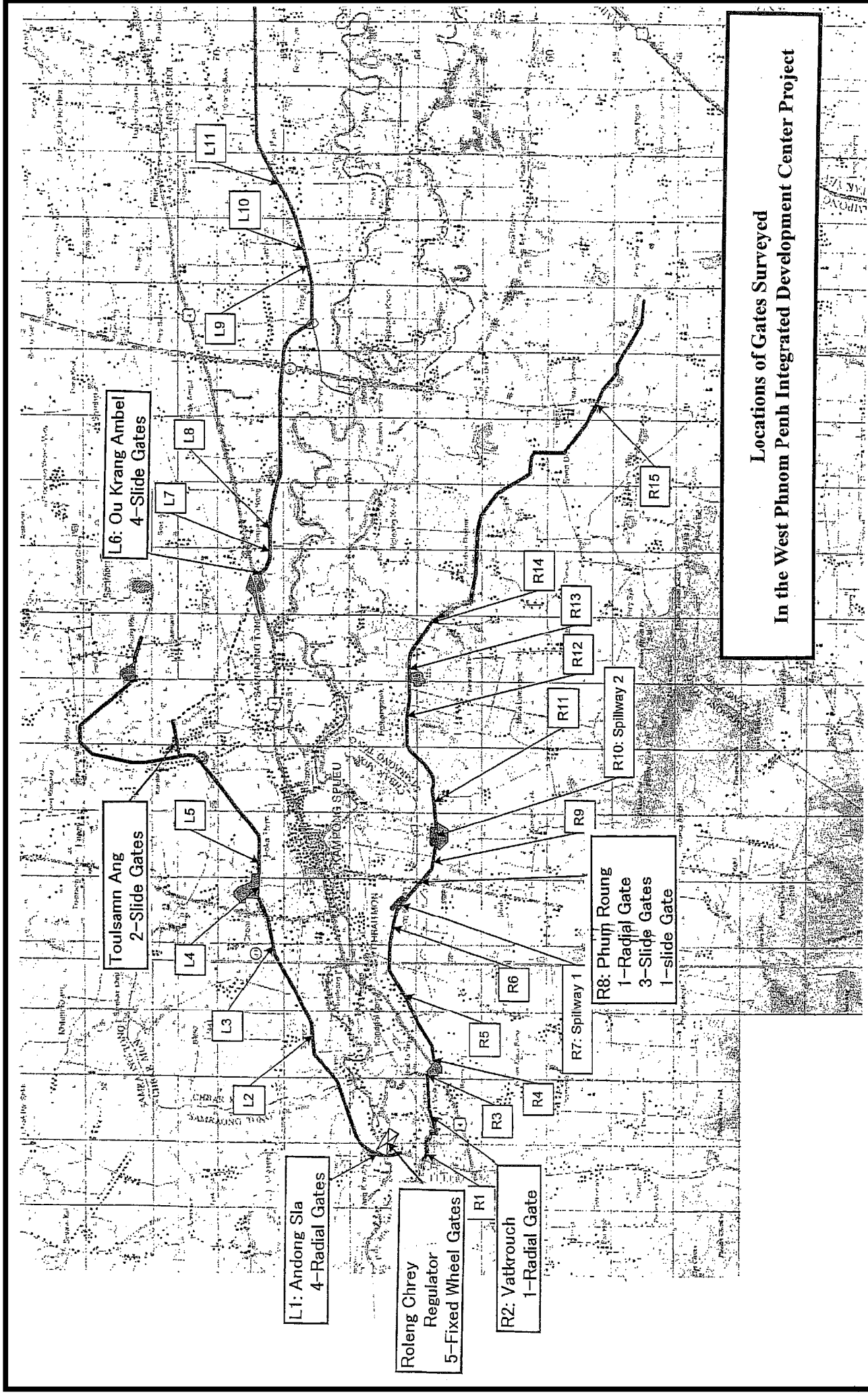


Appendix-E

*GATES OF ROLEANG CHREY REGULATOR AND
OTHER STRUCTURES*



**Locations of Gates Surveyed
In the West Phnom Penh Integrated Development Center Project**

APPROVED
MAR 1978

**THE STUDY
ON
COMPREHENSIVE AGRICULTURAL DEVELOPMENT
OF
PREK THNOT RIVER BASIN
IN
THE KINGDOM OF CAMBODIA**

**FINAL REPORT
Volume-VI: Appendixes for Master Plan
Appendix-E
Gates of Roleang Chrey Regulator and Other Structures**

Table of Contents

Location of Gates Surveyed in the West Phnom Penh Irrigated Development Center Project

	<u>Page</u>
Chapter E-1 Introduction.....	VI-E-1
Chapter E-2 Present Conditions and Findings.....	VI-E-1
E-2.1 Roleang Chrey Regulator.....	VI-E-1
E-2.2.1 General Information of Gates	VI-E-1
E-2.2.2 Present Condition and Findings.....	VI-E-2
E-2.2 Andong Sla Intake Gates (L1).....	VI-E-3
E-2.2.1 General Information of Gates	VI-E-3
E-2.2.2 Present Condition and Findings.....	VI-E-3
E-2.3 Tousamn Ang Check Gates	VI-E-4
E-2.3.1 General Information of Gates	VI-E-4
E-2.3.2 Present Condition and Findings.....	VI-E-5
E-2.4 Ou Krang Ambel Intake Gates	VI-E-5
E-2.4.1 General Information of Gates	VI-E-5
E-2.4.2 Present Condition and Findings.....	VI-E-5
E-2.5 Vatkrouch Check Gate.....	VI-E-6
E-2.5.1 General Information of Gate.....	VI-E-6
E-2.5.2 Present Condition and Findings.....	VI-E-6
E-2.6 Phum Rong Intake and Check Gates.....	VI-E-7
E-2.6.1 General Information of Gates	VI-E-7
E-2.6.2 Present Condition and Findings.....	VI-E-7
Chapter E-3 Improvement Plans	VI-E-9
E-3.1 General	VI-E-9
E-3.2 Roleang Chrey Regulator.....	VI-E-9
E-3.3 Andong Sla Intake Gates (L1).....	VI-E-10
E-3.4 Tousamn Ang Check Gates	VI-E-11
E-3.5 Ou Krang Ambel Intake Gates	VI-E-11
E-3.6 Vatkrouch Check Gate.....	VI-E-11
E-3.7 Phum Rong Intake and Check Gates.....	VI-E-12

List of Attachments

	<u>Page</u>
Attachment 1	Check List for Survey on Roleang Chrey Gates VI-EAT1-1
Attachment 2	Calculation of Hoisting Load for Roleang Chrey Gates VI-EAT2-1
Attachment 3	Drawings of Roleang Chrey Gates Prepared by Snowy Mountains Hydro-electric Authority VI-EAT3-1
Attachment 4	Working Schedule for Repairs of Roleang Chrey Gates VI-EAT4-1
Attachment 5	Drawings of Stoplog VI-EAT5-1

APPENDIX-E: GATES OF ROLEANG CHREY AND OTHER STRUCTURES

Chapter E-1 Introduction

The Roleang Chrey Regulator is the most important structure for the irrigation system in the Target Area. The Roleang Chrey Regulator was constructed in 1974, and it is presently observed that some portions are deteriorated rather than damaged. In particular, the water gates which are indispensable for proper water abstraction and flood control, show the crucially severe condition, so that those could not function properly.

Some water gates recently installed at the major canals connecting with the Regulator, also present poor situations such as leakage, unnecessarily long spindle and corrosion which might be due to improper design and lack of maintenance.

Based on the findings through the site inspection, review on the relevant reports and interview with the gate operator, the countermeasures for those malfunctioned water gates are studied from the viewpoints of temporary and permanent treatment. The temporary measure focuses on keeping the present function level of them with less cost at least, and the permanent one aims to renovate them so as to realize the appropriate function.

