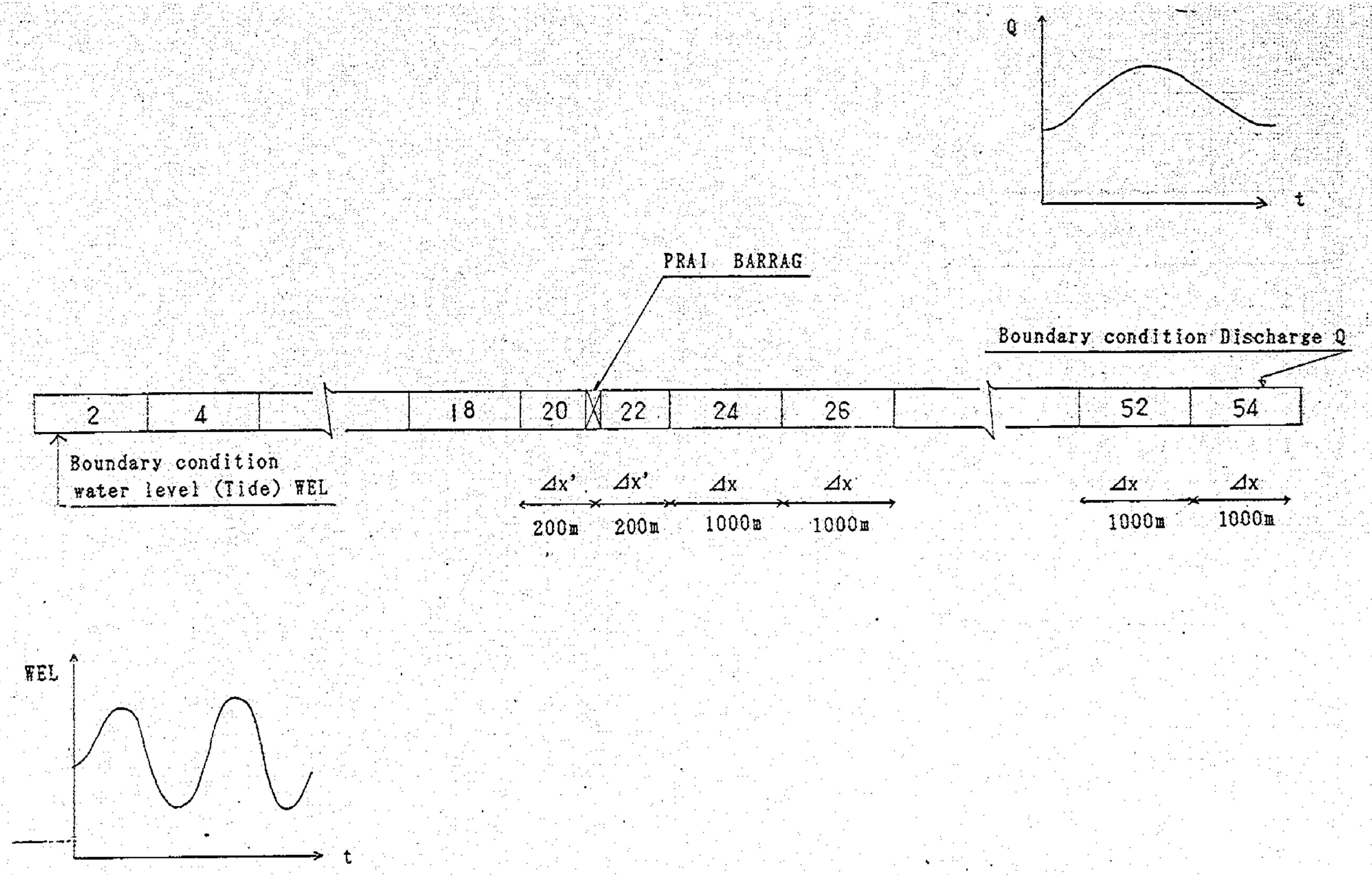
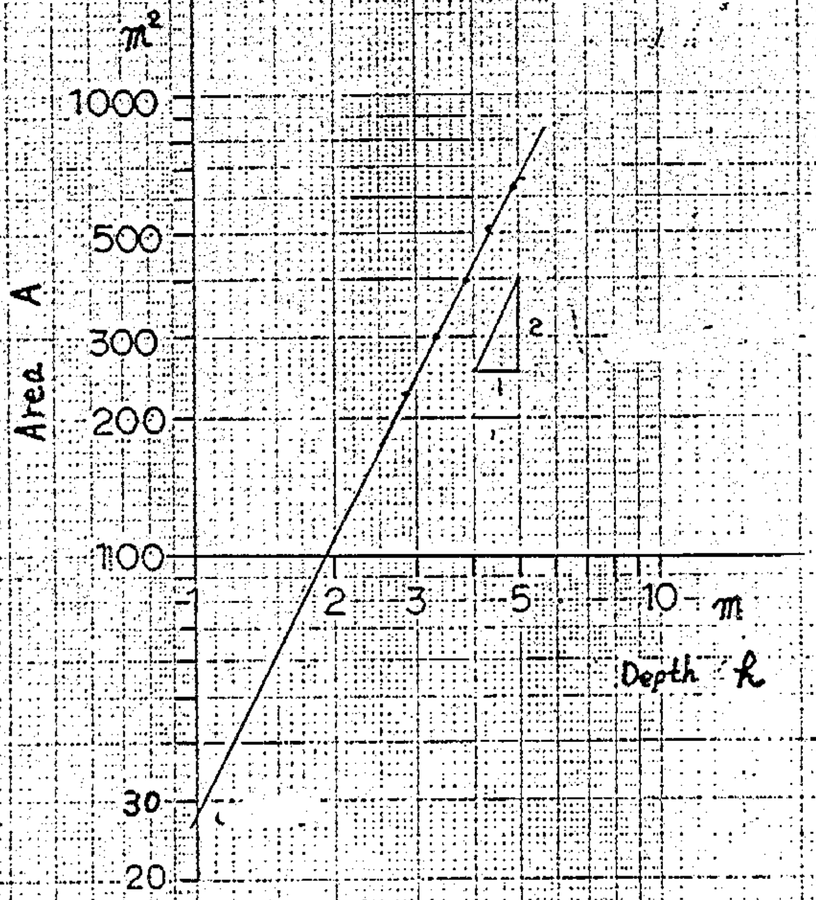



Fig.5-1-3 Schematic diagram of simulation model (w-q)




Cross section area

| h | $29.4 \times h^{1.94}$ | A |
|---|---|---|
| 4.8 | 616.5 | 629.27 |
| 4.3 | 498.1 | 503.59 |
| 3.8 | 391.9 | 391.83 |
| 3.3 | 298.0 | 294.91 |
| 2.8 | 216.7 | 224.15 |

Fig.5-2-1 Reration of water depth and crass section area

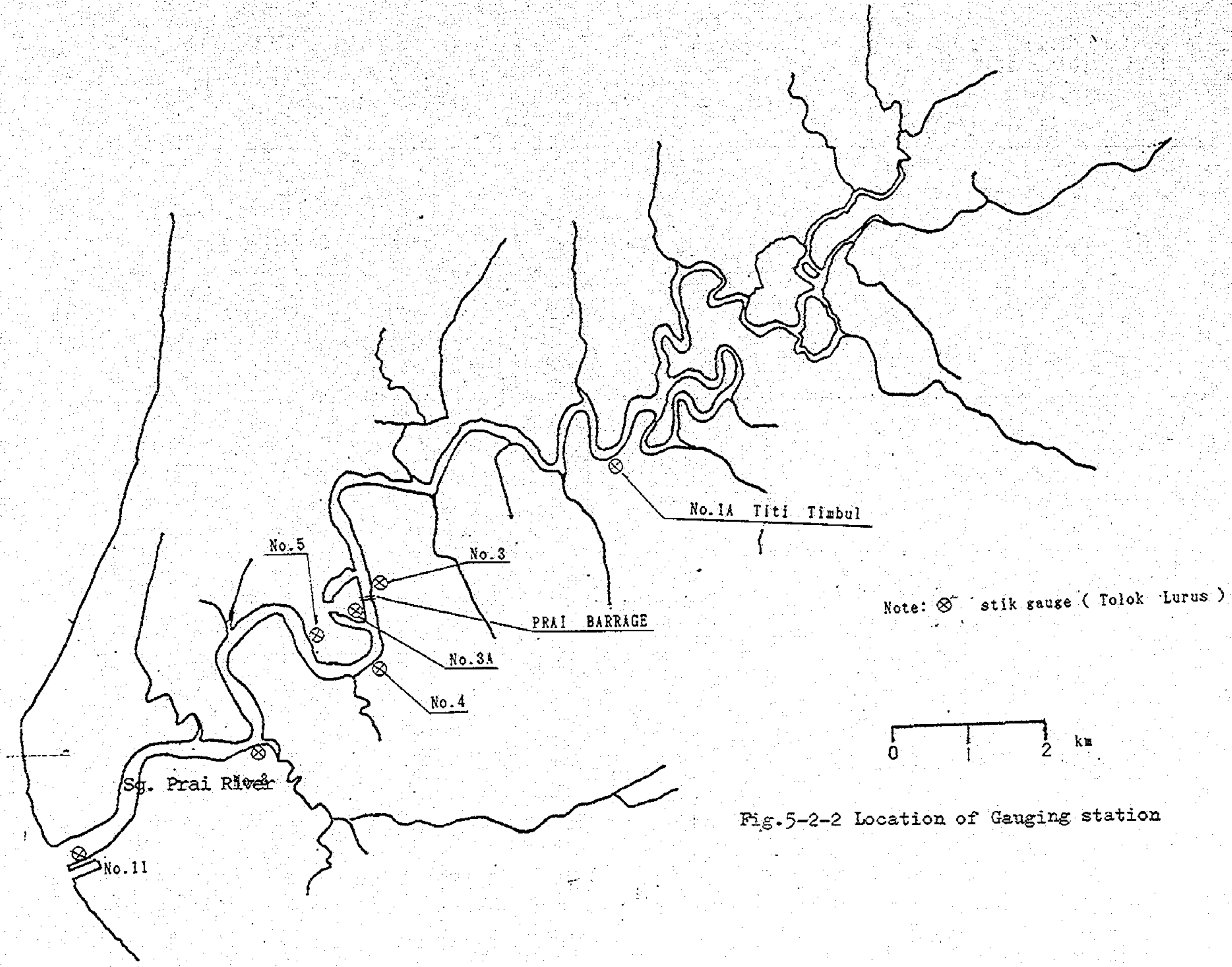



Fig.5-2-2 Location of Gauging station

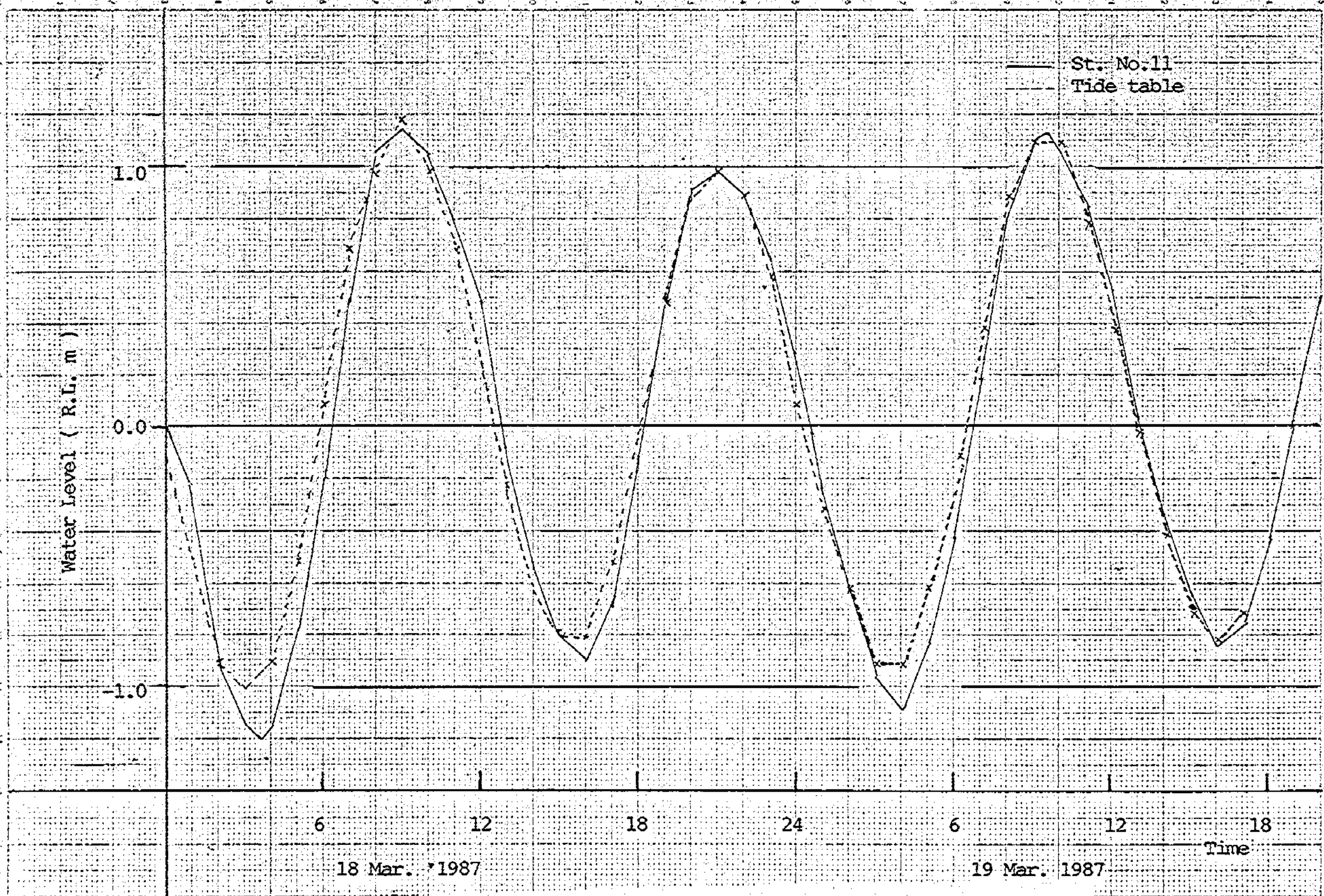



Fig.5-2-3 Observed spring tide at estuary

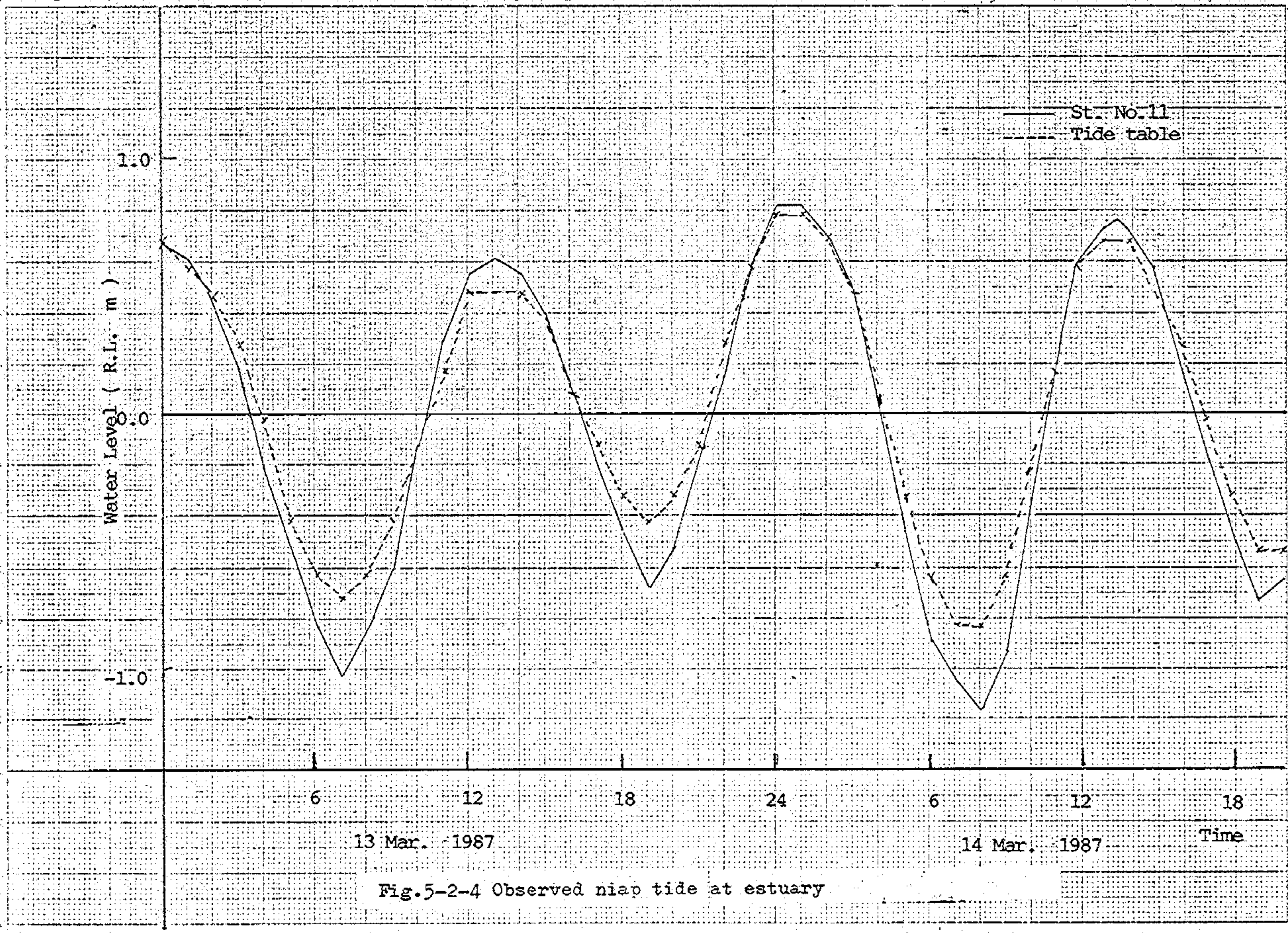



Fig.5-2-4 Observed niap tide at estuary

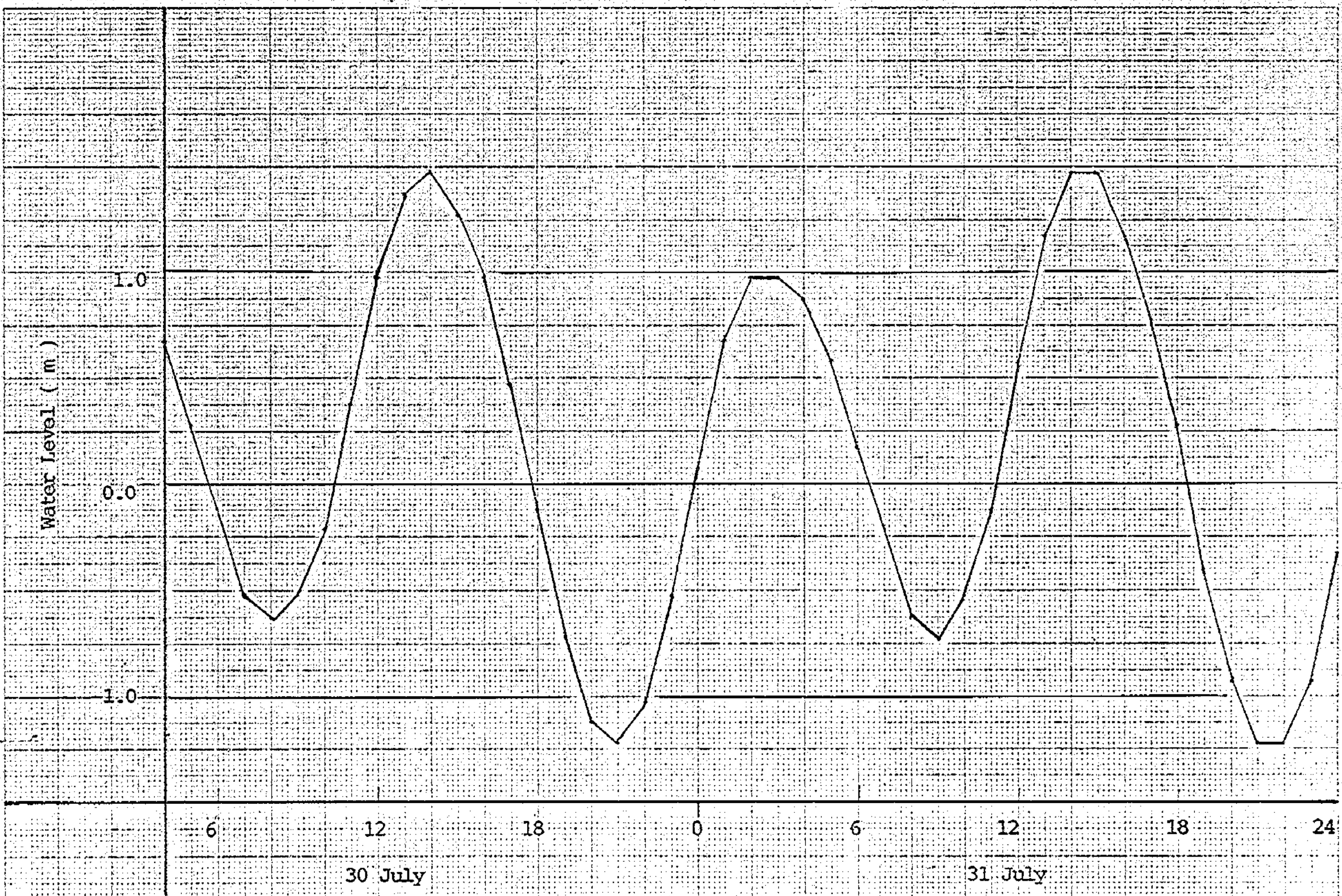



Fig.5-2-5 Fluctuation of tide table on 30-31 July 1988

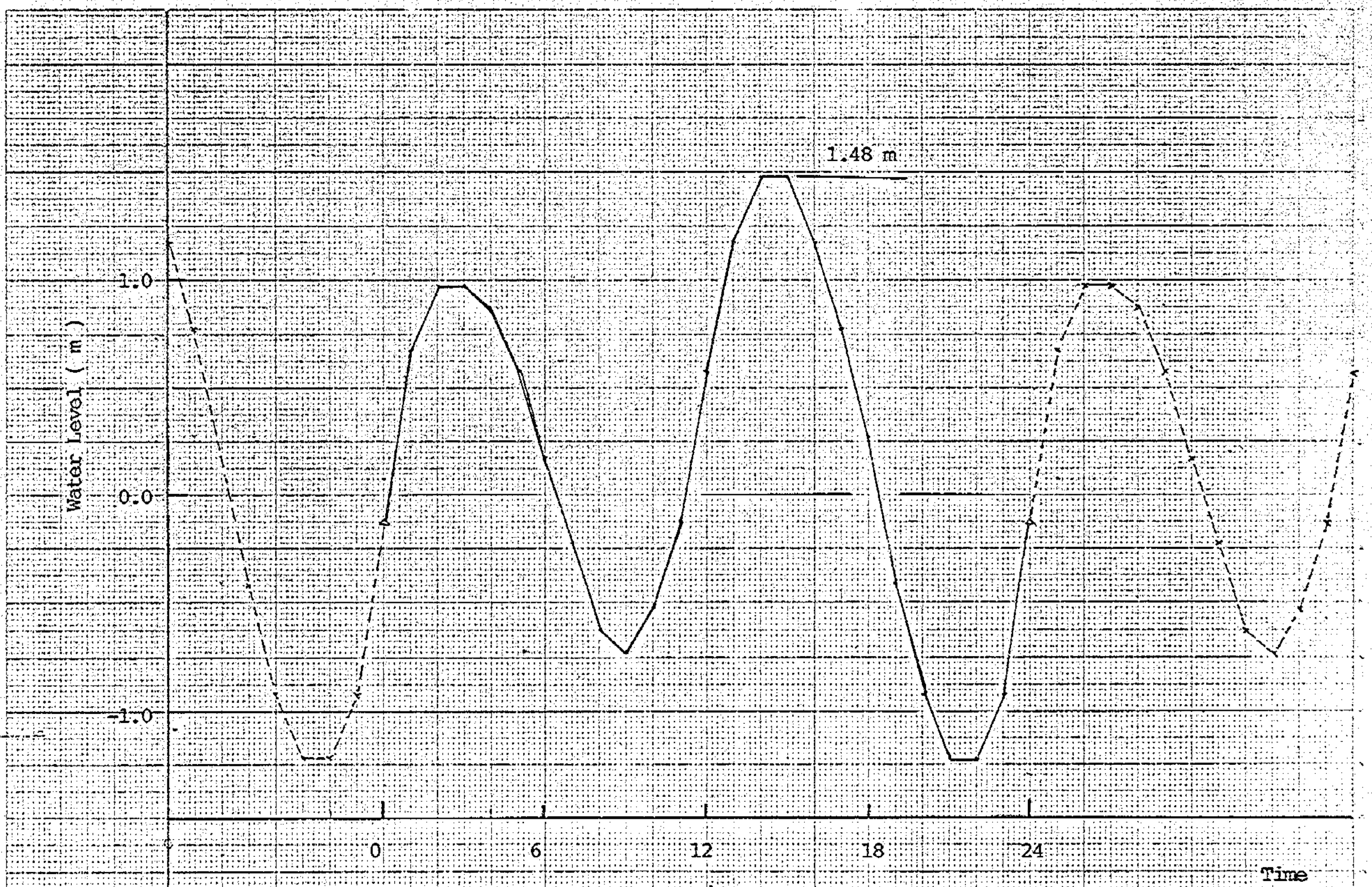
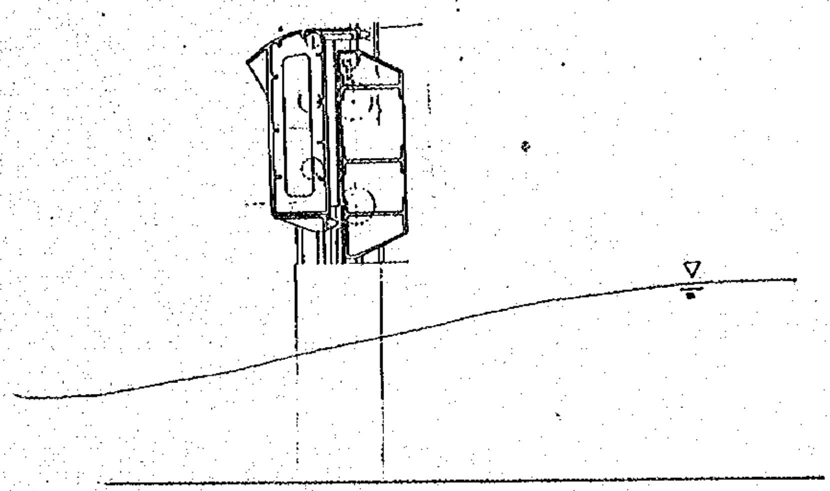
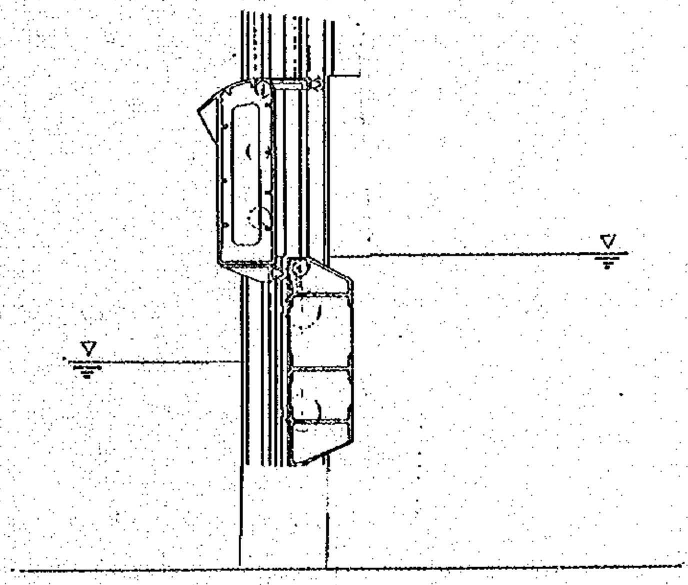


Fig.5-2-6 Fluctuation design tide



channel



orifice

Fig.5-3-1 Gate position and water level condition

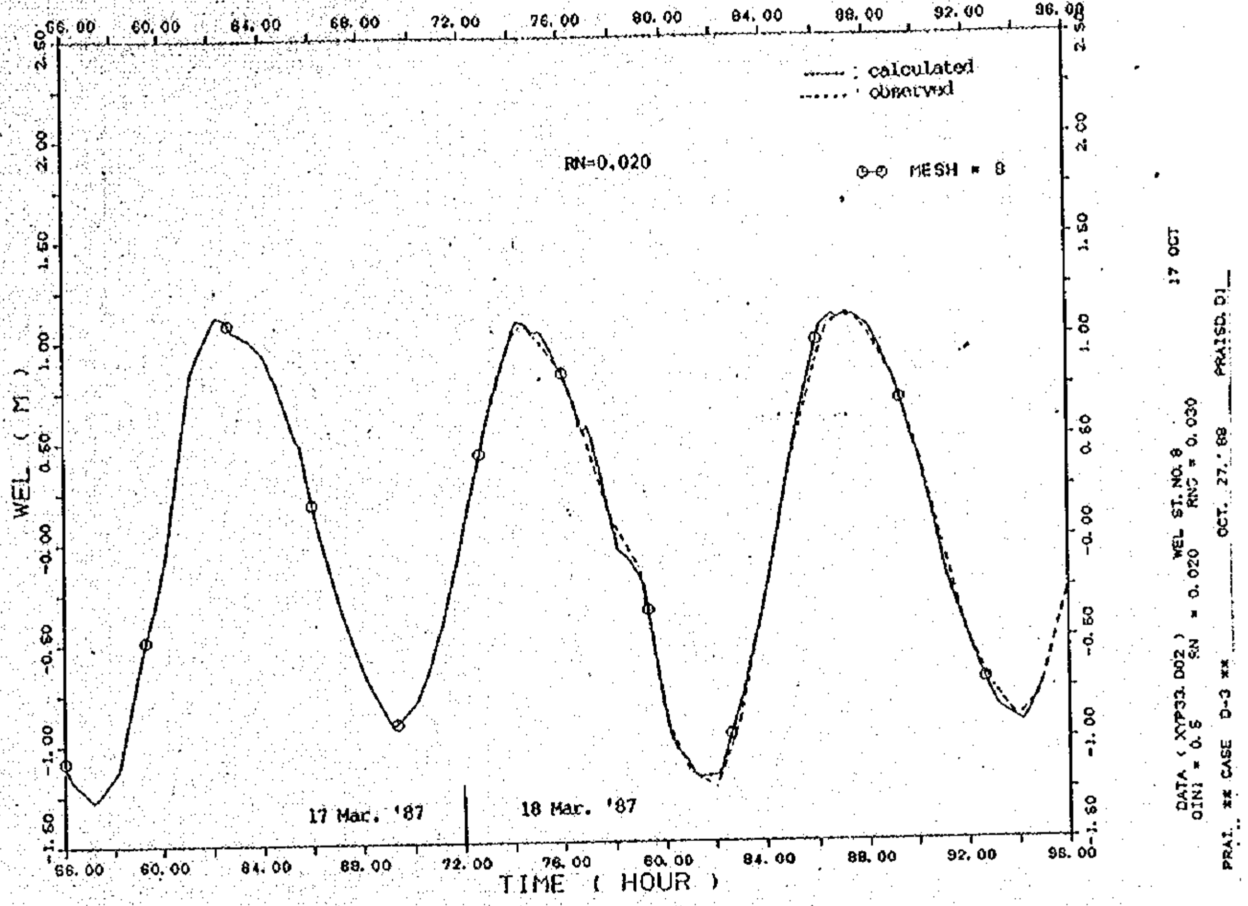



Fig. 5-3-2 comparison of fluctuation between calculation result and observed water level at Mesh ', with roughness coefficient=0.020

