

CHAPTER 9. CONCLUSION AND RECOMMENDATION

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9.1. Conclusion

The project facilities consisting of storage reservoirs, diversion dams, pipeline system and pumping stations are technically feasible. The operation and maintenance of the facilities will also be technically facile and economically viable as compared to water lifting alternative by pump.

The EIRR of project is calculated at 14.6% which is about 1.6% higher than the rate of opportunity cost of capital in Thailand of 13%. Sensitivity analysis also denoted that the project shows sufficient elasticity against the various kinds of the project risks, therefore, the project is concluded as economically feasible.

Through the implementation of the Project, considerable incremental benefits from tangible and intangible aspects can be expected. The beneficial farmers will be able to repay some part of the construction investments from their disposal income. The Project is also financially viable.

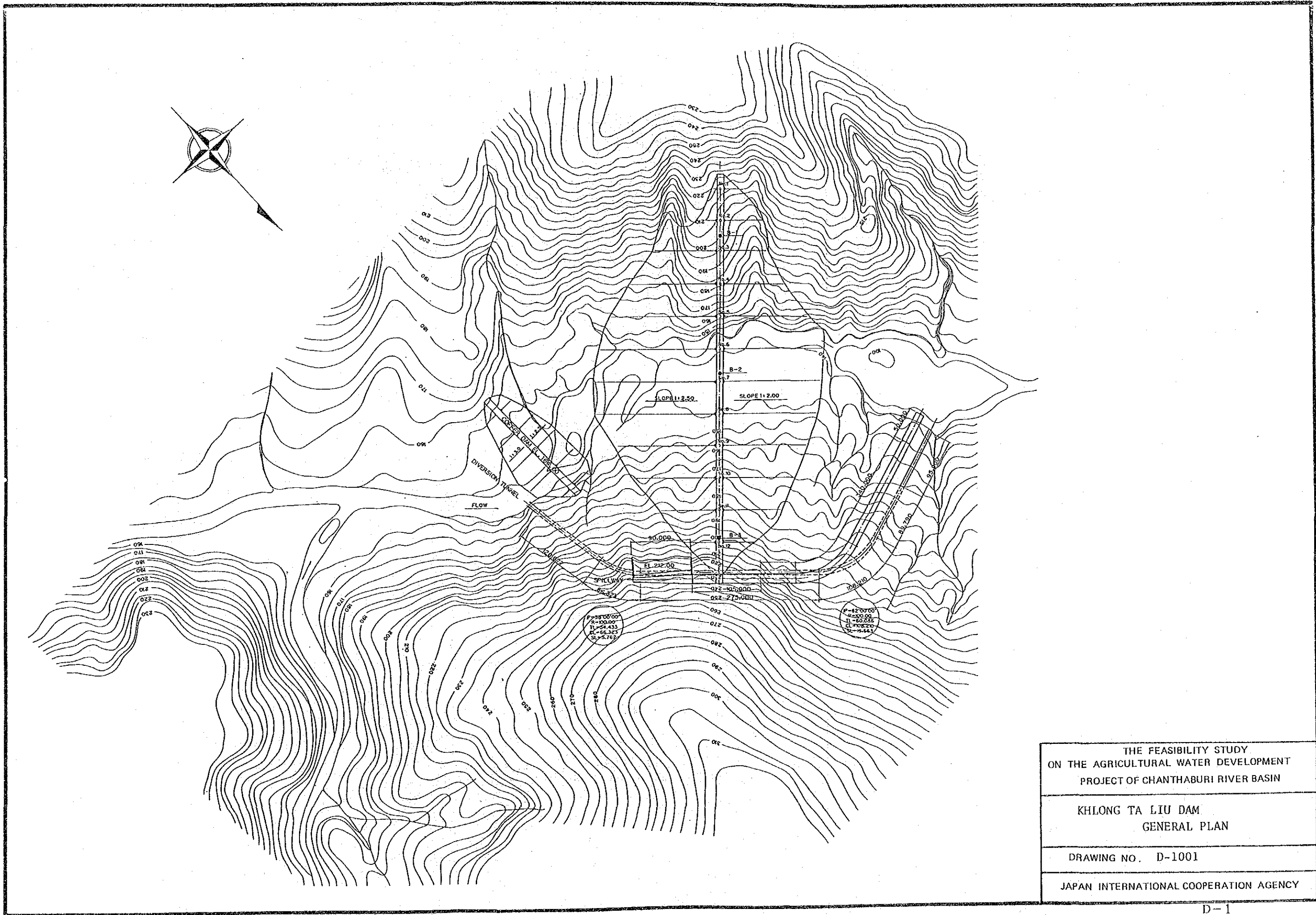
Approximately 20% of initial project costs to cover construction of the project facilities from the distribution point of 200ha commandable area downwards are contributed by the beneficiaries (10% lower than the WB's touchstone of 30%). Since the government has not yet charged the beneficiaries for the project cost, the 20% charge from the beneficiaries is favorably justifiable.

9.2. Recommendation

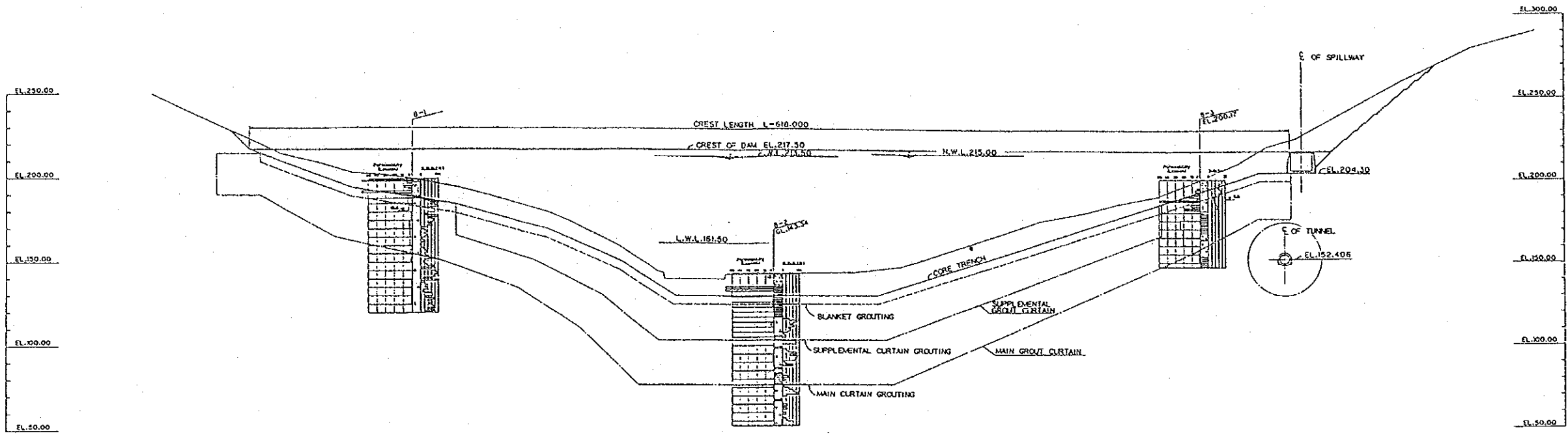
- (1) Water resources to be developed by the Project are mainly utilized as supplemental irrigation water during drought period in the proposed orchard area. Following the recommendation on the water resources development programmes in entire Chanthaburi river basin, the establishment of water management coordination committee and appropriate operation of its body in due consideration of tendency of water demand other than irrigation water supply and multi-purpose utilization of water are vital important.
- (2) Executing agencies of the Project would be two body; namely RID of national government and beneficial farmers, taking into account the present farm management capability of the beneficial farmers and prospected incremental benefit by the scheme. The Government should take necessary action on the enactment of laws and regulations related to the Project and get beneficiary's consensus for the project implementation.
- (3) Prior to and/or during project implementation, the irrigator's association should be established in order to manage the construction of terminal end irrigation facilities, repayment business of their amortization, and operation/maintenance of such terminal facilities. The government should provide administrative assistance as well as technical support for facility designing and construction supervision aspects.
- (4) Preparation of topographic maps with scale 1 to 10,000 is essential in the Upper zone area. These maps will be useful for appropriate planning, detailed design, construction and O & M of the proposed facilities.

- (5) The topographic survey/mapping and geological investigation for the storage dams, diversion dams, pipelines and its appurtenant structures shall be undertaken prior to and during detailed design stage by the executing agency and consultant. The survey items and quantities are described in Appendix B.
- (6) Being situated near the proposed Project boundary, two irrigation projects originated by NEA and King's office are planned to be implemented following the respective policies. Well coordination among the projects concerned shall be made in the planning, construction and O & M works.
- (7) Establishment of demonstration farm of about 10 hectares in the Project area is vital important in order to provide applied orchard irrigation techniques and to extend such technology to the beneficial farmers. The research and services shall be given by RID with the cooperation of provincial agricultural extension offices and Chanthaburi Horticultural Research Center.
- (8) Executing agency for construction of terminal end irrigation facility is considered basically to be Irrigator's Associations. National government, such as RID, however, should take the responsibility to assist them in the project planning, detailed design, construction and O & M works in addition to necessary activities required for establishment and management of the Irrigator's Associations.