Chapter E-2 Present Conditions and Findings

E-2.1 Roleang Chrey Regulator

E-2.2.1 General Information of Gates

General information of gates for the Roleang Chrey Regulator is given below:

General Information of Gate

Item	General Information
Type	Fixed wheel gate
Number	5
Clean span	12.50 m
Height	6.70 m
Hoist	Electric driven, wire rope winding, one motor two drum, with counter weight
Construction year	1974
Consultant	Snowy Mountains Hydro-Electric Authority
Manufacturer	Triveni Structurals Ltd. Maini, Allahbad, India



View from Downstream



Downstream of Pier

E-2.2.2 Present Condition and Findings

(1) Gate leaf

- Almost all main wheels are not able to rotate because of rotation resistance increased due to rusting of shafts. Gate is therefore stopped on the way of closing and cannot be closed fully when the upstream water level is high. Also, the hoist mechanisms are overloaded while the gate is opening, so that the fuse burns. This is a fatal problem of the gates. (See Attachment 1)
- A lot of water leakage is observed due to aging and crack of the rubber seal.
- Painting of the gate leaf is peeled off.
- Four wheel installed in a side girder could not smoothly rotate, which results in obstructing gate movement.



Downstream of Gate Leaf

(2) Guide frame

Whole guide frame could not be investigated in detail since it is partially submerged. But its exposed parts would be sound.

(3) Hoist

- Electric motors, speed reducers, counter shafts and winding drums are still in running condition in spite that those are heavily aged.
- Brakes, position indicators and limit switches do not function at all. The operation of them is carried out by only means of experience and sense of the operator.



Electric Motor and Speed Reducer are in running condition, but heavily aged. Brake does not function.



Limit Switch Box is broken.



Position Indicator does not function.



Control Panel is in working condition but heavily aged.

- Hoisting wire ropes are aged but in service.
- As for the wire rope for counterweight, a connection with the weight has been repaired using wire clips. The connection is preferable to use wire sockets.
- Stocking number of spare parts such as fuse and contacts of magnetic switch are not sufficient.

(4) Diesel Generator

- A diesel generator of 23.9 kVA is aged, but still in working condition.
- As the output of this generator is small, more than two gates cannot be operated simultaneously. At installation of the gate in 1974, two sets of 75 kVA generator were installed, however both generators have been removed.
- The operator is anxious about the anomalous operation that no back up power source is installed.



Diesel Generator is still working, but aged. No backup electric power source is available.

E-2.2 Andong Sla Intake Gates (L1)

E-2.2.1 General Information of Gates

General information of the Andong Sla intake gates (L1) is given in the next page:**General Information of Gates**

Item	General Information
Type	Steel radial gate, four edges sealing
Number	4
Clean span	4.00 m
Height	2.70 m
Hoist	Electric driven, wire rope winding, one motor two drum
Construction year	1974
Consultant	Snowy Mountains Hydro-Electric Authority
Manufacturer	Unknown

E-2.2.2 Present Condition and Findings

- (1) Gate leaf
 - (a) No heavy corrosion

Although almost all parts are presently submerged and surface conditions are not observed, the heavy corrosion is not found in the visible parts.

(b) Leakage

Water is leaking through seals due to damage of the seal rubber. Essentially, this type of gate i.e. four edge sealed radial gate is opt to have problem on the sealing characteristics. In this case, the leakage is inevitable through the wire rope holes of the gate leaf.



Leakage through Gate Top Seal

(2) Guide frame

(a) Present condition of Guide Frame

The present condition of guide frame is not clarified because it is submerged in water.

(3) Hoist

(a) Removal of the hoists for gate No.1 and No.2

The electric parts such as motor and control cabinet gates No.3 and No.4 were removed. These gates can be operated by manual crank in limited openings because hoisting wire ropes are temporarily repaired using steel wires connected with arm of the gate leaf.



Removal of Electric Motor and Control Panel



Temporarily Hoisting Wire

(b) No transmission line

At the construction at 1974, the electric power was sent from the Roleang Chrey Regulator to the intake gates by transmission line of about one kilometer. The cables were removed completely and only a few poles remain.

E-2.3 Tousamn Ang Check Gates

E-2.3.1 General Information of Gates

General Information of Gates	
Item	General Information
Type	Steel slide gate
Number	2
Clean span	2.0 m
Height	3.0 m
Hoist	Manually operated spindle hoist
Construction year	2003
Consultant	Unknown
Manufacturer	Unknown

E-2.3.2 Present Condition and Findings

- (1) Gate leaf, guide frame and hoist

Any problems are not found on the facility, and countermeasures are not required accordingly.

- (2) Downstream side slope

A part of downstream side slope is severely eroded and structure would become unstable , so that repair works are required urgently.

- (3) Improper design

Some farmers claimed that ox-drawn carriage and motorbike cannot smoothly pass over the culvert due to steep slope approach.



Unnecessarily Long Spindle



Severe Side Slope Erosion

E-2.4 Ou Krang Ambel Intake Gates

E-2.4.1 General Information of Gates

General Information of Gates	
Item	General Information
Type	Steel slide gate
Number	4
Clean span	3.5 m
Height	3.0 m
Hoist	Manually operated spindle hoist
Construction year	1987
Consultant	Unknown
Manufacturer	Unknown

E-2.4.2 Present Condition and Findings

- (1) Gate leaf

- (a) Painting

Paintings are damaged and thus corrosion is proceeding.

- (b) Leakage

Leakage was observed through damaged rubber seals.



View from Downstream



Corrosion and Leakage

(2) Guide frame

It is considered that the gates were originally designed as radial gate, but the slide gates were installed using the guide frames for stoplog. Due to this change, the guide frames were not equipped with seal seat of stainless steel, which became one of the reasons for severe leakage.



Box-out for side seal seat remains without filling concrete

(3) Hoist

No problems are found on hoist.

E-2.5 Vatkrouch Check Gate

E-2.5.1 General Information of Gate

General Information of Gate	
Item	General Information
Type	Steel slide gate
Number	1
Clean span	4.00 m
Height	2.54 m
Hoist	Manually operated spindle hoist
Construction year	2002
Consultant	Unknown
Manufacturer	Unknown

E-2.5.2 Present Condition and Findings

(1) Gate leaf

(a) Corrosion

Corrosion is not observed although the painting is damaged.

(b) Rubber seal

Condition of rubber seal can not be observed since both sides of the gate leaf are submerged.

(2) Guide frame

Condition of guide frame could not be observed due to its submergence.

(3) Hoist

There is no problem on the hoist itself but the hoisting wire ropes are temporarily repaired

using the steel wire.



Upstream view



Temporary Measure for Wire Rope

E-2.6 Phum Rong Intake and Check Gates

E-2.6.1 General Information of Gates

General Information of Gates

Item	General Information		
	Steel radial gate	Steel slide gate	Steel slide gate
Type	Steel radial gate	Steel slide gate	Steel slide gate
Number	1	3	1
Clean span	4.00 m	1.15 m	1.0 m
Height	2.54 m	2.0 m	1.0 m
Hoist	Manual wire rope winding	Manual spindle	Manual spindle
Construction year	2004	2004	2004
Manufacturer	Rock Call Co. (Cambodia) under World Bank (IDA) Credit No.3472		

E-2.6.2 Present Condition and Findings

Steel radial gate

(1) Gate leaf

Corrosion is not observed although the painting is damaged. Rubber seal can not be observed since both sides of the gate leaf are submerged.

(2) Guide frame

Condition of guide frame could not be clarified due to its submergence.

(3) Hoist

There finds no problem on the hoist itself but hoisting wire ropes are temporarily repaired using steel wire and chain.



Temporary Treatment by Wire Rope and Chain

Steel slide gate

(1) Gate leaf

No problem on the gate leaf is found.