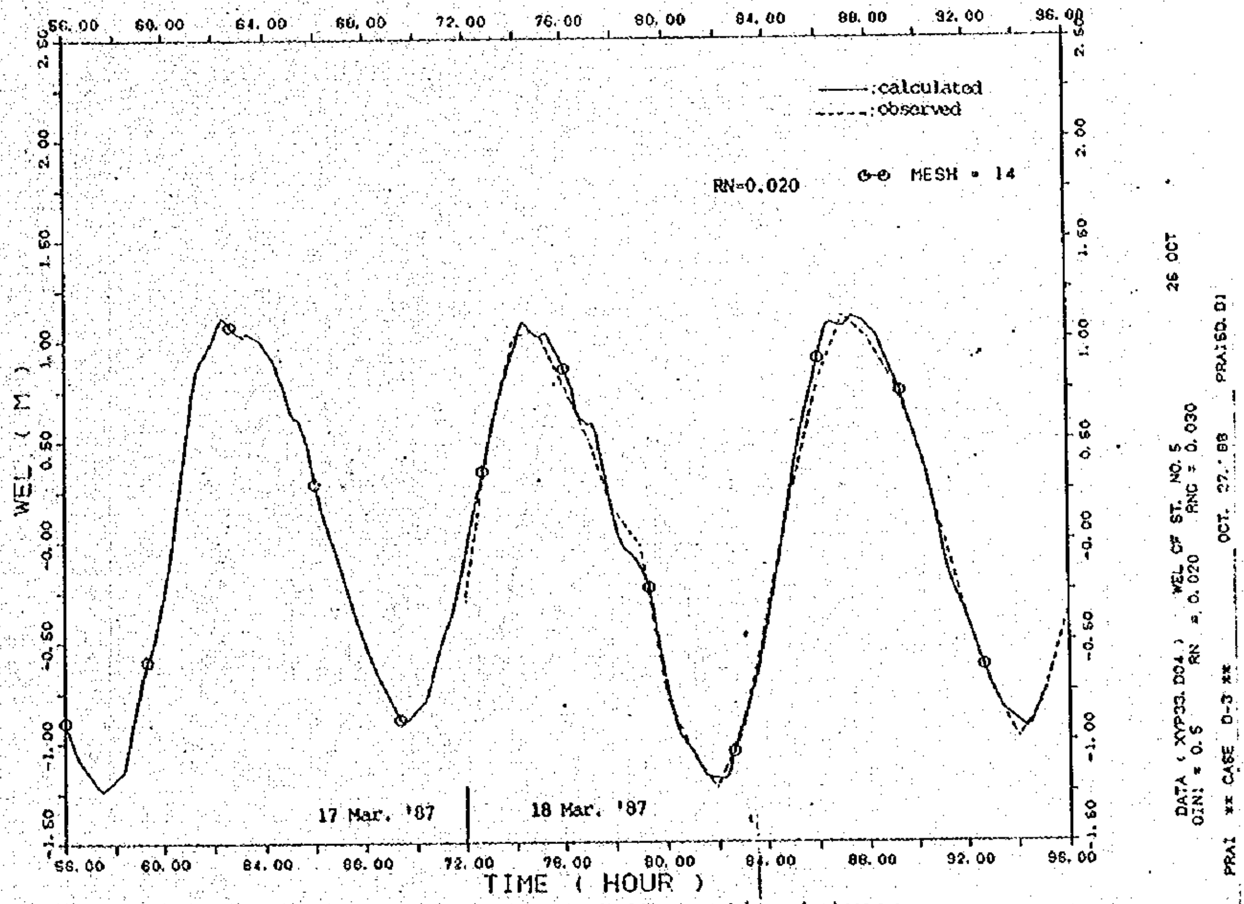



Fig. 5-3-3 Comparison of fluctuation between calculation result and observed water level at Mesh 14, with roughness coefficient=0.020

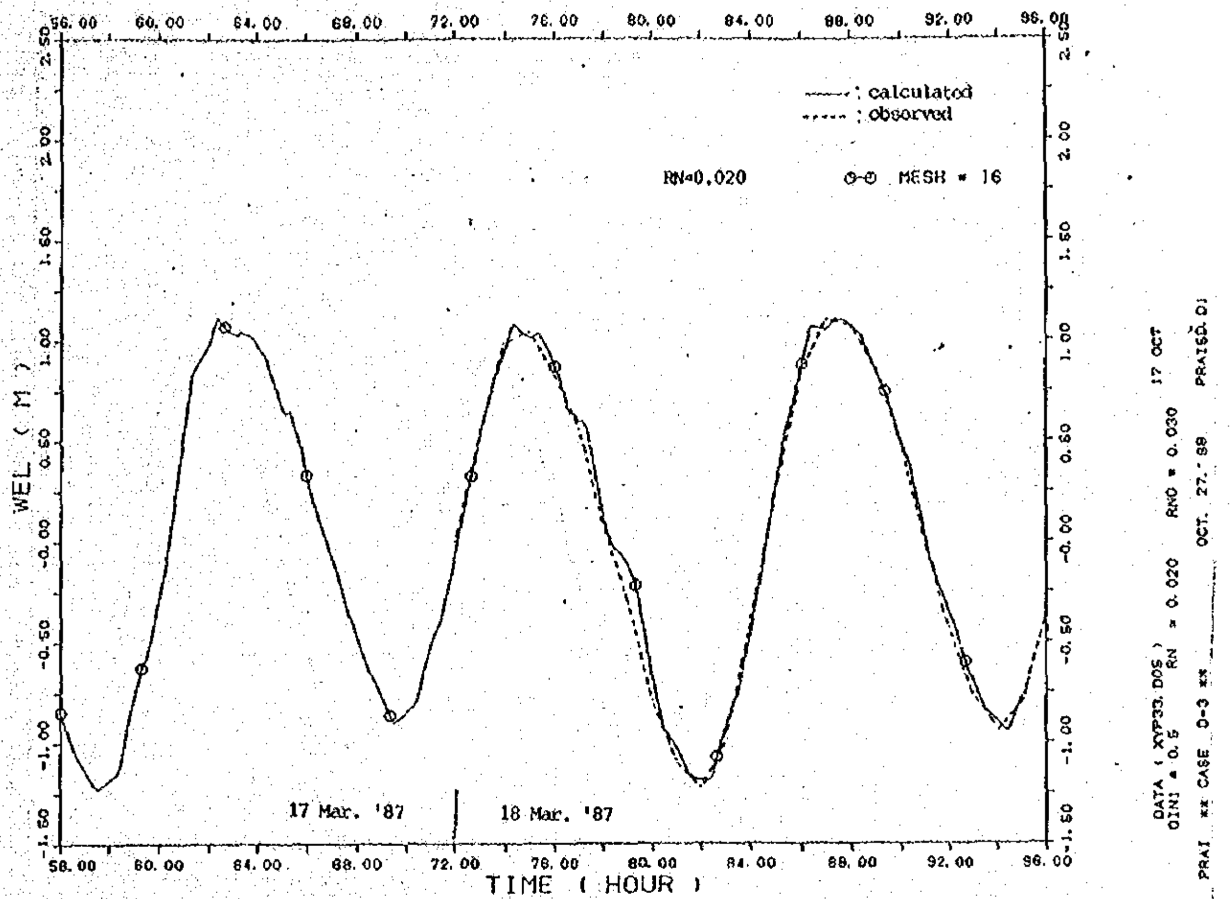



Fig. 5-3-4 Comparison of fluctuation between calculation result and observed water level at Mesh 16, with roughness coefficient=0.020

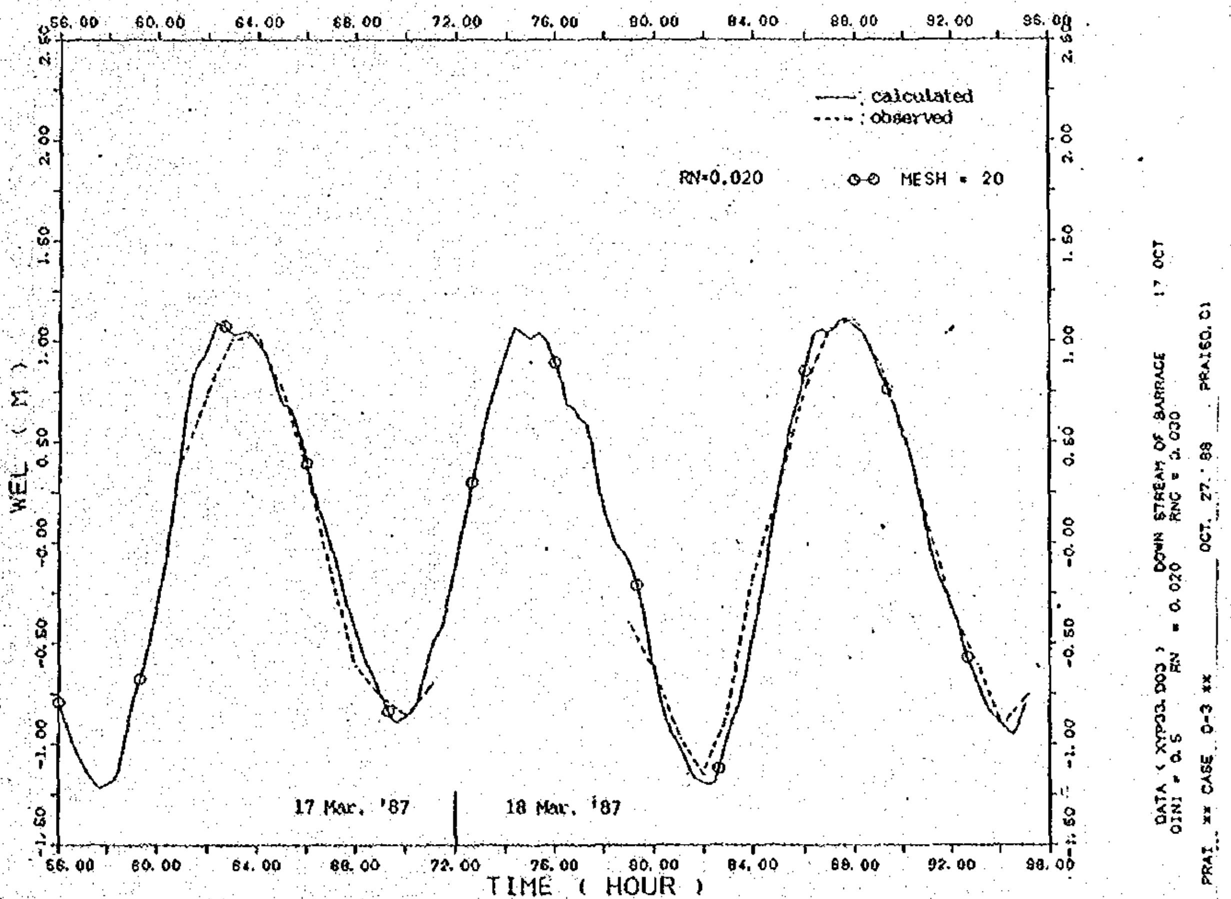



Fig. 5-3-5 Comparison of fluctuation between calculation result and observed water level at Mesh 20, with roughness coefficient=0.020

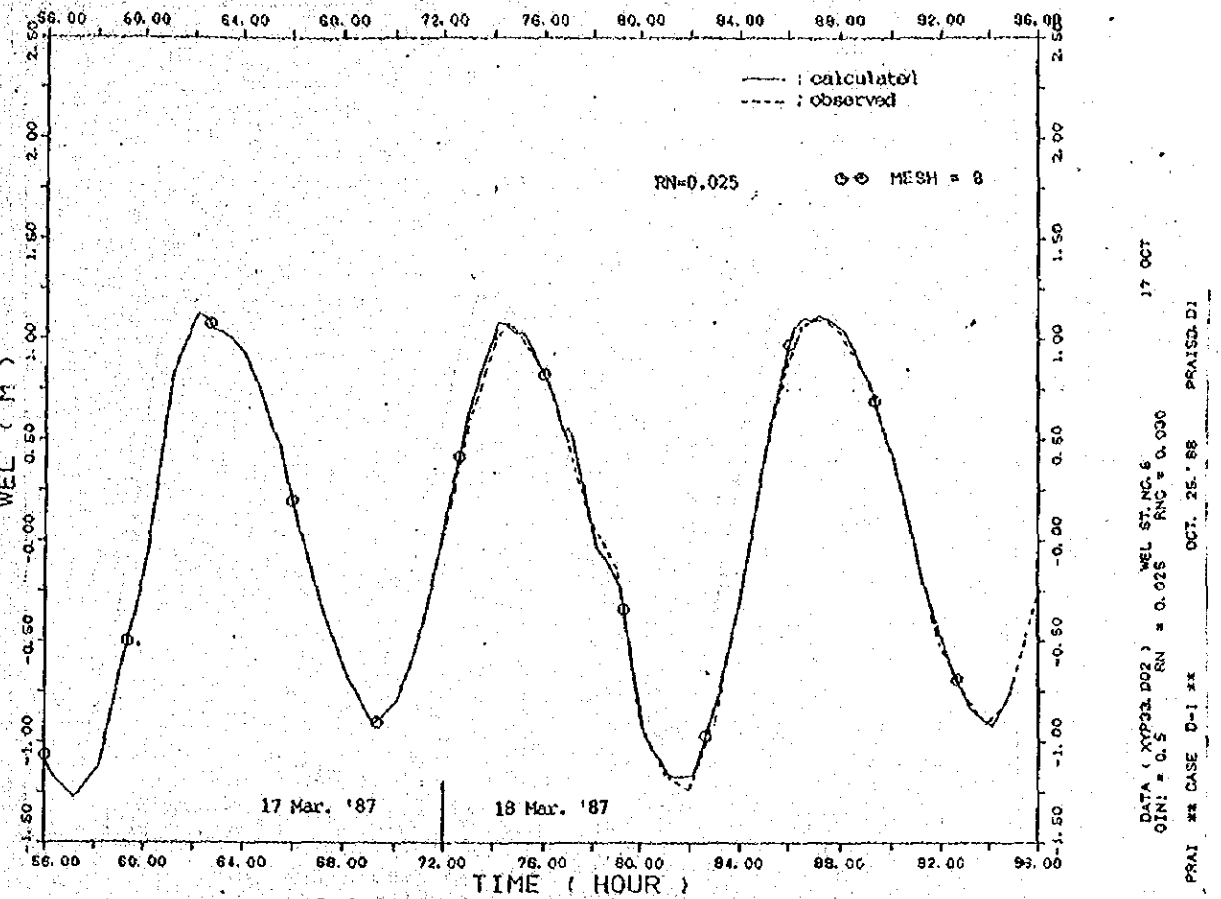



Fig. 5-3-6 Comparison of fluctuation between calculation result and observed water level at Mesh 8, with roughness coefficient=0.025

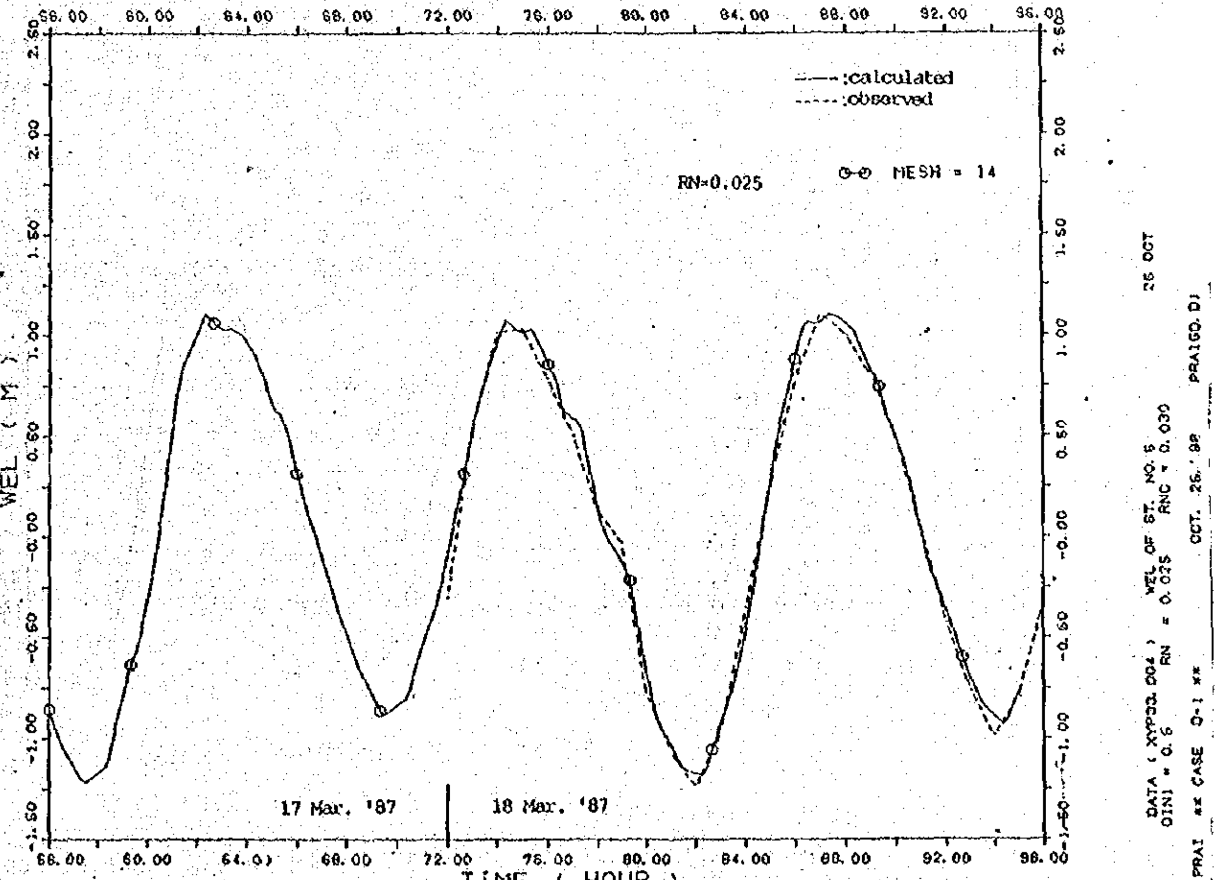



Fig. 5-3-7 Comparison of fluctuation between calculation result and observed water level at Mesh 14, with roughness coefficient=0.025

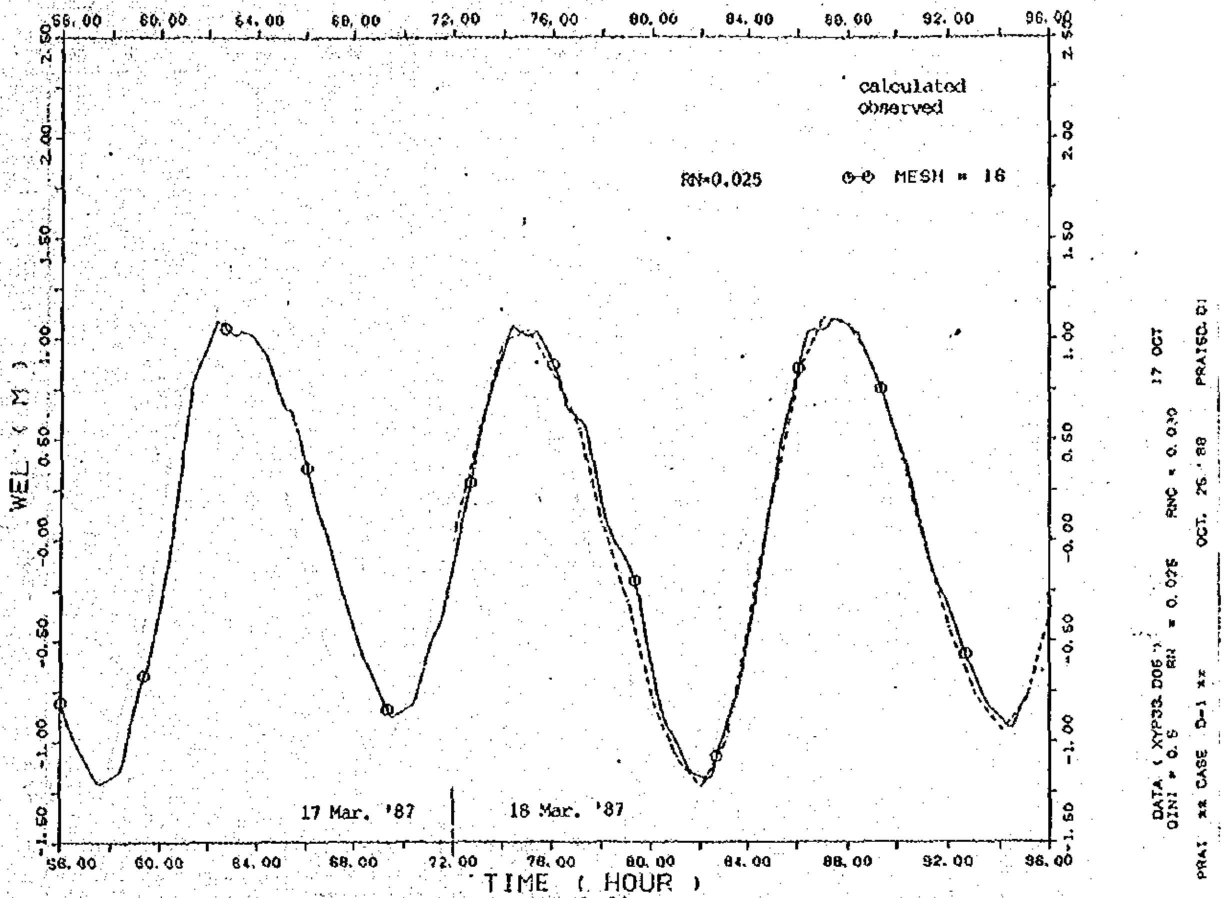



Fig.5-3-8 Comparison of fluctuation between
calculation result and observed water level
at Mesh 16, with roughness coefficient=0.025

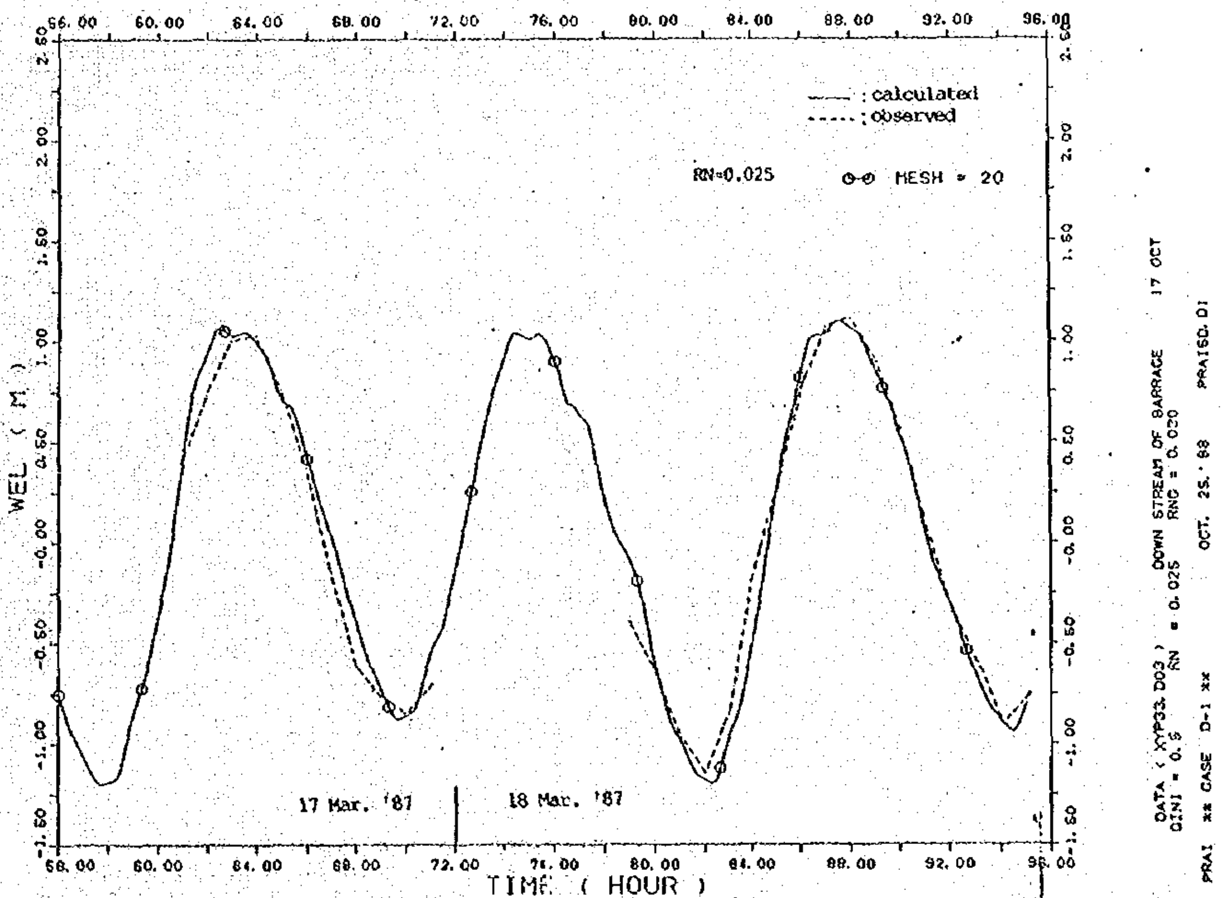



Fig.5-3-9 Comparison of fluctuation between
calculation result and observed water level
at Mesh 20, with roughness coefficient=0.025

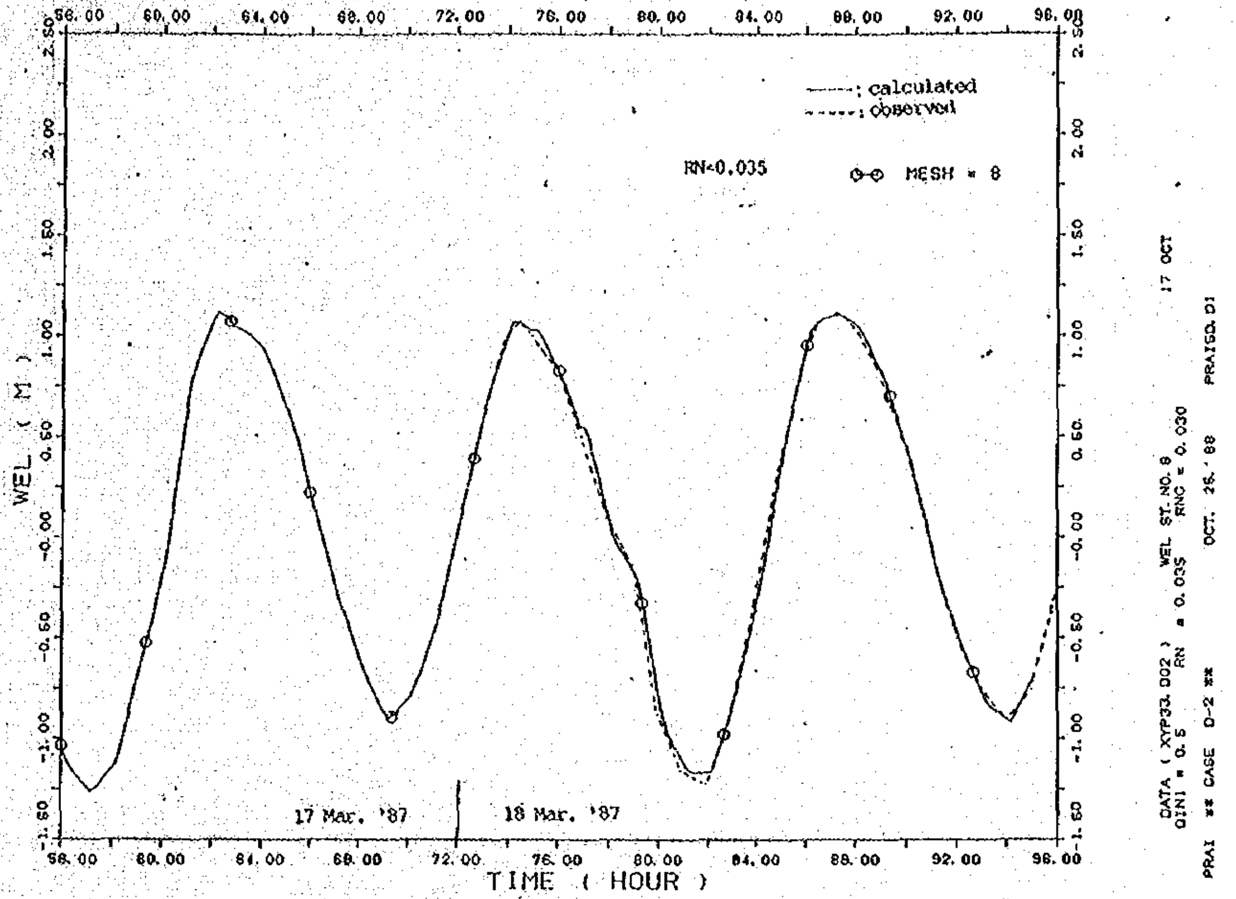



Fig.5-3-10 Comparison of fluctuation between calculation result and observed water level at Mesh 8, with roughness coefficient=0.035

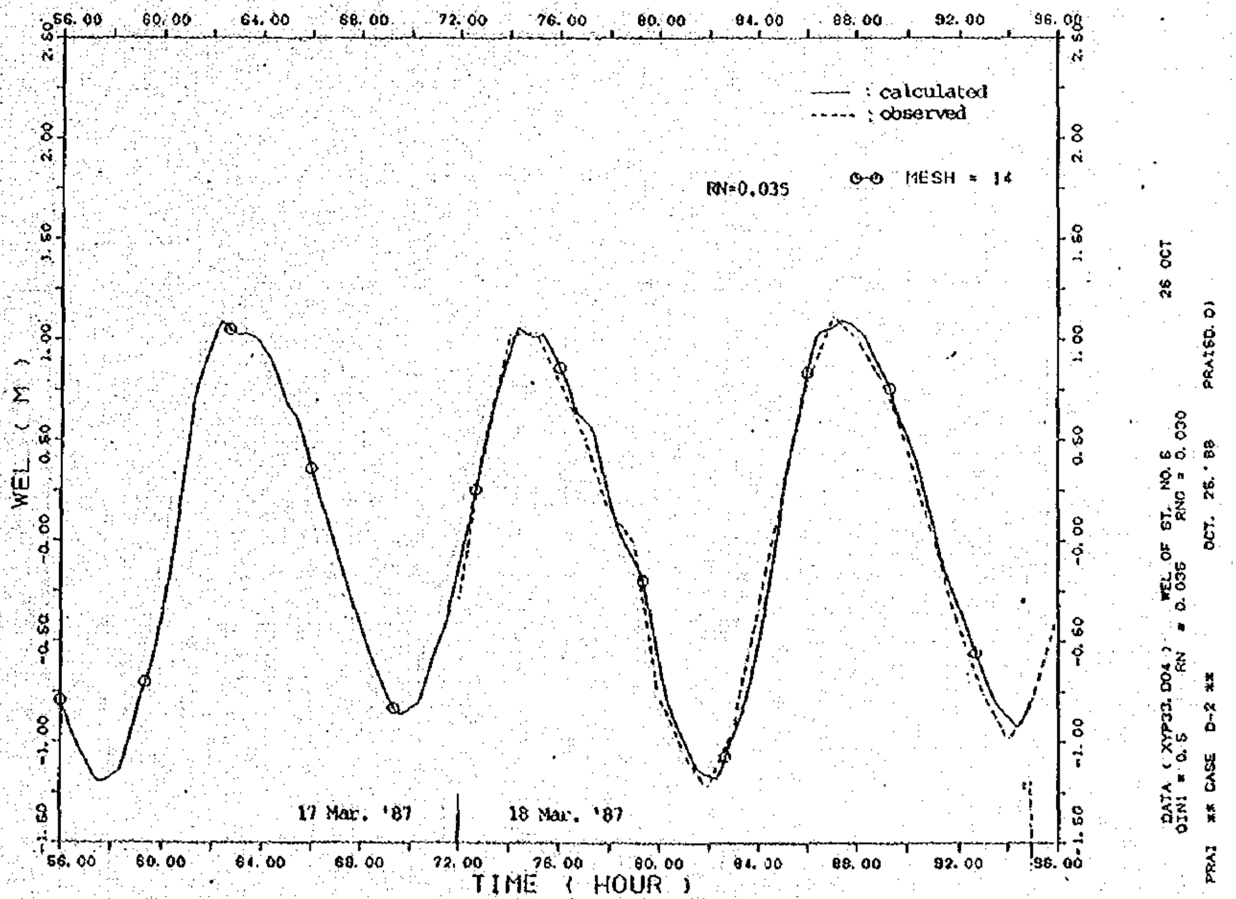



Fig.5-3-11 Comparison of fluctuation between calculation result and observed water level at Mesh 14, with roughness coefficient=0.035

