

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (1/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block	Area (ha)	Block	Area (ha)	Block	Area (ha)	
1st Mon. LSI	225.1						225.1
Sun.							225.1
2nd Mon. LS2	237.4		LP1	225.1			462.5
Sun.			LP2	237.4			462.5
3rd Mon. LS3	240.6		LP1	225.1			703.1
Sun.			LP2	237.4			703.1
4th Mon. LS4	223.3		LP1	225.1			703.1
Sun.			LP2	237.4			703.1
5th Mon. LS5	237.8		LP3-1	56.1			755.4
Tue.			LP3-2	184.5			755.4
Wed. LS6	237.8		LP4-1	83.6			505.9
Thu.			LP4-2	139.7			505.9
Fri.			Total	293.5			505.9
Sat. LS5	237.8		LP3-1	56.1			377.5
Sun.			LP3-2	184.5			377.5
6th Mon. LS6	246.1		LP3-1	56.1			764.7
Tue.			LP3-2	184.5			764.7
Wed. LS6	246.1		LP4-1	83.6			720.6
Thu.			LP4-2	139.7			720.6
Fri.			LP5-1	206.4			720.6
Sat. LS6	246.1		LP5-2	31.4			417.2
Sun.			LP5-1	206.4			417.2
7th Mon. LS7	231.5		LP6-1	169.9			518.6
Tue.			LP6-2	174.4			518.6
Wed. LS7	231.5		LP6-1	169.9			518.6
Thu.			LP6-2	174.4			518.6
Fri.			LP7-1	110.5			518.6
Sat. LS7	231.5		LP7-2	121.0			518.6
Sun.			LP7-1	110.5			518.6
8th Mon. LS8	195.8		LP8-1	21.4			776.3
Tue.			LP8-2	174.4			776.3
Wed. LS8	195.8		LP8-1	21.4			776.3
Thu.			LP8-2	174.4			776.3
Fri.			Total	301.8			776.3
Sat. LS8	195.8		LP6-1	169.9			518.6
Sun.			LP6-2	174.4			518.6
9th Mon.			LP7-1	110.5			518.6
Tue.			LP7-2	121.0			518.6
10th Mon.			LP8-1	21.4			518.6
Tue.			LP8-2	174.4			518.6
			Total	371.6			518.6

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (2/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block	Area (ha)	Block	Area (ha)	Block	Area (ha)	
1st Mon. LSI	225.1						225.1
Sun.							225.1
2nd Mon. LS2	237.4		LP1	225.1			462.5
Sun.			LP2	237.4			462.5
3rd Mon. LS3	240.6		LP1	225.1			703.1
Sun.			LP2	237.4			703.1
4th Mon. LS4	223.3		LP1	225.1			703.1
Sun.			LP2	237.4			703.1
5th Mon. LS5	237.8		LP3-1	56.1			755.4
Tue.			LP3-2	184.5			755.4
Wed. LS6	237.8		LP4-1	83.6			505.9
Thu.			LP4-2	139.7			505.9
Fri.			Total	268.1			505.9
Sat. LS5	237.8		LP3-1	56.1			377.5
Sun.			LP3-2	184.5			377.5
6th Mon. LS6	246.1		LP3-1	56.1			764.7
Tue.			LP3-2	184.5			764.7
Wed. LS6	246.1		LP4-1	83.6			720.6
Thu.			LP4-2	139.7			720.6
Fri.			LP5-1	206.4			720.6
Sat. LS6	246.1		LP5-2	31.4			417.2
Sun.			LP5-1	206.4			417.2
7th Mon. LS7	231.5		LP6-1	169.9			518.6
Tue.			LP6-2	174.4			518.6
8th Mon. LS8	195.8		LP6-1	169.9			518.6
Tue.			LP6-2	174.4			518.6
9th Mon.			LP7-1	110.5			518.6
Tue.			LP7-2	121.0			518.6
10th Mon.			LP8-1	21.4			518.6
Tue.			LP8-2	174.4			518.6
			Total	371.6			518.6

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (3/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block	Area (ha)	Block	Area (ha)	Block	Area (ha)	
10th Wed.	LP7-1	110.5	NI3-2	184.5			
Thu.	LP8-1	21.4	NI4-1	83.6			
Fri.	Total	131.9	NI5-1	206.4			
			NI6-1	169.9			
			Total	644.4			776.3
Sat.	LP7-2	121.0	NI4-2	139.7			
Sun.	LP8-2	174.4	NI5-2	31.4			
	Total	295.4	NI6-2	76.2			
			Total	247.3			542.7
11th Mon.			NI1	225.1			
Tue.			NI2	237.4			
			NI3-1	56.1			
			Total	518.6			518.6
Wed.	LP8-1	21.4	NI3-2	184.5			
Thu.			NI4-1	83.6			
Fri.			NI5-1	206.4			
			NI6-1	169.9			
			NI7-1	110.5			
			Total	754.9			776.3
Sat.	LP8-2	174.4	NI4-2	139.7			
Sun.			NI6-2	31.4			
			NI6-2	76.2			
			NI7-2	121.0			
			Total	368.3			542.7
12th Mon.			NI1	225.1			
Tue.			NI2	237.4			
17th			NI3-1	56.1			
			Total	518.6			518.6
Wed.			NI3-2	184.5			
Thu.			NI4-1	83.6			
Fri.			NI5-1	206.4			
			NI6-1	169.9			
			NI7-1	110.5			
			Total	776.3			776.3
Sat.			NI4-2	139.7			
Sun.			NI5-2	31.4			
			NI6-2	76.2			
			NI7-2	121.0			
			NI8-2	174.4			
			Total	542.7			542.7

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (4/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block	Area (ha)	Block	Area (ha)	Block	Area (ha)	
18th Mon.			NI2	237.4			
Tue.			NI3-1	56.1			
			Total	293.5			293.5
Wed.			NI3-2	184.5			
Thu.			NI4-1	83.6			
Fri.			NI5-1	206.4			
			NI6-1	169.9			
			NI7-1	110.5			
			NI8-1	21.4			
			Total	776.3			776.3
Sat.			NI4-2	139.7			
Sun.			NI5-2	31.4			
			NI6-2	76.2			
			NI7-2	121.0			
			NI8-2	174.4			
			Total	542.7			542.7
19th Mon.			NI3-1	56.1			
Tue.							56.1
Wed.			NI3-2	184.5			
Thu.			NI4-1	83.6			
Fri.			NI5-1	206.4			
			NI6-1	169.9			
			NI7-1	110.5			
			NI8-1	21.4			
			Total	776.3			776.3
Sat.			NI4-2	139.7			
Sun.			NI5-2	31.4			
			NI6-2	76.2			
			NI7-2	121.0			
			NI8-2	174.4			
			Total	542.7			542.7
20th Mon.							0
Tue.							
Wed.			NI4-1	83.6			
Thu.			NI5-1	206.4			
Fri.			NI6-1	169.9			
			NI7-1	110.5			
			NI8-1	21.4			
			Total	591.8			591.8

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (5/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block Area (ha)	Area (ha)	Block Area (ha)	Area (ha)	Block Area (ha)	Area (ha)	
20th Sat.					N14-2	139.7	
20th Sun.					N15-2	31.4	
					N16-2	76.2	
					N17-2	121.0	
					N18-2	174.4	
					Total	542.7	542.7
21st Mon.							0
21st Tue.							
21st Wed.					N15-1	206.4	
21st Thu.					N16-1	169.9	
21st Fri.					N17-1	110.5	
					N18-1	21.4	
					Total	508.2	508.2
21st Sat.					N15-2	31.4	
21st Sun.					N16-2	76.2	
					N17-2	121.0	
					N18-2	174.4	
					Total	403.0	403.0
22nd Mon.							0
22nd Tue.							
22nd Wed.					N16-1	169.9	
22nd Thu.					N17-1	110.5	
22nd Fri.					N18-1	21.4	
					Total	301.8	301.8
22nd Sat.					N16-2	76.2	
22nd Sun.					N17-2	121.0	
					N18-2	174.4	
					Total	371.6	371.6
23rd Mon.							0
23rd Tue.							
23rd Wed.					N17-1	110.5	
23rd Thu.					N18-1	21.4	
23rd Fri.					Total	131.9	131.9
23rd Sat.					N17-2	121.0	
23rd Sun.					N18-2	174.4	
					Total	295.4	295.4

Table I-5 PROGRAMMED WATER DISTRIBUTION SCHEDULE (6/6)

Week Day	Land Soaking		Land Preparation		Normal Irrigation		Total Area (ha)
	Block Area (ha)	Area (ha)	Block Area (ha)	Area (ha)	Block Area (ha)	Area (ha)	
24th Mon.							0
24th Tue.							
24th Wed.					N18-1	21.4	
24th Thu.							
24th Fri.							21.4
24th Sat.					N18-2	174.4	
24th Sun.							174.4

Note. This proposed distribution schedule was established after confirming that peak diversion water requirements at the pump station and respective headgates had become as small as possible with trial and error of preparation of several alternative water distribution schedules.

Table I-6 UNIT GROSS FIELD REQUIREMENT

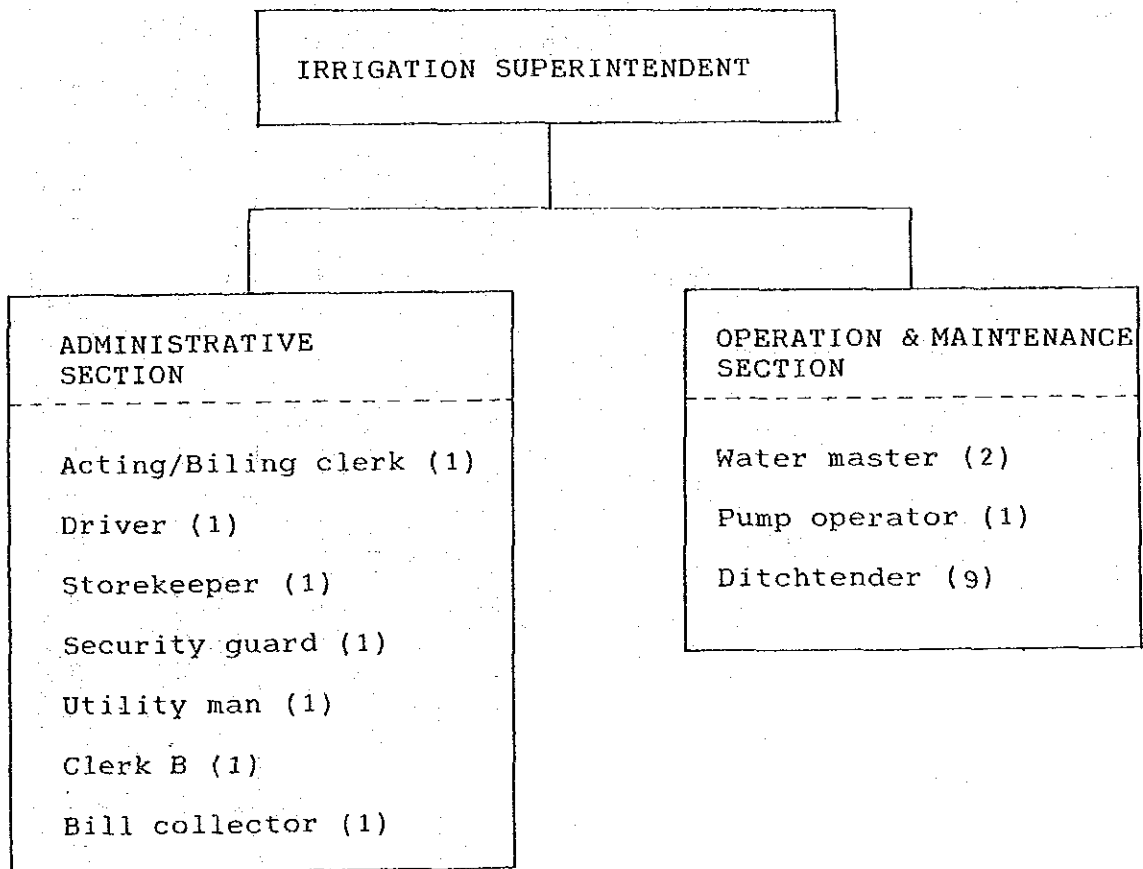
Irrigation Frequency (Days)	Crop Water Requirement (l/s/ha)		Coefficient for Irrigation Loss	Unit Gross Requirement (l/s/ha)		
	Wet Season	Dry Season		Wet Season	Dry Season	
(1)	(2)	(2)	(3)	(1)x(3)	(2)x(3)	
Land soaking	7	3.50	1.17	1.3	4.55	1.52
Land preparation	7	0.93	0.83	1.3	1.21	1.08
	3	2.18	1.95	1.3	2.83	2.53
	2	3.26	2.92	1.3	4.24	3.79
Normal irrigation	3	2.02	3.05	1.3	2.63	3.97
	2	3.03	4.58	1.3	3.94	5.95