(2) Guide frame

The metal seal seat is not provided. The rubber seal touches and slides on the uneven concrete surface. Clearance between concrete surface and rubber seal is a cause of leakage. One of the operators strongly wants to stop the leakage.

An example of seal seat using stainless steel is given in the right side photo for reference. Similar design is recommended as the standard design for its sealing characteristics and long life with small cost increase.



No Provision of Metal Seal Seat



Example of Stainless Steel Seal Seat

(3) Hoist

Maintenance is insufficient. For example, some debris and no lubricant are found in spindle screw. As the protector of the spindle, a spindle cover pipe on the top and a bellows on the bottom are used sometimes. Since the fitting work of the protector is not easy after installation of the hoist, those are not included in the scope.



Debris in Spindle

Chapter E-3 Improvement Plans

E-3.1 General

As mentioned in Chapter E1, countermeasures for malfunctioned gates are worked out through study on the results of site inspection. The proposed countermeasures are discussed below.

E-3.2 Roleang Chrey Regulator

As-built drawings for the gates are not available in MOWRAM, even in the Cambodia National Mekong Committee. Based on the present conditions and findings obtained in the said manner, the temporary and permanent measures are worked out in the concept mentioned above.

(1) Temporary measure

- Replace of the wire rope for counter weight. Ten numbers for 5 gates are required.
- Installation of one additional diesel generator of 75 k VA as a main power source. The existing generator will be used as an auxiliary electric source.
- Spare parts such as fuses, magnetic switch and air filter of diesel generator
- Standard maintenance tools such as wrenches, screw drivers, hammers and grease gun.
- Cost estimate and work period
- Estimated cost: US\$45,000
- Work period: 3 months after order

(2) Permanent measure

(a) Overhaul and repair of wheels

Main wheels may be reused, but bearing metals shall be replaced by oilless bearings and wheel shafts by corrosion resisting steel shafts. If the gates are installed as shown on the detailed drawings prepared by Snowy Mountains Hydro-Electric Authority attached in Attachment 3, it is anticipated that the disassembling and repairing would be technically hard works. Thus, beforehand research and sufficient preparation of the works are essential for smooth overhaul and repair of wheels.

(b) Gate leaf shall be painted after cleaning by sand blast.

(c) Replace of rubber seals

The music note type seal rubber as shown in the drawing of Attachment 3 is not suitable in this case. It is recommended that the L type seal rubber should be adopted from its easy construction and reliable sealing characteristics.

(d) Replace of hoist

The whole hoisting equipment shall be replaced with newly designed ones. For the convenience and safety of the operation, it is proposed to employ the remote control system at control room with local operation.

(e) Required works for renovation

For the renovation works as mentioned above, the gate leaf shall be hoisted up to RL.38.50. As it is deemed that the works will be continued for about two years, (Refer to Attachment 4) a coffer dam or stoplog is necessary for maintaining the water in the reservoir for irrigation. In case of the stoplog, since the stoplog slots do not exist in the pier at present, stoplog slots shall be designed and constructed. (Refer to Attachment 5)

- (f) Countermeasure for releasing small discharge

As the gates are not suitable for discharge of small amount of water such as 5 m³/sec or less because of their large size, it is proposed to install a gate or valve besides the gates. This matter should be considered separately.

- (g) Cost estimate and work period
- Estimated cost: US\$1,500,000
 - Work period: 24 months after order

E-3.3 Andong Sla Intake Gates (L1)

- (1) Temporary measure
- Replacement of wire ropes for gate No.3 and No.4.
 - Cost Estimate and Work Period
 - Estimated cost: US\$ 2,500
 - Work period: One month after order

- (2) Permanent measures

For the permanent measure, two proposals are given as follows:

Proposal-1

- (a) Gate leaf

Gate height shall be increased by about 1.5m, and four-side seal shall be changed into from three-side seal. This modification may require one additional arm in both sides. Existing gate leaf shall be repainted after sand blast cleaning.

- (b) Rubber seal

Rubber seal shall be replaced to improve leakage.

- (c) Hoist mechanism

Hoist mechanism shall be replaced for smooth gate opening and closing.

- (d) Local control panel and remote control panel

Local control panel and remote control panel shall be furnished for easy gate operation

- (e) Transmission line of 380 volts, control cable and poles

Transmission line of 380 volts, control cable and poles shall be furnished.

- (f) Stoplog

One set of stoplog shall be provided for renovation works and easy maintenance purpose.

- (g) Cost Estimate and Work Period

- Estimated cost: US\$ 360,000
- Work period: 12 months after order

Proposal 2

- (a) Gate facilities

All gate facilities shall be newly designed. Existing facilities shall be removed completely including concrete structures.

- (b) New gate

New gate shall be of vertical lift fixed wheel gate with screw spindle hoist.

- (c) Local control panel and remote control panel

Local control panel and remote control panel shall be furnished for easy gate operation

- (d) Transmission line of 380 volts, control cable and poles

Transmission line of 380 volts, control cable and poles shall be furnished.

- (e) Stoplog

One set of stoplog shall be provided for easy maintenance purpose.

- (f) Cost estimate and work period

- Estimated cost: US\$ 450,000 (Not including civil works)
- Work period: 12 months after order

E-3.4 Tousamn Ang Check Gates

As mentioned above, no repairs are required for the gates. But, approach passing over the culvert and downstream side slope of canal should be repaired as soon as possible.

E-3.5 Ou Krang Ambel Intake Gates

- (1) Temporary measure

No temporary measure is recommended.

- (2) Permanent measure

- (a) Gate leaf

The gate leaf shall be repaired after sand blast cleaning.

- (b) Rubber Seals

Rubber seals shall be replaced due to their damage.

- (c) Cost estimate and work period

- Estimated cost: US\$ 22,000
- Work period: One month after order

E-3.6 Vatkrouch Check Gate

- (1) Temporary measure

- (a) Hoisting wire rope

Replacement of hoisting wire rope is recommendable. In this connection, it is proposed to use stainless wire rope in view of maintenance free operation.

- (b) Cost estimate and working period

- Estimated cost: US\$ 1,200
- Work period: One month after order

- (2) Permanent measure

- (a) Gate leaf

Repainting of the gate leaf shall be made after sand blast cleaning.

- (b) Rubber seal

Rubber seal shall be replaced due to its damage.

- (c) Cost estimate and working period

- Estimated cost: US\$ 4,000
- Work period: One month after order

E-3.7 Phum Rong Intake and Check Gates

(1) Temporary measure

(a) Hoisting wire rope for radial gate

Hoisting wire rope for radial gate shall be replaced. It is recommended that stainless wire rope should be used in view of maintenance free operation.

(c) Cost estimate and working period

- Estimated cost: US\$ 1,200
- Work period: One month after order

(2) Permanent measure

(a) Radial gate leaf

The radial gate leaf shall be repainted after sand blast cleaning.

(b) Seal seat for slide gate.

Metal seal seat shall be provided to protect leakage.

