	3.72	3.53	11.64	4.16
Purchase of Materials & Tools	32.98	16.49	37.07	9.63	3.70	3.51	33.37	11.93
Physical Contingencies	7.48	3.74	24.15	6.27	3.94	3.74	20.21	7.23
Administration & Overheads	18.50	9.25	40.00	10.39	13.50	12.82	26.50	9.48
Depreciation of Vehicles & Equip.	24.38	12.18	60.00	15.58	21.00	19.94	39.00	13.95
	200.00	100.00	385.00	99.99	105.33	100.00	279.67	100.00

Source - Based upon analysis and data provided by Irrigation Department of 1981 performance in 16 selected Major Irrigation Schemes at one per range and up datged to 1988 prices.

O&MCOSTL

PERCENTAGE OF ANNUAL MAINTENANCE INDIRECT COSTS

Type Of Maintenance Cost		% Of Annual Maintenance
(2)	Supervision	2·85
(3)	Drivers / Operators	2·03
(4)	Travel / Bata allowance	0·73
(5)	Fuel / Repairs	4·16
(8)	Admin / Dept OH	9·48
(9)	Depreciation Vehicle / Equipment	13·95
		33·20 % Say 33 %

SUMMARY ANNUAL MAINTENANCE COSTS GIRITALE SCHEME MAIN SYSTEM

WORK AREAS	TOTAL ANNUAL COST (RS.)
A. Inlet Canal	154,202.75
B. Giritale Tank/Sluice/Spillway	32,846.78
C. RBMC-Above Dambalawewa (km 0+000 - km 5+922)	146,212.00
D. Dambalawewa Tank/Sluice/Spillway	40,938.05
E. RBMC-Below Dambalawewa (km 6+560-km 15+460)	162,504.75
F. Chandana Pokuna Tank/Sluice/Spillway	8,103.25
G. D-6 Canal to Kadawalawewa and Kadawala Tank/Sluice/Spillway	97,634.90
Sub-total Direct cost	642,442.48
Contingencies @ 7.23%	46,448.59
Total Direct Cost (67%)	688,891.07
ID Admin./O.H/Indirect Cost(33%)	339,304.56
Total Annual Maint.Cost(100%)	Rs. 1,028,195.60

Say Rs.1,028,200/=

Using the Annual Maintenance cost of Rs. 1,028,200/=, above the Annual Maintenance cost for the Giritale Main System per acre would be approximately Rs. 1,028,200/7,340 = 140/Ac.

Say Rs. 140/Ac

GIRITALE SCHEME

EXHIBIT III-2-3
SHEET 3 OF 6

ESTIMATE OF THE EXPENSE NECESSARY TO BE INCURRED FOR : ANNUAL MAINTENANCE PLAN
INLET CANAL/SLUICE/TANKS/SPILLWAY, MAIN AND BRANCH CANALS

SPECIFICATION	SUB ITEMS	ANUAL MAINT. QUANTITIES	UNITS	DESCRIPTION OF WORK ITEMS	COST OF EACH ITEM OF WORK: UNIT RATE Rs. Cts	TOTAL ITEM COST Rs.Cts.
				A. INLET SUPPLY CANAL		
	1	14.00	HA	Weeding/cleaning bund/bank (Twice a year 7 ha)	3,079.00	43,106.00
	2	120.00	M^3	Gravelling access road (once a year)	125.50	15,060.00
	3	75.00	M^3	Repairs to canal bund W/EF (once a year)	99.45	7,458.75
	4	18000.00	M^2	Removal of water plants from canal (once a year)	1.50	28,200.00
	5	15.00	Nos	Removal of ant hills along canal (once a year)	200.00	3,000.00
	6	660.00	M^3	Desilting along canal (once in 4 years-2640M^3)	50.50	33,330.00
	7	2.00	M^3	Repairs to inlet regulator (once in 5 years-10m^3)	2,000.00	4,000.00
	8	24.00	M^2	Repairs to rubble pitching (once a year)	202.00	4,848.00
	9	200.00	M	Repairs to retaining walls (once a year)	5.00	1,000.00
	10	0.50	M^3	Repairs to bridges (once in 5 years-2.5m^3)	2,000.00	1,000.00
	11	2.00	M^3	Repair to TO Struc. (once in 2 years-4 m^3)	2,000.00	4,000.00
	12	24.00	Kg	Lubrication of Regulator Gates (4 x a year-6kg)	100.00	2,400.00
	13	12.00	Kg	Lubrication of T.O Gates (4 x a year-3kg)	100.00	1,200.00
	14	10.00	LTS	Anti-corrosion paint on gates (once a year)	130.00	1,300.00
	15	1.00	Set	Stop logs for Div. Weir (once in 4 years - 4 sets)	2,000.00	2,000.00
	16	1.00	M^3	Repairs to Div. Weir (once in 5 years-5m^3)	2,000.00	2,000.00
	17	2.00	LTS	Painting,Number and Station on structures(once a year)	150.00	300.00
					Sub total A	154,202.75
				B. GIRITALE TANK/SLUICE/SPILLWAY		
	1	7.15	HA.	Weeding/Clearing Giritale Tank Bund (Twice A Year - 3.575 HA)	3,079.00	22,014.85
	2	1.65	M^3	Repair to Rip Rap Protection (Once A Year)	400.00	660.00
	3	16.50	M^3	Earth Excavation/Burrow W/E.F (Once A Year)	99.45	1,640.93
	4	2.00	Nos.	Removed of Ant Hills (Once A Year)	200.00	400.00
	5	16.00	KG.	Lubrication of Sluce Gates (4 x year - 4 Kg)	100.00	1,600.00
	6	4.00	LTS.	Cleaning Gate Grooves/Paint Gates/Guide (Once A Year)	130.00	520.00
	7	48.00	M2	Paint Sluice Struc. White Wash (Once A Year)	7.00	336.00
	8	1.00	No.	Painting Staff Gage on Sluice (Once A Year)	500.00	500.00
	9	48.00	M^3	Clearing U/S & D/S Spilling Chl. (Once A Year)	65.00	2,600.00
	10	0.50	M^3	Repairs to Spillway Structure with 1:3:6 conc.(Once in 5 Yrs.)	2,000.00	1,000.00
	11	1.00	Set	Replacement to Spill Stoplogs (Once in 3 Years - 3 Sets)	1,500.00	1,500.00
	12	0.50	Lts	Painting,Number and Station on structures (once a year)	150.00	75.00
					SUB TOTAL B	32,846.78
					Total Sheet 1	187,049.53

GIRITALE SCHEME

EXHIBIT III-2
SHEET 4 OF 6

ESTIMATE OF THE EXPENSE NECESSARY TO BE INCURRED FOR : ANNUAL MAINTENANCE PLAN
INLET CANAL/SLUICE/TANK/SPILLWAY AND MAIN AND BRANCH CANALS

SPECIFICATION	SUB ITE	ANNUAL MAINT. QUAN-TITIES	UNITS	DESCRIPTION OF WORK ITEMS	COST OF EACH ITEM OF WORK: UNIT RATE Rs. Cts	TOTAL ITEM COST Rs.Cts.
				C. RBMC - ABOVE DAMBALA WEWA (KM 0+000-KM 5+922)		
	1	12.00	HA	Weeding/Clearing along Canl Bund (Twice A Year - 6.8 HA)	3,079.00	36,948.00
	2	90.00	M3	Repairing Canal Bund W/Earth Fil (Once A Year)	99.45	8,950.50
	3	665.00	M3	Desilting along Canal (Once in Two Years - 1330 M3)	50.50	33,582.50
	4	150.00	M3	Gravelling Unpaved Roads (Once A Year)	125.50	18,825.00
	5	7100.00	M2	Removal of Water Plants along Canal (Once A Year)	1.50	10,650.00
	6	18.00	Nos.	Removal of Ant Hills along Canal (Once A Year)	200.00	3,600.00
	7	1575.00	M	Repairs to Retaining Walls (Once A Year)	5.00	7,875.00
	8	20.00	M2	Repairs to Dry Rubble Packing (Once Every 2 Years - 40 M2)	6.00	120.00
	9	6.50	M3	Repairs to Strs. along Canal 1:3:6 Conc.24 Nos(Sequence Varies)	2,000.00	13,000.00
	10	3.00	M2	Repairs to Rubbble Pitching 1:3 M2 (Once a Year)	202.00	606.00
	11	24.00	KG	Lubrication T.O Struc. Gates (4 x A Year - 3Kg)	100.00	2,400.00
	12	6.00	LTS.	Apply Anti-Corrosion Paint to Gate/gate Struc. (Once A Year)	130.00	780.00
	13	1.00	SET	Replace Wooden Stop Log Planks (Once in 4 Years - 4 Sets)	2,000.00	2,000.00
	14	100.00	M3	Cleaning Approach/Tail Channels of Spill (Once A Year)	65.00	6,500.00
	15	2.50	Lts	Painting,Number and Station on structures (once a year)	150.00	375.00
					SUB TOTAL C	146,212.00
				D. DAMBALA WEWA TANK.SLUICE/SPILLWAY		
	1	7.70	HA.	Weeding/Clearing Dambala Tank Bund (Twice A Year - 3.85 HA)	3,079.00	23,708.30
	2	2.50	M^3	Repair to Rip Rap Slope Protection (Once A Year)	400.00	1,000.00
	3	25.00	M3	Earth Excavation/Burrow W/Earth Filling Canal Bund(Once A Year)	99.45	2,486.25
	4	3.00	Nos.	Removal of Ant Hills from Canal Bund (Once A Year)	200.00	600.00
	5	8.00	KG.	Lubricate Sluce Gate (4 x year - 2 Kg)	100.00	800.00
	6	2.00	LTS.	Cleaning Gate Grooves/Paint Gates/Guide (Once A Year)	130.00	260.00
	7	32.00	M2	Paint Sluice Structure (Once A Year)	7.00	224.00
	8	1.00	Nos.	Painting Staff Gage on Sluice Structure (Once A Year)	500.00	500.00
	9	0.50	M3	Repairs to Spill Structure (Once in 5 Years - 2.5m^3)	2,000.00	1,000.00
	10	2.00	SETS	Repairs to Spill Stoplogs (Once in 3 Years - 6 Sets)	2,000.00	4,000.00
	11	80.00	M3	Removal of Debris D/S of Spill Channel (Once A Year)	65.00	5,200.00
	12	9.00	M3	Gravelling Unpaved Section of Bund (Once A Year)	125.50	1,129.50
	13	0.20	Lts	Painting,Number and Station on structures (once a year)	150.00	30.00
					SUB TOTAL D	40,938.05
					Total sheet 2	187,150.05

GIRITALE SCHEME

EXHIBIT III-2-3
SHEET 5 OF 6

ESTIMATE OF THE EXPENSE NECESSARY TO BE INCURRED FOR ; ANNUAL MAINTENANCE PLAN
INLET CANAL/SLUICE/TANK/SPILLWAY AND MAIN AND BRANCH CANALS

SPECIFICATION	SUB ITE	ANNUAL MAINT. QUAN-TITIES	UNITS	DESCRIPTION OF WORK ITEMS	COST OF EACH ITEM OF WORK: UNIT RATE Rs. Cts.	TOTAL ITEM COST Rs. Cts.
				E. RBMC BELOW DAMBALA WEWA TO CHANDANA POKUNA (6+500 - 15+460)		
	1	13.50	HA	Weeding/Clearing Canal Bund (Twice A Year 6.75 HA)	3,079.00	41,566.50
	2	135.00	M3	Repairing Canal Bund W/Earth Fil (Once A Year)	99.45	13,425.75
	3	335.00	M3	Desilting along Canal (Once in Two Years - 670 M3)	50.50	16,917.50
	4	10800.00	M2	Removal of Water Plants along Canal (Once A Year)	1.50	16,200.00
	5	27.00	Nos.	Removal of Ant Hills along Canal (Once A Year)	200.00	5,400.00
	6	722.00	M	Repairs to Retaining Walls (Once A Year)	5.00	3,610.00
	7	70.00	M2	Repairs to Rubbble Pitching (Once A Year)	202.00	14,140.00
	8	930.00	M2	Repairs to Dry Rubble Packing (Once Every 2 Years - 1860 M2)	6.00	5,580.00
	9	19.00	M3	Repairs to Structures (65 Nos) (Sequence Varies)	2,000.00	38,000.00
	10	50.00	KG	Lubrication T.O Structure Gates (4 x A Year 6.25 Kg)	100.00	5,000.00
	11	13.00	LTS.	Apply Anti-Corrosion Paint to Gate Structure (Once A Year)	130.00	1,690.00
	12	6.50	Lts	Painting,Number and Station on structures (once a year)	150.00	975.00
					SUB TOTAL E	162,504.75
				F. CHANDANA POKUNA TANK/SLUICE/SPILLWAY		
	1	1.00	HA	Weeding/Clearing Tank Bund(Twice a Year-0.5ha)	3,079.00	3,079.00
	2	1.50	M^3	Repair to Rip Rap protection (Once a Year)	400.00	600.00
	3	15.00	M^3	Earth/Excav/Borrow & Earth filling Bund (Once a Year)	99.45	1,491.75
	4	2.00	Nos	Removal of Ant Hills from Bund (Once a Year)	200.00	400.00
	5	15.00	M^3	Graveling unpaved Bund Road (Once a Year)	125.50	1,882.50
	6	10.00	M^3	Removal of debris D/S Spill Channel (Once a Year)	65.00	650.00
					SUB TOTAL F	8,103.25
					Total Sheet 3	170,608.00

ESTIMATE.WK1

GIRITALE SCHEME

ESTIMATE OF THE EXPENSE NECESSARY TO BE INCURRED FOR : ANNUAL MAINTENANCE PLAN
INLET CANAL/SLUICE/TANK/SPILLWAY AND MAIN AND BRANCH CANALS

SPECIFICATION	SUB ITE	ANNUAL MAINT. QUAN-TITIES	UNITS	DESCRIPTION OF WORK ITEMS	COST OF EACH ITEM OF WORK: UNIT RATE Rs. Cts.	TOTAL ITEM COST Rs. Cts.
				6. D-6 CANAL TO KADAWALA WEWA AND KADAWALA TANK SLUICE/SPILLWA		
	1	5.00	HA	Clearing/Weeding canal bund (twice a year - 2.5ha)	3,079.00	15,395.00
	2	85.00	M^3	Repairs to canal bund W/EF (once a year)	99.45	8,453.25
	3	125.00	M^3	Desilting along canal (once in two years -250m^3)	50.50	6,312.50
	4	85.00	M^3	Gravelling access road along canal (once a year)	125.50	10,667.50
	5	2600.00	M^2	Removal of water plants along canal (once a year)	1.50	3,900.00
	6	10.00	Nos	Removal of ant hills along canal (once a year)	200.00	2,000.00
	7	115.00	M	Repairs to retaining walls (once a year)	5.00	575.00
	8	1.00	M^2	Repairs to rubble pitching (once a year)	202.00	202.00
	9	4.00	M^3	Repairs to struc (15EA) 1:3:6 conc (sequence varies)	2,000.00	8,000.00
	10	14.00	KG	Lubrications to gates (4 x A year - 1.75 kg)	100.00	1,400.00
	11	4.00	LTS	Apply anti crossive paint to gates (once a year)	130.00	520.00
	12	1.50	Sets	Replace wood planks on spills/Reg. (once 1 x 4 years - 6 sets)	2,000.00	3,000.00
	13	4.60	HA	Kadawala bund cleaning weed (twice a year - 2.3 ha)	3,079.00	14,163.40
	14	50.00	M^3	Cleaning D/s spill channels (once a year)	65.00	3,250.00
	15	35.00	M^3	Repairs to tank bund W/EF (once a year)	99.45	3,480.75
	16	35.00	M^3	Graveling tank bund road (once a year)	125.50	4,392.50
	17	4.00	Nos	Remove ant hills on bund (once a year)	200.00	800.00
	18	6.00	LTS	Clean gate grooves/Paint gate (once a year)	130.00	780.00
	19	24.00	M^2	Painting sluice struc (once a year)	7.00	168.00
	20	1.00	EA	Painting staff gage on sluice (once year)	500.00	500.00
	21	16.00	KG	Lubricate sluice gates (4 x a year - 4 kg)	100.00	1,600.00
	22	90.00	M^3	Cleaning U/s D/s spillway chl (once a year)	65.00	5,850.00
	23	1.00	M^3	Repairs to spillway (once every 5 year - 5m^3)	2,000.00	2,000.00
	23	1.50	Lts	Painting,Number and Station on structures (once a year)	150.00	225.28
				TOTAL G		97,634.90
Admin./Dept. O/H (from ID/IMD)				TOTAL SHEET 4		97,634.90
Supervision of constr. 2.85%				TOTAL SHEET 1		187,049.53
Driver & Equip. Operation 2.03%				TOTAL SHEET 2		187,150.05
Travel & Bata Allowance 0.73%				TOTAL SHEET 3		170,608.00
Vehicle O&M Cost 4.16%				SUB TOTAL		
Admin./Overheads 9.48%				SHEET 1+2+3+4		642,442.48
Depreciation Veh/Equip. 13.95%				Contingencies		
Total 33.26%				@ 7.23%		46,448.59
Say 33%				SUB TOTAL(67%)		688,891.07
				Dept. O/H(33%)		339,304.56
				TOTAL (100%)		1,028,195.60
				Annual Cost/Ac= Rs. 1028195.60/7340		

ESTIMATE.WK1

3. IMPROVEMENTS TO IRRIGATION SYSTEM OPERATIONS

o Assist with and train staff in the development of a water management improvement program in the Gal Oya Right bank system, (or other system to be identified) the four Polonnaruwa District systems and the Ridi Bendi Ela system. Develop training programs, materials, etc., which enable staff to effectively carry out the program.

- Assist with the development of discharge ratings and calibration for control and measurement structures.

- Assist with the measurement of losses in the conveyance, distribution and on-farm systems.

- Conduct on-farm studies to determine water requirements and appropriate irrigation practices for paddy and other crops.
- Analyze the data, make recommendations for improvements in operating procedures and on-farm practices, and prepare a report which includes the findings and recommendations.

- Assist in the preparation of seasonal reports on water issues.

o Develop and assist in the implementation of a computerized weekly operations model for the Gal Oya Right Bank, (or other system to be identified), the four Polonnaruwa District systems and the Ridi Bendi Ela system.

- Develop a computer model for scheduling and recording water releases for each system which takes into account soil properties, cropping patterns, system losses, rainfall, etc. Prepare a document which describes and explains the usage of the computer model.

- Work with training staff to train personnel to utilize the model for operations and prepare seasonal water usage reports.

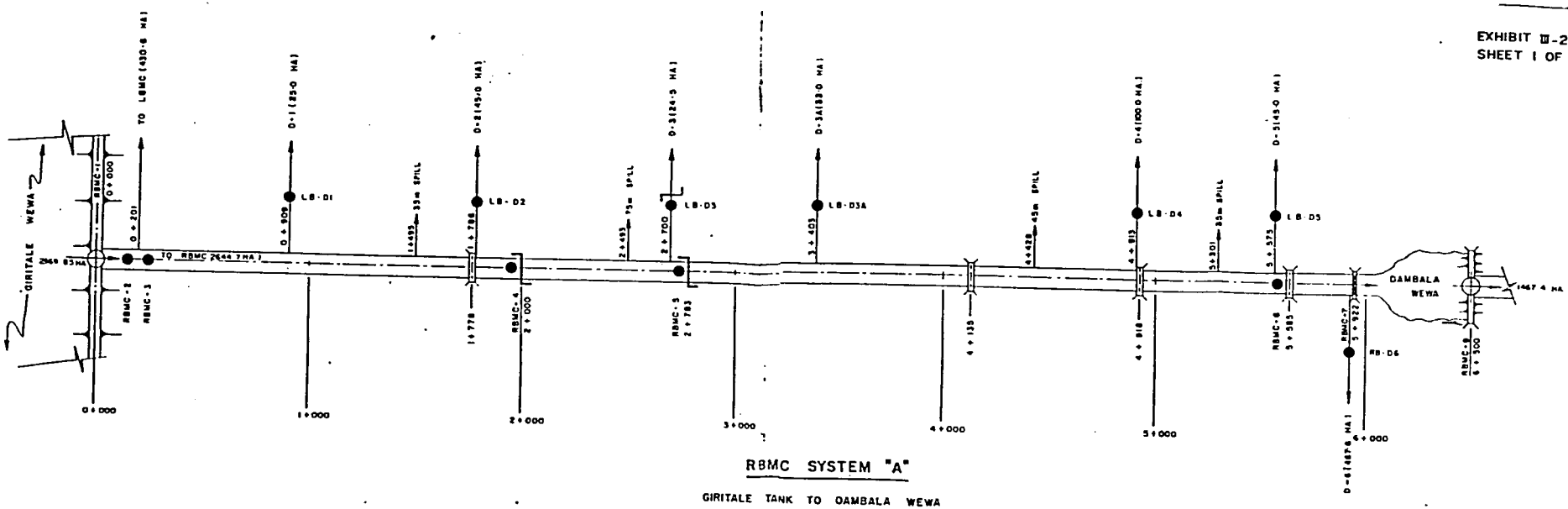
o Develop and assist in the implementation of a computerized daily operations model for the Gal Oya Left Bank system, (or other system to be identified), which takes into account soil properties, cropping patterns, system losses, rainfall, hydraulic transients, etc.

- Develop and prepare documentation for the model
- Work with training staff to train personnel to use the model and prepare seasonal water usage reports

2. DEVELOPMENT OF A PREVENTATIVE MAINTENANCE PROGRAM

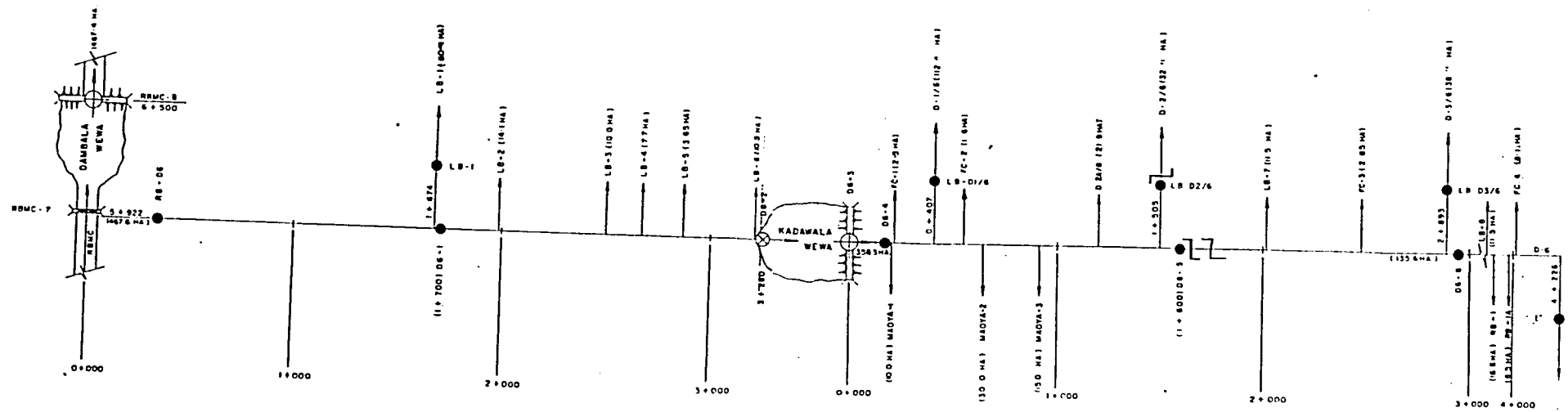
- Assist with the development and implementation of annual maintenance plans and the preparation of a preventive maintenance program for sustained renewal in the four Polonnaruwa District Systems, the Gal Oya Right Bank system, (or other system to be identified) and the Ridi Bendi Ela system.
  - Examine present maintenance procedures and identify Weaknesses and propose appropriate changes. Recommend staffing levels, schedules, procedures, equipment, etc., necessary for carrying out maintenance surveys and maintenance plans based on priority maintenance needs.
  - Develop and work with training staff to present courses on maintenance.
  - Review existing O&M manuals and prepare and updated maintenance manual specifically for use in the implementation of the preventive maintenance program for each of the schemes.
  - Prepare a report which summarizes the experience of the maintenance program, analyzes the progress under the program and makes recommendations for implementing the preventive maintenance program in each scheme.
- Assist with the development and implementation of and annual preventive maintenance program in the Gal Oya Left Bank system or other system to be identified.
  - Examine present maintenance procedures and identify weaknesses and propose appropriate changes. Recommend staff levels. schedules of maintenance, procedures, equipment, etc., necessary for carrying out the preventive maintenance program.
  - Develop and implement refinements to the GSL annual budgeting procedures for the Irrigation Department and procedures which utilize supplemental GSL and USAID maintenance funds.
  - Prepare a preventive maintenance manual and work with training staff to train field staff on the implementation of the preventive maintenance program. Refine and update the manual as appropriate.
  - Prepare a report which summarizes the experience of the preventive maintenance program, analyzes the progress under the program and makes recommendations for implementing the preventive maintenance program on a wider basis.

