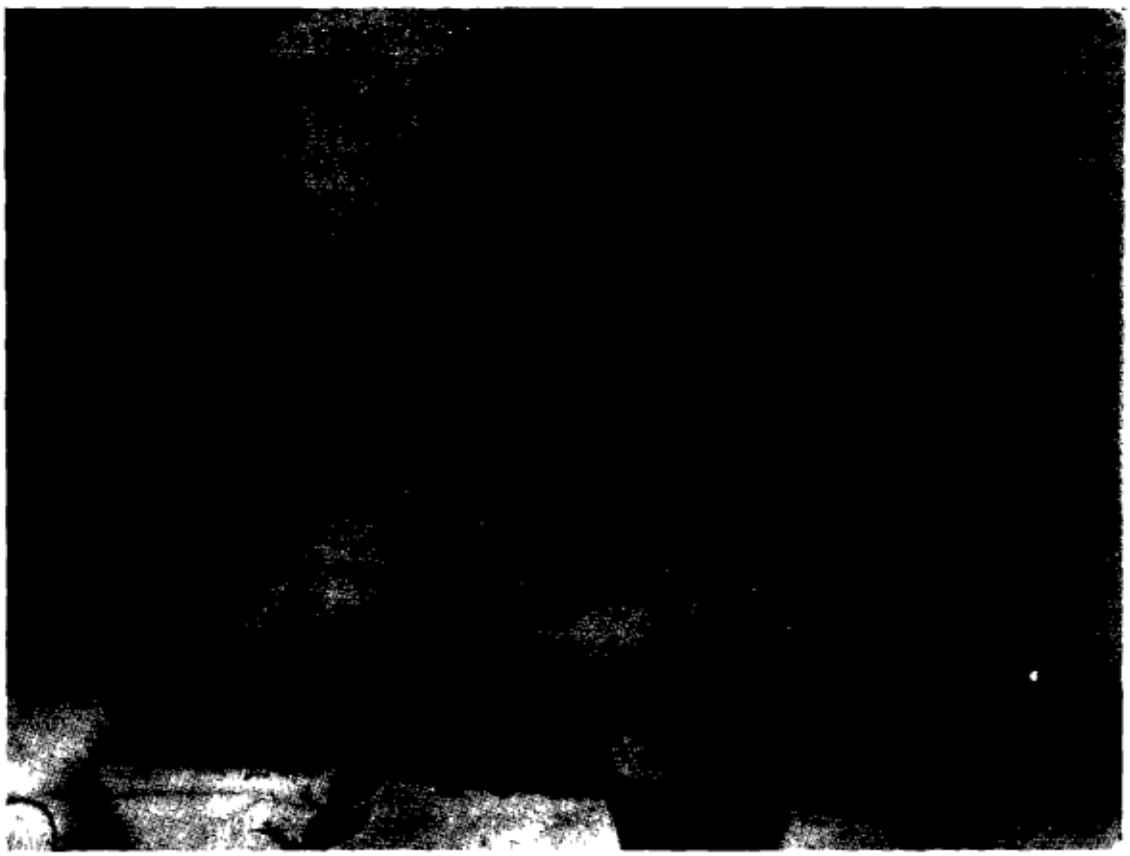
250
88 RE

ISN 4542
250 88KE



Finishing the platform. Note the large size of the platform, the 1-1/2" drain, the outlet and the overflow pipe that can be seen at the far end of the front wall.

2.3 Phase 3 : August - October 1986

In order to find an alternative to the 4" diameter PVC aeration pipe successful experiments were started with a ferrocement channel and lid that totally enclose the handpump spout.

An improved IRP was designed using this lid and channel, an enlarged sedimentation tank and a shallow, downflow filter supported on perforated ferrocement plates. An estimate of the cost showed it to be comparable to the old design.

2.4 Phase 4 : November - December 1986

Building of two improved IRPs and testing to present. Water tends to be slightly cloudy at these plants due to using too large a size of brick chips. The filter run was increased on one IRP by suspending mosquito nets across the sedimentation tank.

2.5 Phase 5 : January - May 1987

Building a further three improved IRP's and testing to present. A smaller size of brick chips was used to ensure clear water.

2.6 Phase 6 : May - June 1987

Building of improved IRPs at old sites (the sites in phase 1 and 2) in order to gain a direct comparison from caretakers and also to re-introduce IRPs to that union where they have a bad name (due to the failure of the previous IRPs).

2.7 Beneficiary Participation

All the new IRPs have been built with varying amounts of beneficiary participation. (see section 5). The IRPs in phase 4 & 5 were all built in a union unfamiliar with IRPs. Beneficiaries are pleased with them but, as with any unfamiliar technology, careful explanation of operating procedures and possible problems is essential.

2.8 Further R & D Work

Although a design suitable for large scale implementation has been achieved, more experimental work can and should be done to further improve the IRP, reduce its cost and obtain more information about its performance. For example:

a) Investigating the use of jute cement (Fibre Reinforced Cement) instead of ferrocement. This is more labour intensive and cheaper than ferrocement. (The channel lid has already been made in this material)

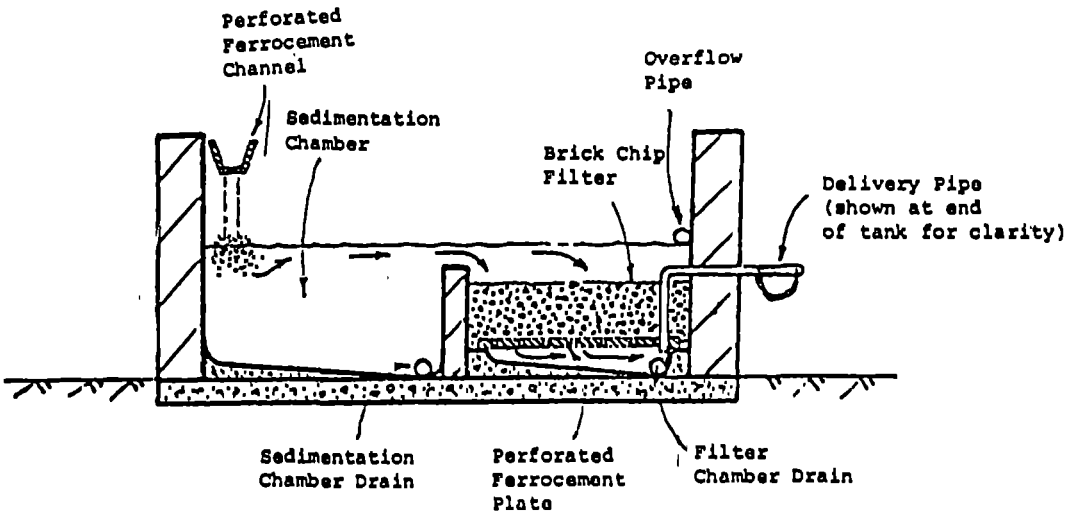
b) Improving aeration by the addition of a channel of brick chips below the aeration channel. At some sites this would increase the iron removal percentage and at all sites it should increase the maximum continuous flow rate for consistent iron removal.

c) Carrying out more tests on the extensive use of netting in the sedimentation tank. This is cheap and very easy to clean.

d) Experimenting with different types of filter media i.e. gravel, rice husks, coconut matting, etc.

Finishing the lid. The ferro-cement channel can be seen clearly in the foreground.

3. DESCRIPTION OF IMPROVED IRP



Sectional side view of improved IRP. (Diagram only)

Water passes from the handpump into a ferrocement channel. This is made at site from a mould and has a ferrocement cover at the handpump end. The water drops through the perforated base of the channel into the sedimentation tank and is aerated as it does so. The aeration causes soluble iron to precipitate out of solution, and form flocs of ferric oxide

Some iron flocs are removed as the water flows across the sedimentation tank, either by sedimentation or, more commonly, by adhesion to the walls and the mosquito nets suspended across the tank. The water then passes over a dividing wall and down through the filter where the rest of the iron flocs are removed.