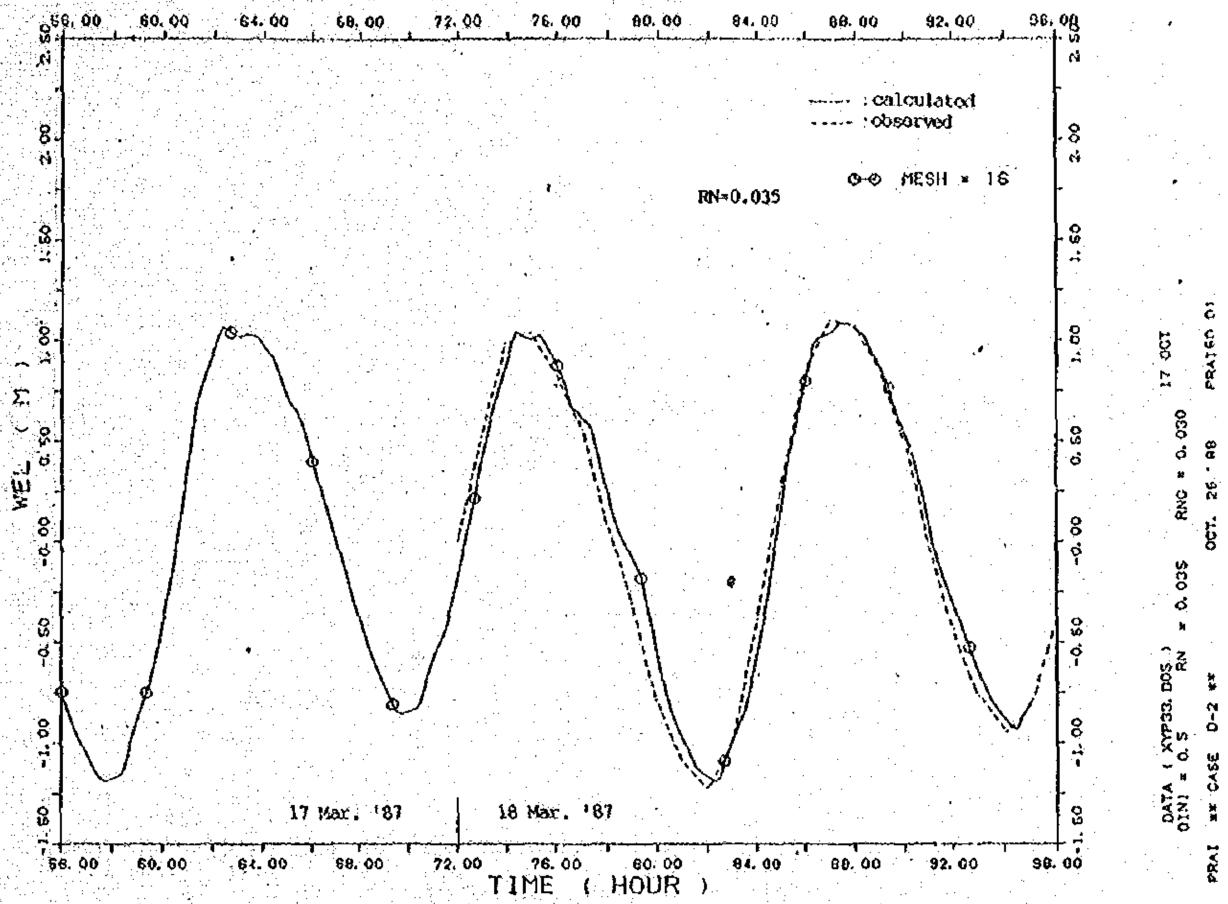



Fig.5-3-12 comparison of fluctuation between calculation result and observed water level at Mesh 16, with roughness coefficient=0.035

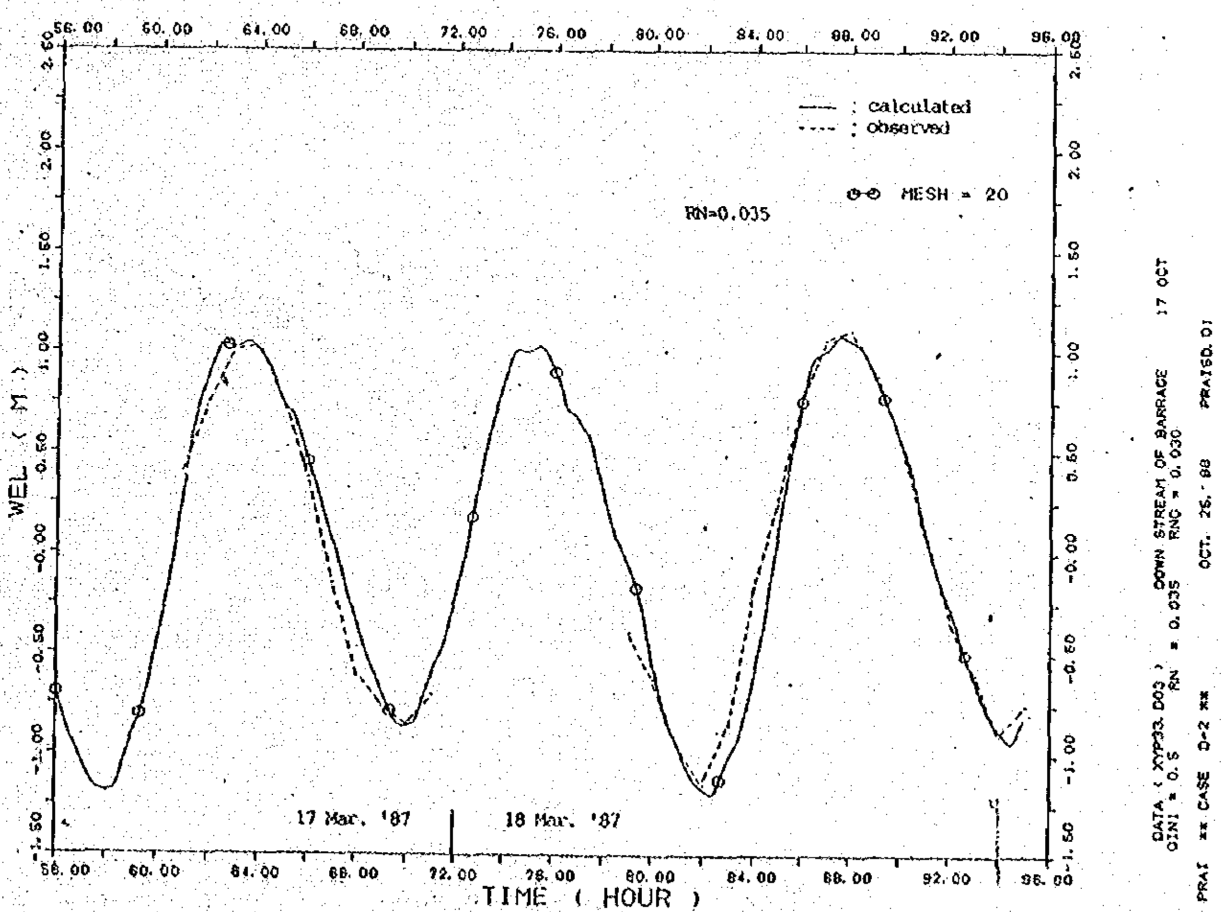



Fig.5-3-13 comparison of fluctuation between calculation result and observed water level at Mesh 20, with roughness coefficient=0.035

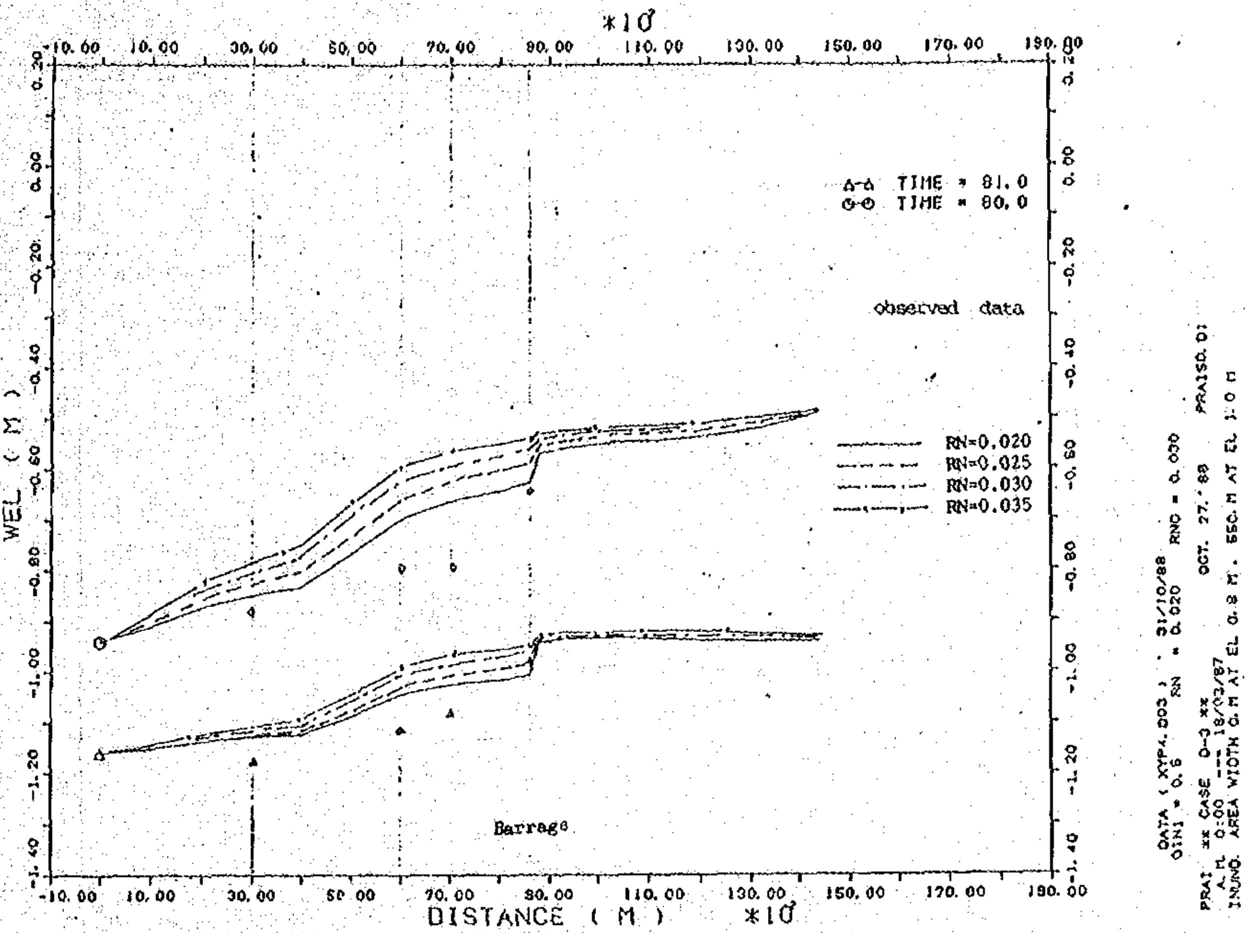



Fig.5-3-14 comparison of longitudinal profile (1)

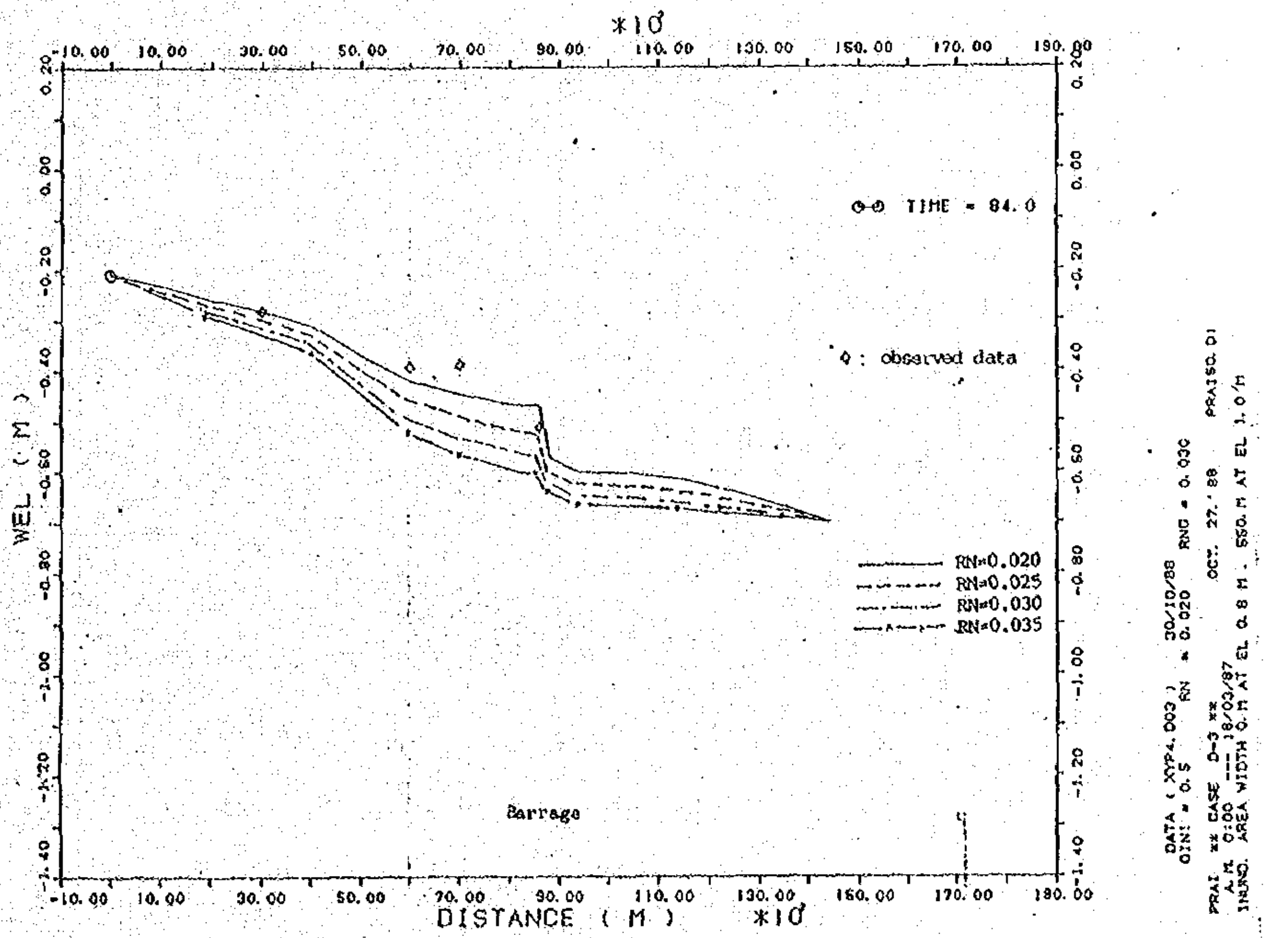



Fig.5-3-15 comparison of longitudinal profile (2)

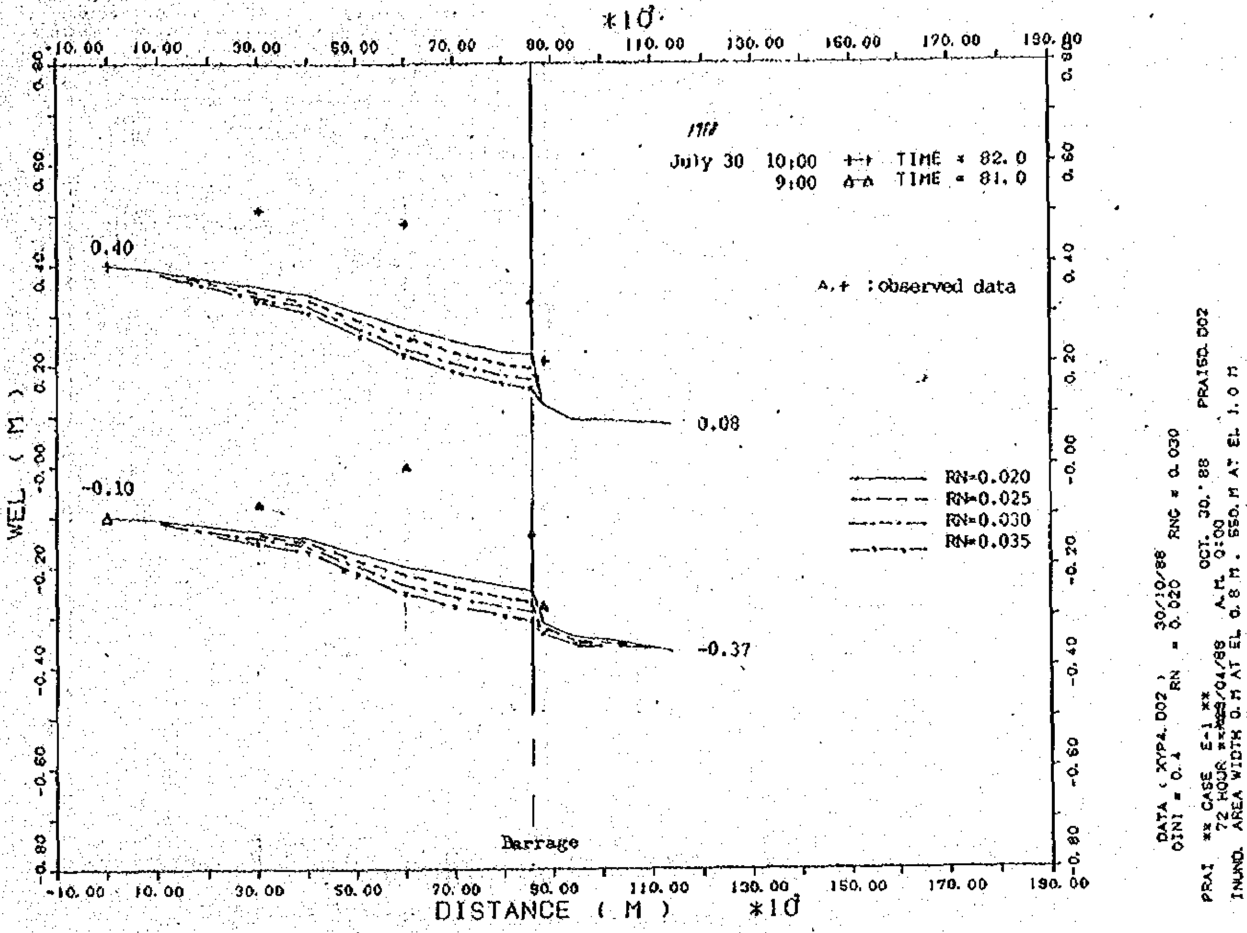



Fig.5-3-16 comparison of longitudinal profile (3)

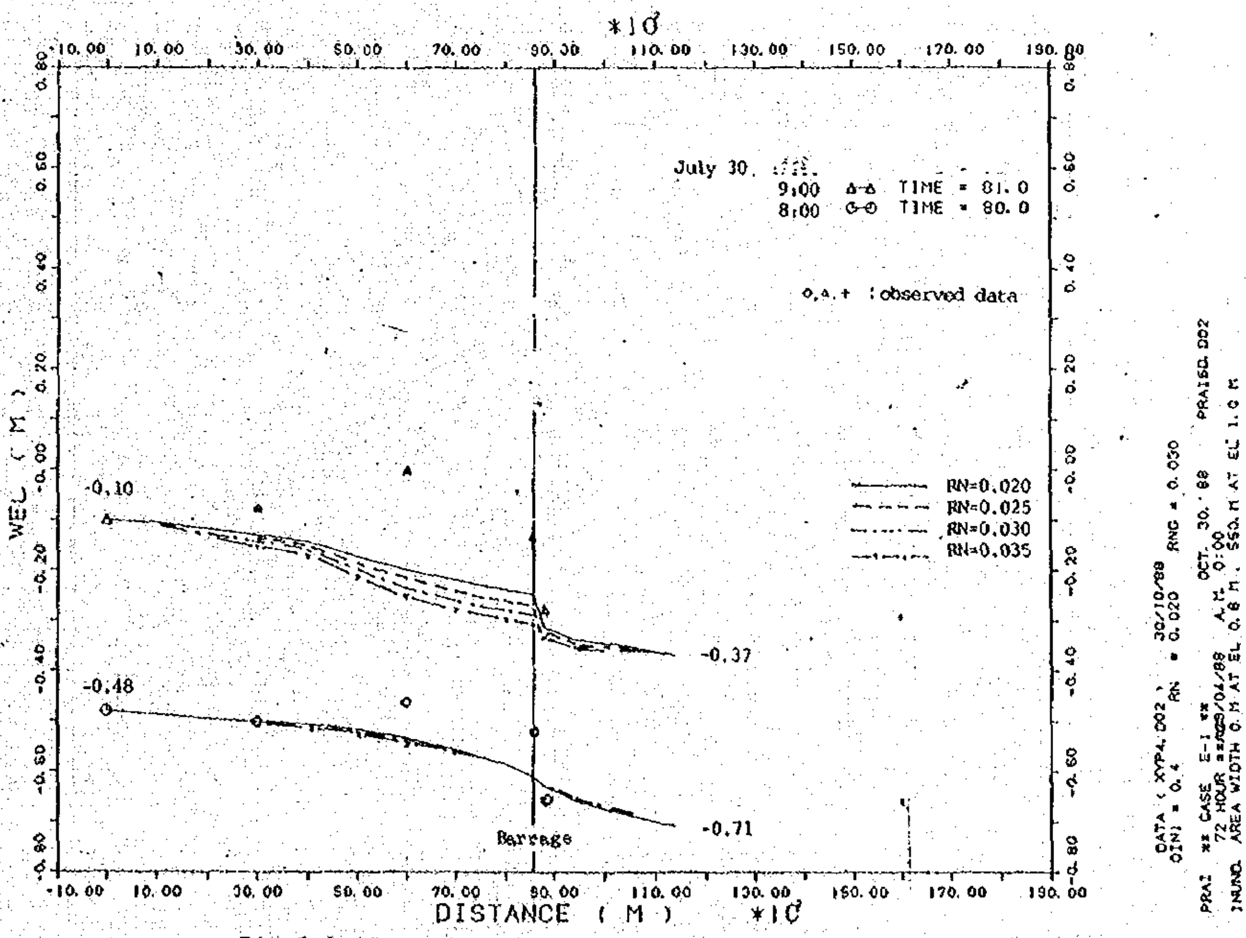



Fig.5-3-17 comparison of longitudinal profile (4)

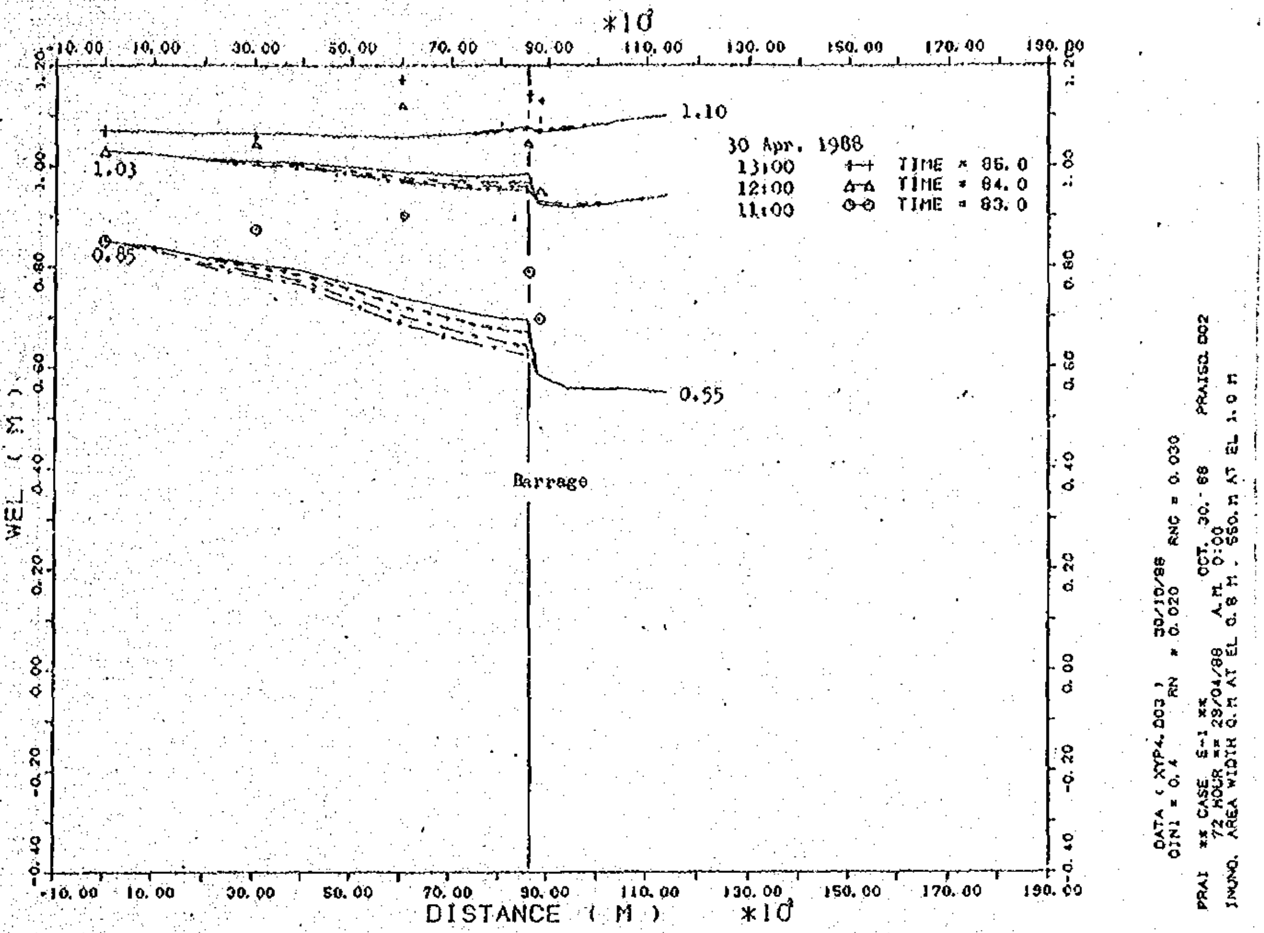



Fig.5-3-18 comparison of longitudinal profile (5)

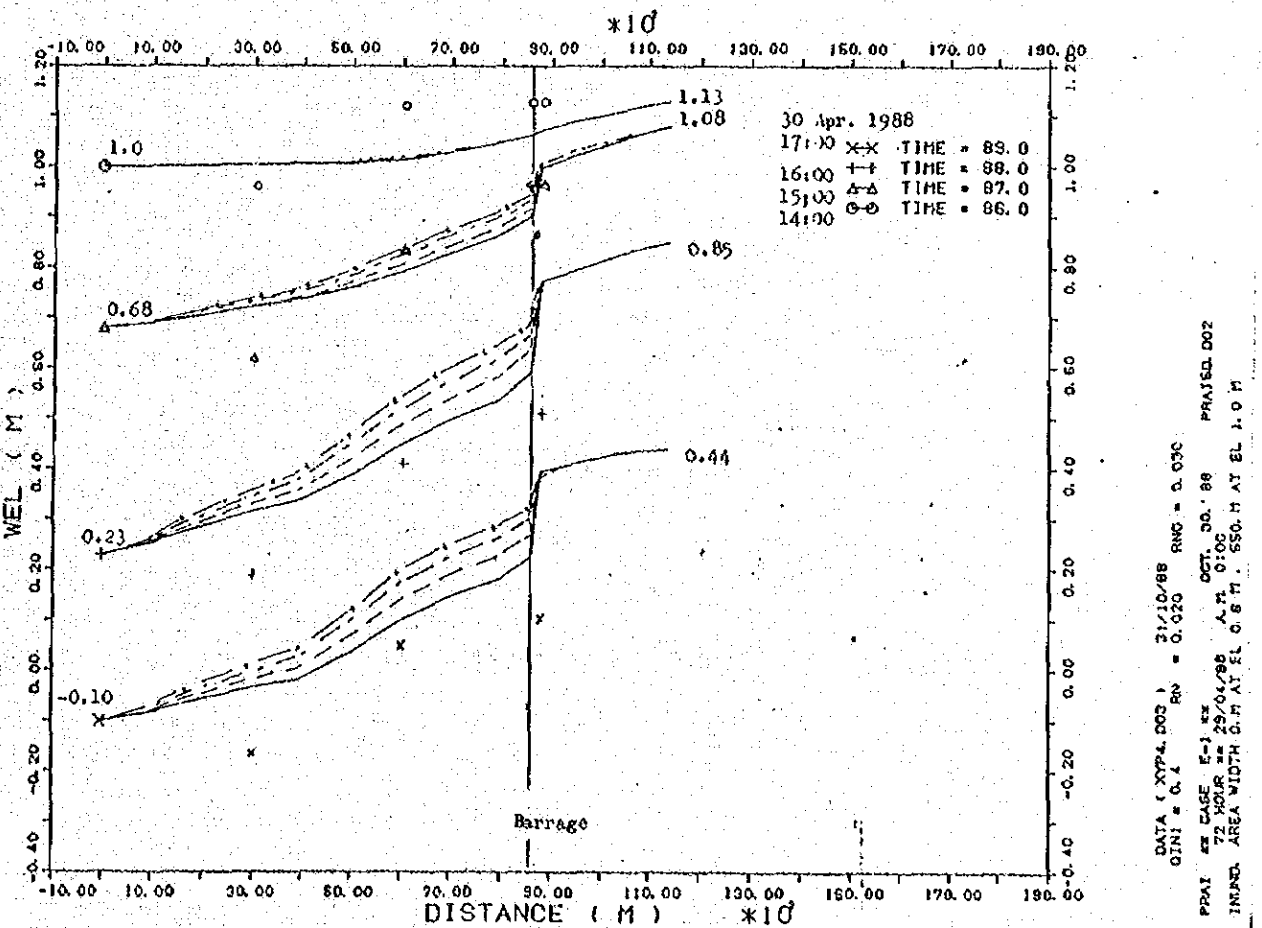



Fig.5-3-19 comparison of longitudinal profile (6)