(c) Cost estimate and working period

- Estimated cost: US\$ 6,000
- Work period: One month after order

Attachments

Attachment 1
Check List for Survey on
Roleang Chrey Gates

Roleng Chrey Regulator - Fixed wheel gate - 12.5mb × 6.7mh

I Gate leaf

	Item	Description	Rank	Remarks
1	General	Vibration, noise	2	
2		Unbalance loading of wire ropes	2	
3	Main beam	Deformation	2	
4		Painting	4	
5		Corrosion	3	
6	Skin plate	Deformation	×	
7		Painting	4	
8		Corrosion	3	
9	Auxiliary girder	Deformation	2	
10		Painting	4	
11		Corrosion	3	
12	Main wheel	Corrosion	×	
13		Rotation trial	4	Experience of operator
14		Lubrication	4	Experience of operator
15	Seal rubber	Leakage	4	
16		Aging	×	
17		Abrasion	×	
18		a	×	
19	Welding	Crack	×	
20	Bolted joint	Loosen, missing	×	

II Guide frame

	Item	Description	Rank	Remarks
1	Main roller rail	Deformation, rust, damage	2	
2	Auxiliary rail	Deformation, rust, damage	2	
3	Seal sheet	Deformation, rust, damage	×	
4	Sill bean	Deformation, rust, damage	×	
5	Stoplog	Guide frame exists or not	nil	

Legend: Rank 1 Excellent
 Rank 2 Good
 Rank 3 Poor
 Rank 4 Damaged
 × Cannot inspect

III Hoist

	Item	Description	Rank	Remarks
1	Electric motor	Appearance	3	3.7 kW
2		Output		
3		Vibration, noise, overheat	2	
4		Insulation resistance	×	
5		Earth resistance	×	
6		Fixing bolts	2	
7	Brake	Appearance	4	
8		Wear of lining	4	
9		Fixing bolts	2	
10	Speed reducer	Vibration, noise, overheat	2	
11		Lubrication oil	2	
12		Fixing bolts	2	
13	Shaft coupling	Misalignment	2	
14		Appearance	2	
15	Bearing	Appearance	2	
16		Wear, damage	2	
17		Lubrication	2	
18	Wire rope	Lubrication	3	
19		Rust	2	
20		Element wire cutting	3	
21	Rope end fixing	Appearance	3	
22		Wear, damage	3	
23	Sheave	Appearance	2	
24		Wear, damage	2	
25		Lubrication	2	
26	Winding drum	Appearance	×	
27		Wear, damage	×	
28		Lubrication	×	
29	Limit switch		4	
30	Position Indicator		4	
31	Manual operation		4	

IV Control panel

	Item	Description	Rank	Remarks
1	General	Appearance	3	
2	Volt meter		nil	
3	Am meter		nil	
4	Wiring		3	
5	Magnetic contactor		2	
6	Aux. Relay		3	
7	Indication lamp		4	
8	Push button switch		2	
9	Insulation resistance		×	

V Diesel generator

	Item	Description	Rank	Remarks
1	Diesel engine	Appearance	3	
2		Noise, vibration	2	
3		Fixing bolt	2	
4		Lubrication oil	2	
5		Fuel oil	2	
6		Cooling water	2	
7		Tachometer	×	
8	Generator	Output		23.9 kVA
9		Appearance	3	
10		Insulation resistance	×	
11	Battery	Electrolytic solution	×	
12		capacity	×	
13	Volt/am meter		2	

Channel Head Regulator - Andong Sla - Radial gate - 4.0mb × 2.7mh

Check list

I Gate leaf

	Item	Description	No.1	No.2	No.3	No.4	Remarks
1	General	Vibration, noise	1				
2		Unbalance loading of wire ropes	—	—	3	3	No.1 and 2 no wire rc
3	Main beam	Deformation	2	2	2	2	
4		Painting	4	4	4	4	
5		Corrosion	3	3	3	3	
6	Skin plate	Deformation	2	2	2	2	
7		Painting	4	4	4	4	
8		Corrosion	3	3	3	3	
9	Auxiliary girder	Deformation	2	2	2	2	
10		Painting	4	4	4	4	
11		Corrosion	3	3	3	3	
12	Arm	Corrosion	2	2	2	2	
13		Deformation	2	2	2	2	
14	Trunnion	Corrosion	2	2	2	2	
15		Lubrication	×	×	×	×	
16	Seal rubber	Leakage	4	4	4	4	
17		Aging	×	×	×	×	
18		Abrasion	×	×	×	×	
19		Cracking	×	×	×	×	
20	Welding	Crack	×	×	×	×	
21	Bolted joint	Loosen, missing	×	×	×	×	

II Guide frame

	Item	Description	No.1	No.2	No.3	No.4	Remarks
1	Side seal seat	Deformation, rust, damage	×	×	×	×	
2	Sill beam	Deformation, rust, damage	×	×	×	×	
3	Stoplog	Guide frame exists or not	existing				

III Hoist No possibility of re-use.

IV Control panel Already removed.

L6 - Ou Krang Ambel

Slide gate - ab. 3.5 mb × 3 mh

I Gate leaf

	Item	Description	No.1	No.2	No.3	No.4	Remarks
1	General	Appearance	3	3	3	3	
2		Deformation	2	2	2	2	
3	Main beam	Painting	4	4	4	4	
4		Corrosion	4	4	4	4	
5	Skin plate	Deformation	4	4	4	4	
6		Painting	4	4	4	4	
7		Corrosion	4	4	4	4	
8	Seal rubber	Leakage	4	4	4	4	
9		Aging	4	4	4	4	
10		Abrasion	×	×	×	×	
11		Crack	4	4	4	4	
12	Welding	Crack	×	×	×	×	
13	Bolted joint	Loosen, missing	×	×	×	×	

II Guide frame

	Item	Description	No.1	No.2	No.3	No.4	Remarks
1	Main rail	Deformation, rust, damage	×	×	×	×	
2	Auxiliary rail	Deformation, rust, damage	×	×	×	×	
3	Seal sheet	Deformation, rust, damage	×	×	×	×	
4	Sill beam	Deformation, rust, damage	×	×	×	×	
5	Stoplog	Guide frame exists or not	Not exist				

III Hoist

	Item	Description	No.1	No.2	No.3	No.4	Remarks
1	Spindle	Appearance	2	2	2	2	
2		Screw	2	2	2	2	
3		Rust	3	3	3	3	
4		Lubrication	2	2	2	2	
5		Deformation	2	2	2	2	
6	Hoist	Appearance	3	3	3	3	
7		Lubrication	2	2	2	2	
8		Rust	3	3	3	3	
9		Wear, damage	2	2	2	2	
10		Handle wheel or crank	—	—	—	—	
11		Fixing bolts	2	2	2	2	

R2 Vatkrouch - Radial gate - 4.0 mb × 2.54 mh

Check list

I Gate leaf

	Item	Description	No.1	Remarks
1	General	Vibration, noise	2	
2		Unbalance loading of wire ropes	2	
3	Main beam	Deformation	2	
4		Painting	4	
5		Corrosion	3	
6	Skin plate	Deformation	2	
7		Painting	4	
8		Corrosion	3	
16	Seal rubber	Leakage	3	
17		Aging	×	
18		Abrasion	×	
19		Cracking	×	
20	Welding	Crack	×	
21	Bolted joint	Loosen, missing	2	

II Guide frame

	Item	Description	No.1	Remarks
1	Side seal seat	Deformation, rust, damage	×	
2	Sill beam	Deformation, rust, damage	×	
3	Stoplog	Guide frame exists or not	×	

III Hoist

	Item	Description	No.1	Remarks
1	Speed reducer	Vibration, noise, overheat	2	
2		Lubrication oil	2	
3		Fixing bolts	2	
4	Shaft coupling	Misalignment	2	
5		Appearance	2	
6	Wire rope	Lubrication	4	Temporally wire repaired.
7		Rust	4	Wire rope ϕ 12mm
8		Element wire cutting	4	

R8 Phum Rong - Radial gate - ab.4 mb × 3 mh

Check list

I Gate leaf

	Item	Description	No.1	Remarks
1	General	Vibration, noise	2	
2		Unbalance loading of wire ropes	2	
3	Main beam	Deformation	2	
4		Painting	4	
5		Corrosion	3	
6	Skin plate	Deformation	2	
7		Painting	4	
8		Corrosion	3	
9	Seal rubber	Leakage	2	
10		Aging	×	
11		Abrasion	×	
12		Cracking	×	
13	Welding	Crack	×	
14	Bolted joint	Loosen, missing	2	

II Guide frame

	Item	Description	No.1	Remarks
1	Side seal seat	Deformation, rust, damage	3	
2	Sill beam	Deformation, rust, damage	×	
3	Stoplog	Guide frame exists or not	×	