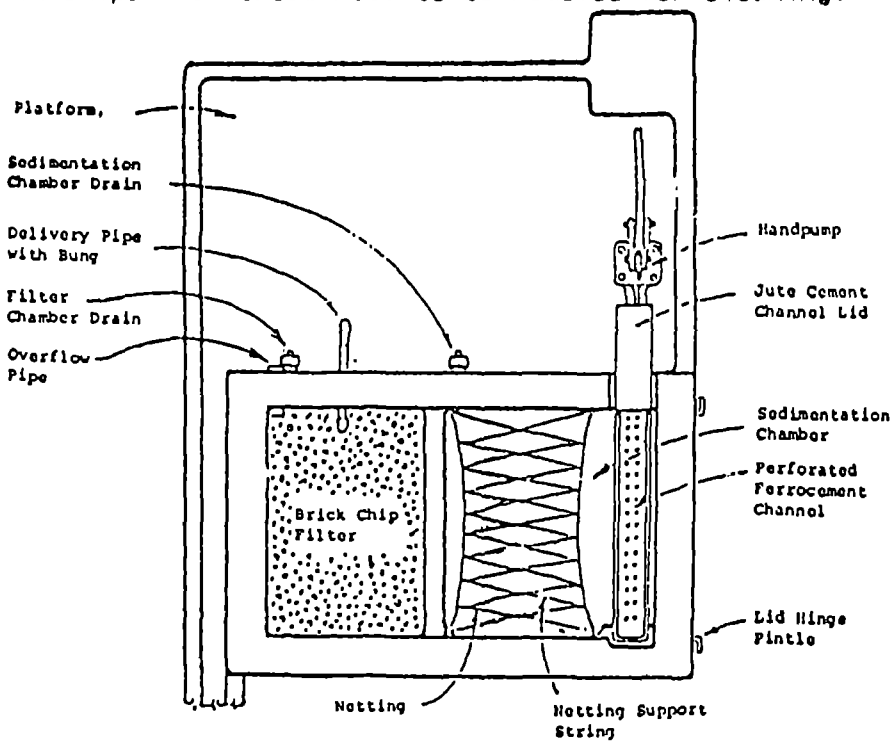
The filter is 8" deep by 23" wide and 33" long. The brick chips are sieved to a size 1/8" - 5/8". The same grade is used throughout for simplicity and maximum use of the filter volume. The brick chips can be removed and replaced without worrying about grading. The filter media rests upon perforated ferro-cement plates supported over a sump to ensure that the entire filter area is used and to make drainage and cleaning easier.

After passing through the filter the treated water is delivered through a 1/2" diameter GI pipe. This is fitted with a tapered wooden bung and the inside of the pipe is machined to a smooth taper to reduce wear and prevent leaks.

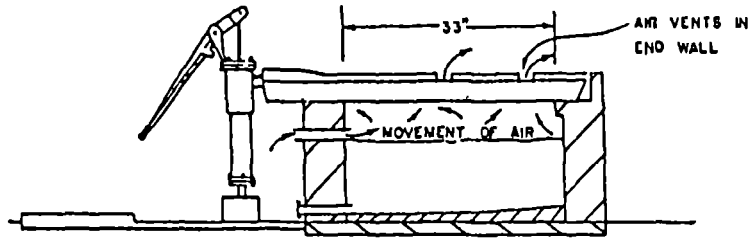
Ordinary plastic or brass taps are of no use as the head of water available is too small for adequate flow. A gate valve works well but soon becomes worn out due to being turned on and off maybe 100 times a day.

A 1-1/2" diameter plastic overflow is provided at a height that ensures that the water level does not become so high that inadequate aeration occurs. Because it is of large diameter it ensures good air circulation through the tank.

A large platform is provided and all outlets (including overflow and drain) of the tank discharge on to it, which prevents the surrounding earth becoming muddy. The platform is big enough to contain all the brick chips when these need to be removed for cleaning.



Plan View of IRP without lid. (Diagram only)



Sectional end view of IRP

The lid is hinged on the IRP and cannot be removed without unbolting the hinges. It is made from wood and corrugated sheet and the inside is painted with coal tar paint to protect it against condensation and termites. It is also provided with a prop to hold it open.

The IRP with the lid propped open. Note the low height that makes cleaning so easy.

Cleaning the IRP is very simple and can be accomplished by one person in well under 3/4 hour; see 'Training of Beneficiaries' for the procedure.

It takes several hours after cleaning for the iron level of treated water to drop to a satisfactory level (under 5 ppm) and maybe up to 1 day before the water is completely clear.

A comparison of the previous and improved designs of IRP is given in Table 1. An outline drawing of the improved IRP is given in Annex 1, and construction costs in Annex 2.

Sl No.	Item	(
1	Aeration/Inlet arrangement	4" dia. (drone t
2.	Charcoal	Bed of c (Users r cost).
3.	Sedimentation	Not usec
4.	Net filter	Not usec
5	Overflow pipe	Not usec
6	Brick chip filter	2 filter one dow 1-1/2" ((Compli grades :
7.	Outlet	1-1/2" I brass o of tap, drained
8	Drains	Three 1 plastic
9.	Platform	Standar extra b on.
10	Height of IRP	Accordi In prac
11	Lid	Two fer (frequ

Ref: IRP.wks/irp

4.2 Performance Details of One Improved IRP

The following performance figures were obtained from tests on one improved IRP. The IRP was fitted with 8 layers of mosquito netting in the sedimentation tank, its filter size was 33" x 23" x 8" deep, chip size was 1/8" - 5/8" and usable storage capacity was 62 l (14 gallons).

The iron content of the raw water was 23 ppm.

The approximate number of beneficiaries was 100.

The maximum possible flow rate was determined by cleaning the IRP, filling it to the maximum operating water level (overflowing) and measuring the discharge at the outlet.

The IRP was then operated normally, drawing off measured quantities of water at regular time intervals and testing the iron content. This gave an indication of iron removal efficiency at a certain withdrawal (treatment) rate.

The IRP was then observed over a period of time under normal conditions to determine the approximate quantity of water used per day, and the length of the filter run (number of days in use before cleaning became necessary).

The results were as follows:

a) The maximum flow rate was 360 lph (80 gph)

b) During simulated "normal" operation, it was found that a treated water quality of 3 ppm Fe (87% removal) was achieved at an average treatment rate (withdrawal rate) of 180 lph (40 gph)

c) The total volume treated during a filter run (normal operation, irrespective of iron removal performance) was estimated at 18,000 l (i.e. observed daily withdrawal x no. of days in filter run).

d) Therefore the hypothetical length of filter run, assuming an average treatment (withdrawal) rate of 180 lph and iron removal from 23 to 3 ppm, is 100 hours operation (18000/180), or approximately 8 days.

e) Assuming water is drawn over a 12-hour period at an average withdrawal rate of 180 lph, the IRP could serve 100 beneficiaries with 21.6 litres per head per day.

5. SITE SELECTION AND BENEFICIARY PARTICIPATION

Sites for IRP construction should be selected according to the following criteria:

a) The beneficiaries should apply formally for an IRP.

b) The tubewell should be a government tubewell and the iron content of the water should be more than 10 ppm.

c) Beneficiaries should understand fully the work involved in building and operating the IRP. Both the benefits and the limitations of the plant should be explained clearly to a gathering of men and women beneficiaries.

Benefits
- rice will be white
- teeth and nails will be clean
- water will smell good and not go cloudy
- soap will lather well
- clothes will be white after washing
- water receptacles will stay clean
- hair will be clean after washing (not sticky)
- large platform will reduce mud around the tubewell

Disadvantages and limitations
- the IRP will have to be cleaned regularly. (Every 5 - 25 days depending on usage and the iron content of the water).
- unless the IRP is shaded, the water will be slightly warm in the late afternoon and evening.
- sometimes the water may be cloudy or contain lumps of iron (e.g. immediately after cleaning, when cleaning is needed or when the IRP has been over used)

d) Beneficiaries should be willing to transport the required quantities of bricks, sand, cement, moulds, sieves and mixing tray to the site from a pick-up point.

e) Beneficiaries should break the required quantity of brick chips and supply unskilled labour as required during constructon; a minimum of one person should be provided all the time to act as helper to the bricklayer, plus extra people as necessary.

f) The beneficiaries should provide two men and two women to be trained in maintenance of the IRP when it is finished.

g) The beneficiaries must take full responsibility for maintenance and repair of the IRP.

Good field work is essential to ensure that beneficiaries participate fully and that they understand the operation of the IRP and their own responsibilities. This is probably the single most important factor determining the success of an IRP. It is also the most difficult to attain.