Note. The unit gross field requirement means gross diversion water requirement per hectare at a turnout commanding a rotation area. The above requirement is that for 17 hours/day pump operation.

Table I-7 CALCULATION FORMULAS FOR DIVERSION REQUIREMENT

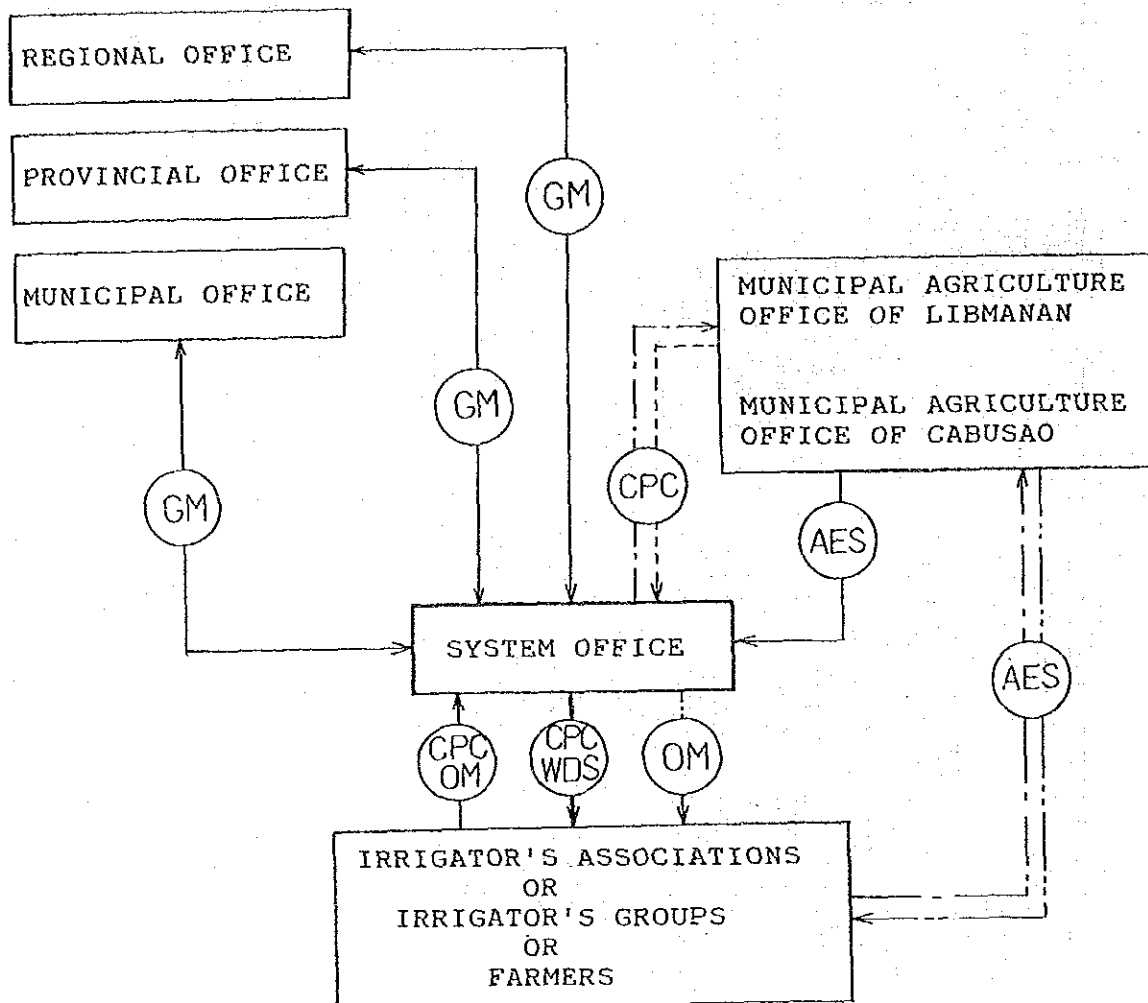
Pump Station	
(Diversion requirement at Pump station)	= (Total gross field requirement for rotation areas to be irrigated in the system)
	x 1.35
Headgate related to Main Canal	
(Diversion requirement at Headgate)	= (Total gross field requirement for rotation areas to be irrigated in the commanding area)
	x 1.35
Headgate related to Lateral Canal or Sublateral Canal	
(Diversion requirement at Headgate)	= (Total gross field requirement for rotation areas to be irrigated in the commanding area)
	x 1.15

Fig.I-1 ORGANIZATION CHART OF THE SYSTEM



Note. () indicates number of staff.

Fig. I-4 RELATION BETWEEN THE SYSTEM OFFICE AND OTHER INSTITUTIONAL ORGANIZATIONS



LEGEND

- | | |
|--------------------------------------|----------------------|
| GM : General matter | ————— : Announcement |
| CPC : Cropping pattern/calendar | ————— : Report |
| WDS : Water distribution schedule | ----- : Consultation |
| OM : Operation and maintenance | ----- : Guidance |
| AES : Agricultural extension service | ----- : Approval |

Form-I.1 RAINFALL RECORD

for the Month of _____, 19 _____

Day	Date	Rainfall (mm)
Mon.		
Tue.		
Wed.		
Thu.		
Fri.		
Sat.		
Sun.		
Sub-total		

Day	Date	Rainfall (mm)
Mon.		
Tue.		
Wed.		
Thu.		
Fri.		
Sat.		
Sun.		
Sub-total		

Day	Date	Rainfall (mm)
Mon.		
Tue.		
Wed.		
Thu.		
Sub-total		

Form-I.2.a CALCULATION FOR IRRIGATION SUSPENSION IN BLOCK

Irrigation block : _____
 Irrigation stage : LS / LP / NI _____
 Irrigation days per week : _____ day/s

	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Transferred water from last week							
Delivered water by irrigation							
Rainfall (mm)							
Corresponding days to rainfall							
Balance of water in block							
Remaining requirement in week							
Remaining requirement is less than one day delivery?	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Transferred water to next week							

(Unit:days)

INSTRUCTIONS

Irrigation block : _____
 Irrigation stage : LS / LP / NI _____
 Irrigation days per week : A day/s

	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Transferred water from last week	B						
Delivered water by irrigation	C	H					
Rainfall (mm)							
Corresponding days to rainfall	D						
Balance of water in block	E	I					
Remaining requirement in week	F						
Remaining requirement is less than one day delivery?	G						
Transferred water to next week	J						

(Unit:days)

where, C=7/A, E=B+C+D, F=7-E, H=C or 0, I=E+H, J=I-7
 if F<C then G=Y (irrigation can be suspended in the week)
 if F>C then G=N (irrigation cannot be suspended)

Form-I.2.b DIVERSION WATER REQUIREMENT IN SUSPENSION WEEK (1/2)

Week No. _____ Date: _____, 19____

 Diversion Requirement (m³/s)

Name of Headgate	Command Area (ha)	Wet Season	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.	Dry Season
Pump Station										
Main Canal										
HG-Lat.B										
Lat.B										
Main										
HG-Lat.C										
Lat.C										
Main										
HG-Lat.D										
Lat.D										
Main										
HG-Lat.E										
Lat.E										
Main										
HG-Lat.F										
Lat.F										
Main										

Form-I.2.b DIVERSION WATER REQUIREMENT IN SUSPENSION WEEK (2/2)

Week No. _____ Date: _____, 19____

 Diversion Requirement (m³/s)

Name of Headgate	Command Area (ha)	Wet Season	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.	Dry Season
Lat.C-2 Canal										
HG-Lat.C-2A										
Lat.C-2A										
Lat.C-2										
HG-Lat.C-2B										
Lat.C-2B										
Lat.C-2										

INSTRUCTIONS

- Diversion discharges at the pump station and headgates shall be calculated by formulas shown in Table.I-7 using gross field requirements at turnouts concerned.
- The gross field requirement shall be calculated multiplying cropping acreage(ha.) in commanding area of the turnout by unit gross field requirement(l/s/ha) shown in Table.I-6.

Lat.B Canal
 HG-Lat.B-Ext.
 Lat.B-Ext.
 Lat.B

Lat.C Canal
 HG-Lat.C-Ext.1
 Lat.C-Ext.1
 Lat.C
 HG-Lat.C-Ext.2
 Lat.C-Ext.2
 Lat.C
 HG-Lat.C-Ext.3
 Lat.C-Ext.3
 Lat.C
 HG-Lat.C-1
 Lat.C-1
 Lat.C
 HG-Lat.C-2
 Lat.C-2
 Lat.C

Lat.C-1 Canal
 HG-Lat.C-1-Ext.1
 Lat.C1-Ext.1 211.5
 Lat.C-1

DAILY DISCHARGE FLOW AND HYDROMETEOROLOGICAL
OBSERVATION DATA REPORT

Week No. _____ to _____, 19 _____
Date: _____

a. DISCHARGE FLOW:
Turnout or Rot. Area: Ave. Discharge: _____
Headgate : or Sec. : li/sec. : REMARKS
Code : Served has : _____
: : : : _____
: : : : _____
: : : : _____
: : : : _____
: : : : _____
: : : : _____
: : : : _____

b. HYDROMETEOROLOGICAL DATA:
Hydromet : Days Average, mm. : Proj. Eva-
Stat. Code: Evaporation : Rainfall : ration, mm.
: : : : VGS : RGS
: : : : _____
: : : : _____
: : : : _____

* VGS - Vegetative Growth Stage
* RGS - Reproductive Growth Stage

Prepared by: _____ Checked by: _____

Ditchtender _____

Watermaster _____

FARM-LEVEL IRRIGATION OPERATION REPORT

Week No. _____ Date: _____, 19 _____

a. Data:
AREA: a. Under : ROTATION AREA, HA.
b. To be : : : : _____

a. land soaking : : : : _____

a. land prep'n : : : : _____

a. normal irrig.: : : : _____

SUB-TOTAL (a) : : : : _____

b. landscaked : : : : _____

a. fallow : : : : _____

SUB-TOTAL (b) : : : : _____

GRAND TOTAL (a+b) : : : : _____

AVERAGE TURFOUT : : : : _____

DISCHARGE, li/sec : : : : _____

(c) : : : : _____

AVERAGE WATER : : : : _____

DUTY li/sec-ha. : : : : _____

(c/a) : : : : _____

b. Other relevant informations: (Please use back of this sheet).

