

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION  
OF  
THE MORAGAHAKANDA AGRICULTURAL  
DEVELOPMENT PROJECT

UPDATING THE FEASIBILITY STUDY

VOLUME-IV DRAWINGS

PHASE-I

MAY 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

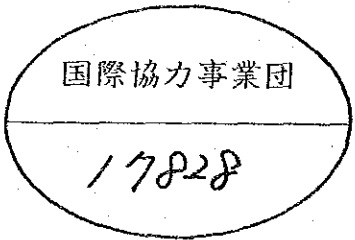


JICA LIBRARY



1066352[4]

17828



国際協力事業団

17828

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION  
OF  
THE MORAGAHAKANDA AGRICULTURAL  
DEVELOPMENT PROJECT

UPDATING THE FEASIBILITY STUDY

VOLUME-IV DRAWINGS

PHASE-I

MAY 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

## REPORT

VOLUME-I      MAIN REPORT

VOLUME-II     ANNEXES

ANNEX-A       GENERAL ECONOMY  
ANNEX-B       METEOROLOGY AND HYDROLOGY  
ANNEX-C       SOIL AND LAND CLASSIFICATION  
ANNEX-D       SOCIO- AND AGRO-ECONOMY  
ANNEX-E       AGRICULTURE  
ANNEX-F       IRRIGATION AND DRAINAGE

VOLUME-III    ANNEXES

ANNEX-G       POWER GENERATION  
ANNEX-H       WATER BALANCE  
ANNEX-I       FOUNDATION AND CONSTRUCTION MATERIAL  
ANNEX-J       OPTIMUM SCALE OF DAM AND POWER STATION  
ANNEX-K       PRELIMINARY DESIGN OF MORAGAHAKANDA DAM  
ANNEX-L       CONSTRUCTION PLAN AND COST ESTIMATE  
ANNEX-M       PROJECT EVALUATION

VOLUME-IV    DRAWINGS

**THE STUDY ON EXTENSION OF  
THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT**

**LIST OF DRAWINGS**

| <u>Plate No.</u>  | <u>Title</u>   |
|-------------------|--|
| <u>DAM</u>        |  |
| D-01              | Reservoir and Vicinity   |
| D-02              | Geological Map of Damsite  |
| D-03              | Geological Profile of Damsite  |
| D-04              | General Plan   |
| D-05              | Plan of First Saddle Dam   |
| D-06              | Elevations of First Saddle Dam   |
| D-07              | Spillway Section of First Saddle Dam                                     |
| D-08              | Power Station  |
| D-09              | Arrangement of Indoor Equipment  |
| D-10              | Arrangement of Outdoor Equipment   |
| D-11              | Power Station Main Single Diagram  |
| D-12              | Connection Diagram of the Transmission Line System                       |
| D-13              | Construction Time Schedule   |
| D-14              | Reservoir Operation Study (1)  |
| D-15              | Reservoir Operation Study (2)  |
| <u>IRRIGATION</u> |  |
| I-01              | General Plan   |
| I-02              | Layout in Sample Area System D1  |
| I-03              | Yoda Ela Intake  |
| I-04              | Kalu Ganga Tank Plan, Profile & Section                                  |
| I-05              | Kalu Ganga Anicut  |
| I-06              | System D1 Main Canal Profile (Improvement)                               |
| I-07              | System D1 Branch Canal No.1 Profile (1) (Improvement)                    |
| I-08              | System D1 Branch Canal No.1 Profile (2)                                  |
| I-09              | System D1 Branch Canal No.2 Profile (1)                                  |
| I-10              | System D1 Branch Canal No.2 Profile (2)                                  |
| I-11              | System D1 Branch Canal No.3 Profile                                      |
| I-12              | System D2 D1 Main Canal, North Canal & R.B.18 Profiles (1) (Improvement) |
| I-13              | System D2 D1 Main Canal, North Canal & R.B.18 Profiles (1) (Improvement) |
| I-14              | System D2 Branch Canal No.1 Profile (1) (Improvement)                    |
| I-15              | System D2 D1-East New Branch Canal Profile (Improvement)                 |
| I-16              | System D2 D1-East New Branch Canal Profile                               |

| Plate No.      | Title   |
|----------------|---|
| I-17           | System A/D Main Canal Profile (1)                               |
| I-18           | System A/D Main Canal Profile (2)                               |
| I-19           | Aqueducts   |
| I-20           | Turnouts  |
| I-21           | Diversion Structures Type A                                     |
| I-22           | Diversion Structures Type B                                     |
| I-23           | Check Structures  |
| I-24           | Spillways & Wasteways   |
| I-25           | Drop Structures   |
| I-26           | Cross Drains & Drain Inlets                                     |
| I-27           | Bridges   |
| I-28           | Bathing & Washing Places  |
| <br>           |   |
| <u>GEOLOGY</u> |   |
| G-01           | Geological Map of Damsite                                       |
| G-02           | Geological Profile of Damsite                                   |
| G-03           | Lugeon Map of Damsite   |
| G-04           | Location Map of Geological Investigation                        |
| G-05           | Result of Grouting Test   |
| G-06           | Geological Record of Test Adit No.1 No.2 and No.3               |
| G-07           | Geological Record of Test Adit No.4 No.5                        |
| G-08           | Geological Record of Test Adit No.6 No.7 No.8                   |
| G-09           | Rock Shear Test Geological Condition of Test Planes BS-1 BS-2   |
| G-10           | Rock Shear Test Geological Condition of Test Planes BS-3 BS-4   |
| G-11           | Rock Shear Test Load Displacement Curves BS-1 BS-2              |
| G-12           | Rock Shear Test Load Displacement Curves BS-3 BS-4              |
| G-13           | Rock Shear Test Displacement of Side Gauge                      |
| G-14           | Plate Load Test PL-2  |
| G-15           | Plate Load Test PL-2'   |
| G-16           | Plate Load Test PL-3  |
| G-17           | Borrow Area and Quarry Sites                                    |
| G-18           | Location of Previous Geological Survey at Moragahakanda Damsite |
| G-19           | Location of Recent Geological Survey at Moragahakanda Damsite   |
| G-20           | Geological Profile of Downstream Borrow Areas                   |
| <br>           |   |
| <u>SOIL</u>    |   |
| S-01           | Field Observation Point   |
| S-02           | Soil Map (System A/D, Undeveloped Area)                         |
| S-03           | Soil Map (System D1, Undeveloped Area)                          |
| S-04           | Soil Map (System D2, Undeveloped Area)                          |
| S-05           | Soil Map (System G)   |



Plate No.

Title

---

ALTERNATIVE STUDY

|      |   |
|------|---|
| A-01 | Alternative Study of Second Saddle Dam    |
| A-02 | Alternative Layout of Dam I               |
| A-03 | Alternative Layout of Dam II              |
| A-04 | Alternative Layout of Dam III             |
| A-05 | Alternative Layout of Dam IV              |
| A-06 | Reservoir and Vicinity                    |
| A-07 | Geological Map of Damsite                 |
| A-08 | Estimated Monthly Peak Output             |
| A-09 | Estimated Monthly Energy Output           |
| A-10 | Elahera Afterbay                          |
| A-11 | Geological Profile of Diversion Weir Site |
| A-12 | Kongetta Oya Afterbay                     |
| A-13 | NCP Diversion Weir Alternatives           |

## ABBREVIATIONS

|       |  |
|-------|--|
| CB    | Central Bank of Sri Lanka  |
| CEB   | Ceylon Electricity Board   |
| CECB  | Central Engineering Consultancy Bureau                             |
| CISIR | Central Institute for Scientific and Industrial Research           |
| DA    | Department of Agriculture  |
| DCS   | Department of Census and Statistics                                |
| FAO   | Food and Agriculture Organization - United Nations                 |
| FD    | Forest Department  |
| GDP   | Gross Domestic Product   |
| GNP   | Gross National Product   |
| GOJ   | Government of Japan  |
| GOSL  | Government of Sri Lanka  |
| IBRD  | International Bank for Reconstruction and Development (World Bank) |
| ID    | Irrigation Department  |
| IDB   | Industrial Development Board                                       |
| JICA  | Japan International Cooperation Agency                             |
| MADR  | Ministry of Agricultural, Development and Research                 |
| MASL  | Mahaweli Authority of Sri Lanka                                    |
| MEA   | Mahaweli Economic Agency   |
| MECA  | Mahaweli Engineering and Construction Agency                       |
| MFP   | Ministry of Finance and Planning                                   |
| MLLD  | Ministry of Lands and Land Development                             |
| MMD   | Ministry of Mahaweli Development                                   |
| MTI   | Ministry of Trade and Industries                                   |
| NCDZ  | North Central Dry Zone   |
| NCP   | North Central Province   |
| NCRB  | North Central River Basin  |
| NWDZ  | North-Western Dry Zone   |
| RVDB  | River Valley Development Board                                     |
| SEDZ  | South-Eastern Dry Zone   |
| SD    | Survey Department  |
| UNDP  | United Nations Development Programme                               |
| WMP   | Water Management Secretariat                                       |
| GA    | Government Agent Division  |

|        |   |
|--------|---|
| AGA    | Assistant Government Agent Division       |
| GS     | Grama Sevaka Division                     |
| T&V    | Training and Visit System                 |
| KVS    | Kursi Vapthi Sevaka (GS level instructor) |
| CRCS   | Comprehensive Rural Credit Scheme         |
| MPCS   | Multi-Purpose Co-operative Societies      |
| ASC    | Agrarian Service Centre                   |
| NCRCS  | New Comprehensive Rural Credit Scheme     |
| AI     | Agricultural Instructor                   |
| PMB    | Paddy Marketing Board                     |
| MRKFED | Co-operative Marketing Federation         |
| FCD    | Food Commissioner's Department            |
| CWE    | Co-operative Wholesale Establishment      |