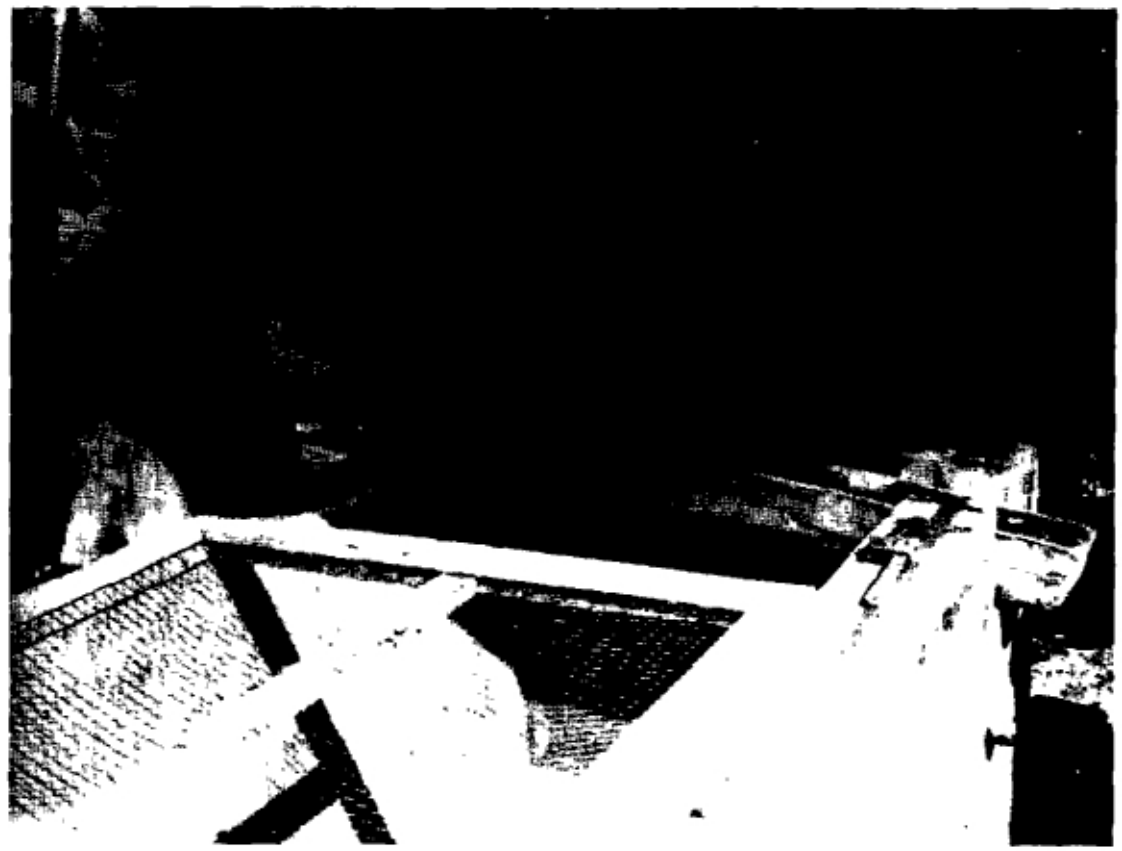
Bad site selection and poor participation of the beneficiaries may lead to :

a) Domination of the IRP by one family
b) Exclusion of the poorer and least motivated beneficiaries
c) Failure of the IRP due to lack of interest, or misunderstanding of its operation, maintenance and capability.
4) Dependence on DPHE for maintenance and repair
5) Failure of the IRP due to overuse.

It is important that, after completion, the IRPs should be visited occasionally to sort out any operational problems. e.g. beneficiaries may be concerned to know why a neighbouring IRP has a far longer filter run than theirs, or why water is cloudy at times.

The beneficiaries should feel free to contact the DPHE SAE or mechanics for advice on IRP operation.

In a new area, it is a good idea to select sites fairly close together so that beneficiaries can compare their IRPs and learn from each other. It also makes organisation and transport of materials easier. The selection of sites at public places can create a lot of interest in a new area. e.g. outside union parishad offices, mosques and schools.



A large sieve (not part of the IRP) in position ready for sieving the filter khoa during construction. Note that the ferrocement channel at the back is in the retracted position for easy access to the handpump, so that tubewell water can be drawn directly during cleaning of the filter.

6. OPERATION, CLEANING AND MAINTENANCE

The IRP is designed to be operated, cleaned and maintained by the beneficiaries themselves. The beneficiaries must therefore be involved in the construction, to help them understand the IRP and how to look after it. They must also be trained in how to use the IRP.

6.1 IRP Operation

The following points should be explained carefully to the beneficiaries, with a practical demonstration:

a) Keep the lid closed at all times unless cleaning the IRP.

b) Pump an equivalent amount into the tank, as water is drawn from the outlet.

c) Always replace the wooden bung to prevent loss of water.

d) Never block the overflow to store more water as this will reduce aeration and the effectiveness of the IRP.

e) Do not allow any one to put their hands in the water or to get inside the tank unless they are clean and have a good reason to. Especially do not allow any one to stand on the filter bed as this could break the ferro-cement perforated plates underneath.

f) Be careful when handling the ferro-cement aeration channel and channel lid as they can be broken easily. Also always shut the IRP lid gently to avoid damage to the lid, tank and hinges or to any children in the way !

g) Use the IRP water for all purposes.

A simple explanation of the operating principles of the IRP should be given, e.g.:

a) Iron is dissolved in underground water and so the water looks clean.

b) The water is mixed with air by dropping into the tank from the channel.

c) The air and iron combine in a chemical reaction and the iron is separated from the water.

d) The iron is removed by sedimentation in the large chamber and filtration through the brick chips.

6.2 IRP Cleaning

It is essential that the Caretaker Family is trained to clean the IRP. Both men and women should be trained. The IRP should be cleaned whenever the treated water becomes too cloudy, has lumps of iron floc or the flow is too slow.

The cleaning procedure is as follows:

a) Open lid and slide aeration channel clear of handpump to allow water to be drawn by bucket direct from the handpump.

b) Remove filter drain cap with wrench.

c) For IRPs without nets in sedimentation tank:-

Using a bucket, flush the filter with water from the sedimentation tank, then with clean tubewell water, until the filter drain water is fairly clean.

For IRPs with nets in sedimentation tank:-

Shake the nets vigorously until all the iron flocs have dropped off. Flush the filter with clean tubewell water until the filter drain water is fairly clean.

d) Remove sedimentation chamber drain cap and flush with clean water from the tubewell.

e) Replace drain caps using jute or cloth on the threads to prevent leaks and seizing of threads.

f) Wash the platform and platform drain.

g) Clean dust and insects from inside the tank and lid.

h) Replace the channel, fill the tank and close the lid.

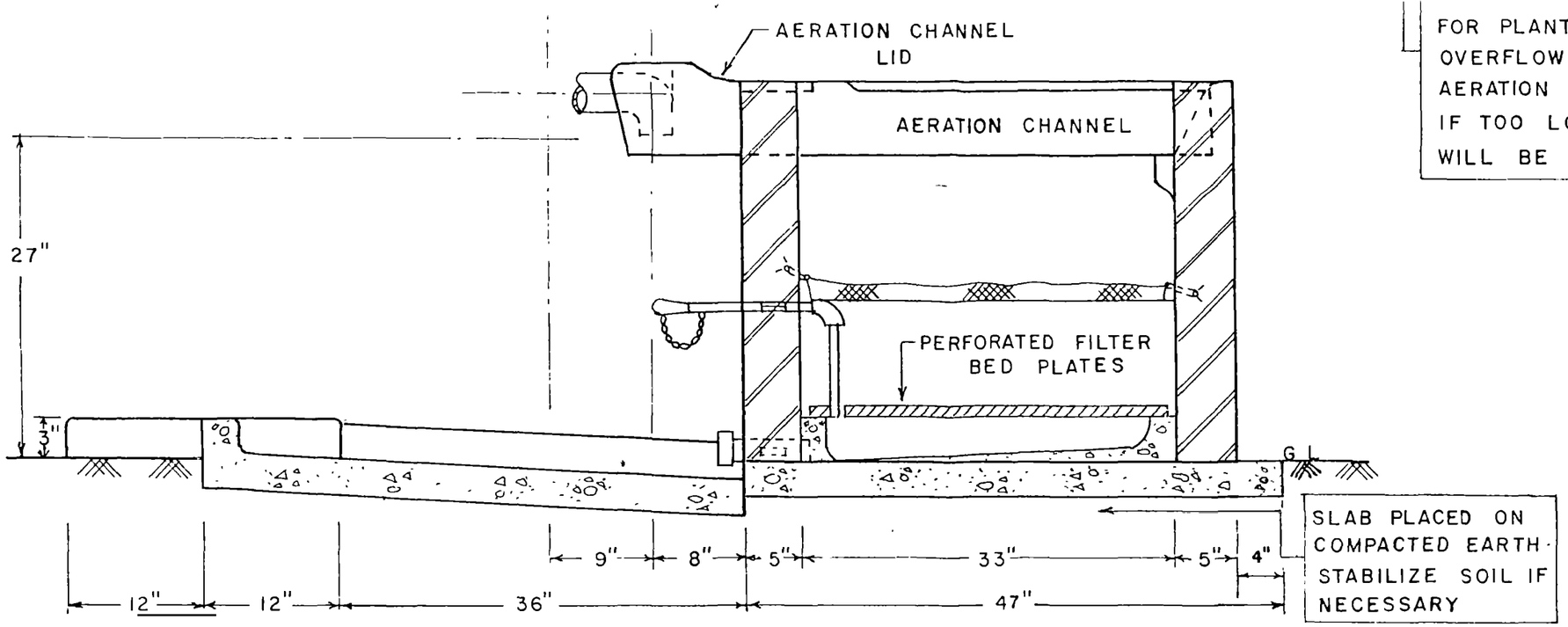
It is quite possible for one person to clean the IRP and refill the tank in under 1/2 hour. Periodically, it may be necessary to remove the filter media, wash it with clean water on the platform and replace it in the filter chamber.