Prepared and Submitted by: _____

Ditchtender _____

for Parshall Flume

Section/Rotation Area Served: _____
 Station: _____
 Flume Size: _____

DISCHARGE FLOW RECORDS

for Week Nos. _____ to _____, Date: _____, 19____

Date	Day	Gage Height		Observation		Submergence in		Equivalent Dis-		Days Average	REMARKS
		Reading, cm.	Reading, cm.	Hb	Hb	Percent	(Hb/Ha)100	charge in li/sec.	Discharge		
		PM	PM	AM	PM	AM	PM	AM	PM	li/sec.	
Mon											
Tue											
Wed											
Thu											
Fri											
Sat											
Sun											

WEEK NO.	WEEK ANALYSIS OF DISCHARGES								AVERAGE
Mon									
Tue									
Wed									
Thu									
Fri									
Sat									
Sun									

WEEK NO.	WEEK ANALYSIS OF DISCHARGES								AVERAGE
Mon									
Tue									
Wed									
Thu									
Fri									
Sat									
Sun									

Prepared by: _____

Checked and Submitted by: _____

Ditchtender

Watermaster

for Double-Gated
Turnout

Rotation Area Served: _____
Station: _____
Orifice Size: _____

DISCHARGE FLOW RECORDS

for Week No. _____ to _____, Date: _____, 19 _____

Date	Day	Gate Opening in cm.	Head in cm.	Equivalent Dis- charge, li/sec.	Days Ave. Discharge*
		AM: PM:	AM: PM:	AM: PM:	li/sec.
: Mon :	:	:	:	:	:
: Tue :	:	:	:	:	:
: Wed :	:	:	:	:	:
: Thu :	:	:	:	:	:
: Fri :	:	:	:	:	:
: Sat :	:	:	:	:	:
: Sun :	:	:	:	:	:

WEEK NO.	WEEK ANALYSIS OF DISCHARGES	AVERAGE
: Mon :	:	:
: Tue :	:	:
: Wed :	:	:
: Thu :	:	:
: Fri :	:	:
: Sat :	:	:
: Sun :	:	:

WEEK NO.	WEEK ANALYSIS OF DISCHARGES	AVERAGE
: Mon :	:	:
: Tue :	:	:
: Wed :	:	:
: Thu :	:	:
: Fri :	:	:
: Sat :	:	:
: Sun :	:	:

WEEK NO.	WEEK ANALYSIS OF DISCHARGES	AVERAGE
: Mon :	:	:
: Tue :	:	:
: Wed :	:	:
: Thu :	:	:
: Fri :	:	:
: Sat :	:	:
: Sun :	:	:

WEEK NO.	WEEK ANALYSIS OF DISCHARGES	AVERAGE
: Mon :	:	:
: Tue :	:	:
: Wed :	:	:
: Thu :	:	:
: Fri :	:	:
: Sat :	:	:
: Sun :	:	:

Prepared by:

Checked and Submitted by:

Ditchtender

Watermaster

Form-I.5.h

For Calibrated Staff Gage Section/Rotation Area Served _____

Station: _____
Latest Calibration Date: _____

DISCHARGE FLOW RECORDS

for Week Nos. _____ to _____ Date: _____, 19 _____

Date	Day	Observed Gage Height, cm.	Equivalent Discharge, li/sec.	Days Average Discharge	REMARKS
		AM: PM:	AM: PM:	li/sec.	
: Mon :	:	:	:	:	:
: Tue :	:	:	:	:	:
: Wed :	:	:	:	:	:
: Thu :	:	:	:	:	:
: Fri :	:	:	:	:	:
: Sat :	:	:	:	:	:
: Sun :	:	:	:	:	:
WEEK NO. :	WEEK ANALYSIS OF DISCHARGE AVERAGE :				:
: Mon :	:	:	:	:	:
: Tue :	:	:	:	:	:
: Wed :	:	:	:	:	:
: Thu :	:	:	:	:	:
: Fri :	:	:	:	:	:
: Sat :	:	:	:	:	:
: Sun :	:	:	:	:	:
WEEK NO. :	WEEK ANALYSIS OF DISCHARGE AVERAGE :				:
: Mon :	:	:	:	:	:
: Tue :	:	:	:	:	:
: Wed :	:	:	:	:	:
: Thu :	:	:	:	:	:
: Fri :	:	:	:	:	:
: Sat :	:	:	:	:	:
: Sun :	:	:	:	:	:
WEEK NO. :	WEEK ANALYSIS OF DISCHARGE AVERAGE :				:
: Mon :	:	:	:	:	:
: Tue :	:	:	:	:	:
: Wed :	:	:	:	:	:
: Thu :	:	:	:	:	:
: Fri :	:	:	:	:	:
: Sat :	:	:	:	:	:
: Sun :	:	:	:	:	:
WEEK NO. :	WEEK ANALYSIS OF DISCHARGE AVERAGE :				:

Prepared by:

Checked and Submitted by:

Ditchtender

Watermaster

Form-I.6 MAINTENANCE RECORD

Date: .19

Inspection record

Inspected by:

Item	Name	Present Condition	Countermeasure to be taken
Canal			
Structure			
Road			

Maintenance and repair record actually executed for the above

Item	Name	Date	Work
Canal			
Structure			
Road			

**PART - 2 MANUAL FOR OPERATION AND MAINTENANCE OF
ON-FARM IRRIGATION AND DRAINAGE SYSTEMS**

CHAPTER - 1 GENERAL PROVISIONS

- Article - 1 These provisions provided hereunder shall be applied for operation and maintenance of on-farm irrigation and drainage facilities in respective rotation areas of the Libmanan-Cabusao Pump Irrigation System. On-farm irrigation and drainage facilities
- Irrigation Facilities
 Main farm ditches
 Farm ditches
 Canal related structures
- Drainage Facilities
 Main farm drains
 Farm drains
 Canal related structures
- Article - 2 Water delivery to a rotation area shall be made for the rotation days determined in the water distribution schedule at system level. Water delivery to a rotation area
- Article - 3 Distribution method of irrigation water at on-farm level in a rotation area commanded by a turnout shall be decided by farmers or irrigator's associations themselves. Distribution method of on-farm level
- Article - 4 Starting the irrigation water delivery to a rotation area shall be announced to farmers or irrigator's association in the area by the O&M Section in the System Office at least one week before the scheduled date of starting the water delivery. Announcement of irrigation water delivery

CHAPTER - 2 ORGANIZATION

Article - 5 Farmers or irrigator's association in a rotation area shall be in charge of operation and maintenance for on-farm facilities such as farm ditches, farm drains and their related structures. Organization responsible for on-farm facilities

(1) In a rotation area before turned over, a leader of farmers in the rotation area shall be responsible for the operation and maintenance.

(2) In a rotation area after turned over, a leader of the irrigator's association or a leader of the irrigator's group/compact farms shall be responsible for the operation and maintenance.

Article - 6 Farmers or irrigator's association in a rotation area shall be in charge of the irrigated farming practices such as seeding, fertilizing, cultivating and disease control under the guidance of the municipal agriculture office in Libmanan or Cabusao. Organization responsible for agricultural extension services

(1) In a rotation area before establishment of irrigator's association, a leader of farmers in the rotation area shall be responsible for the agricultural extension services.

(2) In a rotation area after establishment of irrigator's association, a leader of the irrigator's association or a leader of the irrigator's group/compact farms shall be responsible for the agricultural extension services.

CHAPTER - 3 OPERATION OF ON-FARM IRRIGATION

Article - 7 Water source is the Libmanan river and the irrigation water shall be conveyed to each turnout commanding a rotation area through the pump station, main, lateral & sublateral canals in accordance with the water distribution schedule prepared by the O&M Section in the System Office. Such distribution schedule is prepared on the weekly basis.

Water distribution to a rotation area

Article - 8 Water conveyed to a turnout commanding a rotation area is delivered to each farm plot through on-farm irrigation facilities such as farm ditches and division boxes, etc.

Delivery of water to each farm plot

Article - 9 Water conveyed to outlets to respective farm plots shall be delivered in accordance basically with the principles for water depth control at plot level. As a principle, the water depth control at each plot level shall be conducted as explained below:

Water depth control at farm plot level

- During land preparation 2-7 cm
- After transplanting 3-5 cm
- Tillering stage 2-3 cm
- Maximum tillering stage 0 cm
- Panicle formation stage 5-7 cm
- Heading stage 2-3 cm
- Ripening stage 0 cm

Article - 10 Operation of on-farm facilities in a rotation area shall be performed as follows:

Operation of on-farm irrigation facilities

- (1) In a rotation area where the simultaneous distribution of irrigation water at on-farm level is adopted, such canal related facilities as division box, outlet for farm plot, etc. shall be operated only when adjustment of flow condition is required in order to make even distribution of water. After such adjustment is made and even distribution condition is attained, the facilities can be left without any operation until next adjustment required.

When water is delivered to a turnout commanding a rotation area in the scheduled rotation days, the water is automatically distributed to each farm plot through the on-farm facilities having been adjusted.

- (2) In a rotation area where the rotational distribution of irrigation water at on-farm level is adopted, such facilities as division box, outlet to farm plot, etc. shall be operated according to the distribution schedule for the rotation area which shall be prepared by farmers or irrigator's association concerned to the area.

Article - 11

During operation , if it rains in a day, or rains for two or more days, the pump operation shall be stopped according to the daily suspension schedule of irrigation, and then water delivery to turnouts will be automatically stopped. So, the on-farm irrigation facilities can be left without any specific operation regardless of the rain.

Suspension of
water delivery

CHAPTER - 4 PREPARATION AND EXECUTION OF ON-FARM WATER DELIVERY SCHEDULE

Article - 12 Cropping pattern and calendar for each rotation area shall be a part of and be consistent with the programmed cropping pattern and calendar at system level, which shall be prepared by the O&M Section in the System Office and be approved by the municipal agriculture offices in Libmanan and Cabusao.

Programmed cropping pattern and calendar for a rotation area

Article - 13 The on-farm water distribution schedule shall be prepared by farmers or irrigator's association in each rotation area based on the cropping pattern and calendar for the rotation area, taking account of the water delivery days to the turnout commanding the rotation area as well as the water distribution method at on-farm level adopted by the farmers or the irrigator's association in the area. The on-farm water distribution schedule consists of the following:

On-farm water distribution schedule

- a. Table showing the irrigation stage, water delivery day/days, irrigation area (farm plots), and discharges in/at all the on-farm canals such as a main farm ditch and farm ditches, and structures such as division boxes, outlets to respective farm plots.
- b. Flow diagram showing a schematic layout of on-farm irrigation canal system and all farm plots on which the data prepared in the above table also are presented.

Necessary numbers or sheets of the table and the flow diagram to be prepared are the same as changing times of water distribution conditions such as irrigation stage and combination of water delivery day/days and irrigation area.

Samples of the table and the flow diagram are shown in Table II.1 and Fig. II.1 respectively.