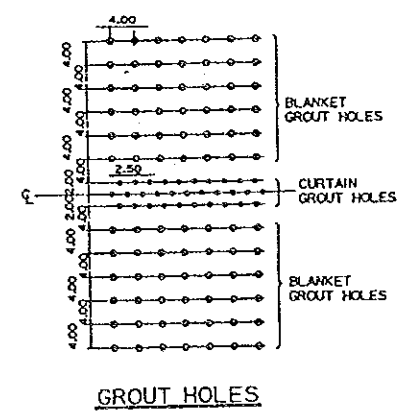
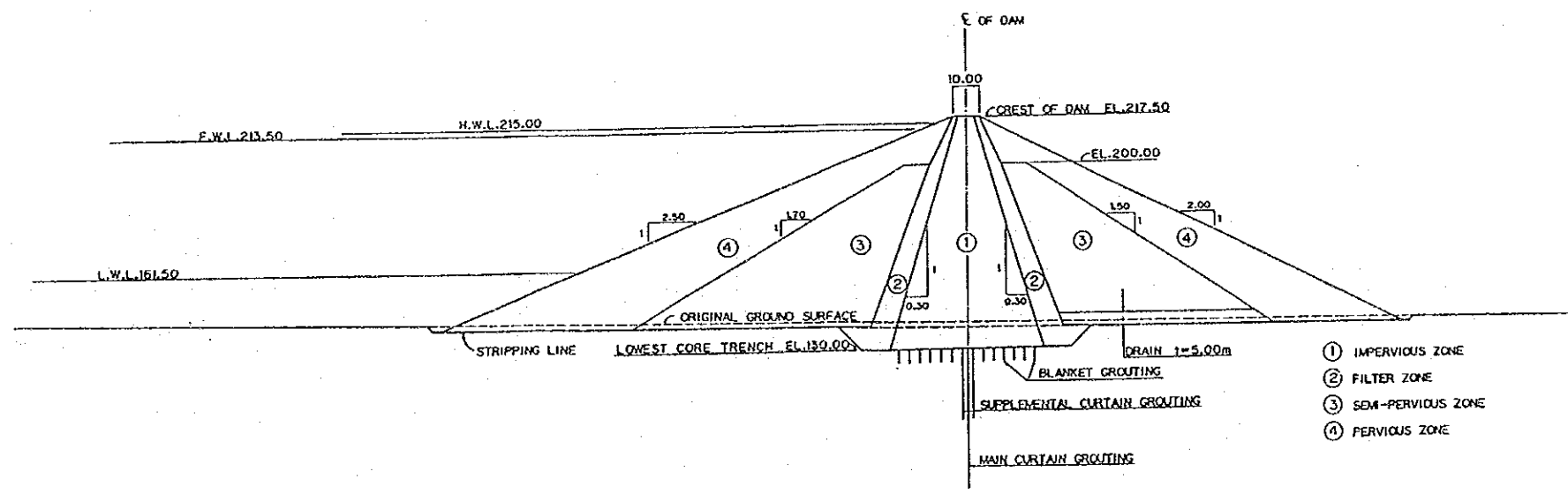
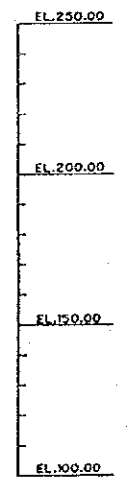
DRAWINGS



| |
|---------------------------------------------------------------------------------------------------------------|
| <p>THE FEASIBILITY STUDY ON THE AGRICULTURAL WATER DEVELOPMENT PROJECT OF CHANTHABURI RIVER BASIN</p> |
| <p>KHLONG TA LIU DAM GENERAL PLAN</p> |
| <p>DRAWING NO. D-1001</p> |
| <p>JAPAN INTERNATIONAL COOPERATION AGENCY</p> |



| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|--------|--------|--------|--------|--------|--|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| EL. OF CORE TRENCH | | 218.00 | 211.67 | 195.00 | 193.00 | 185.00 | | 171.20 | 170.00 | 150.00 | 130.00 | 130.00 | 130.00 | 130.00 | 143.5 | 145.7 | 130.00 | 145.18 | 162.35 | 170.53 | 185.00 | 197.50 | 204.30 | |
| ORIGINAL GROUND SURFACE | | 223.2 | 214.5 | 204.0 | 203.0 | 195.0 | | 181.3 | 180.0 | 156.0 | 140.0 | 140.0 | 140.0 | 143.5 | 145.7 | 139.0 | 139.0 | 159.0 | 175.3 | 182.35 | 186.2 | 191.0 | 203.0 | 225.0 |
| ACCUMULATED DISTANCE | | 0.0 | 20.0 | 60.0 | 70.0 | 120.0 | | 170.0 | 175.0 | 220.0 | 250.0 | 270.0 | 270.0 | 320.0 | 370.0 | 370.0 | 420.0 | 470.0 | 520.0 | 540.0 | 540.0 | 570.0 | 620.0 | 620.0 |
| DISTANCE | | 0.0 | 20.0 | 40.0 | 10.0 | 50.0 | | 50.0 | 5.0 | 45.0 | 30.0 | 20.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 20.0 | 30.0 | 50.0 | 50.0 | |
| STATION | | | No. 1 | +40.00 | No. 2 | No. 3 | | No. 4 | +5.00 | No. 5 | +30.00 | No. 6 | No. 7 | No. 8 | No. 9 | No. 10 | No. 11 | +20.00 | No. 12 | No. 13 | | No. 14 | | |

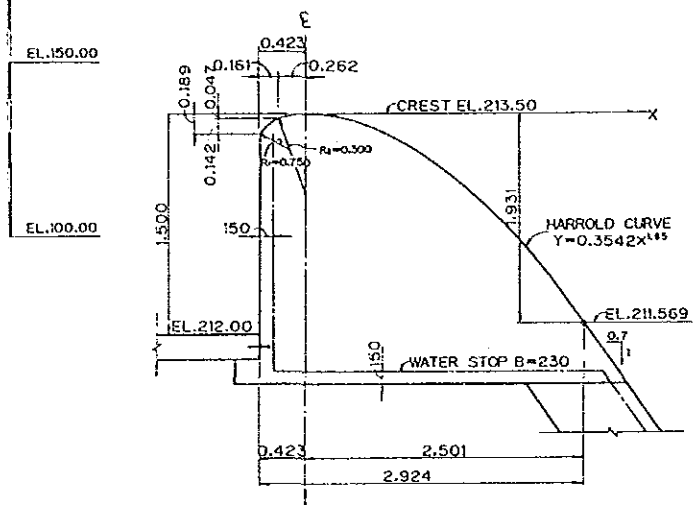
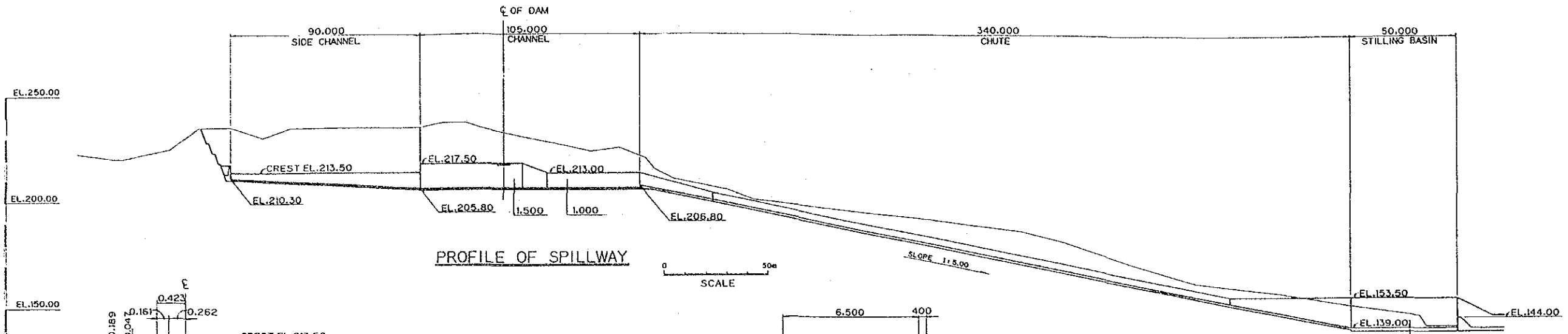