#### REPORT

|       |  |
|-------|--|
| MGDP  | Master Plan of Mahaweli Ganga Development Project (UNDP/FAO, 1968) |
| AMDP  | Accelerated Mahaweli Development Programme (NEDECO, 1977)          |
| ISS   | Implementation Strategy Study (NEDECO, 1978)                       |
| HCP   | Hydrological Crash Programme (NEDECO, 1981)                        |
| TDS   | Transbasin Diversion Study (Electrowatt, 1981 & 1984)              |
| MWRMP | Mahaweli Water Resources Management Project (ACRES, 1986)          |

## ABBREVIATIONS OF MEASUREMENT

### Length

|    |   |            |
|----|---|------------|
| mm | = | Millimeter |
| cm | = | Centimeter |
| m  | = | Meter      |
| km | = | Kilometer  |
| ft | = | Foot       |
| yd | = | Yard       |

### Area

|                 |   |       |   |                   |
|-----------------|---|-------|---|-------------------|
| cm <sup>2</sup> | = | sq.cm | = | Square centimeter |
| m <sup>2</sup>  | = | sq.m  | = | Square meter      |
| ha              | = |       |   | Hectare           |
| km <sup>2</sup> | = | sq.km | = | Square kilometer  |

### Volume

|                 |   |       |   |                      |
|-----------------|---|-------|---|----------------------|
| cm <sup>3</sup> | = | cu.cm | = | Cubic centimeter     |
| l               | = | lit   | = | liter                |
| kl              | = |       |   | Kiloliter            |
| m <sup>3</sup>  | = | cu.m  | = | Cubic meter          |
| gal.            | = |       |   | Gallon               |
| MCM             | = |       |   | Million Cubic Meters |

### Weight

|     |   |            |
|-----|---|------------|
| mg  | = | Milligram  |
| g   | = | Gram       |
| kg  | = | Kilogram   |
| ton | = | Metric ton |
| lb  | = | Pound      |

### Time

|     |   |   |   |        |
|-----|---|---|---|--------|
| sec | = | s | = | Second |
| min | = |   |   | Minute |
| h   | = |   |   | Hour   |
| d   | = |   |   | Day    |
| y   | = |   |   | Year   |

### Electrical Measures

|    |   |               |
|----|---|---------------|
| V  | = | Volt          |
| A  | = | Ampere        |
| Hz | = | Hertz (cycle) |
| W  | = | Watt          |
| kW | = | Kilowatt      |
| MW | = | Megawatt      |
| GW | = | Gigawatt      |

### Other Measures

|                 |   |                    |
|-----------------|---|--------------------|
| %               | = | Percent            |
| PS              | = | Horsepower         |
| °               | = | Degree             |
| '               | = | Minute             |
| "               | = | Second             |
| °C              | = | Degree centigrade  |
| 10 <sup>3</sup> | = | Thousand           |
| 10 <sup>6</sup> | = | Million            |
| 10 <sup>9</sup> | = | Billion (milliard) |

### Dirived Measures

|                   |   |                     |   |                        |
|-------------------|---|---------------------|---|------------------------|
| m <sup>3</sup> /s | = | m <sup>3</sup> /sec | = | Cubic meter per second |
| cusec             | = |                     |   | Cubic feet per second  |
| mgd               | = |                     |   | Million gallon per day |
| kWh               | = |                     |   | Kilowatt hour          |
| MWh               | = |                     |   | Megawatt hour          |
| GWh               | = |                     |   | Gigawatt hour          |
| kWh/y             | = |                     |   | Kilowatt hour per year |
| kVA               | = |                     |   | Kilovolt ampere        |
| BTU               | = |                     |   | British thermal unit   |

### Money

|      |   |                  |
|------|---|------------------|
| Rs.  | = | Sri Lanka Rupees |
| US\$ | = | US dollar        |
| Yen  | = | Japanese Yen     |