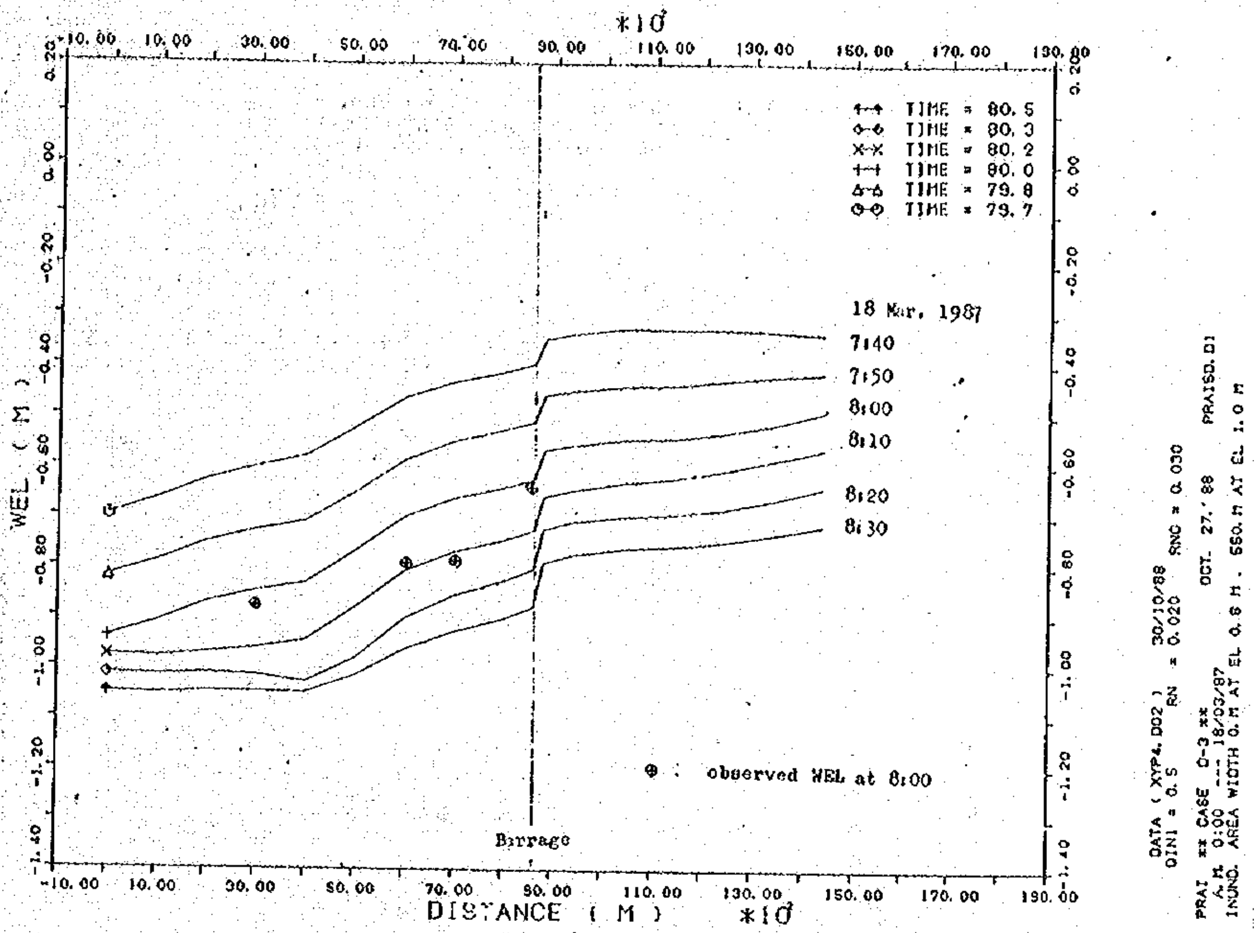



Fig.5-3-20 comparison of longitudinal profile with regard to time

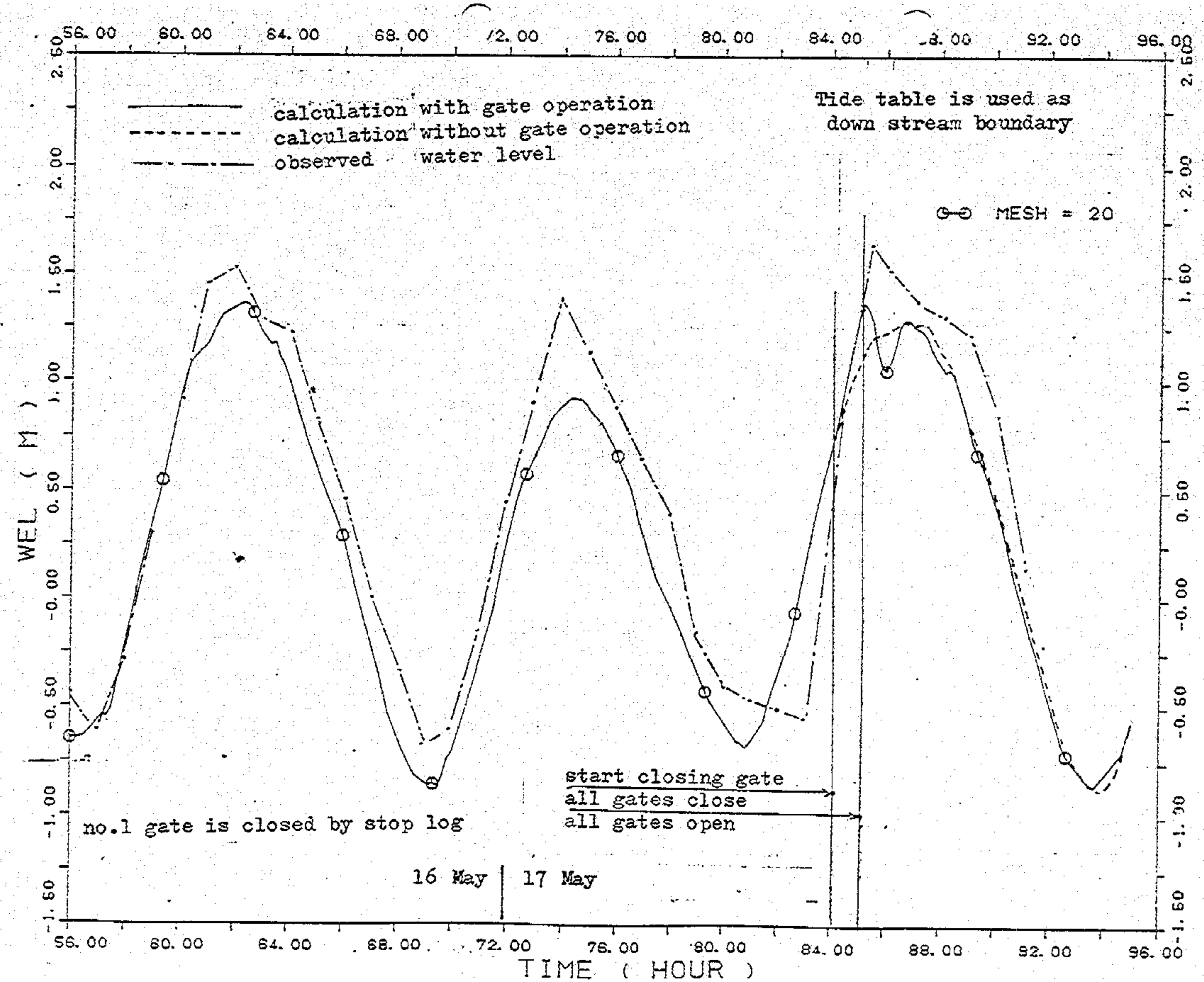

calculation with gate operation
calculation without gate operation
observed water level
Tide table is used as down stream boundary
MESH = 20
no.1 gate is closed by stop log
start closing gate
all gates close
all gates open
16 May
17 May
WEL ( M )
TIME ( HOUR )
56.00
60.00
64.00
68.00
72.00
76.00
80.00
84.00
88.00
92.00
96.00
2.50
2.00
1.50
1.00
0.50
-0.00
-0.50
-1.00
-1.50
DATA ( XYP33.D04 )
QINI = 10.0 RN = 0.020 RNO = 0.030
6 NOV
PRAI * CASE B-1 * NOV. 04,'88 , PRAID.D01
DOWN STREAM BOUNDALY TIDE TABLE (14/3/84 - 17/3/84 )
INUN. AREA BKM (26-40) 0.M AT 0.8 M. 550.M AT 1.0 M
XYPLOT33 15/10/88

Fig.5-4-1

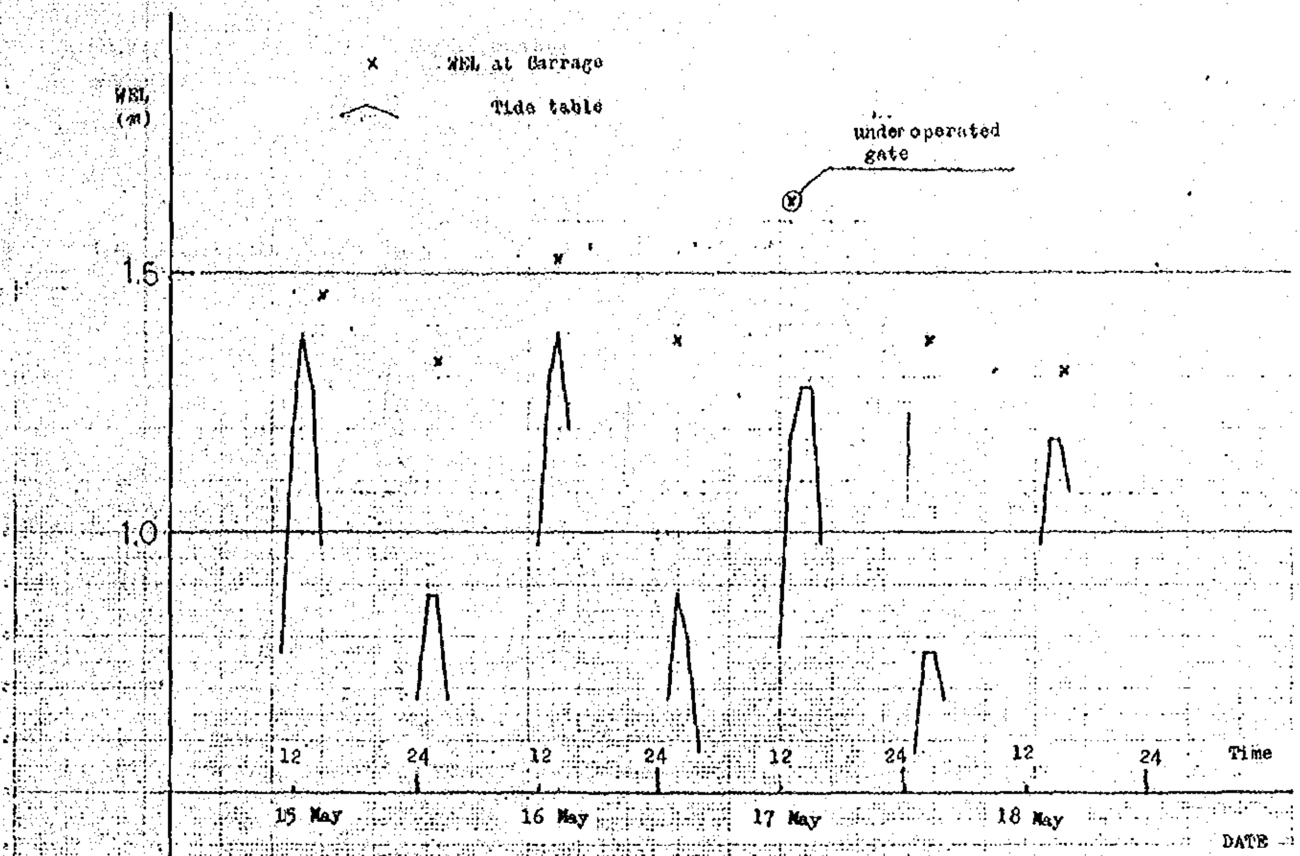



Fig.5-4-2 Comparison of peak between tide table and observed water level at Barrage on spring tide in May 1984

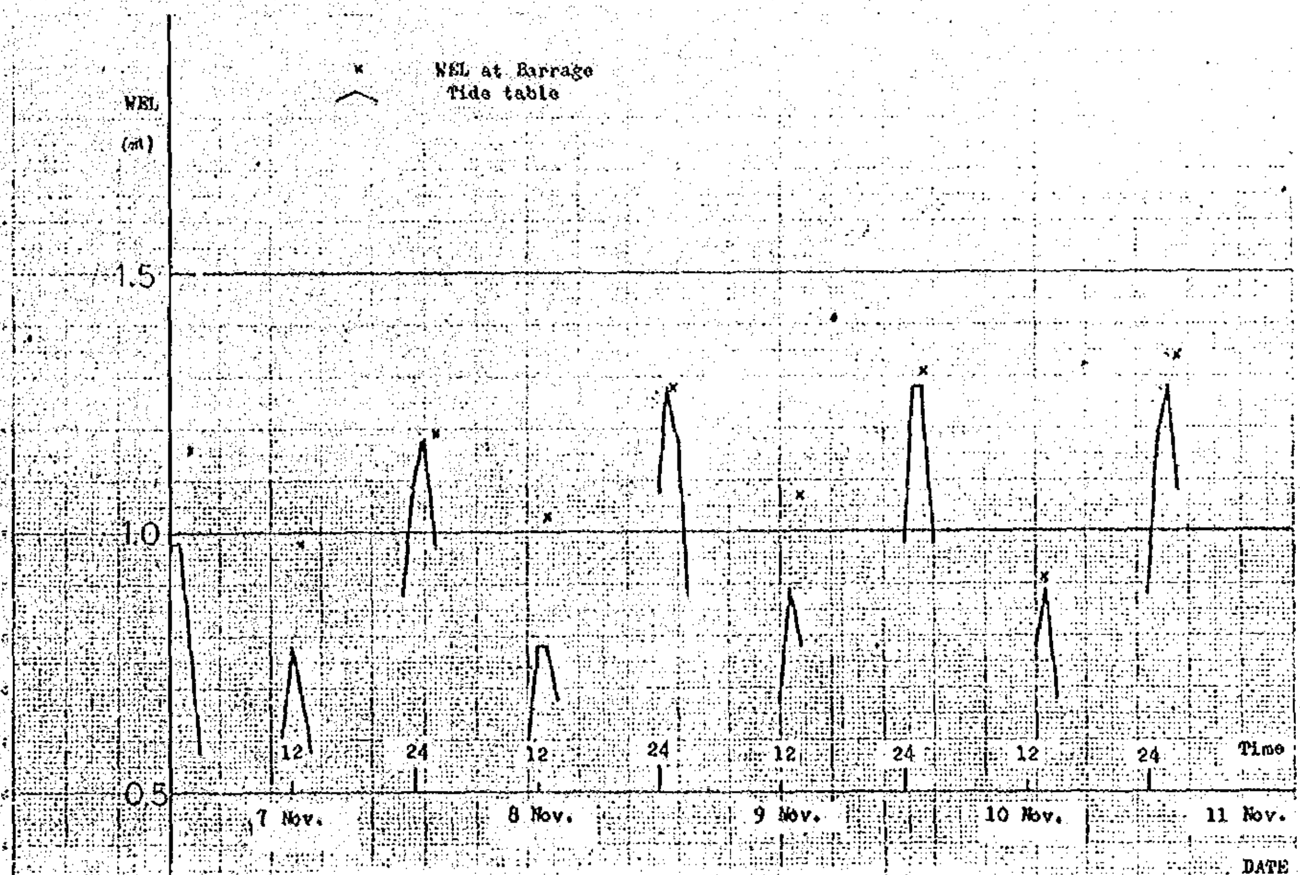



Fig.5-4-3.Comparison of peak between tide table and observed water level at Barrage on spring tide in November 1984 (1)

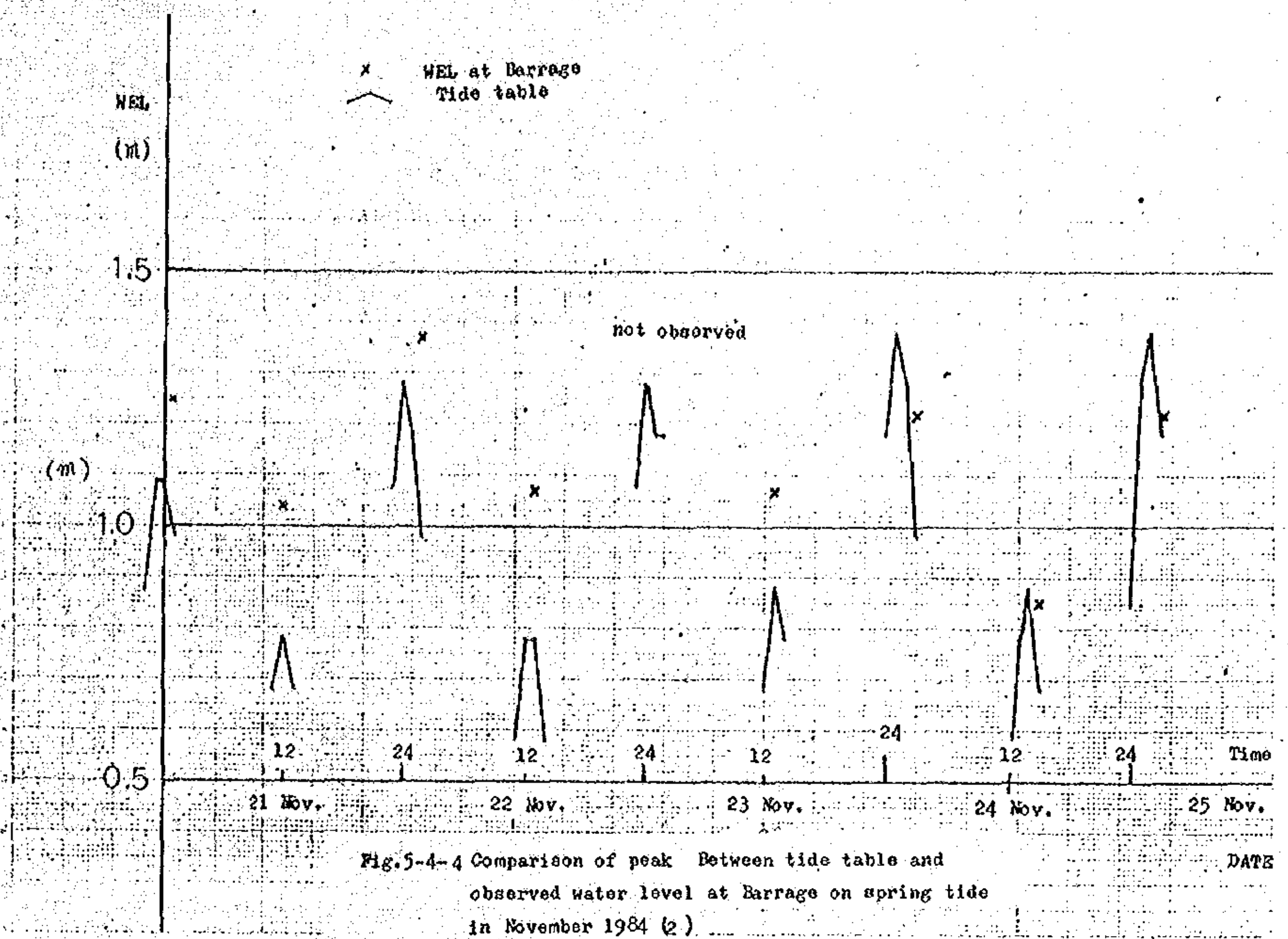



Fig.5-4-4 Comparison of peak Between tide table and observed water level at Barrage on spring tide in November 1984 (2)

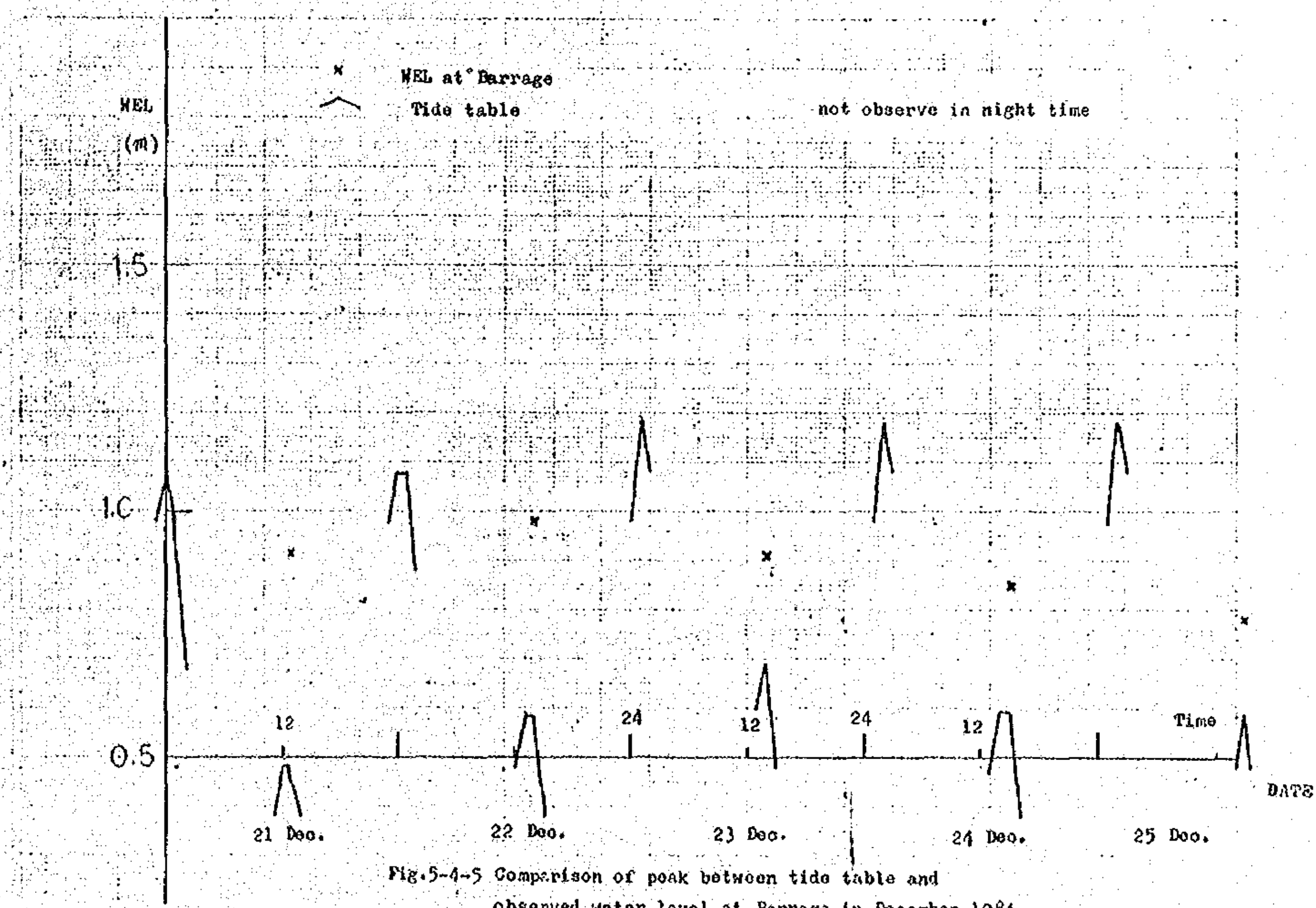



Fig.5-4-5 Comparison of peak between tide table and observed water level at Barrage in December 1984

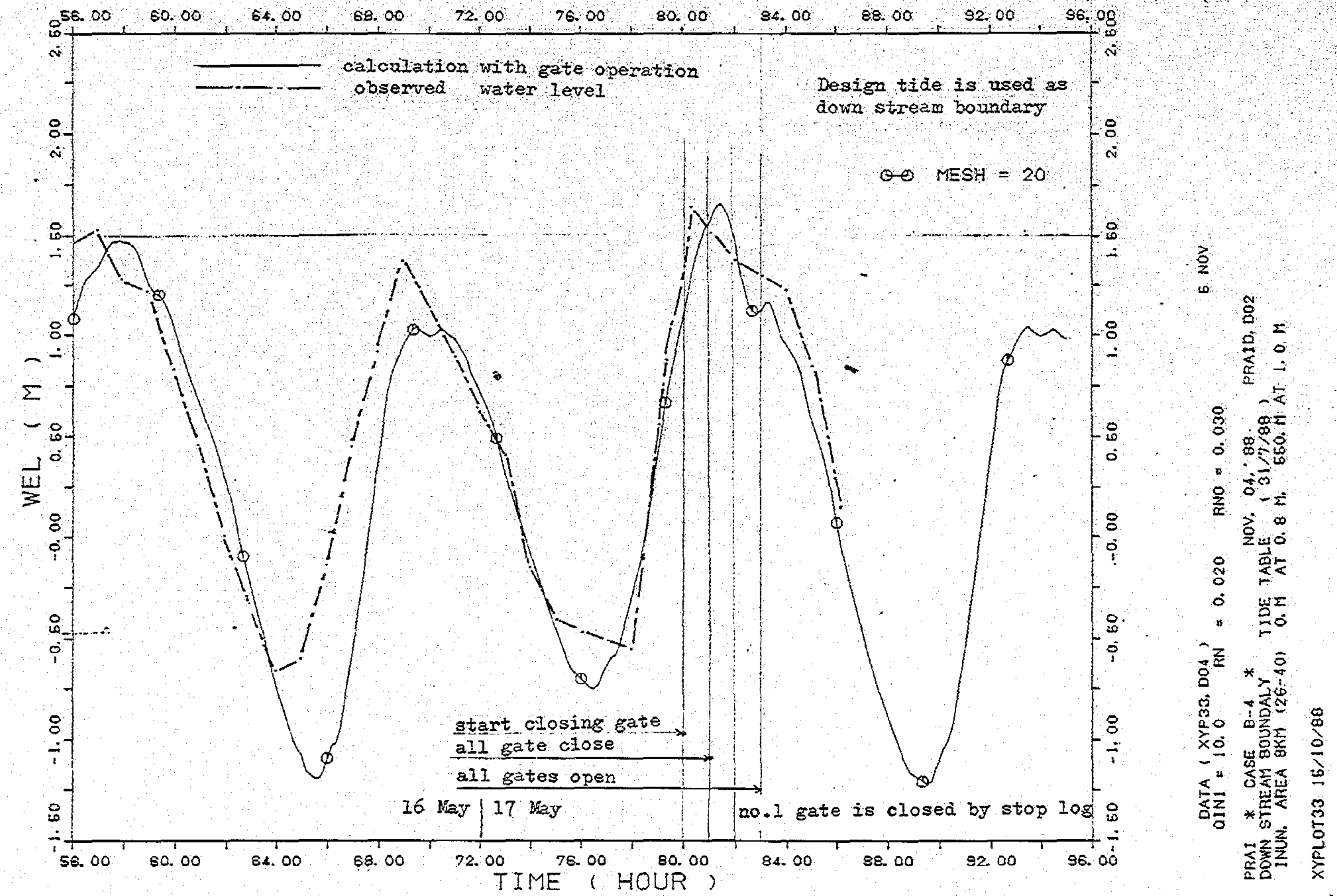
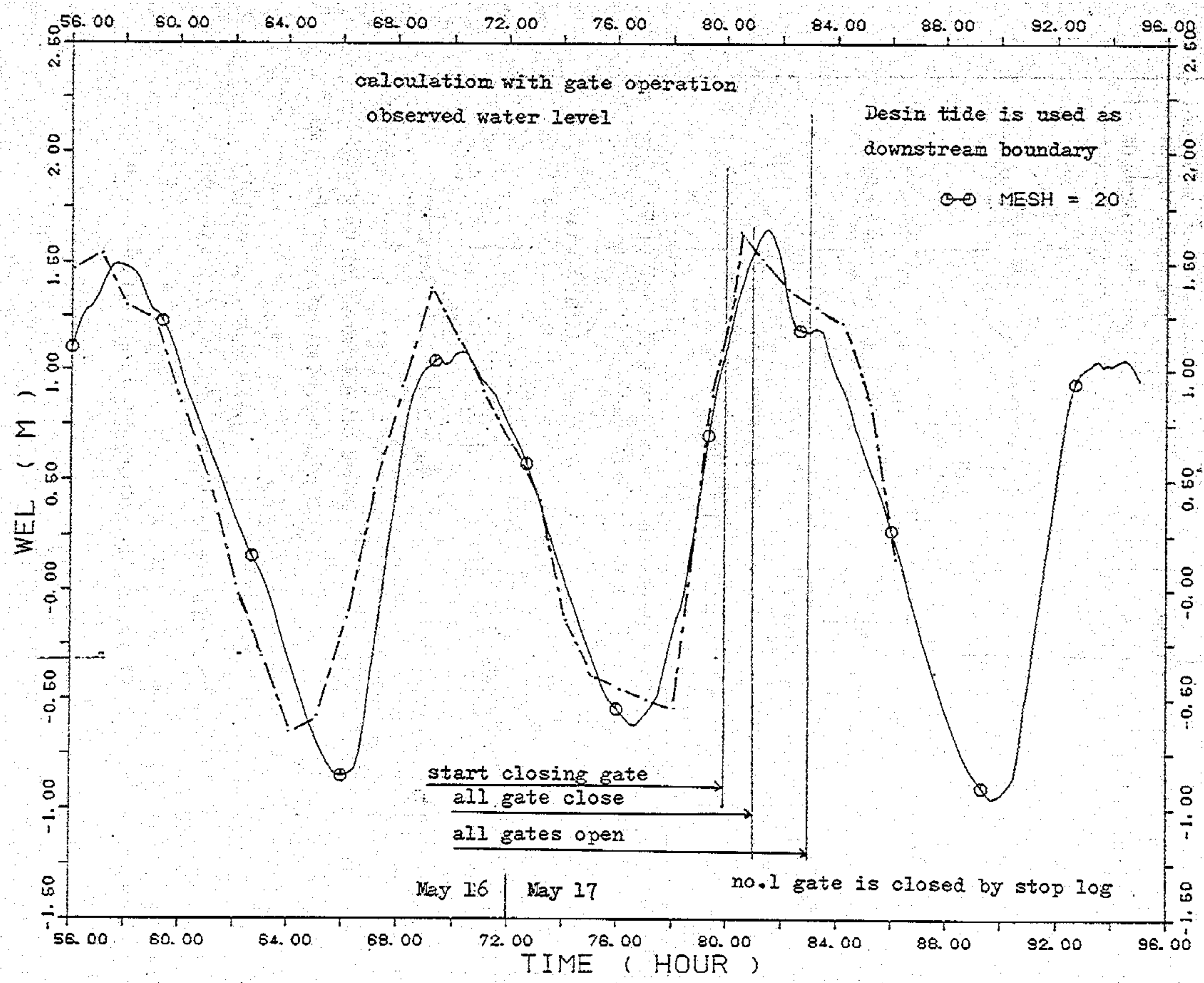



Fig.5-4-6 Fluctuation of water level on attempt operation

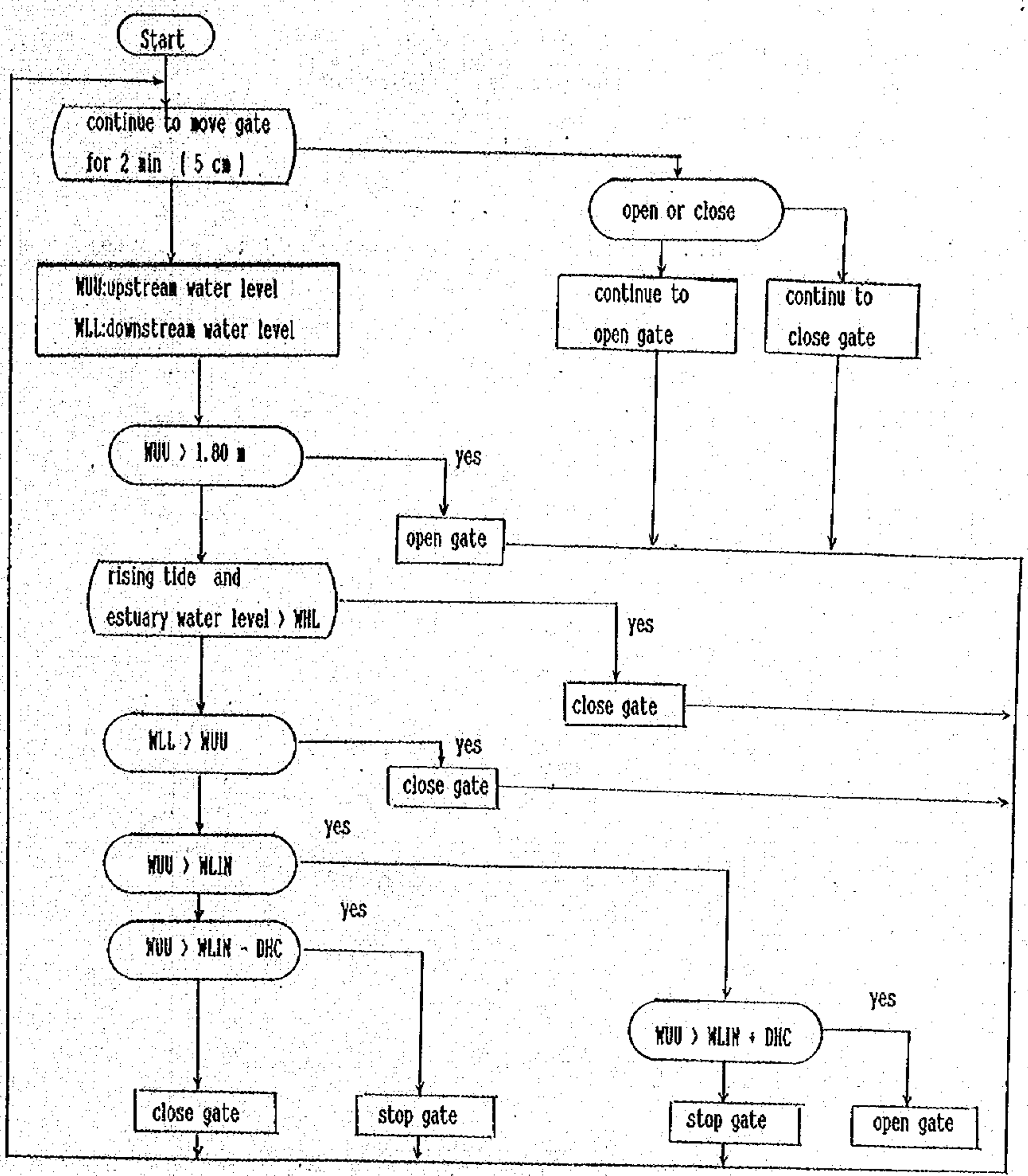
inflow $Q=10\ m^3/sec$, design tide




DATA ( XYP33.D04 ) 6 NOV
QINI = 100.0 RN = 0.020 RNO = 0.030
PRAI * °CASE B-6 * NOV. 04.'88 PRAID.D02
DOWN STREAM BOUNDALY TIDE TABLE ( 31/7/88 )
INUN. AREA 8KM (26-40) 0.M AT 0.8 M. 550.M AT 1.0 M
XYPLOT33 15/10/88

Fig.5-4-7 Fluctuation of water level on attempt operatio

inflow Q=100 $m^3$/sec design tide




If a gate is full open, the next gate start to open,
and if a gate complte close, the next gate start to close

---

WLIN : normal inpounding water level

DHC : allowance to operate gata    DHC = 0.1 m is used in simulation.