THE FEASIBILITY STUDY
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 PROJECT OF CHANTHABURI RIVER BASIN

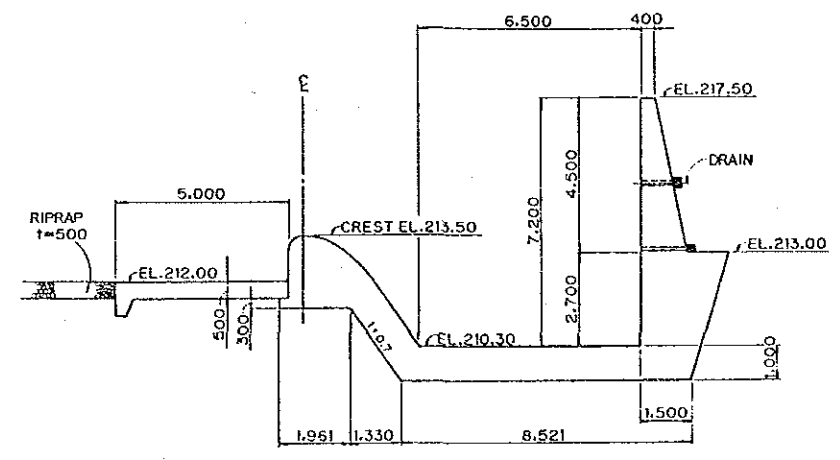
KHLONG TA LIU DAM
 TYPICAL CROSS SECTION &
 LONGITUDINAL SECTION OF DAM

DRAWING NO. D-1002

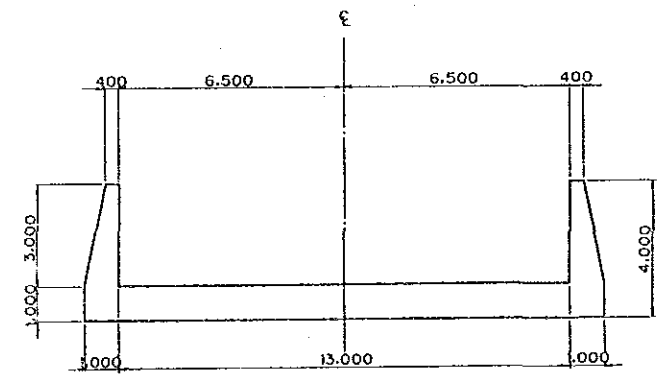
JAPAN INTERNATIONAL COOPERATION AGENCY



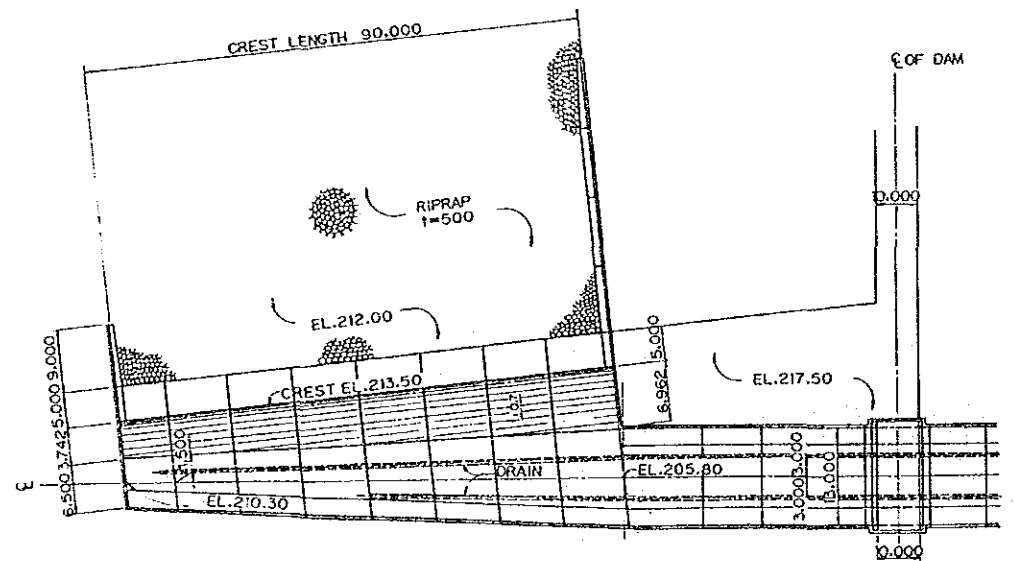
SECTION OF WEIR



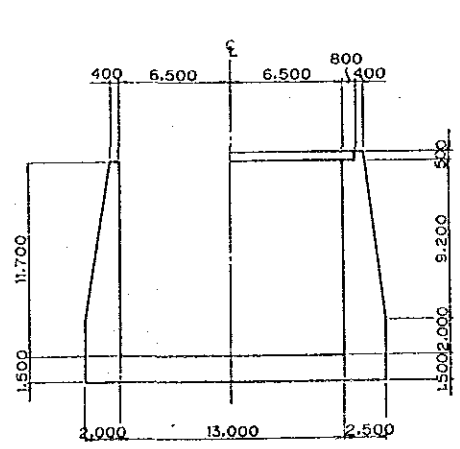
SIDE CHANNEL



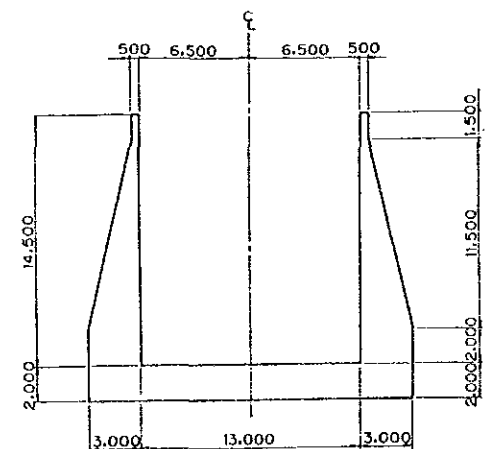
CHUTE



PLAN OF SIDE CHANNEL



CHANNEL



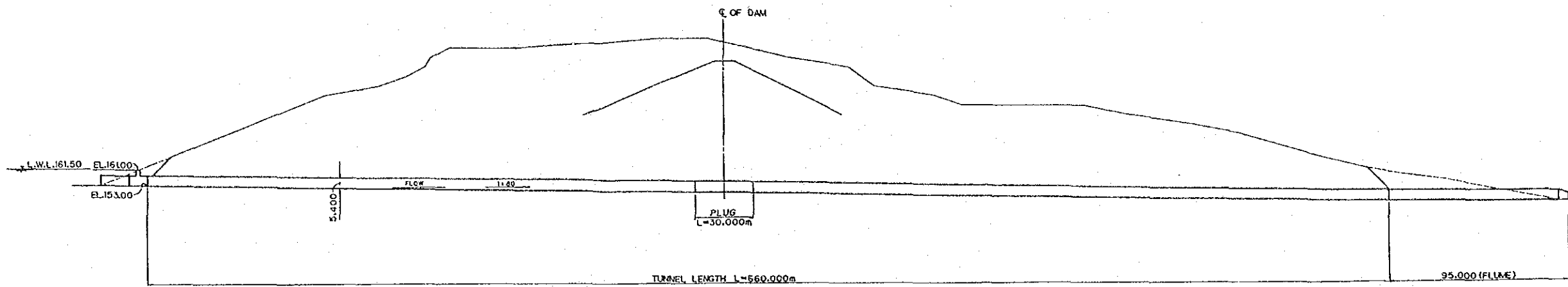
STILLING BASIN

THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

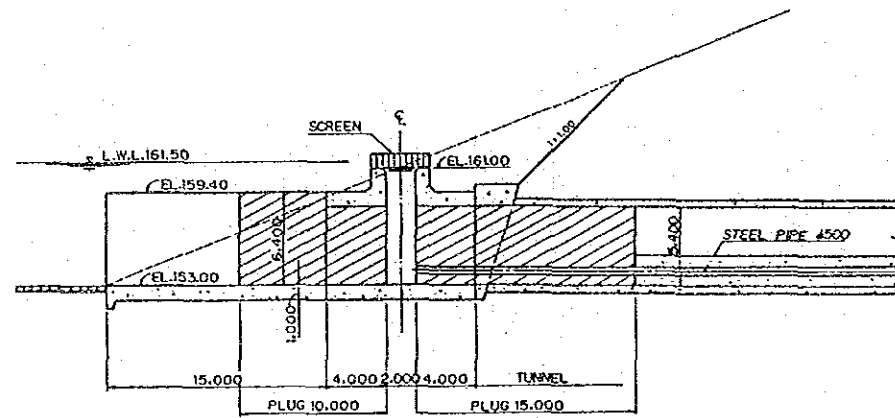
KHLONG TA LIU DAM
SPILLWAY

DRAWING NO. D-1003

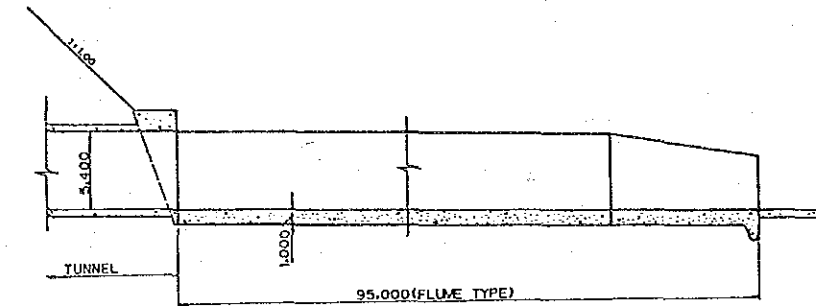
JAPAN INTERNATIONAL COOPERATION AGENCY



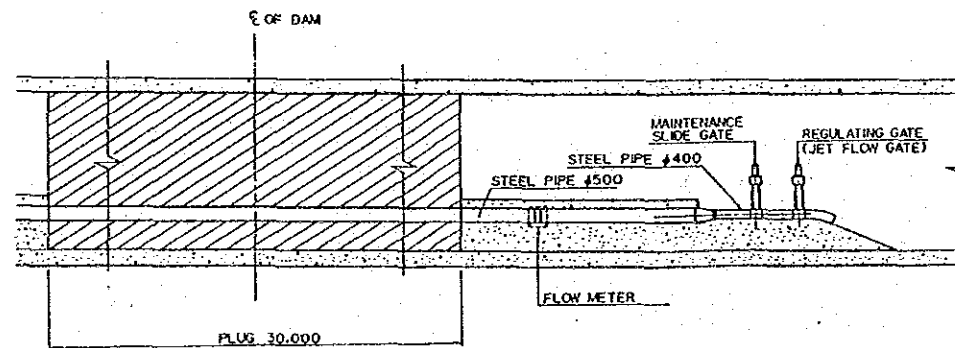
PROFILE OF TUNNEL



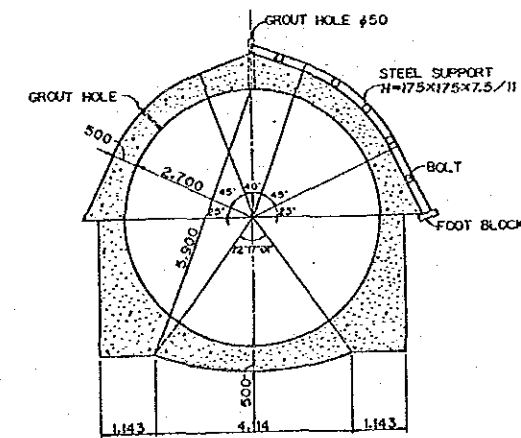
PROFILE OF TUNNEL ENTRANCE



PROFILE OF TUNNEL EXIT

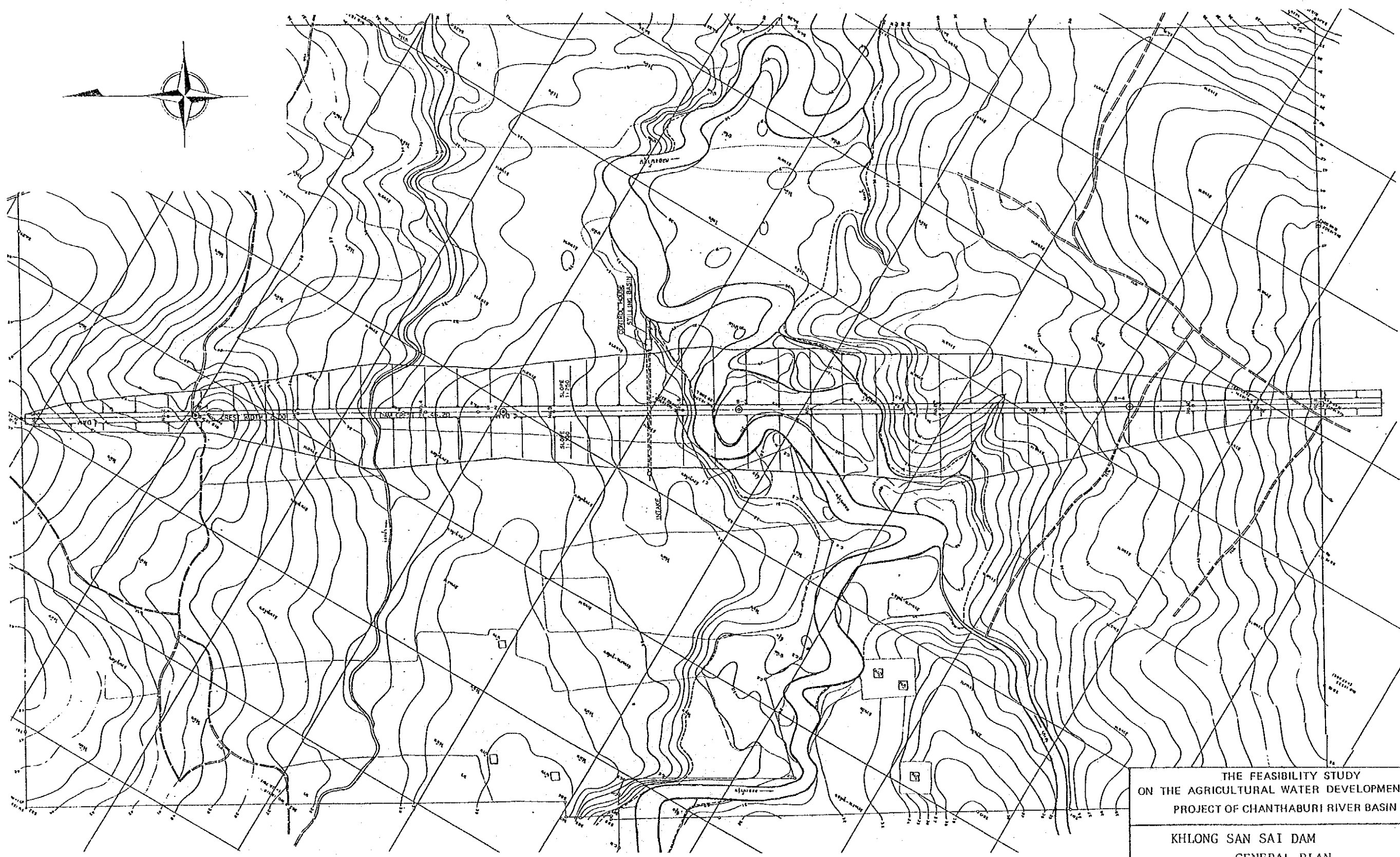


PLUG & GATE

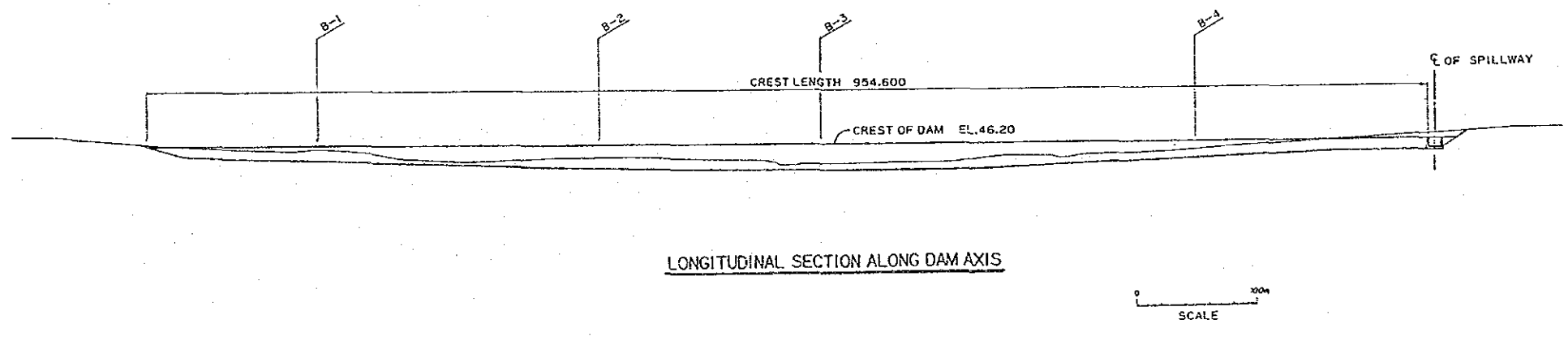
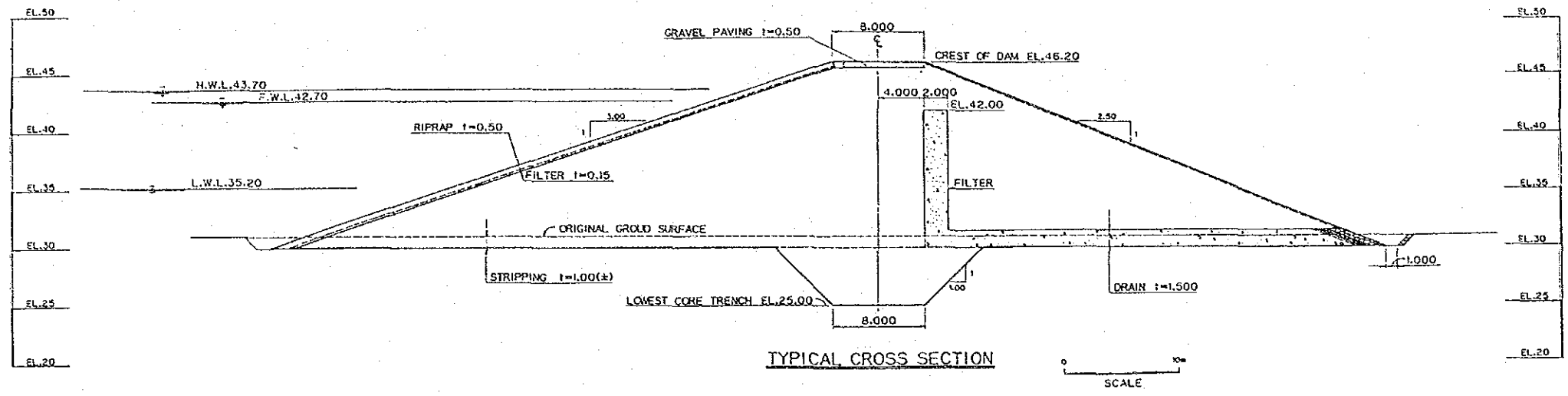


TUNNEL SECTION

| |
|------------------------------------------------------------------------------------------------------|
| THE FEASIBILITY STUDY ON THE AGRICULTURAL WATER DEVELOPMENT PROJECT OF CHANTHABURI RIVER BASIN |
| KHLONG TA LIU DAM DIVERSION TUNNEL & INTAKE FACILITY |
| DRAWING NO. D-1004 |
| JAPAN INTERNATIONAL COOPERATION AGENCY |