EXHIBIT III-2-6
SHEET 1 OF 2



RBMC SYSTEM "A"

GIRITALE TANK TO DAMBALA WEWA
RBMC STA 0 + 000 TO STA. 5 + 922



KADAWALA WEWA SYSTEM "A"

RBMC TO KADAWALA WEWA
STA 0 + 000 TO STA 3 + 260

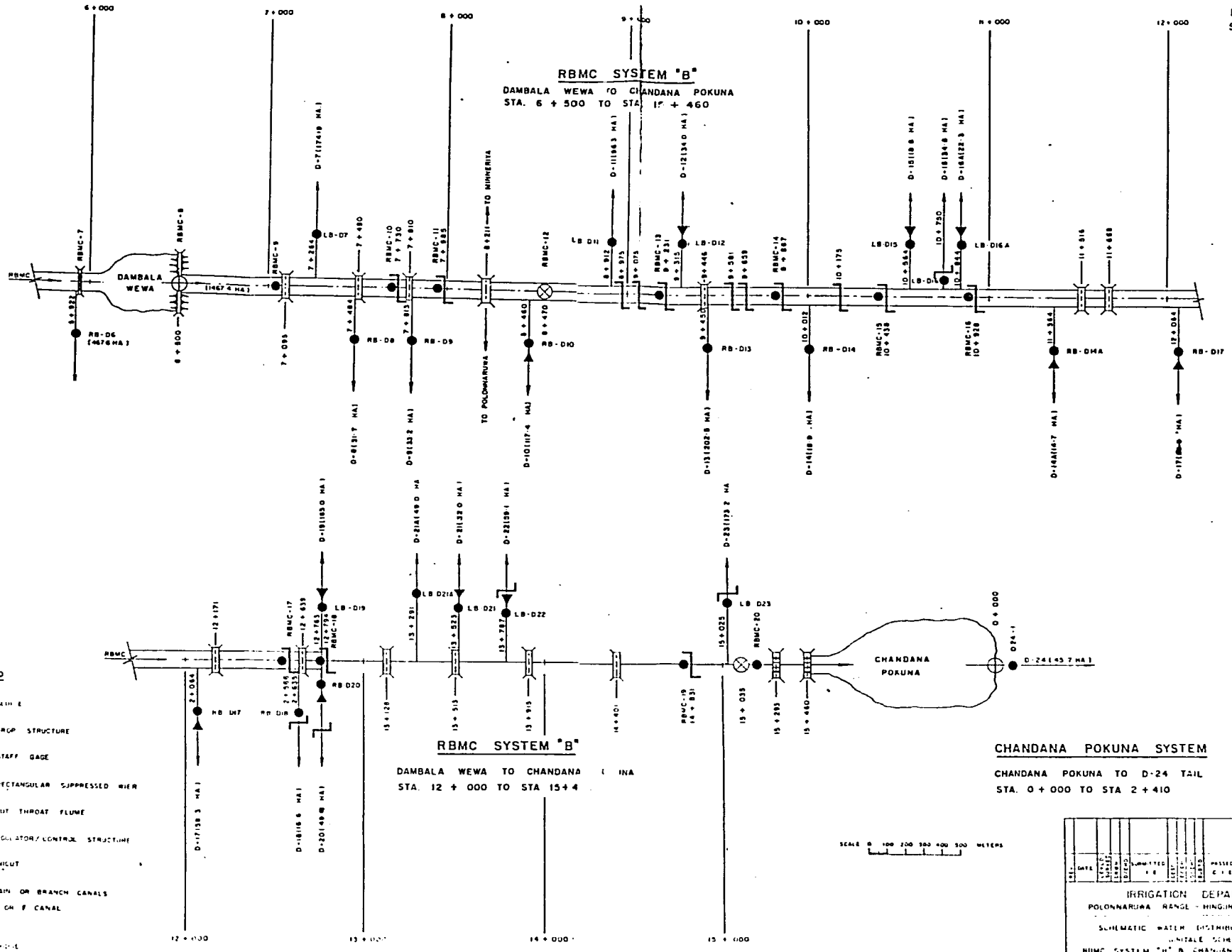
KADAWALA WEWA SYSTEM "B"

KADAWALA WEWA TO RB-2
STA 0 + 000 TO STA 4 + 226

LEGEND

- SLUICE
- DROP STRUCTURE
- STAFF GAGE
- REGULATOR / CONTROL STRUCTURE
- ANICUT
- MAIN OR BRANCH CANALS

IRRIGATION DEPARTMENT



IRRIGATION DEPARTMENT
POLONNARUWA RANGE - HINGURAKGODA DIVISION
SCHEMATIC WATER DISTRIBUTION DIAGRAM
-INITIAL SCHEME
RBMC SYSTEM "B" & CHANDANA POKUNA SYSTEM

ISMP

ANNUAL MAINTENANCE PLAN -- GIRITALE SCHEME

INLET CANAL, HEADWORKS & MAIN/BRANCH CANALS

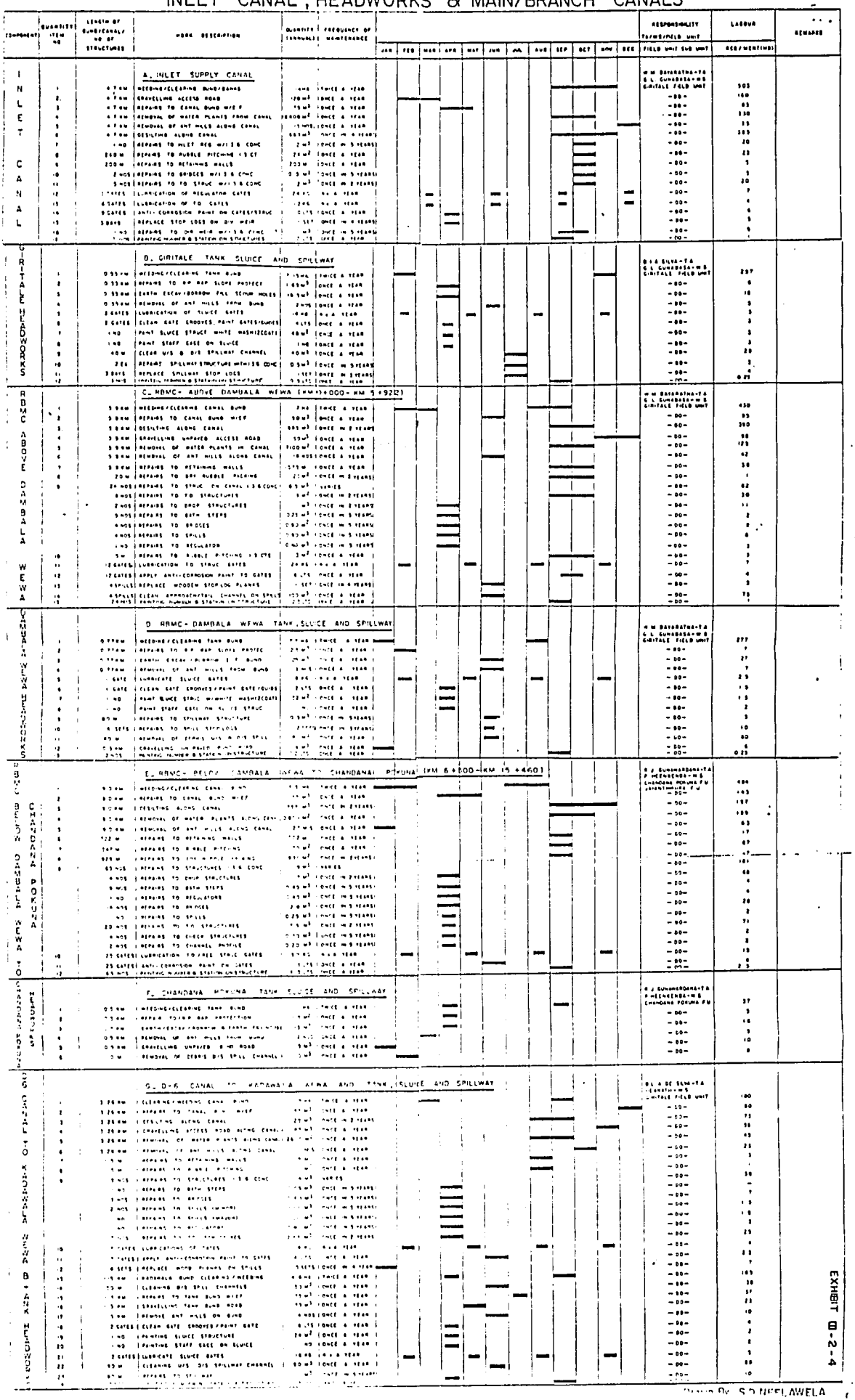
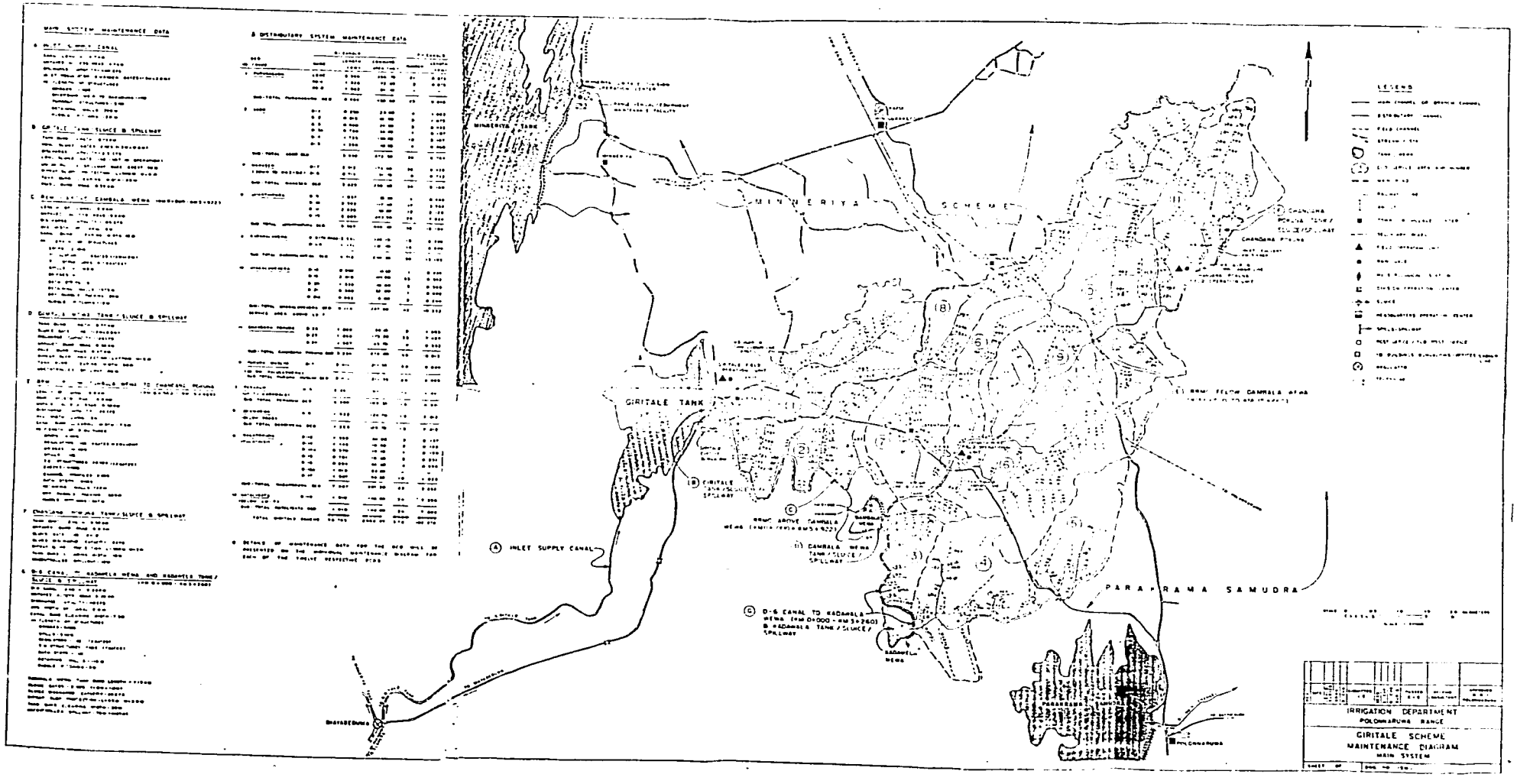


EXHIBIT D-2-4



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ANNUAL MAINTENANCE PLAN DCO ESTIMATING CRITERIA
TYPE 1 D/C (Q>3 CFS Q<50 CFS)

	Type of Maintenance	Frequency of Maint.	Unit Rate	Estimating Criteria
1	Weeding Canal Bund	twice a year	Ha	----
2	Earthwork on D/C Type 1	once a year	km	10 m^3/km
3	Desilting Along Canal	once a year	m^3	50% length 3" depth
4	Gravelling Roads	once a year	km	20m^3/km
5	Removing Water Plants	once a year	m^2	20%Area Avg. W=4.52
6	Lubricating of TO Gate	4 x year	kg	1/4 kg/gate
7	Paint Gates w/Anti Crossion Paint	once a year	Lts	1/2 Lts/gate
8	Removal of Ant Hills From Canal Bund	once a year	km	3 Nos./km
9	Repairs to Dry Rubble Packing	once in 2 yrs	m^2	Rs. 6/m^2
10	Repairs to canal lining	once a year	LM	Rs. 4/m^2
11	Repairs to Rubble Pitching	once a year	m^2	10% of area
12	Repairing Retaining Walls	once a year	Lm	Rs. 5/Lm
13	Repairs to Structures w/1:3:6 Concrete	varies	m^3	----
	Bridges	once in 5 yrs	m^3	0.05m^3/yr
	Regulators	once in 5 yrs	m^3	0.10m^3/yr
	TO Structures	once in 2 yrs	m^3	0.09m^3/yr
	Chl. Profiles	once in 5 yrs	m^3	0.025m^3/yr
	Drops	once in 2 yrs	m^3	0.125m^3/yr
	Bath Steps	once in 5 yrs	m^3	0.012m^3/yr
	Culverts	once in 5 yrs	m^3	0.05m^3/yr
	Check/End Structures	once in 5 yrs	m^3	0.025m^3/yr
	F.P.T.O	once in 2 yrs	m^3	0.0125m^3/yr
	Div. Box	once in 5 yrs	m^3	0.025m^3yr
	Drain Cross/Spills	once in 5 yrs	m^3	0.05m^3/yr
14	Replace wooden gates	once in 5 yrs	EA	

AMPDCOL

ANNUAL MAINTENANCE PLAN DCO ESTIMATING CRITERIA
TYPE 2 F/C (Q>1 CFS Q<3 CFS)

	Type of Maintenance	Frequency of Maint.	Unit Rate	Estimating Criteria
1	Weeding Canal Bund	twice a year	Ha	----
2	Earthwork on F/C Type 2	once a year	km	7.5m^3/km
3	Desilting Along Canal	once a year	m^3	50% length 2" depth
4	Gravelling Roads	once a year	km	15m^3/km
5	Removing Water Plants	once a year	m^2	20%Area Avg. W=2.08m
6	Lubricating of TO Gate	4 x year	kg	1/4 kg/gate
7	Paint Gates w/Anti Crossion Paint	once a year	Lts	1/2 Lts/gate
8	Removal of Ant Hills From Canal Bunds	once a year	km	3 Nos./km
9	Repairing Retaining Walls	once a year	Lm	Rs. 5/Lm
10	Repairs to canal lining	once a year	LM	Rs. 4/Lm
11	Repairs to Rubble Pitching	once a year	m^2	10% of area
12	Repairs to Dry Rubble Packing	once in 2 yrs	m^2	Rs. 6/m^2
13	Repairs to Structures w/1:3:6 Concrete	varies	m^3	----
	FPTO	once in 2 yrs	m^3	0.006m^3/yr
	Bridges	once in 5 yrs	m^3	0.025m^3/yr
	Regulators	once in 5 yrs	m^3	0.05m^3/yr
	TO Structures	once in 2 yrs	m^3	0.045m^3/yr
	Chl. Profiles	once in 5 yrs	m^3	0.012m^3/yr
	Drops	once in 2 yrs	m^3	0.0625m^3/yr
	Bath Steps	once in 5 yrs	m^3	0.006m^3/yr
	Culverts	once in 5 yrs	m^3	0.025m^3/yr
	Check/End Structures	once in 5 yrs	m^3	0.012m^3/yr
	Cut Throat Flume	once in 5 yrs	m^3	0.02m^3/yr
	Drain Cross/Spills	once in 5 yrs	m^3	0.025m^3/yr
	Division Box	once in 5 yrs	m^3	0.012m^3/yr
14	Replace wooden gates	once in 5 yrs	EA	

AMPDCOL

ANNUAL MAINTENANCE PLAN DCO ESTIMATING CRITERIA
TYPE 3 F/C (Q>Ø CFS Q<1 CFS)

	Type of Maintenance	Frequency of Maint.	Unit Rate	Estimating Criteria
1	Weeding Canal Bund	twice a year	Ha	----
2	Earthwork on F/C Type 3	once a year	km	5 m^3/km
3	Desilting Along Canal	once a year	m^3	50% length 2" depth
4	Gravelling Roads	once a year	km	15m^3/km
5	Removing Water Plants	once a year	m^2	20%Area Avg. W=1.29
6	Lubricating of TO Gate	4 x year	kg	1/4 kg/gate
7	Paint Gates w/Anti Crossion Paint	once a year	Lts	1/2 Lts/gate
8	Removal of Ant Hills From Canal Bunds	once a year	km	3 Nos./km
9	Repairing Retaining Walls	once a year	Lm	Rs. 5/Lm
10	Repairs to canal lining	once a year	LM	Rs. 4/Lm
11	Repairs to Rubble Pitching	once a year	m^2	10% of area
12	Repairs to Dry Rubble Packing	once in 2 yrs	m^2	Rs. 6/m^2
13	Repairs to Structures w/1:3:6 Concrete	varies	m^3	----
	Bridges	once in 5 yrs	m^3	Ø.Ø13m^3/yr
	Regulators	once in 5 yrs	m^3	Ø.Ø25m^/yr
	TO Structures	once in 2 yrs	m^3	Ø.Ø22m^3/yr
	Chl. Profiles	once in 5 yrs	m^3	Ø.ØØ6m^3/yr
	Drops	once in 2 yrs	m^3	Ø.Ø3m^3/yr
	Bath Steps	once in 5 yrs	m^3	Ø.ØØ3m^3/yr
	Culverts	once in 5 yrs	m^3	Ø.Ø12m^3/yr
	Check/End Structures	once in 5 yrs	m^3	Ø.ØØ6m^3/yr
	Cut Throat Flume	once in 5 yrs	M^3	Ø.Ø1m^3/yr
	FPTO	once in 2 yrs	m^3	Ø.ØØ3m^3/yr
	Division Box	once in 5 yrs	m^3	Ø.ØØ6m^3/yr
	Draining Cross/Spill	once in 5 yrs	m^3	Ø.Ø12m^3/yr
14	Replace wooden gates	once in 5 yrs	EA	

AMPDCOL

ANNUAL MANTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

TYPE 1 D-CANALS (Q>3 CFS <50 CFS; A>36 HA <607 HA)

LBMC	0+000	- 3+596
RB-1	0+000	- 1+826
RB-2	0+000	- 1+062

6.484km Say 6.5km

1 Weeding and clearing along canal bunds (Twice a year)
AVG. clearing width = 5m; Area = 5.0mx6500m = 32500m^2 = 3.25HA
2x3.25 = 6.5HA/yr.

2 Repairs to canal bund w/Earth filling (once a year)
Assume D/C = 10.0m^3/km/yr. V=10m^3x6.5km = 65m^3 Say 65m^3/yr

3 Desilting along canal (every year)
Avg. width canal bed = 1.50m
Assume 50% of canal req^s. desilting
Avg. depth = 0.075m for D/C (>3 <50cts)
V = 6500m x 0.075m x 0.50 x 2.0m = 488m^3/yr

4 Gravelling unpaved roads (once a year)
L = 2.2 km Assume 20m^3/km for D-C (>3 <50c
V = 2.2 x 20m^3 = 44m^3/yr

5 Removal of water plants from canal (once a ye
Assume 20% of length Avg. width = 4.52m
A = 4.52m x 0.20 x 6500m = 5876m^2
Say 5880m^2

6 Lubrication of T.O Gates 13Nos. (4 x a year)
15 Gates x 1/4kg/gate x 4 = 13kg/yr.

7 Application of Anti corrossive Paint (once a
13 Gates x 1/2Lt/gate = 6.5Lts Say 7 Lts.

8 Removal of Ant Hills along canal (once a year
3 Ant Hills/km
No. = 3x6.5 = 19.5 Say 20/Year

9 Repairs to Retaining walls (once a year)
L = 551 LM

10 Repairs to canals lining (once a year)
L = 286m

11 Repairs to Rubble pitching (once ayear)
1:3 mix
L = 294m Assume 10% gross area
W = 1.5 m
A = 0.10 x 294 x 1.5m = 44.1 Say 45m^2

ANNUAL MAINTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

TYPE 1-D-CANALS (Contd.)

12 Repairs to Dry Rubble Packing (once in 2 years)
L = 116m Avg width = 1.5m
Area = 116m x 1.5 = 174m^2 Say 175m^2/2 Yr. = 87.5 Say 90m^2/yr

13 Repairs to structures w/1:3:6 conc. (sequence varies)
for D/CQ>3 CFS <50CFS

Type of struc.	No.	Frequancy	Vol. Conc. m^3/Year
Drops	13	Every 2 yrs.	0.125m^3/yr x 13 = 1.625m^3
T.O Struc.	15	Every 2 yrs.	0.09m^3/yr x 15 = 1.350m^3
Channel Profile	19	Every 5 yrs.	0.025m^3/yr x 19 = 0.475m^3
Culverts	7	Every 5 yrs.	0.05m^3/yr x 7 = 0.350m^3
Bridges/	12	Every 5 yrs.	0.05m^3/yr x 12 = 0.600m^3
End Struc.	3	Every 5 yrs.	0.025m^3 x 3 = 0.075m^3
FP.T.O	29	Every 2 yrs.	0.0125m^3/yr x29 = 0.363m^3
Bath steps	6	Every 5 yrs.	0.012m^3/yr x 6 = 0.072m^3
Regulators	4	Every 5 yrs.	0.10/m^3/yr x 5 = 0.400m^3
Div Box	2	Every 5 yrs.	0.025/m/yr x 2 = 0.05m^3
Total	110		5.360m^3/yr
			Say 5.4m^3/yr

5.4m^3/110 = 0.04909m^3/str/yr

14 Replacement of wooden gates (every 5 yrs) 2 Nos.

DCOMQEL

ANNUAL MAINTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

Type 2 F-Canal (Q>1.ØCFS <3.ØCFS; A>12HA <36HA)

RB-3 Ø+ØØØ - Ø+51Ø
LB-2 Ø+ØØØ - Ø+692
FC-13 Ø+ØØØ- Ø+63Ø
RB-7 Ø+ØØØ - Ø.635
RB-6 Ø+ØØØ - Ø+433
RB-5 Ø+ØØØ - 1+22Ø
4+12Ø Say 4.Ømkm

1 Weeding & clearing along canal bund (Twice ayear)
Avg. Clearing width = 4.5m; Area =4.5x4,ØØØ=18,ØØØm^2=1.8HA
1.8HA x2 = 3.6 HA/yr

2 Repairs to canal bund w/Earth filling (once a year)
Assume for F/C (Q>1 CFS <3 CFS) 7.5m^3/km/yr
V= 7.5m^3/km x 4.Ømkm = 3Øm^3/yr

3 Desilting along canal (every year)
Avg. Width = 1.ØØm Assume 5Ø% of canal req's. desilting
Avg. depth = Ø.Ø5m for F/C (Q>1 <3CFS)
V = 1.ØØm x Ø.Ø5m x 4ØØØm x Ø.5 = 1ØØm^3/yr

4 Gravelling unpaved roads (once a year)
L = 3.878km Assume 15m^3/km for FC (Q>1 <3CFS)
V = 3.9 km x 15m/km = 58.5m^3 Say 6Ømˆ3

5 Removal of water plants from canal (once a year)
Assume 2Ø% of canal length Avg. width = 2.Ø8m
A = 2.Ø8m x .2Ø x 4,ØØØ = 1664m^2
Say 1665m^2

6 Lubrication of T.O. Gates (4 x 4 Year)
Nil

7 Application of Anti corrossive paint (once a year)
3 Gates x 1/2 Lt/gate = 1.5Lts/yr

8 Removal of Ant Hills along canal (once a year)
3 hills/km x 4 km = 12 Hills/yr

9 Repairs to Retaining walls (once a year)
L = 8Øm

1Ø Repairs to canal lining (once a year)
L = 34m

DCOMQEL

ANNUAL MAINTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

Type 2 F-Canal (Q>1.ØCFS <3.ØCFS; A>12HA <36HA) (Cont..)

11 Repairs to Rubble pitching (once a year) 1:3 mix
L = 6m, width = 1.Øm 1Ø% Gross area
A = 6 x 1.Ø x Ø.1 = Ø.6m^2 Say 1.Øm^2

12 Repairs to Dry Rubble packing Nil

13 Repairs to Structures w/1:3:6 conc. (Sequance varies)
For F/C Q>1CFS <3CFS

Type of Struc.	No.	Frequency	Vol. Conc. m^3/yr
Drops	34	Every 2 yrs	Ø.Ø625m^3/yr x 34 = 2.125
TO Struc.	3	Every 2 yrs	Ø.Ø45m^3/yr x 3 = Ø.135
Culverts	3	Every 5 yrs	Ø.Ø25m^3/yr x 3 = Ø.Ø75
Chl. Profiles	17	Every 5 yrs	Ø.Ø12m^3/yr x 17 = Ø.2Ø4
End Stsruc.	5	Every 5 yrs	Ø.Ø12m^3/yr x 5 = Ø.Ø6
F.P.T.O	59	Every 2 yrs	Ø.ØØ6m^3/yr x 59 = Ø.354
	121		2.953m^3
			Say 3.Øm^3/y

3.Øm^3/121 = Ø.Ø25m^3/str/yr

14 Replacement of wooden gates (once in 5 years)
3 Gates

DCOMQEL

ANNUAL MAINTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

Type 3 FC (Q>ØCFS <1CFS; A>ØHA <12HA)

FC-1/RB-1;FC2/RB1;LB1/LBMC;FC1/LB1;LB4/LBMC;FC1/LB4;FC2/LB4;
LB5/LBMC;FC1/LB5;LB3/LBMC;FC1/LB3;RB4/LBMC;FC1/RB4;RB3A/LBMC
LB1A/LBMC;FC1/RB5

Total length of canals = 5570m
Total length of roads = 1150m

1 Weeding/clearing along canal bund (Twice a year)
Avg. width = 2.5m; Area = 2.5 x 5,570m = 13,925m^2 = 1.4HA
2x1.4HA = 2.8HA/yr

2 Repairs to canal Bynd w/earth filling (once a year)
Assume for F/C (Q>/ØCFS < 3CFS) 5.0m^3/km
V= 5.0m^3/kmx5.5/km = 27.85m^3 Say 30m^3/yr

3 Desilting along canal bed (every year)
W = Ø.50m Assume d= Ø.05m 50% of length
V = Ø.50m x Ø.05m x .50 x 5.57Øm = 69.6 Say 70m^3/yr

4 Gravelling unpaved road (once a year)
L = 1,150m Assume 15m^3/km for FC (Ø-3 CFS)
V = 1.15km x 15m^3 = 17.25 Say 20m^3/yr

5 Removal of water plants along canal (once a year)
Assume 20% of length Avg. width = 1.29m
A = Ø.2Ø x 5,57Øm x 1.29m = 1457m^2 Say 15ØØm^2

6 Lubricate to Gates (4 x a year)
Nil

7 Paint gates w/Anti crossion paint (once a year)
4 gates x 1/2 Lt/gate = 2 Lts/yr

8 Removal of Ant Hills along canal (once a year)
3 Hills/km x 5.57km^2 = 16.71 Say 17 Hills

9 Repairs to retaining walls (once a year)
L = 48m

1Ø Repairs to canal lining (once a year)
L = 15m

11 Repairs to Rubble Pitching (once a year)
L = 1Øm x Ø.1Ø x 1.Ø = 1.Øm^2

12 Repairs to Dry. rubble packing (once a year)
A = 1Øm x 1.Ø width = 1Øm^2

DCOMQEL

ANNUAL MAINTENANCE PLAN
PURANAGAMA DCO
QUANTITY ESTIMATE

Type 3 FC (Q>ØCFS <1CFS; A>ØHA <12HA) (Cont.)