## CONVERSION FACTORS

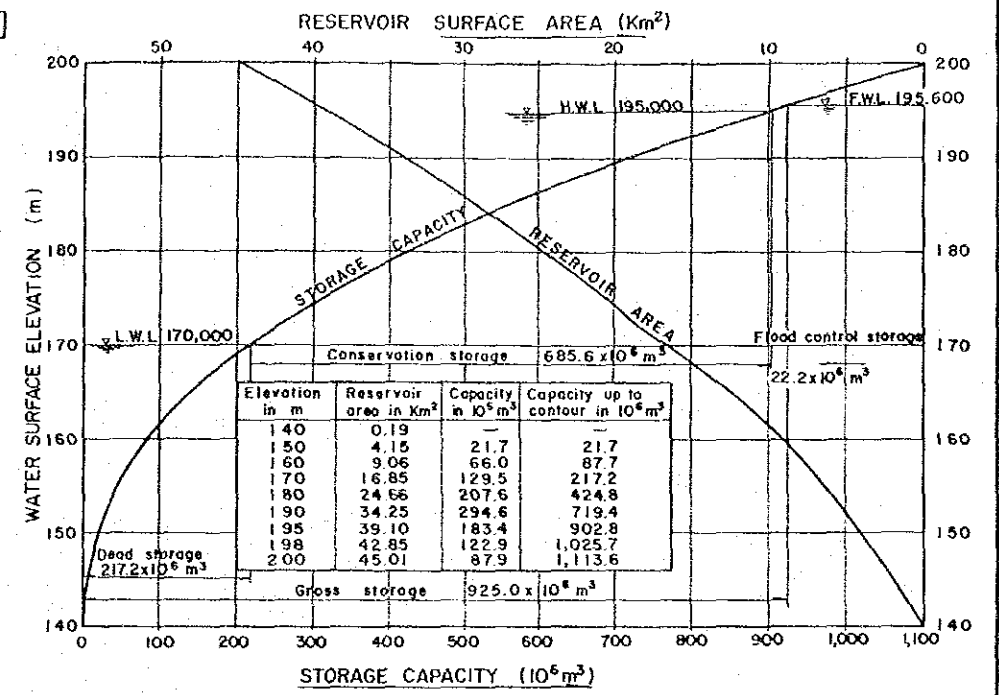
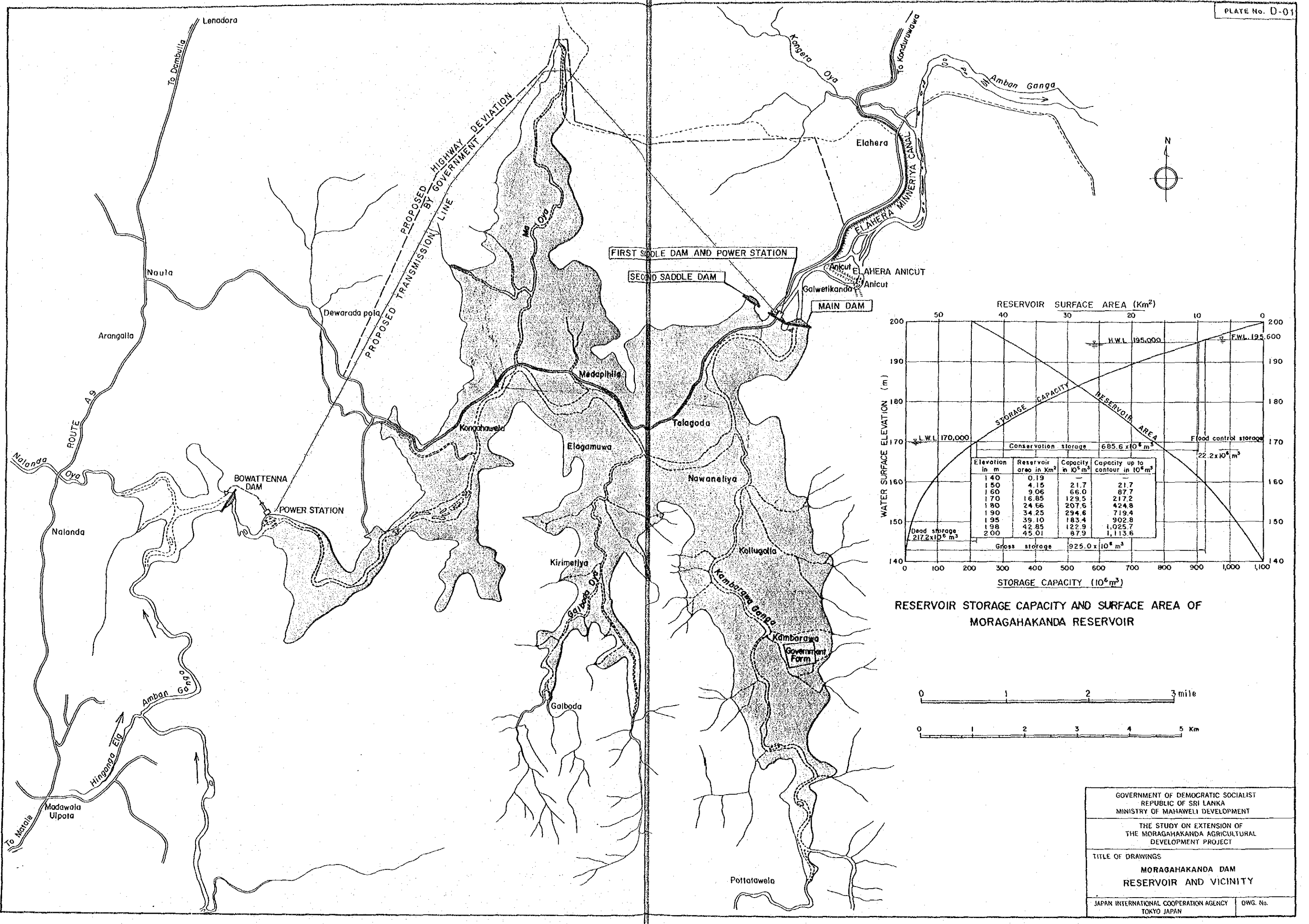
|                  | <u>From Metric System</u>      |                                    | <u>To Metric System</u>            |
|------------------|--------------------------------|------------------------------------|------------------------------------|
| Length           | 1 cm                           | =                                  | 0.394 inch                         |
|                  | 1 m                            | =                                  | 3.28 ft = 1.094 yd                 |
|                  | 1 km                           | =                                  | 0.621 mile                         |
|                  |                                |                                    | 1 inch = 2.54 cm                   |
|                  |                                | 1 ft = 30.48 cm                    |                                    |
|                  |                                | 1 yd = 91.44 cm                    |                                    |
|                  |                                | 1 mile = 1.609 km                  |                                    |
| Area             | 1 cm <sup>2</sup>              | =                                  | 0.155 sq.in                        |
|                  | 1 m <sup>2</sup>               | =                                  | 10.76 sq.ft.                       |
|                  | 1 ha                           | =                                  | 2.471 acres                        |
|                  | 1 km <sup>2</sup>              | =                                  | 0.386 sq.mile                      |
|                  |                                | 1 sq.ft = 0.0929 m <sup>2</sup>    |                                    |
|                  |                                | 1 sq.yd = 0.835 m <sup>2</sup>     |                                    |
|                  |                                | 1 acre = 0.4047 ha                 |                                    |
|                  |                                | 1 sq.mile = 2.59 km <sup>2</sup>   |                                    |
| Volume           | 1 cm <sup>3</sup>              | =                                  | 0.0610 cu.in                       |
|                  | 1 lit                          | =                                  | 0.220 gal. (imp.)                  |
|                  | 1 kl                           | =                                  | 6.29 barrels                       |
|                  | 1 m <sup>3</sup>               | =                                  | 35.3 cu.ft                         |
|                  | 10 <sup>6</sup> m <sup>3</sup> | =                                  | 811 acre-ft                        |
|                  |                                | 1 cu.ft = 28.32 lit                |                                    |
|                  |                                | 1 cu.yd = 0.765 m <sup>3</sup>     |                                    |
|                  |                                | 1 gal. (imp.) = 4.55 lit           |                                    |
|                  |                                | 1 gal. (US) = 3.79 lit             |                                    |
|                  |                                | 1 acre-ft = 1,233.5 m <sup>2</sup> |                                    |
| Energy           | 1 kWh                          | =                                  | 3,413 BTU                          |
|                  |                                |                                    | 1 BTU = 0.293 Wh                   |
| Temperature      | °C                             | =                                  | (°F-32) 5/9                        |
|                  |                                |                                    | °F = 1.8°C + 32                    |
| Derived Measures |                                |                                    |                                    |
|                  | 1 m <sup>3</sup> /s            | =                                  | 35.3 cusec                         |
|                  | 1 kg/cm <sup>2</sup>           | =                                  | 14.2 psi                           |
|                  | 1 ton/ha                       | =                                  | 891 lb/acre                        |
|                  | 10 <sup>6</sup> m <sup>3</sup> | =                                  | 810.7 acre-ft                      |
|                  | 1 m <sup>3</sup> /s            | =                                  | 19.0 mgd                           |
|                  |                                |                                    | 1 cusec = 0.0283 m <sup>3</sup> /s |
|                  |                                |                                    | 1 psi = 0.703 kg/cm <sup>2</sup>   |
|                  |                                |                                    | 1 lb/acre = 1.12 kg/ha             |
|                  |                                |                                    | 1 acre-ft = 1,233.5 m <sup>3</sup> |
|                  |                                |                                    | 1 mgd = 0.0526 m <sup>3</sup> /s   |

## EXCHANGE RATE

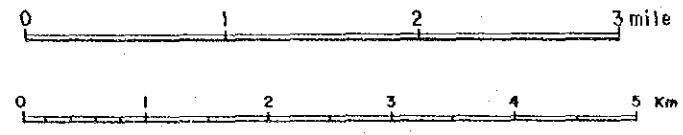
US\$1.0 = J. Yen 140.0 = Rs. 30.5



DAM



RESERVOIR STORAGE CAPACITY AND SURFACE AREA OF MORAGAHAKANDA RESERVOIR



GOVERNMENT OF DEMOCRATIC SOCIALIST  
 REPUBLIC OF SRI LANKA  
 MINISTRY OF MAHAWELI DEVELOPMENT

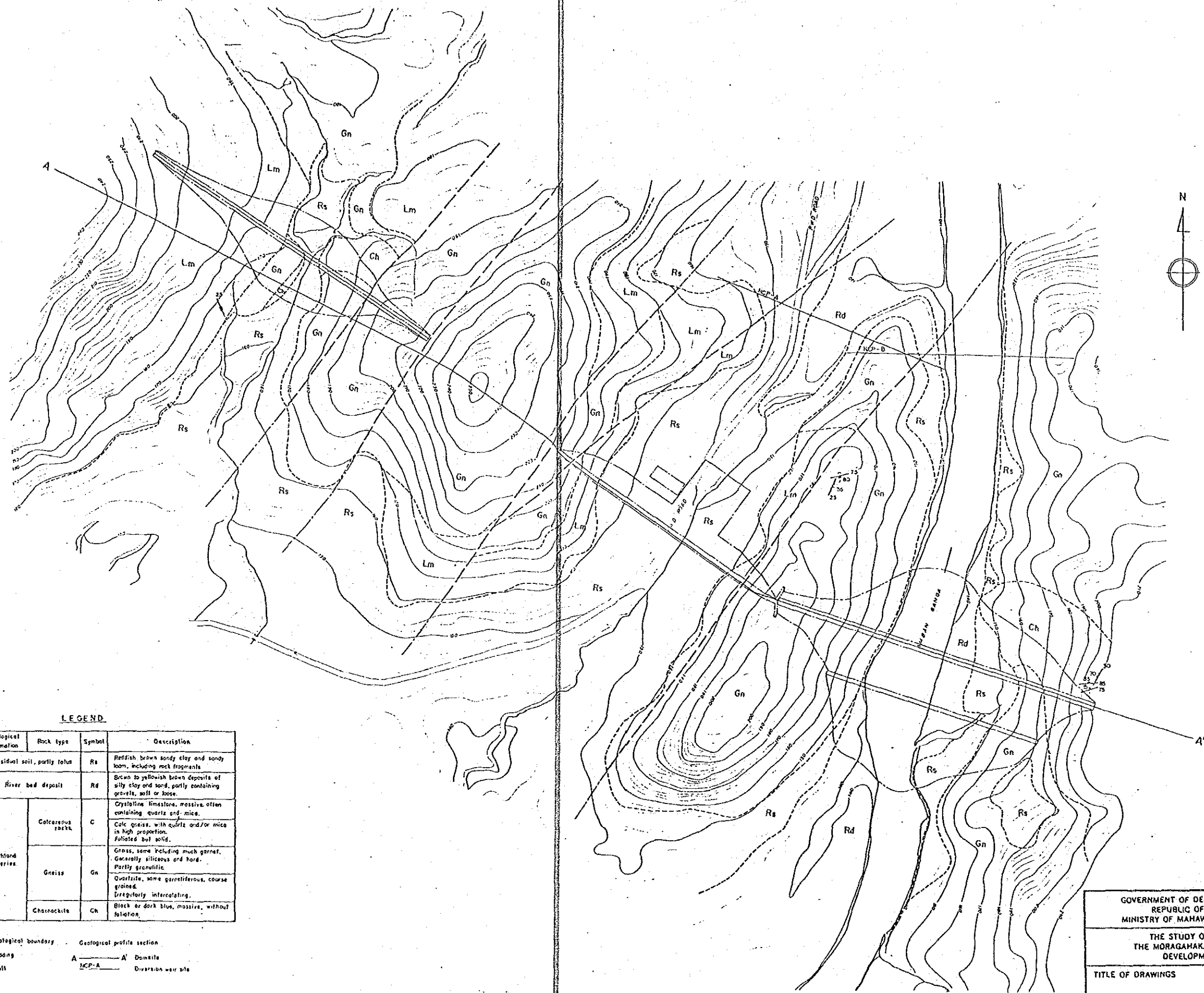
THE STUDY ON EXTENSION OF  
 THE MORAGAHAKANDA AGRICULTURAL  
 DEVELOPMENT PROJECT

TITLE OF DRAWINGS  
**MORAGAHAKANDA DAM  
 RESERVOIR AND VICINITY**

JAPAN INTERNATIONAL COOPERATION AGENCY  
 TOKYO JAPAN

OWG. No.