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| THE FEASIBILITY STUDY ON THE AGRICULTURAL WATER DEVELOPMENT PROJECT OF CHANTHABURI RIVER BASIN |
| KHLONG SAN SAI DAM GENERAL PLAN |
| DRAWING NO. D-1001 |
| JAPAN INTERNATIONAL COOPERATION AGENCY |



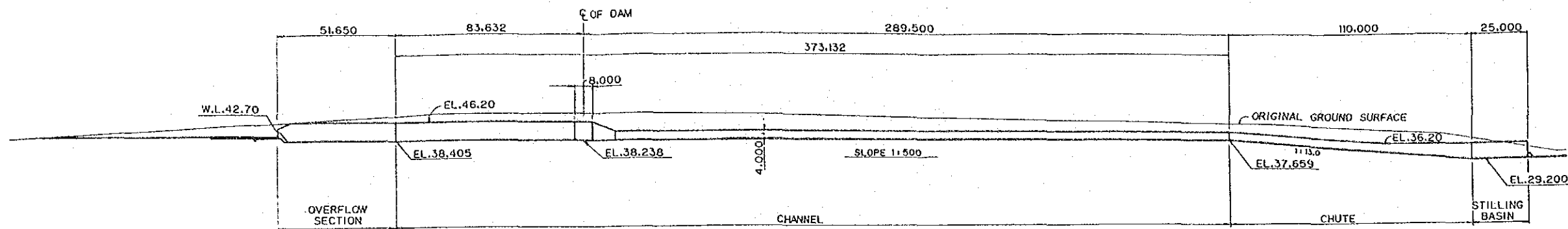
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|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| EL. OF CORE TRENCH | 46.20 | 43.00 | 37.00 | 34.50 | 32.00 | 28.50 | 27.00 | 26.00 | 25.00 | 25.00 | 27.00 | 31.00 | 35.00 | 37.20 | 37.20 | 37.20 | | | | | |
| ORIGINAL GROUND SURFACE | 48.0 | 47.5 | 46.0 | 42.0 | 36.0 | 35.0 | 36.0 | 35.0 | 33.0 | 32.0 | 31.0 | 31.0 | 36.0 | 37.0 | 43.0 | 46.0 | 48.0 | 52.0 | | | |
| ACCUMULATED DISTANCE | 0.0 | 10.0 | 30.0 | 110.0 | 210.0 | 310.0 | 370.0 | 410.0 | 400.0 | 410.0 | 510.0 | 560.0 | 610.0 | 710.0 | 810.0 | 860.0 | 910.0 | 960.0 | | | |
| DISTANCE | 0.0 | 10.0 | 20.0 | 80.0 | 100.0 | 100.0 | 60.0 | 40.0 | 90.0 | 10.0 | 100.0 | 50.0 | 50.0 | 100.0 | 100.0 | 50.0 | 50.0 | 50.0 | | | |
| STATION | No. 1 | +20.0 | | No. 2 | | No. 3 | | No. 4 | +60.0 | No. 5 | +50.0 | No. 6 | +50.0 | No. 7 | +50.0 | No. 8 | No. 9 | No. 10 | +50.0 | No. 11 | +50.0 |

THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

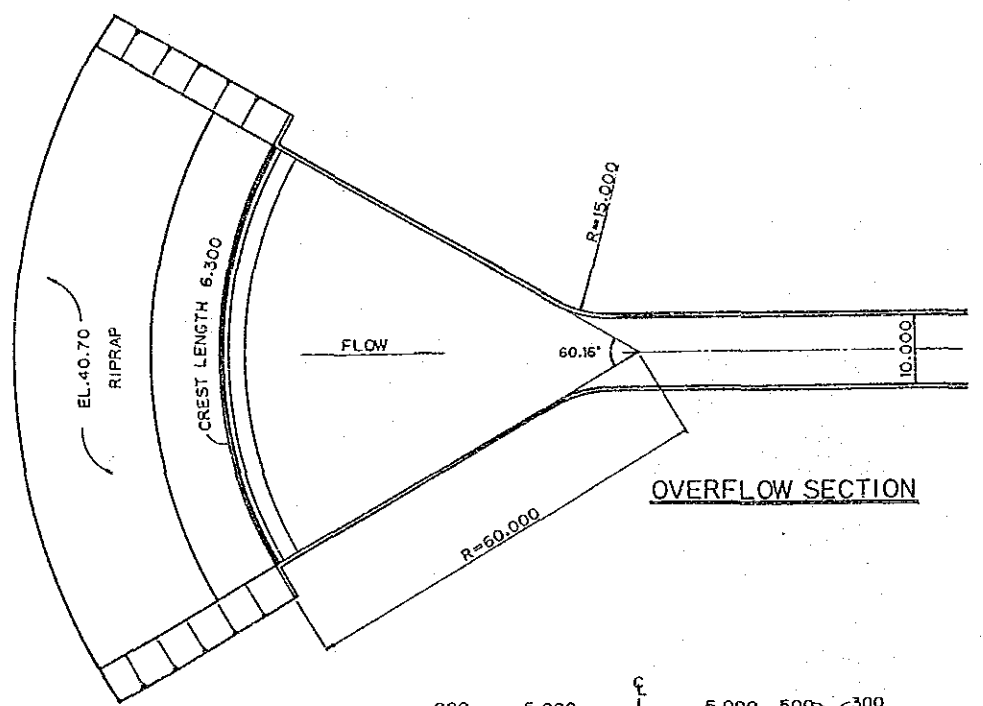
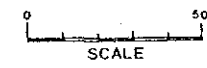
KHLONG SAN SAI DAM
TYPICAL CROSS SECTION &
LONGITUDINAL SECTION OF DAM