13 Repairs to Struc. w/1:3:6 Conc. (Sequence varies)

Type of Struc.	No.	Frequency	Vol. Conc.M^3/yr	
Drops	22	Once in 2 yrs	.Ø3m^3/yrx22	= Ø.66
T.O. Struc.	4	Once in 2 yrs	.Ø22m^3/yrx4	= Ø.Ø88
Chl. Profiles	11	Once in 5 yrs	.ØØ6m^3/yrx11	= Ø.Ø66
Culverts	9	Once in 5 yrs	.Ø12m^3/yrx9	= Ø.1Ø8
End. Struc.	6	Once in 5 yrs	.ØØ6m^3/yrx6	= Ø.Ø36
F.P.T.O	31	Once in 2 yrs	.ØØ3m^3/yrx31	= Ø.Ø93
Cut Throut Flume	1	Once in 5 yrs	.Ø1m^3/yrx1	= Ø.Ø1
Total	84			1.Ø61m^
			Say	1.1m^3

1.1m^3/84 = Ø.Ø13m^3/Str/yr

14 Replace wooden gates (once in 5 yrs)
4 Nos Rs. 5ØØ/gate = Rs. 1ØØ/Gate/yr

DCOMQEL

SIRITALE SCHEME - PURANAGAMA DCO
ESTIMATE OF EXPENSES NECESSARY TO BE INCURRED FOR : ANNUAL MAINT. PLAN

A. TYPE 1 - D/C Q>3CFS <50CFS
LBMC; RB-1; and RB-2

SUB ITEM	QUNTY	UNIT	DESCRIPTION	UNIT RATE Rs.	TOTAL ITEM COST Rs.
1	6.5	HA	Cleaning/weeding canal bund (twice a yr)	3,079.00	20,013.50
2	65	M^3	Repairs to bund w/Earth Fill (once a yr)	99.45	6,464.25
3	488	M^3	Desilting along canal (once a year)	50.50	24,644.00
4	44	M^3	Gravelling road (once a year)	125.50	5,522.00
5	5880	M^2	Removal of water plants from canal (once a yr)	1.50	8,820.00
6	13	kg	Lubricate Gate/struc (4 x a year)	100.00	1,300.00
7	7	Lts	Paint Gates w/anti corrossive pt. (once a year)	130.00	910.00
8	20	Nos	Removal of Ant Hills from canal (once a year)	200.00	4,000.00
9	551	Lm	Repairs to Retaining walls (once a year)	5.00	2,755.00
10	286	Lm	Repairs to canal lining (once a year)	4.00	1,144.00
11	45	M^2	Repairs to Rubble Pitching (once a year)	202.00	9,090.00
12	90	M^2	Repairs to Dry Rubble Packing (once in 2 yrs)	6.00	540.00
13	5.4	M^3	Repairs to Struc.(Nos.114) w/1:3:6 Conc.(varies)	2,000.00	10,800.00
14	2	Nos	Replacement of wooden gates (once in 5 yrs)	100.00	200.00
			TOTAL COST TYPE 1		96,202.75

B. TYPE 2-F/C Q>1CFS <3CFS
LB-2; RB-3; FC-13; RB-7; RB-6; & RB-5

1	3.6	HA	Weeding and cleaning canal bund (twice a year)	3,079.00	11,084.40
2	30	M^3	Repairs to canal bund w/Earth Fill (once a year)	99.45	2,983.50
3	100	M^3	Desilting along canal (once a year)	50.50	5,050.00
4	60	M^3	Gravelling unpaved canal roads (once a year)	125.50	7,530.00
5	1665	M^2	Removal of water plants along canal (once a year)	1.50	2,497.50
6	Nil				
7	1.5	Lts	Paint gates w/Anti crrossive paint (once a year)	130.00	195.00
8	12	Nos	Removal of Ant Hills from canal bund(once a year)	200.00	2,400.00
9	80	M	Repairs to retaining walls (once a year)	5.00	400.00
10	34	M	Repairs to canal lining (once a year)	4.00	136.00
11	1	M^2	Repairs to Rubble Pitching (once a year)	202.00	202.00
12	Nil		Nil		
13	3.0	M^3	Repairs to Struc. w/1:3:6 Conc. (varies) (117Nos)	2,000.00	6,000.00
14	1	Nos	Replace wooden gates (once in 5 yrs)	100.00	300.00
			TOTAL COST TYPE 2		38,778.40

DCOCOSTL

. GIRITALE SCHEME - PURANAGAMA DCO
. ESTIMATE OF EXPENSES NECESSARY TO BE INCURRED FOR : ANNUAL MAINT. PLAN

C. TYPE 3 - F/C Q>0CFS <1CFS

FC-1/RB-1; FC2/RB1; LB1/LBMC;FC1/LB1; LB4/LBMC; FC1/LB4; FC2/LB4; LB5/LBMC; FC1/LB5; LB3/LBMC; FC1/LB3; LB4/LBMC; FC1/RB4; RB3A/LBMC; LB1A/LBMC; & FC1/RB5/LBMC

SUB ITEM	QUNTY	UNIT	DESCRIPTION	UNIT RATE Rs.	TOTAL ITEM COST Rs.
1	2.8	HA	Clearing/weeding canal bund	3,079.00	8,621.20
2	30	M^3	Repairs to canal bund w/Earth Filling (once a yr)	99.45	2,983.50
3	70	M^3	Desilting along canal (once a year)	50.50	3,535.00
4	20	M^3	Gravelling along canal Roads (once a year)	125.50	2,510.00
5	1500	M^2	Removal of water plants along canal (once a year)	1.50	2,250.00
6	Nil				
7	2	Lts	Paint gates W/Anti crossion paint (once a year)	130.00	260.00
8	17	Nos	Remove Ant Hills along canal (once a year)	200.00	3,400.00
9	48	M	Repairs to retaining walls (once a year)	5.00	240.00
10	15	M	Repairs to canal lining (once a year)	4.00	60.00
11	1	M^2	Repairs to rubble pitching (once a year)	202.00	202.00
12	10	M^2	Repairs to Dry Rubble Packing (once 2 years)	6.00	60.00
13	1.1	M^3	Repairs to Struc. W/1:3:6 conc. (Varies) (80 Nos)	2,000.00	2,200.00
14	4	Nos	Replace wooden gates (once in 5 yrs)	100.00	400.00
			TOTAL COST TYPE 3		26,721.70

DCOCOSTL

SUMMARY ANNUAL MAINTENANCE COST ESTIMATE - DCO PURANAGAMA AND
ALLOCATION OF LABOUR MATERIALS/EQUIPMENT/TRANSPORT

SUB ITEM	DESCRIPTION	TYPE 1 D/C	TYPE 2 F/C	TYPE 3 F/C	TOTAL COST LABOR/ MATERIAL/ EQUIPMENT/ TRANSPORT	%	ALLOCATION OF COST LABOR (Rs.)	MATERIAL %	EQUIP/TRAN Rs.
1	Clearing/weeding canal bund (twice a year).	20,813.50	11,034.40	8,621.20	39,719.10	98	38,924.72	2	794.38
2	Repairs to bund w/Earth fill (once a year)	6,464.25	2,983.50	2,983.50	12,431.25	90	11,188.10	10	1,243.15
3	Desilting along chl (once a year)	24,644.00	5,050.00	3,535.00	33,229.00	98	32,564.42	2	664.58
4	Gravelling Roads (once a year)	5,522.00	7,530.00	2,510.00	15,562.00	44	6,847.26	56	8,714.72
5	Removal of water plants/weeding from canal(once a yr)	8,820.00	2,497.50	2,250.00	13,567.50	98	13,296.15	2	271.35
6	Lubricate gate struc (4 x a year)	1,300.00	----	----	1,300.00	25	325.00	75	975.00
7	Paint gate W/Anti crossive Paint (once a year)	910.00	195.00	260.00	1,365.00	40	546.00	60	819.00
8	Removal of Ant Hills from canal bund (once a year)	4,000.00	2,400.00	3,400.00	9,800.00	98	9,604.00	2	196.00
9	Repairs to Ret/walls (once a year)	2,755.00	400.00	240.00	3,395.00	40	1,358.00	60	2,037.00
10	Repairs to canal Lining (once a year)	1,144.00	136.00	68.00	1,348.00	40	536.00	60	824.00
11	Repairs to rubble pitching (once a year)	9,090.00	202.00	202.00	9,494.00	40	3,797.60	60	5,696.40
12	Repairs to Dry Rubble Packing (once a year)	540.00	----	60.00	600.00	70	420.00	30	180.00
13	Repairs to struc. w/1:3:6 Conc (varies)	10,600.00	6,200.00	2,200.00	19,000.00	40	7,600.00	60	11,400.00
14	Replacement of wooden gates (once in 5 yrs)	200.00	300.00	400.00	900.00	20	180.00	80	720.00
	SUB TOTAL CONSTR. COST	96,202.75	38,778.40	26,721.70	161,702.85	78.9	127,187.27	21.1	34,515.58
	CONTINGENCIES @ 7½%	7215.21	2908.38	2004.13	12127.71		9539.05		2588.67
	TOTAL CONST. COST	103,417.96	41,686.78	28,725.83	173,830.56		136,726.32		37,104.25
	DCO ADMIN/OF COST @ 5%	5170.90	2084.34	1436.29	8691.53		6836.32		1855.21
	TOTAL DCO ANNUAL MAINT. COST	108,588.85	43,771.12	30,162.12	182,522.09		143,562.63		38,959.46
	SERVICE AREA OF PURANAGAMA DCO =	438.6 Ha = 1084 AC			Rs. 171.54/Ac		Rs. 134.93/Ac		Rs.36.62/Ac

SUMDCOCE

EXHIBIT III-2-9
SHEET 3 OF 3

ANNUAL MAINTENANCE PLAN & COST ESTIMATES EXHIBIT III-2-13
TERTIARY SYSTEMS - PSS Sheet 1 of 4
(30 JUNE 1992)

DCO No	NAME OF DCO	FIELD WORK %	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP %	Sinhala Trans.
1	AMBANGANGA	100	100	100	100	0	100
2	ALUTHWEWA	100	100	100	100	0	100
3	D - 4 CHL	100	100	100	100	0	100
4	LAXAUYANA	100	100	100	100	0	0
5	MANIKKAMPATTIYA	100	100	100	100	0	100
6	TALPOTHA	100	100	100	100	0	100
7	THAMBALA(ALHILALPURA)	100	100	100	100	0	0
8	SOMAWATHIYA	100	100	100	100	0	0
9	KEGALUGAMA	100	100	100	100	0	0
10	PULASTIGAMA	100	100	100	100	0	0
11	GEMUNUPURA	100	100	100	100	0	0
12	GALTHAMBARAWA	100	100	100	100	0	0
13	SEWAGAMA	100	100	100	100	0	0
14	PALUGASDAMANA	100	100	100	100	0	0
15	MONARATENNA	100	100	100	100	0	0
16	VIJAYARAJAPURA	100	100	100	100	0	100
17	SINHARAJAPURA	100	100	100	100	0	0
18	PAHALAKALINGAELA	100	100	100	100	0	0
19	SUNGAWILA/MOHIDEEN	100	100	100	100	0	0
20	WEERAPURA	100	100	100	100	0	100
21	KALAHAGALA	100	100	100	100	0	0
22	DAMANA GEMUNUPURA	100	100	100	100	0	0
23	SINHAPURA	100	100	100	100	0	0
24	VIJAYABAPURA	100	100	100	100	0	0
25	LANKAPURA	100	100	100	100	0	100
26	WEERA PEDESA	100	100	100	100	0	100
27	2 CHL/WEERAPARAKRAMA	100	100	100	100	0	100
28	MAHASEN	100	100	100	100	0	0

AMPCETS

ANNUAL MAINTENANCE PLANS & COST ESTIMATES
TERTIARY SYSTEMS - MINNERIYA
30 JUNE 1992

EXHIBIT III-2-13
Sheet 2 of 4

DCO No.	NAME OF DCO	FIELD WORK %	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP %	Sinhala Trans.
1	Raja Ela	100	100	100	100	0	0
2	Kotalawela	100	100	100	100	0	0
3	Hinguraka	100	100	100	100	0	0
4	Kumaragama	100	100	100	100	0	0
5	Hingurakdamana	100	100	100	100	0	0
6	Kotigahapitiya	-----	-----	-----	------	----	-------
7	Kaudulla	100	100	100	100	0	0
8	Galamuna Gamunu	100	100	100	100	0	0
9	Galamuna Perakum	100	100	100	100	0	0
10	Galamuna Wijaya	100	100	100	100	0	0
11	Yoda Ela	100	100	100	100	0	100
12	Kusumpokuna	100	100	100	100	0	0
13	Viharamawatha	100	100	100	100	0	100
14	Yatigalpothana	100	100	100	100	0	0
15	Hathamuna	100	100	100	100	0	100
16	Ulpathwewa	100	100	100	100	0	100
17	Divulankadawela	100	100	100	100	0	100
18	Mahasen	100	100	100	100	0	100
19	Govt. Farm	------	-----	------	------	----	-------
20	Nissanka	100	100	100	100	0	0
21	Sansungama	100	100	100	100	0	0

EXHIBIT W-2-13
Sheet 3 of 4

ANNUAL MAINTENANCE PLANS & COST ESTIMATES
TERTIARY SYSTEMS - GIRITALE
(30 JUNE 1992)

No.	NAME OF DCO	FIELD WORK %	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP %	Sinhala Transla
1	PURANAGAMA	100	100	100	100	100	0
2	AGBO	100	100	100	100	100	0
3	MAHASEN	100	100	100	100	100	0
4	JAYANTHIPURA	100	100	100	100	100	0
5	KADAWALA WEWA	100	100	100	100	100	100
6	UNAGALAWEHERA	100	100	100	100	100	0
7	CHANDANAPOKUNA	100	100	100	100	100	100
8	PURANA MUSLIM	100	100	100	100	100	0
9	PARAKUM	100	100	100	100	100	0
10	BENDIWEWA	100	100	100	100	100	0
11	NAGAPOKUNA (PULASTI)	100	100	100	100	100	0
12	HATASISATA	100	100	100	100	100	0

AMPCETS

ANNUAL MAINTENANCE PLANS AND COST ESTIMATES EXHIBIT III-2-13
TERTIARY SYSTEMS - KAUDULLA Sheet 4 of 4
(" 30 JUNE . 1992)

DCO No	NAME OF DCO	FIELD WORK %	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP. %	Sinhala Trans.
1	EKSATH	100	100	100	100	0	100
2	MENIK HOROWWA	100	100	100	100	0	100
3	SAMA	100	100	100	100	0	100
4	GOVISETHA	100	100	100	100	0	100
5	MANDALAGIRI	100	100	100	100	0	0
6	KALINGA ELA	100	100	100	100	0	0
7	C.P PURA PERAKUM	100	100	100	100	0	0
8	PUBUDU	100	100	100	100	0	0
9	SUHADA EKSATH	100	100	100	100	0	100
10	SRI NAGA	100	100	100	100	0	0
11	VIJAYAPURA VIJAYA	100	100	100	100	0	0
12	SAMAGI	100	100	100	100	0	100
13	MAHINDAPURA	100	100	100	100	0	100
14	MAHAWELI	100	100	100	100	0	0
15	D.S. SENANAYAKE	100	100	100	100	0	0
16	SRI VIJAYA	100	100	100	100	0	0
17	WEERA KEPPETIPOLA	100	100	100	100	0	0
18	NAGARAPURA SAHANA	100	100	100	100	0	100
19	MAHASEN	100	100	100	100	0	0
20	EKSATHGOVI	100	100	100	100	0	0
21	VIJITHA	100	100	100	100	0	0
22	PRAGATHI	100	100	100	100	0	0

AMPCETS

ANNUAL MAINTENANCE COST OF DCDs SYSTEM - GIRITALE SCHEME

DCD No.	DCD NAME	COMMAND AREA Ha	COMMAND AREA Ac	LABOUR COST Rs.	MAT/EQUP. TRANS. COST Rs.	TOTAL COST Rs.	UNIT COST PER Ha	UNIT COST PER Ac	
1	PURANAGAMA	430.60	1064.00	143,560	38,960	182,520	423.87	171.54	
2	AGGUPURA	272.50	675.00	98,700	29,360	128,060	440.59	177.87	
3	PARAKUM	109.35	270.20	28,730	11,920	40,650	371.74	150.44	
4	KADAWALAWEWA	240.55	595.00	97,350	32,350	129,700	539.18	217.98	(1)
5	BENDIWEWA	126.70	313.00	51,450	17,150	68,600	541.44	219.17	(1)
6	JAYANTIPURA	449.40	1110.50	164,960	58,270	223,230	496.73	201.02	
7	MAHASEN	206.60	510.50	84,550	25,225	109,775	531.34	215.03	
8	PURANA MUSLIM	211.35	522.00	100,160	33,020	133,180	630.14	255.13	(2)
9	NAGAFOKUNA	201.20	497.00	67,760	23,560	91,320	453.88	183.74	
10	UNAGALAWEHERA	297.60	735.00	117,540	37,130	154,670	519.72	210.44	
11	CHANDRAFOKUNA	270.00	667.00	110,400	38,785	149,265	536.92	217.27	
12	MATALLISATA	146.00	361.00	75,050	23,200	98,250	672.95	272.16	(2)
TOTAL		2767.05	7340.20	1,132,270	360,938	1,501,220	505.49	204.52	
	SAY	2770 Ha	7340 Ac						

Average Cost per Ac. 1,501,220/7,340 = Rs. 204.53

1. All paddy lots of extent 2.0 Ac
2. Re-use of water from anicut (Independent water supply)

amcdco

ANNUAL MAINTENANCE COST OF DCOs SYSTEM - MINNERIYA SCHEME .

DCO No.	DCO NAME	COMMAND AREA Ha	COMMAND AREA Ac	CLAIMED COST Rs.	MAT/EQUIP. TRANS. COST Rs.	TOTAL COST Rs.	UNIT COST PER Ha	UNIT COST PER Ac
1	ULPOTHWEWA	423.45	1045	86890	40875	127765	302	122
2	KOTALAWELA	588.74	1434	102898	53975	156865	278	109
3	KUMARAGAMA	233.88	575	105153	48769	153922	661	268
4	VIHARAMAWATHA	664.16	1640	246878	91549	338439	518	206
5	HINGURAKDAHANA	996.98	2462	122377	47499	169876	178	69
6	GALAHUNA GEHUNU	469.15	1159	171604	57356	229848	488	198
7	NISSANKA	441.58	1091	138957	25438	156387	354	143
8	GALAHUNA VIJAYA	274.88	677	68885	38438	187243	391	158
9	SANSUNGAMA	397.97	983	142556	66365	208921	528	218
10	KAUDULLA	369.21	912	185167	51473	156642	424	172
11	RAJAELA	664.88	1648	252261	185465	357726	539	218
12	NAVAKUSUMPOKUNA	747.73	1847	153658	63886	217456	291	118
13	HINGURAKA	608.56	1761	86929	35755	122684	178	78
14	MAHASEN	361.44	893	196731	69878	265881	735	298
15	YODAELA	535.21	1322	96433	51815	148248	277	112
16	YATIYALPOTANA	412.19	1018	86485	49953	136438	331	134
17	PERAKUM	438.68	1084	146571	41626	188197	437	177
18	HATAHUNA	656.18	1621	184778	42497	147275	224	91
19	DIVULANKADAWELA	237.83	587	64719	21639	86558	364	147
	TOTAL	9583.79	23731.88	2,478,178	11,883,355	13,473,483	7,467	3,821

Average Annual Maintenance Cost = 3,473,483/23,731 = Rs. 146

amcdco

ANNUAL MAINTENANCE COST OF DCOs SYSTEM - PARAKRAMA SAMUDRA SCHEME

DCO No.	DCO NAME	COMMAND AREA		LABOUR COST	MAT/EQUP. TRANS. COST	TOTAL COST	UNIT COST	
		Ha	Ac	Rs.	Rs.	Rs.	PER Ha	PER Ac
1	AMBANGANGA	443.79	1077	176,750	52,250	229,000	516.01	208.75
2	ALUTHWEWA	364.5	900	195,600	52,650	248,250	681.87	275.83
3	WEERAPEDESA	22.3	55	17,600	4,600	22,200	995.52	403.64
4	2 ELA DCO	93.7	231.5	26,500	14,700	41,200	439.78	177.97
5	4 ELA DCO	145.7	360	48,050	19,850	68,700	471.52	190.83
6	MANIKKAMPITIYA	414.33	1024	116,000	39,800	155,800	374.10	151.37
7	GALTHAMBARAWA	291	719	120,550	71,500	200,000	687.29	278.16
8	VIJAYARAJAPURA	442	1092	185,900	69,800	255,700	578.51	234.16
9	SINHARAJAPURA	410.6	1035	83,250	35,900	121,150	287.42	117.05
10	PAHALA PALINGA ELA	359.7	889	87,700	42,300	132,000	366.97	148.48
11	MAHARAJAWENNA	188.6	465	60,050	26,100	94,980	503.18	204.09
12	PAHANA GEMUNU-PURA	276.72	684	75,700	38,200	134,100	484.61	196.05
13	PALUGASDAKSHA	511.95	1265	141,350	70,000	212,150	414.48	167.71
14	SEWAGAMA	656.69	1623	257,700	62,200	319,900	487.14	197.18
15	LAKSAUYANA	255	630	90,900	31,900	122,800	481.57	194.92
16	VIJAYABAPURA	180	445	57,150	19,000	76,150	423.06	171.12
17	SINHAPURA	302.12	747	62,050	35,700	97,750	323.55	130.86
18	TALPOTHA	216.19	534	185,150	36,200	141,350	653.82	264.78
19	LANKAPURA	244.81	605	181,900	38,800	185,700	431.76	174.71
20	WEERAPURA	263	650	114,100	36,250	150,350	571.67	231.31
21	THAMMALA	151.85	375	74,980	27,200	102,180	672.37	272.27
22	GEMUNUPURA	408	1008	126,800	36,300	163,100	399.75	161.81
23	MAHASEN	328	770	120,500	49,300	169,800	530.63	214.94
24	DEGALUGAMA	208	474	94,650	43,800	130,450	692.25	280.26
25	SORAPURA/ APAYAPURA	260	642	154,550	52,650	207,200	796.92	322.74
26	SUNGAETLA	274	677	107,600	43,000	150,600	549.64	222.45
27	PULASTIGAMA	305	951	162,200	81,800	244,000	633.77	256.57
28	KALAHAGALA	100.07	247	36,700	6,500	43,200	327.67	161.88

100

ANNUAL MAINTENANCE COST OF DCOs SYSTEM - KAUDULLA SCHEME

DCO No.	DCO NAME	COMMAND AREA Ha	COMMAND AREA Ac	LABOUR COST Rs.	MAT/EQUP. TRANS. COST Rs.	TOTAL COST Rs.	UNIT COST PER Ha	UNIT COST PER Ac
1	EKSATH	182.20	450	148607	36357	176964	971	393
2	KENIKHUROWWA	98.40	243	44155	16369	60524	615	249
3	SAMA	196.00	484	92894	32631	124725	636	258
4	GOVISETHA	115.00	286	52234	19285	71519	618	250
5	MANDALAGIRI	190.00	469	104588	38626	143214	754	305
6	KALINGA ELA	211.25	525	125254	41751	167005	791	318
7	CP PURA PERAKUM	405.00	1000	275744	75103	350847	866	351
8	PUBUDU	289.00	714	171354	57118	228472	791	320
9	SUMANA EKSATH	253.50	626	130776	48691	179467	708	287
10	SRI NAGA	131.98	326	64534	23058	87592	664	269
11	VIJAYAPURA VIJAYA	157.80	390	93563	31188	124751	791	320
12	SAMAGI	252.40	623	156716	49546	206262	817	331
13	MAHINDAPURA	241.00	595	118314	34068	152382	632	256
14	MAHAWELI	77.68	192	33491	11421	44912	578	234
15	DS SENANAYAKE	168.78	417	100433	37190	137623	816	330
16	SRI VIJAYA	178.00	487	53282	24589	77871	393	159
17	WEERA - KEPPETIPOLA	183.60	454	107997	42422	150419	819	331
18	NAGAPURA SCHEME	310.50	767	150245	57358	207603	669	271
19	MAHASEN	316.00	783	284678	119999	404677	1277	517
20	EKSATH GOVI	112.00	277	125276	38332	163608	1461	591
21	VIJITHA	165.60	409	86892	29735	115627	698	283
22	PRAGATHI	124.00	308	96745	30625	127370	1021	414
	TOTAL	4302.01	10027	2660772	874462	3503434	17305.2	17035.71
	Average annual maintenence Cost 3,503,434/10027 =							324

ANNUAL MAINTENANCE PLANS & COST ESTIMATES
TERTITARY SYSTEMS - RBE
(30 JUNE 1992)

No.	NAME OF DCO	FIELD WORK	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP %	Sinhala Transla
1	KATAGAMUWA (INLET CANAL)	100	100	100	100	50	100
2	MAGALLEGAMA	100	100	100	100	50	100
3	CENTRAL CANAL	100	100	100	100	50	100
4	DANDUWAWA	100	100	100	100	50	100
5	THARANAGOLLA	100	100	100	100	50	100
6	DANGAHAWELAYAYA	100	100	100	100	50	100
7	HEELOGAMA	100	100	100	100	50	100
8	DIVULLEWA	100	100	100	100	50	100
9	BUDUMUTTAWA	100	100	100	100	50	100
10	BALANGOLLAGAMA	100	100	100	100	50	100
11	IBBAWELA	100	100	100	100	50	100

AMPCETS

ANNUAL MAINTENANCE COST OF UCOs SYSTEM - RIDI BENDI ELA SCHEME

UCOI No.	UCO NAME	COMMAND AREA Ha	COMMAND AREA Ac	LABOUR COST Rs.	MAT/EQUP. TRANS. COST Rs.	TOTAL COST Rs.	UNIT COST PER Ha	UNIT COST PER Ac
1	KATAGAHUWA	245.00	605	146500	29300	175800	718	291
2	MAGALLEGAMA	129.00	319	21478	7160	28638	222	90
3	CENTER CANAL	161.00	398	63953	21318	85271	530	214
4	DANDUWANA	176.00	435	23959	7986	31945	182	73
5	TARANAGULLA	211.00	521	38215	12738	50953	241	98
6	DANGAWELAYAYA	197.00	487	71214	14243	85457	434	175
7	HEELOGAMA	113.00	279	12254	4084	16338	145	59
8	DIULLEWA	209.00	516	38797	12932	51729	248	100
9	BUDUHUTTEWA	238.00	588	48071	16024	64095	269	109
10	DALAGULLAGAMA	431.00	1064	77283	26420	105713	245	99
11	IDDAWELA	138.00	341	21392	7131	28523	207	84
	TOTAL	2248.00	5553.00	565110.00	159344.00	724462.00	13439.33	1392.1

Average Annual Maintenance Cost per Acre = 724,462/5,553 = Rs. 130

ANNUAL MAINTENANCE PLANS & COST ESTIMATES
TERTIARY SYSTEMS - GAL OYA LB
(30 JUNE 1992)

DCO No	NAME OF DCO	FIELD WORK	COST EST	MAINT PLAN	ISSUE TREE	BOP	Sinhala Trans.
1	LB 1A BATAHIRA DUNGALA	100	Ø	Ø	Ø	Ø	Ø
2	LB 1,2,& 3	100	Ø	Ø	Ø	Ø	Ø
3	LB 4	100	Ø	Ø	Ø	Ø	Ø
4	LB 5	100	Ø	Ø	Ø	Ø	Ø
5	LB 6	100	Ø	Ø	Ø	Ø	Ø
6	LB 7 (upper)	100	Ø	Ø	Ø	Ø	Ø
7	LB 7 (lower)	100	Ø	Ø	Ø	Ø	Ø
8	LB 8	100	Ø	Ø	Ø	Ø	Ø
9	LB 10	100	Ø	Ø	Ø	Ø	Ø
10	LB 11	Ø	Ø	Ø	Ø	Ø	Ø
11	LB 11A & B	Ø	Ø	Ø	Ø	Ø	Ø
12	LB 12	Ø	Ø	Ø	Ø	Ø	Ø
13	LB14	Ø	Ø	Ø	Ø	Ø	Ø
14	LB 15	Ø	Ø	Ø	Ø	Ø	Ø
15	LB 16	Ø	Ø	Ø	Ø	Ø	Ø
16	UB 1 - Udarigama	Ø	Ø	Ø	Ø	Ø	Ø
17	UB 2	Ø	Ø	Ø	Ø	Ø	Ø
18	UB 5,4 & 5B	Ø	Ø	Ø	Ø	Ø	Ø
19	UB 7	Ø	Ø	Ø	Ø	Ø	Ø
20	UB 8 & 8A	Ø	Ø	Ø	Ø	Ø	Ø
21	UB 9 & 10	Ø	Ø	Ø	Ø	Ø	Ø
22	UB 11	Ø	Ø	Ø	Ø	Ø	Ø
23	UB 12	Ø	Ø	Ø	Ø	Ø	Ø
24	UB 13,14,15 & 16	Ø	Ø	Ø	Ø	Ø	Ø

ANNUAL MAINTENANCE PLAN & COST ESTIMATES
TERTIARY SYSTEMS GAL OYA LB
(30 JUNE 1992)

DCO No	NAME OF DCO	FIELD WORK %	COST EST %	MAINT PLAN %	ISSUE TREE %	BOP %	Sinhala Trans.
25	UB 17	100	Ø	Ø	Ø	Ø	Ø
26	M Ø1	100	Ø	Ø	Ø	Ø	Ø
27	M2, 3 & 4	100	Ø	Ø	Ø	Ø	Ø
28	M 5	100	Ø	Ø	Ø	Ø	Ø
29	M 5.2	100	Ø	Ø	Ø	Ø	Ø
3Ø	M 5.4	100	Ø	Ø	Ø	Ø	Ø
31	M6.7	100	Ø	Ø	Ø	Ø	Ø
32	M 8	100	Ø	Ø	Ø	Ø	Ø
33	M 9.11	100	Ø	Ø	Ø	Ø	Ø
34	M 12	100	Ø	Ø	Ø	Ø	Ø
35	M 16	100	Ø	Ø	Ø	Ø	Ø
36	M 17 & 2Ø	100	Ø	Ø	Ø	Ø	Ø
37	LB - 19 & 2Ø	100	Ø	Ø	Ø	Ø	Ø
38	LB 21 & 22	100	Ø	Ø	Ø	Ø	Ø
39	LB 23,24 & 25	100	Ø	Ø	Ø	Ø	Ø
4Ø	LB 29,3Ø,31,32&G-1	100	Ø	Ø	Ø	Ø	Ø
41	G 3	100	Ø	Ø	Ø	Ø	Ø
42	G 5	100	Ø	Ø	Ø	Ø	Ø
43	G 6	100	Ø	Ø	Ø	Ø	Ø
44	G 4 & 7	100	Ø	Ø	Ø	Ø	Ø
45	G 1Ø	100	Ø	Ø	Ø	Ø	Ø
46	G 2 & LB 27	100	Ø	Ø	Ø	Ø	Ø
47	G 11	100	Ø	Ø	Ø	Ø	Ø
48	G 9 & 12	100	Ø	Ø	Ø	Ø	Ø
49	G 13,14,15,&16 & PERAKUM	100	Ø	Ø	Ø	Ø	Ø
5Ø	PADDANGALAYAYA	Ø	Ø	Ø	Ø	Ø	Ø
51	RUHUNUGAMA	Ø	Ø	Ø	Ø	Ø	Ø
52	LB 34,35&36	Ø	Ø	Ø	Ø	Ø	Ø
53	LB 37,38,39	Ø	Ø	Ø	Ø	Ø	Ø
54	LB 4Ø,41,42	Ø	Ø	Ø	Ø	Ø	Ø

ANNUAL MAINTENANCE PLAN & COST ESTIMATES
TERTIARY SYSTEMS - GAL OYA RB
(30 JUNE 1992)

EXHIBIT III-2-17
Sheet 3 OF 3

DCO No	NAME OF DCO	FIELD WORK	COST EST	MAINT PLAN	ISSUE TREE	BOP	Sinhala Trans.
1	RB 1 - 6	100	Ø	Ø	Ø	Ø	Ø
2	RB 7,8&11,G1&2	100	Ø	Ø	Ø	Ø	Ø
3	G3,4& Tail/Galmadu Br	100	Ø	Ø	Ø	Ø	Ø
4	V-1 to 9	100	Ø	Ø	Ø	Ø	Ø
5	V 10 - 19	100	Ø	Ø	Ø	Ø	Ø
6	RB1A-16&16A& Damana Br Chl	100	Ø	Ø	Ø	Ø	Ø
7	RB 20	100	Ø	Ø	Ø	Ø	Ø
8	I 1 to 4	100	Ø	Ø	Ø	Ø	Ø
9	WG 1 to 9	Ø	Ø	Ø	Ø	Ø	Ø
10	WG 10 to 12	100	Ø	Ø	Ø	Ø	Ø
11	WG 13 to 18 & tail end of WG	Ø	Ø	Ø	Ø	Ø	Ø
12	RB 23,26&27	Ø	Ø	Ø	Ø	Ø	Ø
13	Illukkuchenai	Ø	Ø	Ø	Ø	Ø	Ø
14	Neethai	Ø	Ø	Ø	Ø	Ø	Ø
15	PK 1 to 8	Ø	Ø	Ø	Ø	Ø	Ø
16	PK 9 to 12 & 14	Ø	Ø	Ø	Ø	Ø	Ø
17	PK 13, 15 to 19	Ø	Ø	Ø	Ø	Ø	Ø
18	PK 20 to 31	Ø	Ø	Ø	Ø	Ø	Ø
19	RB 31	Ø	Ø	Ø	Ø	Ø	Ø
20	TA 1 to 17	Ø	Ø	Ø	Ø	Ø	Ø
21	RB 35A to 36A	Ø	Ø	Ø	Ø	Ø	Ø
22	AK 1 to 5	Ø	Ø	Ø	Ø	Ø	Ø
23	AK 6 to 8	Ø	Ø	Ø	Ø	Ø	Ø
24	AK 9	Ø	Ø	Ø	Ø	Ø	Ø
25	AK 10	Ø	Ø	Ø	Ø	Ø	Ø
26	RB 24,25,29 & 30	Ø	Ø	Ø	Ø	Ø	Ø
27	RB 32	Ø	Ø	Ø	Ø	Ø	Ø
28	VR 1 to 7	100	Ø	Ø	Ø	Ø	Ø
29	VR 7 to 13	Ø	Ø	Ø	Ø	Ø	Ø
30	KL 6, 8 to 13	Ø	Ø	Ø	Ø	Ø	Ø
31	RB 35	Ø	Ø	Ø	Ø	Ø	Ø
32	SK 4 & KL 14 to 18	Ø	Ø	Ø	Ø	Ø	Ø
33	KL 19 to 23	Ø	Ø	Ø	Ø	Ø	Ø
34	KL 24 to 30	Ø	Ø	Ø	Ø	Ø	Ø
35	SK 5 to 13	Ø	Ø	Ø	Ø	Ø	Ø
36	SK 14 to 18	Ø	Ø	Ø	Ø	Ø	Ø

Note: 1. DCO names for RB are not recorded yet as per amended
2. Only canal Nos. are given above

AMPCETS

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SYSTEMS OPERATION WATER MANAGEMENT CELL
FUNCTIONAL CHART

POLONNARUWA RANGE DDI OFFICE

- DIRECTS THE SUCCESSFUL IMPLEMENTATION OF THE RANGES OPERATION PROGRAM THROUGH THE RANGE OPERATION CENTER.