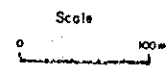




LEGEND

| Geological age | Geological formation       | Rock type         | Symbol | Description   |
|----------------|----------------------------|-------------------|--------|---|
| Quaternary     | Residual soil, partly loam |                   | Rs     | Reddish brown sandy clay and sandy loam, including rock fragments   |
|                | River bed deposit          |                   | Rd     | Brown to yellowish brown deposits of silty clay and sand, partly containing gravels, silt or loess.   |
| Pre-Cambrian   | Highland series            | Calcareous schist | C      | Crystalline limestone, massive, often containing quartz and mica.<br>Calc. gneiss, with quartz and/or mica in high proportion.<br>Foliated but solid.                 |
|                |                            | Gneiss            | Gn     | Gneiss, some including much garnet. Generally siliceous and hard.<br>Partly granitic.<br>Quartzite, some garnetiferous, coarse grained.<br>Irregularly intercalating. |
|                |                            | Charnockite       | Ch     | Black or dark blue, massive, without foliation.   |

- Geological boundary
- Geological profile section
- Breeding
- A-A' Dam site
- ICP-A
- Division weir site
- Dam site



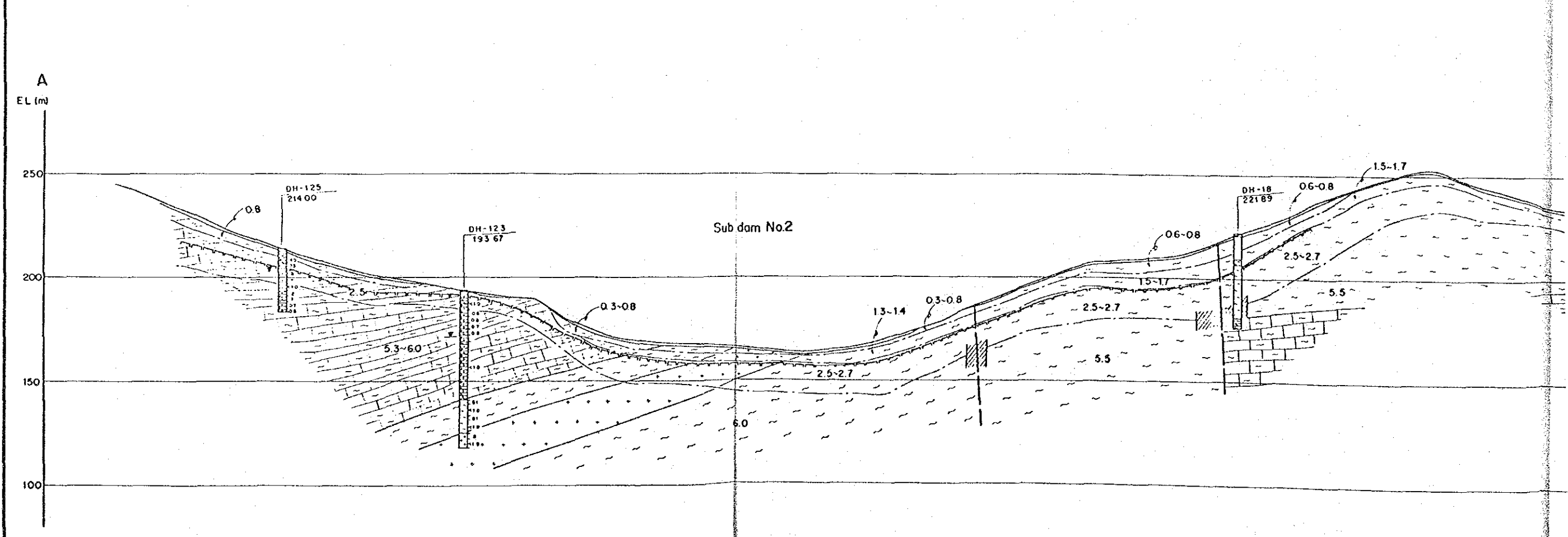
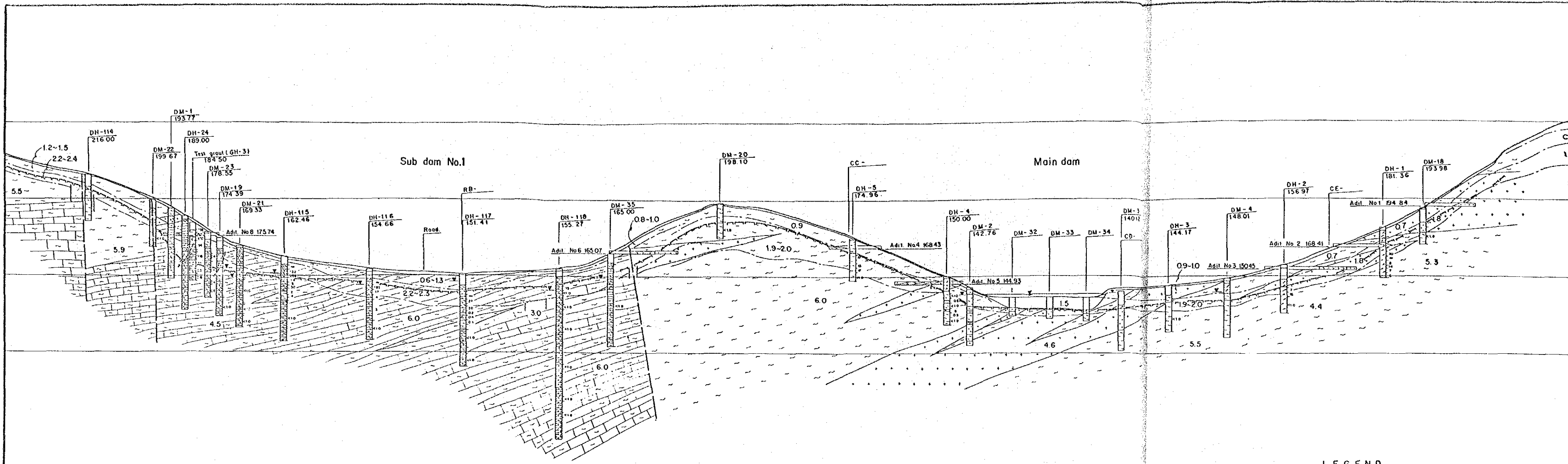
GOVERNMENT OF DEMOCRATIC SOCIALIST  
REPUBLIC OF SRI LANKA  
MINISTRY OF MAHAWELE DEVELOPMENT

THE STUDY ON EXTENSION OF  
THE HORAGAHAKANDA AGRICULTURAL  
DEVELOPMENT PROJECT

TITLE OF DRAWINGS

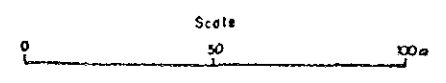
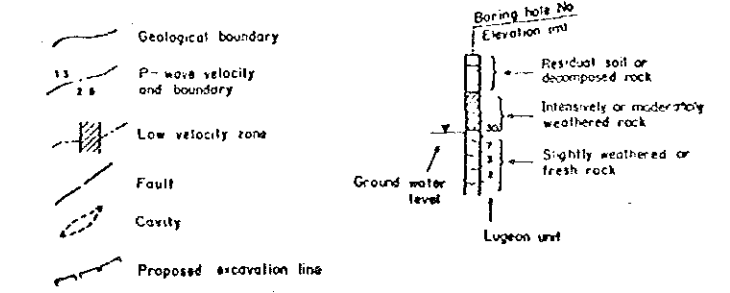
GEOLOGICAL MAP OF DAMSITE