Article - 14 Execution of water distribution in a rotation area shall be performed by farmers or irrigator's association in accordance with the on-farm water distribution schedule.

Execution of on-farm water distribution schedule

- (1) A leader of farmers or irrigator's association in a rotation area shall be informed by a ditch tender of the arrival of water to a turnout commanding the rotation area.
- (2) A leader of farmers or irrigator's association in a rotation area shall operate division boxes in a main farm ditch.
- (3) Member of farmers in an on-farm irrigation block consisting of certain numbers of farm plots shall be informed by the leader of farmers or irrigator's association of the arrival of water to a division box commanding the on-farm irrigation block.
- (4) Member of farmers in an on-farm irrigation block shall operate their respective outlets to farm plot in a farm ditch.

Article - 15

A leader of farmers or irrigator's association shall inspect a main farm ditch and farm ditches in a rotation area. The leader shall be informed by members of farmers in respective on-farm irrigation blocks of the water delivery situation on their land. The leader shall take necessary measures if situation goes wrong, and shall report to a ditch tender in the O&M Section of the System Office of the water delivery situation in his rotation area.

Inspection and report of water delivery situation in a rotation area

Chapter - 5 . OPERATION OF ON-FARM DRAINAGE

- Article - 16 Drainage systems covering a rotation area are gravity ones. Excess water will be drained automatically without any artificial operation. Automatic operation
- Article - 17 On-farm drainage facilities shall be inspected and maintained, by member of farmers or irrigator's association, always in good condition so as to keep their functions. Any kind of object which obstructs the water flow in farm drains and their related structures shall be removed by the member immediately after the inspection. Inspection and maintenance of on-farm drainage facilities

Chapter - 6 REPAIR AND MAINTENANCE OF ON-FARM FACILITIES

- Article - 18. Repair and maintenance of on-farm irrigation and drainage facilities in a rotation area shall be made by farmers or irrigator's association in the area. The O&M Section in the System Office shall assist the farmers or irrigator's association in the repair and maintenance as occasion demands. Organization responsible for repair and maintenance of on-farm facilities
- Article - 19. Repair and maintenance works are classified into (a) on-the-spot repair, (b) routine maintenance and (c) special annual maintenance. Classification of repair and maintenance works
- a. On-the-spot repair shall mean immediate repair of canals and structures which result in obstruction of irrigation and drainage water flows.
 - b. Routine maintenance shall mean day-to-day maintenance of canals and structures to keep them always in workable condition. The maintenance works shall comprise cutting grasses, removal of silt and debris, filling in ruts and holes of canal bank, repair to any minor bank scour and erosion, greasing and oiling of mechanical equipment and gates, restoration of gravel metalling for service road if any.
 - c. Special annual maintenance shall mean maintenance of irrigation and drainage canals and structures which cannot be undertaken as the routine maintenance. Such special annual maintenance shall be executed when canals and structures are not needed for irrigation and drainage. As a principle, special annual maintenance shall be executed twice a year during the following periods:
 - In the month prior to land soaking for dry season paddy.
 - In the month prior to land soaking for wet season paddy.In special annual maintenance, particular attention shall be paid to scouring at downstream bed and bank of diversion and drop structures, silt deposits in canals and structures, replacement of stoplogs and gates lost or stolen, painting of timber and steel gate and etc.

Chapter - 7 IRRIGATED AGRICULTURE

- Article - 20 The cropping pattern and calendar at system level shall be prepared by the O&M Section in the System Office and be approved by the municipal agriculture offices in Libmanan and Cabusao. Cropping pattern and calendar for each rotation area shall be a part of those at system level, and be informed by the O&M Section to farmers or irrigator's association in the rotation area after the approval of the municipal agriculture office.
- Article - 21 The cropping pattern and calendar for each rotation area informed by the O&M Section shall be executed by farmers or irrigator's association in the rotation area. In execution, such cropping pattern and calendar shall be strictly followed by farmers so as to save trouble for reparation of water distribution schedule. If the proposed cropping pattern and calendar will not be followed, the O&M Section shall modify the proposed ones according to the changed planting date and acreage of paddy. It will take considerable much time to update the water distribution schedule.
- Article - 22 Agricultural extension services regarding seed, fertilizer, cultural method and disease control shall be made to farmers or irrigator's association in a rotation area directly by the municipal agriculture office in Libmanan or Cabusao. Agricultural extension services to farmers in a rotation area

Chapter - 8 MONITORING AND REPORTING

- | | | |
|--------------|---|--|
| Article - 23 | Actual cropping calendar and acreage of paddy planted to land in a rotation area shall be surveyed weekly by member of farmers or irrigator's association in the area, and the result of the survey shall be reported to the O&M Section in the System Office. Form II.1 shall be used. | Actual cropping calendar and acreage |
| Article - 24 | After the harvest, the yield and production of paddy shall be surveyed by member of farmers or irrigator's association in a rotation area, and the result of the survey shall be reported to the O&M Section in the System Office. Form II.1 shall be used. | Yield and production |
| Article - 25 | Discharge of canals shall be measured daily at division boxes by member of farmers or irrigator's association in a rotation area, and the result shall be reported to the O&M Section in the System Office once for every month by the 10th of next month. Form II.2 shall be used. | Discharge in on-farm irrigation canals |
| Article - 26 | Operation and maintenance records, including all the operation and maintenance activities, shall be compiled by member of farmers or irrigator's association in the rotation area at each end of month, and be reported to the O&M Section in the System Office by the 10th of next month. Form II.3 shall be used. | Operation and maintenance records |
| Article - 27 | All the records and reports shall be copied, and one complete set of the copies shall be always kept by a leader of farmers or irrigator's association in the rotation area with systematic filing method. | Keeping records and reports |

Chapter - 9 OTHER PROVISIONS

Article - 28	Violation or disobedience to the predetermined cropping schedule shall be strictly forbidden.	Violation of cropping schedule
Article - 29	Violation of the pre-determined water distribution schedule or stealing water shall be strictly forbidden.	Violation of water distribution schedule
Article - 30	Private installation of division box or outlet to farm plot shall be strictly forbidden. When a necessity will arise to install some diversion apparatus in on-farm canals, prior approval shall be obtained from a leader of farmers or irrigator's association in the rotation area.	Private installation of diversion apparatus
Article - 31	Re-modeling of on-farm canals and structures shall be strictly forbidden, unless prior approval is given by a leader of farmers or irrigator's association.	Re-modeling of canals and structures
Article - 32	Water buffalo or other animals shall not be allowed to enter into canals.	Obstruction of water buffalo
Article - 33	Private vehicles and public transportation shall be forbidden to use on-farm service roads, unless prior approval is obtained from a leader of farmers or irrigator's association.	Limited use of on-farm service roads
Article - 34	Private use of the berm and outer side slopes of canals for cultivation shall be strictly forbidden.	No use of canal banks for cultivation
Article - 35	Unattendance to cooperative works for operation and maintenance of on-farm canals and structures without any particular reasons shall be forbidden.	Unattendance to cooperative works
Article - 36	Unattendance to meetings/activities for operation of a rotation area without any particular reasons shall be forbidden.	Unattendance to meetings/activities
Article - 37	Sanctions for each of the above cases shall be ruled at the general meeting among all farmers in the rotation area.	Sanctions

Table II-1 SAMPLE OF ON-FARM WATER DISTRIBUTION SCHEDULE

(1) Rotation area where simultaneous distribution is adopted

Week	Dry	Land Soaking	Land Preparation	Normal Irrigation
5th	Mon. Sun.	Block-1 Block-2 Block-3		
6th 8th	Wed. Thu. Fri.		Block-1 Block-2 Block-3	
9th 21st	Wed. Thu. Fri.			Block-1 Block-2 Block-3

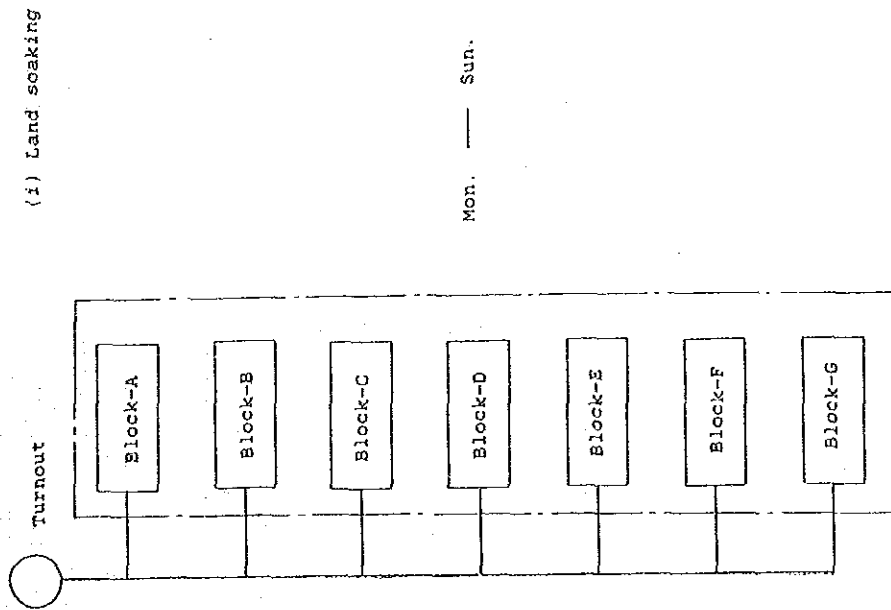
(2) Rotation area where rotational distribution is adopted

Week	Dry	Land Soaking	Land Preparation	Normal Irrigation
5th	Mon.	Block-LS01		
	Tue.	Block-LS02		
	Wed.	Block-LS03		
	Thu.	Block-LS04		
	Fri.	Block-LS05		
	Sat.	Block-LS06		
	Sun.	Block-LS07		
6th 8th	Wed.		Block-1	
	Thu.		Block-2	
	Fri.		Block-3	
9th 21st	Wed.			Block-1
	Thu.			Block-2
	Fri.			Block-3

Note: - The above sample rotation area shall be one of rotation areas in the irrigation block LP5-1 or NI5-1.
 - In the above rotation area, the land soaking shall be started in 5th week of the distribution schedule at system level.
 - In case the rotational distribution at on-farm level is adopted, the on-farm irrigation blocks shall be divided so that total diverted water per hectare will be the same in all the on-farm irrigation blocks.

Fig. II-1 SAMPLE OF ON-FARM FLOW DIAGRAM (1/4)

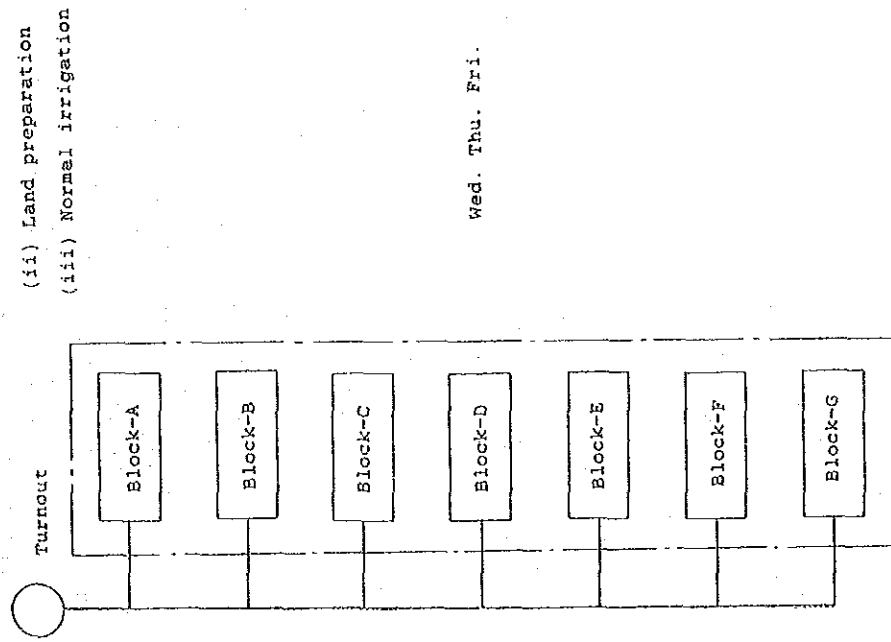
(1) Rotation area where simultaneous distribution is adopted.