RANGE OPERATION CENTER

- IMPLEMENTS THE DIVISION OPERATIONS PROGRAM WITHIN THE RANGE.
- COORDINATES PROGRAMS ON RESERVOIR OPERATION MODEL, SYSTEMS OPERATION MODEL AND SEASONAL WATER REPORT.
- PREPARES THE GIRITALE SCHEME'S SYSTEM OPERATION MODEL.
- REPLICATES THE GIRITALE SCHEME SYSTEM OPERATION MODEL IN THE PARAKRAMA SAMUDRA, MINNERIYA AND KAUDULLA DIVISIONS.

DIVISIONS IE OFFICE

- DIRECTS THE PREPARATION OF THE MODEL FOR RESERVOIR OPERATION, SYSTEM OPERATIONS AND SEASONAL WATER REPORT FOR HIS DIVISION.

DIVISION OPERATIONS CENTER

- RESPONSIBLE FOR THE PREPARATION OF THE MODELS FOR RESERVOIR OPERATION, SYSTEMS OPERATION AND SEASONAL WATER REPORT FOR THE DIVISION.
- IDENTIFY AND ESTABLISH FIELD OPERATION UNITS AND SUB UNITS.
- ESTABLISH TWO WAY COMMUNICATIONS BETWEEN OPERATIONS CENTERS AND FIELD OPERATION UNITS.
- INSTALL RAIN GAUGE NETWORK FOR THE DIVISION.

CALIBRATION TEAM

- ESTABLISH CONTROL AND MEASURINING DEVICES IN THE MAIN, BRANCH CANALS AND AT D-CANAL OFFTAKES.
- CALIBRATE CANALS AND MEASURING DEVICES WITHIN THE SCHEME.
- PREPARE DISCHARGE TABLES OF CALIBRATED CANALS AND MEASURING DEVICES.
- RE-CALIBRATE CANALS AND MEASURING DEVICES AT LEAST ONCE A YEAR.
- TAKE AND RECORD DAILY DISCHARGES OF CALIBRATED CANALS AND MEASURING DEVICES AND COMMUNICATE TO THE IE DIVISION OFFICE.
- ASSESS CANAL LOSSES, SEEPING AND PERCOLATION.
- SUBMIT RECORDS OF DISCHARGES TO IE OFFICE.
- ADJUST GATE OPENINGS BASED UPON IE OFFICE DIRECTIONS.

ISSUE TREE UPDATING TEAM

- PREPARE ISSUE TREE FOR THE DIVISION SCHEMES.
- UPDATE ISSUE TREES AS NECESSARY WHEN THERE ARE CHANGES IN THE DISTRIBUTION SYSTEM AND THE TOTAL CULTIVATED AREA.
- PREPARE SCHEMATIC WATER DISTRIBUTION DIAGRAMS FOR THE DIVISION SCHEMES.

SYSTEMS OPERATION WATER MANAGEMENT CELL
ORGANIZATION CHART - GIRITALE SCHEME

PREPARED BY: ..... IE MINNERIYA

RECOMMENDED BY: ..... CDP - SAJ

APPROVED BY: ..... DDI - POLONNARUWA

POLONNARUWA RANGE
S. PIYADASA - DDI

GIRITALE SCHEME
SENARATHNA - I.E
PIYARATHNA - D.A

RANGE OPERATION CENTRE
NIMAL ROHANA - I.E. DDI OFFICE

DIVISION OPERATION CENTRE
DAYARATHNA - T.A

CALIBRATION TEAM
W.S.C. EKANAYAKA - T.A
B.A.L. De SILVA - T.A

OPERATION TEAM

ISSUE TREE UPDATING TEAM
PIYARATHNA - D.A

DISTRIBUTORY CANAL
W.M. DAYARATHNA - T.A
W.A.J. GUNARATNE - W.S

PURANAGAMA DCO - (1)
(L.B. MAIN CANAL)
H.G.S. PREMACHANDRA - I.O
R.P. WINISARATH - PRESIDENT
A. JAYASINGHE - JALAPALAKA

AGBOPURA DCO - (2)
(D-1, 2, 3, 3A, 4 & 5)
P.R. RUWANSEELI - I.O
M.M. SAMARAKOON - PRESIDENT
M.M. SAMARAKOON - JALAPALAKA

PERAKUM DCO - (3)
(D-6)
JAYAWEERA BANDARA - I.O
H.M. PUNCHIBANDA - PRESIDENT
H.M. SOMIPALA - JALAPALAKA

DISTRIBUTORY CANAL
B.A.L De SILVA - T.A
H.M.K. HERATH - W.S

KADAWALAWEWA DCO - (4)
(D-6, 1/6 & 2/6)
JAYAWEERA BANDARA - I.O
H.M. MUTHUBANDA - PRESIDENT
H.A. SOMIPALA - JALAPALAKA

BENDIWEWA DCO - (5)
(D 3/6, TAILEND D6)
H.M. NANDA KUMARA - I.O
G. JINADASA - PRESIDENT
PETHIYAGODA - JALAPALAKA

JAYANTHIPURA DCO - (6)
(D-9, 10, 11 & 13)
M.D.S. JAYASINGHE - I.O
D.M. WILLIAMSINGHO - PRESIDENT
S.D. MALHONDHA - JALAPALAKA

MAIN CANAL
RANASINGHE - T.A
GUNADASA - W.S

PATROL LABOURERS

1. W. PERERA
MC STA 0+000 - DAMBALA WEWA
2. L.B. PEIRIS
MC STA. DAMBALA WEWA - CHANDANA POKUNA
3. H.A. MATIES - D7
4. R.G. PIYASENA - D8, D9, D6, DAMBALAWEWA SLUICE
5. M.A. JAYARATNE - D10, D17
6. K.D. JAYASENA - D1, D5
7. M.G. GUNAWARDANE - D18, D22
8. L.T.H. APPUHAMY - D6, (4), (5)

DISTRIBUTORY CANAL
W.S.C. EKANAYAKA - T.A
L. GUNASIRI - W.S

MAHASENPURA DCO - (7)
(D-7 & 8)
H.G.S. KUMARASIRI - I.O
T.B. PERAMUNA - PRESIDENT
H.M. SENEVIRATHNA - JALAPALAKA

PURANA MUSLIM DCO - (8)
(PALUGOLLAWELA ANICUT CANAL AND TAILEND D7)
H.G.S. PREMACHANDRA - I.O
U.H. JALALDEEN - PRESIDENT
U.S. JALALDEEN - JALAPALAKA

NAGAPOKUNA DCO - (9)
(D-12, 14, 15, 16, 16A, 14A & 17)
K.G. HEENMENIKE - I.O
D.D. WEERAWANSA - PRESIDENT
N. PREMATILAKA - JALAPALAKA

DISTRIBUTORY CANAL
R.J. GUNAWARDANA - T.A
P. HEENKENDA - W.S

UNAGALA WEHERA DCO - (10)
(D-18, 19, 20, 21 & 21A)
H.W. DAYARATHNE - I.O
W.M. KARUNARATHNE - PRESIDENT
W.F. RANATUNGA - JALAPALAKA

CHANDANA POKUNA DCO - (11)
(D-22, 23 & 24)
H.M. SWARNATILAKA - I.O
A.A. MAWATHTHA - PRESIDENT
F.M. HEENBANDA - JALAPALAKA

HATALISATA DCO - (12)
(HATALISATA ANICUT, C.P. ANICUT AND TAILEND OF D19)
H.W. DAYARATHNE - I.O
R.D. HEENBANDA - PRESIDENT
HERATH BANDA - JALAPALAKA

EXHIBIT B-3-2

IRRIGATION SYSTEMS MANAGEMENT PROJECT
POLONNARUWA RANGE

JOB DESCRIPTION OF WATER MANAGEMENT CELL STAFF

DDI Polonnaruwa Range

1 Overall supervision of all Water Management Cells within the Range

2 Supervise the implementation of the Range Water Management Program,

3 Monitor and evaluate the overall performance of the program every end of the month and end of the cropping season

4 Directs the implementation of programs/decisions taken at the District Agricultural Committee meetings

5 Approves/disapproves amendments/recommendations by scheme IEs for any deviation from Water Management Programs/Schedules

6 Issues instructions/directives regarding the provision of necessary funds and other resources in support of the established Computer Assisted Systems Operation Model/Water Management Programs

7 Encourage/provide an understudy/Trainee for the Range Operation Center to have a suitable replacement for the Head, Range Operation Center when he is due for promotion to avoid disruption of the program and frustration of those due for promotion

8 Occasional field auditing of the Field Operation Units and some of the key activities to instill seriousness and to ensure accuracy of data collection/reading gages etc.

9 Holding Seasonal Evaluation Sessions in each scheme where the main indicators of improved irrigation are reviewed for effecting refinements during the ensuing seasons

10 Encourage special training sessions including staff exchange program among other systems to share experiences and strengthen the computer application processes.

Head, Range Operation Center under the direct supervision of the DDI Polonnaruwa Range.

1 Coordinates/supervises the overall operation of all scheme water management cells within the Range

2 Coordinates/supervises the identification of site/location of measurement structures/gauges

3 Assists in the design and supervises the construction/ installation and calibration of measurement structures/ gauges in all the schemes within the Range

4 Compiles water level data from the Division Operation Center and feed the same into the Range Computer

5 Evaluate computer results based on the daily water requirements in coordination with the Scheme DA and the TA in charge of the Division Operation Center

6 Coordinates/supervises the readjustment of gates based on the results of the evaluation in item 5 above

7 Supervises the implementation of the Computer Assisted Systems Operation Model in each Scheme

8 Assists the Scheme Water Management Cells in the calibration of the Computer Model using actual field data

9 Furnishes suggestions to update/improve the Computer Model by incorporating all observed refinements

10 Coordinates/supervises the preparation of Seasonal Water Reports and Reservoir Operation Reports after each cropping season

11 Coordinates/supervises the Pre season planning of irrigation operation before each cropping season with the aid of the reports mentioned in Item 8 above

IRRIGATION SYSTEMS MANAGEMENT PROJECT
POLONNARUWA RANGE

JOB DESCRIPTION OF WATER MANAGEMENT CELL STAFF

Irrigation Engineer (IE) - (Division)

Under the general supervision of the DDI (Range) undertakes the following:

1. Directs the overall supervision of utilization of the System Operation Model for improved water management.

2. Directs and supervises the preparation of the Seasonal Water Report and the Reservoir Operation Report and reviews the seasonal performance, against the set objectives.

3. Directs and supervises the preparation of the "Action Plan", the preparation and updating of the issue tree for the scheme.

4. Conducts periodical field checks, at least once a month, to ensure the adherence to the "Action Plan", credibility of data, validity of calibrations, etc.

5. Makes regular use of the "water management index" to assess the progress of water issues and takes remedial measures.

6. Conducts periodic meetings with the Water Management Cell staff to review the progress of operations and effects necessary changes in the "Action Plan".

7. Reviews the prepared Seasonal Water Report and should any variations/deviations from the original cultivation plan exist he should comment/spellout the reasons for such deviations .

8. Supervises the pre seasonal planning of the Operations Plan for the oncoming season making use of the experiences of the previous season.

9. Maintains regular dialogue with DCOs and the satisfactory farmer participation in the implementation process, accommodating their views and coordinating the activities of the other Line Agencies pertaining to operations.

10. Attends at least one monthly meeting of a DCO of his choice every month such that he attends meetings of 12 DCOs in one year and reviews Operation Plans with them.

Divisional Assistant (DA)/Additional Irrigation Engineer
Under the immediate supervision of the IE (Division) undertake the following:

1. Overall incharge for establishing and maintaining a well kept operations center.

2. Coordinates all activities pertaining to Computer Assisted System Operations Model & related operations in consultation with the I.E and I.E DDI's Office/Head, Range Operation Centre where necessary.

3. Prepares an Action Plan, issue tree and updating the issue tree, in consultation with the IE, IE DDI's Office and the staff involved in System Operation Model.

4. Supervises collection of daily data from the field and submittal of this data to the Divisional Operation Centre and sending the computer results to the TA in charge of gate operations for adjustment of gates where necessary and to the Head, Range Operation Centre for further evaluation .

5. Reviews the evaluation of daily print outs of the computer results and with the assistance of the TA of the Divisional Operation Centre; assesses computer results and calibrates the model based on reasonable supporting data to simulate the actual field conditions

6. Using the Cropping Progress data collected by the PH, establishes the crop calendar for each node.

7. Assigns Water Management Cell operating team and calibration team for field work.

8. Provides transport facilities to field staff in consultation with the Transport Officer.

9. Establishes communication link with DCOs through the Water Management Operation staff.

10. Brings to the notice of the IE the problems encountered and remedial measures new proposals etc. to improve the operation of the system .

11. Prepares the Seasonal Water Report at the end of a season & pre-seasonal planning necessary for the oncoming season.

12. Periodically inspects all vital/critical field operations to ensure the accuracy of reports from field personnel and the successful implementation of the operation programme and encourage TAS and WSs to maintain good enthusiasm by comending jobs done properly and well during operations.

TECHNICAL ASSISTANT (TA) (MAIN CANAL)

Under the immediate supervision of the DA undertakes the following:

1. Supervises and is responsible for the collection and submittal to the Division Operation Center of daily water level/water delivery and rainfall data within the scheme.

2. Directs and supervises the opening, closing and adjustment of the opening of the Headgate of the Giritale tank, minor tanks and headgates of D Canals in the scheme as directed by the DA.

3. Assists the DA in all aspects of the operation of the system operation model and in the preparation of seasonal water report and reservoir operation model.

4. Supervises the preventive maintenance of the main canal, canal structures within the MC, sluice gates of tanks and headgates of D-Canals.

5. Evaluates and compiles maintenance reports for his reference and for submittal to the Irrigation Engineer.

6. Supervises the equitable distribution of irrigation water to the D-Canals within the scheme.

7. Supervises the work of Work Supervisors regarding collection of water level/water delivery and rainfall data and opening,closing and adjustment of gate openings and training of the Jalapalaka on the above work.

8. Compiles reports on daily water level/water delivery and rainfall data including adjustment of gates.

9. Conducts field inspections at least once a week to ensure successful implementation of the work program of the WS and Patrol Laborers under his supervision.

10. Submits work programs and progress to the Irrigation Engineer.

TECHNICAL ASSISTANT (TA) (FOR DISTRIBUTARY CANALS)

Under the immediate supervision of the DA undertakes the following:

1. Directs and supervises the equitable distribution of water within the DCOs under his jurisdiction.

2. Supervises the training and guidance of the Jalapalaka in the proper operation and maintenance of control/check structures and preventative maintenance of D-Canals.

3. Conducts field inspection at least once a week to ensure that the operations program within the DCO is carried out successfully and to be able to establish actual water requirement for the different farming activities and crop growth stages.

4. Maintains constant dialogue with DCOs within his area of coverage to discuss with them their problems regarding maintenance and operation including excessive use/wastage of or shortage of irrigation water.

5. Coordinates with the TA for MC regarding water issues to the D-Canals within his Jurisdiction.

6. Participates in DCO meetings within his area of Jurisdiction and encourages participatory management concepts by comending works well done and suggesting improvements.

7. Submits to the IE reports of work program and progress within his area of Jurisdiction.

TECHNICAL ASSISTANT (TA) (DIVISION OPERATIONS CENTER)

Under the immediate supervision of the DA undertakes the following:

1. Receives and enters in the computer daily water level/water delivery and rainfall data for the computer assisted System Operations Model.

2. Assists the DA in maintaining a well kept operations center and in the proper care of the computer and accessories, records and other data.

3. Assists in the installation and calibration of measuring devices, preparation and updating of issue trees.

4. Prints out daily computer results, analyzes/evaluates the result and submits this to the Divisional Assistant for review and direction for adjustment of gates where necessary.

5. Furnishes copies of the print out to the Head Range Operation Center for further evaluation and inputting into the Range Operation Center computer.

6. Assists the Divisional Assistant in the preparation of Seasonal Water Report, Reservoir Operations Model and in the calibration of the System Operations Model, and all other aspects of operation of the system operations model.

7. Maintains close coordination with the Head, Range Operations Center to discuss problems encountered in the operation of the System Operation Model including the theoretical back ground of the model.

8. Maintains records of daily water level/water delivery and rainfall data submitted and problems encountered in the operation of the system operations model.

TECHNICAL ASSISTANT (TA) (CALIBRATION TEAM)

Under the immediate supervision of the DA undertakes the following:

1. Establishes control and measuring devices in the Main, Branch and D-Canal headgates.

2. Calibrates canals and measuring devices within the scheme.

3. Prepares discharge tables/curves of calibrated canals and measuring devices.

4. Re-calibrate canals and measuring devices at least once a year or as necessary.

5. Assesses canal losses, seepage and percolation.

6. Submits records of discharge measurements to the IE office.

7. Conducts periodic check on measuring devices and submits report to the IE regarding lost or damaged measuring devices.

8. Submits to the IE work program and progress of installation and calibration/re calibration of measuring devices.

WORK SUPERVISOR (WS) (FOR THE MAIN CANAL).

Under the immediate supervision of the Technical Assistant (for Main Canal) undertakes the following:

1. Assists the T A (for the MC) in the supervision of the collection and submittal to the Division Operation Center of daily water level/water delivery and rainfall data within the scheme.

2. Monitor the performance of the PLs in reading gages, etc. and examine records and figures of PLs regularly.

3. Assists the TA (for the MC) in the supervision of the opening, closing and adjustment of the opening of the head sluice of the Giritale Tank, minor tanks and head gates of D-Canals within the scheme.

4. Assists the TA (for the MC) in the proper maintenance of the Main Canal and canal structures within the MC, sluice gates and headgates of D Canals.

5. Assists the TA (for the MC) in evaluating and compiling maintenance reports for ready reference and for submission to the Irrigation Engineer.

6. Assists the TA in the equitable distribution of water to the D-Canals within the scheme.

7. Assists the TA in the supervision of patrol laborers charged with collecting water level/water delivery and rainfall data and those charged with opening, closing and adjusting gate openings.

8. Assists the TA in training and guiding the Jalapalaka in opening and adjusting gate openings based on the water requirements of the DCO and in the use of Discharge tables.

9. Submits to the TA weekly work programs and progress.

WORK SUPERVISOR (FOR DISTRIBUTARY CANALS)

Under the immediate supervision of the TA (MC) undertakes the following:

1. Assists the TA (for Distributary Canals) in the supervision of the equitable water distribution within the DCO areas by the Jalapalaka.

2. Instructs, trains and guides the Jalapalaka in the proper operation and maintenance of control/check structures along the D-Canal and the preventive maintenance of these canals.

3. Instructs trains and guides the Jalapalaka in the equitable distribution of irrigation water to the field canals within the DCO area.

4. Coordinates with the WS (for main canal) regarding water issues to the D-Canals within his jurisdiction.

5. Maintains constant dialogue with the DCOs within his jurisdiction to find out their problems and suggests solutions to these problems.

6. Meet with the FCRS and DCO representatives at least once per each issue and verify records and discuss any issue and record them in the books.

7. Walk the system with the Jalapalaka and/or the Chairman of the DCO and Field Canal representatives to ensure equitable distribution of water within the DCOs so as to be able to establish actual water requirements for the different farming activities and crop growth stages.

8. Participate in regular and special DCO meetings of DCOs within his jurisdiction.

9. Submits reports of work programs and progress to the TA.

PATROL LABORERS (PL) (for collection of water level/water delivery and rainfall data)

Under the general supervision of the TA (for the main canal) and the immediate Supervision of the Work Supervisior (for the Main Canal) undertakes the following:

1. Collects, reads and reports to the Division Operation Center daily water level/water delivery and rainfall data within his area of coverage.

2. Keeps records of all reports on daily water level/water delivery and rainfall data that he submitted to the Division Operations Center.

3. Reports to the WS (MC) and the TA in-charge of the Division Operations Center all measuring devices lost and/or destroyed.

4. Instructs, trains and guides the Jalapalaka on the proper way to read the measuring devices, in the use of the discharge tables, on how to record water level and water delivery data and how to keep records of these data.

5. Attends to the maintenance of the portion of the main canal within his area of coverage.

6. Submits weekly work program and progress to his Work Supervisor.

7. Undertakes works that may be assigned to him from time to time by his supervisors.

Note: One patrol laborer collects the water level/water delivery and rainfall data from Chandanapokuna to Dambalawewa tank and hands his reports to the other Patrol Laborer who collects the same kind of Data from Dambalawewa to the head sluice of the Giritale Tank and takes this data to the Division Operations Center. He is also incharge of the head sluice of the Giritale Tank.

PATROL LABORER (PL). (for Opening, closing and adjustment of the opening of gates)

Under the general supervision of the TA (for the Main Canal) and the immediate Supervision of the Work Supervisor (for the Main canal) undertakes the following:

1. Opens, closes and adjusts opening of head gates of the D-canals as directed by the TA for the Main Canal.

2. Takes and records water level as-left after opening and as-found before adjusting and as-left after adjusting the gate openings.

3. Keeps records of all water level readings as per item No. 2.

4. Submits reports to the TA for the Main Canal on water level readings every after opening and/or adjustment of the gate opening is made, including on closing the headgate of D Canals within his jurisdiction.

5. Instructs, trains and guides the Jalapalaka within his jurisdiction on how to adjust gate openings based on the required discharge to be delivered on the use of and on the interpretation of the discharge table to determine the discharge based on gage height/water level.

6. Attends to the maintenance of the portion of the Main Canal within his area of jurisdiction.

7. Submits weekly work program and progress to his work Supervisor.

8. Undertakes work that may be assigned to him from time to time by his Supervisors.

DCO Chairman

1. Assists the DCO in the selection and fielding of a good J/P.

2. Directs and supervises the activities of the Jalapalaka and monitors regularly and carefully the functions of the Jalapalaka.

3. Attends to the duties and responsibilities of the Jalapalaka when no Jalapalaka has been selected and/or in the absence of the Jalapalaka

4. Advises and assists the FCRS to manage their roles satisfactorily.

5. Liases with the IE staff cordially in all operation matters and strive to resolve any conflict amicably.

6. Influence proper care of measuring devices, gates, locks, and all other onfarm facilities.

7. Discourages illegal issues, encroachments, etc.

8. Directs and supervises the maintenance of all canals and canal structures within the coverage of the DCO in accordance with the DCO maintenance plan.

9. Responsible for the enforcement of all regulations as set forth in the DCOs By-Laws.

10. Imposes sanctions and penalties for all violations of regulations based on the By-Laws of the DCO.

11. Cause the collection of all monies due the DCO, be it membership fees, contributions or penalties.

12. Conducts regular and/or special meetings of the Board and whenever necessary.

Jalapalaka (JP) (DCO Water Manager)

Under the general supervision of the DCO Chairman the Jalapalaka of the DCO undertakes the following :

1. Assist the patrol laborer charged with collecting water delivery data in reading and recording daily water levels and discharge measurements in D-canals. He must be at the Headgate of D-canals of the DCO area at the time readings are to be taken.

2. Keeps records of daily water level and discharge measurements in D-canals.

3. Assists patrol labourers charged with the opening and closing the headgates of D-canals and in making the necessary adjustments in gate openings whenever necessary, as directed by the TA in charge or WS authorized by him.

4. Attends to the proper maintenance and upkeep of all measuring devices within his area and keep them operational all the time. Clears the face of staff gauges and repaints those that need to be repainted.

5. Guard against thief/vandals all measuring devices within his area and reports to the Work Supervisors staff gauges/ measuring devices damaged or stolen and assists in installing new ones.

6. With the help and guidance of the TA supervising the DCO coverage, prepares cropping pattern and calendar for the DCO area based on what has been agreed upon in the DCO and in the cultivation meeting prior to each cultivation season.

7. With the assistance and guidance of the TA concerned determines the actual water requirement for each farming activity and/or crop growth stage based on constant field observation taking into account excess/shortage of water delivery and drainage water reuse.

8. Operates and controls canal check structures.

9. Cleans and removes floating debris in front of canal check structures, turnouts and necessary devices.

10. Lubricates gates during off- season and paint them as necessary. Reports to the Work Supervisor facilities needing repairs.

11. Inspects field canals periodically to see how they are operating.

12. Coordinate with farmers and work supervisors regarding the preparation of irrigation programs, cropping pattern and calendar and improved agricultural practices within the DCO.

13. Attends to the equitable delivery of irrigation water to all field canals within the coverage of the DCO.

14. Supervises the distribution of water to the farms by the respective field canal representatives.

15. Supervises the maintenance, repair and improvement of field canals and structures with the help of field canal representatives.