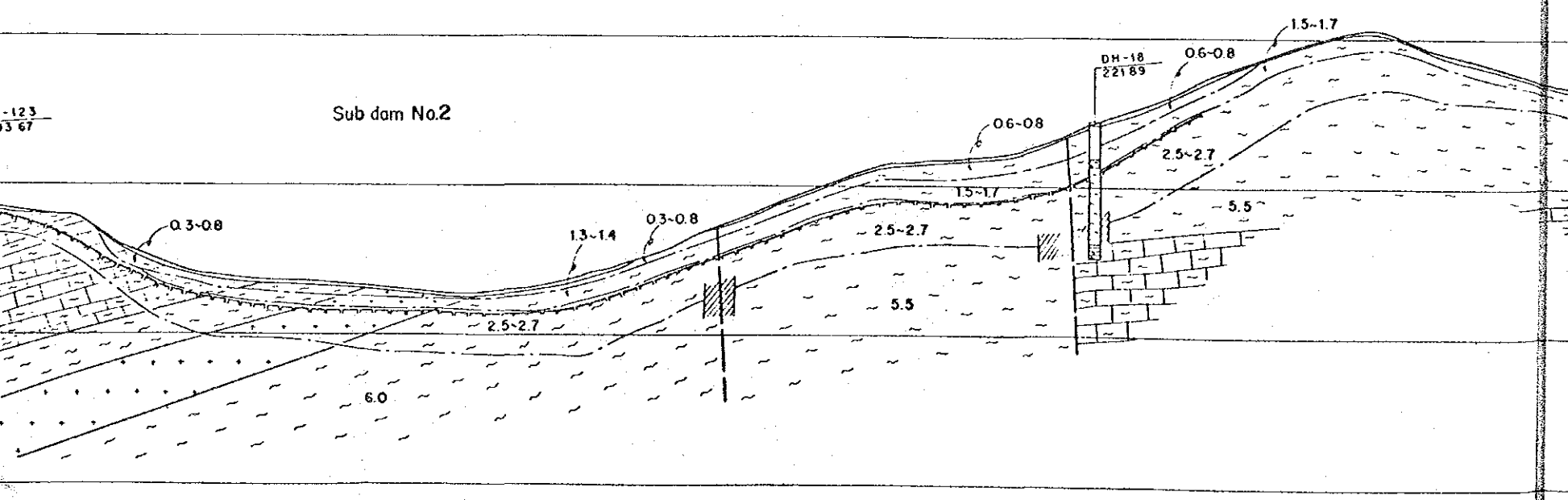
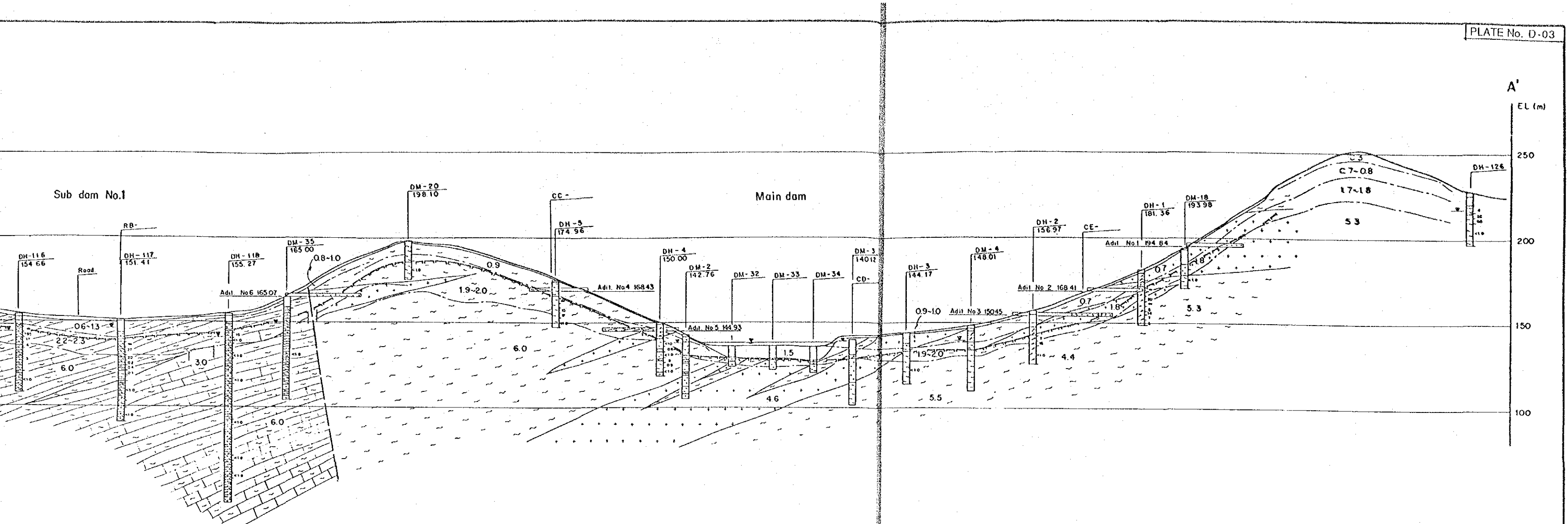
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG. No.  
TOKYO JAPAN



LEGEND

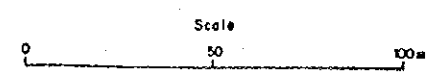
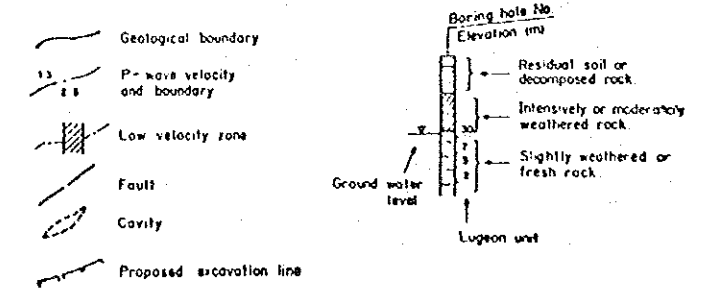
| Geological age | Geological formation        | Rock type             | Symbol | Description  |
|----------------|-----------------------------|-----------------------|--------|--|
| Quaternary     | Residual soil, partly talus |                       |        | Reddish brown sandy clay and sandy loam, including rock fragments.                                 |
|                | River bed deposit           |                       |        | Brown to yellowish brown deposits of silty clay and sand, partly containing gravels, soft or loose |
| Pre-Cambrian   | Highland series             | Crystalline limestone |        | Composed of calcite, often containing quartz and mica, massive and solid                           |
|                |                             | Calc gneiss           |        | Composed of calcite, with quartz and/or mica in high proportion. Foliated but solid                |
|                |                             | Gneiss                |        | Generally siliceous and hard. Some including much garnet. Partly granitic.                         |
|                |                             | Charnockite           |        | Black or dark blue, massive and solid, without foliation   |
|                |                             | Quartzite             |        | Composed of quartz, some including garnet. Irregularly intercalating. Generally hard and cracky    |





LEGEND

| Geological age | Geological formation         | Rock type             | Symbol | Description   |
|----------------|------------------------------|-----------------------|--------|---|
| Quaternary     | Residual soil, partly talus. |                       |        | Reddish brown sandy clay and sandy loam, including rock fragments.                                  |
|                | River bed deposit            |                       |        | Brown to yellowish brown deposits of silty clay and sand, partly containing gravels, silt or loose. |
| Pre-Cambrian   | Highland series              | Crystalline limestone |        | Composed of calcite, often containing quartz and mica, massive and solid.                           |
|                |                              | Calc gneiss           |        | Composed of calcite, with quartz and/or mica in high proportion. Foliated but solid.                |
|                |                              | Gneiss                |        | Generally siliceous and hard. Some including much garnet. Partly granitic.                          |
|                |                              | Charnockite           |        | Black or dark blue, massive and solid, without foliation.   |
|                |                              | Quartzite             |        | Composed of quartz, some including garnet. Irregularly intercalating. Generally hard and crackly.   |