Fig. 5-5-1 Flow chart of gate operation

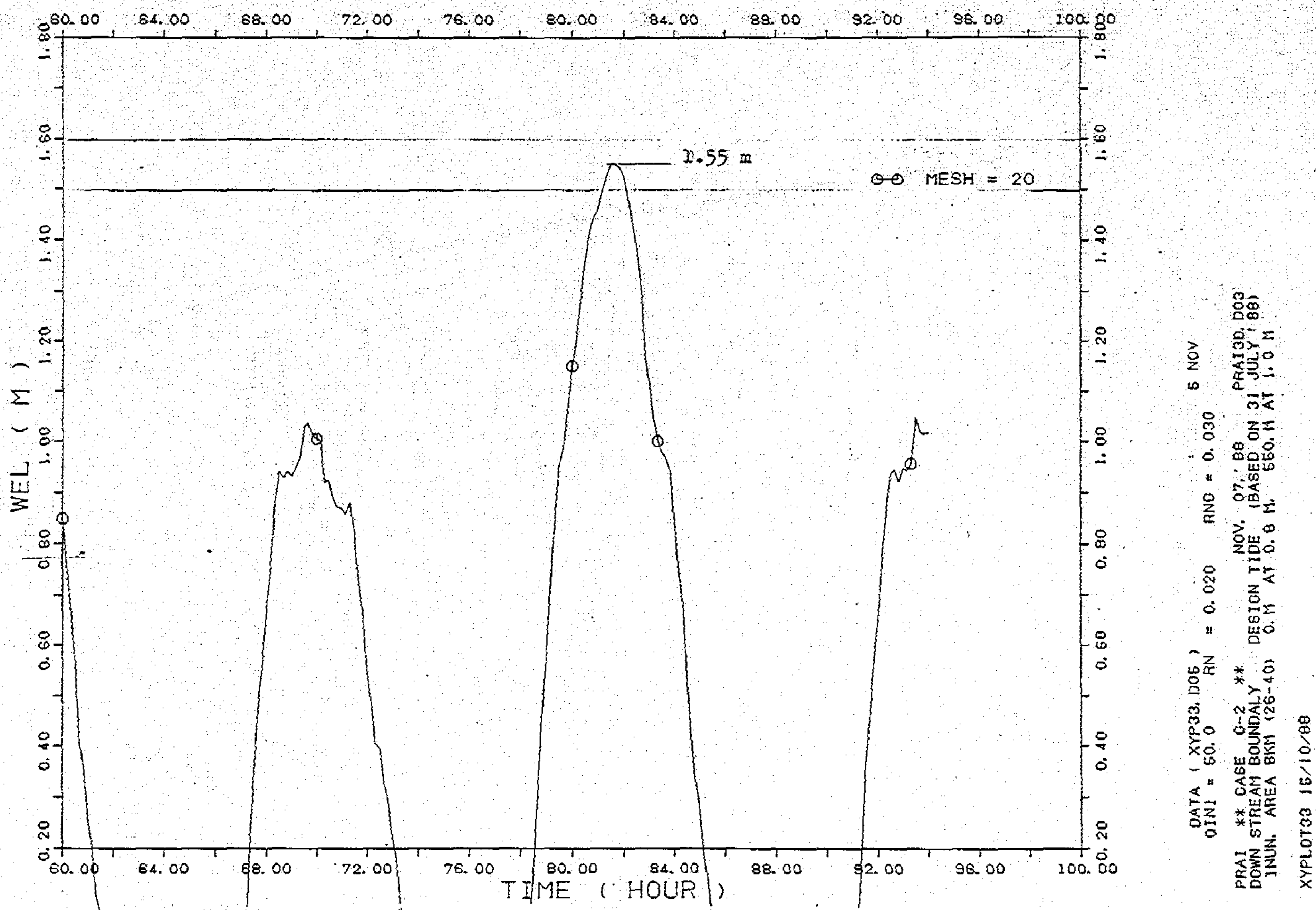



Fig. 5-5-2 Peak of Fluctuation at down stream of the Barrage
Mesh 20 (case-1)

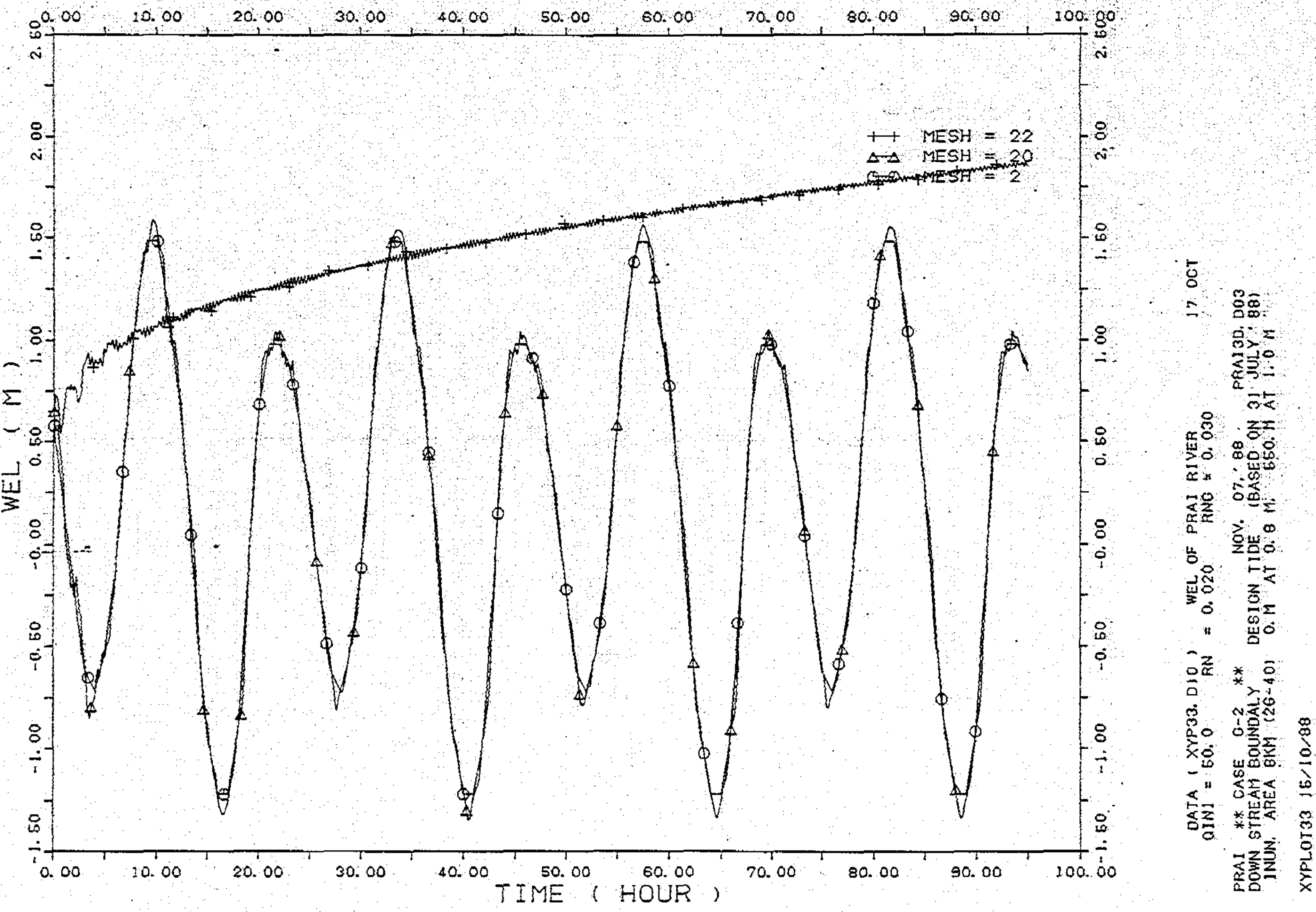



Fig. 5-5-3 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (case-1)

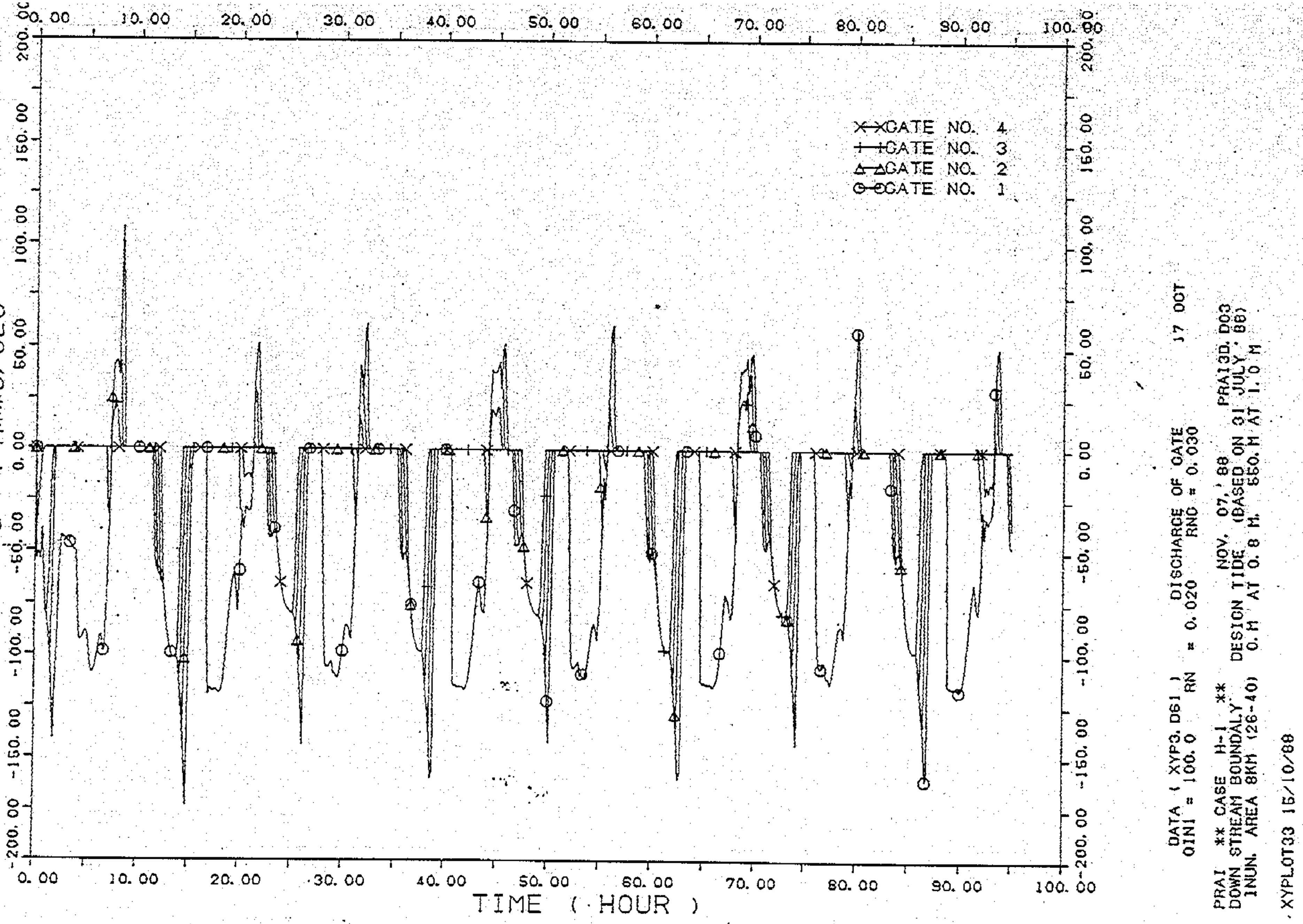



Fig.5-5-4 Discharge passed through gates (case-2)

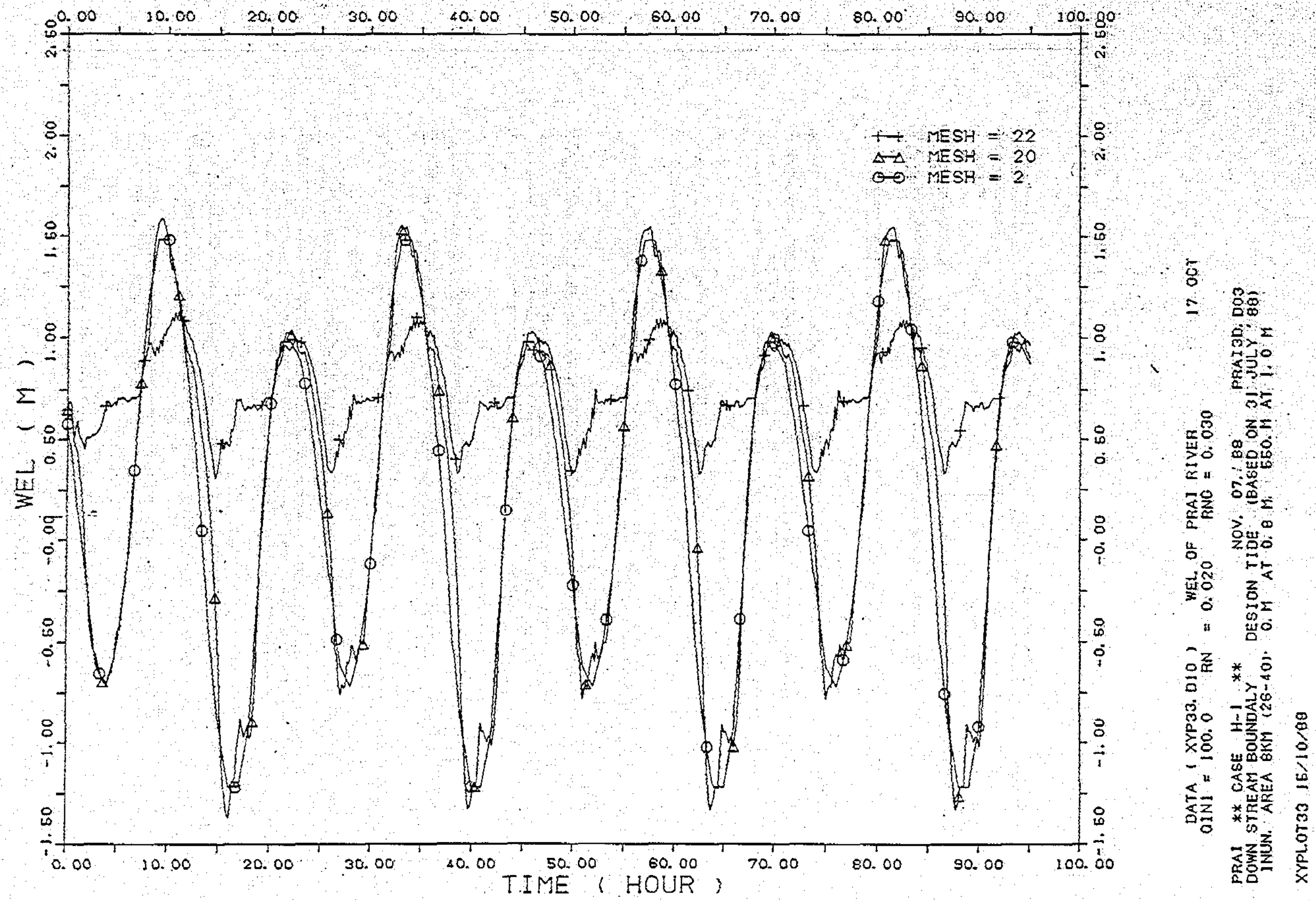



Fig.5-5-5 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (case-2)

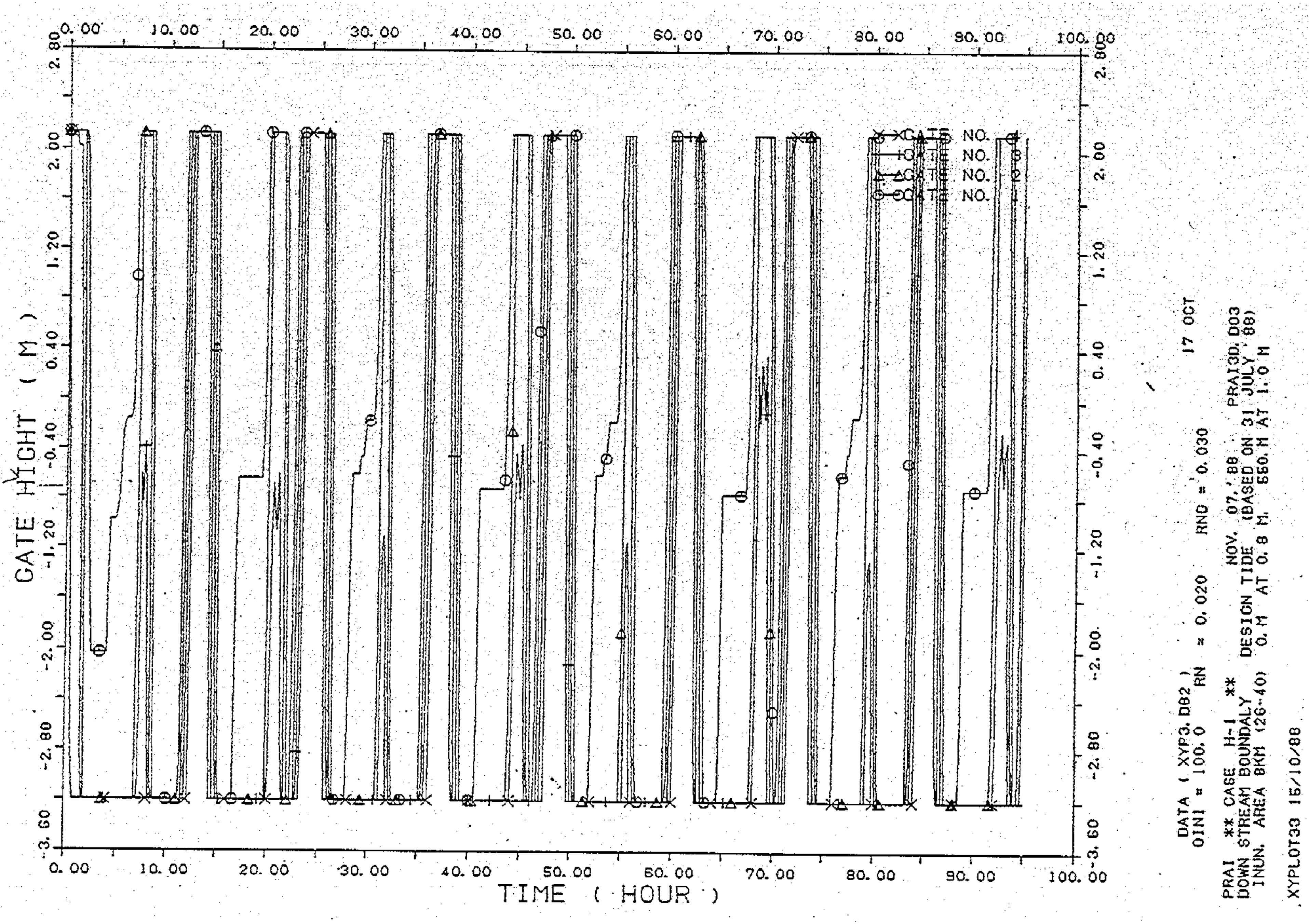



Fig.5-5-6 Opening height of gates (case-2)

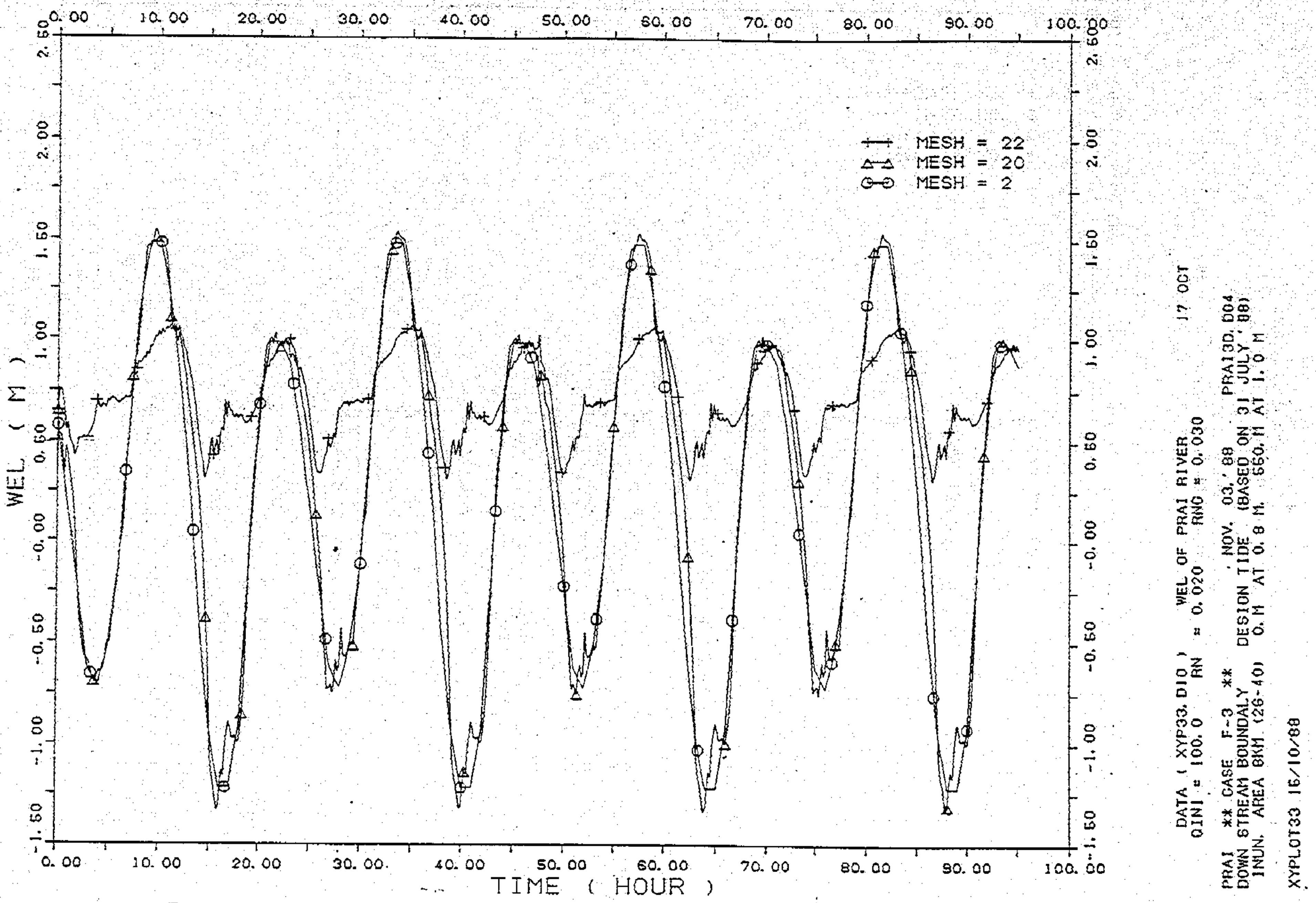



Fig.5-5-7 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (case-3)

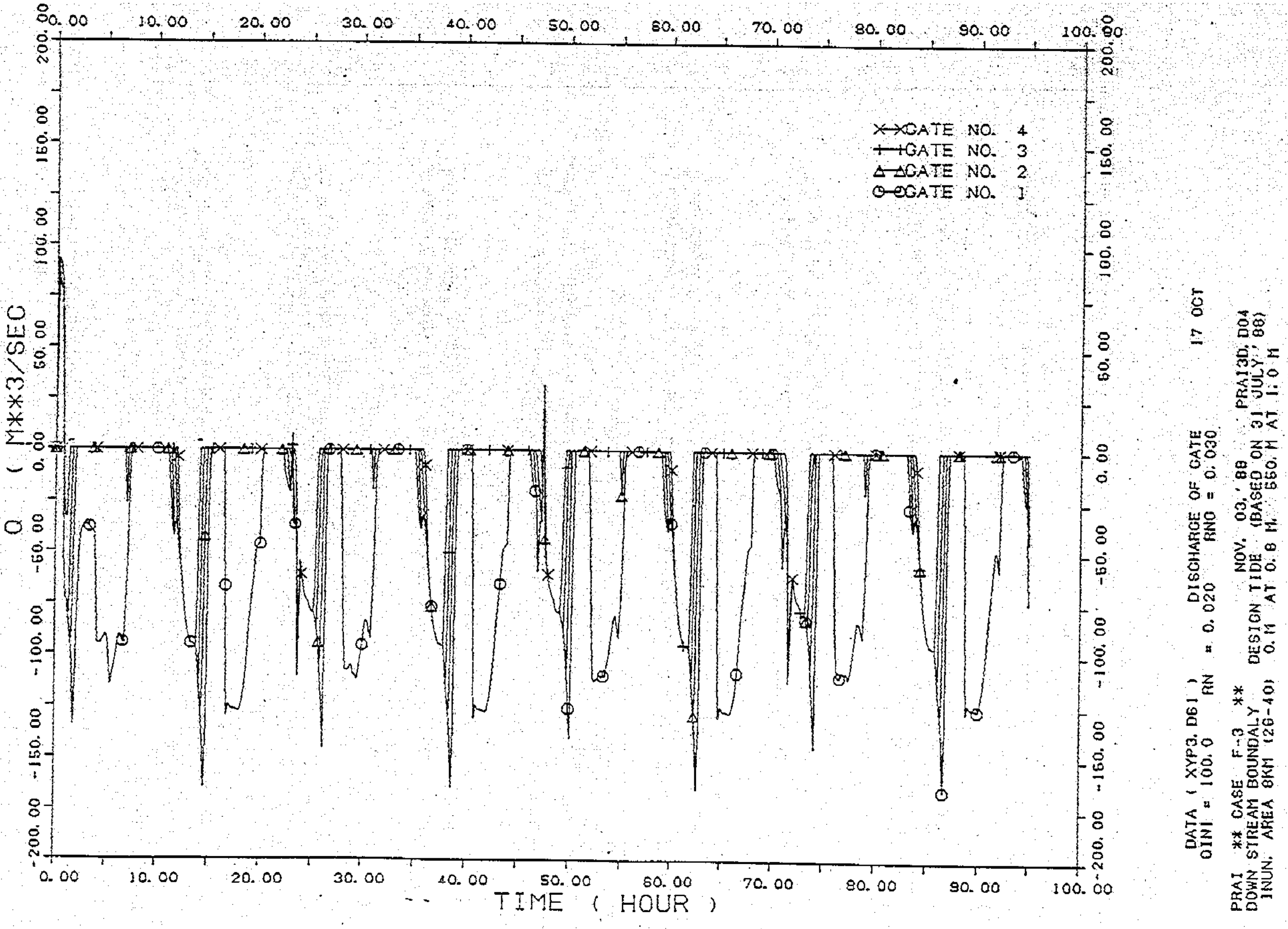



Fig.5-5-8 Discharge passed through gates (case-3)