IRRIGATION SYSTEMS MANAGEMENT PROJECT - POLONNARUWA RANGE — TABLE II-1-1

MONITORING SURVEYS, DESIGNS AND CONSTRUCTION

OF

PARAKRAMA SAMUDRA, MINNERIYA, GIRITALE, KAUDULLA, BAKAMUNA

ATTARAGALLEWA SCHEMES - AS OF 31 DECEMBER 1990

CANAL		TOTAL LENGTH (Km)	COMPLETED AS OF 31 DECEMBER 1990			PROGRAM FOR 1991			REMAINING FOR LIFE OF PROJECT		
			SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	PSS	27.7	24.7	19.7	19.7	3.0	8.0	8.0	--	--	--
	MIN	15.8	15.8	15.8	15.8	--	--	--	--	--	--
	GIR	5.6	1.6	1.6	1.6	4.0	4.0	4.0	--	--	--
	KAU	7.2	7.2	7.2	7.2	--	--	--	--	--	--
	TOTAL	55.5	48.5	43.5	43.5	7.0	12.0	12.0	--	--	--
B.C	PSS	19.9	19.9	19.9	19.9	--	1.3	--	--	--	--
	MIN	17.1	17.1	15.8	14.2	--	--	2.8	--	--	--
	GIR	10.7	10.7	10.7	10.7	--	--	--	--	--	--
	KAU	19.4	19.4	19.4	19.5	--	--	--	--	--	--
	TOTAL	67.1	67.1	65.8	64.3	--	1.3	2.8	--	--	--
D.C	PSS	158.8	139.8	104.3	63.9	18.8	53.7	25.8	--	--	69.1
	MIN	98.2	98.2	69.4	56.8	--	28.7	25.8	--	--	9.2
	GIR	29.9	29.9	21.8	16.9	--	8.1	3.8	--	--	9.2
	KAU	73.3	63.8	53.5	38.8	9.7	19.9	24.4	--	--	10.1
	ATA	7.6	--	--	--	7.6	7.6	5.7	--	--	1.9
	TOTAL	359.8	322.9	249.8	175.6	36.1	118.8	83.9	--	--	99.5
FC	PSS	266.3	116.8	106.8	9.4	158.3	88.8	48.8	--	79.5	216.9
	MIN	268.4	229.5	154.6	74.3	38.9	113.8	84.8	--	--	110.1
	GIR	129.9	108.8	61.8	20.8	21.9	68.9	37.8	--	--	72.1
	KAU	312.5	234.4	158.7	89.1	76.1	153.8	98.8	--	--	133.4
	ATA	26.6	--	--	--	6.6	6.6	3.3	20.8	20.8	23.3
	TOTAL	1003.7	687.9	481.1	193.6	295.8	423.1	254.3	20.8	99.5	555.8
DRN	PSS	45.8	--	--	--	27.8	27.8	18.8	18.8	18.8	35.8
	MIN	65.8	--	--	--	65.8	65.8	--	--	--	65.8
	GIR	--	--	--	--	--	--	--	--	--	--
	KAU	35.8	--	--	--	15.8	15.8	15.8	20.8	20.8	20.8
	ATA	1.5	--	--	--	1.5	1.5	1.5	--		--
	TOTAL	146.5	--	--	--	108.5	108.5	26.5	38.8	38.8	120.8
TOTAL	PSS	516.9	299.6	258.7	112.9	199.1	178.8	83.8	18.8	97.5	321.8
	MIN	455.7	351.8	254.8	159.5	103.9	199.5	111.8	8.8	8.8	184.3
	GIR	176.1	150.2	95.1	58.8	25.9	81.8	44.8	--	--	81.3
	KAU	447.4	324.8	238.8	154.6	102.8	188.7	129.4	20.8	20.8	163.5
	ATA	35.7	--	--	--	15.7	15.7	10.5	20.8	20.8	25.2
	TOTAL	1631.8	1126.4	839.4	477.8	447.4	654.9	379.5	58.8	137.5	775.3

MSDC

REHABILITATION OF RBE SYSTEM UNDER ISMP
WATER MEASUREMENT STRUCTURES, PRIORITY REHABILITATION AND REHAB. INLET CANAL
PHYSICAL STATUS REPORT AS OF 31-12-1990

NATURE OF WORK	PERCENTAGE COMPLETED UPTO 31-12-90			PERCENTAGE REMAINING FOR LOP		
	SURVEYING	DESIGN	CONSTRUCTION	SURVEYING	DESIGN	CONSTRUCTION
WATER MEASUREMENT STRUCTURES	80	80	43	20	20	57
PRIORITY REHABILITATION	75	45	21	25	55	79
REHABILITATION OF INLET CANAL	100	40	0	0	60	100

OREHABRB

WATER MEASUREMENT STRUCTURES, PRIORITY REHABILITATION AND REHAB. INLET CANAL
FINANCIAL STATUS REPORT AS OF 31-12-1990

	1	2	3	4	5 (1+2+3)-4	6	7 (5)+(6)
NATURE OF WORK	SUB-PROJECT No. 1	SUB-PROJECT No. 2	SUB-PROJECT No. 3	APPROXIMATE EXP. UPTO 31-12-91	BALANCE CARRYOVER	NEW ALLOCATION FOR 1991	TOTAL ALLOCATION FOR 1991
WATER MEASUREMENT STRUCTURES	74,530.85	175,729.44	37,815.35	252,586.00	35,489.64	200,000.00	235,489.64
PRIORITY REHAB. WORKS	263,264.43	931,308.44	264,319.29	1,190,000.00	268,892.16	3,000,000.00	3,268,892.16
REHAB. OF INLET CANAL	---	---	---		---	9,200,000.00	9,200,000.00
TOTALS	337,795.28	1,107,037.88	302,134.64	1,442,586.00	304,381.80	12,400,000.00	12,704,381.80

OREHABRB

IRRIGATION SYSTEMS MANAGEMENT PROJECT - AMPARA RANGE
MONITORING SURVEYS, DESIGNS AND CONSTRUCTION
OF PRAGMATIC REHABILITATION WORKS
GAL OYA RIGHT BANK SYSTEM
AS OF 31 DECEMBER 1990

CANAL	TOTAL LENGTH (Km)	COMPLETED AS OF 31 DECEMBER 1990			PROGRAM FOR 1991			REMAINING FOR LIFE OF PROJECT		
		SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	35.2	35.2	35.2	29.0	--	--	6.2	--	--	--
B.C	84.0	84.0	58.3	5.0	--	25.7	79.0	--	--	--
D.C	175.0	105.0	5.4	--	70.0	169.6	--	--	--	175.0
F.C	227.4	--	--	--	227.4	180.0	--	--	47.4	227.4
DRN	100.0	--	--	--	50.0	--	--	50.0	100.0	100.0
TOTAL	621.6	224.2	98.9	34.0	347.4	375.3	85.2	50.0	147.4	502.4

MSDCGORB

TABLE II -1-4

IRRIGATION SYSTEMS MANAGEMENT PROJECT - AMPARA RANGE
MONITORING CONSTRUCTION OF PREVENTATIVE MAINTENANCE WORKS
GAL OYA LEFT BANK SYSTEM
AS OF 31 DECEMBER 1990

CANAL	TOTAL LENGTH (Km)	COMPLETED AS OF 31 DECEMBER 1990			PROPOSED 1991 PROGRAM			REMAINING FOR LIFE OF PROJECT		
		SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.	SURVEY	DESIGN	CONST.
M.C	70.5	--	--	52.5	--	--	18.0	--	--	--
B.C	36.5	--	--	--	--	--	36.5	--	--	--
D.C	281.2	--	--	34.0	--	--	247.2	--	--	--
F.C	362.4	--	--	41.0	--	--	321.4	--	--	--
DRN	---	--	--	--	--	--	--	--	--	--
TOTAL	750.6	--	--	127.5	--	--	623.1	--	--	--

MSDC60LB

GIRITALE SCHEME WATER MANAGEMENT OPERATIONS

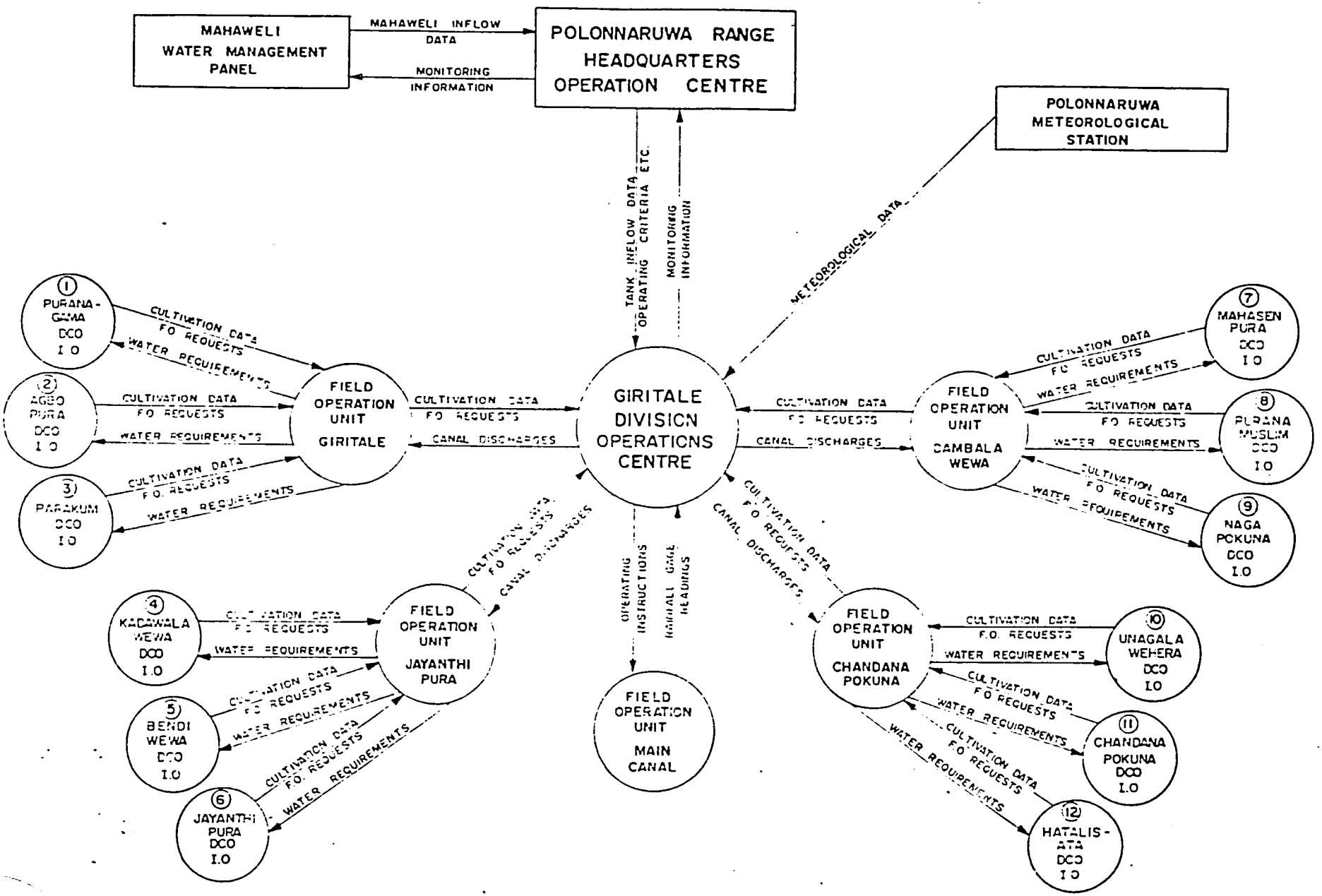


EXHIBIT B-3-4

IRRIGATION SYSTEMS MANAGEMENT PROJECT
DETAILED PROCEDURE IN COLLECTING DAILY FIELD DATA
GIRITALE SCHEME

Collection of field data, ie. water level, rainfall, cropping, area planted, etc., will be done by Patrol Laborers. The Field Canal Representatives (FCRs) will collect the daily cropping data within their area. They will report this in a prescribed form to be submitted to the DCO Jalapalaka who in turn will turn over these reports to the Gauge Reader for that DCO area. Patrol Laborer No. 1 will start from D-24 (Chandanapokuna) at about 7:00 AM takes readings of all measurement devices including rain gauges along the RBMC, D-canals, up to Dambalawewa Tank and arrives at the Dambalawewa Field Operation unit (FOU) at about 11:00 AM. Patrol Labour No. 2 starts form the Tail end of D-6 at about 7:00 AM, takes readings of all measurement and all other data along D-6 up to Dambalawewa arriving there at about 10:00 AM. PL No. 1 and No. 2 hands over the data they have gathered to Patrol Laborer No. 3 at the Dambalawewa FOU. PL No. 3 also takes readings of all measurement devices and other data from the head sluice of the Giritale Tank to Dambalawewa Tank. He then proceeds to the Giritale FOU where he collects the data gathered by Patrol Laborer No. 4, who starts from the tailend of LBMC at about 7:00 AM takes readings of all measurement devices, rain gauges and other data up to the headgate of LBMC and proceeds to the Giritale FOU arriving there at about 9:30 AM and hands over the data he gathered to PL No.3.

PL No. 5 starts from Giritale FOU at about 7:00 AM to take gauge height readings of inflow node M1D7/23A along Palugollewa Anicut Canal and out flow node M1D7/23B after the confluence of the Palugollewa Anicut Canal and D7. He then proceeds to Hatalisata Anicut takes gauge height readings of inflow node M1D19/42A and outflow node M1D19/42B after the confluence of the Hatalisata Anicut Canal and D19. He goes back to the Giritale FOU arriving there at about 11:00am and hands over the data he gathered to PL No. 3. PL No.3 then proceeds to the Division Operation Center in Minneriya and hands over to the Division Computer Operator the data that they have collected. The Division Computer Operator enters these data daily into the computer and gets a printout each week. Copies of the printout are given to the TA incharge of the DOC who hands over one copy to the DA and another copy is transmitted to the Head of the Range Operation Center who enters the data into the Range Computer and for his evaluation/analysis.

CLTFDGTL.TAC

POLONNARUWA RANGE - MINNERIYA SCHEME

Process of Obtaining and Conveying Gauge Readings to the Minneriya Division Operations Center and Schedule of re Conveying Evaluated Data to the Field Operations units.

Gauge Reader (A):

Starts from the tail end of D/37 and collects the following Gauge Readings.

- Feeder Channel from Timbiri Amuna at D/37
- D/37 and D/s of RB/7 of D/37
- D/37 at LB1 (Boundary of DCO 16 and DCO 17
- Gangoda Wewa
- D/31 A off Minneriya Yoda Ela (MYE) canal

Should reach the Divulankadawela Field Operations Unit at 7.30 AM.
Distance of travelling - approximately 14 Kms.

Gauge Reader (B)

Starts from tail end of D/31 and collects the following gauge readings

- RB3 beyond Tissa Amuna
- Feeder Channel from Timbiri Amuna at LB2 D31
- Beginning of LB2 (Boundary of DCO 14 and DCO 15)
- 1st Drop in LB2
- LB1 of D31
- D31 beginning

Should reach Divulankadawela Field Operations Unit at 7.30 AM. Collect all gauge readings brought to Divulankadawela Field Operations Unit by gauge reader (A) and proceeds along the Minneriya Main Channel towards Hingurakgoda. On the way he should collect the following gauge readings.

- Yudaganawa Bridge
- D29
- D30

He arrives at the Hingurakgoda Field Operations Unit at 8.00 AM. Distance of travelling, Approximately 15 Kms.

Gauge Reader (C)

Starts from the tail end of D/28 collects the following gauge readings:

- D28 RB9
- RB8 -(Boundary of DCO 13 and DCO 12)
- LB9
- RB6B
- Pinpara (Finga Road) Bridge (Boundary of DCO 12 and DCO 11)
- Yatiyalpathana North 1
- Drop on D28 (Boundary of DCO 10 and DCO 11)
- D28 near RB1
- Beginning of D28
- On Minneriya Main Channel near D28

He arrives at the Hingurakgoda Field Operations Unit at 8.00 AM. Distance of travelling - approximately 12 Kms.

Gauge Reader (D)

Starts from the Tail end of D22

- Kotikapitiya
- All gauge readings along D22
- On MYE Main Channel D/s of regulator near D22
- D23
- D24
- D25
- D26

He arrives at the Hingurakgoda Field Operations Unit at 8.00 AM Distance of Travelling Approximately 12 Kms.

Gauge Reader (E)

Starts from Gal Amuna collects all gauge readings along D21 and arrives at the Hingurakgoda Field Operations Unit at 8.00 AM, distance of travelling approximately 12 Kms.

Gauge Reader (F)

Starts from Jayanthi Sluice and proceeds along the Main Channel Collecting gauge readings.

- Reading D/s of spill No. 1
- Raja Ela
- D2
- D/3
- Minneriya MC Junction (Y/3)
- D13 (MC) (Boundary of DCO 2 and DCO 3)
- D16 (MC)
- D21 (MC) Y/17
- Beginning of D21

He arrives at the Hingurakgoda Field Operations Unit at 8.00 AM. Collects all gauge readings brought to the Hingurakgoda Field Operations Unit by Gauge Readers B, C, D, and E and proceeds along the Hingurakgoda- Minneriya Main Road and arrives at Minneriya Division Field Operations Unit at 9.00AM.

Distance of travelling - approximately 20 kms. Note: All Gauge Readers should also collect all rainfall data etc on their way.

After the computer results are obtained and evaluated the Gauge Reader (F) should take them back to the Hingurakgoda Field Operations Unit and from there sent to the respective TAs, WSs and Patrol Labourers involved in adjusting gates, through the Gauge Readers E, D, C, B and A.

The D.A himself will attend to matters regarding any changes in the main sluice.

It is recommended that the Main Canal Field Operation Unit should be at Field Operation Unit Hingurakgoda. The TA in charge of the Main Channel should be stationed at the Hingurakgoda Field Operations Unit as this Unit will be the Center of Operations of this whole process. If a telephone is installed at this Unit considerable time could be saved in the process. Rather than the Gauge Reader travelling from Hingurakgoda to Minneriya and taking the results back from Minneriya to Hingurakgoda the evaluated computer results could just be relayed through the Telephone.

Patrol Labourers (Operations and Maintenance)

Employment of Patrol Labourers should be as follows:

- D28 - 02 Nos.
- D21 - 02 Nos.
- D37 7 D31 will be done by farmers

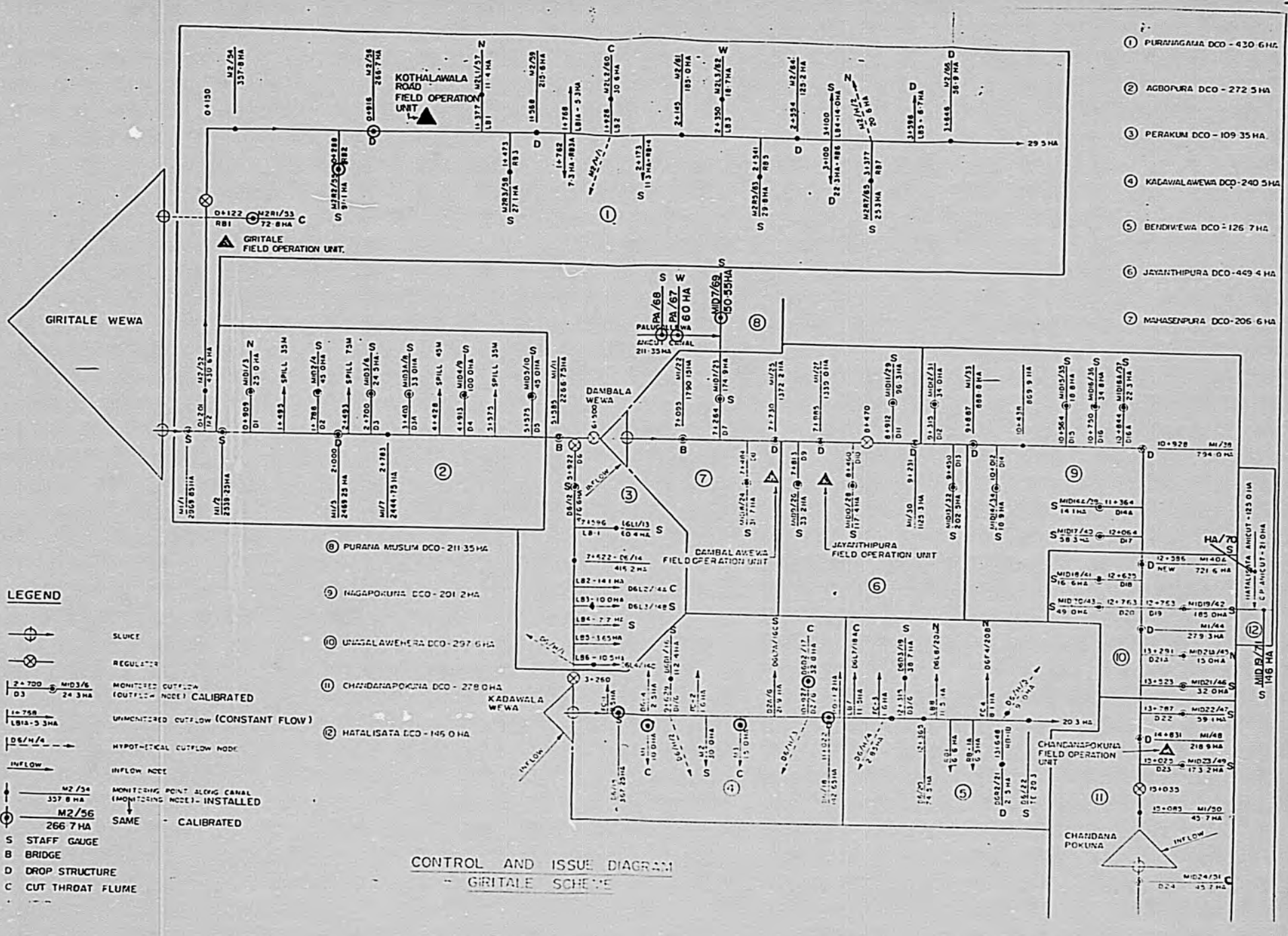
MC	- 0 -15kms -	04 Nos
MC	- 15 Tail end	03 Nos
D22	-	01 No
	Total	12 Nos.

Each Patrol Labourer should be given a specific section to be maintained by him.

This program was prepared by Technical Assistants P. G. A. Silva, N. D. W. Palliyaguru, and B. L. Ariyasinghe.

GUGREAD.MNY

EXHIBIT M-3-6



CONTROL AND ISSUE DIAGRAM
- GIRITALE SCHEME

SHELADIA Associates, Inc.
Consulting Engineers Irrigation Systems Management Project

Riverdale
Colombo
Polonnaruw.

~~35/7 Gregory's Road, Colombo 7. P. O. Box 1874, Colombo. Tel. 596034~~
GF. 1, 2, 3. BMICH Complex Colombo 7. P.O. Box 297 Tel/Fax 699823

March 24, 1992

Dr. Gary P. Merkley
International Irrigation Center
Department of Agricultural and Irrigation Engineering
Utah State University
Logan, Utah 84322-4105

Subject: Giritale Scheme Water Management Model.

Dear Dr. Merkley,

For the past two cropping seasons we have been utilising the water management model which you programmed for the Giritale Scheme under the Irrigation Systems Management Project. In the process we have observed some problem areas which we think should be rectified and which needs reprogramming/improvement of the model to enhance its performance. Some of the problems identified are as follows:

1. Sorting of Nodes:

While inserting new nodes in between existing nodes it has been observed in some cases, that this caused disorder in the node arrangement and showed undesirable screen effects. We would like to insert the corresponding monitor nodes in between the DCO (Farmer Organisation) boundaries so we could determine the amount of water being delivered to each DCO. (Please see Exhibit I)

2. Branch Nodes.

It was observed that Branch nodes should have a monitor node immediately below it to be able to get correct results, otherwise only the first outflow node can be taken into account for calculations without regard to the rest of the nodes below it.

3. Suggestions.

In addition to the rectifications requested above, we request the following revisions to the program, if it is possible:

a To remove the upper limit on Re in the Effective Rainfall formula.

b To remove the Ci in the formula Q = cd(H)^NF and introduce a Zero error in the formula in the following manner:

Q = Cd(H-Zero error)^NF

The gauge readings in the Daily Delivery calculations may be altered so that the computer results can be used to set the gauges without adjustment, i.e., Gauge Height in the Daily Delivery Calculations = Calculated Height plus Zero Error.

GIRITALE SCHEME
HINGURAKGODA DIVISION
WEEKLY WATER MANAGEMENT EVALUATION REPORT

EXHIBIT I

O&M Week: 1 Date: 10-Nov-91 to 16-Nov-91 Season: Maha

Node Label	Node Type	DCO Number	Area (ha)	First day of Issue	Required (1000m3)	Actual (1000 m3)	Water mgt Index
MI/1	Monitor		2970	10 Nov 91			
M2/52	Monitor	1	431	10 Nov 91			
M1/2	Monitor	2	2539	10 Nov 91			
M1D1/3	Outflow	2	25	10 Nov 91	11	163	15.148
M1D2/4	Outflow	2	45	10 Nov 91	19	140	7.224
M1D3/6	Outflow	2	24	10 Nov 91	11	75	6.941
M1D3A/8	Outflow	2	33	10 Nov 91	14	59	4.384
M1D4/9	Outflow	2	100	10 Nov 91	51	198	3.867
M1D5/10	Outflow	2	45	10 Nov 91	18	263	14.933
M1/11	Monitor	2	2267	10 Nov 91			
D6/12	Monitor	3	477	12 Nov 91			
M1/22	Monitor	7	1790	10 Nov 91			
M1D7/23	Outflow	7	175	10 Nov 91	10	0	0.000
M1D7FA/23A	Inflow	8	61	10 Nov 91			
M1D7/23B	Outflow	8	150	10 Nov 91			
M1D8/24	Outflow	7	32	10 Nov 91			
M1/25	Monitor	6	1372	10 Nov 91			
M1D9/26	Outflow	6	33	10 Nov 91	7	86	12.195
M1D10/28	Outflow	6	117	10 Nov 91	29	184	6.267
M1D11/29	Outflow	6	96	12 Nov 91	10	96	9.980
M1/30	Monitor	9	1126	12 Nov 91			
M1D12/31	Outflow	9	34	11 Nov 91	5	24	5.061
M1D13/32	Outflow	6	203	12 Nov 91	20	162	7.957
M1/33	Monitor	9	839	10 Nov 91			
M1D14/34	Outflow	9	19	10 Nov 91	4	45	10.103
M1D15/35	Outflow	9	19	10 Nov 91	3	34	11.427
M1D16/36	Outflow	9	35	10 Nov 91	5	54	10.005
M1D16A/37	Outflow	9	22	12 Nov 91	2	12	5.657
M1D14A/39	Outflow	9	14	10 Nov 91	5	41	8.347
M1D17/40	Outflow	9	58	12 Nov 91	9	71	8.144
M1/40A	Monitor	10	722	10 Nov 91			
M1D18/41	Outflow	10	17	10 Nov 91	3	38	11.421
M1D19/42	Outflow	10	185	10 Nov 91	18	0	0.000
M1D19HA/42A	Inflow	12	125	10 Nov 91		0	0.000
M1D19/42B	Inflow	12	21	10 Nov 91	15	0	0.000
M1D20/43	Outflow	10	49	10 Nov 91	10	12.5	12.941
M1/44	Monitor	10	324	10 Nov 91			
M1D21A/45	Outflow	10	15	10 Nov 91	3	120	42.530
M1D21/46	Outflow	10	32	10 Nov 91	6	32	5.015
M1D22/47	Outflow	11	59	10 Nov 91	8	73	8.927
M1/48	Monitor	11	219	10 Nov 91			
M1D23/49	Outflow	11	173	10 Nov 91	42	312	7.484
M1D24/55	Outflow	11	46	10 Nov 91	13	318	23.825

WKWMER

UTAH STATE UNIVERSITY • LOGAN, UTAH 84322-4105

Department of Agricultural and Irrigation Engineering
Telephone (801) 750-2785
Fax (801) 750-1248

March 27, 1992

C. F. Leonhardt
Chief of Party
Sheladia Associates, Inc.
Irrigation Systems Management Project
Colombo, Sri Lanka

Dear Chuck:

I recieved your fax yesterday, and today I did some programming work on the WMM computer model. The following have been corrected or modified:

1. Sorting of Nodes I did find an error in the node sorting algorithms, and have made corrections. Now the insertion of nodes should work all right, without "undesirable screen effects".

2. Branch Nodes I cannot find anything wrong with the branch nodes as you describe in item number 2 of your fax. Please ask T. A. Cordan to send more detailed information about this problem.

3. Effective Rainfall I have greatly increased the limits on the effective rainfall equations. There should be no problem with the new limits, unless you want to use unrealistically large values.