III Hoist

	Item	Description	No.1	Remarks
1		Vibration, noise, overheat	2	
2	Speed reducer	Lubrication oil	2	
3		Fixing bolts	2	
4	Shaft coupling	Misalignment	2	
5		Appearance	2	
6	Wire rope	Lubrication	3	Temporary repaired
7		Rust	3	
8		Element wire cutting	2	

Attachment 2
Calculation of
Hoisting Load for
Roleang Chrey Gates

Calculation on Hoisting Load and Motor Output

1. Hydro-static load on gate

$$W = 1/2(6.7^2 * 12.5) = 280.6 \text{ tonf}$$

2. Resistance of wheel

$$Fr = (\mu_1 + \mu_2 * r)W/R = (0.1 + 0.2 * 4.75)280.6/39.0 = 7.6 \text{ tonf}$$

When friction coefficient of pin increases to 0.8, the friction force will be;

$$Fr' = (\mu_1 + \mu_2 * r)W/R = (0.1 + 0.8 * 4.75)280.6/39.0 = 34.5 \text{ tonf}$$

3. Resistance of rubber seal

$$Fs = \mu_3(q + p * b) L = 0.7(0.03 + 3.35 * 0.015)6.70 * 2 = 0.8 \text{ tonf}$$

4. Self weight of gate leaf

$$Wf = 35.0 \text{ tong}$$

5. Weight of counter weight

$$Wc = 8.0 * 2 = 16.0 \text{ tonf}$$

6. Total

			Hoisting	Lowering	Hoisting $\mu 0.8$	Lowering $\mu 0.8$
Self weight	Wf	↓	35.0	↓ 35.0	↓ 35.0	↓ 35.0
Counter weight	Wc	↑	16.0	↑ 16.0	↑ 16.0	↑ 16.0
Roller resistance	Fr	↓	7.6	↑ 7.6	↓ 34.5	↑ 34.5
Seal resistance	Fs	↓	0.8	↑ 0.8	↓ 0.8	↑ 0.8
Total	F	↓	27.4	↓ 10.6	↓ 54.5	↑ 16.3
Note			1	2		3

Note 1: Hoisting load = 27.4 tonf

Note 2: Lowering force = 10.6

Note 3: Gate does not close fully/

7. Motor output

$$P = F * v / 6.12 * e = 27.4 * 0.3 / 6.12 * 0.45 = 2.98 \text{ kW use } 3.7 \text{ kW}$$

When the counter weight is eliminated, $F = 27.4 + 16.0 = 43.4 \text{ tonf}$

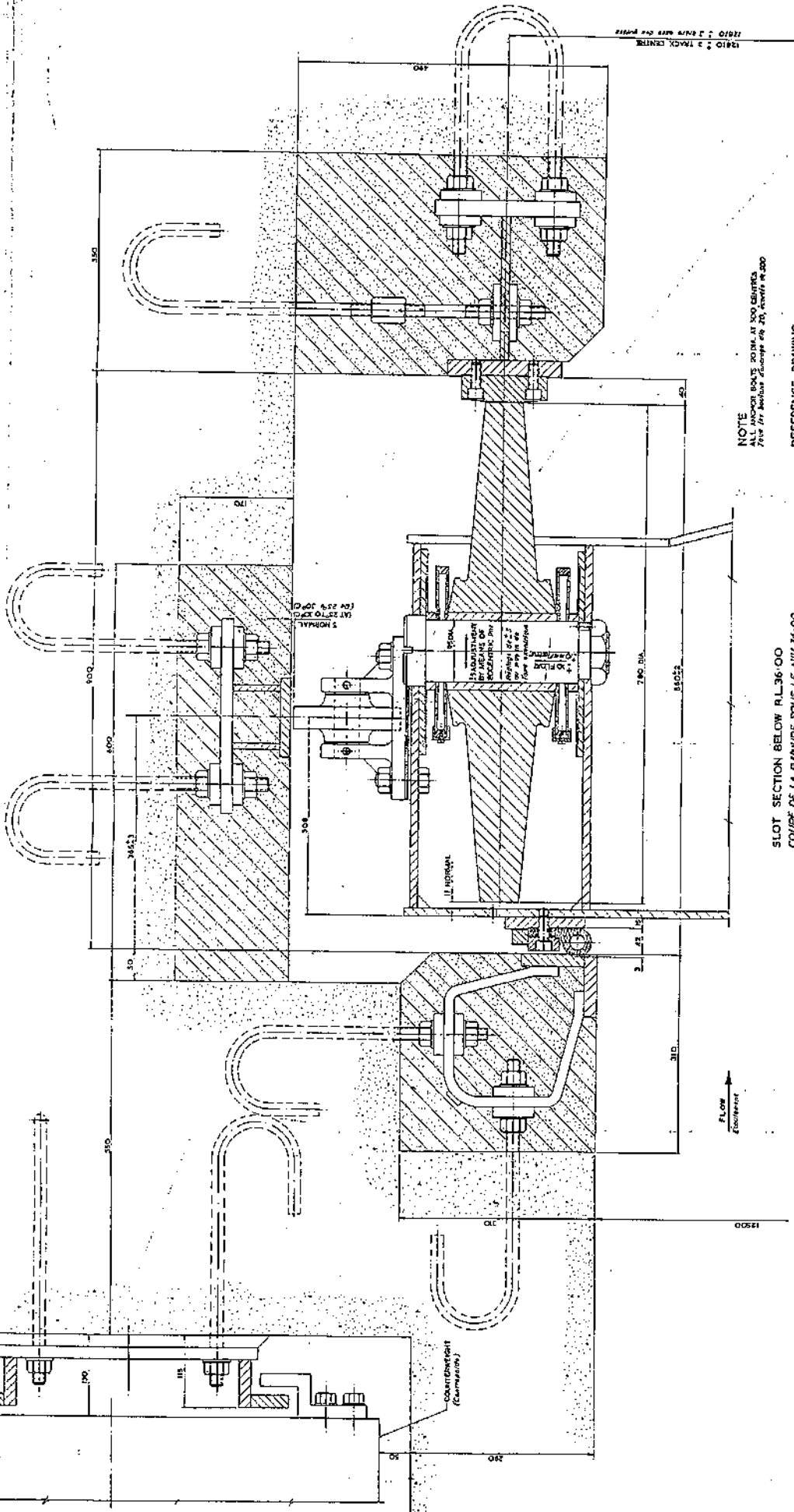
$$P' = F * v / 6.12 * e = 43.4 * 0.3 / 6.12 * 0.45 = 4.73 \text{ kW use } 5.0 \text{ kW}$$

When the roller resistance increased,

$$P = F * v / 6.12 * e = 54.5 * 0.3 / 6.12 * 0.45 = 5.94 \text{ kW}$$

3.7 kW motor is overloaded.