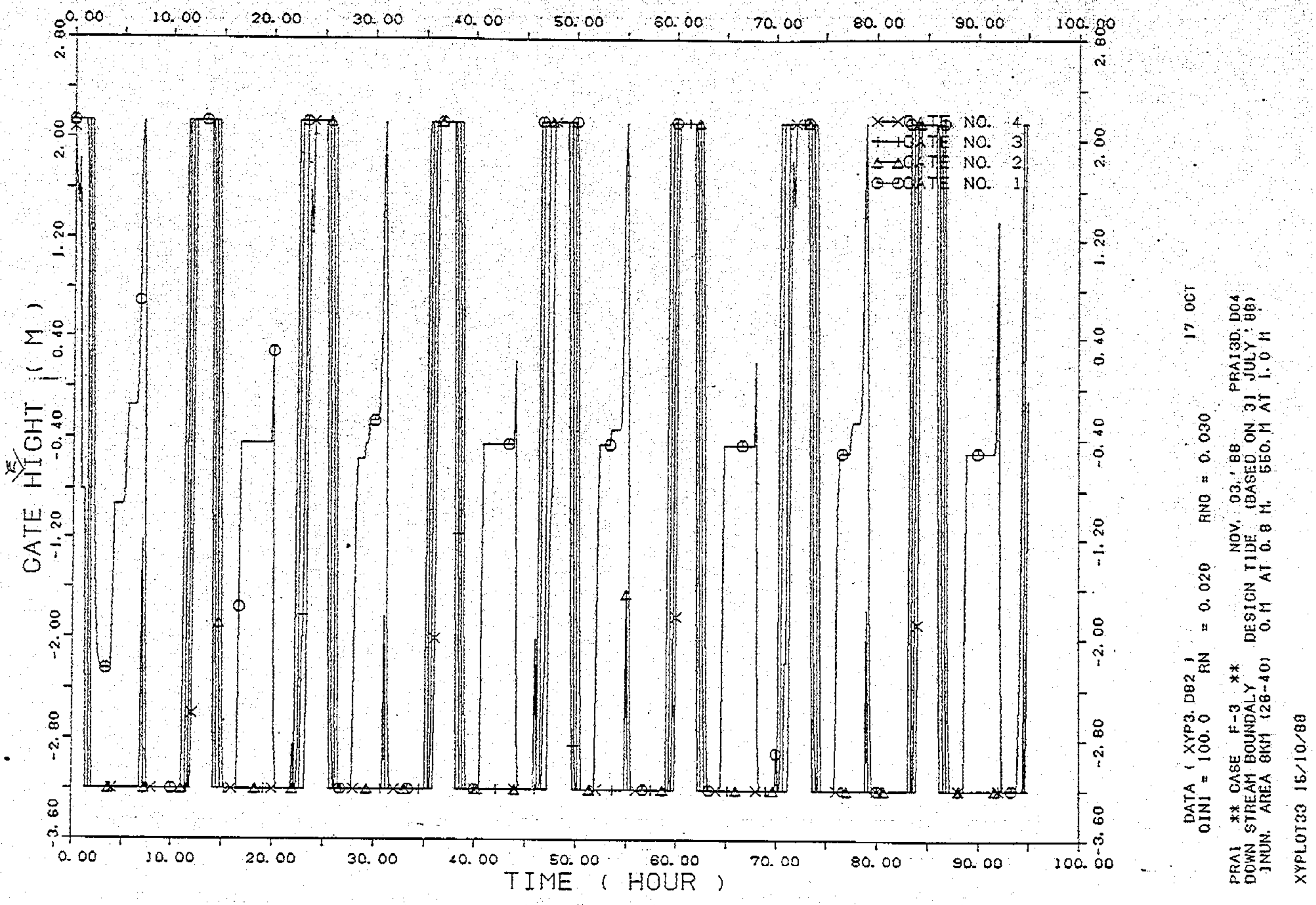
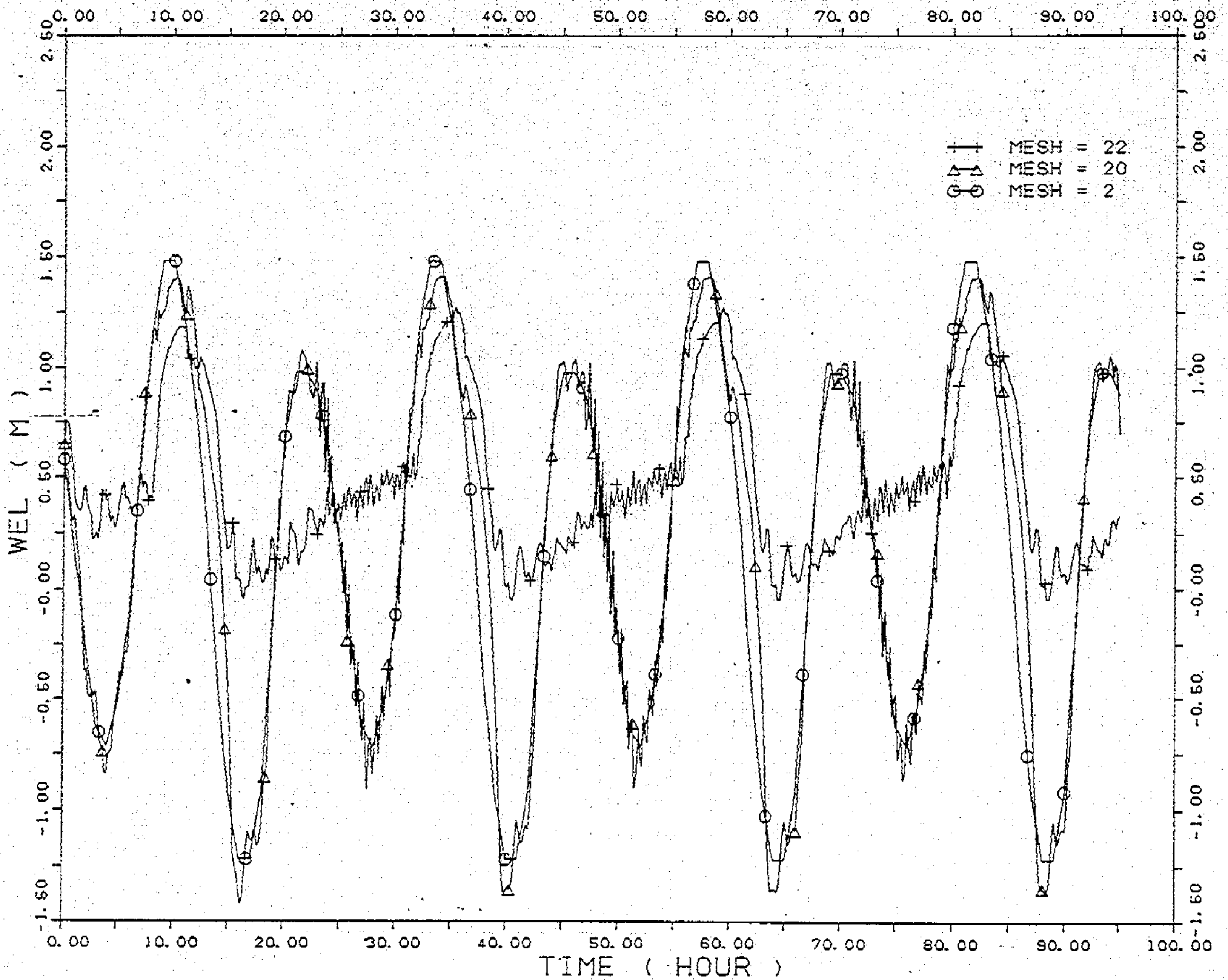



Fig. 5-5-9 Opening height of gates (case-3)




DATA ( XYP33.D10 ) WEL OF PRAI RIVER 17.OCT
QINI = 10.0 RN = 0.020 RNO = 0.030

PRAI ** CASE K-1 ** NOV. 14,'88 PRAI3D.D06
DOWN STREAM BOUNDALY DESIGN TIDE (BASED ON 31 JULY,'88)
INUN. AREA 8KM (26-40) 0.M AT 0.8 M, 550.M AT 1.0 M

XYPLOT33 15/10/88

Fig.5-5-10 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (case-4)

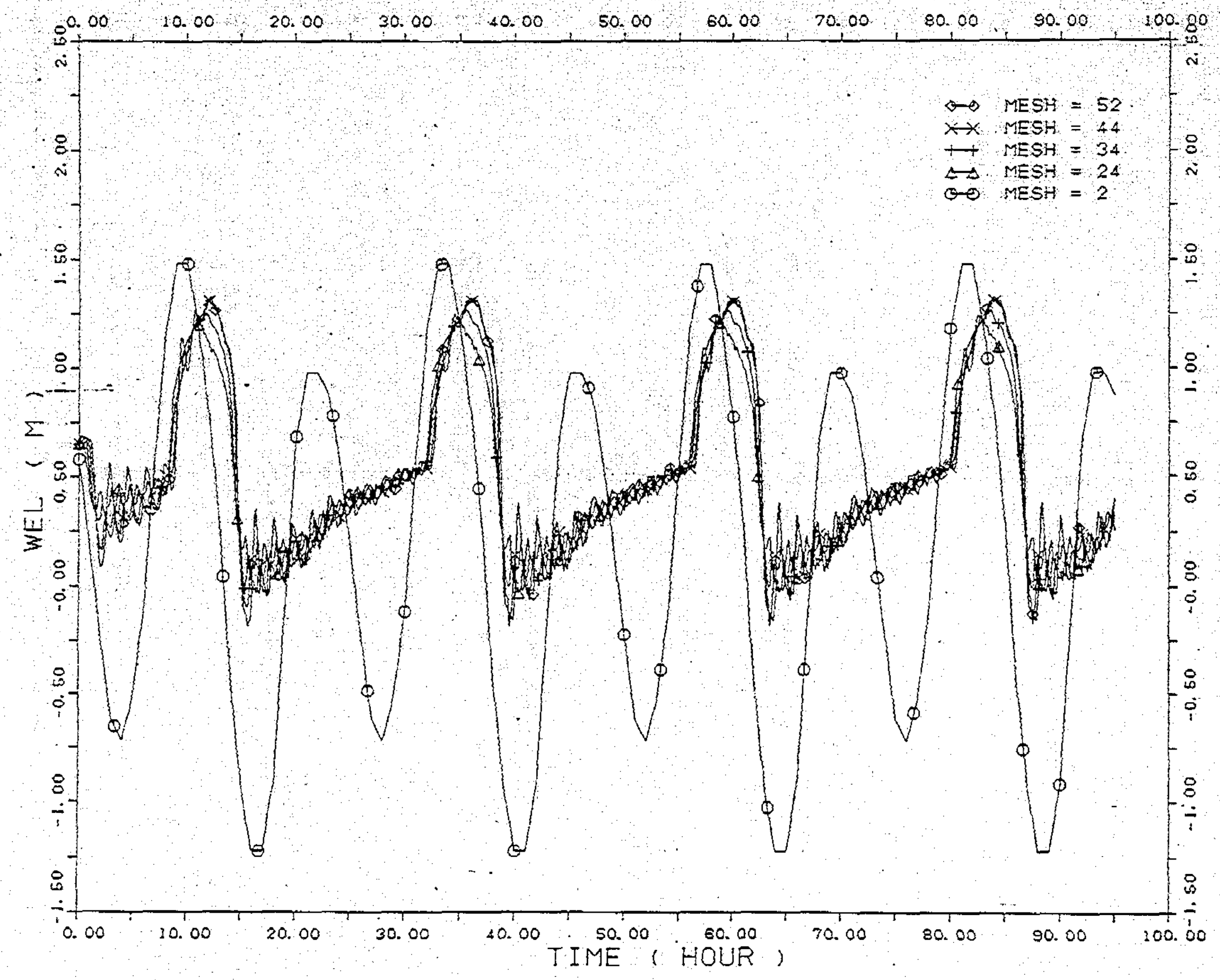



Fig.5-5-11 Fluctuation of water level at Mesh 24, Mesh 34 Mesh 44 and Mesh 52 (case-4)

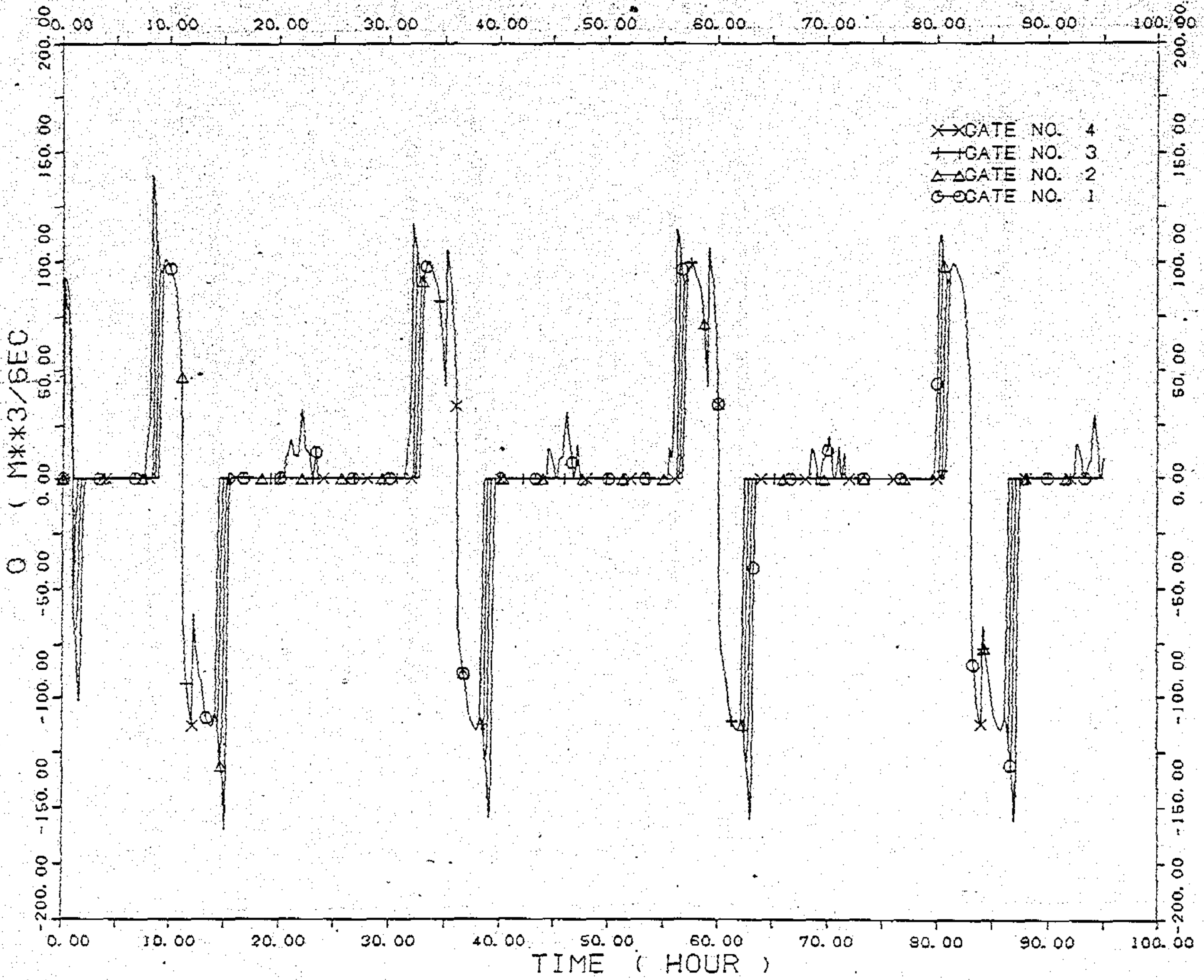



Fig. 5-5-12 Discharge passed through gates (case-4)

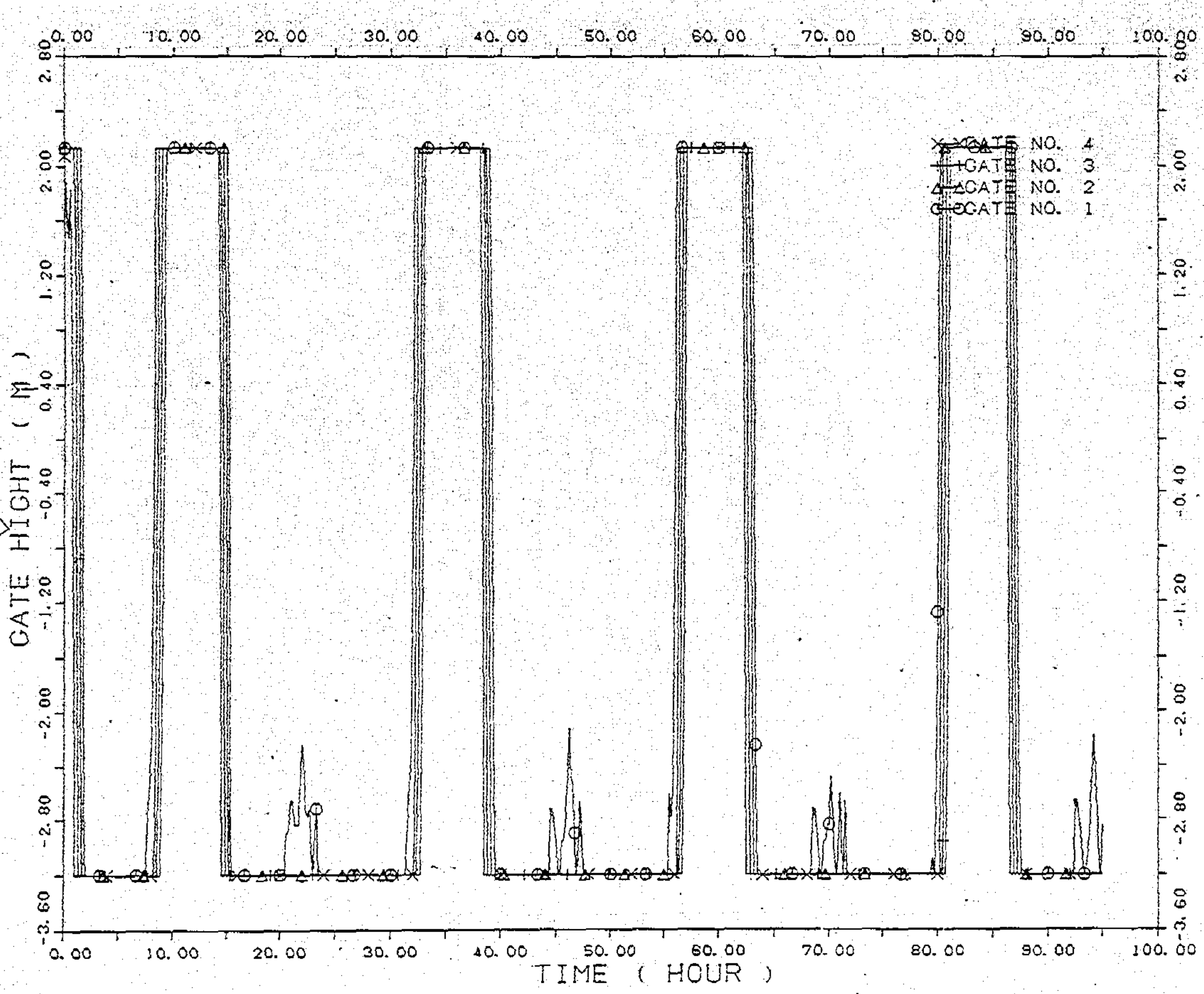



Fig. 5-5-13 Opening height of gates (case-4)

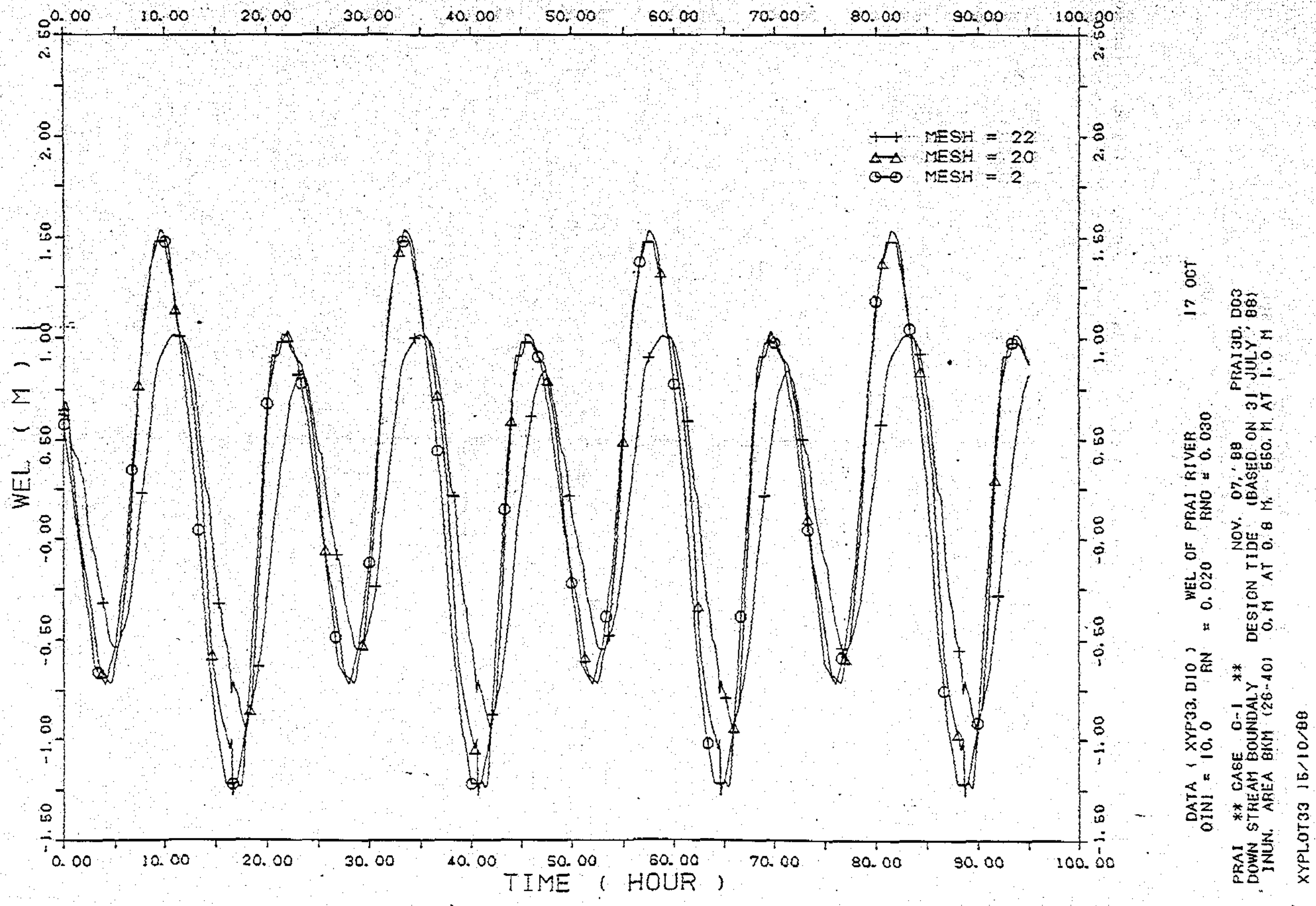



Fig. 5-5-14 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (case-5)

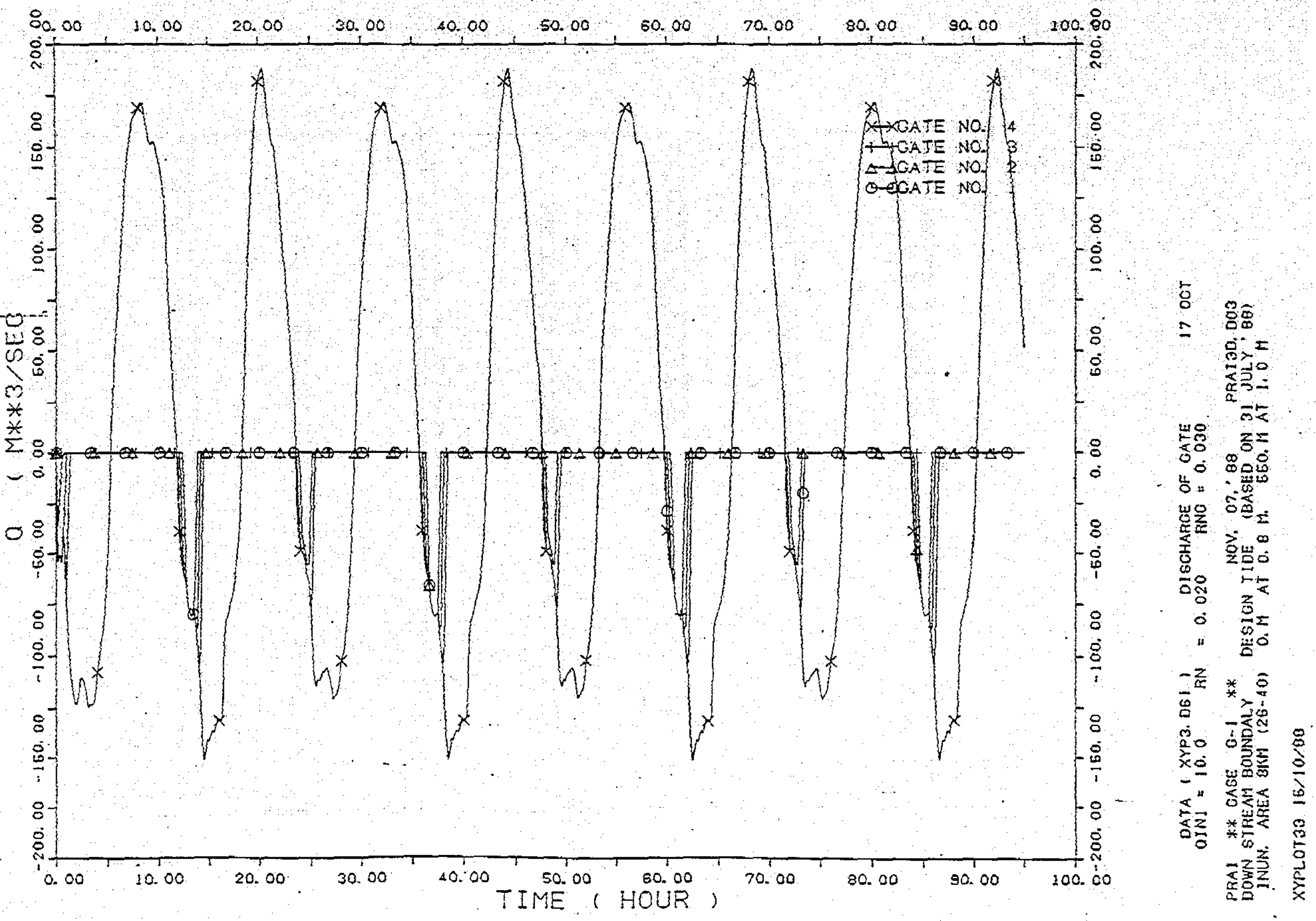



Fig.5-5-15 Discharge passed through gates (case-5)

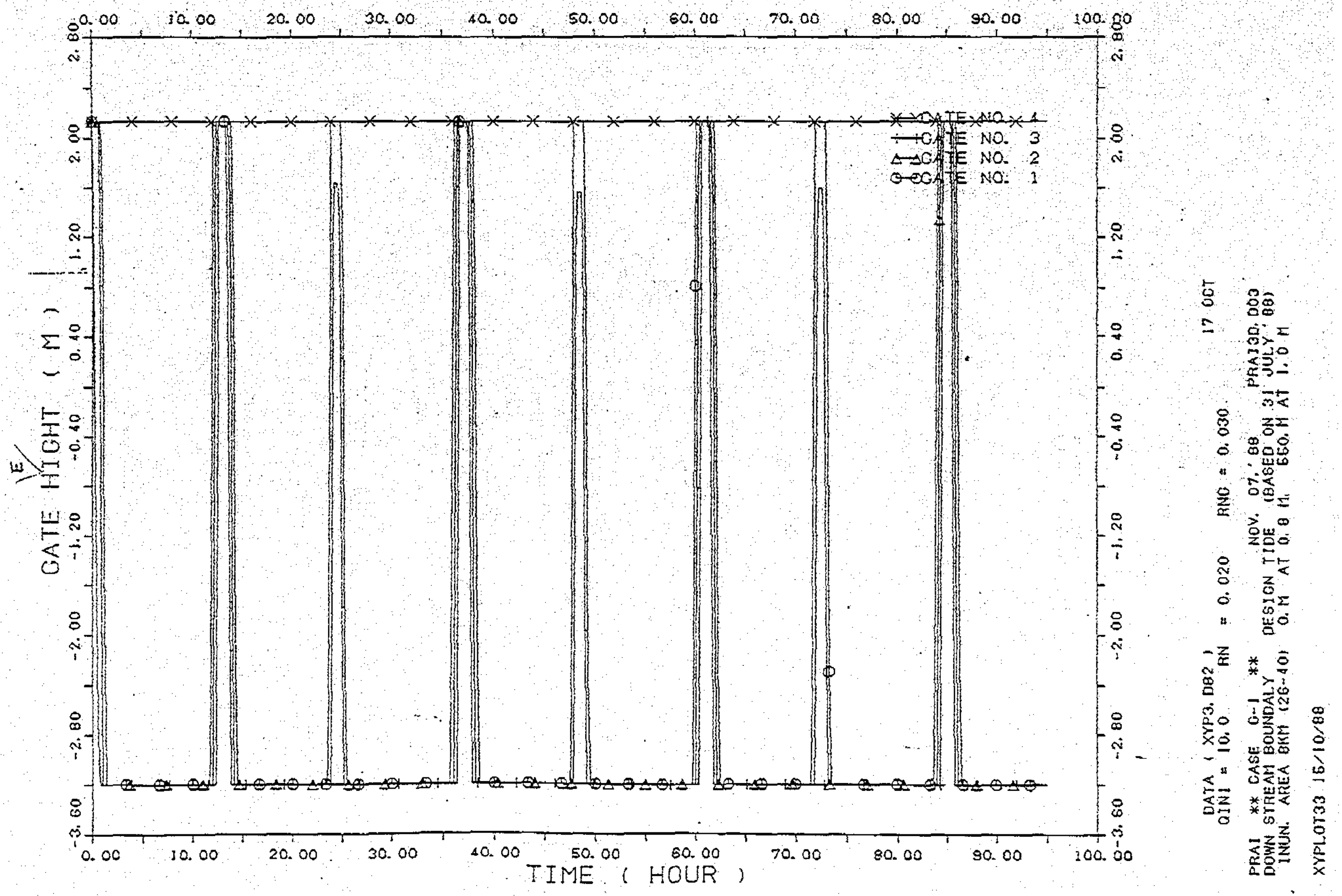



Fig.5-5-16 Opening height of gates (case-5)

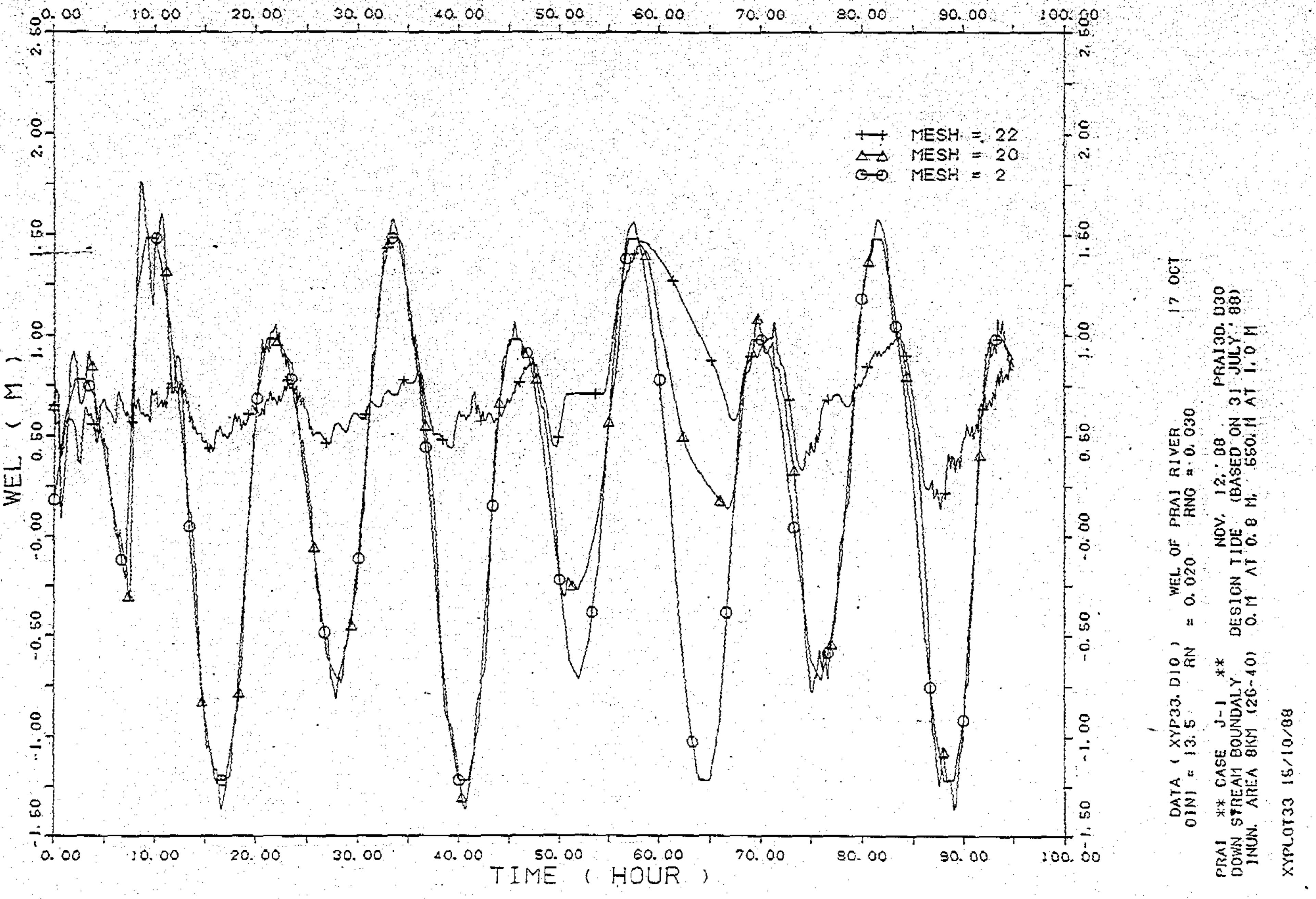



Fig. 5-5-17 Fluctuation of water level at downstream, Mesh 20 and upstream, Mesh 22 of the Barrage (flood routing)