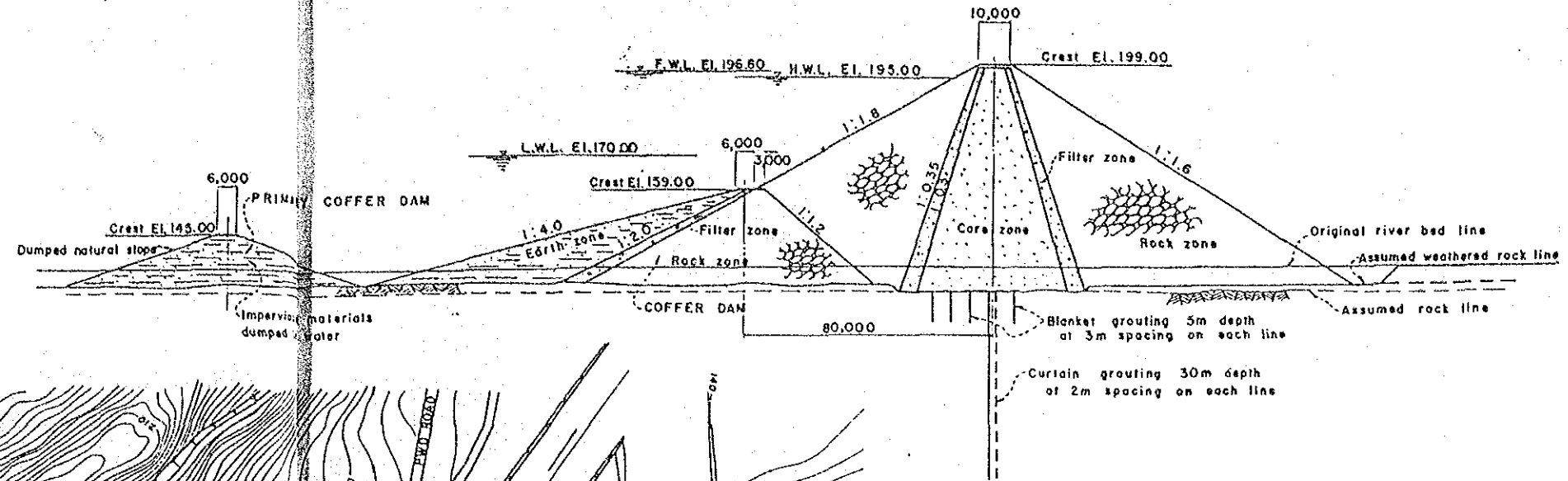
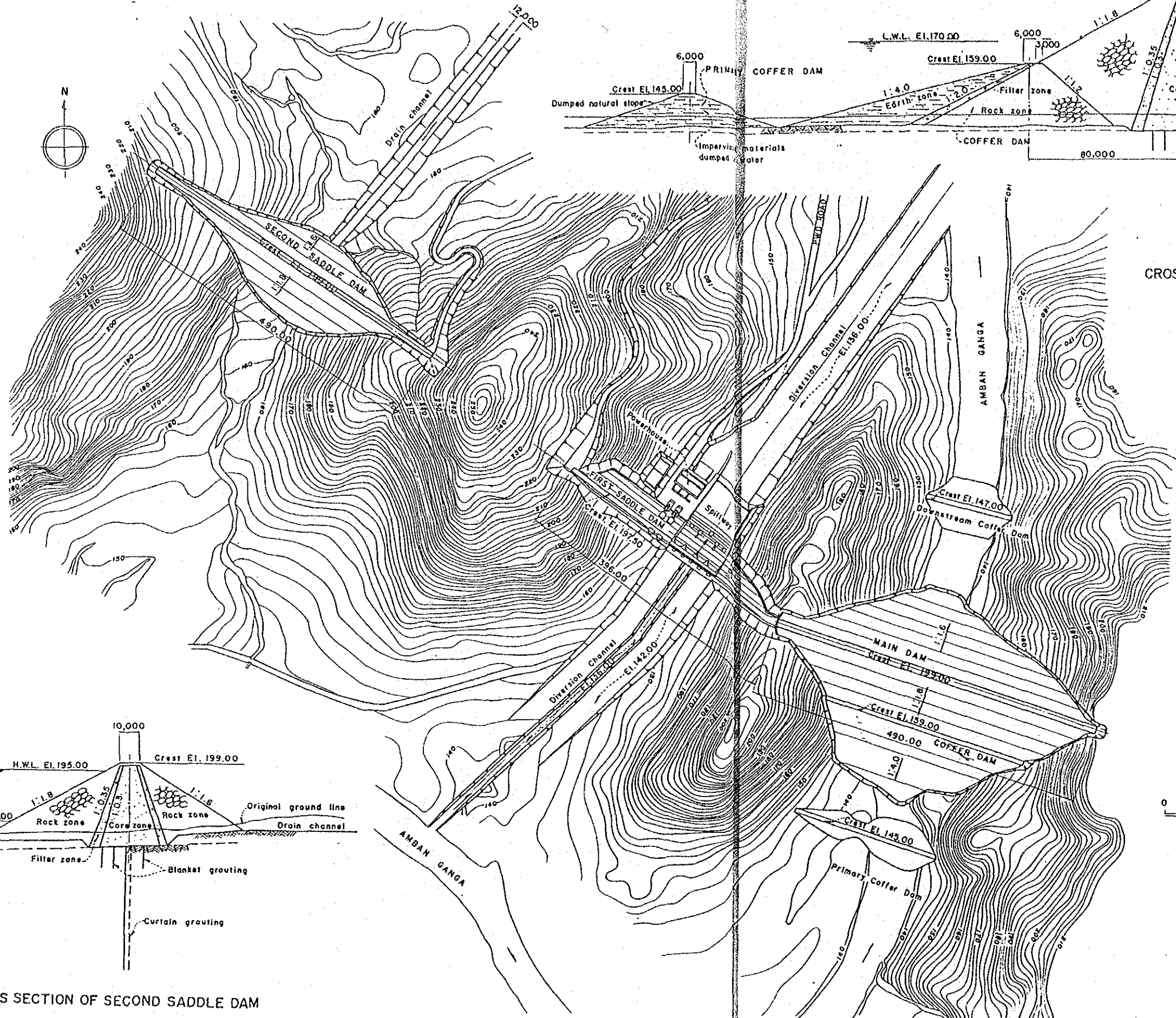
GOVERNMENT OF DEMOCRATIC SOCIALIST  
REPUBLIC OF SRI-LANKA  
MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION OF  
THE MORAGAHAKANDA AGRICULTURAL  
DEVELOPMENT PROJECT

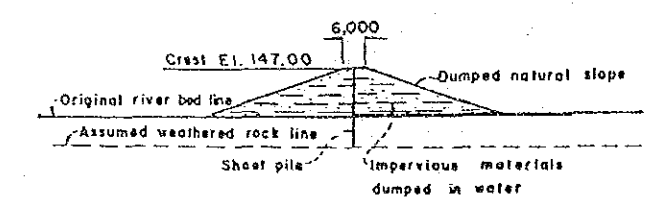
TITLE OF DRAWINGS

GEOLOGICAL PROFILE OF DAMSITE

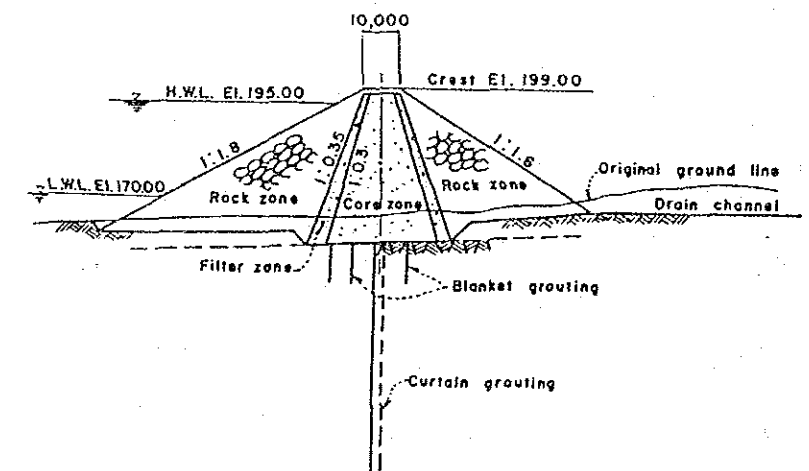
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG. No.  
TOKYO JAPAN



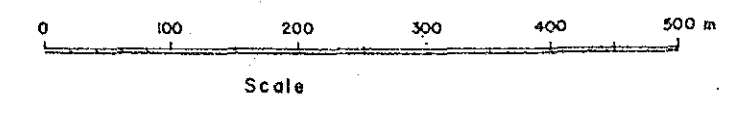
CROSS SECTION OF MAIN DAM



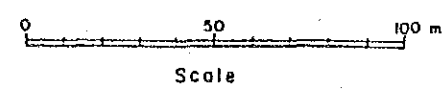
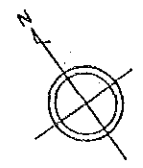
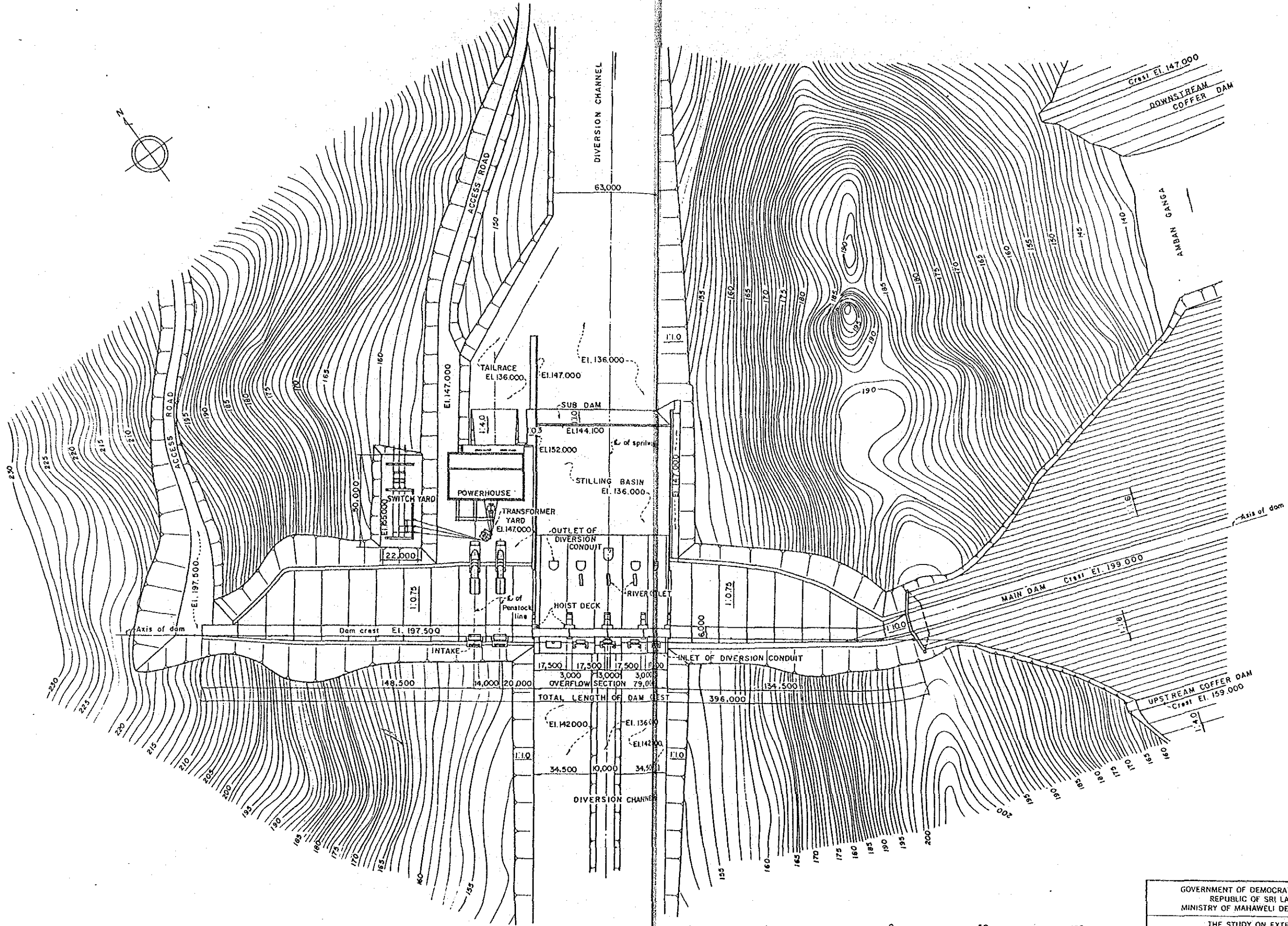
DOWNSTREAM COFFER DAM