Note. The above sample rotation area be one of rotation areas in the irrigation block LP5-1 or N15-1.

Fig. II-1 SAMPLE OF ON-FARM FLOW DIAGRAM (2/4)

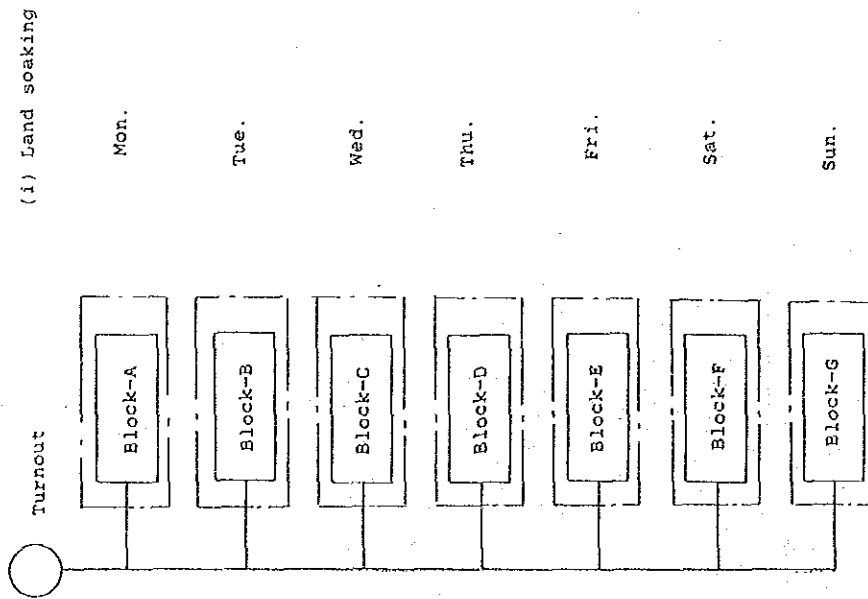
Rotation area where simultaneous distribution is adopted.



Note. The above sample rotation area be one of rotation areas in the irrigation block LP5-1 or N15-1.

FIG. II-1 SAMPLE OF ON-FARM FLOW DIAGRAM (3/4)

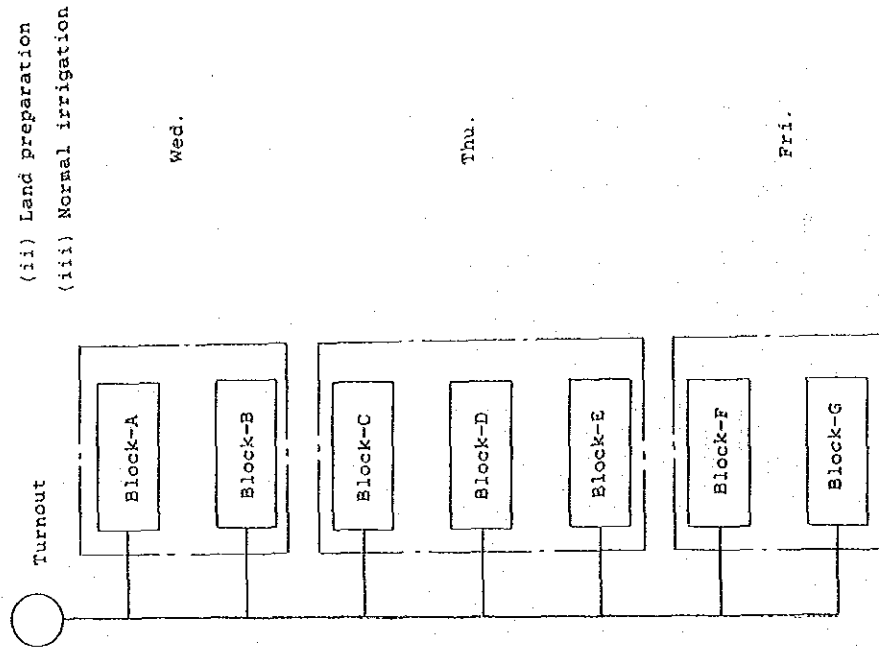
(2) Rotation area where rotational distribution is adopted.



Note. The above sample rotation area be one of rotation areas in the irrigation block LP5-1 or N15-1.

Fig. II-1 SAMPLE OF ON-FARM FLOW DIAGRAM (4/4)

Rotation area where rotational distribution is adopted.



Note. The above sample rotation area be one of rotation areas in the irrigation block LP5-1 or N15-1.

For Calibrated Staff Gage Section/Rotation Area Served _____

Station: _____
 Latest Calibration Date: _____

DISCHARGE FLOW RECORDS

for Week Nos. _____ to _____ Date: _____, 19 _____

Date	Day	Observed Gage Height, cm.	Equivalent Discharge, li/sec.	Days Average Discharge, li/sec.	REMARKS
		AM: PM:	AM: PM:		
	Mon				
	Tue				
	Wed				
	Thu				
	Fri				
	Sat				
	Sun				
WEEK NO. _____		WEEK ANALYSIS OF DISCHARGE AVERAGE			
	Mon				
	Tue				
	Wed				
	Thu				
	Fri				
	Sat				
	Sun				
WEEK NO. _____		WEEK ANALYSIS OF DISCHARGE AVERAGE			
	Mon				
	Tue				
	Wed				
	Thu				
	Fri				
	Sat				
	Sun				
WEEK NO. _____		WEEK ANALYSIS OF DISCHARGE AVERAGE			
	Mon				
	Tue				
	Wed				
	Thu				
	Fri				
	Sat				
	Sun				
WEEK NO. _____		WEEK ANALYSIS OF DISCHARGE AVERAGE			

Prepared by: _____

Checked and Submitted by: _____

Form-II.3 OPERATION AND MAINTENANCE RECORDS

ROTATION AREA : _____ Date: _____, 19
 MONTH : _____ Prepared by: _____

OPERATION RECORD Inspected by: _____

Item	Present Condition	Countermeasure to be taken
Water delivery condition		
Stoplog operation at division point		
Any other troubles on operation		

MAINTENANCE RECORD

Inspection record Inspected by: _____

Item	Name	Present Condition	Countermeasure to be taken
Canal			
Structure			
Road			

Maintenance and repair record actually executed for the above

Item	Name	Date	Work
Canal			
Structure			
Road			

APPENDIXES

APPENDIX-1 GUIDELINE OF TECHNICAL PRACTICES NEEDED FOR PROPER DISTRIBUTION OF IRRIGATION WATER

1. Discharge or rate of flow measurement
2. Preparation of daily suspension schedule of water delivery

APPENDIX-2 ARTICLES TO BE MODIFIED IN CASE OF MAXIMUM SERVICE AREA BEING ADOPTED

APPENDIX-3 RECORD FORMS

1. Pump operation record
2. Check list for pump operation
3. Inspection on emergency works for pump operation

APPENDIX-1 GUIDELINE ON TECHNICAL PRACTICES NEEDED FOR PROPER
DISTRIBUTION OF IRRIGATION WATER

1. Discharge or Rate of Flow Measurement

Discharge or rate of flow refers to the volume of irrigation water passing through a reference point, usually a measuring device, per unit of time. It is expressed in liters per second (lit/sec) or cubic meters per second (CMS).

The measuring devices which are commonly used to measure discharges or rates of flow include Parshall Flumes, double-gated turnout (sometimes called constant head orifice turnout) and calibrated staff gage (sometimes called current meter gaging stations).

Parshall Flume, shown in Figure A-1, is a specially shaped structure that relates a head (H_a) upstreams to discharge (Q) during its freeflow condition. For submerged flow, the downstream head (H_b) has to be observed to determine the degree of submergence (DS), $H_b/H_a \times 100$, which is used to establish the actual flow as per cent of the free flow using the submergence chart, shown in Figure A-2.

Flumes are designated according to the width of throat (W). A flume of certain width has a particular table, as shown in Table A-1 for a one foot Parshall Flume, and limit of degree of submergence (DS) in which submerged flow occurs. The discharge table for a particular size of flume is established using the following relationship:

- a. For throat width of 1 to 8 feet:

$$Q = 28.32 \times W \left(\frac{H_a}{30.48} \right)^{1.522} W^{0.026}$$

- b. For throat width of 10 to 50 feet:

$$Q = 28.32 (3.687W + 2.5) \left(\frac{H_a}{30.48} \right)^{1.6}$$

where, Q : discharge, lit/sec
 W : throat width (ft)
 H_a : upstream head (cm)

The limits of the degree of submergence (DS) for submerged flow to occur are:

70% - for 1 to 8 foot Parshall Flumes
80% - for 10 to 50 foot Parshall Flumes

Example of discharge or rate of flow measurement using a Parshall Flume:

- a. Free flow condition:

$H_a = 20.75$ cm
 $H_b = 13.00$ cm

Degree of submergence (DS) will be equal to:

$$\begin{aligned} D_s &= H_b/H_a \times 100 \\ &= 13.00/20.75 \times 100 \\ &= 63\%, \text{ therefore, the flow is in a free flow condition} \end{aligned}$$

From Table A-1, Q will be equal to:

$$Q = 63.10 \text{ lit/sec}$$

b. Submerge flow condition:

$$\begin{aligned} H_a &= 20.75 \text{ cm} \\ H_b &= 17.85 \text{ cm} \end{aligned}$$

Degree of submergence (DS) will be equal to:

$$\begin{aligned} D_S &= H_b/H_a \times 100 \\ &= 17.85/20.75 \times 100 \\ &= 86\%, \text{ therefore, the flow is in a submerged condition} \end{aligned}$$

From Figure A-2, Submergence Chart, using 86%, actual flow is 80% of free flow discharge as defined by H_a and is equal to:

$$\begin{aligned} Q &= 63.10 \text{ lit/sec} \times 80/100 \\ &= 50.48 \text{ lit/sec} \end{aligned}$$

For the proper functioning of the Parshall Flumes:

1. Floating debris near the flume should be avoided,
2. Stone and silt deposits on the flooring of the flume should be removed regularly, and
3. Checking of flow downstream of the flume should be minimized.

Double-gated turnout (sometimes called constant-head orifice turnout), shown in Figure A-3, is a combination regulating and measuring device using an adjustable submerged orifice for discharge measurement. Discharges are varied by controlling the opening of the orifice gate and the differential head (h) created by the turnout gates. The discharge is established using the relationship:

$$Q = \frac{CA\sqrt{2g\Delta h}}{1000}$$

where, Q : discharge (lit/sec)
 Δh : differential head (m)
A : orifice gate opening (m^2)
g : acceleration due to gravity (9.8 m/sec^2)
C : discharge coefficient

The discharge coefficient (C) is approximately 0.67 for normal operation where the upstream head is 2.5 or more times the maximum opening of the orifice gates.