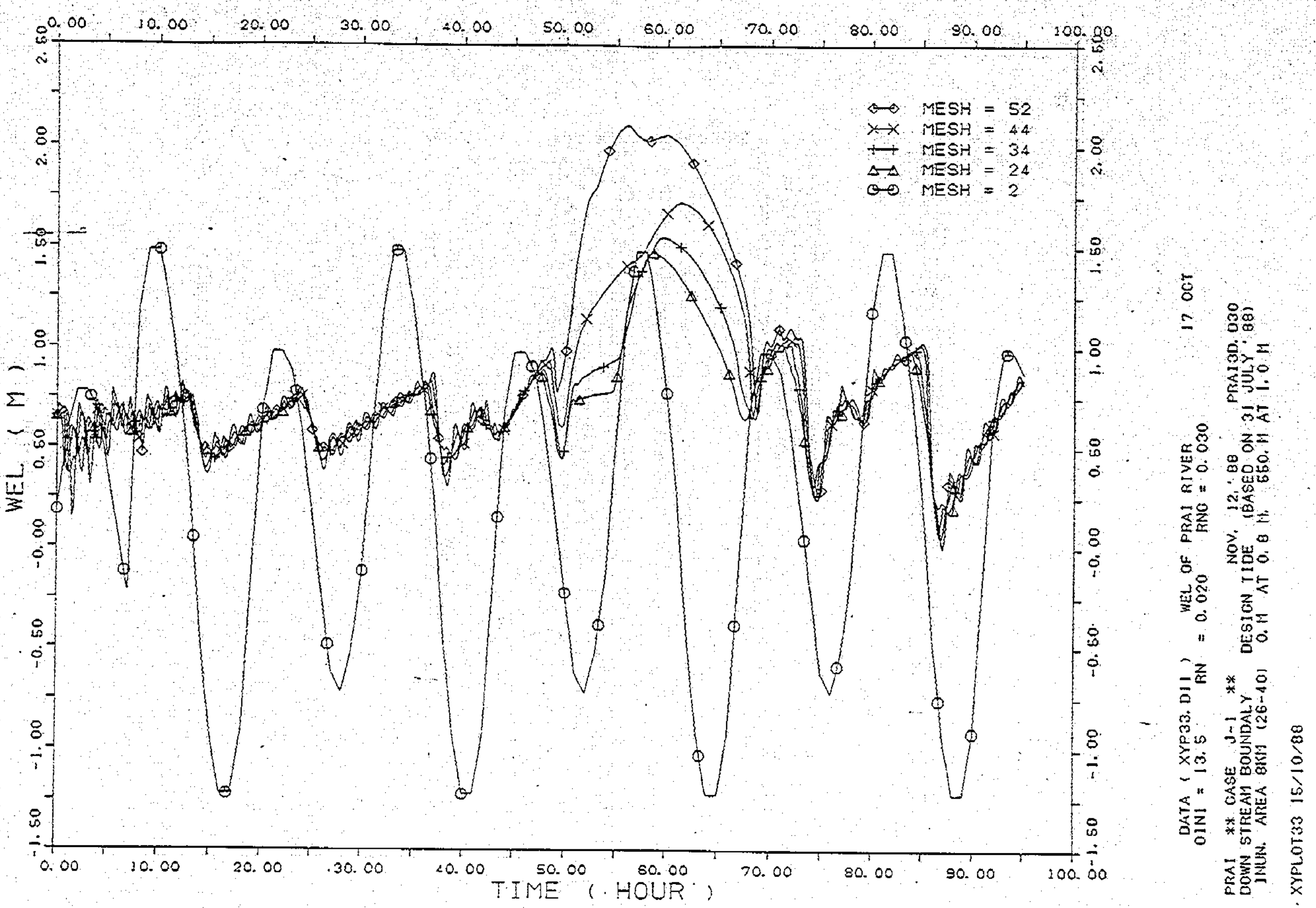



Fig.5-5-18 Fluctuation of water level at Mesh 24, Mesh 34 Mesh 44 and Mesh 52 (flood routing)

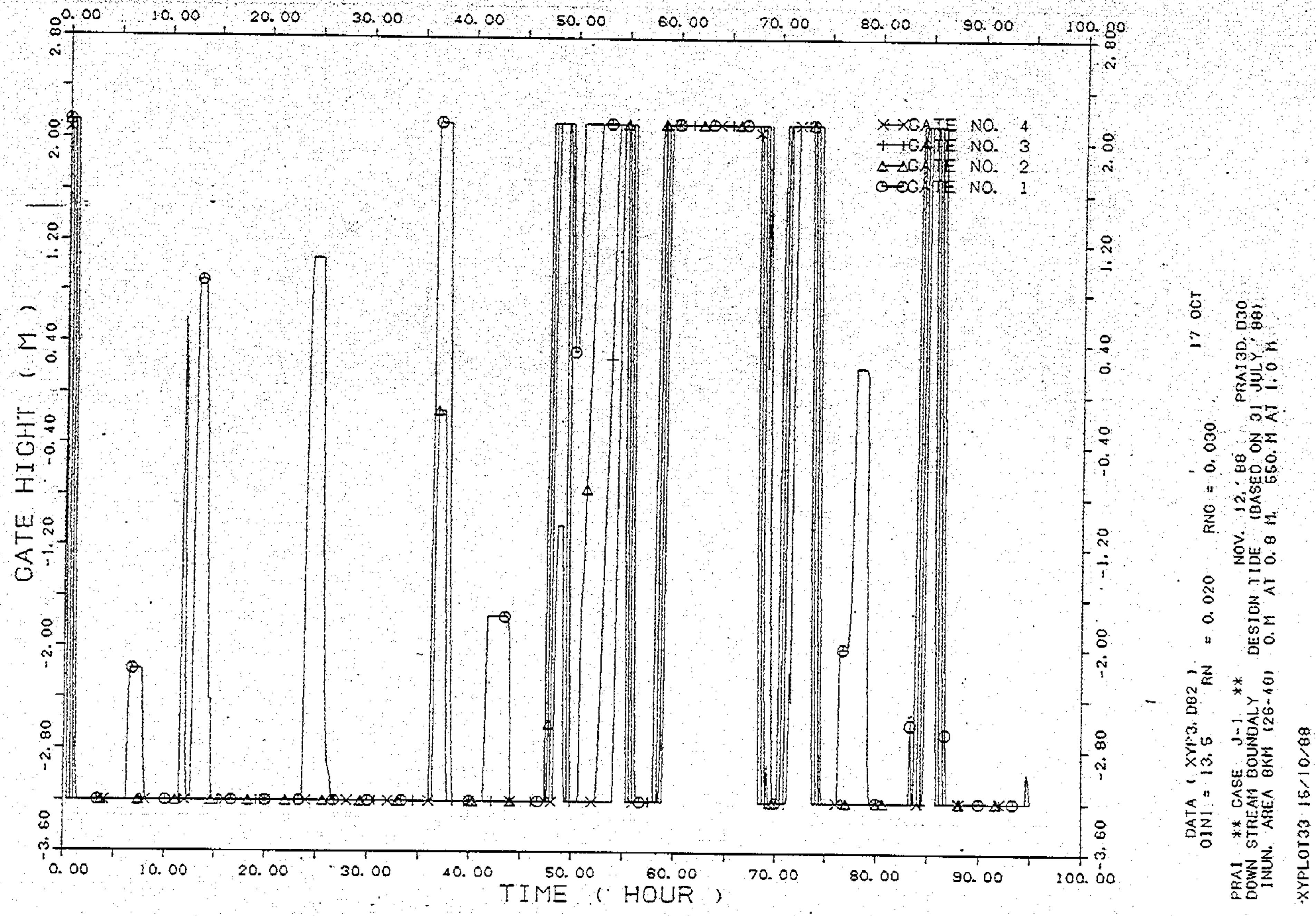



Fig. 5-5-19 Opening height of gates (flood routing)

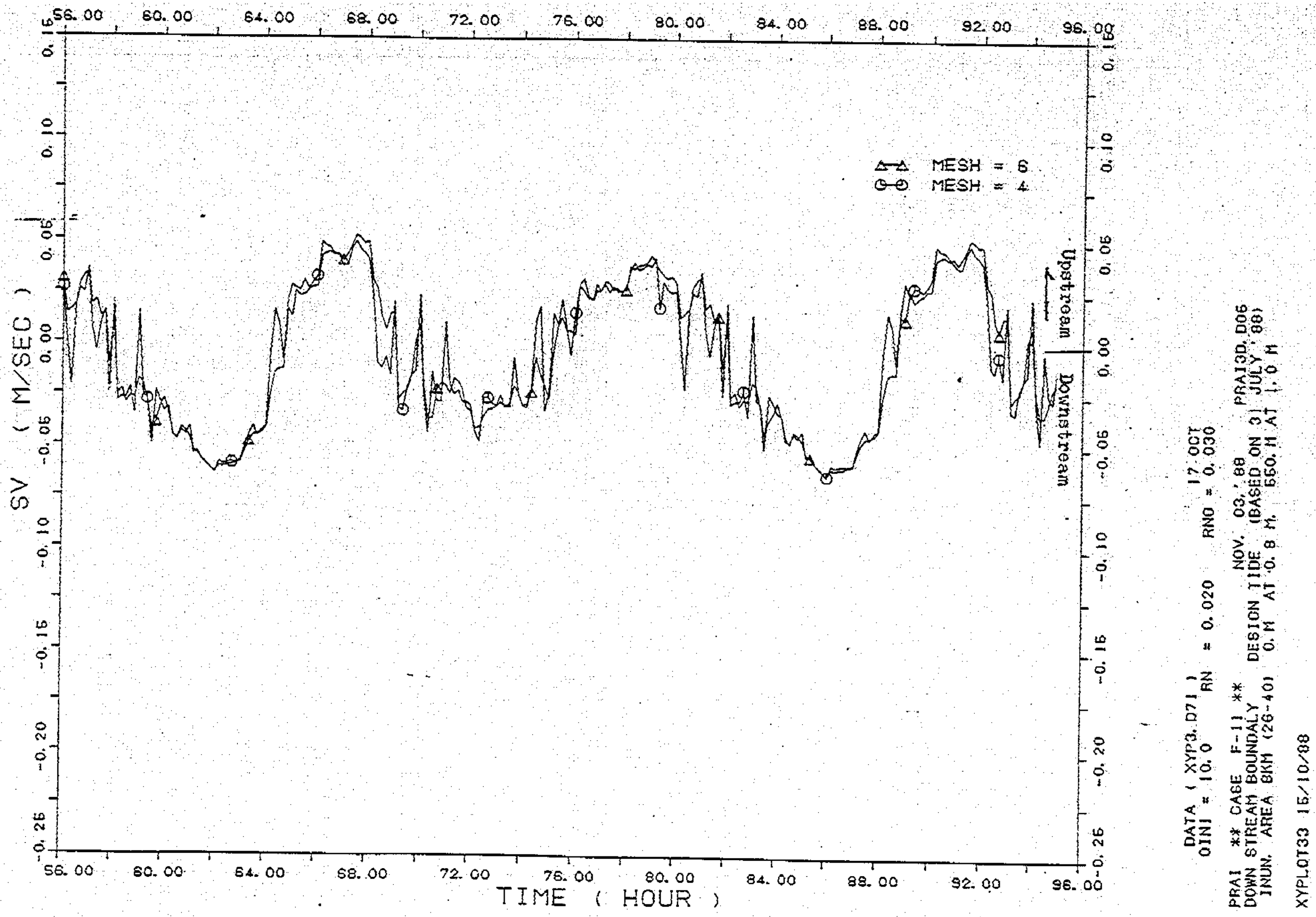



Fig.5-6-1 Shear velocity at Mesh 4 and Mesh 6
without gate operation

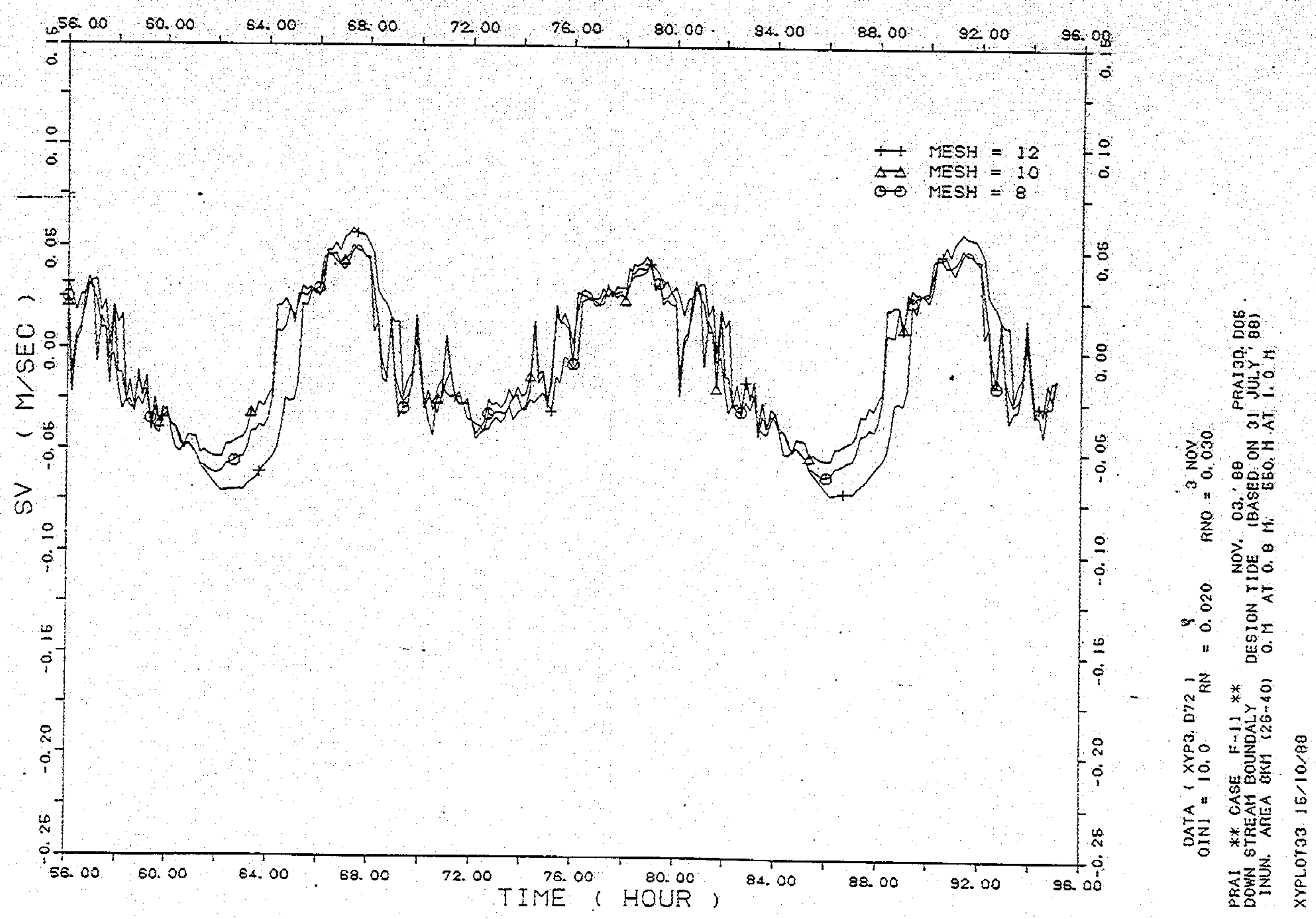



Fig.5-6-2 Shear velocity at Mesh 8, Mesh 10 and Mesh 12
without gate operation

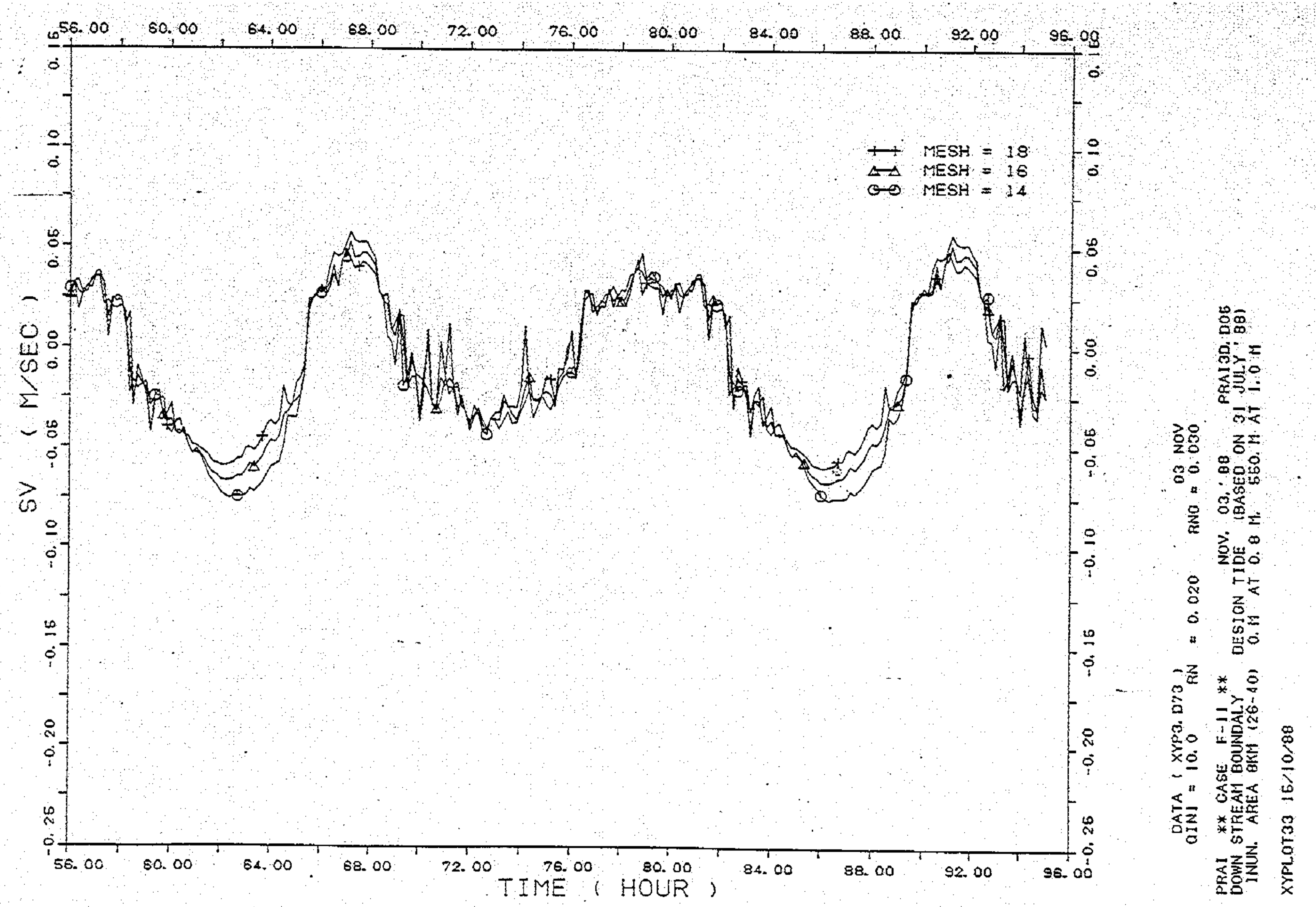



Fig.5-6-3 Shear velocity at Mesh 14, Mesh 16 and Mesh 18
without gate operation

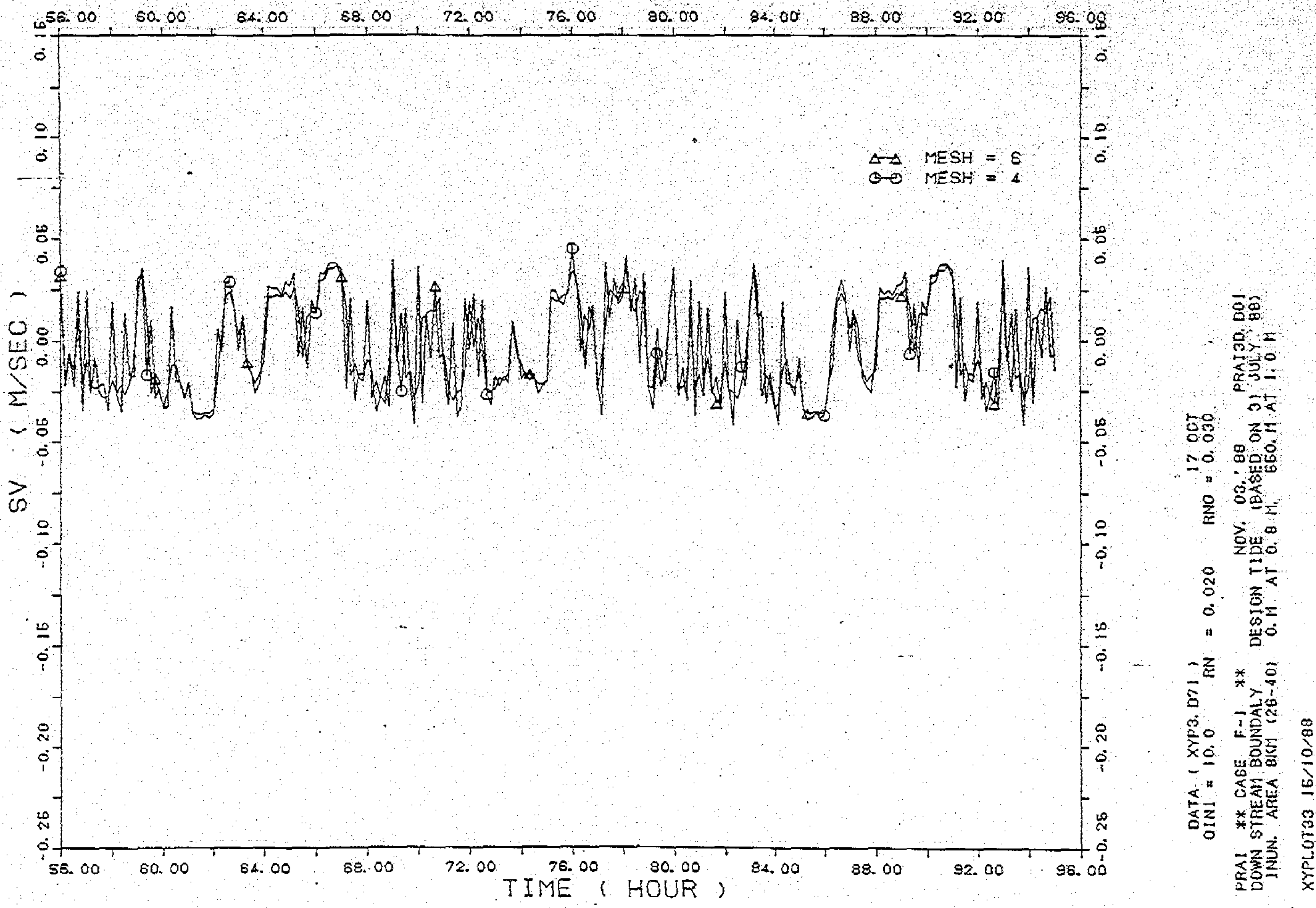



Fig.5-6-4 Shear velocity at Mesh 4 and Mesh 6
with gate operation

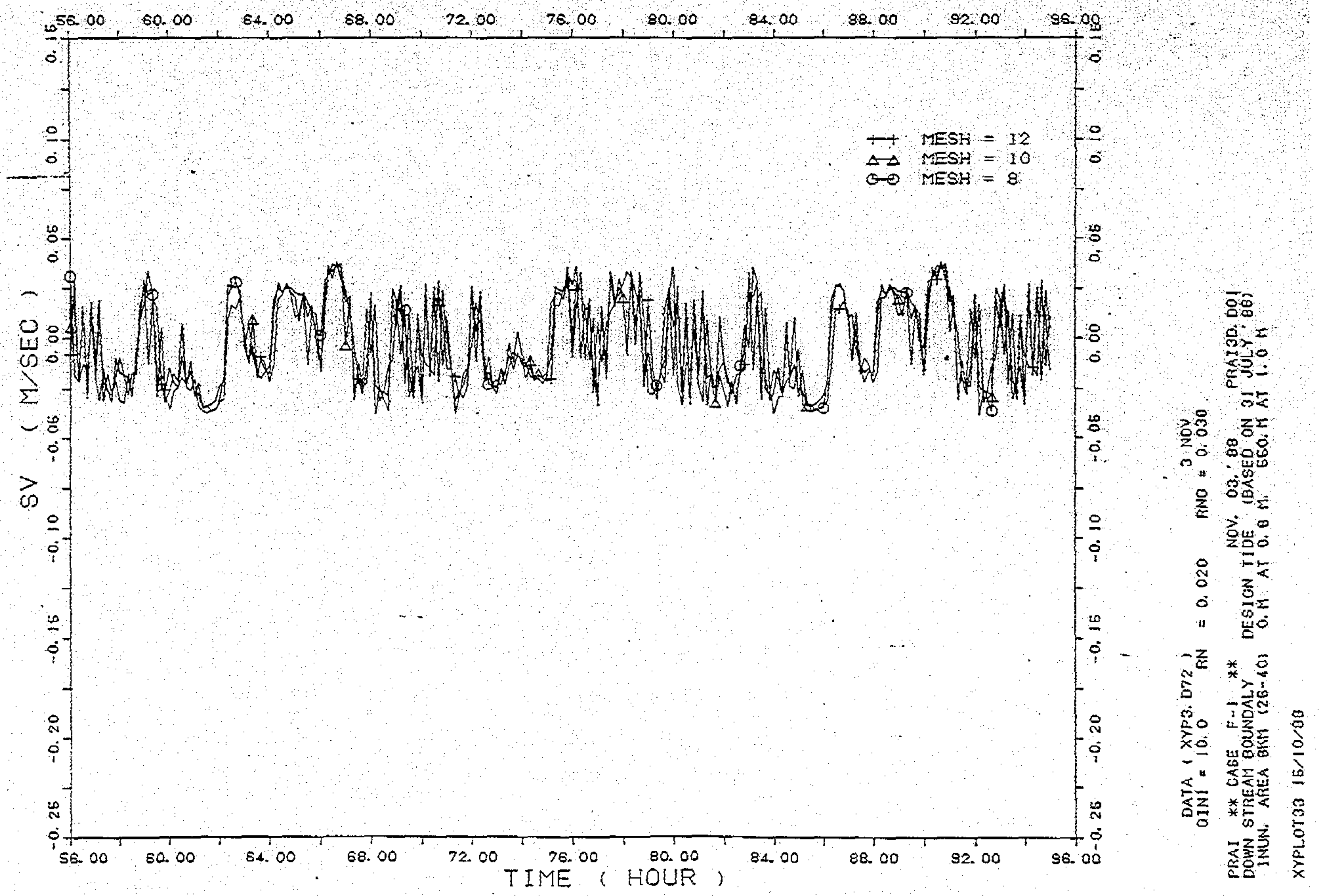



Fig.5-6-5 Shear velocity at Mesh 8, Mesh 10 and Mesh 12
with gate operation

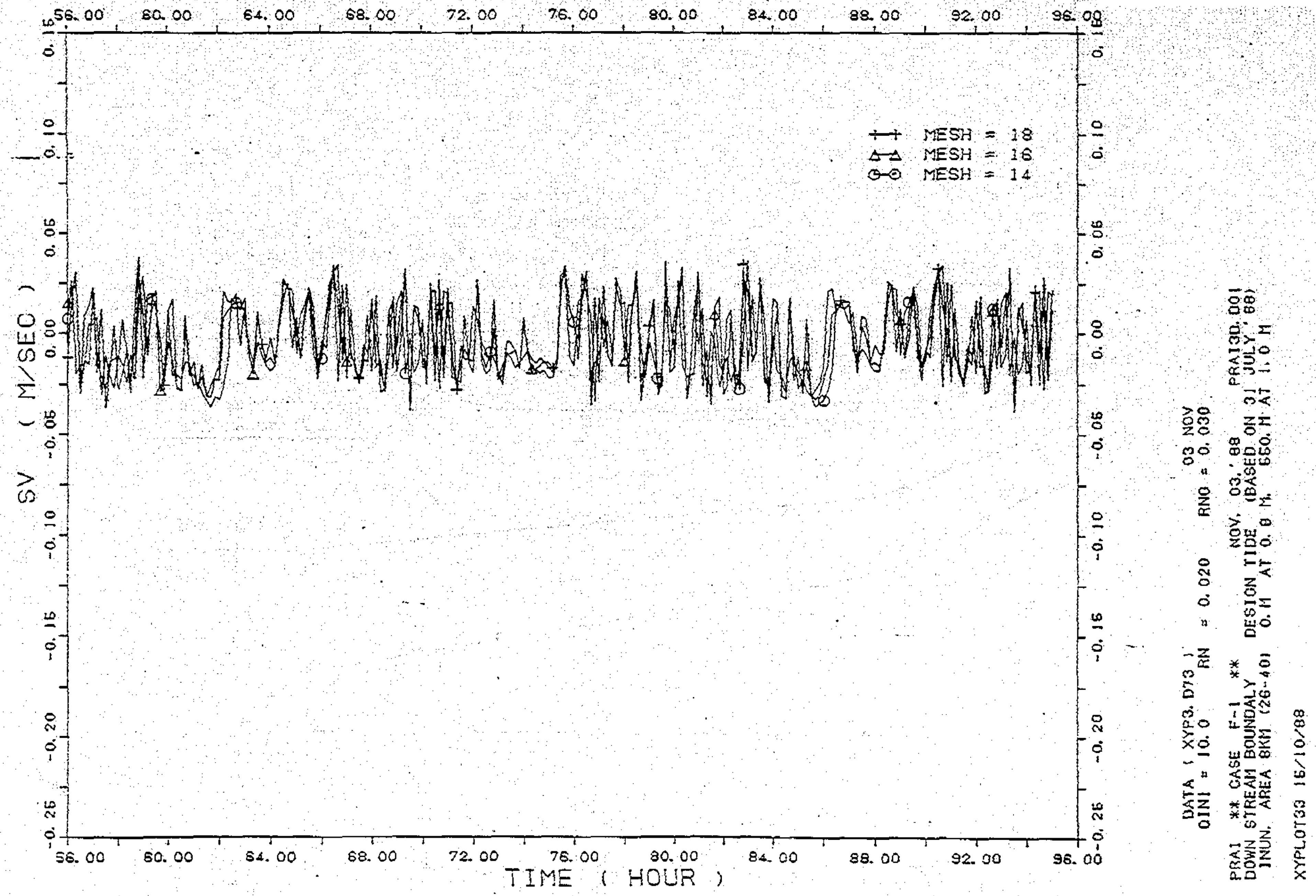



Fig.5-6-6 Shear velocity at Mesh 14, Mesh 16 and Mesh 18 with gate operation

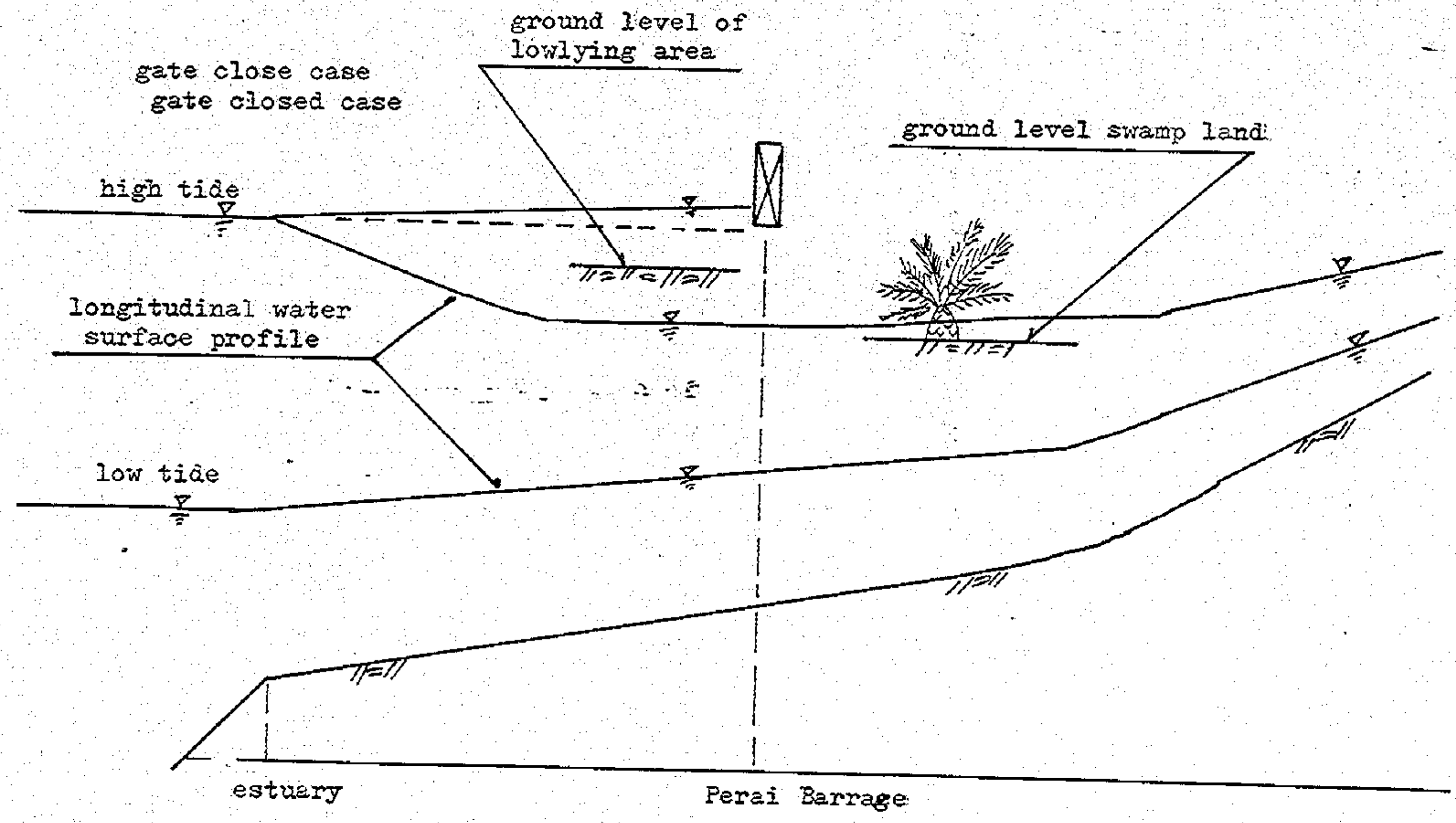



Fig.5-7-1 Longitudinal water surface of Sg. Perai

# VI. STUDY ON THE GATE LEAVES AND RELATED FACILITIES

6-1 The present condition of gate

6-1-1 The history of gate

The History of Gate are as follow;