6.3 IRP Maintenance

If the IRP has been properly constructed, the only items likely to need repair are the movable parts, i.e. the ferrocement channel, ferrocement filter plates and the lid. The repair of the lid should be within the competence of any local carpenter. Advice should, however, be given on the repair of the ferrocement parts, namely to clean off all traces of iron deposit, chip the edges to an angle, soak in water, grout, repair with strong cement mortar and cure.

The pump handle fulcrum pins should be oiled regularly with any type of oil (mustard oil works well). This will prevent the handle from wearing out so fast and make pumping very easy.

FOR PLANT PERFORMANCE. IF OVERFLOW PLACED TOO HIGH, AERATION WILL BE REDUCED. IF TOO LOW, DELIVERY FLOW WILL BE REDUCED.

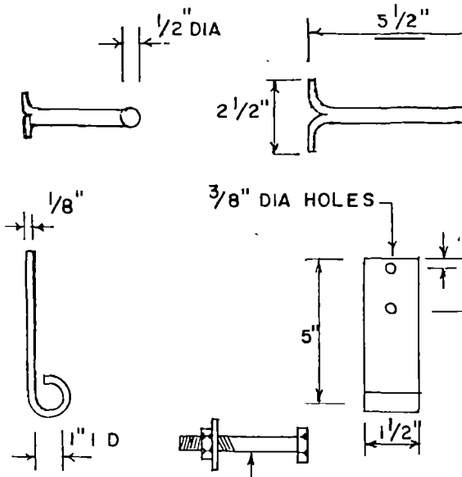


SECTION X-X

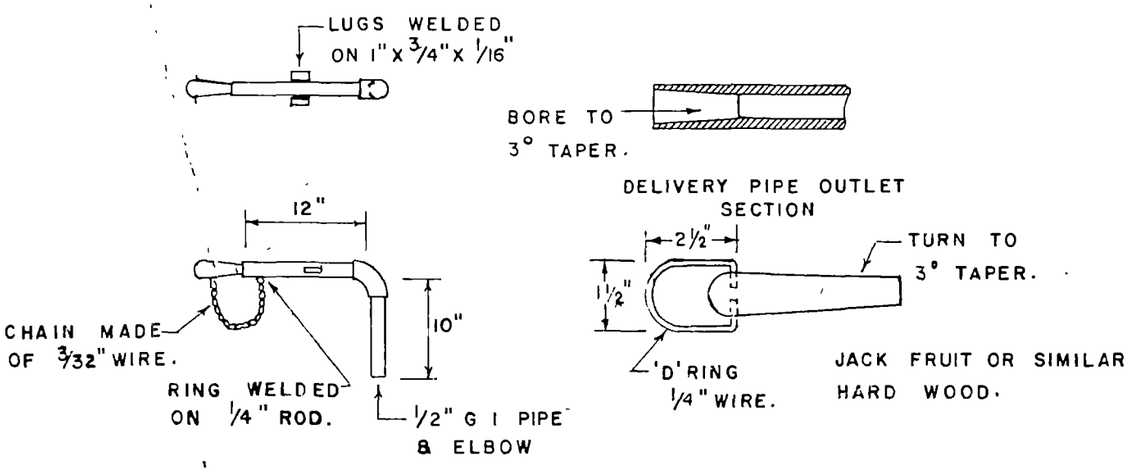
WITHOUT LID
OR BRICK CHIPS

LID HINGE DETAILS

(MILD STEEL)



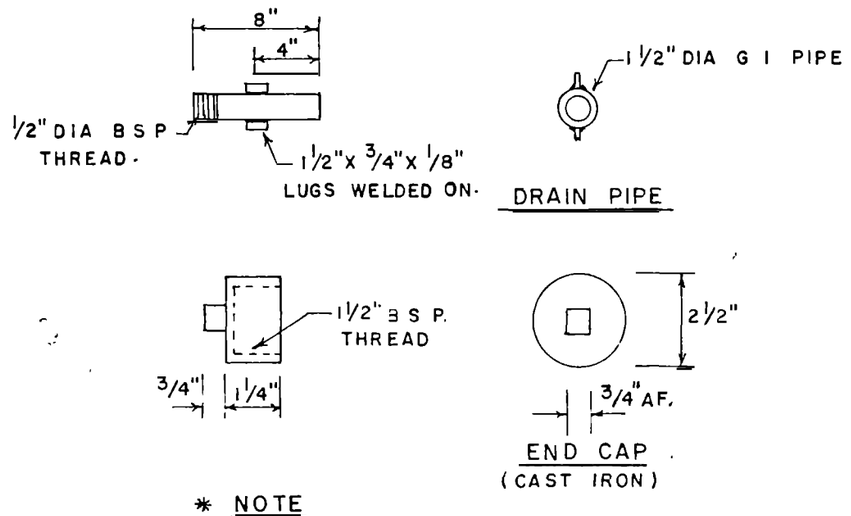
DETAILS OF DELIVERY PIPE



* NOTE

ENSURE THE PIPE IS CLEAN & FREE OF GREASE BEFORE CEMENTING.

DETAILS OF FLUSHING DRAIN

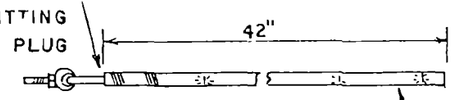


* NOTE

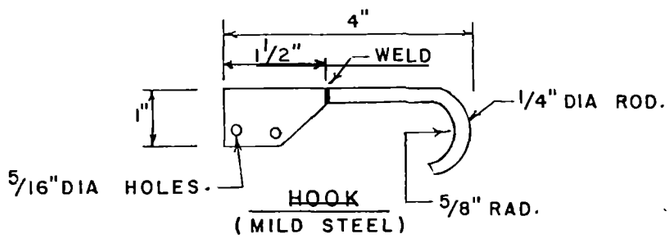
ENSURE THE PIPE IS CLEAN & FREE OF GREASE BEFORE CEMENTING.

CUT RECES FOR CHANNE LID.

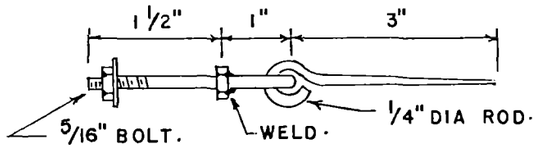
WIRE TO STOP SPLITTING
WEDGE IN WOODEN PLUG
& HINGE TIGHTLY



PROP ASSEMBLY

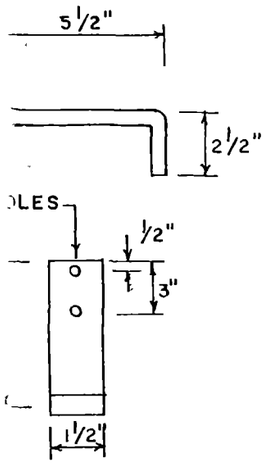


HOOK
(MILD STEEL)



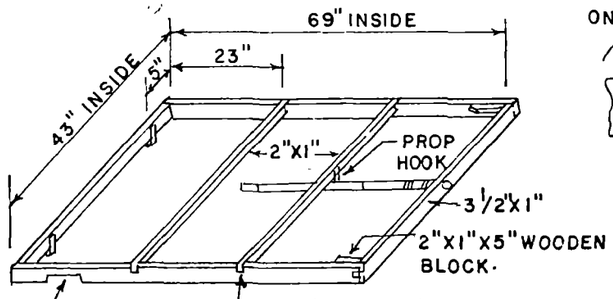
HINGE
(MILD STEEL)

-S



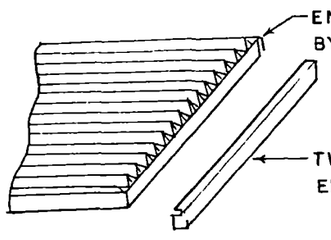
x 5/16" BOLT
3 FLAT WASHER.

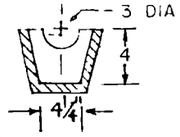
LID ASSEMBLY



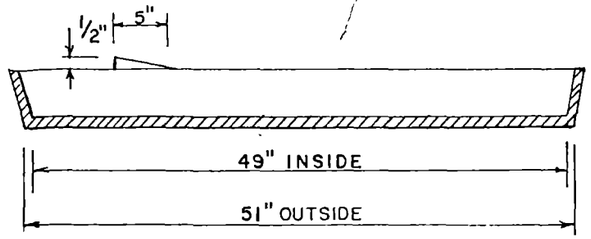
USE DOVETAIL JOINTS ON CORNERS

USE MANGO WOOD FOR THE FRAME. PAINT WITH LOCALLY AVAILABLE WOOD PRESERVATIVE.