Example of discharge or rate of flow measurement using the calibrated staff gage:

a. First example:

Orifice opening : 10.0 cm
Differential head : 7.0 cm

From Table A-2 the discharge (Q) is equal to:

$$Q = 47.0 \text{ lit/sec}$$

b. Second example:

Orifice opening : 15.0 cm
Differential head : 9.0 cm

From Table A-2 the discharge (Q) is equal to:

$$Q = 80.1 \text{ lit/sec}$$

For the proper functioning of double-gated turnouts:

1. Debris and sediment accumulation in the structure should be minimized,
2. Orifice gate should be free from debris and weeds,
3. Farmditch just downstream the structure should always be kept clean for smooth flow, and
4. Turnout and orifice gates should be oiled regularly.

Calibrated staff gages, shown in Figure A-4, is a wooden or enameled steel staff gages that gives depth of flow from a certain datum. The depth of flow is related to discharges using a discharge-gage height curve, shown in Figure A-5, which is developed from a number of discharge measurement at the different gage height using a current meter, shown in Figure A-6. Using the curve, a table as shown in Table A-3 is derived. For every calibrated staff gage a particular calibration should be made preferably in at least three (3) to five (5) gage heights. Since most canal sections are not stable, frequent calibration should be done to update the curve and the table.

Example of discharge or rate of flow measurement using the calibrated staff gage:

a. First example:

Gage height (h) = 62.5 cm

From Figure A-5 or Table A-3, the discharge (Q) is equal to:

$$Q = 58.0 \text{ lit/sec}$$

b. Second example:

Gage height (h) = 45.0 cm

From Figure A-5 or Table A-3, the discharge (Q) is equal to:

Q = 25.0 lit/sec

For the proper functioning of the calibrated staff gages:

1. It should not be disturbed and always be perpendicular to the plane of the canal bottom,
2. Its rating curve should be periodically checked by taking current meter measurements, and
3. Debris and weed accumulation in the gage should be minimized.

Table A-1 DISCHARGE TABLE FOR A ONE-FOOT PARSHALL FLUME

Upper Head (cm)	(Unit: lit/sec)			
	Throat Width (m)	0.25	0.50	0.75
1.0	0.6	0.9	1.2	1.5
2.0	1.8	2.2	2.5	3.0
3.0	3.3	3.7	4.2	4.7
4.0	5.1	5.6	6.1	6.7
5.0	7.2	7.8	8.3	9.0
6.0	9.5	10.2	10.8	11.5
7.0	12.1	12.7	13.4	14.2
8.0	14.8	15.4	16.1	17.0
9.0	17.8	18.5	19.2	20.1
10.0	20.8	21.5	22.3	23.2
11.0	24.0	24.8	25.7	26.6
12.0	27.5	28.3	29.2	30.1
13.0	31.0	31.9	32.8	33.8
14.0	34.6	35.6	36.5	37.5
15.0	38.5	39.4	40.4	41.5
16.0	42.5	43.5	44.5	45.6
17.0	46.6	47.6	48.7	49.8
18.0	50.9	51.9	53.0	54.2
19.0	55.1	56.2	57.3	58.3
20.0	59.6	60.7	61.9	63.1
21.0	64.3	65.4	66.5	67.8
22.0	69.0	70.2	71.3	72.7
23.0	73.9	75.1	76.3	77.6
24.0	78.7	79.9	81.1	82.5
25.0	83.8	85.0	86.3	87.7
26.0	88.9	90.2	91.5	92.9
27.0	94.2	95.5	96.8	98.3
28.0	99.6	100.9	102.3	103.8
29.0	104.9	106.3	107.6	109.2
30.0	110.5	111.9	113.3	114.8

Table A-2 DISCHARGE FOR A DOUBLE-GATED TURNOUT OF ORIFICE WIDTH OF 60.0 CENTIMETERS

Orifice Opening (cm)	(Unit: lit/sec)										
	5	6	7	8	9	10	11	12	13	14	15
2.0	7	8	9	10	11	12	13	14	15	16	17
3.0	12	13	14	15	16	17	18	19	21	22	23
4.0	16	17	18	19	21	22	20	22	23	25	27
5.0	20	22	23	25	27	28	24	26	28	30	32
6.0	24	26	28	30	32	33	28	30	33	35	37
7.0	28	30	33	35	37	39	32	35	38	40	43
8.0	32	35	38	40	43	45	36	39	42	45	48
9.0	36	39	42	45	48	50	40	43	47	50	53
10.0	40	43	47	50	53	56	44	48	52	55	58
11.0	44	48	52	55	58	62	48	52	56	60	64
12.0	48	52	56	60	64	67	52	56	61	65	69
13.0	52	56	61	65	69	73	56	61	66	70	74
14.0	56	61	66	70	74	78	60	65	71	75	80
15.0	60	65	71	75	80	84	64	70	75	80	86
16.0	64	70	75	80	86	90	68	74	80	85	91
17.0	68	74	80	85	91	95	70	78	84	90	96
18.0	70	78	84	90	96	101	75	82	90	95	101
19.0	75	82	90	95	101	107	80	87	94	101	107
20.0	80	87	94	101	107	112					

Table A-3 DISCHARGE TABLE FOR A CALIBRATED STAFF GAGE (Headgate of Sub-Lateral B-2, Sta. 1 + 200)

Gage Height (cm)	(Unit: lit/sec)				
	0	0.25	0.50	0.75	
10.0	1.0	1.1	1.2	1.3	
11.0	1.5	1.6	1.8	1.9	
12.0	2.1	2.3	2.5	2.7	
13.0	2.9	3.2	3.4	3.7	
14.0	4.0	4.3	4.6	5.0	
15.0	5.3	5.7	6.1	6.6	
16.0	7.0	8.5	8.0	8.5	
17.0	9.0	9.6	10.2	10.8	
18.0	11.5	12.2	12.9	13.6	
19.0	14.4	15.2	16.0	16.9	
20.0	17.8	18.8	19.8	20.8	
21.0	21.9	23.0	24.2	25.4	
22.0	26.6	27.9	29.2	30.6	
23.0	32.0	33.5	35.1	36.6	
25.0	45.4	47.4	49.4	51.4	
26.0	53.6	55.7	58.0	60.3	
27.0	62.7	65.2	67.7	70.4	
28.0	73.1	75.8	78.7	81.6	
29.0	84.6	87.7	90.9	94.2	
30.0	97.5	101.0	104.2	108.2	
31.0	111.9	115.7	119.7	123.7	
32.0	127.8	132.1	136.4	140.9	
33.0	145.4	150.1	154.9	159.8	
34.0	164.8	169.9	175.2	180.6	
35.0	186.1	191.7	197.5	203.4	
36.0	209.4	215.5	221.8	228.3	
37.0	234.9	241.6	248.4	255.5	
33.0	262.6	269.9	277.4	285.0	

Figure A - 2 SUBMERGENCE CHART FOR PARSHALL FLUMES

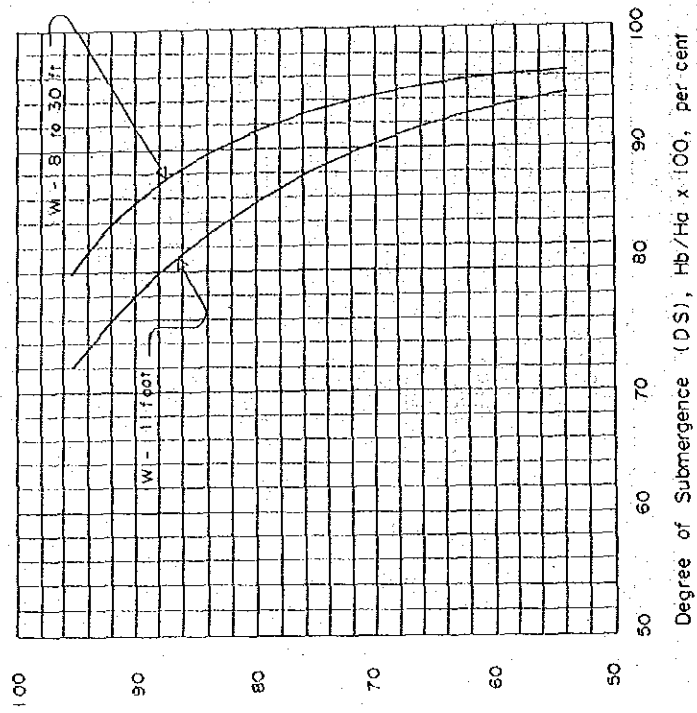


Figure A - 1 PARSHAL FLUME

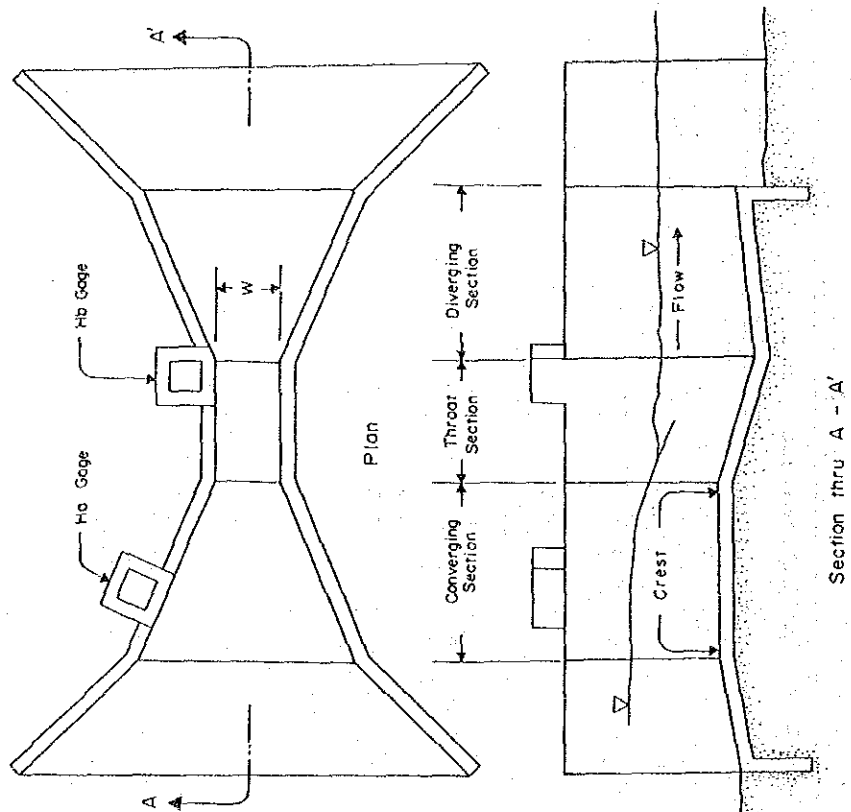


Figure A - 4 CALIBRATED STAFF GAGE.