CROSS SECTION OF SECOND SADDLE DAM

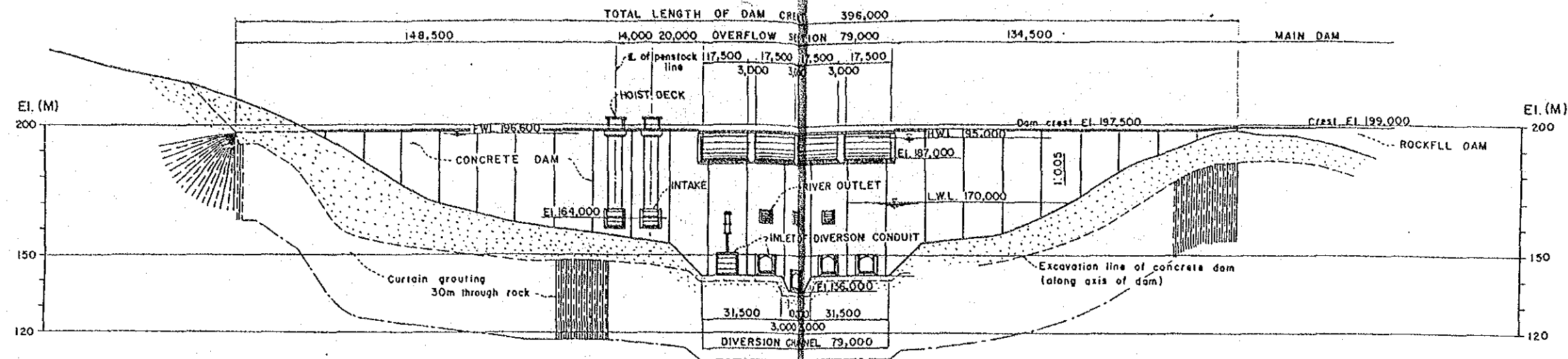


|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br>MORAGAHAKANDA DAM<br>GENERAL PLAN  |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | OWG. No. |

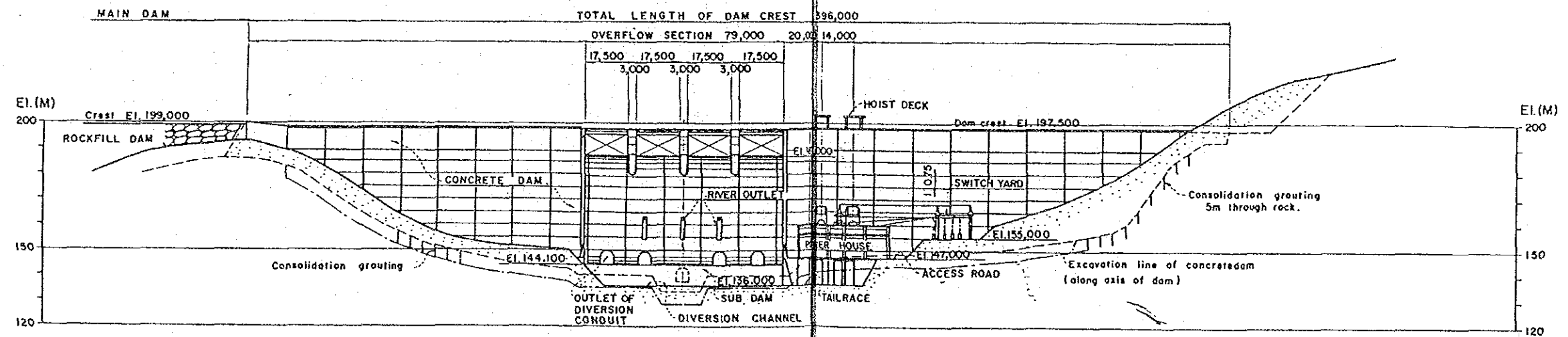


|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELE DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br>MORAGAHAKANDA DAM<br>PLAN OF FIRST SADDLE DAM                              |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |

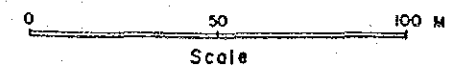
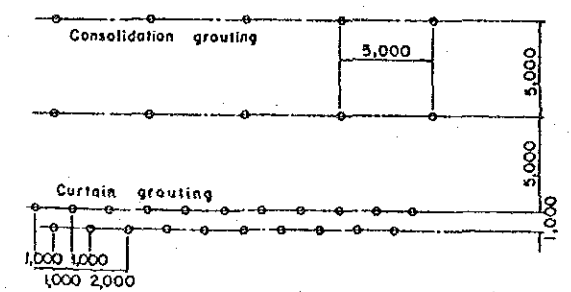