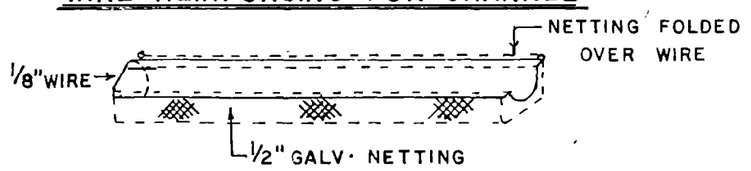


SECTION Y-Y



SECTION X-X

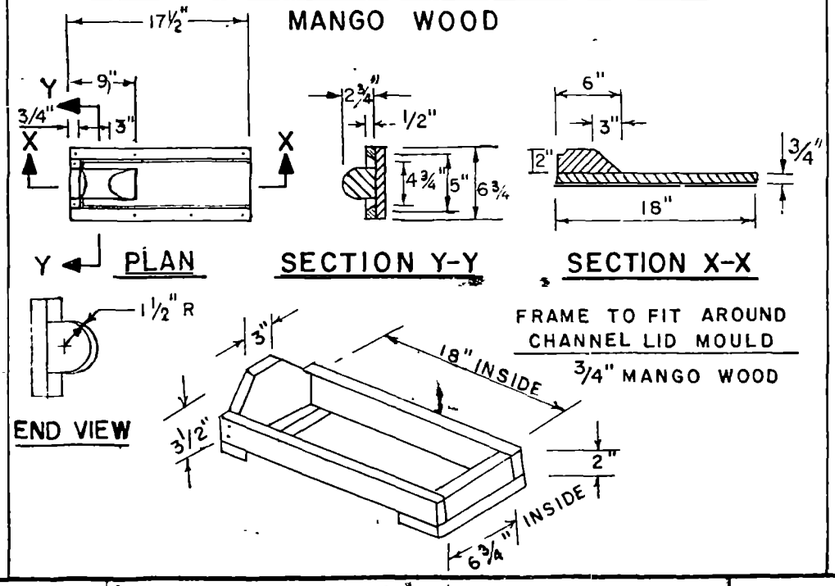
WIRE REINFORCING FOR CHANNEL



1. USE MOULD TO FORM REINFORCING WIRE SHAPE.
2. OIL INSIDE MOULD OR USE POLYTHENE SHEET.
3. PLASTER INSIDE MOULD – 1 CEMENT : 2 SAND ¾" THICK.
4. LAY IN REINFORCING & PLASTER TO ¾" THICKNESS. LEVEL WITH TOP OF MOULD.
5. MAKE 32 HOLES 5/16" DIA. AS IN MAIN DRAWING
6. CURE FOR 2 WEEKS.

CHANNEL LID MOULD – FERROCEMENT OR JUTE CEMENT

MANGO WOOD



HOOK FOR LID PROP . . . .

½"X8" WOOD SCREWS . . . . . .

COAL TAR PAINT . . . . . .

½" GALV. WIRE NETTING — CHANNEL 1'-6"X
PERFORATED PLA

⅛" OR 10 GAUGE WIRE — CHANNEL 5'-4"
PERFORATED PLA

MOSQUITO COMPLETE WITH WEIGHTS & STRI

NYLON STRING . . . . . .

BINDING WIRE . . . .

TOOLS / MOULDS REQUIF

CHANNEL MOULD . . . . . .

CHANNEL LID MOULD . . . . . .

PERFORATED PLATE MOULD . . .

MIXING PLATFORM . . . . . .

SMALL FLOAT FOR CHANNEL MOULD . .

⅛" SIEVE . . . . . .

⅝" SIEVE . . .

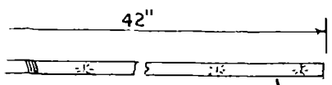
S.E./P.E
May be approved
E.E. P.H.E. V.S.-II

DPHE
GOVERNMENT OF BANGLADESH
DHAKA

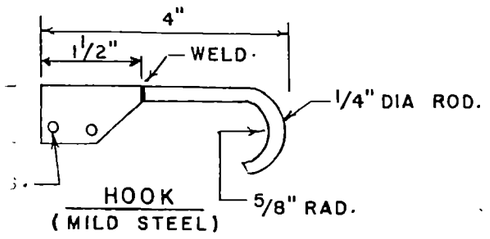
UNICEF
G P O BOX 58
DHAKA
BANGLADESH

DRAWN BY : MD. SALIM / BEN YOUNG	SCALE: MAIN DRGS
APPROVED BY: C. E. DPHE	
APPROVED BY: C. E GLENNIE UNICEF	DRG. NO.

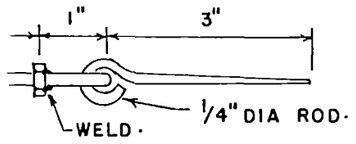
LID PROP DETAILS



PROP ASSEMBLY



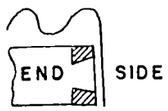
HOOK
(MILD STEEL)

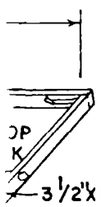


HINGE
(MILD STEEL)

BLY

USE DOVETAIL JOINTS
ON CORNERS.



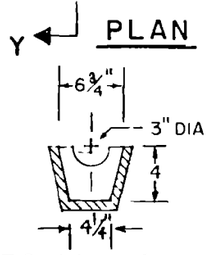


"x1"x5" WOODEN
LOCK.

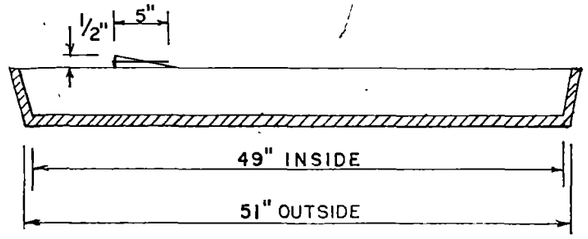
USE MANGO WOOD FOR
THE FRAME. PAINT WITH
LOCALLY AVAILABLE
WOOD PRESERVATIVE.

NEATLY SEALED
UTTING & FLATTENING.

G I SHEET
PIECES.

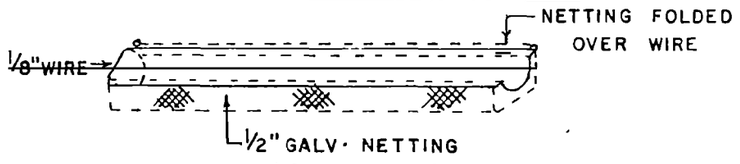


SECTION Y-Y



SECTION X-X

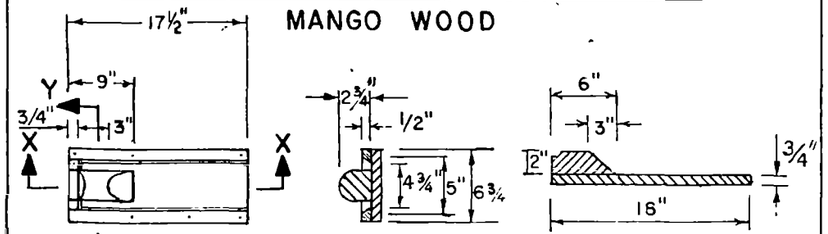
WIRE REINFORCING FOR CHANNEL

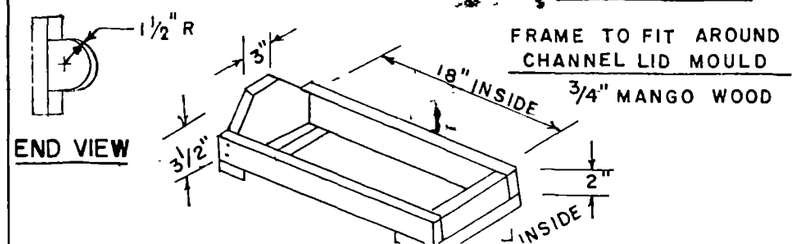


① USE MOULD TO FORM REINFORCING WIRE SHAPE.
② OIL INSIDE MOULD OR USE POLYTHENE SHEET.
③ PLASTER INSIDE MOULD - 1 CEMENT : 2 SAND ¾" THICK.
④ LAY IN REINFORCING & PLASTER TO ¾" THICKNESS. LEVEL WITH TOP OF MOULD.
⑤ MAKE 32 HOLES 5/16" DIA. AS IN MAIN DRAWING.
⑥ CURE FOR 2 WEEKS.