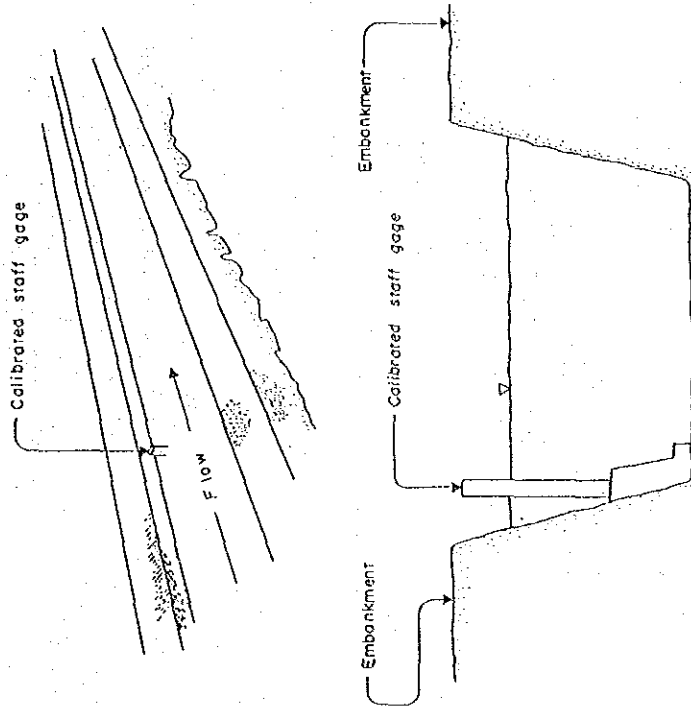


Figure A - 3 DOUBLE-GATED TURNOUT OR CONSTANT HEAD ORIFICE TURNOUT

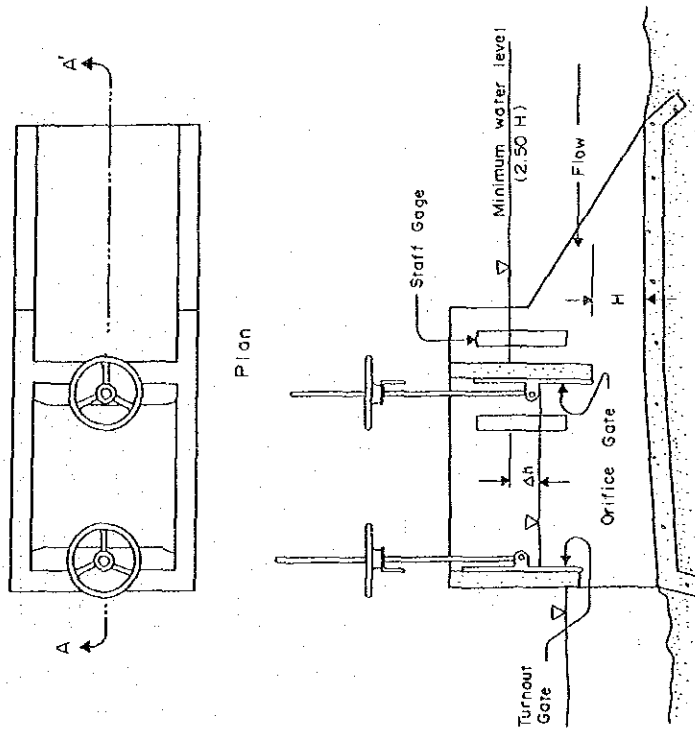
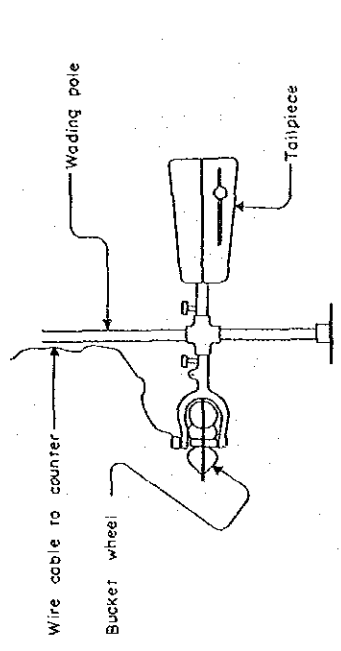
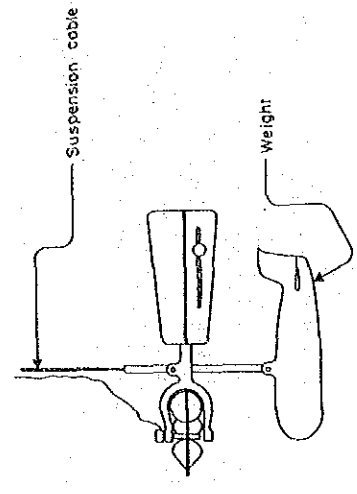


Figure A-6 CURRENT METERS USED FOR DISCHARGE OR RATE OF FLOW MEASUREMENT

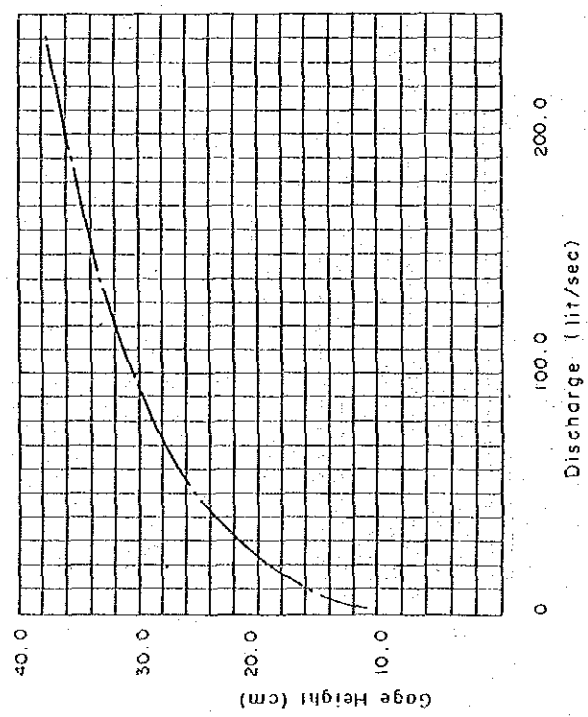


a. Current meter wading type



b. Current meter suspended type

Figure A-5 DISCHARGE - GAGE HEIGHT CURVE



2. Preparation of Daily Suspension Schedule of Water Delivery

(1) Criteria on Irrigation Suspension

Proposed criteria on irrigation suspension are as follows:

Rainfall Range in Previous Day	Period of Irrigation Suspension
- 7 mm	0 day
8 - 15 mm	1 day
16 - 23 mm	2 days
24 - 30 mm	3 days
31 - 38 mm	4 days
39 - 46 mm	5 days
47 - mm	6 days

The above criteria can be directly applied only to irrigation blocks where daily water delivery of 7 days/week is executed such as those under land soaking being performed or some blocks under land preparation for example Block-LS1 or Block-LP1. For irrigation blocks where rotational water deliver is conducted such as those under land preparation being performed for example Block-LP3-1 and all the blocks under normal irrigation being executed, the above criteria shall be used in process of calculation for decision of suspension period in each block as mentioned hereinafter.

(2) Preparation of Suspension Schedule

(a) Rainfall observation

Daily rainfall shall be observed by a water master at the rainfall station in the System Office site. The observation time shall be at 8:00 every morning. The magnitude of rainfall shall be recorded in Form-I.1.

(b) Determination of suspension period

Period of irrigation suspension shall be determined for each irrigation block taking into account water delivery to the irrigation block executed before rainfall. For example, in case it rained 20 mm on Monday in 5th week, suspension period of Block-LP3-1 is determined as follows:

- Delivered water amount on Monday is for half of one week requirement. It means that irrigation for 3.5 days requirement was finished on Monday.
- On the other hand, rainfall of 20 mm corresponds to 2 days irrigation requirement according to the above table.
- Total water amount that Block-LP3-1 received is for 5.5 days irrigation requirement. So, the remaining water requirement for the week is calculated to be for 1.5 days.

- The irrigation requirement for 1.5 days is less than water amount to be delivered by one day rotational distribution to Block-LP3-1, namely water amount for 3.5 days irrigation requirement.
- Finally, it is decided that water delivery to Block-LP3-1 on Tuesday shall be suspended.
- The shortage of water corresponding to 1.5 days irrigation requirement shall be transferred to next preparation time of suspension schedule after next rainfall.

Form-I.4.a shall be used for calculation in the above process. Using this form, suspension periods of all the irrigation blocks shall be determined.

(c) Calculation of diversion requirement

Diversion requirements at the pump station and all the headgates concerned shall be calculated for the week. the calculation formula shown in Table I-7 shall be applied to determine those diversion requirements. The calculation results shall be recorded in Form-I.4.b.

The above calculation results shown in Form I.4.a and Form I.4.b shall be used as the daily suspension schedule.

APPENDIX-2 ARTICLES TO BE MODIFIED IN CASE OF
MAXIMUM SERVICE AREA BEING ADOPTED

**PART - 1 MANUAL FOR OPERATION AND MAINTENANCE OF
IRRIGATION AND DRAINAGE SYSTEMS**

CHAPTER - 1 GENERAL PROVISIONS

Article - 1 These provisions provided hereunder shall be applied for operation and maintenance of irrigation and drainage facilities in the Libmanan-Cabusao Pump Irrigation System. Irrigation and drainage facilities for operation and maintenance

Irrigation Facilities Number

Pumps	4 nos.
Main canal	1 no.
Lateral canals (Lat.A, Lat.B, Lat.C, Lat.D, Lat.E, Lat.F)	6 nos.
Sublateral canals (Lat.B-Ext., Lat.C-Ext.1, Lat.C-Ext.2, Lat.C-Ext.3, Lat.C-1, Lat.C-2, Lat.C-1-Ext.1, Lat.C-2A, Lat.C-2B, Lat.C-2-Ext.)	10 nos.
Canal related structures	340 nos.