4. Calibration Equations The structures equation has been changed to the form that you have suggested. In the node data, the three structure calibration parameters are now: Cd, Zero, and Nf (instead of Ci, Cd, and Nf). The value of the zero correction may be positive or negative. For Nf > 0 the equation will be:

$$Q = C_d (h_u + h_{zero})^{n_f}$$

where h_{zero} corresponds to the column heading "Zero" in the model's data entry screen for node data. For Nf = 0, the equation will be:

$$Q = C_d (h_u + h_{zero})$$

GIRITALE SCHEME
HINGURAKGODA DIVISION

Weekly Water Management Evaluation Report

O&M Week: 4 Dates: 01-Dec-91 to 07-Dec-91 Season: Maha

Node Label	Node Type	DCO Number	Area (ha)	First Day of Issue	Required (1000 m3)	Actual (1000 m3)	Water Management Index
M2R1/53	Outflow	0	73	10-Nov-91	43	0	0.000
M2R2/55	Outflow	0	91	10-Nov-91	53	0	0.000
M2/56	Outflow	0	214	10-Nov-91	126	0	0.000
M1D1/3	Outflow	0	25	10-Nov-91	15	71	4.871
M1D2/4	Outflow	0	45	10-Nov-91	26	45	1.731
M1D3/6	Outflow	0	25	10-Nov-91	15	0	0.000
M1D3A/8	Outflow	0	33	10-Nov-91	19	14	0.739
M1D4/9	Outflow	0	100	10-Nov-91	59	60	1.023
M1D5/10	Outflow	0	45	10-Nov-91	26	107	4.094
D6L1/13	Outflow	0	60	12-Nov-91	34	0	0.000
D6L2/14A	Outflow	0	14	12-Nov-91	8	0	0.000
D6L3/14B	Outflow	0	10	12-Nov-91	6	0	0.000
D6L6/14C	Outflow	0	11	12-Nov-91	6	0	0.000
D6M1/15A	Outflow	0	10	12-Nov-91	6	0	0.000
D6D1/16	Outflow	0	113	12-Nov-91	64	0	0.000
D6M2/16A	Outflow	0	27	12-Nov-91	15	0	0.000
D6M3/16B	Outflow	0	23	12-Nov-91	13	0	0.000
D6L7A/16C	Outflow	0	21	12-Nov-91	12	0	0.000
D6D2/17	Outflow	0	60	12-Nov-91	34	0	0.000
D6L7/18A	Outflow	0	14	12-Nov-91	8	0	0.000
D6D3/19	Outflow	0	37	12-Nov-91	20	0	0.000
D6L8/20A	Outflow	0	16	12-Nov-91	9	0	0.000
D6F4/20B	Outflow	0	11	12-Nov-91	6	0	0.000
D7-U/S	Outflow	0	175	10-Nov-91	57	0	0.000
D7-D/S	Outflow	0	150	10-Nov-91	43	0	0.000
M1D9/24	Outflow	0	32	10-Nov-91	18	0	0.000
M1D9/26	Outflow	0	33	10-Nov-91	19	25	1.312
M1D10/28	Outflow	0	117	10-Nov-91	67	57	0.857
M1D11/29	Outflow	0	96	12-Nov-91	54	43	0.797
M1D12/31	Outflow	0	34	11-Nov-91	19	9	0.465
M1D13/32	Outflow	0	203	12-Nov-91	114	47	0.408
M1D14/34	Outflow	0	19	10-Nov-91	11	6	0.532
M1D15/35	Outflow	0	19	10-Nov-91	10	9	0.945
M1D16/36	Outflow	0	35	10-Nov-91	20	6	0.279
M1D16A/37	Outflow	0	22	12-Nov-91	12	14	1.119
M1D14A/39	Outflow	0	15	10-Nov-91	9	7	0.802
M1D17/40	Outflow	0	58	12-Nov-91	33	22	0.673
M1D18/41	Outflow	0	17	10-Nov-91	10	8	0.793
D/19U/S	Outflow	0	100	10-Nov-91	57	0	0.000
D/19 D/S	Outflow	0	85	10-Nov-91	49	0	0.000
M1D20/43	Outflow	0	49	10-Nov-91	28	10	0.353
M1D21A/45	Outflow	0	15	10-Nov-91	9	31	3.610
M1D21/46	Outflow	0	22	10-Nov-91	13	7	0.505
M1D22/47	Outflow	0	59	10-Nov-91	34	20	0.590
M1D23/49	Outflow	0	173	10-Nov-91	100	92	0.923
M1D24/55	Outflow	0	48	10-Nov-91	28	2	0.079

Irrigation Systems Management Project

Irrigation Department

Polonnaruwa Range

Hingurakgoda Division

Seasonal Water Report

Giritale Scheme
Yala 1991

Date :-25/10/91

Cultivation

Extent Cultivated as a percentage of area under specification	120.9
Extent successfully harvested (Ha)	3035.0
Percentage of cultivation success	100.0
Average estimated yield (T/Ha)	4.5

Water Issue

Total Water Issues 1000M^3	43908.3
Calculated ave: water requirement for OFC (M)	0.0

Calculated water allocation for OFC

From sluice number one (1000M^3)	0.0

Duty

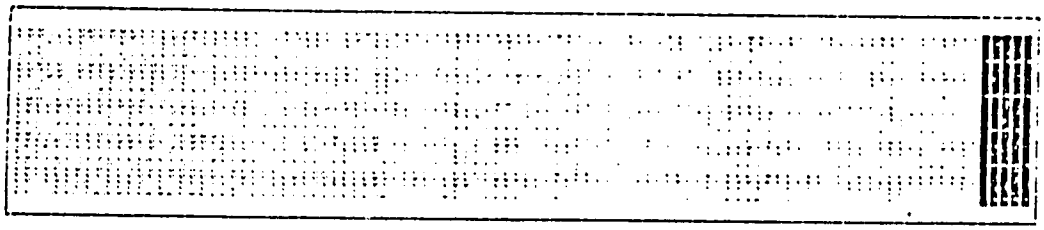
a) Scheme Duty (paddy) excluding ER (M)	1.45
Rainfall during the season (mm)	131.0
Estimated effective rainfall (ER) (mm) during the season	82.5
Scheme duty (paddy) including ER (M)	1.53
Ave. paddy yield/unit of water used (Kg/M^3)	0.29
Calculated field water requirement (M)	1.48
Calculated field irrigation requirement (M)	1.40
Canal system efficiency %	Ø,97

Reservoir Water Balance

Yield from catchment (1000M^3)	238.7
Total Inflow (1000M^3) (Catchment yield + Augmentation Supply)	36335.9
Change in storage (1000M^3)	-12865.5
* Issues for Irrigation (1000M^3) (from reservoir water balance)	46423.6
Issues as measured from sluice discharges (1000M^3)	43908.3

Item	Value	Percentage
Irrigation Issues	43908	95
Seepage	226	0
Evaporation	2552	5
Spillage	0	0
Releases	0	0

Reservoir Water Balance



LEGEND

* Issues for irrigation=inflow -change in storage-releases-spillage-evaporation and seepage losses

RESERVOIR PERFORMANCE

Date	Water Level (M)	Water Surface Area (Ha)	Capacity (1000M^3)	Discharge from Sluice (1000M^3)	Spillage (1000M^3)	Releases (1000m^3)	Est Evapo. Loss (1000M^3)	Estimated Seepage & Percolation Loss (1000^M3)	Augmentation Supply (1000M^3)	Catchment Inflow (1000M^3)
04/06/91	6.2	189.0	6096.9	0.0	0.0	0.0	15.9	1.0	657.5	10.93
05/06/91	6.5	197.3	6666.1	0.0	0.0	0.0	16.6	1.1	876.9	12.75
06/06/91	6.9	204.9	7229.2	0.0	0.0	0.0	17.2	1.2	978.0	0.00
07/06/91	7.3	215.7	8017.6	0.0	0.0	0.0	18.1	1.3	733.5	0.00
08/06/91	7.6	223.5	8688.5	549.5	0.0	0.0	18.8	1.4	889.9	0.00
09/06/91	7.6	223.5	8688.5	549.5	0.0	0.0	18.8	1.4	978.0	0.00
10/06/91	7.6	226.2	8912.2	549.5	0.0	0.0	19.0	1.4	965.0	0.00
11/06/91	7.7	228.8	9135.8	549.5	0.0	0.0	19.2	1.5	896.8	0.00
12/06/91	7.8	228.8	9135.8	366.3	0.0	0.0	19.2	1.5	921.0	0.00
13/06/91	7.9	231.4	9359.5	0.0	0.0	0.0	19.4	1.5	838.0	0.00
14/06/91	8.1	239.3	10030.5	0.0	0.0	0.0	20.1	1.6	904.6	0.00
15/06/91	8.4	244.0	10513.7	0.0	0.0	0.0	20.5	1.7	970.2	0.00
16/06/91	8.7	250.7	11205.0	549.5	0.0	0.0	21.0	1.8	978.0	0.00
17/06/91	8.7	250.7	11205.0	549.5	0.0	0.0	21.0	1.8	955.5	0.00
18/06/91	8.8	252.9	11435.4	549.5	0.0	0.0	21.2	1.9	908.9	0.00
19/06/91	8.8	252.9	11435.4	549.5	0.0	0.0	21.2	1.9	813.8	0.00
20/06/91	8.8	252.9	11435.4	244.5	0.0	0.0	21.2	1.9	546.9	0.00
21/06/91	8.9	255.1	11665.8	0.0	0.0	0.0	21.4	1.9	950.4	0.00
22/06/91	9.1	261.7	12411.2	0.0	0.0	0.0	22.0	2.0	896.8	0.00
23/06/91	9.4	265.4	12934.1	0.0	0.0	0.0	22.3	2.1	589.2	0.00
24/06/91	9.6	269.2	13457.0	549.5	0.0	0.0	22.6	2.2	510.6	0.00
25/06/91	9.5	267.3	13195.5	549.5	0.0	0.0	22.4	2.2	322.2	0.00
26/06/91	9.3	265.4	12934.1	549.5	0.0	0.0	22.3	2.1	368.9	0.00
27/06/91	9.2	261.7	12411.2	549.5	0.0	0.0	22.0	2.0	405.2	0.00
28/06/91	9.1	261.7	12411.2	366.3	0.0	0.0	22.0	2.0	584.0	0.00
29/06/91	9.2	261.7	12411.2	0.0	0.0	0.0	22.0	2.0	300.6	0.00
30/06/91	9.2	263.6	12672.6	0.0	0.0	0.0	22.1	2.1	317.0	0.00
01/07/91	9.4	265.4	12934.1	549.5	0.0	0.0	21.9	2.1	312.7	0.00
02/07/91	9.2	263.6	12672.6	549.5	0.0	0.0	21.8	2.1	339.5	0.00
03/07/91	9.1	261.7	12411.2	549.5	0.0	0.0	21.6	2.0	395.7	0.00
04/07/91	9.0	259.5	12126.7	549.5	0.0	0.0	21.4	2.0	146.0	0.00
05/07/91	8.8	255.1	11665.8	366.3	0.0	0.0	21.1	1.9	136.5	0.00
06/07/91	8.9	255.1	11665.8	0.0	0.0	0.0	21.1	1.9	195.2	0.00
07/07/91	8.9	255.1	11665.8	0.0	0.0	0.0	21.1	1.9	200.4	0.00
08/07/91	8.9	257.3	11896.3	549.5	0.0	0.0	21.3	1.9	109.7	5.47
09/07/91	8.8	252.9	11435.4	549.5	0.0	0.0	20.9	1.9	116.6	0.00
10/07/91	8.5	248.4	10974.5	549.5	0.0	0.0	20.5	1.8	114.9	0.00
11/07/91	8.3	241.8	10283.2	549.5	0.0	0.0	20.0	1.7	153.7	0.00
12/07/91	8.0	236.6	9806.8	366.3	0.0	0.0	19.6	1.6	156.3	0.00
13/07/91	8.1	236.6	9806.8	0.0	0.0	0.0	19.6	1.6	119.2	0.00
14/07/91	8.1	236.6	9806.8	0.0	0.0	0.0	19.6	1.6	136.5	0.00
15/07/91	8.1	236.6	9806.8	549.5	0.0	0.0	19.6	1.6	100.2	0.00
16/07/91	7.9	231.4	9359.5	549.5	0.0	0.0	19.1	1.5	97.6	0.00
17/07/91	7.6	223.5	8688.5	549.5	0.0	0.0	18.5	1.4	72.5	0.00
18/07/91	7.3	218.3	8241.2	366.3	0.0	0.0	18.0	1.3	112.3	0.00

IRRIGATION SYSTEMS MANAGEMENT PROJECT - POLONNARUWA

IRRIGATION SYSTEM OPERATIONS COST

1. General

The source of the annual operation and maintenance funds for irrigation systems are the Irrigation Management Division (IMD) Consolidated Fund and the Irrigation Department (ID) Consolidated Fund. The Irrigation Engineers (IEs) of each irrigation division submit through the Range Deputy Director of Irrigation (DDI) typical O&M budget estimates. However, what they usually receive are lower than what they have proposed depending on how much fund is made available by Parliament through the Treasury. Because of the perennial lack of sufficient O&M funds essential O&M activities in irrigation systems could not be fully attended to giving rise to the rapid deterioration of irrigation facilities and services. This rapid deterioration of irrigation facilities would lead to the need for more frequent rehabilitation of the system which consequently would result to decrease in agricultural production. If these facilities were properly maintained through sustained preventive maintenance and operation, rehabilitation of the system will be less often and through improved operations increase in agricultural production could be expected.

Operation and maintenance of Irrigation systems are parallel but separate activities. These activities are usually undertaken concurrently and are done and/or supervised by the same staff. In analysing the operations cost for the Main System it is important to identify the staff that undertake concurrent tasks and determine how much time is devoted to operation and how much time is devoted to maintenance and other activities. The detailed components of the main items in the O&M budget must be looked into in order to come up with a viable O&M budget. For this exercise the Giritale system in the Polonnaruwa Range will be considered taking into account the taking over of the D-canal Systems Operation and Maintenance by Distributary Canals Farmer Organization.

The operation of the Main System which consists of the inlet canal from EMYE, Giritale Tank, Right Bank (RB) main canal, Dambalawewa, Kadawalawewa and Chandana Pokuna reservoirs shall be the responsibility of the Irrigation Department. The operation of all head sluices of tanks and reservoirs, headgates of distributary canals, structures along the RB main canal and measuring devices along the RB main canal and at headgates of all distributary canals are the responsibility of the Irrigation Department.

The operation of the Distributary Canal System of the Giritale Scheme is to be undertaken by the 12 Distributary Canal Farmer Organization (DCFOs) when the operation of the said system is finally turned over to the DCFOs.

The Head of the Range Operation Center coordinates the various activities relative to the operation of the Computer Assisted Systems Operation Model including the identification of location, supervision of design, construction and calibration of measurement devices. He also enters into the computer at the Range Operation Center (ROC) the weekly data transmitted to the ROC by the TA of the Division computer Center for his analysis and evaluation. The Water Management Cell Organization Chart for the Giritale System is presented herein as Exhibit 2-A.

3. Collection of Field Data.

Collection of field data, ie. water level, rainfall, cropping, area planted, etc., will be done by Patrol Laborers. The Field Canal Representatives (FCRs) will collect the daily cropping data within their area. They will report this in a prescribed form to be submitted to the DCO Jalapalaka who in turn will turn over these reports to the Gauge Reader for that DCO area. Patrol Laborer No. 1 will start from D-24 (Chandanapokuna) at about 7:00 AM takes readings of all measurement devices including rain gauges along the RBMC, D-canals, up to Dambalawewa Tank and arrives at the Dambalawewa Field Operation unit (FOU) at about 11:00 AM. Patrol Labour No. 2 starts form the Tail end of D-6 at about 7:00 AM, takes readings of all measurement and all other data along D-6 up to Dambalawewa arriving there at about 10:00 AM. PL No. 1 and No. 2 hands over the data they have gathered to Patrol Laborer No. 3 at the Dambalawewa FOU. PL No. 3 also takes readings of all measurement devices and other data from the head sluice of the Giritale Tank to Dambalawewa Tank. He then proceeds to the Giritale FOU where he collects the data gathered by Patrol Laborer No. 4, who starts from the tailend of LBMC at about 7:00 AM takes readings of all measurement devices,. rain gauges and other data up to the headgate of LBMC and proceeds to the Giritale FOU arriving there at about 9:30 AM and hands over the data he gathered to PL No.3.

PL No. 5 starts from Giritale FOU at about 7:00 AM to take gauge height readings of inflow node M1D7/23A along Palugollewa Anicut Canal and out flow node M1D7/23B after the confluence of the Palugollewa Anicut Canal and D7. He then proceeds to Hatalisata Anicut takes gauge height readings of inflow node M1D19/42A and outflow node M1D19/42B after the confluence of the Hatalisata Anicut Canal and D19. He goes back to the Giritale FOU arriving there at about 11:00am and hands over the data he gathered to PL No. 3. PL No.3 then proceeds to the Division Operation Center in Minneriya and hands over to the Division Computer Operator the data that they have collected. The Division Computer Operator enters these data daily into the computer and gets a printout each week. Copies of the printout are given to the TA incharge of the DOC who hands over one copy to the DA and another copy is transmitted to the Head of the Range Operation Center who enters the data into the Range Computer and for his evaluation/analysis.

- Maintenance of Field Operation Units offices on the need basis - (at least once a year).

Table 5-A presents the estimated Field activities Cost charged to operation.

6. Division Computer Operation Center Operations Cost.

The Division Computer Center (DOC) could be considered as the nerve center of the operation of the schemes. The Minneriya DOC serves the Computer needs of the Minneriya and Giritale Schemes, hence the cost of operation of the DOC will be shouldered by both Schemes. Although the operations cost of the DOC would not be much compared to the other items, it is being given prominence in coming up with the Annual Operations Cost because of its importance to Operations. The share of the Giritale Scheme in the operation of the DOC may be estimated as follows:

- Salary - This includes the salaries of the TA incharge of the Division Operation Center and other operations activities and the Computer Operator.
- Supplies and Materials - This includes, computer paper, ribbon, photo copying paper, etc. needed to keep the computer in operation.
- Repair and maintenance of the computer unit and the DOC.

Table 6-A presents the estimated cost for operation of the Division Computer Center.

7. Administration Cost (Operation)

Although Operations is a field activity it derives administrative support from the Administrative staff of the Division. The share of operations on this support could be estimated to be considered as 10% overhead cost to include the following:

- Supervision - This will include travel expenses of supervisors when on inspection of operation activities, attend meetings of DCOs, part of allowances in proportion to the time alloted for operation.
- Watching - this includes part of the salaries and allowances of Watchers which amount will be charged against operation.
- Casual employee - This will include part of the salaries of draftsman, clerks, peons, etc. or a portion of the contingency cost, devoted to operation related works.

Annexure I

COMPUTATION OF OPERATIONS COSTS

The computation of costs hereunder were based on rates, accomplishments and other information furnished by the Irrigation Department and other sources.

- Service Area of Giritale Scheme - 7,340 Acs
- Salaries/Wages

a	Divisional Assistant	Rs. 4,000/mo
b	Technical Assistants	3,000/mo
c	Work Supervisor	2,400/mo
d	Driver	2,400/mo
e	Computer Operator	3,000/mo
f	Patrol Laborer	120/day
g	Laborer	85/day

- Daily allowances

a	Technical Assistants	Rs. 100.00
b	Work Supervisor	75.00
c	Driver	75.00

- No. of working days per month - 20 days
- No. of hours per week day - 8 hrs
- Monthly Bicycle allowance - Rs. 40

- Unit Prices of Plastic gauges as of Aug. 1990

Ø - 0.50 Meters -	Rs. 125
Ø - 0.75 Meters -	185
Ø - 1.50 Meters -	380
Ø - 2.00 Meters -	500

A. Field Operations Activities.

1 Field Operations supervision Cost

The TA in charge of operation who will be on full time will be provided with a motor cycle and will spend 65% of his time in the field supervising field operations and 35% of his time at the DOC supervising computer operations.

a. Salary -
   a. Rs. 3,000x12x.65 = Rs. 23,400

b. Allowance
   a Rs. 100x20x12x.65 = Rs. 15,600

c. Fuel and oil - He travels an average of 100 kms per day while on field supervision at 40 kms per liter. Oil consumption 1000 kms per liter.
   100kmx20 days/mo x 12 mos x .65 = 15,600 kms/yr

3 Calibration of measurement devices annually - one calibration Team can calibrate 1 location in the D-Canals (4-6 stages0 per day and 1 location in the Main Canal (6 stages) per 2 days.

No. of locations in the MC - 13
No. of locations in the D-Canal - 65

No. of days to complete calibration in the MC = 13x2=26 days
No. of days to complete calibration D-canal = 65x1 = 65 days
No. of days to complete calibration Scheme wide=65+26=91days
One calibration Team is composed of:
2 TAs, 2 Laborers and 1 driver

a Salaries
TA - 3,000/20x2x91 = Rs. 27,300
Laborers 85x2x91 = Rs. 15,470
Driver 2,400/20x91 = Rs. 10,920

b Allowances
TA - 2xRs 100x91 = Rs. 18,000
Driver - Rs 75x91 = Rs 6,825

c Fuel and Oil -
Distance travelled for 91 days @ 80 kms/day = 7,280 kms. Change oil every 3,000 kms, 7,280km/3000 = 2.42 @ 5 liters
For Fuel - (7,280/10)11.50 = Rs. 8,372
For Oil - 2 x 5 Rs. 52.50 = Rs. 525
Rs. 8,897

4 Updating control and issue Tree (5 days/year).
It is estimated that 1 TA and 1 WS could handle this work for 5 days each year.

a. Salaries
TA - Rs. 3,000/20x5 = Rs. 750
WS - Rs. 2,400/20x5 = Rs. 600

5 Opening, closing and adjustment of gates

It is estimated that 1 TA devoting at least 1 hour per day, 1 WS, 2 hrs per day and 6 PLs, 2 hrs per day for 8 months (4 months per cropping season) will be involved in this activity.

a. Salaries

1 TA - 1 hrx5dayx4wksx8mo = 160hrs/8 = 20 days/year
(Rs. 3,000/20)20 = Rs. 3,000

2 WS - 2 x 5 x 4 x 8 = 320 /8 = 40 days/year
(2400/20)40 = Rs. 4,800

8 Operation of Field Operations Units (5 FOUs)

There are 5 Field Operations Units (FOUs) within the scheme. It is assumed that these FOUs will be used for both operation and maintenance activities, so it is estimated that operations will absorb 35% of the cost of operation of the FOUs and 65% will be charged against maintenance.

a Salaries

TA - 5 TAs x 1hr x 5 da x 4wks x 12 mos = 150 man days
(Rs. 3000/20)150x.35 = Rs. 7,875
WS - 5x2x5x4x12 = 2400/8 = 300 mandays
(Rs. 2400x20)300x.35 = Rs. 12,600

PL - 5x120x20x12x.35 = Rs 50,400

b Allowances
5 TAs - Rs. 100x150x.35 = Rs 5250
5 WSs - Rs. 75x300x.35 = Rs 7875

9 Maintenance of Field Operations Units (5 FOUs). It is assumed that the FOUs will be repainted at beast once in 2 years. It is estimated that repainting would cost Rs. 1000. Repair works on the buildings, furniture, bulletin boards, billboards, etc will also be done. As in item 8, 35% of the cost will be charged to operation and 65% to maintenance.

a Repainting of FOUs - Rs. 1000/2x5x.35 = Rs. 875
b Repairs - lump sum - Rs. 500x5x.35 = Rs. 875

II Division Operations Center Operations Cost.

It is assumed that the DA as Head of the Water Management Cell spends at least 1 hour per day for the supervision of operations activities including analysis of the Weekly Water Management Evaluation Report. The TA incharge of the DOC will also supervise all other field operations activities so he will be on a full time basis. He devotes 35% of his time at the DOC and 65% of his time in the field supervising field operations. The Computer Operator will devote at least 35% of his time working on the Computer Assisted Systems Operation Model. In the absence of a computer operator, a TA capable of operating the Model could operate the computer.

1 Supervision

a Salary
DA - 1hrx5dayx4weeksx12mos = 240 hrs/8hrs = 30 mandays
(Rs. 4000/20)30 = Rs. 6,000
TA - Rs. 3,000x12x.35 = Rs. 12,600
Computer Operator - Rs. 3000x12x.35 = Rs. 12,600

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FIELD ACTIVITIES COST (OPERATION)/YEAR

Table 5 - A
Sheet 1 of 2

	Activities	Salaries	Insta-llation	Fuel & Oil	Allowance	Misc. Over time
1	Field Operations Supervision	23,400		12,636	15,600	2,920
2	Repair of measurrement devices/gauges. (Assume 20% would need repairs annually).		4,000	368		4,511
	1 TA - 4 man days	600			400	
	1 WS - 4 man days	480			300	
	1 Driver - 4 man days	480			300	
3	Re-calibration of measurement devices annualy			8,897		
	2 TAs - 182 man days	27,300			18,200	
	2 Laborers - 182 man days	15,470				
	1 Driver - 182 man days	10,920			6,825	
4	Updating control and Issue Tree (Annually)					
	1 TA - 5 mandays/year	750				
	1 WS - 5 mandays/year	600				
5	Opening, closing and adjustment gates					
	1 TA - 20 mandays/year	3,000			2,000	
	1 WS - 40 mandays/year	4,800			3,000	
	6 PLs - 6x40 mandays/year	28,800			1,920	
6	Collecting Field data-gauge height,rainfall,cropping etc					
	1 TA - 20 mandays/year	3,000			2,000	
	1 WS - 40 mandays/year	4,800			3,000	
	5 PLs - 5x160 mandays/year	96,000			1,600	60,000

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Table 6-A

DIVISION COMPUTER CENTER OPERATIONS COST

STAFF	ACTIVITY	SALARY	COMPUTER SUPPLIES	REPAIRING & MAINTENANCE
D/A	Supervision	6,000		
TA	Incharge of Operation	12,600		
Computer Operator	Computer Operation	12,600		
Computer Unit			5,763	3,100
Computer Center				310
Sub Total		31,200	5,763	3,410

DOCOC

If a WM covers 612 ac his salary per month will be:

612 x Rs. 3.Ø = Rs. 1836.ØØ/mo. or
Rs. 1836 x 8 = Rs. 14,688/yr. or Rs. 7,344/crop season.

The salary of the WM for the 4 months of close season will be charged to maintenance as he is also expected to assist in the supervision of maintenance work during this period.

2. Field Canal Representatives (FCR).

A FCR will have to work at least 1.5 hrs everyday for 8 months (2 cropping seasons) per year to attend to water distribution within his area of coverage. His salary per acre assuming a daily rate of Rs. 8Ø per day could be estimated as follows:

(Rs. 8Ø/8) (2x3Ø) / 16Ø = 3.75/ac/mo

If a FCR covers 16Ø acres his salary per month will be:
Rs. 3.75 x 16Ø = Rs. 6ØØ/mo x 8 = Rs. 4,8ØØ/yr

If the area covered by a DCO is 612 acres there will be at least 4 FCRs with a total salary of:
Rs. 4,8ØØ x 4 = Rs. 19,2ØØ/yr or Rs. 9,6ØØ/crop season.

b. Bicycle allowance.

The Water Master should be given a bicycle allowance so he could easily cover his area of coverage and efficiently carry out his duties and responsibilities. At the rate of Rs. 1ØØ per month he will receive:
Rs. 1ØØ x 8 = Rs. 8ØØ/yr or Rs. 4ØØ/cropping season.

c. Annual Operations Cost (Ave. DCO Area - 612 Ac.)

1 - Water Master and 4 Field Canal Representatives.

1 Salary of Water Master (Jalamalaka)
Rs. 3.ØØ x 8 = Rs. 24.ØØ/Ac/yr
Rs. 24x612 = Rs. 14,688/yr

2 Bicycle Allowance of the WM
Rs. 1ØØ x 8 = Rs. 8ØØ/yr

3 Salary of 4 Field Canal Representatives
Rs. 3.75 x 8 = Rs. 3Ø/Ac/yr/FCR
4 x Rs. 3Ø x 16Ø = Rs. 19,2ØØ/yr

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CHAPTER IV

BALANCE OF WORK TO COMPLETE O&M COMPONENT AS OF 30 JUNE 1992

4.1 REHABILITATION OF IRRIGATION SYSTEMS

There are 168 Sub-Projects that have been programmed for rehabilitation within the ISMP area. Out of this total number, 61 Sub-Projects have been certified 100% complete, 25 Sub-Projects have been certified 75% complete, 50 Sub-Projects have been certified more than 50% complete and 32 Sub-Projects less than 50% complete. Sub-Projects found to be over 75% complete but less than 100% complete are only certified 75% complete. The 100% complete are certified 100% complete. The total amount involved in these partially completed Sub-Projects is approximately Rs. 43,819,337. By Scheme the Total Reimbursement Outstanding as of 31 March 1992 are as follows:

o	Parakrama Samudra Scheme	-	Rs. 4,970,284
o	Minneriya Scheme	-	9,427,775
o	Giritale Scheme	-	3,025,231
o	Kaudulla Scheme	-	5,621,689
o	Ridi Bendi Ela Scheme	-	9,066,803
o	Gal Oya RB & LB	-	11,259,821
			43,819,337

The Status Report of Partially Completed Rehabilitation Works as of 31 March 1992 is presented as Exhibit IV-1-1.