DRAWING NO. D-1002

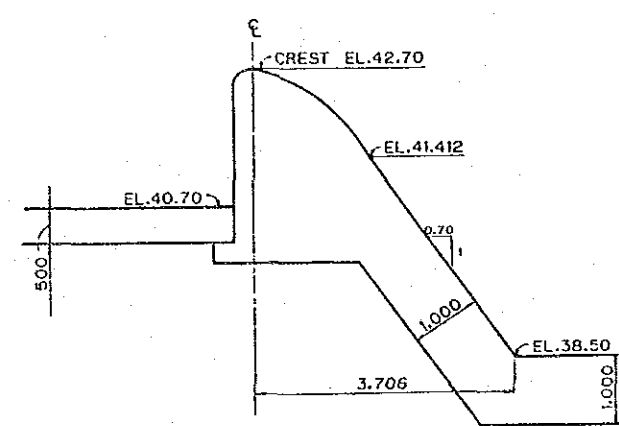
JAPAN INTERNATIONAL COOPERATION AGENCY



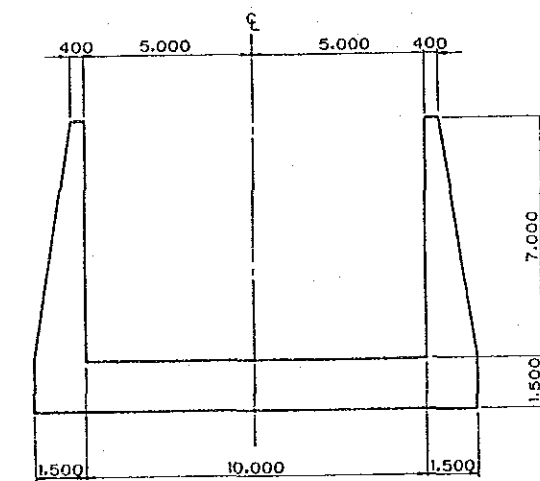
PROFILE OF SPILLWAY



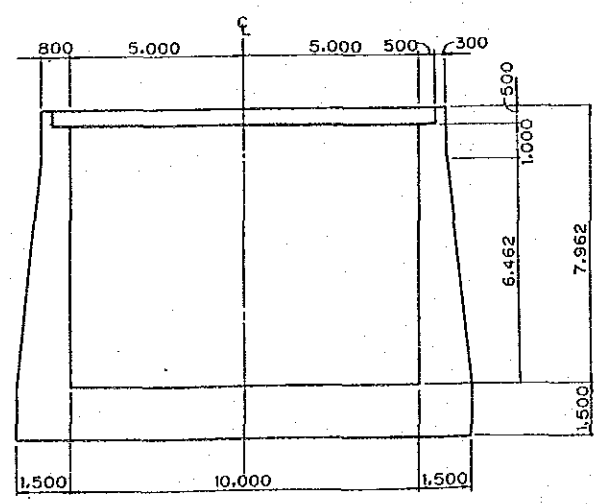
OVERFLOW SECTION



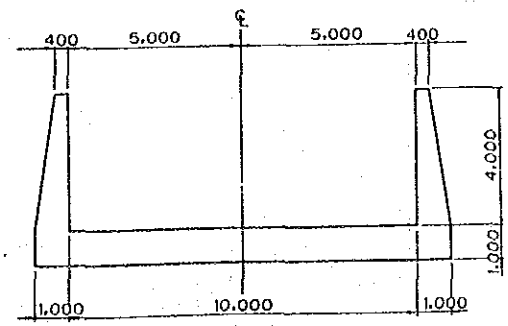
WEIR



STILING BASIN

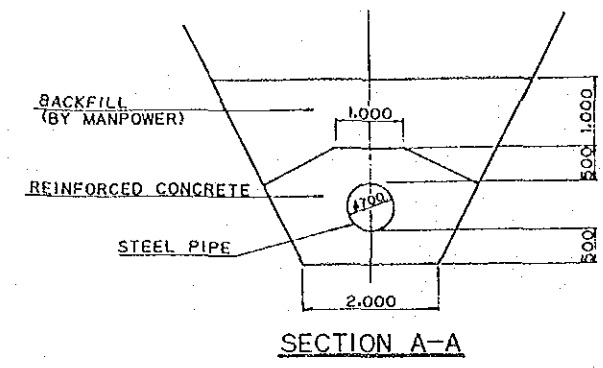
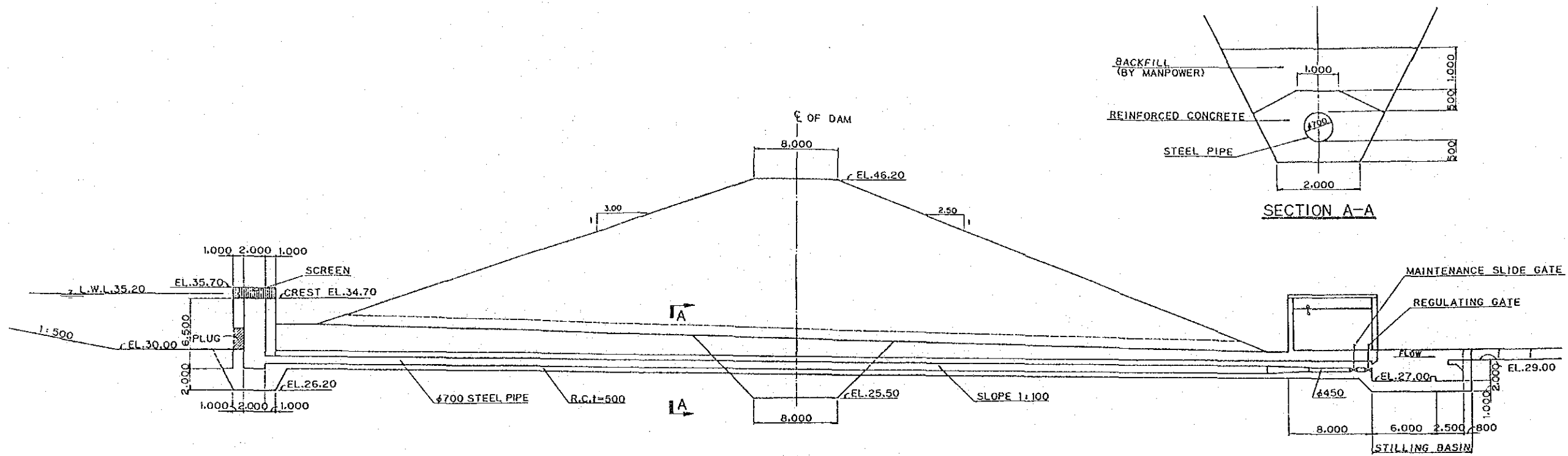


C OF DAM

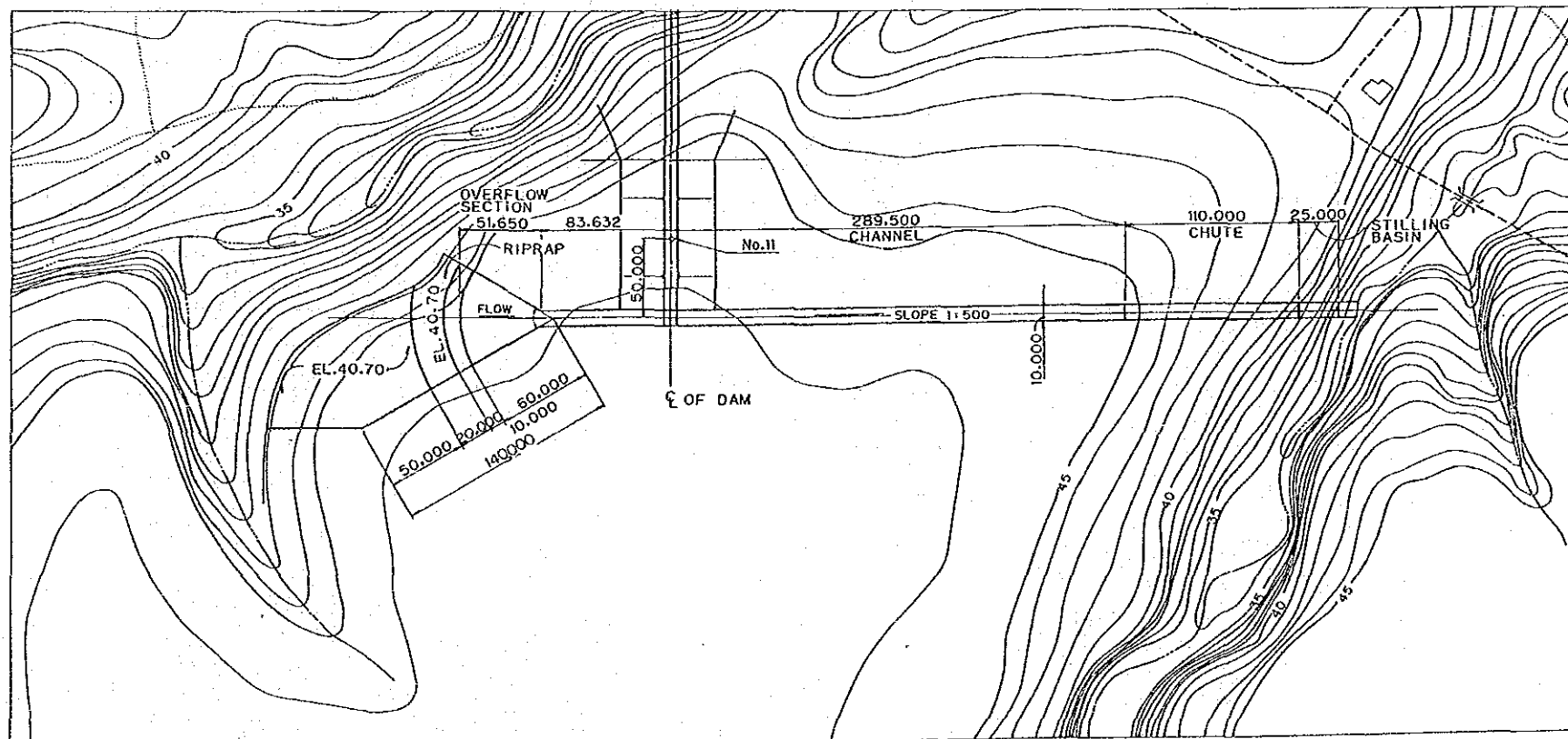
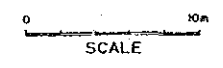