CHANNEL LID MOULD – FERROCEMENT OR JUTE CEMENT

MANGO WOOD





FRAME TO FIT AROUND
CHANNEL LID MOULD
¾" MANGO WOOD

BOLT, NUT & FLAT WASHER (2"x½")		4 nos.
3'-6" HINGE FITTED BAMBOO LID PROP		1 ,,
HOOK FOR LID PROP		1 ,,
½"x8" WOOD SCREWS		2 ,,
COAL TAR PAINT		1 seer
½" GALV. WIRE NETTING	CHANNEL 1'-6"x4'-6"	1 piece
	PERFORATED PLATE 1'-6"x1'-10"	2 ,,
⅛" OR 10 GAUGE WIRE	CHANNEL 5'-4"	2 ,,
	PERFORATED PLATE 6'-4"	2 ,,
MOSQUITO COMPLETE WITH WEIGHTS & STRING		as reqd.
NYLON STRING		as reqd.
BINDING WIRE		as reqd

TOOLS / MOULDS REQUIRED

CHANNEL MOULD	1 nos.
CHANNEL LID MOULD	1 ,,
PERFORATED PLATE MOULD	2 ,,
MIXING PLATFORM	1 ,,
SMALL FLOAT FOR CHANNEL MOULD	1 ,,
⅛" SIEVE	1 ,,
5/8" SIEVE	1 ,,

S.E/P.E
May be approved
E.E P.E Vis-II

DPHE
GOVERNMENT OF BANGLADESH
DHAKA

UNICEF
G.P O BOX 58
DHAKA
BANGLADESH

IRON REMOVAL PLANT

~~DRAWN BY : MD. SALIM / BEN YOUNG~~	SCALE: MAIN DRGS. 1"=1'-0"	OTHERS: NOT TO SCALE
APPROVED BY: C.E. DPHE		

ALTERNATIVE PLATFORM DRAIN POSITIONS

Y

1½"

5" 4"

9"

9"

75"

HANDPUMP CENTRE LINE

NYLON LOOPS EMBEDDED IN WALLS

SEDIMENTATION CHAMBER

NETTING (SEE NOTE)

PLATFORM

FLUSHING DRAIN

FILTER CHAMBER

X

X

DELIVERY PIPE

FLUSHING DRAIN

OVERFLOW

3"

PLATFORM DRAIN

PLAN

Y

AERATION CHANNEL LID

AERATION CHANNEL

PERFORATED FILTER BED PLATES

27"

WALL RECESSED TO HOLD LID PROP

5"

* 8"

30" * 3"

2"

8"

4"

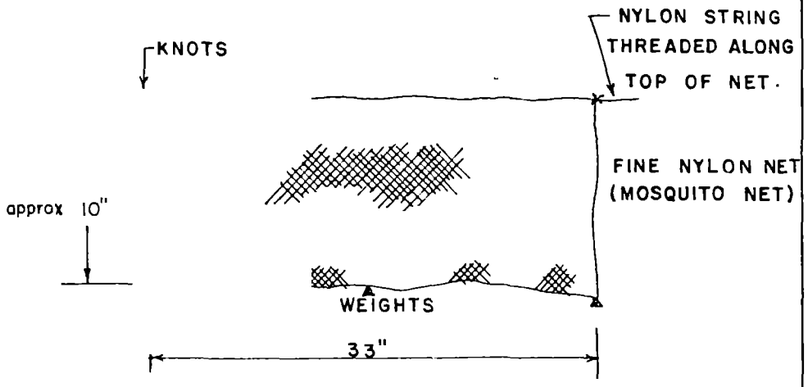
5" 23" 3"

68"

SECTION Y

HEIGHTS OF OVERFLOW AND DELIVERY PIPE ARE CRITICAL FOR PLANT PERFORMANCE. IF OVERFLOW PLACED TOO HIGH, AERATION WILL BE REDUCED. IF TOO LOW, DELIVERY FLOW WILL BE REDUCED.

DETAILS OF NETTING



* NOTE

THESE NETS NEED ONLY BE USED WHERE RAW WATER IRON CONTENT EXCEEDS 15 P.P.M

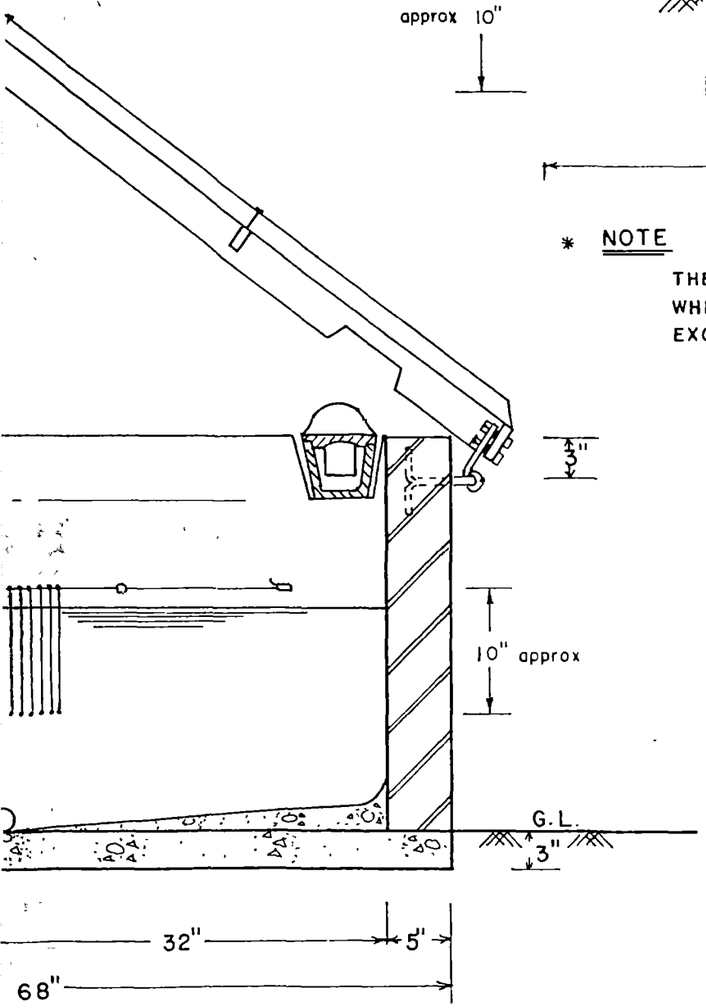
BRICK CHIP FILTER DETAILS

8" DEEP	MADE OF FIRST
1/8"- 5/8"	CLASS BRICKS

GRAVEL SHOULD WORK JUST AS WELL. A MORE EVEN GRADING SHOULD GIVE BETTER PERFORMANCE. i.e. 1/8"- 1/4"

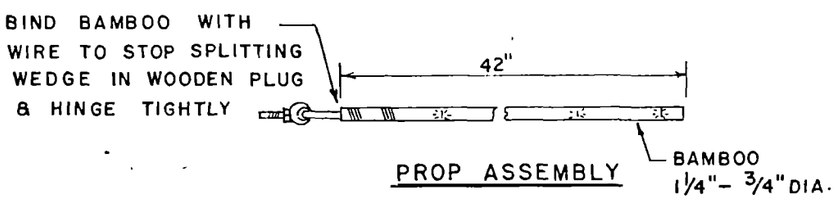
* NOTE

DO NOT USE A SIZE LESS THAN 1/8"

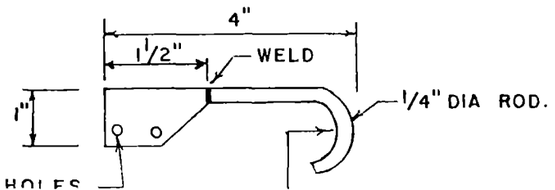


CTION Y-Y

LID PROP DETAILS



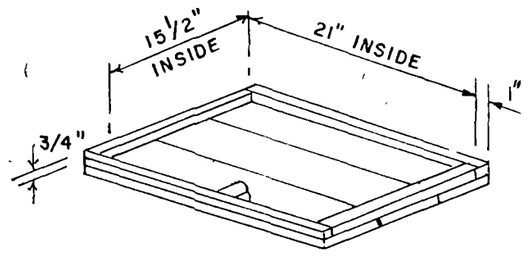
PROP ASSEMBLY



FERROCEMENT ITEMS

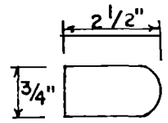
PERFORATED PLATE DETAILS – 2 REQD.

REINFORCEMENT – MAKE 1/8" WIRE FRAME AROUND EDGE AND COVER WITH ONE LAYER OF 1/2" GALVANISED WIRE MESH. MAKE PLATES USING THE METHOD DESCRIBED IN FERROCEMENT CHANNEL DETAILS. MAKE 80 HOLE 1/4" DIA AS SHOWN IN THE MAIN DRAWING.