4.2 DEVELOPMENT OF PREVENTATIVE MAINTENANCE PROGRAM

The work remaining to be accomplished to complete the Annual Maintenance Plans for Main System and Distributary System in order to implement the Preventative Maintenance Program will be presented separately for each Range in the Project.

4.2.1 PREVENTATIVE MAINTENANCE WORKS REMAINING FOR POLONNARUWA RANGE.

A. ANNUAL MAINTENANCE PLANS - MAIN SYSTEM

In the Polonnaruwa Range the Status of the Annual Maintenance Plans for the Main System of the four Schemes in the Range are presented on Table IV-2-1 below:

TABLE IV-2-1

STATUS OF ANNUAL MAINTENANCE PLANS - MAIN SYSTEM)
POLONNARUWA RANGE
AS OF 30 JUNE 1992

SCHEME	WALK-THRU MAINT.	ANNUAL MAINT. COST	ANNUAL MAINT. PLANS	SCHEMATIC DIST. DIAGRAM	MAINT DIAG.
PSS	100	100	100	100	60
Giritale	100	100	100	100	100
Minneriya	100	100	100	100	60
Kaudulla	100	100	100	100	60

Included in the Table IV-2-1 only the preparation of the Maintenance Diagrams for the Parakrama Samudra, Minneriya, Kaudulla Scheme remain to be completed.

The basic layout for the Maintenance Diagram of the Irrigation System for these Schemes has already been done and includes the location and boundaries of each DCFO. Only the additional information as provided on the Giritale Maintenance Diagram remains to be completed. This work is now 60% complete and should be completed by the end of June 1992.

B. ANNUAL MAINTENANCE PLANS - DISTRIBUTION CANAL SYSTEM

The Status of Annual Maintenance Plans for the 81 DCFOs in the four Schemes of the Polonnaruwa Range were presented on Exhibit III-2-13 (4 sheets). Based upon this Exhibit, Giritale Scheme has completed all the requirements, i.e, Field Work, Cost Estimates, Maintenance Plans, Issue Trees, and Maintenance Diagrams from all its 12 DCFOs. Only translation the Maintenance Plans remains to be done. This will be accomplished for the DCFOs by the ID when the D-Canals are officially turned over by the ID to the DCFO.

For the remaining 69 DCFOs in the Parakrama Samudra, Minneriya and Giritale Schemes only the Maintenance Diagram based upon up-dated BOPs remain to be accomplished. Sinhala translations of the Annual Maintenance Plans for these DCFOs will again be completed before the ID officially turns over the D-Canals to the DCFO.

The preparation of the Maintenance Diagrams for each DCFO is a major effort and the ID has responsibility for preparing the Diagram for the DCO.

4.4.2 PREVENTIVE MAINTENANCE WORK REMAINING IN KURUNEGALA

A. ANNUAL MAINTENANCE PLAN - MAIN SYSTEM

As of 30 June 1992, the Annual Maintenance Plan and related documents for the Ridi Bendi Ela Scheme Main System has been completed. The Main System of RBE Scheme includes the Anicut/Headworks, Inlet Canals, Magalle Tank/Headwork, RBMC, LB off RBMC, LBMC and LB off LBMC. The Annual Maintenance Cost for these work is Rs. 2,223,363 or Rs. 339/Acre.

B. ANNUAL MAINTENANCE PLAN - DISTRIBUTARY CANAL SYSTEM

As of 30 June 1992, the Annual Maintenance Plans and related documents for the eleven DCOs in the RBE Scheme have been completed, sinhala translations of these documents will be prepared by the ID before the official hand-over of the D-Canals to the DCFOs.

C. PREVENTATIVE MAINTENANCE (PRIORITY REHABILITATION)

As stated in Chapter III, the Status of Priority Rehabilitation work under the Preventative Maintenance Program for the RBE Scheme is presented on Table III-2-5. Based upon that Table, considerable work remains to be accomplished on all Sub-Projects for which PILs have been established by USAID. Only Sub-Project 4 and 17 have been certified 100% complete, and the remaining 15 Sub-Projects are in various levels of completion ranging from 07% to 86.0%. The outstanding work involved is Rs. 9,514,537 as of 30/6/1992.

4.2.3 PREVENTATIVE MAINTENANCE WORK REMAINING - AMPARA RANGE

A. ANNUAL MAINTENANCE PLANS - MAIN SYSTEM

As of 30 June 1992, the Annual maintenance Plans and related documents have been completed for both Gal Oya RB and LB Main Systems. The Annual Maintenance Cost for the Gal Oya LB was found to be Rs. 6,636,937 (Rs. 107.5/Ac.) and for the Gal Oya RB Rs. 6,840,314 (Rs.198/Ac.).

B. ANNUAL MAINTENANCE PLANS - DISTRIBUTARY CANAL SYSTEM

The Status of completion of the Annual Maintenance plans for the 36 DCFOs in the Gal Oya RB and the 53 DCFOs in the Gal Oya LB as of 30 June 1992 was presented in Chapter III under Exhibit III-2-17 (3 sheets). This exhibit shows that considerable work remains to be done to complete the Annual Maintenance Plans. Walk-Thru maintenance Survey Preparation of Quantity and Cost Estimates, Preparation of Annual Maintenance Plans, Preparation of Issue Trees, Preparation of Maintenance Diagrams and the translation of these documents into Sinhala or Tamil.

The ID must prepare all of the documents listed above for each DCO. Unfortunately the schedule for conducting the Walk-Thru Survey and for preparing these documents was not implemented as outlined in the 1992 Annual Work Plan under Table II-15 (sheet 1 of 4; 2 of 4; and 3 of 4). As of 30/6/92 the field work has been accomplished in only 10 DCOs and of 36 in the Right Bank and 34 out of 54 DCFOs in the Left Bank. The ID should complete the Walk-Thru Maintenance Survey for the remaining DCFOs so that the Annual Maintenance Plans can be completed.

C. PREVENTATIVE MAINTENANCE PROGRAM - GAL OYA LB

Under the Preventative Maintenance Program for the Gal Oya Left Bank System, six Sub-Projects have been started and the status of completion of these six Sub-Projects was presented in Chapter III under Table III-2-8. Five of the six Sub-Projects have been certified between 56 to 81% complete. Only one Sub-Project, Sub-Project No. 4 has not been certified completed as only about 35% of the work under that Sub-Project has been completed.

4.3 IMPROVEMENT TO IRRIGATION SYSTEMS OPERATION

Rehabilitation in the Irrigation Systems Management Project was undertaken hand-in-hand with the implementation of the Action Plan for Water Management Operations Programs. Rehabilitation involves various activities, irrigation, survey, design and construction, which was given priority over all other activities. Even at the early stage of the Project, implementation of the Action Plan could not be fully achieved due to the low priority given to Water Management Improvement Programs. The installation of measuring devices accelerated after the Irrigation Sector Assistance Agreement between the GOSL and USAID was finalized. However, implementation was slow and by the end of the first quarter of 1992, not much have been accomplished. What is left to be done by the end of March 1992 is presented in Exhibit III-3-1.

The existing Field Operation units in the Minneriya Scheme and in the Parakrama Samudra Scheme must be improved. In addition the units must be provided with the same visual aids and layout maps displayed in the FOUs in Giritale, RBE and Kaudulla.

A detailed procedure for the collection of field data to be transmitted to the Division Operation Center, based on the prepared Water Management Operations Charts for the Kaudulla, PSS and RBE, should be prepared. This procedure will avoid confusion and delay on the part of the Gauge Readers who have to transmit the field data to the Division Operation Centers.

The control and measuring devices in the main and branch canals in the Parakrama Samudra Scheme have to be improved and provided with plastic gauges. The additional measuring points identified at the boundaries of DCFOs must be established and calibrated. Discharge curves/tables for all measuring points must be prepared and copies given to the DCO Jalapalakas. Copies of these discharge tables/curves must be kept at the FOU offices concerned for ready reference. This must also be done in the low Level Canal of the Kaudulla Scheme, in the Minneriya Scheme and in the Gal Oya Right Bank System.

Establishment of control and measuring devices in the distributary canals in the Low Level Canal in the Kaudulla Scheme, Parakrama Samudra Scheme, Minneriya scheme and in the Gal Oya Right Bank System. Likewise, the calibration of these measuring devices must be undertaken as soon as they are installed. Once calibrated, the gauge heights must be read and entered into the CASOM. Assessment of canal losses, seepage and percolation should also be undertaken.

The Computer Assisted System Operation Model, (CASOM) in all the Schemes except Giritale and Gal Oya Left Bank System must be utilized for Water Management Operations. In the Gal Oya Scheme although the program for the new model has been installed in the recently acquired Computer, however, the printer for the old computer is not compatible with the new computer. Therefore, they cannot use the program installed in the new computer. In RBE, Kaudulla, PSS and Minneriya Schemes they have not yet started gathering field data to be used in the CASOM installed in their computers. These Schemes should start utilizing the computers for the CASOM as soon as the measurement devices are installed and calibrated. There are instances where even the Computer at the Range Operation Center is out of order and could not be used. The computers in the Division Operation Centers usually break down and the computer at the Range Operation Centers had to be transferred to the Division Operation

Center to replace the computer that broke down while it is being repaired. As a result, the preparation of the Seasonal Water Reports and the Reservoir Operation Reports is delayed. These reports should be prepared immediately after each cropping season so they can be analyzed and used in programming the next seasons cropping activities. Exhibit IV-1-1 presents the Status of the progress in the activities under the operations Plan as of the end of the First Quarter 1992.

IRRIGATION SYSTEMS MANAGEMENT PROJECT
STATUS REPORT OF PARTIALLY COMPLETED REHABILITATION WORKS
PARAKRAMA SAMUDRA SCHEME
AS OF 31 MARCH 1992

PIL NO	SUB PROJECT NO.	% COMPLETE AS PER IES' RPT	% COMPLETE AS PER INSPECTION & DATE	% COMPLETE CERTIFIED	BALANCE OF REIMB. AMOUNT OUTSTANDING RS.	DEFICIENCIES AND REMAINING WORK REQUIRED
			1988 WORKS			
26	18	97	88.80 (4-5-89)	75.00	110,250.00	3% balance work to be done
26	19	97	65.90 (4-5-89)	65.00	318,277.00	3% balance work to be done
26	23	80	66.20 (4-5-89)	66.00	536,617.00	20% balance work to be done
			Balance 1988 Work		965,144.00	
			1989 WORKS			
38	13	85	69.15 (22-11-91)	69.15	211,781.00	15% balance work to be done
38	15	95	52.20 (4-6-90)	52.20	577,058.00	Balance work in RB-6/D-2 to be done
38	21	80	64.19 (5-3-91)	64.19	202,347.00	Balance 20% to be done
38	22	70	25.00 (13-6-91)		326,610.00	Work at a standstill
38	26	90	80.40 (24-6-91)	75.00	157,575.00	Balance to be done
38	27	100	61.80 (12-6-91)	61.80	245,882.00	Balance to be done
38	28	95	74.08 (6-6-91)	74.08	227,691.00	Balance work to be done
38	30	50			266,585.00	

IRRIGATION SYSTEMS MANAGEMENT PROJECT
STATUS REPORT OF PARTIALLY COMPLETED REHABILITATION WORKS
MINNERIYA SCHEME
AS OF 31 MARCH 1992

PIL NO	SUB PROJECT NO.	% COMPLETE AS PER IES' RPT	% COMPLETE AS PER INSPECTION & DATE	% COMPLETE CERTIFIED	BALANCE OF REIMB. AMOUNT OUTSTANDING RS.	DEFICIENCIES AND REMAINING WORK REQUIRED
			1988 WORKS			
26	6	100	73.90 (6-3-89)	73.00	283,651.00	At the time of inspection, the construction work was in progress.
26	7	100	94.77 (26-3-91)	75.00	138,690.00	Work not completed at the time of inspection.
26	8		51.58 (13-4-91)	51.58	212,825.00	No action taken to complete work.
26	9	-	-	-	244,516.00	No improvement in progress as per construction progress reports (Jan' 91 to date).
26	10		55.50 (21-3-91)	55.50	183,365.00	No efforts have been taken to improve the progress as indicated in1991 report.
			Balance 1988 Work		1,063,047.00	
			1989 WORKS			
36	15		97.11 (9-8-91)	75.00	217,674.00	Construction on 0.3m drop struc. in D35 to be done. Construction drop str. at on 20m of RB2 to be to be done. Repairs to drop struc. to be done in D35
38	16		79.23 (26-2-92)	75.00	235,164.00	
38	17		94.12 (18-3-92)	75.00	198,125.00	

SUB-PRJ.WK1

IRRIGATION SYSTEMS MANAGEMENT PROJECT
STATUS REPORT OF PARTIALLY COMPLETED REHABILITATION WORKS
GIRITALE SCHEME
AS OF 31 MARCH 1992

PIL NO	SUB PROJECT NO.	% COMPLETE AS PER IES' RPT	% COMPLETE AS PER INSPECTION & DATE	% COMPLETE CERTIFIED	BALANCE OF REIMB. AMOUNT OUTSTANDING RS.	DEFICIENCIES AND REMAINING WORK REQUIRED
			1988 WORKS			
26	5	60	60.70 (23-3-92)	60.70	346,020.00	Initial inspectionfixed 3rd week Feb. balance work to be completed.
			1989 WORKS			
38	6	100	99.00 (8-1-92)	71.50	153,091.00	E/Work around structure 1 No. FPTO to be re-done D-20
38	7	60	52.57 (26-3-91)	52.57	423,558.00	D-19 (3km - 4.4km); RB/5-12; LB/8-2 to be completed
38	12	85	61.90 (21-3-91)	61.90	360,123.00	D-10(0-1.5); FCC/D-10; D-11; D-8; D-9; balance work to be completed
38	8	60			418,038.00	Initial inspection fixed 3rd week Feb. balance work to be completed
						balance work to be completed
38	10	90	54.03 (17-7-91)	54.03	293,103.00	D-18, no work done
38	11	85	56.72 (12-3-91)	56.72	357,250.00	D-12 & D-13 (1.6 - 2.8km) balance work to be done
38	13	90	52.73 (13-3-91)	52.73	542,058.00	balance work in D-7 4thkm & 6th km to be done
			Balance 1989 Work		2,547,221.00	
			1990 WORKS			
63	1001	40			131,990.00	Balance work to be done
TOTAL REIMBURSEMENT OUTSTANDING AS OF 31-3-1992					3,025,231.00	

SUB-PRJ.WK1

IRRIGATION SYSTEMS MANAGEMENT PROJECT
STATUS REPORT OF PARTIALLY COMPLETED REHABILITATION WORKS
KAUDULLA SCHEME
AS OF 31 MARCH 1992

PIL NO	SUB PROJECT NO.	% COMPLETE AS PER IES' RPT	% COMPLETE AS PER INSPECTION & DATE	% COMPLETE CERTIFIED	BALANCE OF REIMB. AMOUNT OUTSTANDING RS.	DEFICIENCIES AND REMAINING WORK REQUIRED
			1989 WORKS (CONT)			
38	24	100	92.53 (18-02-92)	92.53	26,249.00	Work not commenced in D3/Branch 1A and repairs to Drop in FC21/D3 has not been done.
			Balance 1989 Work		2,617,297.00	
			1990 WORKS			
66	18A				148,713.00	Poor progress, action must be taken to complete work
66	27		91.59	75.00	171,134.00	Pls refer to the certification report and complete balance work
66	28				817,617.00	
66	29				212,325.00	
66	30				230,295.00	
66	31		80.34	75.00	212,392.00	Pls refer to the certification report and complete the balance work.
			Balance 1990 Work		1,853,166.00	
TOTAL REIMBURSEMENT OUTSTANDING AS OF 31-3 1992					5,621,692.00	

SUB-PRJ.WK1

IRRIGATION SYSTEMS MANAGEMENT PROJECT
STATUS REPORT OF PARTIALLY COMPLETED REHABILITATION WORKS
GAL OYA RB & LB
AS OF 31 MARCH 1992

PIL NO	SUB PROJECT NO.	% COMPLETE AS PER IES' RPT	% COMPLETE AS PER INSPECTION & DATE	% COMPLETE CERTIFIED	BALANCE OF REIMB. AMOUNT OUTSTANDING RS.	DEFICIENCIES AND REMAINING WORK REQUIRED
		1989 WORKS GAL OYA RB				
38	6	63	50.00 (27-7-91)	50.00	567,200.00	
38	8	100	65.80 (31-3-90)	65.80	497,600.00	
67	9	92	60.00 (8-11-90)	60.00	225,445.00	
67	10	100	50.00 (24-7-91)	50.00	467,557.00	
67	11	100	74.00 (8-11-90)	74.00	171,250.00	
67	12	90	73.40 (23-12-91)	73.40	439,325.00	
67	13	96	61.70 (23-12-91)	61.70	375,842.00	
67	14	95	50.00 (29-7-91)	50.00	376,190.00	
67	15	85	71.20 (23-12-91)	71.20	340,393.00	
67	16	90			1,299,603.00	
67	17	45			1,518,160.00	
67	18	70			620,912.00	
67	19	90			683,665.00	
67	20		54.74 (27-12-91)	54.74	389,762.00	
67	22		33.00		890,426.00	
67	23		29.20		743,700.00	
67	24		47.72 (27-12-91)	50.00	277,146.00	
TOTAL REIMBURSEMENT GORB OUTSTANDING AS OF 31-3-1992					9,794,182.00	

SUB-PRJ.WK1

CALENDAR YEAR 1992

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TASK 2 - OPERATION AND MAINTENANCE IMPROVEMENT

No.	SUB TASKS	RESP PERSON ORG'N	JAN 01/31	FEB 01/28	MAR 01/31	APR 01/30	MAY 01/31	JUN 01/30	JUL 01/31	AUG 01/31	SEP 01/30	OCT 01/31	NOV 01/30	DEC 01/31
2.2	IMPROVEMENT TO IRRIGATION SYSTEMS OPERATIONS PSS SCHEME (29,247 Acs)													
2.2.1	INSTALLATION OF MEASURING DEVICES/GAUGES(76 LOCATIONS)	ID	53----53----|-----53----55----56----|-----|-----65----80----100		53xxxx|xxxxx|xxxx46									
2.2.2	CALIBRATION OF MEASURING DEVICES/GAUGES(76 LOCATIONS)	ID	53----53----|-----|-----53----55----|-----|-----60----|-----60---80---100		53xxxx|xxxxx|xxxx54									
2.2.3	ASSESSMENT OF CANAL LOSSES (12M-NODES)	ID	30----40----50---60----|----70--- 75----80---85----|-----|----90---100		30xxxx|xxxxx|xxxx30									
2.2.4	UPDATING ISSUE TREES	ID	0-----10----20---30----40---50----60----70----80----90----100---		0xxxxx|xxxxx|xxxxx0									
2.2.5	DEPLOYMENT OF MONITORING PERSONNEL (16TAs, 7WSs, 7PLs)	ID	50----70----90----100---100---|		50xxxx|xxxxx|xxx100									
2.2.6	ESTABLISHED FIELD OPERATIONS UNITS	ID	0-----20----40----60----80--100		0xxxxx|xxxxx|xxxx0									
2.2.7	IMPLEMENTATION OF COMPUTER ASSISTED SYSTEM OPERATIONS	ID	50----60----70----|---100											
2.2.8	UPDATING SYSTEM DATA AND REFINEMENT OF OPERATIONS	ID	0-----20----30----40----50----55----60----65----70----75----85----95--100		0xxxxx|xxxxx|xxxxx0									
2.2.9	WATER MANAGEMENT CELL ESTABLISHED AND FUNCTIONING BASED ON ESTABLISHED INDICATORS	ID	50----|-----|----75-----|----|---100		50xxxx|xxxxx|xxxx50									
2.2.10	PREPARATION OF SEASONAL WATER REPORTS													
	I. MAHA SEASON	ID	0-----0-----90----95----100		0xxxxx|xxxxx|xxxx60									
	II. YALA SEASON	ID	0-----0-----0-----0-----0-----0-----0-----60----90----100											
2.2.11	PREPARATION OF RESERVOIR OPERATIONS SEASONAL PLANS													
	I. MAHA SEASON	ID	0-----0-----90----95----100		0xxxxx|xxxxx|xxxx60									
	II. YALA SEASON	ID	0-----0-----0-----0-----0-----0-----0-----80----90----100											

IRRIGATION SYSTEMS MANAGEMENT PROJECT
ANNUAL WORK PLAN

EXHIBIT IV-3-1
Sheet 3 of 8

CALENDAR YEAR 1992

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TASK 2 - OPERATION AND MAINTENANCE IMPROVEMENT

No.	SUB TASKS	RESP PERSON ORG'N	JAN 01/31	FEB 01/28	MAR 01/31	APR 01/30	MAY 01/31	JUN 01/30	JUL 01/31	AUG 01/31	SEP 01/30	OCT 01/31	NOV 01/30	DEC 01/31
2.2	IMPROVEMENT TO IRRIGATION SYSTEMS OPERATIONS													
	GIRITALE SCHEME (7,340 Acs)													
2.2.1	INSTALLATION OF MEASURING DEVICES/GAUGES(78 LOCATIONS)	ID	100 100xxx	xxx100										
2.2.2	CALIBRATION OF MEASURING DEVICES/GAUGES(78 LOCATIONS)	ID	70----80----90----100 90xxxx	xxxxx	xxxx90									
2.2.3	ASSESSMENT OF CANAL LOSSES (20 M-NODES)	ID	20----50----75----100 20xxxx	xxxxx	xxxx20									
2.2.4	UPDATING ISSUE TREES	ID	100---- 100xxx	xxxx-	---100									
2.2.5	DEPLOYMENT OF MONITORING PERSONNEL (71 TAs, 5 HSs, 8 FLs)	ID	100--- 100xxx	xxxxx	xxx100									
2.2.6	ESTASBLLISHED FIELD OPERATIONS UNITS		0----- 0xxxxx	xxxxx	xxx100									
2.2.7	IMPLEMENTATION OF COMPUTER ASSISTED SYSTEM OPERATIONS	ID	75----80----90----100 25xxxx	xxxxx	xxxx25									
2.2.8	UPDATING SYSTEM DATA AND REFINEMENT OF OPERATIONS	ID	40----45----50----55----60----65----70----75----80----|----20----90--100 40xxxx	xxxxx	xxxx40									
2.2.9	WATER MANAGEMENT CELL ESTABLISHED AND FUNCTIONING BASED ON ESTABLISHED INDICATORS	ID	50----|-----|----75-----|-----|---100 50xxxx	xxxxx	xxxx60									
2.2.10	PREPARATION OF SEASONAL WATER REPORTS	ID												
	I. MAHA SEASON 1991-92		0-----|-----|-----|---100 xxxxx	xxxxx	xxxx50									
	II. YALA SEASON 1992		0-----|-----|-----|-----|-----|-----|-----|-----|---100											
2.2.11	PREPARATION OF RESERVOIR OPERATIONS SEASONAL PLANS	ID												
	I. MAHA SEASON 1991-92		0-----|-----|-----|---100 0xxxxx	xxxxx	xxxx0									
	II. YALA SEASON 1992		0-----|-----|-----|-----|-----|-----|-----|-----|---100											

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TASK 2 - OPERATION AND MAINTENANCE IMPROVEMENT

No.	SUB TASKS	RESP PERSON ORG'N	JAN 01/31	FEB 01/28	MAR 01/31	APR 01/40	MAY 01/31	JUN 01/30	JUL 01/31	AUG 01/31	SEP 01/30	OCT 01/31	NOV 01/30	DEC 01/31
2.2	IMPROVEMENT TO IRRIGATION SYSTEMS OPERATIONS BAKAMUNA/ATTARAGALLEWA SCHEME (1,000 Acs)													
2.2.1	INSTALLATION OF MEASURING DEVICES/GAUGES(30 LOCATIONS)	ID	0----- 0xxxxx	----- xxxxx	----- xxxxx	----- 0	----- 0	----- 0	----- 0	----- 0	0----- 0	25---- 0	50---- 0	55---60 0
2.2.2	CALIBRATION OF MEASURING DEVICES/GAUGES(30 LOCATIONS)	ID	0----- 0xxxxx	----- xxxxx	----- xxxxx	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	0----- 0	25---50 0	
2.2.3	ASSESSMENT OF CANAL LOSSES (15 M-NODES)	ID	10---- 0xxxxx	20---- xxxxx	30---- xxxxx	35---- 0	40---- 0	50---- 0	60---- 0	70---- 0	80---- 0	90---- 0	100 0	
2.2.4	UPDATING ISSUE TREES	ID	0----- 0xxxxx	10---- xxxxx	20---- xxxxx	30---- 30	40---- 0	50---- 0	60---- 0	70---- 0	80---- 0	90---- 0	100 0	
2.2.5	DEPLOYMENT OF MONITORING PERSONNEL (TAs, WSs, FLs)	ID	0----- 0xxxxx	15---- xxxxx	25---- xxxxx	35---- 10	50---- 0	----- 0	----- 0	----- 0	----- 0	50---- 0	75--100 0	
2.2.6	ESTABLISH FIELD OPERATIONS UNITS	ID	0----- 0xxxxx	----- xxxxx	----50 xxxxx	----- 0	----- 0	---100 0						
2.2.7	IMPLEMENTATION OF COMPUTER ASSISTED SYSTEM OPERATIONS	ID	0 0xxxxx	xxxxx	xxxxx	0	0	0	0	0	0	0	0	0
2.2.8	UPDATING SYSTEM DATA AND REFINEMENT OF OPERATIONS	ID	0 0xxxxx	xxxxx	xxxxx	0	0	0	0	0	0	0	0	0
2.2.9	WATER MANAGEMENT CELL ESTABLISHED AND FUNCTIONING BASED ON ESTABLISHED INDICATORS	ID	50---- 50xxxx	----- xxxxx	----60 xxxxx	----- 60	----- 0	----75 0	----- 0	----- 0	---100 0	----- 0	----- 0	---100 0
2.2.10	PREPARATION OF SEASONAL WATER REPORTS	ID												
	I. MAHA SEASON 1991-92		0----- 0	----- 0	----- 0	0---100 0	0	0	0	0	0	0	0	0
	II. YALA SEASON 1992		0----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	0---100 0	0	0	0
2.2.9	PREPARATION OF RESERVOIR OPERATIONS SEASONAL PLANS	ID												
	I. MAHA SEASON 1991-92		0----- 0	----- 0	----- 0	0---100 0	0	0	0	0	0	0	0	0
	II. YALA SEASON 1992		0----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	0---100 0	0	0	0

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TASK 2 - OPERATION AND MAINTENANCE IMPROVEMENT

No.	SUB TASKS	RESP PERSON ORG'N	JAN 01/31	FEB 01/28	MAR 01/31	APR 01/40	MAY 01/31	JUN 01/30	JUL 01/31	AUG 01/31	SEP 01/30	OCT 01/31	NOV 01/30	DEC 01/31
2.2	IMPROVEMENT TO IRRIGATION SYSTEMS OPERATIONS													
	GAL OYA RB SCHEME (34,474 Acs.)													
2.2.1	INSTALLATION OF MEASURING DEVICES/GAUGES (48 LOCATIONS)	ID	12----20---30-----|-----30--- 32----35----40----|-----|-----40----45---45 12xxxx|xxxxx|xxxxx12											
2.2.2	CALIBRATION OF MEASURING DEVICES/GAUGES (48 LOCATIONS)	ID	0-----15----20----|-----20----23----27----30--- |-----|-----30----35---35 0xxxxx|xxxxx|xxxxx10											
2.2.3	ASSESSMENT OF CANAL LOSSES (17 M-NODES)	ID	0-----|-----|-----|-----0-----5-----10----60----|-----|-----70----|----10 0xxxxx|xxxxx|xxxxx0											
2.2.4	UPDATING ISSUE TREES	ID	0----------0											
2.2.5	DEPLOYMENT OF MONITORING PERSONNEL (11 TAs, 3 WSs, 6 FLs)	ID	0----------0											
2.2.6	ESTABLISH FIELD OPERATIONS UNITS	ID												
2.2.7	IMPLEMENTATION OF COMPUTER ASSISTED SYSTEM OPERATIONS	ID	0----------0											
2.2.8	UPDATING SYSTEM DATA AND REFINEMENT OF OPERATIONS	ID	0----------0											
2.2.9	WATER MANAGEMENT CELL ESTABLISHED AND FUNCTIONING BASED ON ESTABLISHED INDICATORS	ID	50----|-----|----60-----|-----|----75-----|-----|----80-----|-----|---100 50xxxx|xxxxx|xxxx50											
2.2.10	PREPARATION OF SEASONAL WATER REPORTS	ID												
	I. MAHA SEASON 1991-92		0-----|-----|-----|-----0---100 0xxxxx|xxxxx|xxxxx0											
	II. YALA SEASON 1992		0-----|-----|-----|-----|-----|-----|-----|-----|-----0---100 0xxxxx|xxxxx|xxxxx0											
2.2.11	PREPARATION OF RESERVOIR OPERATIONS SEASONAL PLANS	ID												
	I. MAHA SEASON 1991-92		0-----|-----|-----|-----0---100 0xxxxx|xxxxx|xxxx 0											
	II. YALA SEASON 1992		0-----|-----|-----|-----|-----|-----|-----|-----|-----0---100											

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The basic objective of the Operation and Maintenance phase of the Irrigation Systems Management Project is to improve and upgrade seven selected existing irrgation Schemes within the Project area and to introduce improvements in operation and maintenance in order to increase water use efficiency and agricultural production. Exhibit V-1-1 and V-1-2 respectively were developed to guide system operators in effecting improvements in Systems Operation and Maintenance.