CHUTE

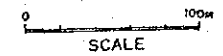
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| THE FEASIBILITY STUDY ON THE AGRICULTURAL WATER DEVELOPMENT PROJECT OF CHANTHABURI RIVER BASIN |
| KHLONG SAN SAI DAM SPILLWAY |
| DRAWING NO. D-1003 |
| JAPAN INTERNATIONAL COOPERATION AGENCY |



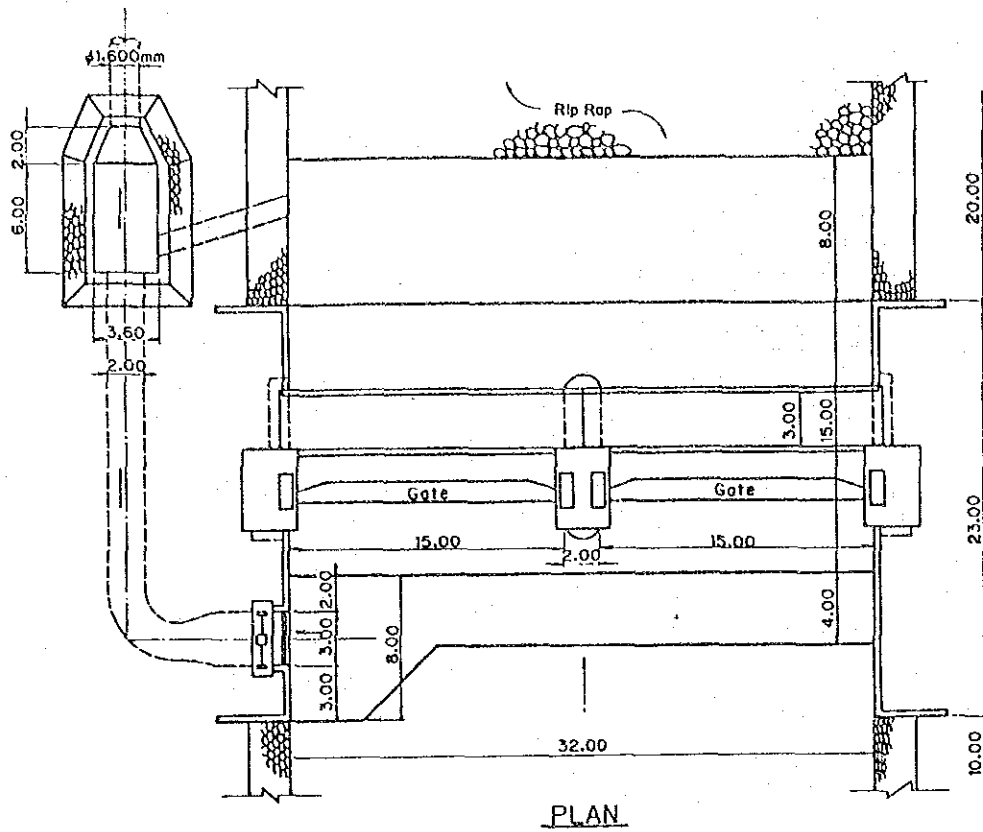
PROFILE OF INTAKE FACILITY



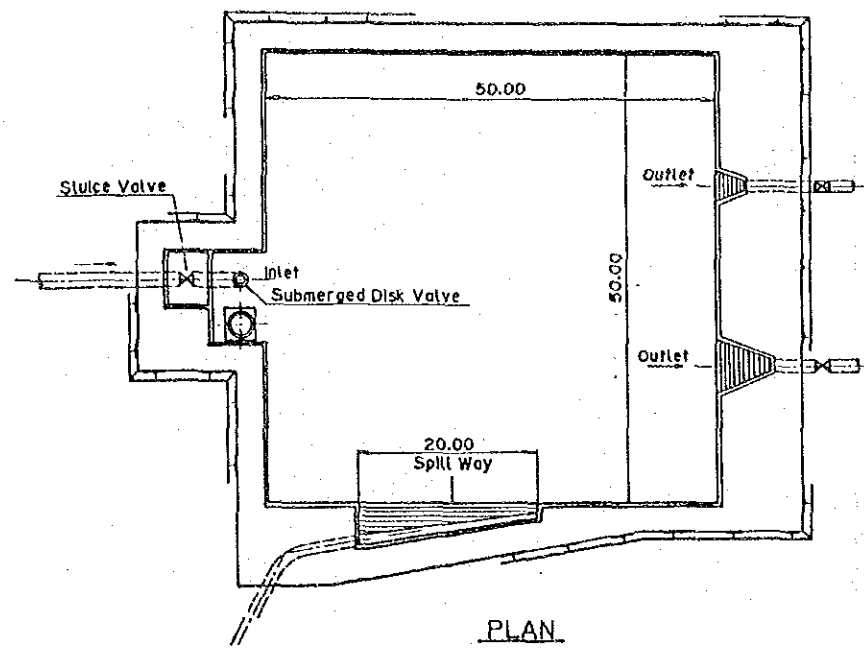
PLAN OF SPILLWAY



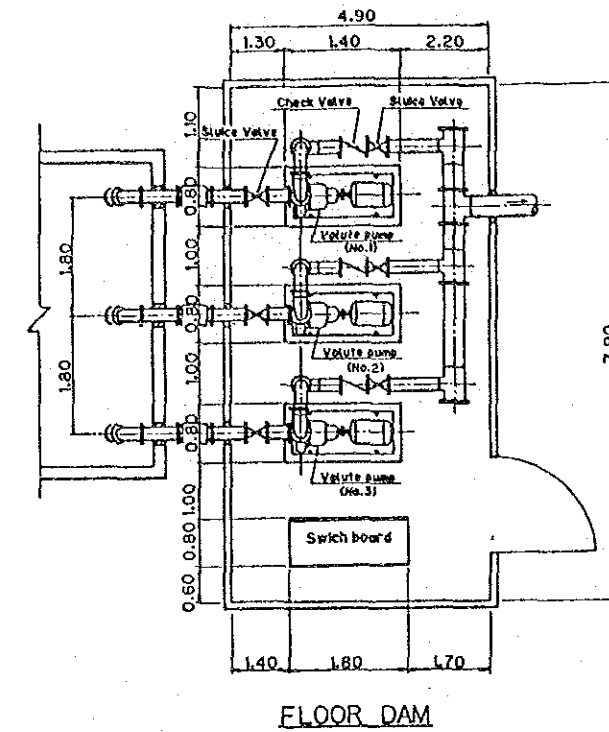
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| THE FEASIBILITY STUDY ON THE AGRICULTURAL WATER DEVELOPMENT PROJECT OF CHANTHABURI RIVER BASIN |
| KHLONG SAN SAI DAM INTAKE FACILITY |
| DRAWING NO. D-1004 |
| JAPAN INTERNATIONAL COOPERATION AGENCY |