| DATE | G A T E | THE WHOLE |
|---|---|---|
| 22, Oug, '79 | | Piling start |
| 28, Dec, '79 | | First concreting start |
| 1, Dec, '80 | Fix gate guide | |
| 6, Dec, '80 | Fix gate guide | |
| 25, Jan, '81 | Gate work completed | |
| 11, Jun, '81 | | Earthwork completed |
| Jul, '81 | | Main work completed |
| 31, Jul, '81 | Speed test of gate | |
| 3, Nov, '81 | Speed test of gate | |
| 4, Nov, '81 | Speed test of gate | |
| 25, Feb, '82 | Speed test of gate | |
| 26, Feb, '82 | Speed test of gate | |
| 12, Apr, '82 | | Opening ceremony |
| 28, Sep, '82 | Gate NO4 main wire rope snapped(power cable) Gate NO1 small wire rope snapped(bottom leaf fxing device) | |
| 12, Nov, '83 | Gate NO3 main wire rope snapped | |
| 10, Jan, '83 | Gate NO3 main wire rope change | |
| 10, Dec, '83 | Gate NO1 took out | |
| 19, Dec, '83 | | Final payment of contract |
| 29, Mar, '84 | | Construction of gangway |
| 7, May, '84 | Gate NO4 main wire rope change | |
| 17, May, '84 | Close test of all gate Gate NO1 close by stop-log Gate NO2 close, it take one 20minute to do for inclination occur | |

| DATE | G A T E |
|---|---|
| | Gate NO3 / Gate NO4<br>Go down 12:15 / 12:35<br>All close 12:31 / 12:54<br><br>Alise 14:15 / 13:45<br>Full open 14:40 / 14:14<br><br>Close time of all gate<br>12:54~13:45(51minute)<br>A flood occur |
| 21, Sep, '84 | Gate NO1 repair and repaint |
| 13, Mar, '84 | Gate NO4 wire rope snapped |

6-1-2 The Present Condition of Gate

1 Condition of gate

(1) Gate NO1
Since first repair or repaint in December 1983, no visible corrosion identified taking place on this gate.
Hoisting device is normal.
But, the chances of inclination occuring is very large, during operation.
(cf.Table-1)

(2) Gate NO2, 3, 4
The existing condition of coating is very bad, and also the is a very large reduction to the plate thickness.
It was not in operation for quite some time and it is seen that there is difficulty in operation as there is no proper lubrication in the rollers.
Hoisting device is normal.
Corrosion is also taking place on the gate guides.
(cf.Table-2)

(3) The others
① Electrical, control, hydraulic equipments, and emergency supply stand-by generator, are still in good condition.
② Laying pipes. and wiring: Fairly in good condition as there are some minor damages to the ducts for laying pipes and wiring.

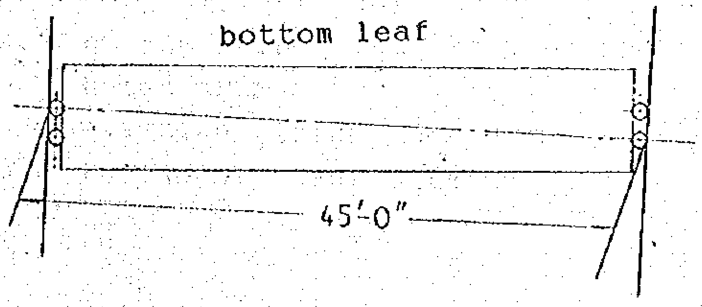
2 Construction of gates

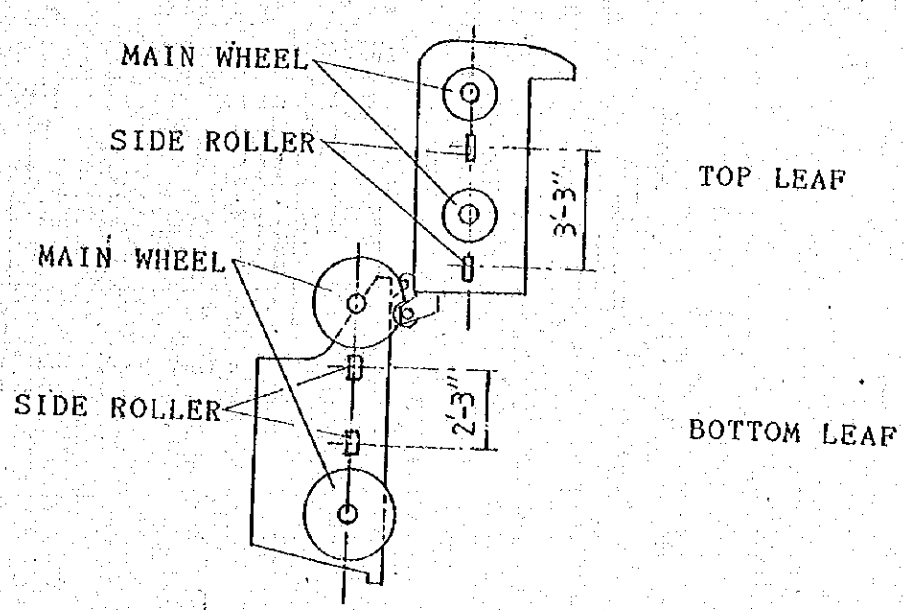
(1) The position of side rollers

The inclination of the gate is impossible to control, since the distance between side rollers is small, especially that of bottom leaf is very small.

In cases where the distance between guides is more than 45' 0, it is impossible to control the inclination of the gate, when the gate is rubbing against the guides.

The Rubber or both sides will be badly damaged.



(2) Wiring

Wiring system of the existing gate is used for single leaf gate, which is a very rare case.

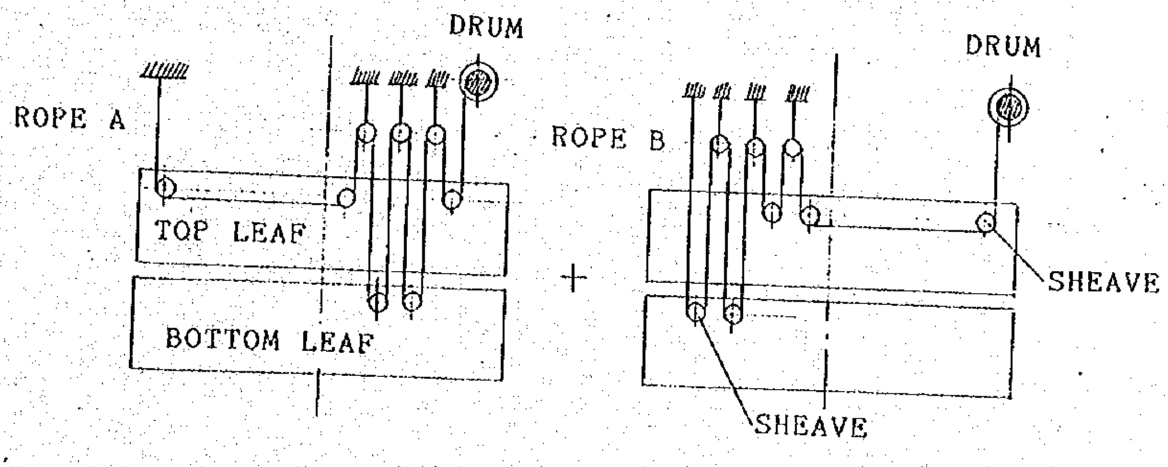
The reasons above are as follows:

① The efficiency of wiring is not good, because of the many rope sheaves.

② Smooth operation for double leaf gate is impossible because of the complex wiring mechanism, which normally causes the inclination of the gate due to the unbalance of the both sides wire rope tension and due to the sheave effeciency. This gate is so designed as to minimize, the above unbalance as much as possible, however, it will be impossible to avoid the gate inclination.

Smooth operation of the gate leaf cannot be expected due to the disturbance of the rubber seal raising ahead and lowering at the hoist drum side.

Accordingly, the existing wiring mechanism is not recommended for the double leaf gate complex sealing system.



(3) Wire rope

In addition to the above, the wire rope dia seems to be small and has a possibility of jamming or snapping.
The reason for the above is because the design uses a lower safety factor of not less than 6 for wire rope i.e (6. 81 on the actual caclulation).
In the case of Japan, such safety factor for wire rope shall not be less than 8 with tension strength of wire rope at the time of maximum motor torque not more than 90% against yield point.
Further more, hydraulic motor is used in this case there fore, it is recommended to check hydraulic relief pressure in

order to avoid wire rope breaking caused by such pressure(Maximum torque).

### 6-1-3 Check of sink and inclination on barrage

The survey done to check for sinking and inclination on barrage

(a) Height of guide wall (2.13m) and hoist establishment level (7.01m) for pier

| point | guide wall | hoist establishment level |
|---|---|---|
| JBR1.B.M | 3.70m | 3.70m |
| pier 1 | 2.05 | 6.93 |
| pier 2 | 2.05 | 6.94 |
| pier 3 | 2.04 | 6.93 |
| pier 4 | 2.04 | 6.93 |
| pier 5 | 2.03 | 6.92 |

(b) Out of plumb on pier

| point | out of plumb |
|---|---|
| pier 1(R) | +0.75 cm |
| pier 2(L) | +0.30 |
| pier 2(R) | +1.55 |
| pier 3(L) | +0.40 |
| pier 3(R) | +0.25 |
| pier 4(L) | +0.60 |
| pier 4(R) | +0.40 |
| pier 5(L) | +1.10 |

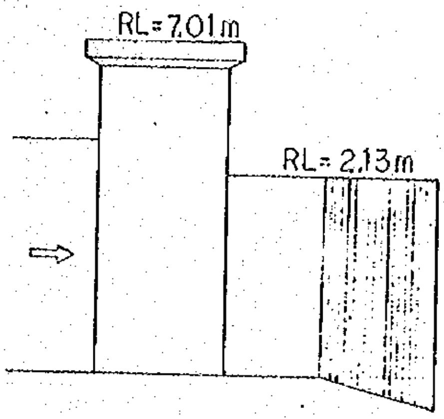
From the survey result obtained in (a) it is impossible to check for the actual construction and general sinking as the difference in value is very small compared to the established level on plan.

From the survey result obtained in (b) it is also impossible to check for any inclination because the results shows there is no extreme out of plumb for all the piers.

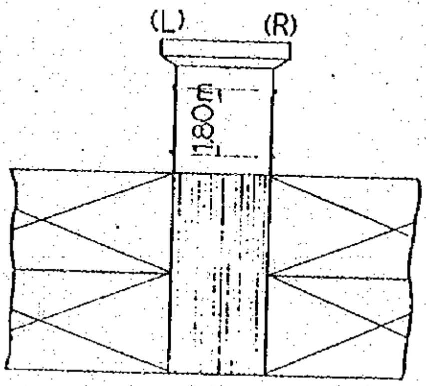
From both the paragraph mentioned above we can conclude that the main structure of barrage is normal as there is no general sinkimg and extreme out of plumb.

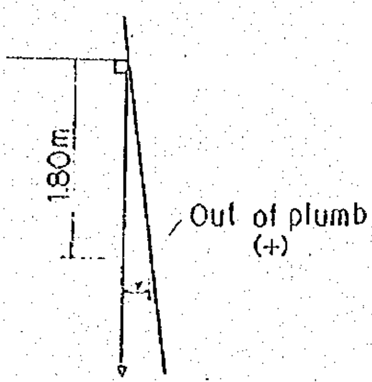
Accordingly the existing main structure needs no further improvements.

(a) Check for sink




(b) Check for out of plumb



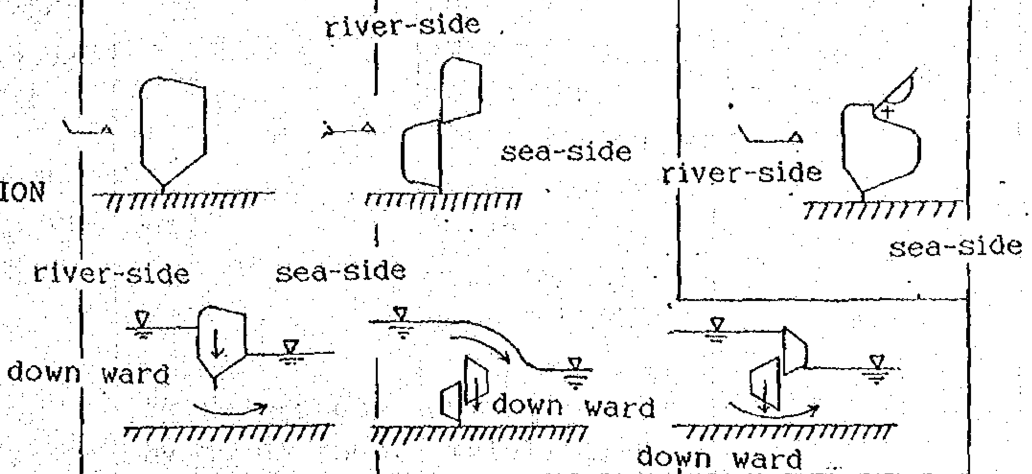
### 6-1-4 Judgment of repair or renewal

According to the detail investigation in 1988, NO.2, 3 and 4 gate cannot be used any more. The present state of NO.1 gate is fairly well, but smooth operation cannot be expected because the design of gate itself have some difficulties for operation.
Judging from above points, it is proper to renew all the four gates.

## 6-2 SUGGESTION

### 6-2-1 Type of gate

Tidal gate installed around an estuary is to prevent the tidal intrusion and to protect against high tide.
General, comparison of tidal gate, the special features and quality are listed in the table below:

| ITEM \ TYPE | 1 SINGLE LEAF GATE | 2 DOUBLE LEAF GATE | 3 SUB-GATE ATACHED GATE |
|---|---|---|---|
| 1<br>CONSTRUCTION |  | | |
| 2<br>PREVENTION OF TIDAL INFUSION | Operation of the gate, upper level fixed, difficult to stop intrusion of sea water from bottom of the gate during operation. | The upper gate can be controlled by lowering and allowing the water to spill over from the upstream side which the bottom gate is fixed preventing the tidal intrusion from below. | It is the same to "2" |

| TYPE / ITEM | 1 SINGLE LEAF GATE | 2 DOUBLE LEAF GATE | 3 SUB-GATE ATACHED GATE |
|---|---|---|---|
| 3 INFLUENCE OF OPPOSITE PRESSURE AND WAVE PRESSURE (INFLUENCE OF PRESSURE FROM SEA SIDE WHILE CLOSEING) | Influence is small, from opposite pressure and wave pressure from sea side. | Influence is not by opposite pressure from sea side. The pressure effect is only during lifting and lowering the gate. (The trussed of the upper leaf is forcing downstream and is in the opposite side of the bottom leaf) | Easier operation during, uplifting due to the opposite pressure and wave pressure from the sea. (Stoppers establish all closed position) |
| 4 UPSTREAM FLOW WATER LEVEL FIXED | It is necessary to do lower extremity discharge to fixed and control upstream water level. | Over flow is mainly over the upper leaf only and the under flow will only be allowed when the water level upstream extremity high. | It is the same to"2". |
| 5 HYDRAULIC FORCE (RUNNIG IN TIME) | Gravitational force acting and pulling the gate downwards. | The down-pull force acts on the top leaf, bottom leaf during operation. | The down-pull force acts on the main gate. |

<table>
<tr><td>6<br>CIVIL(PIER)<br>CONSTRUCTION</td><td>The pier is high, compared to the double leaf gate.<br><br>Gate guide need only one line.</td><td>The pier is lower, compared to the one leaf and flap attached gate.<br>It requires two line of gate guides.</td><td>The pier is high, compared to the double leaf gate.<br><br>Gate guide requires only one line.</td></tr>
<tr><td>7 WEIGHT</td><td>A standard<br>(1.0)</td><td>Heavy<br>(1.5)</td><td>A little heavy<br>(1.2)</td></tr>
<tr><td>TYPE<br>ITEM</td><td>1 SINGLE LEAF GATE</td><td>2 DOUBLE LEAF GATE</td><td>3 SUB-GATE ATACHED GATE</td></tr>
<tr><td>8<br>MAINTENANCE,<br>INSPECTION,<br>AND CONTROL</td><td>Maintenance, inspection, and control can be done easily by raising the gate above the water level. The water can be sealed using stop log gate for each gate used.</td><td>It is the same to "1".</td><td>It is the same to "2".</td></tr>
<tr><td rowspan="2">9<br>INFLUENCE BY<br>SEDIMENTARY<br>SAND</td><td>Ther is little influence by sand sedimenta-tion.</td><td>There is little influence by sand sedimenta-tion from upper flow side.<br>It has a pos-sibility that top leaf could</td><td rowspan="2">There is little influence by sand sedimenta-tion.</td></tr>
<tr><td colspan="2">not be lowred down to the lowest level by the influence of sand sedimentation from sea side.</td></tr>
</table>

| ITEM \ TYPE | 1 SINGLE LEAF GATE | 2 DOUBLE LEAF GATE | 3 SUB- GATE ATACHED GATE |
|---|---|---|---|
| OVERALL VALUATION | It is difficult to establish both the prevention of tidal influence while also maintaining the upstream water level at a fixed position. | It is suitable to establish both prevention of tidal influence as well as maintaining a fixed water level at the upstream side. | It is not suitable when under the influence opposite pressure and wave pressure. |

6-2-2 Hoisting method

It is impossible to make the big modification of the gate leaf, considering this gate purpose. (function)
There fore it is recommendable to make the modification to the hoist to control the inclination of gate.
Hoisting method plan recommendable are as follow;

1 1motor-2drum, 1set

A crossing or bridge between piers shall also be provided.
In this method, the difference of upper and lower gate leaf weight and the friction force of rubber seals between the ga te leaves can be studied.
The present operation method can be applied.

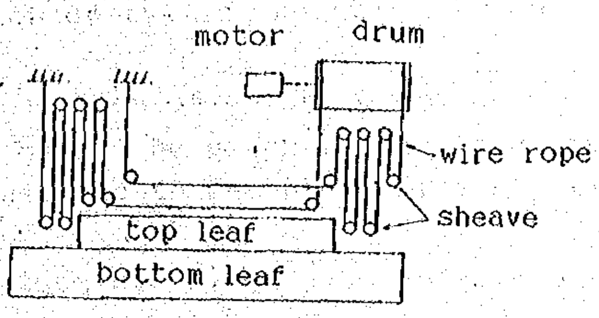
2 1motor-2drum, 2set

It is recommended to provide for each upper and lower gate leaf.
The above method is most reasonable and recommended for the system.
According to this method, it is possible for independent operation on interlocking operation of upper gate leaf and lower gate leaf.
However, a crosing or bridge between piers shall be provided.

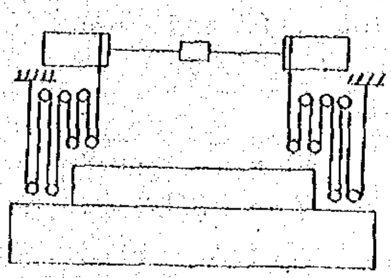
3 2motor-2drum, 1set

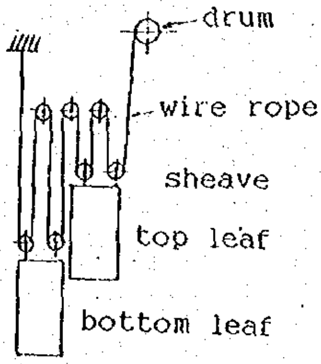
Generally, this method used about 20 meter of gate span, inclination adjusting and operation can be done accurately.

From the above, the recommended cases are in the order as follows (2), (3) and (1).

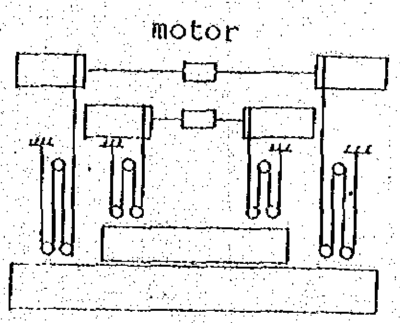


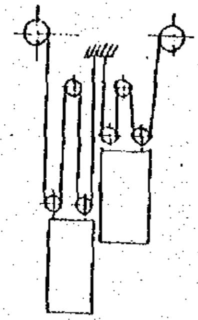

1M-1D(one motor, one drum:the present condition)



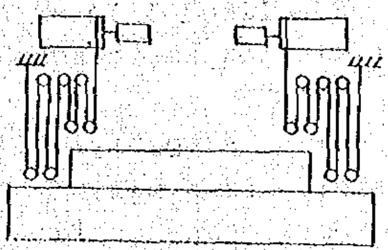



(1) 1M-2D(one motor, two drum)



(2) 2M-4D(two motor, four drum)



(3) 2M-2D(two motor, two drum)

6-2-3 Selection of type of hoisting device

In selecting the type of hoisting device, careful consideration should be given to the type, size, purpose and frequency of use, and to the place of installation of the hydraulic gate
The classification of roller gate hoisting devices is listed in Table.

Table Type of roller gate hoisting device

| Purpese | Type of hoisting device | | | | | |
|---|---|---|---|---|---|---|
| | Electric | | | Hydraulic | | |
| | Wirerope winding type | Screw spindle type | Rack gear type | Cylinder type | Cylinder wire type | Hydraulic motor wirerope type |
| Large size gate | ○ | × | × | △ | △ | ○ |
| Medium size gate | ○ | △ | △ | △ | △ | ○ |
| Small size gate | ○ | ○ | ○ | △ | △ | ○ |

Note ○ Operating system suitable for use.
△ Operating system suitable for use in some cases.
× Operating system not suitable for use.
, The size of a small gate, medium gate and large gate are standardized for 3-sized watertight gates as follows:

Small sized gate less than 10㎡
Medium sized gate less than 50㎡
Large sized gate more than 50㎡

1 Wirerope winding type

This type can be widely used for medium-size and largesize gates.

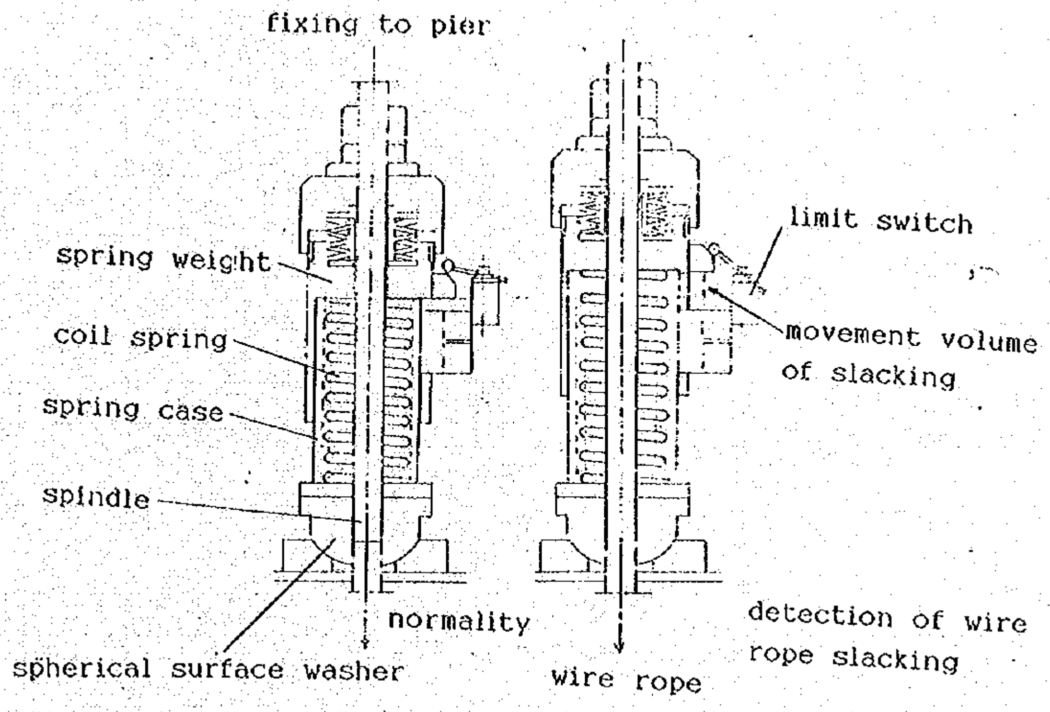
2 Hydraulic motor wirerope type

When multiple hydrulic gates are installed, they can be operated by switching a valve through one hydraulic pump. But extra cost is required for the replacement of oil and maintenance.

6-2-4 Safety device and auxiliary facilities for gate hoist

1 Detection device for wirerope slackening and dislocation.

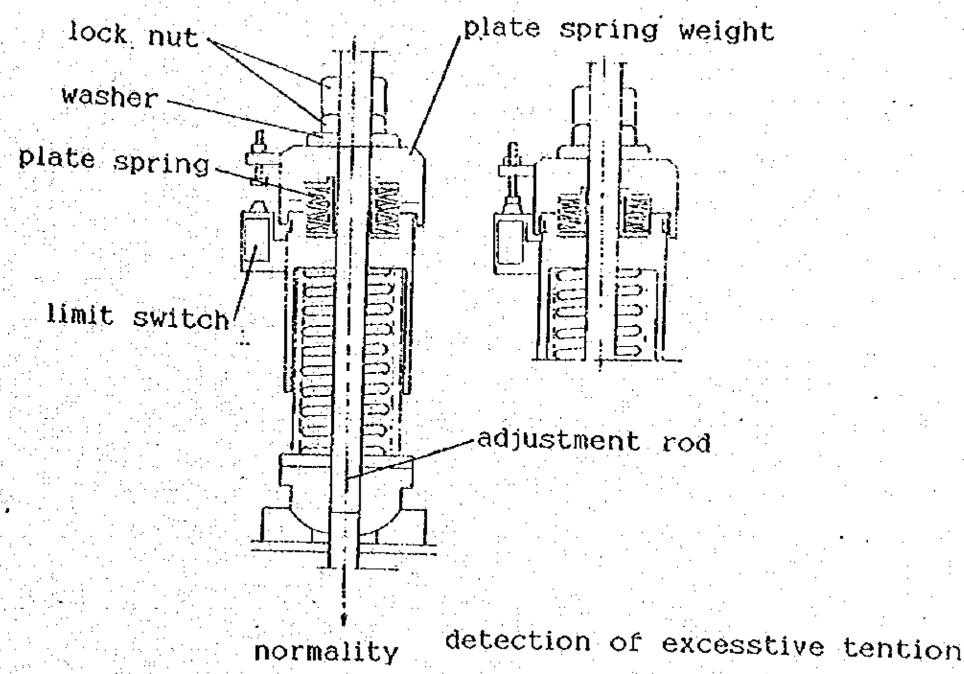
In case of wirerope slackening, the spindle of the wirerope end will be raised by the coil spring.
Then the spring saucer will also be raised and at the same time sending signal to the motor by the limit switch which is at the side of the device and will stop the hoist automatically.
The detection device for dislocation is installed for the protection of the metal fittings.




Detective device for wire rope slacking

2 Overload protector

This protector is used to automatically shut off the power when an overload is generated in the hoist.
An overcurrent relay, torque limit detector, sliding clutch, shear pin, buckling protector, etc. are commonly used for a rope winding type, screw spindle type, and rack gear ype.
For a shear pin, cosideration should be given so that the gate leaf does not lower under its own weight even if the pin is broken.
A relief valve is generally provided for a hydraulic cylider type and hydraulic cylinder wireropetype.




Detective device for excessive tention of wire rope

3 Gate inclination adjusting device

A differential synchronizer is generally used to adjust the gate inclination when one gate leaf is lifted up by two gate hoists.

4 Limit switch

This switch is used to automatically stop the gate at its upper and lower travelling limit and should be maintained in excellent water-proof and dust-proof condition and operated exactly as planned.

5 Emergency limit switch

This switch is used for operation when the limit switch is out of order and is generally the same type as the limit switch.

6-2-5 The materials of gate leaf

The materials that can be used for a gate leaf one, steel for general structures, stainless steel, and alluminum.
But aluminum is not suitable, for the tidal barrage gate because of the poor strength.
Comparison of the special quality of stainless steel to general steel.
(mild steel)

1 Welding

(1) The efficiency of the welding will be low because of the limitation of the welding current.
(2) The thermal rate of expansion was high(mild steel is about 1.6 lesser), thermal conduction is small(mild steel to about 1/4), since welding can easly strain and when it occurs it is difficult to do back the straightening.
Accordingly, it requires special welding skills or techniques.

2 Strength

Tensile strength of stainless steel is high to about 20 percent, but stress is low to about 20 percent.
Because of the plate thickness which was heavy.

3 Corrosion

Stainless steel is strong than mild steel by selection of high quality stainless steel.

4 The cost

The cost comparison of gate leaf are as follow;

| the item | mild steel | Stainless steel |
|---|---|---|
| The cost of metereals | 1.0 | 3.0~3.5 |
| Processing charges | 1.0 | 1.5~1.7 |
| Production cost | 1.0 | 2.0~2.5 |

The above, stainless steel is good to prevent corrosion.
It is more economical than mild steel in terms of the life span as it requires no coating.
But stainless steel is not suitable, since it requires high welding techniques and high quality materials.