This will involve not only the Irrigation Management Division and Irrigation Department personnel but also the DCFOs and other government agencies as well. It will be a joint cooperative effort of all concerned.

5.1.1 A major Project achievement was the involvement of the D-Canal Farmers Organizations (DCFOs) not only in rehabilitation but also in operation and maintenance of the D-Canal system as well. Because of the involvement / participation of the DCFOs in the rehabilitation of the D-Canal system they became aware of their responsibilities as beneficiaries of the Irrigation Schemes to protect and improve the facilities. Their involvement in rehabilitation greatly improved their capabilities in this endeavour and have helped enhance development efforts within the Project area.

At the start, progress was slow and some construction faults were noticed. However, with the guidance and technical assistance of the Technical Assistants (TA) concerned, these faults were corrected and in the end they have become more capable and the quality of their work has greatly improved. Despite these improvements, however, there are still some areas where improvements had been suggested, but which could not be fully implemented due to time constraints. There are also some canal structures which are in need of repair, but have not been programmed for rehabilitation for priority have been given to structures that are about to collapse and which were considered more essential in operations.

Some Sub-Projects take three to four years to complete. Some of the reasons cited were existing local conditions, length of time in preparing designs and estimates which at times extend up to the close season,

etc. Contractors do not usually maintain the works they have completed earlier so these works deteriorate after some time and very often even before they are turned over and reported as completed.

Various types of structures have been constructed within the ISMP area depending on various factors. Rubble packing of scoured outlets of structures and side slopes of big canals are common sights and are still in place. In other areas retaining walls/toe walls have been constructed instead of rubble packing. There are also toe walls constructed on small field canals which appear to be too bulky and inappropriate for small canals. In these instances, rubble packing would have been better or even well compacted earthfill would be sufficient.

Improvements to headgates of turnouts for the installation of screw type sliding steel gates come in different sizes and shapes. It was observed that the improvements made on these structures in Gal Oya RBE Ridi Bendi Ela and some in PSS in Polonnaruwa are of the correct height and size and are more economical to construct than the others. Photos of these type of structures are presented as Exhibit V-1-3. The more economical ones have been highlighted in the Quarterly Report for the quarter ending September 1991.

It was observed that most outlets of newly constructed drop structures along distributary canals are scoured and need protection from further scouring. It was suggested that rubble packing on both sides of the outlet of the structures be undertaken.

5.1.2 DEVELOPMENT OF ANNUAL MAINTENANCE PLANS

The Annual Maintenance Plans and Costs developed for the Main Systems of the Seven Schemes on the Project was a major effort of accomplishment. Nowhere in Asia has a program been developed with such detail and planning.

The information and data developed under the Annual Maintenance Plans and related documents, if implemented under the Preventative Maintenance Program after ISMP, will be effective in sustaining the Main Systems provided the maintenance funds determined under the Annual Maintenance Plans are provided to the ID by the GOSL for each Scheme. So far the funds allocated for maintenance by the GOSL for the four Schemes in the

Polonnaruwa Range is only about 40% of that required according to the Annual Maintenance Costs developed for the Main System of these four Schemes. Furthermore, part of that budget allocation for Maintenance was to be used for the D-Canals, so it is even less than 40% of the Main System maintenance required. The Table V-1-1 below presents the allocated 1992 Budget for maintenance under the ISMP Preventative Maintenance Annual Maintenance Cost developed over the LOP.

TABLE V-1-1

ANNUAL MAINTENANCE COST VS. BUDGET
POLONNARUWA RANGES - MAIN SYSTEM

Scheme	Extent (Ac.)	Estimated Annual Maint. Cost (Rs.)	1992 Alloc. Maintenance Budget (Rs.)	Shortfall (Rs.)	% Budget
PSS	20,247	2,507,296	1,082,700	1,381,596	43.2
Minneriya Giritale	31,012	3,141,721	1,125,700	2,059,021	35.8
Kaudulla	10,824	2,117,589	949,500	1,168,089	44.8
Total	62,083	7,766,606	3,157,900	4,608,706	40.6

As a result of the above table, it can be concluded that additional funds must be allocated for Main System Maintenance if the Schemes under the ISMP are to be sustained under Preventative Maintenance Program without need for major rehabilitation in the future.

The Annual Maintenance Plans and Costs developed for the Distributary Systems of 5 of the 7 Schemes (92 out of 201) of the Project was a major effort of accomplishment. This information and data developed under the Annual Maintenance Plans, if implemented by the DCOs after the Project should be effective, provided the DCOs develop the man-power and funds to fully implement the plans for sustaining the systems. So far these Annual Maintenance Plans have not yet been implemented by the DCFOs, so conclusions as to the effectiveness of the Preventative Maintenance Program at the Distributary Canal Level remains to be seen as of 30 June 1992.

Based upon detailed results developed for the twelve DCOs in the Giritale Scheme the following information regarding the maintenance of the D and F canals that will be taken over and maintained by the DCFOs can be stated:

- The average cost Annual Maintenance of the DCFOs in Giritale Scheme was about Rs. 205 per acre.
- Labor requirement of the Maintenance Cost was found to be about 75% or about Rs. 155 per Acre.
- Cost of material, equipment, fuel etc 25% or only Rs. 50 per Acre.

Based upon the above results it can be concluded that the annual cost needed to allow the DCFO to maintain their D and F canals will only be about Rs. 50 per acre if the members contribute their labor to the organization to implement the Annual Maintenance Plans.

5.1.3 IMPROVEMENTS TO IRRIGATION SYSTEMS OPERATION

The Action Plan for the implementation of improved water management in all the Schemes within the ISMP area was developed after discussions and review of past experiences by those who developed the Plan.

The Plan is meant to improve the management of the resources available within the Schemes. The implementation of the activities under the plan is easy but needs dedication and perseverance. Operations and Maintenance are not attractive tasks. Therefore, the personnel involved must be properly motivated and compensated, otherwise they will favor the other fields of Engineering. The Irrigation Department has technical personnel very capable of undertaking the implementation of the Plan. There are those who like to undertake challenges and this is a very challenging activity.

Water Management Cells have been set up in all the Schemes within the ISMP. As discussed in Chapter III, paragraph 3.3.1, the Plan is already under implementation. In the Giritale, Kaudulla, RBE and GOLB Schemes a TA who will head the Scheme Water Management Cell will be working full time supervising operations activities in their respective Schemes.

Installation and calibration of measuring devices is being undertaken and patrol laborers have been assigned to gather field data to be fed into the computer model. In this undertaking the cooperation and assistance of the DCOs will be needed.

Implementation has just started and there are still flaws in the operation. As operation implementation progresses the problems encountered will have to be resolved as they come. Some problems in the utilization of the model have been identified and have been rectified. Some of the computers usually break down so some units have to be moved from one operation center to another to keep at least one of the computers in operation.

Assessment of canal losses, seepage and percolation is lagging behind. This has to be attended to in order to further refine the operation of the CASOM.

Operations and maintenance are parallel, but separate activities in the Irrigation Schemes. The funds for these activities are usually given as lump sum appropriations. The Annual Maintenance Cost for the Main System have been prepared for most the Schemes within the ISMP area. An Operation Cost Estimate for the Giritale Main and Distributary System was prepared based on information gathered from the IE Minneriya and his staff and the actual needs for sustained operation including the operation of the Division Computer Center, which is considered the nerve center of operations activities of the Scheme. It is expected that the lump sum appropriation provided by the IMD for O&M of Schemes, based on these estimates discussed above, that it will now be easier to allocate the necessary funds separately for the individual activities. Ultimately this will lead to more efficient and effective implementation of O&M programs of the respective systems.

5.2 RECOMMENDATIONS

It is an acceptable fact that the Irrigation Systems Management Project is an outstanding project which has initiated participatory management of Irrigation Schemes by involving the DCFOs in the management of the Schemes. The operation and maintenance of the Distributary Canal System in more than 40 DCFO areas have already been taken over by DCOs, while the other areas where DCFOs have already been formed are being operated and maintained jointly by the

Irrigation Department and the DCFOs. This is the on-the-job training phase for the DCFOs so that once they become capable of undertaking operation and maintenance by themselves, they will eventually take over.

What should be looked into very closely is the ustainability of this undertaking. Although the DCFOs have taken over the O&M of the D-Canal System, the TAs of the Irrigation Department, Irrigation Management Division and other personnel involved should continue guiding and assisting these DCFOs in their O&M activities and to continuously monitor the progress of the DCFOs take-over. The Field Operations Unit offices set up in all the Schemes within the ISMP area should be made the venue of meetings and discussions for the resolution of problems and requests for assistance presented by the DCFOs. FOUs offices have been established within a FOU which covers 3 or more DCFO areas.

These DCFOs together with the TA of that FOU must hold a meeting about 30 days before the Kanna Cultivation meeting to discuss and develop operations plans for the coming cropping season. If the water in the Tank is not sufficient to irrigate the whole area during the Yala season, they should decide what percent of the area is to be planted. Their plan should be presented at the System Level Farmer Organization meeting which should take place three weeks before the Kanna meeting. In this meeting the IE of the Scheme should advise the SLFO members about the water availability situation in the Scheme and recommend how the water should be allocated. The recommendation of the IE and his staff will be discussed and the SLFO will have to come to an agreement which they will have to present in the pre-Kanna meeting. Whatever is agreed upon in the pre-Kanna meeting will be presented and discussed for eventual confirmation with or without revision by the general assembly attending the Kanna meeting. Since the Operations Plan approved in the Kanna meeting will have to be implemented by the Irrigation Department, the IE concerned should take the lead in the proper allocation of water to best satisfy the needs for effective and efficient water management.

The DCOs need funds for operation and maintenance of the D-Canal level facilities, contributions from members must be collected in order to generate enough funds to pay the salaries of the Jalapalaka, who should work full time to assure the equitable distribution of water within the DCFO area and honorarium of the Field Canal Representatives, who will assist the Jalapalaka and the other officials of the DCO and for the maintenance of canals and other facilities., This contribution could be augmented by earnings from undertaking contracts for Irrigation Department works.

The Irrigation Department must continue utilizing the DCOs to undertake contract works to generating funds for their O&M activities and further improve further their capabilities in construction and rehabilitation.

During the walk-through surveys for planning rehabilitation works, more care should be taken in considering which works are to be given priority especially when funds are limited. It is economically prudent to give priority to canal structures that are about to collapse but could still be saved. They are easier to repair than those that have already collapsed. In the selection of the type of canal protection structures to be adapted, the use of the rubble packing against the bulky and more expensive toe walls must be closely studied, especially in areas where the topography is flat and the danger of canal washout is not imminent.

For the turnout headgate improvement installation of screw type steel gates similar nto the ones the smaller structures constructed in Gal Oya RB, Ridi Bendi Ela and some parts of Parakrama Samudra Schemes could be looked into and adopted in the unfinished Sub-Projects and/or in future rehabilitation projects.

There are drop structures with outlets already being scoured. These outlets must be protected from further scouring otherwise the outlet of these structures might collapse. Rubble packing could be used in stabilizing the canal side slopes at the outlet of these structures. There are also pipe outlets in field canals which extend beyond the toe of the canal embankment up to the extent of the canal reservation but which are already being tilled by farmers. If the width of the canal bund is sufficient the pipe outlet should extend only up to the toe of the canal bund.

5.2.2 DEVELOPMENT OF ANNUAL MAINTENANCE PLAN

- The Preventative maintenance Program for the main System of the Seven Schemes in the Project has been prepared and Annual Maintenance Plans and Costs have been developed for each Scheme. Presently only about 40% of the annual maintenance funds required to implement the long term Preventative Maintenance Program has been budgeted by the GOSL for the Main System Maintenance. It is recommended that additional funds be allocated for Main System Maintenance by the GOSL if the Preventative Maintenance Program is to be effective and to meet the Project objectives of system sustainability without further need of major rehabilitation.

- In order that Preventative Maintenance of the Distributary Canal Systems to be operated and maintained by the DCFOs, it is recommended that continual assistance and training be given to the DCOs in the maintenance of these newly acquired systems by the Irrigation Department.

- It is recommended that for DCFOs still to be formed at PADC (30 June 19912) that Annual Maintenance Plans be prepared by the ID. These Maintenance Documents Annual Maintenance Plans, Cost Estimates, Maintenance Diagram Schematic Work Distribution Diagrams be officially transferred to the DCFOs when the official handing over takes place between ID and the DCFOs.

5.2.3 IMPROVEMENT TO IRRIGATION SYSTEMS OPERATION

The Water Management Cells established in all the seven Schemes within the ISMP must be managed properly to serve the needs of operation's activities within the Schemes. In schemes where the Field Operations Units offices have not yet been commissioned, all efforts must be exerted to officially open them and make sure that all the DCFOs concerned make use of these FOUs offices since they are the extension of the scheme IEs office in field. The data and information available in the FOU offices must be explained to the DCFOs so they can utilize them in times of need. It must be explained to the DCOs that their assistance and cooperation is very necessary in order to attain effective and efficient water management. The role of the Jalapalaka and the DCFO President as embodied in their " Job Description " should be explained thoroughly to them especially in the collection of field data needed to be entered daily in the CASOM. Their cooperation and assistance in safeguarding and maintaining the measuring devices within their DCO areas must be stressed to them.

It is the responsibility of the Irrigation Department to train them on-the-job on the reading of gauge heights and the equivalent discharges and all other aspects of operation and maintenance. The ID must provide them with discharge curves/tables to help them understand that they have to appropriate and distribute to the farmers only the amount of water they need during the different growth stages of rice production.

The installation and calibration of measuring devices in all Schemes where this activity have not yet been completed must be vigorously carried out on a first

priority basis. Unless these measuring devices are installed and calibrated and the gauge heights read, recorded and entered into the CASOM, water management will be a futile exercise.

Calibration of measuring devices in the Main Canals and Branch Canals and the bigger D-Canals shall be done in identified gauging stations with the use of current meters. In smaller D-Canals where there are drop structures near the headgate of the D-Canals it would be best to calibrate the drop structure and use it as the measuring device for that canal. For small canals where the use of current meters is not effective due to the low flow in the canal it would be best to calibrate the measuring device with the use of a portable cut throat flume.

The assessment of canals losses which is one the parameters needed for the refinement of the operation of the CASOM, could be undertaken hand-in-hand with the calibration of measuring devices, especially along the main canals. The TAs trained to undertake this activity have the knowledge and capabilities, to undertake this exercise.

The rain gauge networks established in all the Schemes must be fully utilized in order to minimize the use of water from the tanks, utilization of effective rainfall is a very important factor in water management. The water that could be saved through the utilization of effective rainfall could be conserved in the tanks for use during the on-coming Yala Season.

It is reiterated that even after the turnover of operations of the distributary system to the DCFOs, the technical assistance, guidance and supervision to the DCFOs still remains the responsibility of the Irrigation Department and the Irrigation Management Division. It is, therefore, imperative that there should at least be one responsible official of the Irrigation Department to be assigned to supervise the operation of the system on a full time basis, otherwise operations will be neglected if there is no one individual responsible for this activity. At the close of each cropping season the official mentioned above could attend to the preparation of the Seasonal Water Report and the operations plans for the next cropping season. He should also supervise the repair/replacement of damaged measurement devices during the closed season.

The Head of the Range Operations Center should coordinate the various activities relative to the operation of the Computer Assisted Systems Operation Model including the identification of location, supervision of design, construction and calibration of measurement devices. He must also enter into the computer at the Range Operation Center (ROC) the weekly data transmitted to the ROC by the TA of the Division Computer Center for his analysis and evaluation. If all the data on the CASOM are available at the ROC he could easily appraise the DDI of the progress on the utilization of the CASOM without going to all the Division Operation Centers.

The DA and the Head of the Range Operation Center must analyze the Weekly Water Management Evaluation Reports and should they find canals with a Water Management Index (WMI) much higher or lower than the WMI of these canals, efforts should be made to correct the situation. The DA concerned should advise the TA concerned of the discrepancies and to find out what went wrong.

The TA of the FOU and the DCFO Water Master (Jalapalaka) concerned should then make joint walk-thru verification in the field and through careful observation and amiable communication with other DCFO members they will be able to determine whether there is over supply or lack of water. By varying the amount of water being delivered to problem D-canal areas and making weekly joint walk-thru verification, the correct water requirement could be established and then quantified at the gaging station at the headgate of the problem D-canal.

Subsequently, the TA for the main canal should then advise the PLs to adjust the opening of the turnout gate of the canal to allow the right amount of water to flow. Whether the gates were adjusted properly or not could be checked when the computer printout for the following week is analyzed.

The preparation of an Operations Cost Estimate was meant to serve as a guide for IEs to allocate the necessary funds for effective operations activities. The estimate provides for the allowances of TAs involved in operations, salaries and overtime pay for laborers and other miscellaneous expenses necessary for sustained operation of water management in the Scheme. It must be emphasized that necessary funds must be provided for the immediate repair and maintenance of

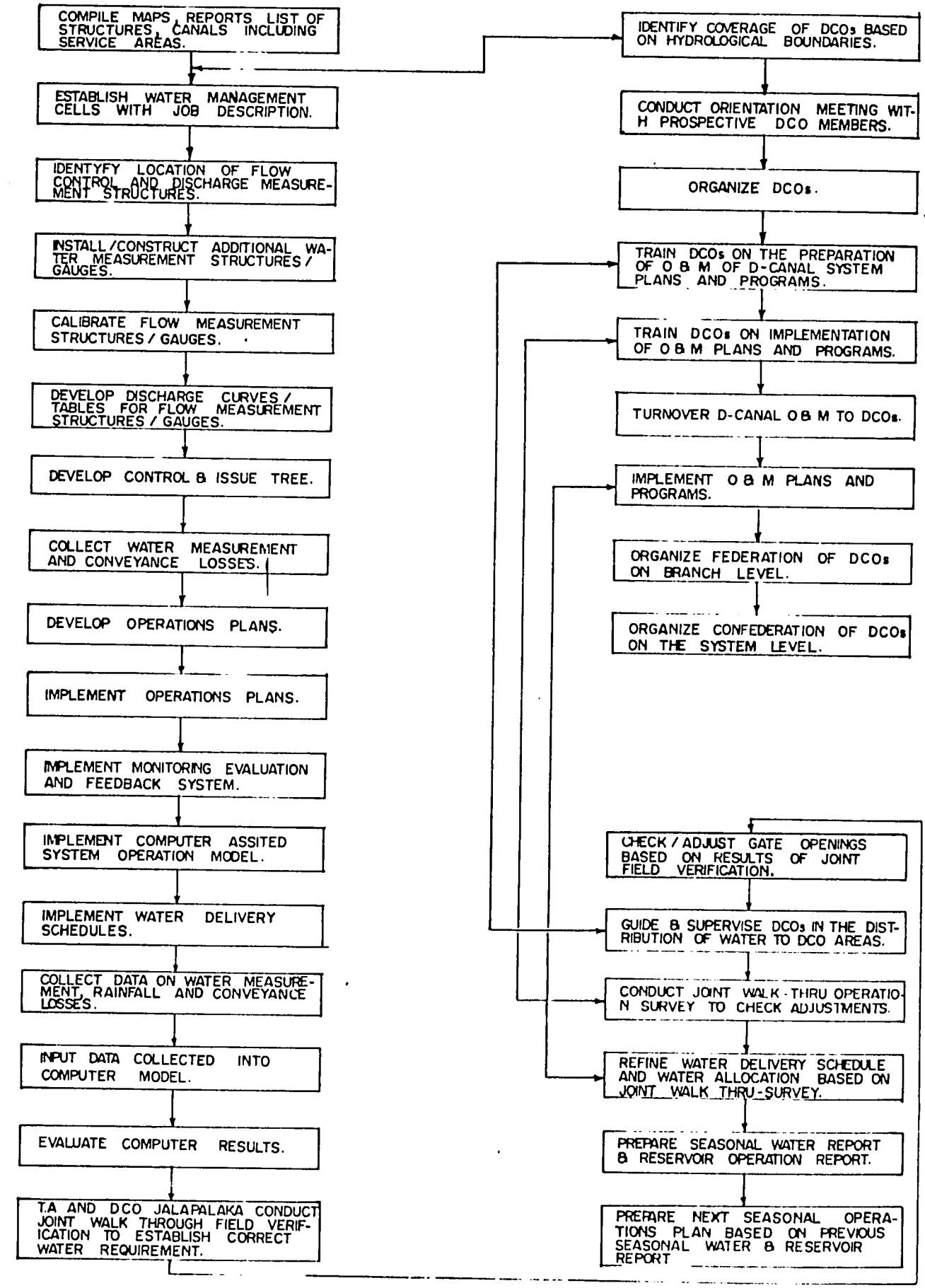
the computer unit in order not to disrupt the operation of the CASOM which is very essential in improving the water management activities in the Schemes. Although the estimate was based on activities in the Giritale Scheme, it could serve as a basis with the necessary innovations to suit conditions in each Scheme, for the preparation of an Operations Cost Estimate for all the other Schemes within the Irrigation Systems Management Project.

A set of indicators (Score Card) for the evaluation of water management cells for at least two Irrigation Schemes within the ISMP area was developed to assist the IEs to monitor the progress of the Schemes in attaining the objectives of water management.

These indicators were primarily drawn up to evaluate the three candidate Schemes for the attainment of the conditions of the Third Tranche of the Irrigation Sector Assistance Agreement between the GOSL and USAID. However, these indicators will be helpful to IEs in their monitoring the progress of water management programs within their respective Schemes. The Score Card is presented as Exhibit V-1-4.

IRRIGATION SYSTEMS MANAGEMENT PROJECT

IRRIGATION OPERATIONS IMPROVEMENT



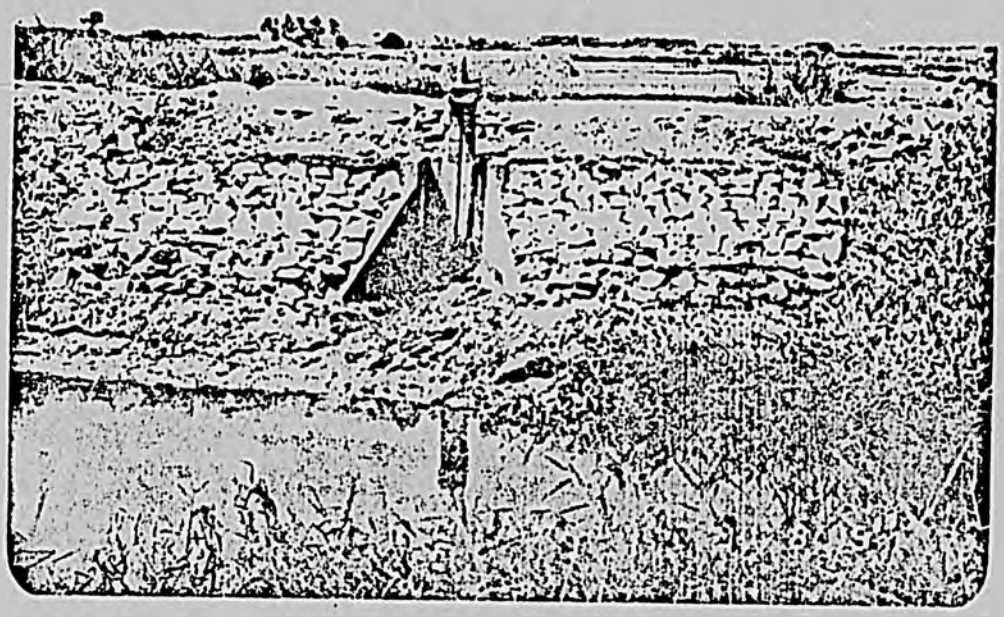


Photo showing a type of turnout structure improvement for the installation of screw type steel gates which is considered more economical than the other types.

Photo showing the ordinary type of turnout structure improvement which is more expensive than the one pictured above.

IRRIGATION SYSTEM MANAGEMENT PROJECT
SCORE CARD
IN EVALUATING WATER MANAGEMENT CELLS

SCHEME: _____
NUMBER OF FIELD OPERATION UNITS (FOU): _____
NAME/NO. OF FOU: _____
DATE EVALUATED: _____
NAME OF EVALUATOR/S: _____

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SCORES		INDICATORS
PS	AS	
10	___	1. FIELD OPERATION UNIT (FOU) OFFICE.
0.5	___	o Date established= _____ Address/Location= _____
1.0	___	o Permanent or Temporary= _____
1.5	___	o Organization Chart= _____
1.0	___	o Communication Flow WMO Chart=_____
1.0	___	o Irrigation Layout Map= _____
2.0	___	o Desk= 1 ___, Conf. Table= 1 ___, Chairs= 6___ Cabinet/Shelf= 1 ___, Benches= 2 ___
1.5	___	o Report forms available= _____
0.5	___	o No. of DCFOs covered= _____
1.0	___	o Bulletin Board available and sufficient?_____
10	___	2. PERSONNEL DEPLOYMENT FOR OPERATION.
2.0	___	o 1 TA as Head of Operations (full time)
2.0	___	o 1 TA as head of FOU
1.0	___	o WS- No. required = 5, No. deployed = _____
2.0	___	o PL- No. required = 11, No. deployed = _____
2.0	___	o DCO Jalapalakas- No. required = 12 No. deployed = _____
1.0	___	o Job description of each position.
10	___	3. INSTALLATION OF WATER MEASURING DEVICES.
5.0	___	o Plastic gauges installed at: a. gauge post, retaining walls and other structures- No. required= _____, No. inst._____
4.0	___	o Cut Throat Flumes - No. req.= 10, No. inst.= _____
1.0	___	o Rain Gauges - No. req.= ___, No. Inst.= _____

10	___	7.	RECORDS KEPT ON FILE FOR READY REFERENCE.
1.0	___		o Discharge tables/rating curves.
1.0	___		o Records of daily gauge readings.
1.0	___		o Area irrigated by each turnout.
1.0	___		o Length of Canals (D&F).
2.0	___		o Weekly management evaluation report.
0.5	___		o Daily work itinerary and time sheet.
0.5	___		o Scheme Water Management Cell Organization Chart and Water Management Operations Chart properly posted.
0.5	___		o Seasonal water/reservoir operation reports.
0.5	___		o Irrigation Diversion Requirements of Main, Branch Canals and On-Farm Water Requirements.
2.0	___		o Schedule of water delivery.
05	___	8.	OTHER WATER MANAGEMENT TOOLS, EQUIPMENT, INSTRUMENTS, ETC. ARE AVAILABLE.
0.5	___		o Grass and shrub cutting knives.
0.5	___		o Heavy Hoes/Mammotys.
0.5	___		o Crowbar.
0.5	___		o Meter stick/measuring tape.
0.5	___		o Graduated cylinder for measuring water from the rain gauge.
0.5	___		o Gate Operating Handle.
0.0	___		o Set of wrenches.
0.5	___		o Extra sets of nuts and bolts.
0.5	___		o Anti Corrosive paints and paint brush.
1.0	___		o Extra spares of Plastic Gauges (to immediately replace broken/lost plastic guages).