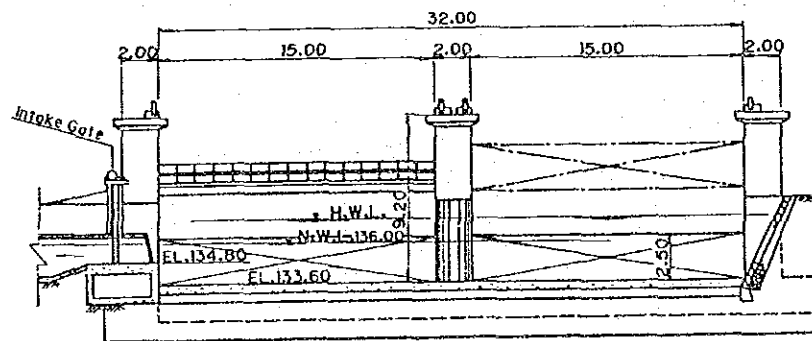
PLAN



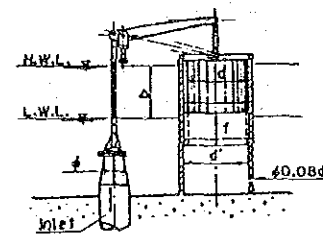
PLAN



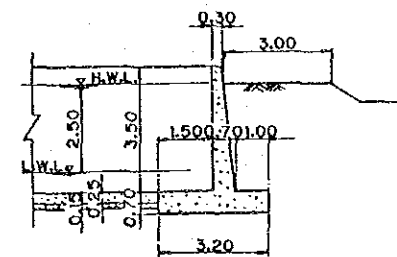
FLOOR DAM



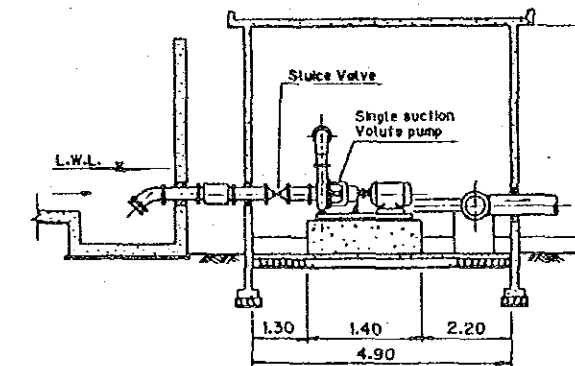
UPSTREAM ELEVATION



SUBMERGED DISK VALVE DETAIL

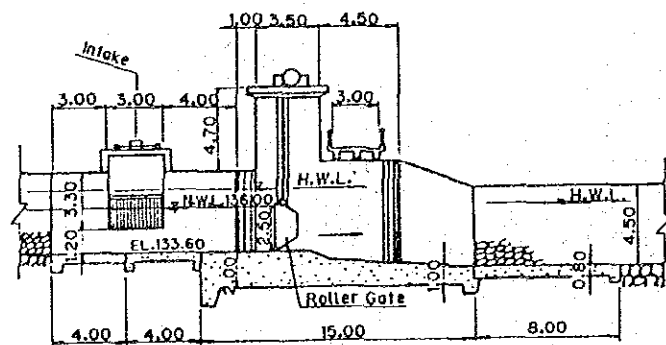


TYPICAL SECTION WALL



PROFILE

PUMPING STATION



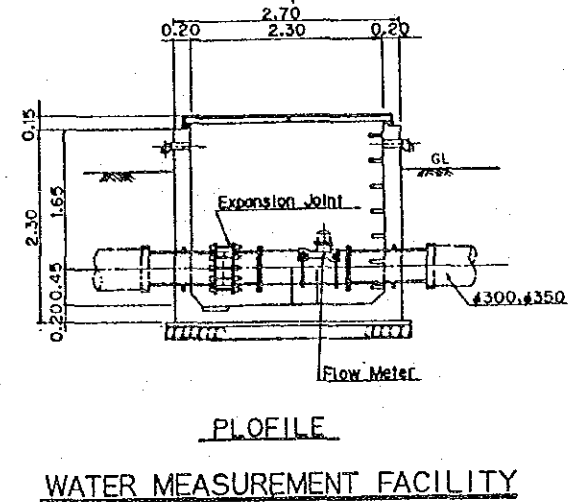
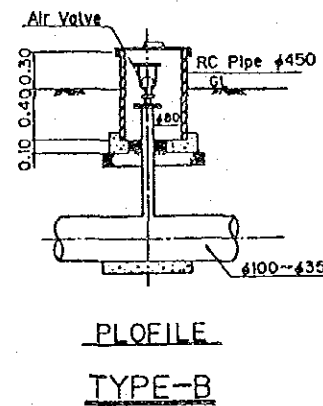
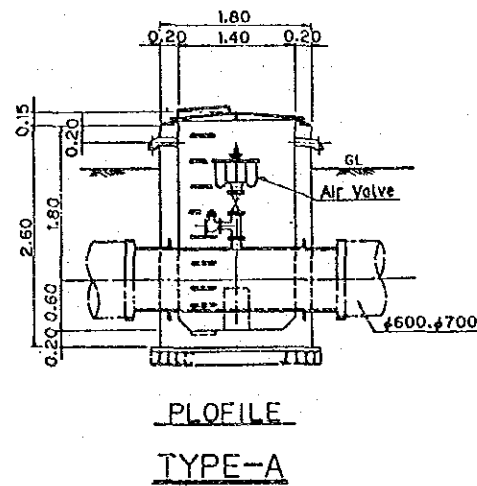
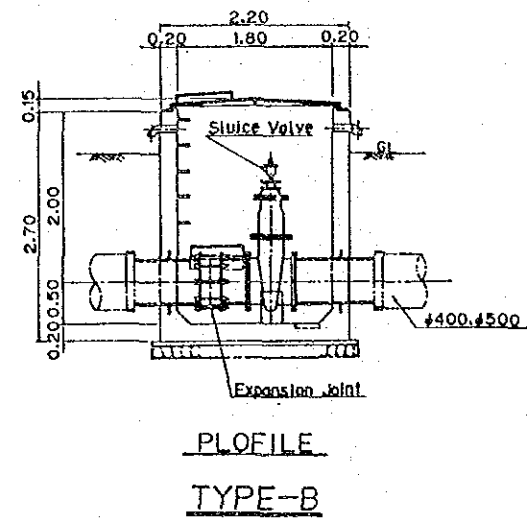
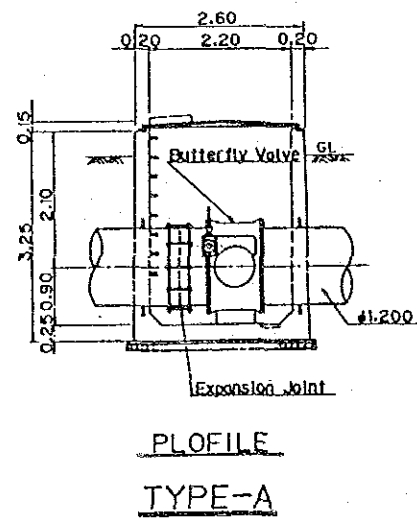
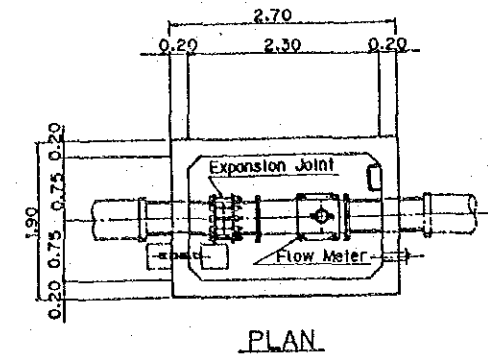
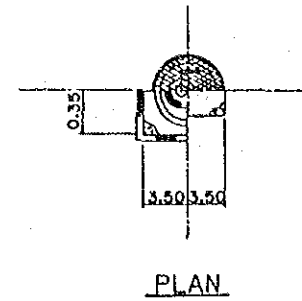
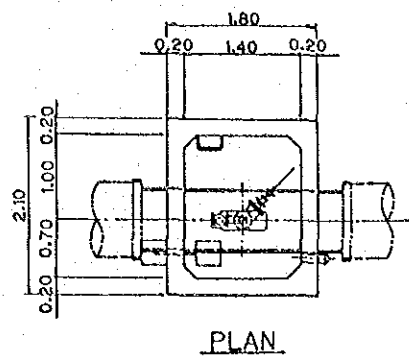
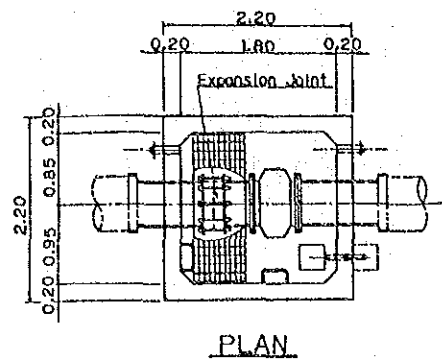
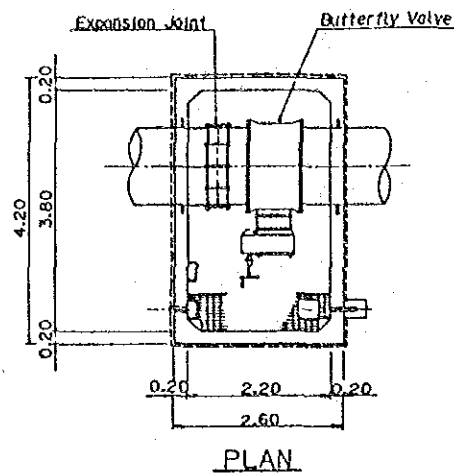
TYPICAL SECTION
DIVERSION DAM

THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

IRRIGATION FACILITY
DIVERSION DAM, REGULATING
RESERVOIR & PUMPING STATION

DRAWING NO. F-1001

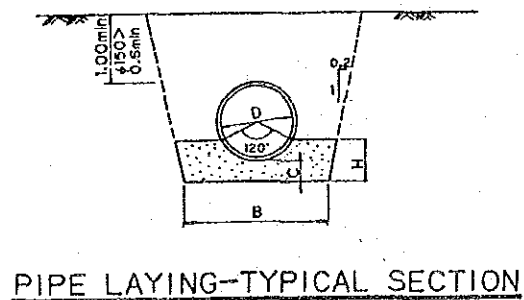
JAPAN INTERNATIONAL COOPERATION AGENCY



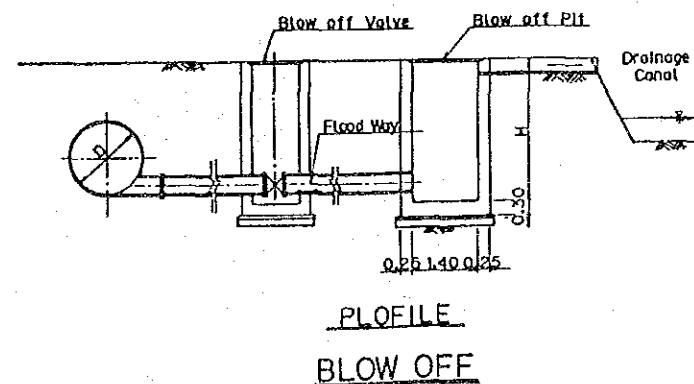
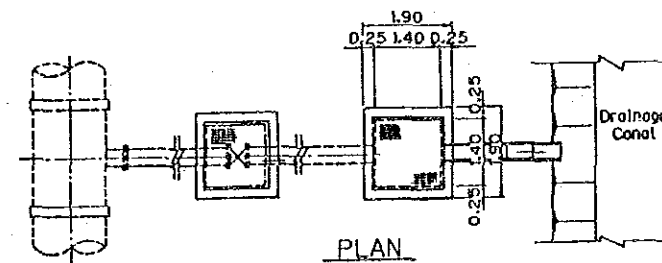
CONTROL VALVE

AIR VALVE

WATER MEASUREMENT FACILITY



| D(mm) | B(cm) | H(cm) | C(cm) | |
|-------|-------|-------|-------|--------|
| 150 | 50 | | | PVC |
| 200 | 60 | 16 | 10 | SP&ACP |
| 250 | 85 | 22 | 15 | |
| 300 | 90 | 23 | 15 | |
| 350 | 95 | 24 | 15 | |
| 400 | 100 | 26 | 15 | |
| 450 | 105 | 27 | 15 | |
| 500 | 130 | 33 | 20 | |
| 600 | 140 | 36 | 20 | |
| 700 | 150 | 38 | 20 | |
| 800 | 160 | 41 | 20 | |
| 900 | 170 | 43 | 20 | |
| 1,000 | 180 | 56 | 30 | |
| 1,100 | 190 | 59 | 30 | |
| 1,200 | 220 | 61 | 30 | |
| 1,350 | 235 | 65 | 30 | |
| 1,500 | 250 | 69 | 30 | |
| 1,600 | 260 | 75 | 30 | |