Attachment 3
Drawings of
Roleng Chrey Gates Prepared by
Snowy Mountains Hydro-electric Authority



NOTE
 ALL ANCHOR BOLTS SHALL BE 500 GRADERS
 Size for Anchor Bolts Example of 30, Anchor of 200

REFERENCE DRAWING
 FIXED WEIR GATE - GENERAL ARRANGEMENT MV-PT-31

SLOT SECTION BELOW RL.36.00
 COUPE DE LA RANURE SOUS LE NIVEAU 36.00

FLOW
 Ecoulement

Scale: 1:12.5
 Sheets: 7/23

PLAN DE REFERENCE
 Niveau de référence de la porte Weir
 Niveau de référence de la rampe de la porte Weir

AUSTRALIA COLONIAL PLAN
 NEWLY ACQUIRED TITLES - ELECTRIC AUTHORITY
 ROTUNDA DU CARRONCE
 MINISTERE DES TRAVAUX PUBLICS - ROTUNDA

PREK THNOT DIVERSION WEIR BARRAGE DE DERIVATION DU PREK THNOT KAMPUNG MUDOM - COUPE DE LA RANURE	
NO. 100	REV. 1/10/54
DATE 1/10/54	SCALE 1:12.5
DRAWN BY 1/10/54	CHECKED BY 1/10/54
APPROVED BY 1/10/54	APPROVED BY 1/10/54
PROJECT NO. 1/10/54	PROJECT NO. 1/10/54
REV. 1/10/54	REV. 1/10/54
MV-PT-31A	

NOTES:

- MANUFACTURING TOLERANCES**
 THE SIDE BOTTOM SEAL PLATES IN THE TOP SEAL ASSEMBLY SHALL BE WITHIN ± 0.03 mm. THE FULL LENGTH ± 0.15 mm.
- INSTALLATION TOLERANCES**
 1 THE TOLERANCES OF EACH GATE SHALL HAVE A DOWNDOWN BETWEEN VERTICAL PLATES OF ± 0.15 mm. PART TO THE CENTRE LINE OF SPILLWAY OPENING.
 2 THE SEAL PLATES SHALL BE WITHIN ± 0.03 mm. ± 0.15 mm. TO THE CENTRE LINE OF SPILLWAY OPENING.
 3 THE SEAL PLATES SHALL HAVE ITS CENTERING POINT ON THE CENTRE LINE OF SPILLWAY OPENING.
 4 THE BOTTOM SEAL PLATE SHALL BE FLUSH WITH THE SPILLWAY PROFILES BETWEEN HORIZONTAL PLATES ± 0.15 mm. ± 0.15 mm. TO THE CENTRE LINE OF SPILLWAY OPENING.
 5 THE HORIZONTAL DISTANCE BETWEEN THE CENTERING POINTS OF THE SEAL PLATES SHALL BE WITHIN ± 0.03 mm. ± 0.15 mm. TO THE CENTRE LINE OF SPILLWAY OPENING.
 6 THE SEAL PLATES SHALL BE WITHIN ± 0.03 mm. ± 0.15 mm. TO THE CENTRE LINE OF SPILLWAY OPENING.

NOTES:

- Remarques de fabrication**
 Les plaques d'étanchéité latérales et de fond de la porte doivent être fabriquées avec des tolérances de $\pm 0,03$ mm sur toute la longueur de $\pm 0,15$ mm.
- Remarques d'installation**
 1 Les serrures de chaque vane doivent avoir une déviation de $\pm 0,15$ mm entre les plaques verticales de $\pm 0,15$ mm par rapport à la ligne médiane de l'ouverture de la vanne.
 2 Les plaques d'étanchéité doivent être fabriquées avec des tolérances de $\pm 0,03$ mm sur toute la longueur de $\pm 0,15$ mm par rapport à la ligne médiane de l'ouverture de la vanne.
 3 Les plaques d'étanchéité doivent être alignées avec le profil de la vanne entre les plaques horizontales de $\pm 0,15$ mm par rapport à la ligne médiane de l'ouverture de la vanne.
 4 Les distances horizontales entre les points de centrage des plaques d'étanchéité doivent être de $\pm 0,03$ mm sur toute la longueur de $\pm 0,15$ mm par rapport à la ligne médiane de l'ouverture de la vanne.

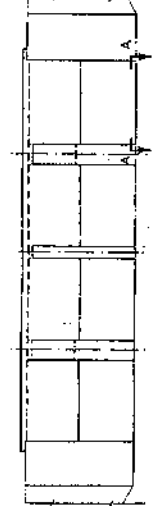
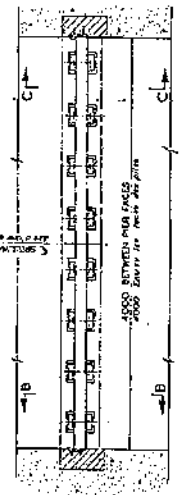
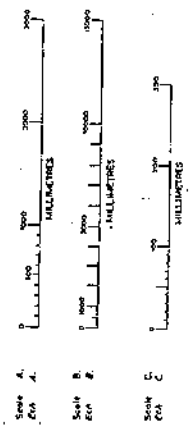
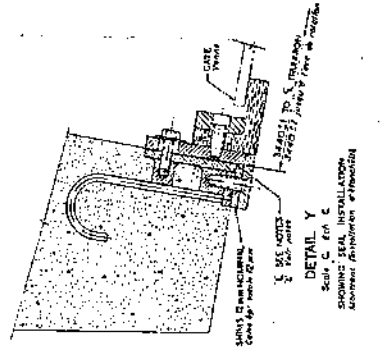
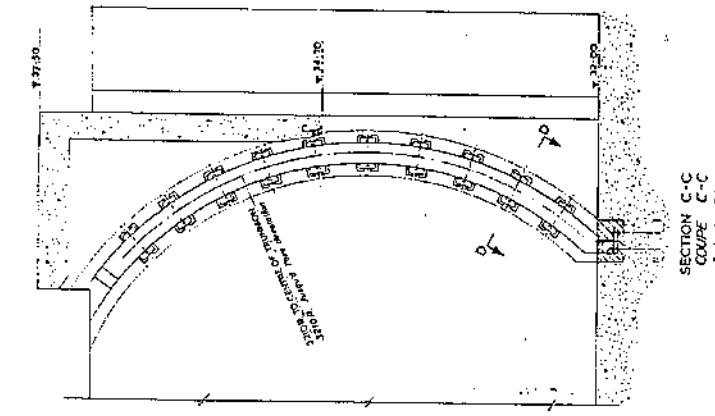
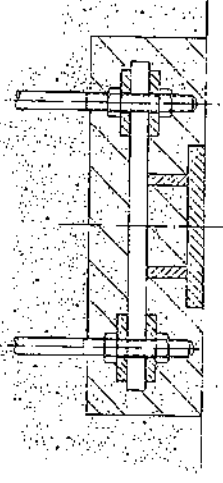
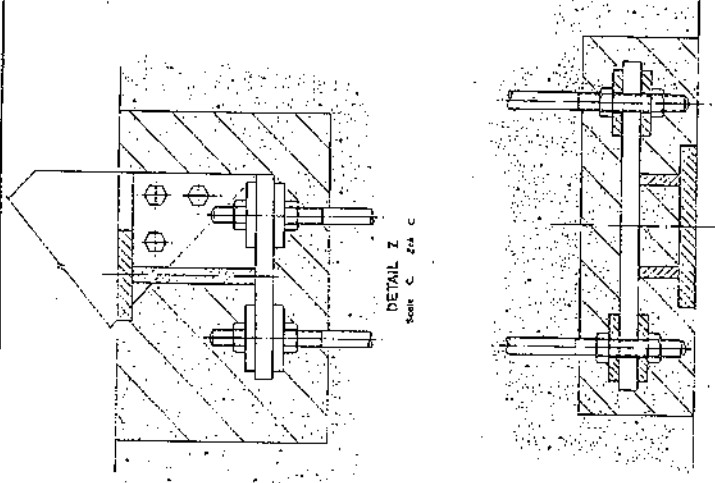
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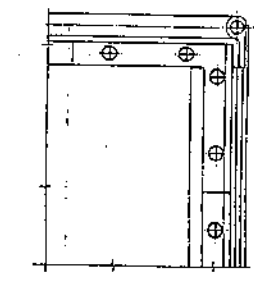
PRICE BOOK - CATALOGUE OF THE AUSTRALIAN POWER ENGINEERING BOARD
 PARTIAL GATES - GENERAL ARRANGEMENT

PLAN DE REFERENCE:

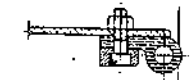
CATALOGUE DE PRISE DU CANAL DE PRESE THINOT
 MANUEL SECTEUR - ARRANGEMENT GENERAL