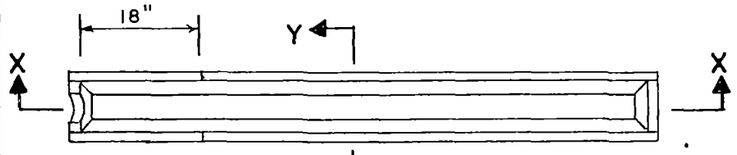


PERFORATED PLATE MOULD

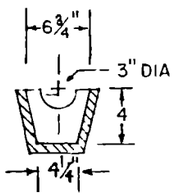
ONE MOULD IN CENTRE OF LONG SIDE (TO PROVIDE GAP FOR DELIVERY PIPE)



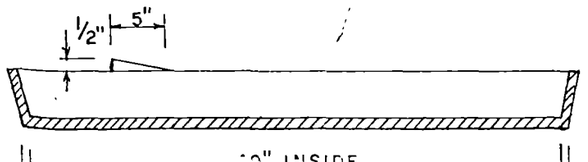
CHANNEL MOULD DETAILS
3/4" MANGO WOOD



PLAN



SECTION Y-Y



MATERIALS REQUIRED FOR AN IRON REMOV

FIRST CLASS BRICKS ... FOR MAS
FOR AGGF
FOR FILT

CEMENT .....

SAND .....

CEMENT RATIOS

CONCRETE	5 : 2 1/2 : 1
MORTAR	4 : 1
FERROCEMENT	3 : 1
PLASTER (OUTSIDE)	4 : 1
PLASTER (INSIDE)	3 1

WOOD : (Mango or similar inexpensive va

CORRUGATED G.I SHEET 6' X 3' X 26 S

1 1/2" Ø G I DRAIN PIPE .....

1 1/2" Ø G I END CAP .....

12" x 1/2" Ø G I DELIVERY PIPE (Complet
10" x 1/2" Ø G I DELIVERY PIPE ...

1/2" Ø G.I. ELBOW .....

6" X 1 1/2" Ø P.V C. OVERFLOW PIPE

NYLON ROPE LOOP .....

LID HINGE .....

BOLT, NUT & FLAT WASHER (2" X 1/2")

3'-6" HINGE FITTED BAMBOO LID PRC

HOOK FOR LID PROP .....

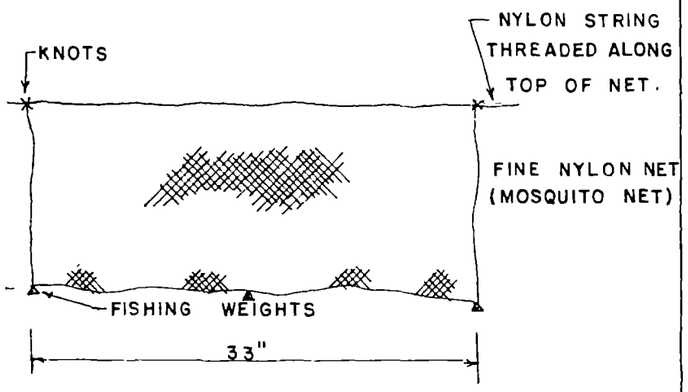
1/2" X 8" WOOD SCREWS .....

COAL TAR PAINT .....

1/2" GALV WIRE NETTING CHANNEL
PERFORATE

1/8" OR 10 GAUGE WIRE CHANNEL
PERFORATE

DETAILS OF NETTING



* NOTE

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BRICK CHIP FILTER DETAILS

3"

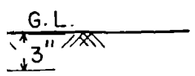
8" DEEP	MADE OF FIRST
1/8"- 5/8"	CLASS BRICKS

GRAVEL SHOULD WORK JUST AS WELL. A MORE EVEN GRADING SHOULD GIVE BETTER PERFORMANCE i.e. 1/8"- 1/4"

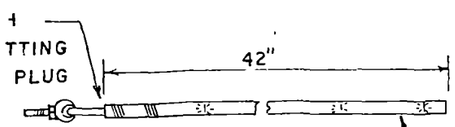
approx

* NOTE

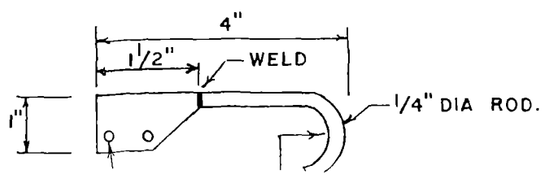
DO NOT USE A SIZE LESS THAN 1/8"



LID PROP DETAILS



PROP ASSEMBLY



FERROCEMENT ITEMS

PERFORATED PLATE DETAILS—2 REQD.

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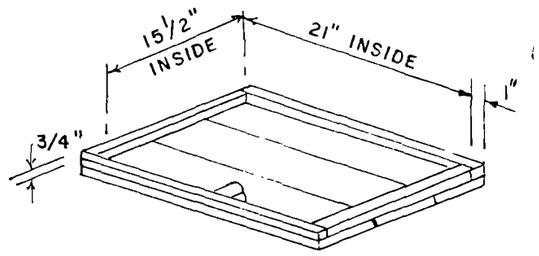
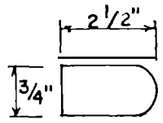
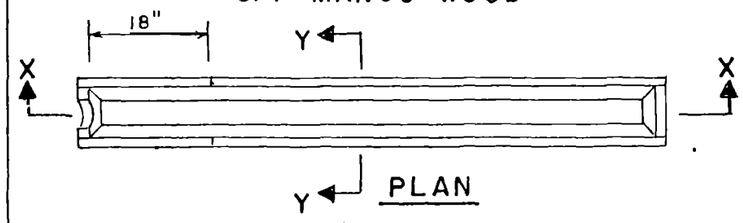


PERFORATED PLATE MOULD

ONE MOULD IN CENTRE OF LONG SIDE (TO PROVIDE GAP FOR DELIVERY PIPE)



CHANNEL MOULD DETAILS
3/4" MANGO WOOD



MATERIALS REQUIRED FOR CONSTRUCTION OF AN IRON REMOVAL PLANT

FIRST CLASS BRICKS	FOR MASONRY	200	350 nos.
	FOR AGGREGATE CHIPS (10 c ft)	100	
	FOR FILTER CHIPS (5 cft, 1/8"-5/8")	50	
CEMENT			5 bags.
SAND			20 cft

CEMENT RATIOS

CONCRETE — 5 : 2 1/2 . 1

MORTAR — 4 : 1

FERROCEMENT — 3 : 1

PLASTER — 4 : 1 (OUTSIDE)

PLASTER — 3 1 (INSIDE)

NEAT CEMENT FINISHING

OUT SIDE

PLATFORM & ALL FRONT WALL, THREE SIDES 10" HIGH.

INSIDE

CHANNEL AREA FULL HEIGHT REMAINING WALLS 19" HIGH.

WOOD : (Mango or similar inexpensive variety)	3 1/2" X 1" X 72"	2 pieces
	2" X 1" X 48"	4 pieces
CORRUGATED G.I SHEET 6' X 3' X 26 SWG		2 pieces
1 1/2" Ø G I. DRAIN PIPE		2 nos
1 1/2" Ø G I END CAP		2 nos
12" x 1/2" Ø G I DELIVERY PIPE (Complete with wooden bung & chain)		1 ,,
10" x 1/2" Ø G I DELIVERY PIPE		1 ,,
1/2" Ø G I ELBOW		1 ,,
6" X 1 1/2" Ø P.V.C. OVERFLOW PIPE		1 ,,
NYLON ROPE LOOP		4 ,,
LID HINGE		2 pairs
BOLT, NUT & FLAT WASHER (2" x 1/2")		4 nos
3'-6" HINGE FITTED BAMBOO LID PROP		1 ,,
HOOK FOR LID PROP		1 ,,
1/2" X 8" WOOD SCREWS		2 ,,
COAL TAR PAINT		1 seer
1/2" GALV WIRE NETTING	CHANNEL 1'-6" X 4'-6"	1 piece
	PERFORATED PLATE 1'-6" X 1'-10"	2 ,,
1/8" OR 10 GAUGE WIRE	CHANNEL 5'-4"	2 ,,
	PERFORATED PLATE 6'-4"	2 ,,

7. CONCLUSION AND RECOMMENDATIONS

1 The improved IRP design is now suitable for adoption as the standard design for a regular, large scale IRP construction programme.

2. The overall performance of the new IRP is a great improvement on the old design and is acceptable to beneficiaries. However, if too many people use it the treated water will tend to have a high iron content and the IRP will need frequent cleaning.