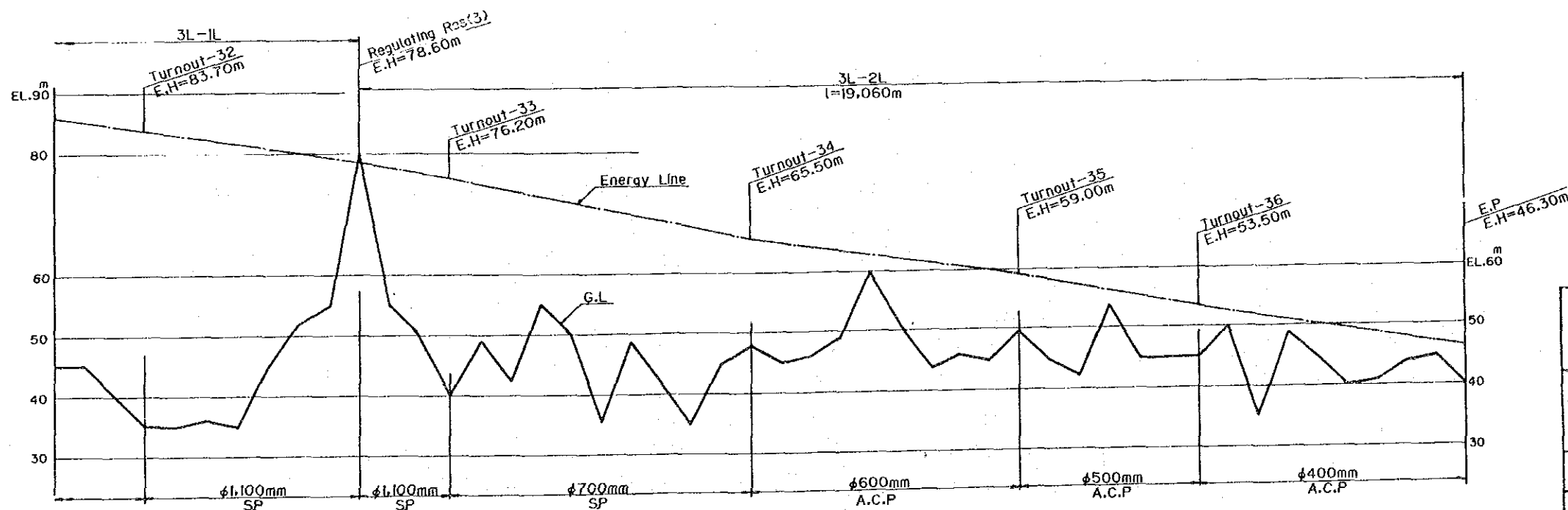
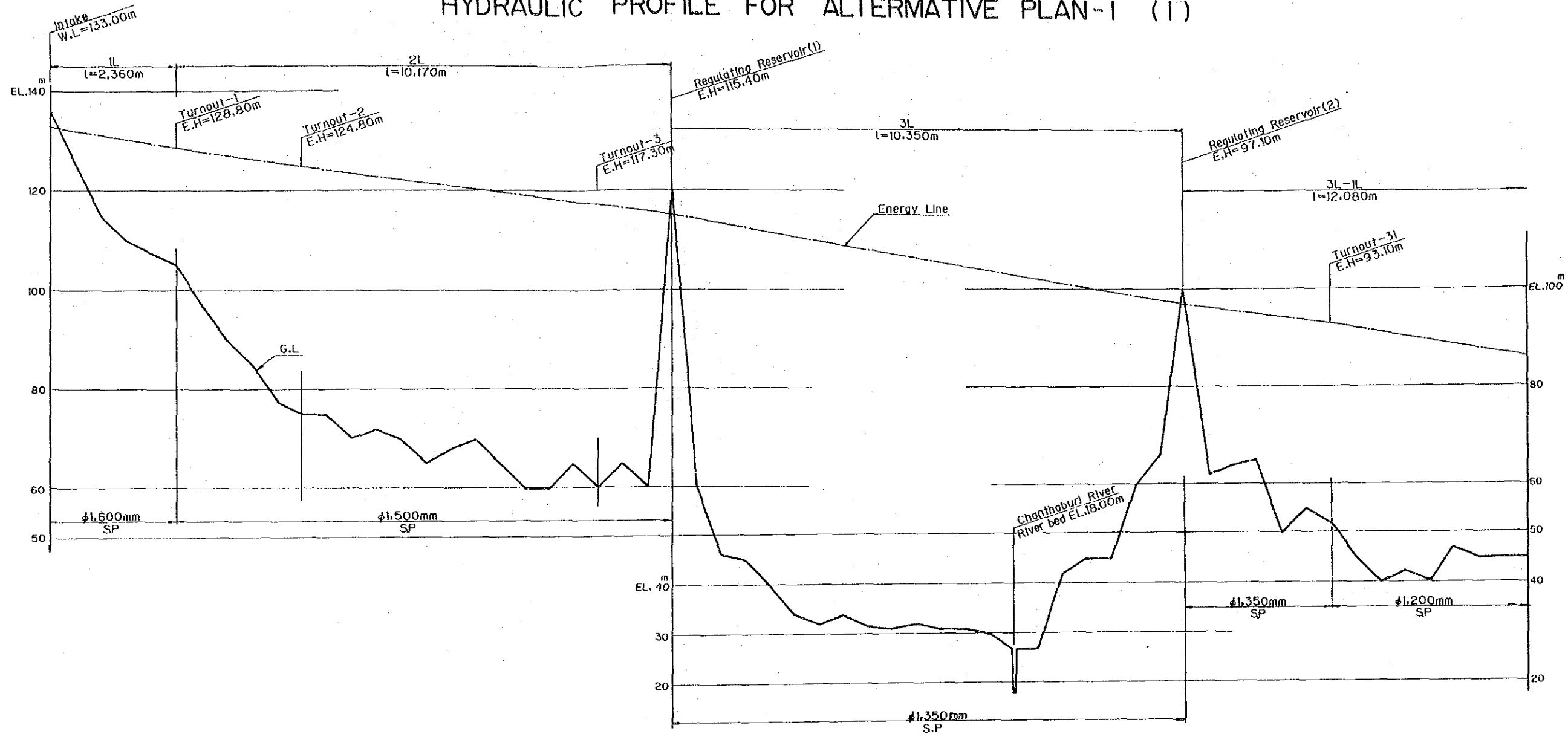
THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

IRRIGATION FACILITY
PIPE

DRAWING NO. F-1002

JAPAN INTERNATIONAL COOPERATION AGENCY

HYDRAULIC PROFILE FOR ALTERNATIVE PLAN-1 (1)



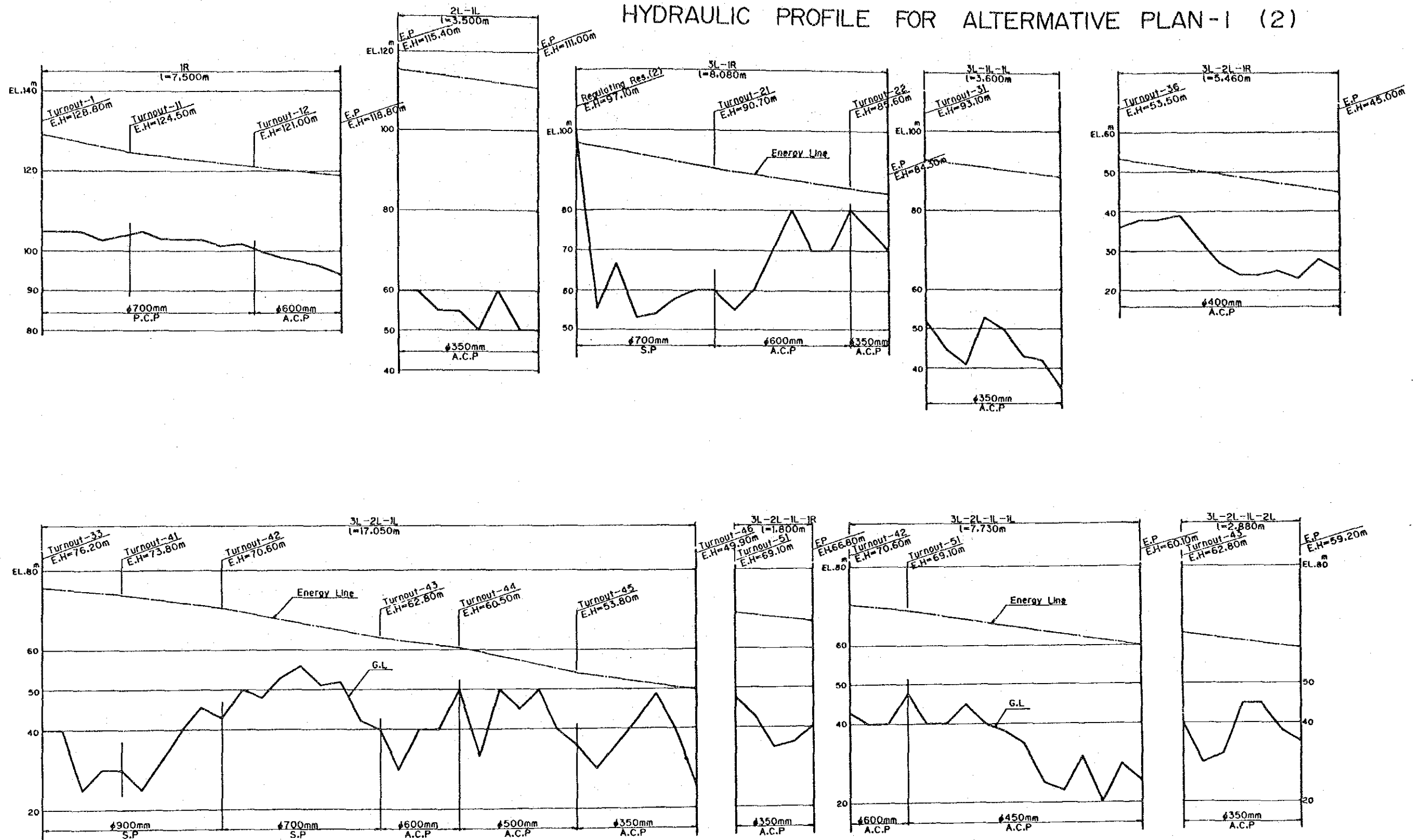
THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

HYDRAULIC PROFILE FOR
ALTERNATIVE PLAN-1 (1)

DRAWING NO. F-1003

JAPAN INTERNATIONAL COOPERATION AGENCY

HYDRAULIC PROFILE FOR ALTERNATIVE PLAN-1 (2)



THE FEASIBILITY STUDY
ON THE AGRICULTURAL WATER DEVELOPMENT
PROJECT OF CHANTHABURI RIVER BASIN

HYDRAULIC PROFILE FOR
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