AUSTRALIA CONTROLLED PLAN	
SHIPPY MOUNTAINS HYDRO ELECTRIC AUTHORITY	
MANUFACTURED BY: BENTON & BOWLES	
PROJECT: GUYAN VALLEY - DAM	
PREPARED BY: A. J. J. J.	
DATE: 1987	
APPROVED BY: A. J. J. J.	
DATE: 1987	
DRAWN BY: A. J. J. J.	
DATE: 1987	
SCALE: 1:100	
SHEET: 102	

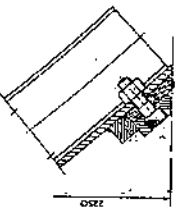




VIEW F-F
SCALE 1/4"



SECTION H-H
COUPE H-H
SCALE 1/4"



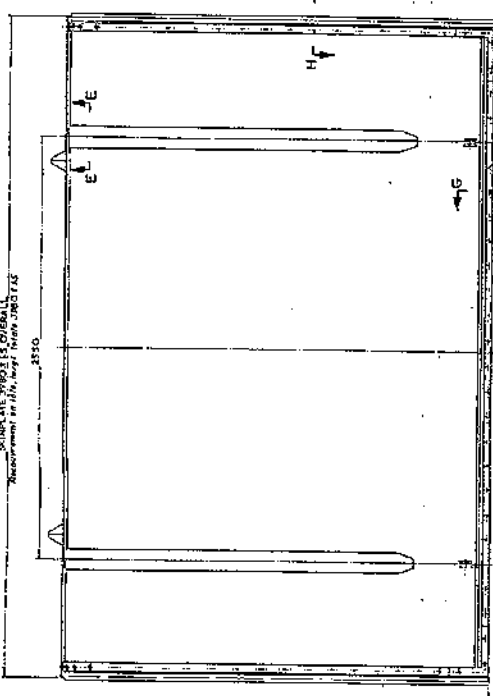
SECTION G-G
COUPE G-G
SCALE 1/4"

NOTES
 SHAKES AND THE LUBRICANT AND LUBRICANT FEEDERS THE HEAD OF EACH APPROXIMATELY 1/2 IN. (13mm) SHALL BE KEPT CLEAN AND FREE FROM OIL AND LUBRICANT BEFORE USE. THE LUBRICANT SHALL BE KEPT CLEAN AND FREE FROM OIL AND LUBRICANT BEFORE USE. THE LUBRICANT SHALL BE KEPT CLEAN AND FREE FROM OIL AND LUBRICANT BEFORE USE.

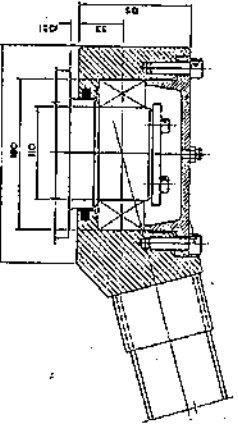
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 Dessins de référence

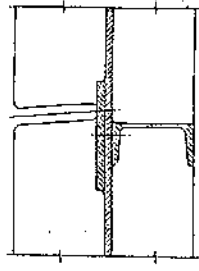
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POLICE MONTÉE ROYALE		UNION	NO. 100-1000-100
CIVIL SERVICE		UNION	NO. 100-1000-100
UNION		UNION	NO. 100-1000-100
UNION		UNION	NO. 100-1000-100



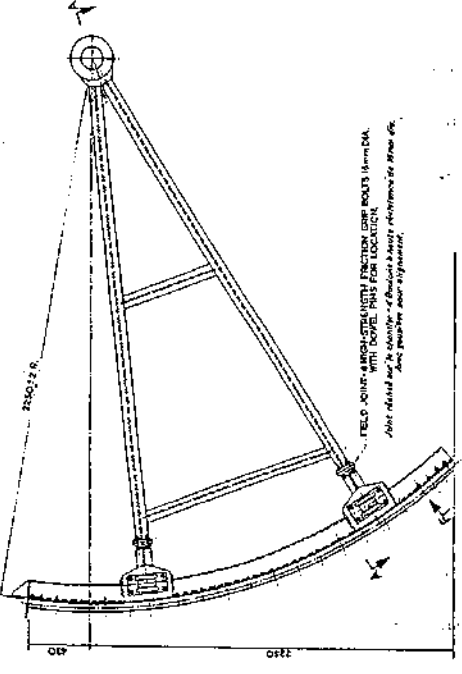
OVERALL DIMENSIONS



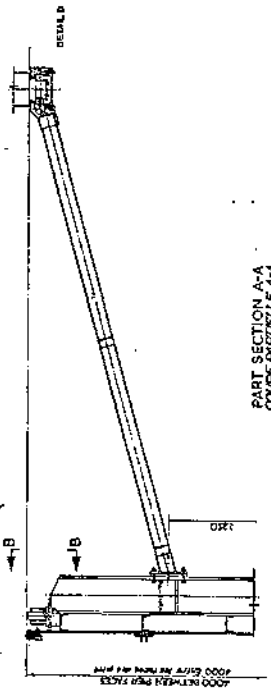
DETAIL D
SCALE 1/4"



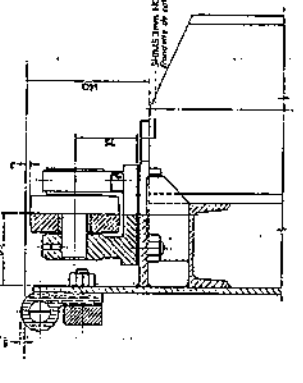
SECTION E-E
COUPE E-E
SCALE 1/4"



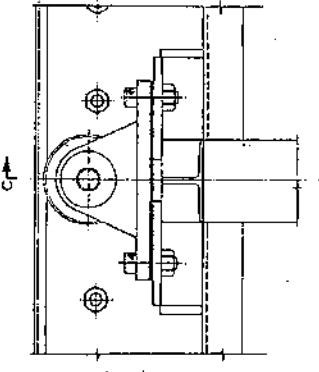
FIELD JOINT AND SUB-ASSEMBLY DETAILS



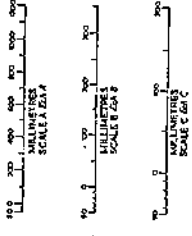
PART SECTION A-A
COUPE PARTIELLE A-A
SCALE 1/4"



PART SECTION C-C
COUPE PARTIELLE C-C
SCALE 1/4"



VIEW B-B
COUPE B-B
SCALE 1/4"



Attachment 4
Working Schedule for
Repairs of Roleang Chrey Gates

	Month	No.1 Gate										No.2 Gate					No.3 Gate							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Notice of proceed																								
Stoplog	Design/Fabrication																							
	Installation																							
	Removal																							
	Disassemble																							
Wheel	Bushing purchasing																							
	Bushing assemble																							
	Pin fabrication																							
	Assemble																							
Gate leaf	Sand blast																							
	Painting																							
	Removal																							
Hoist	Design/Fabrication																							
	Installation																							
Control panels (Local and remote)	Design/Fabrication																							
	Installation																							

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Roleng Chrey Regulator
**Working Schedule for
Stoplog Installation**