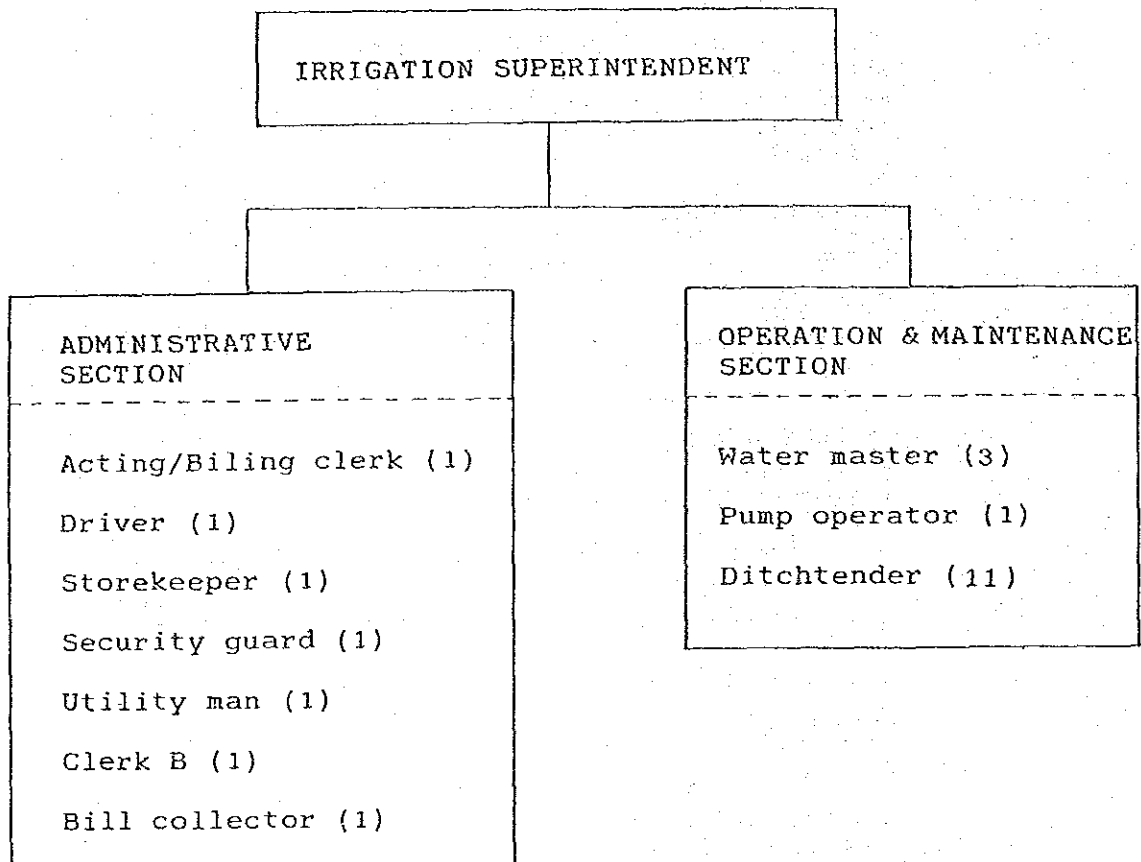
Drainage Facilities Number

Main drains (D-A, D-B, D-C, D-D, D-E, D-F, D-G, D-H, D-I, D-J, D-K)	11 nos.
Lateral drains (D-D-1, D-J-1, D-J-2)	3 nos.
Canal related structures	190 nos.

CHAPTER - 2 ORGANIZATION

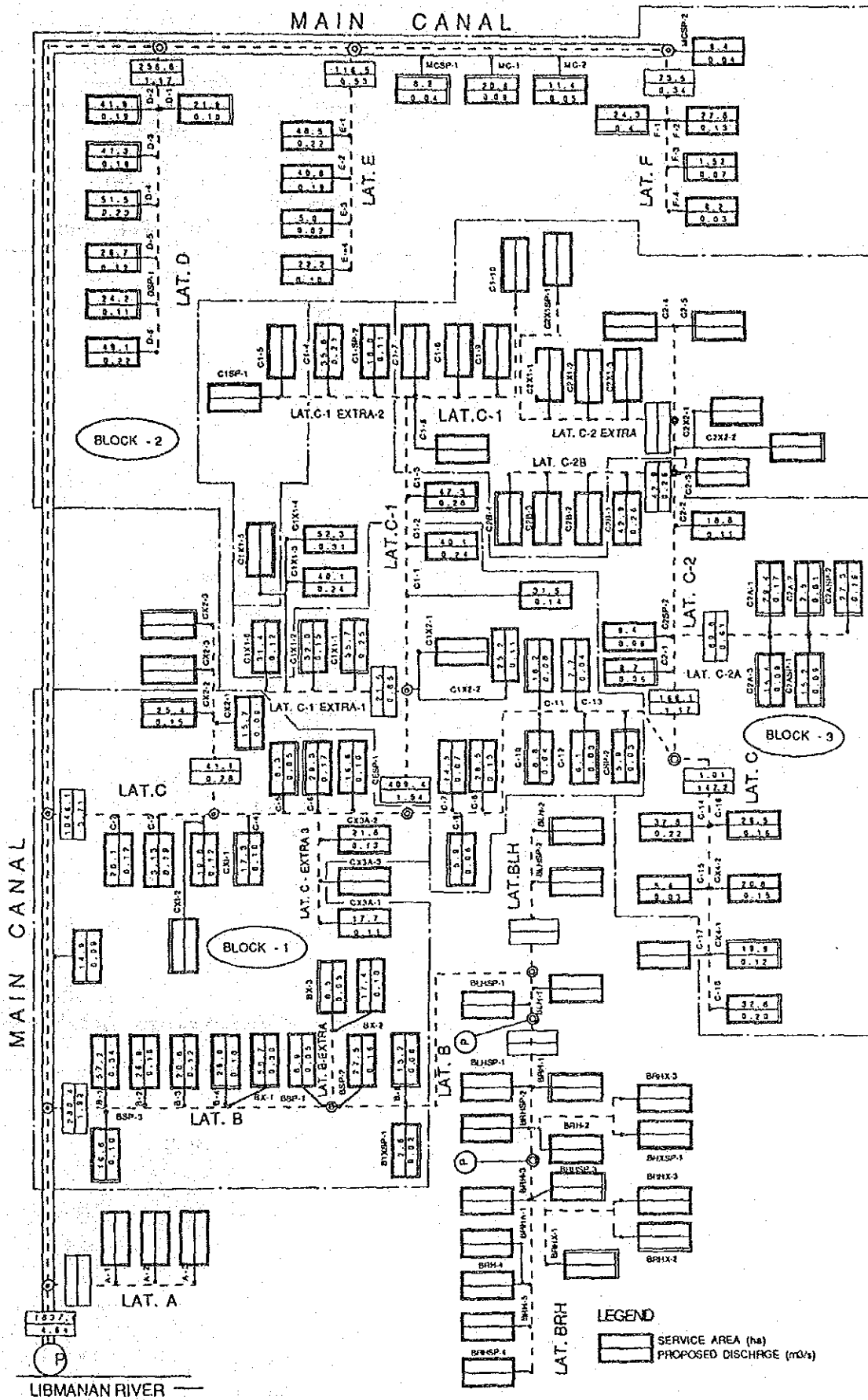
Article - 6 The Libmanan-Cabusao Pump Irrigation System Office shall be responsible for operation of the system. The organization chart of the system is shown in Fig. I-1. Organization responsible for system

Fig.I-1 ORGANIZATION CHART OF THE SYSTEM



Note. () indicates number of staff.

PROGRAMMED FLOW DIAGRAM
(MAX SERVICE AREA)



APPENDIX-3 RECORD FORMS

1. Pump operation record

Name of System :		Pump No.	Year :	Month :	Name of Operator :						
Date	Operation		Electrical			Mechanical		System		Remarks	
	Start	Stop	Operation Hours	Total Operation Hours	Voltage (V)	Current (A)	Electric Consump (KWH)	Lubricant Consump (Lit)	Grease Consump (Kg)		Intake W.L. (m)
1	:	:	:	:	:	:	:	:	:	:	:
2	:	:	:	:	:	:	:	:	:	:	:
3	:	:	:	:	:	:	:	:	:	:	:
4	:	:	:	:	:	:	:	:	:	:	:
5	:	:	:	:	:	:	:	:	:	:	:
6	:	:	:	:	:	:	:	:	:	:	:
7	:	:	:	:	:	:	:	:	:	:	:
8	:	:	:	:	:	:	:	:	:	:	:
9	:	:	:	:	:	:	:	:	:	:	:
10	:	:	:	:	:	:	:	:	:	:	:
11	:	:	:	:	:	:	:	:	:	:	:
12	:	:	:	:	:	:	:	:	:	:	:
13	:	:	:	:	:	:	:	:	:	:	:
14	:	:	:	:	:	:	:	:	:	:	:
15	:	:	:	:	:	:	:	:	:	:	:
16	:	:	:	:	:	:	:	:	:	:	:
17	:	:	:	:	:	:	:	:	:	:	:
18	:	:	:	:	:	:	:	:	:	:	:
19	:	:	:	:	:	:	:	:	:	:	:
20	:	:	:	:	:	:	:	:	:	:	:
21	:	:	:	:	:	:	:	:	:	:	:
22	:	:	:	:	:	:	:	:	:	:	:
23	:	:	:	:	:	:	:	:	:	:	:
24	:	:	:	:	:	:	:	:	:	:	:
25	:	:	:	:	:	:	:	:	:	:	:
26	:	:	:	:	:	:	:	:	:	:	:
27	:	:	:	:	:	:	:	:	:	:	:
28	:	:	:	:	:	:	:	:	:	:	:
29	:	:	:	:	:	:	:	:	:	:	:
30	:	:	:	:	:	:	:	:	:	:	:
31	:	:	:	:	:	:	:	:	:	:	:
Total :		:	:	:	:	:	:	:	:	:	:

2. Check list for pump operation

Name of System :		Name of Operator :		Date :		
Area	Check list	Evaluation		Remarks		
		Functioning or normal (o)	No function or abnormal (x)			
Before starting	System	- Irrigation schedule.	:	:	:	
		- Weather.	:	:	:	
		- Water Level at intake.	:	:	:	
		- Keep the susp free.	:	:	:	
		- from the dirt and any contaminants	:	:	:	
		- Clean intake and trash rack	:	:	:	
			- of any foreign matters.	:	:	:
			- Safety.	:	:	:
		Electrical	- Voltage at the incoming panel.	:	:	:
		Mechanical	- Visible inspection.	:	:	:
		- Fullfill grease and lubricant oil.	:	:	:	
		- Rotate the pump-shaft.	:	:	:	
During running	System	- Water level at intake and discharge side.	:	:	:	
		- Draw down at intake susp.	:	:	:	
		- Safety.	:	:	:	
		Electrical	- Function of all guage and meter.	:	:	:
			- Voltage and current at pump panel.	:	:	:
			- Temperature of motor.	:	:	:
		Mechanical	- Visible inspection.	:	:	:
			- Vibration and noise.	:	:	:
			- Grease and lubricant oil.	:	:	:
			- Leakage of the gland.	:	:	:
After stopping	System	- Recording.	:	:	:	
	Mechanical	- Clean the all facilities.	:	:	:	
		- Recording.	:	:	:	
	Electrical	- Switch-off of all panel.	:	:	:	
		- Recording	:	:	:	

3. Instruction on emergency works for pump operation

	Area	Work Item	Responsibility		Remarks
			System office	Operator	
Minor and Major troubles	System	- Stop the all facilities.	:	: x	:
	Electrical	- Inform system office	:	: x	:
	Mechanical	- Check the causes.	: x	: x	:
Heavy Rain Typhoon and Earthquake	System	- Irrigation schedule.	: x	:	:
		- Water Level at Intake.	:	: x	:
		- Preventive work for pump house to wind, rain and water.	:	: x	:
		- Check the damage of pumping facilities.	: x	: x	:
		- Reporting of damage & condition.	:	: x	:
		- Safety.	: x	: x	:
	Electrical	- Stop the main switch.	:	: x	:
		- Check the Transmission Line & outside electric facilities.	: x	: x	:
		- Reporting of damage & condition.	:	: x	:
	Mechanical	- Protect the pumping equipment from the wind & rain and water.	: x	: x	:
		- Reporting of damage & condition.	:	: x	:
	After Heavy Rain Typhoon and Earthquake	System	- Check damage of all facilities especially intake.	: x	: x
- Make sure to check the daily check list carefully.			: x	: x	:
Electrical		- Check damage of all equipment.	: x	: x	:
		- Dry the rotor and equipment for insulation.	:	: x	:
		- Check the wiring connection.	:	: x	:
		- Make sure to check the daily check list carefully.	: x	: x	:
Mechanical		- Check damage of all equipment.	: x	: x	:
		- Refill oil and grease.	:	: x	:
		- Check loosen bolts and nuts.	:	: x	:
		- Make sure to check the daily check list carefully.	: x	: x	:

JICA