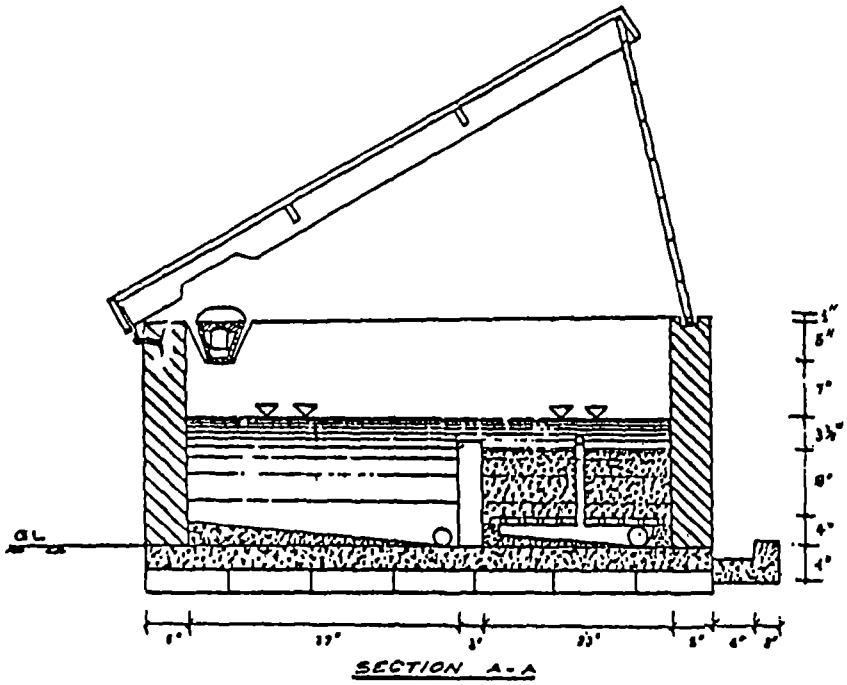
3. Experience has shown that if the IRP is constructed badly it will start leaking early on and will probably be abandoned. To avoid this, mistris should be under close supervision and paid on a daily basis.

4. In order to ensure a high standard of construction and adequate instruction of beneficiaries an extensive inspection programme should be maintained by DPHE whereby every IRP built is inspected during construction, after completion, once a month for six months after construction and at six monthly intervals thereafter.

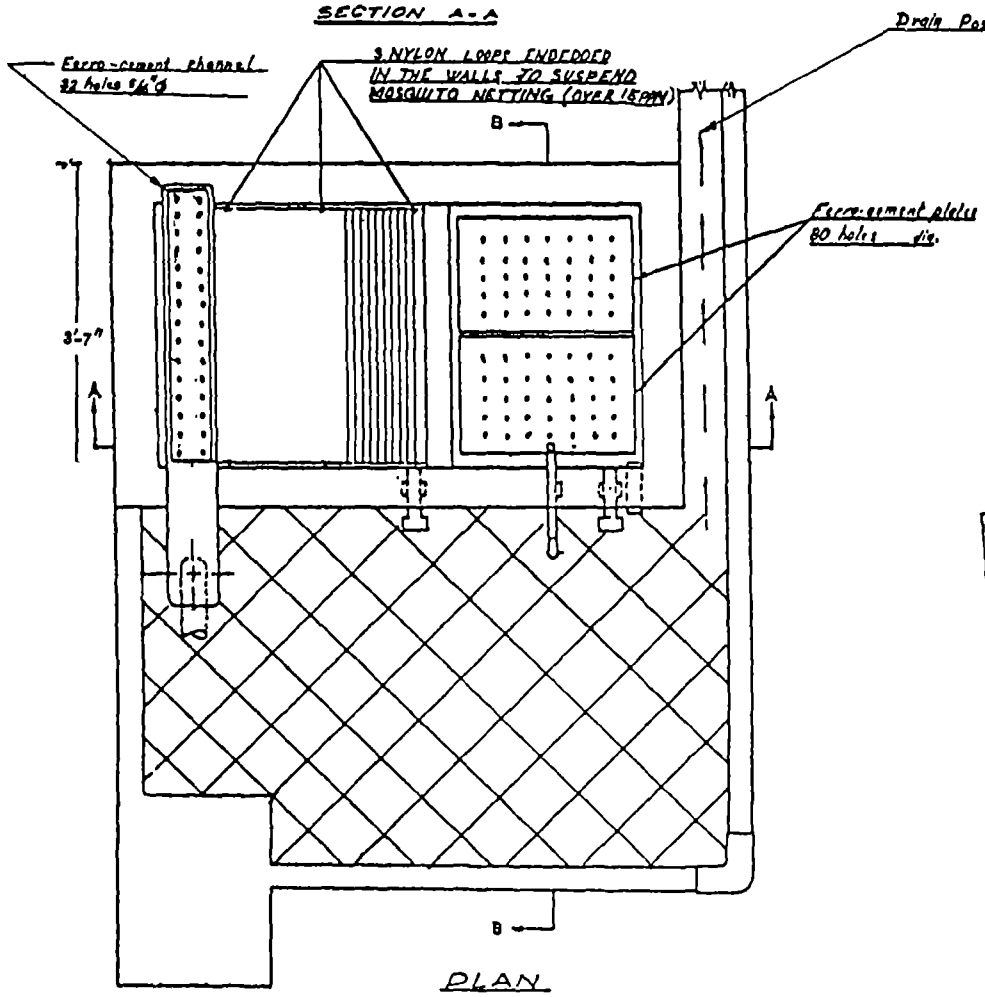
5. In order to establish the design, to ensure adequate coverage and to test the administrative procedures, the construction programme should be restricted to a small area for the first one or two years.

6. Research and Development activities on the IRP should continue in Sirajgonj upazila and any further improvements should be introduced to the regular IRP construction programme..

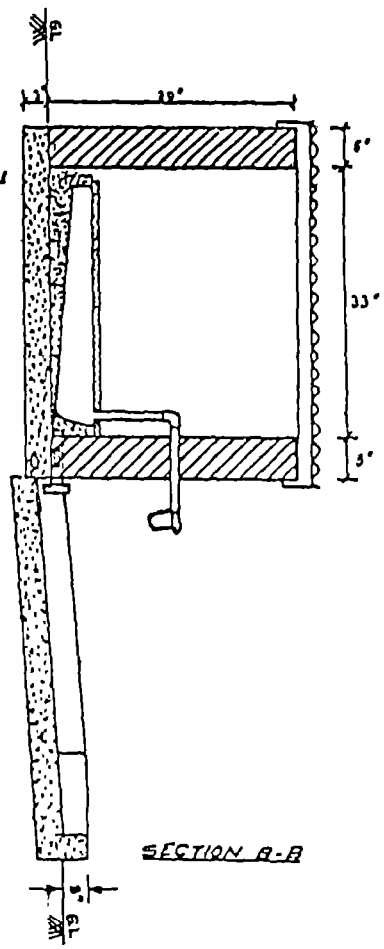
IRON REMOVAL PLANT



SECTION A-A



PLAN



SECTION B-B

Annex 2

Materials and Cost of Improved IRP

	Item	Quantity	Rate (Taka)	Cost (Taka)
1.	1st class bricks	350 nos.	1400 per 1000	490
2.*	Sand (best quality)	20 cft.	300 per 100 cft.	60
3.	Portland cement	5 bags	120 per bag	600
4.*	'Khoa' making	10 cft.	3 per cft.	30
5.	1/8-5/8" 1st class 'Khoa'	5 cft.	15 per cft.	60
6.	Mango wood	0.6 cft.	140 per cft.	84
7.+	CGI sheet 6'x3'x26 SWG	2 nos.	120	240
8.+	8"x1-1/2" dia GI drain pipe t.o.e.	2 nos.	15	30
9.	1-1/2" dia GI cap	2 nos.	10	20
10.	12"x1/2" dia GI delivery pipe t.o.e. with bung and chain	1 no.	20	20
11.	10"x1/2" dia GI delivery pipe t.o.e.	1 no.	15 per ft.	13
12.	1/2" dia GI elbow	1 no.	7	7
13.+	8"x1-1/2" dia PVC overflow pipe	1 no.	4	4
14.	Nylon rope loop	-	L.S.	4
15.	Lid hinges	2 nos.	12	24
16.	2"x1-1/4" bolt, nut and flat washers	4 nos.	2.5	10
17.*	4' bamboo lid prop	1 no.	10	10
18.	Hinge for lid prop	1 no.	4	4
19.	Hook for lid prop	1 no.	2	2
20.*	Coal tar paint (or equivalent)	1 seer	15 per seer	15
21.+	1/2" galv. wire mesh	12 sft	2 per sft	24
22.+	1/8" dia or No. 10 gauge wire	25 ft	0.4 per ft	10
23.+	Binding wire	as reqd	L.S.	1
24.	Mosquito Netting	as reqd	L.S.	25
25.	Mason	5 days	60	300
26.*	Helper	5 days	35	175
27.	Carpenter	as reqd	L.S.	100
28.*	Carriage	as reqd	L.S.	180
29.	Contingencies		L.S.	208
			Total cost: Taka	2,750
			(Old IRP total cost: Taka	2,400)

* Items provided by beneficiaries, value Tk. 470, or 17% of total.

\+ Items available in DPHE Stock, value Tk. 909