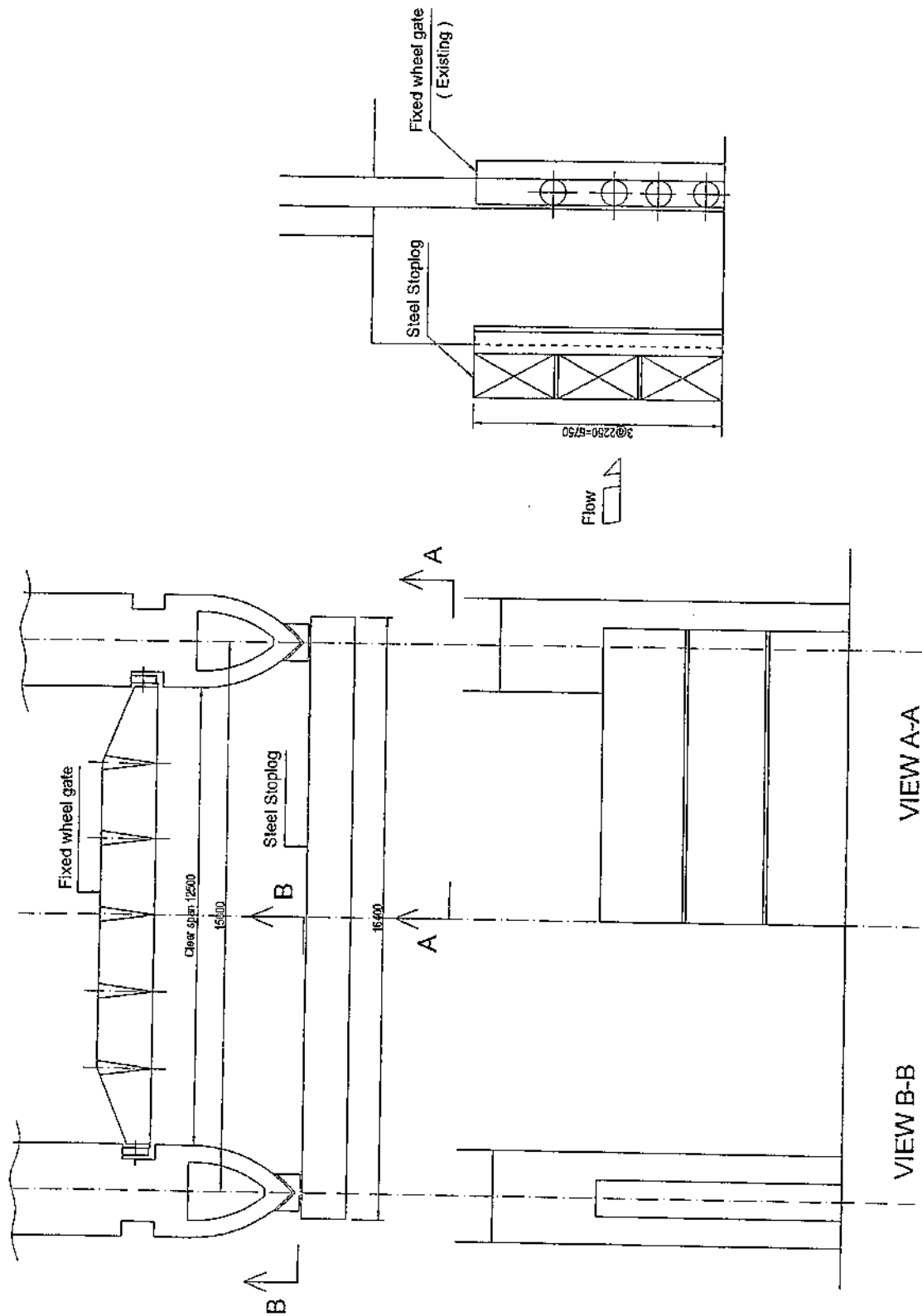
	Month	No.1 Gate									No.2 Gate			No.4 Gate			No.3 Gate							
		1	2	3	4	5	6	7	8	9	8	9	10	11	12	13	14	15	16	17	18	19	20	
Notice of proceed																								
Coffer dam	Installation																							
	Removal																							
Wheel	Disassemble																							
	Bushing purchasing																							
	Bushing assemble																							
	Pin fabrication																							
Gate leaf	Assemble																							
	Sand blast																							
	Painting																							
Hoist	Removal																							
	Design/Fabrication																							
Control panels (Local and remote)	Installation																							
	Design/Fabrication																							
	Installation																							

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Roleng Chrey Regulator
**Working Schedule for
Cofferdam Construction**

Attachment 5
Drawings of Stoplog

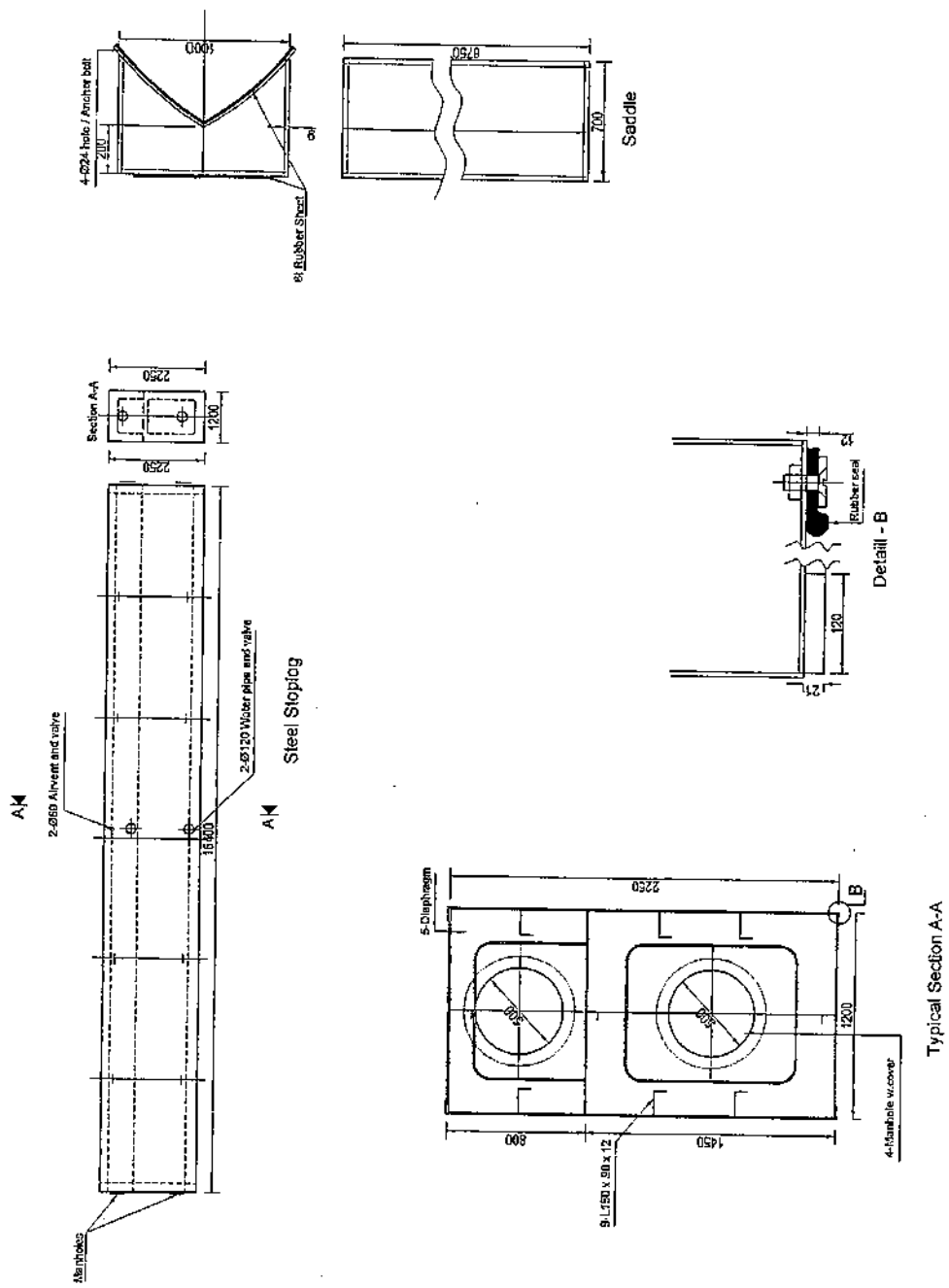


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Roleng Chrey Regulator

Steel Stoplog



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Roleng Chrey Regulator
Details of Steel Stoplog