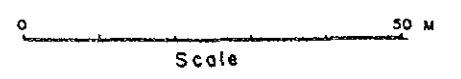
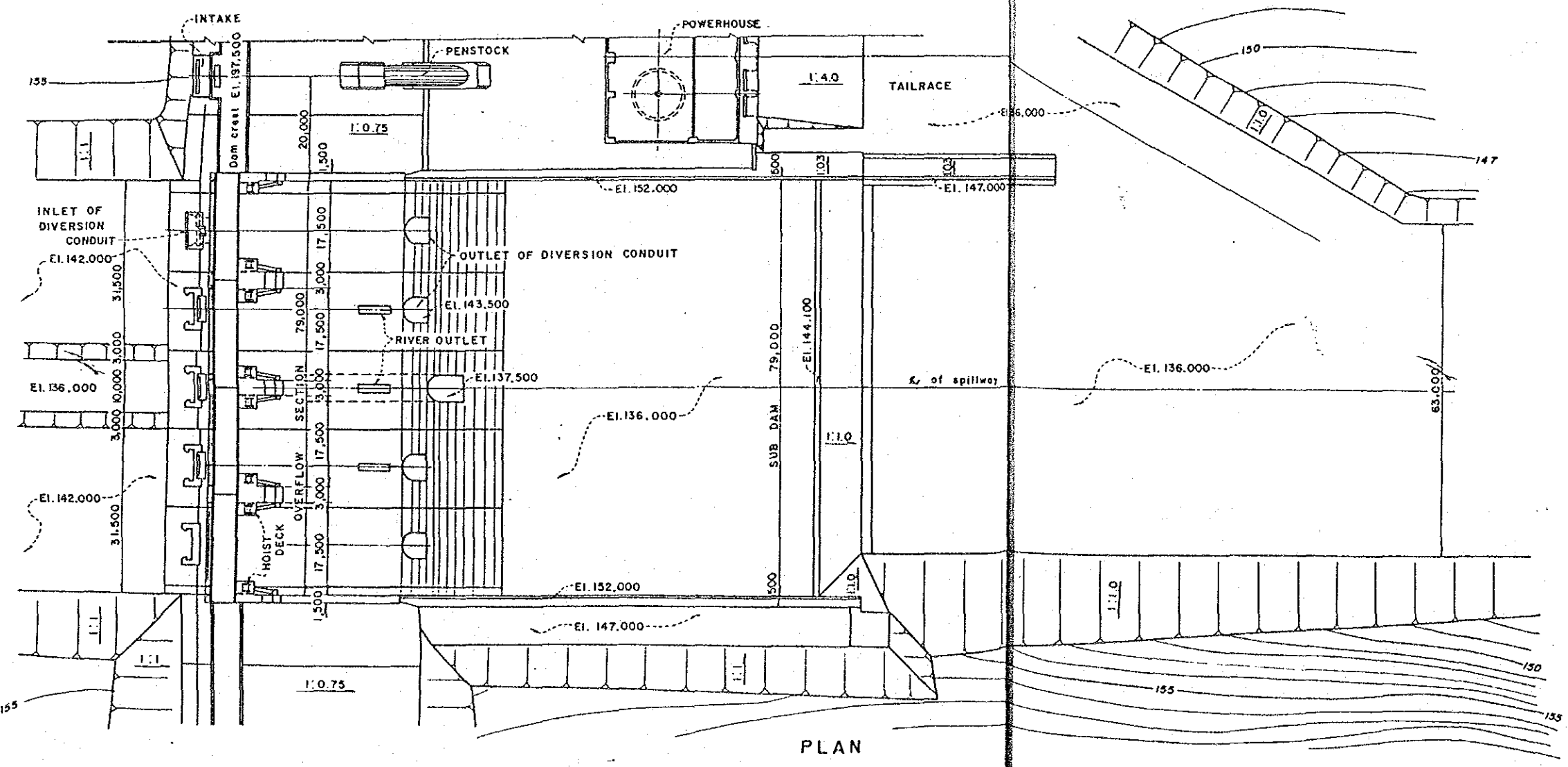
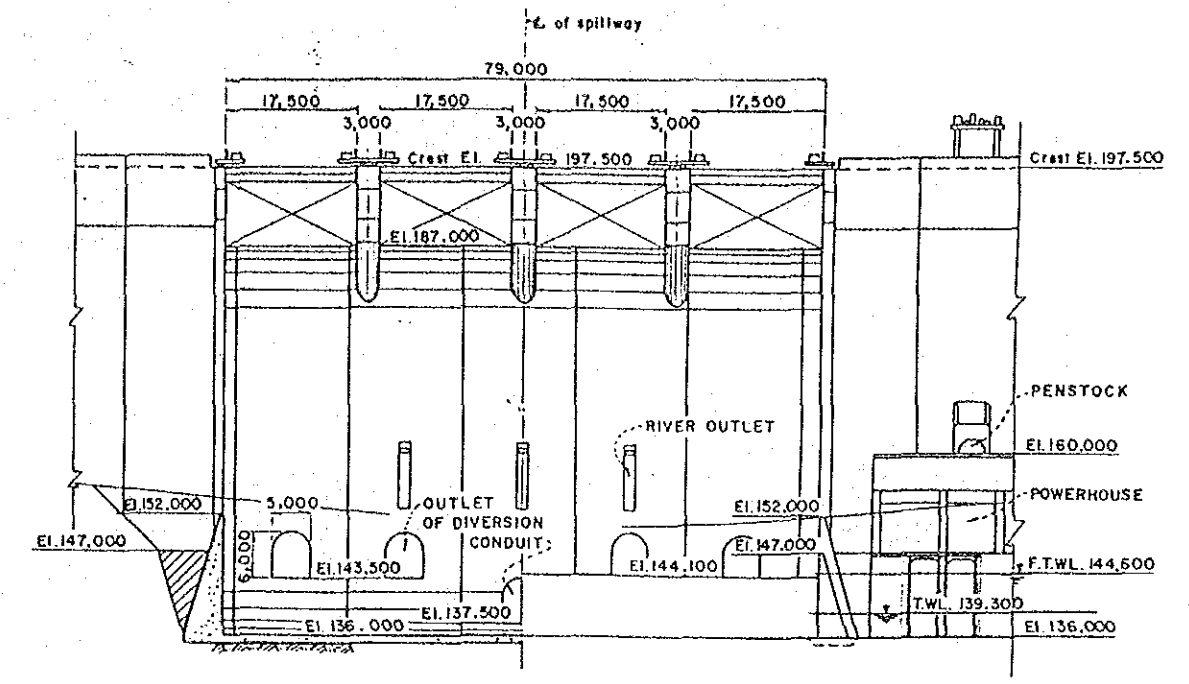
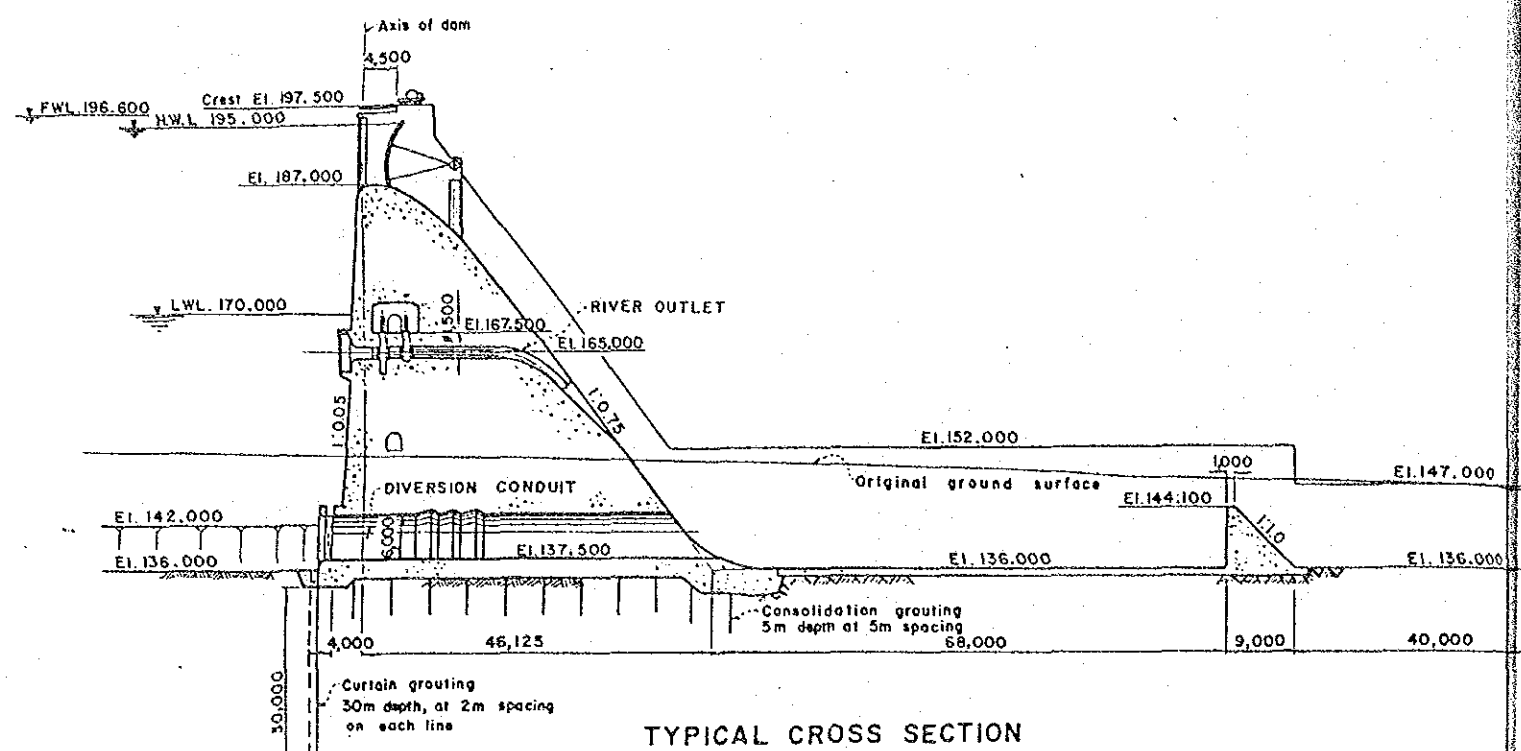
UPSTREAM ELEVATION



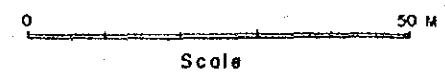
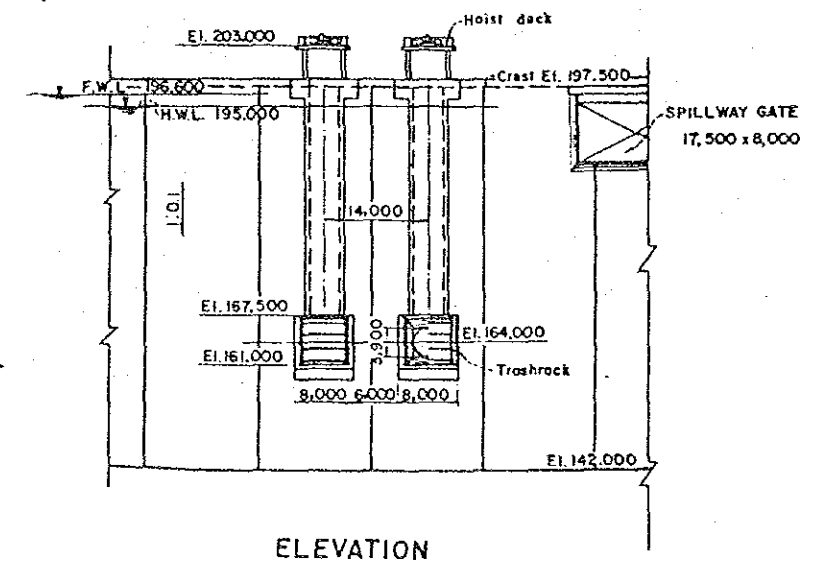
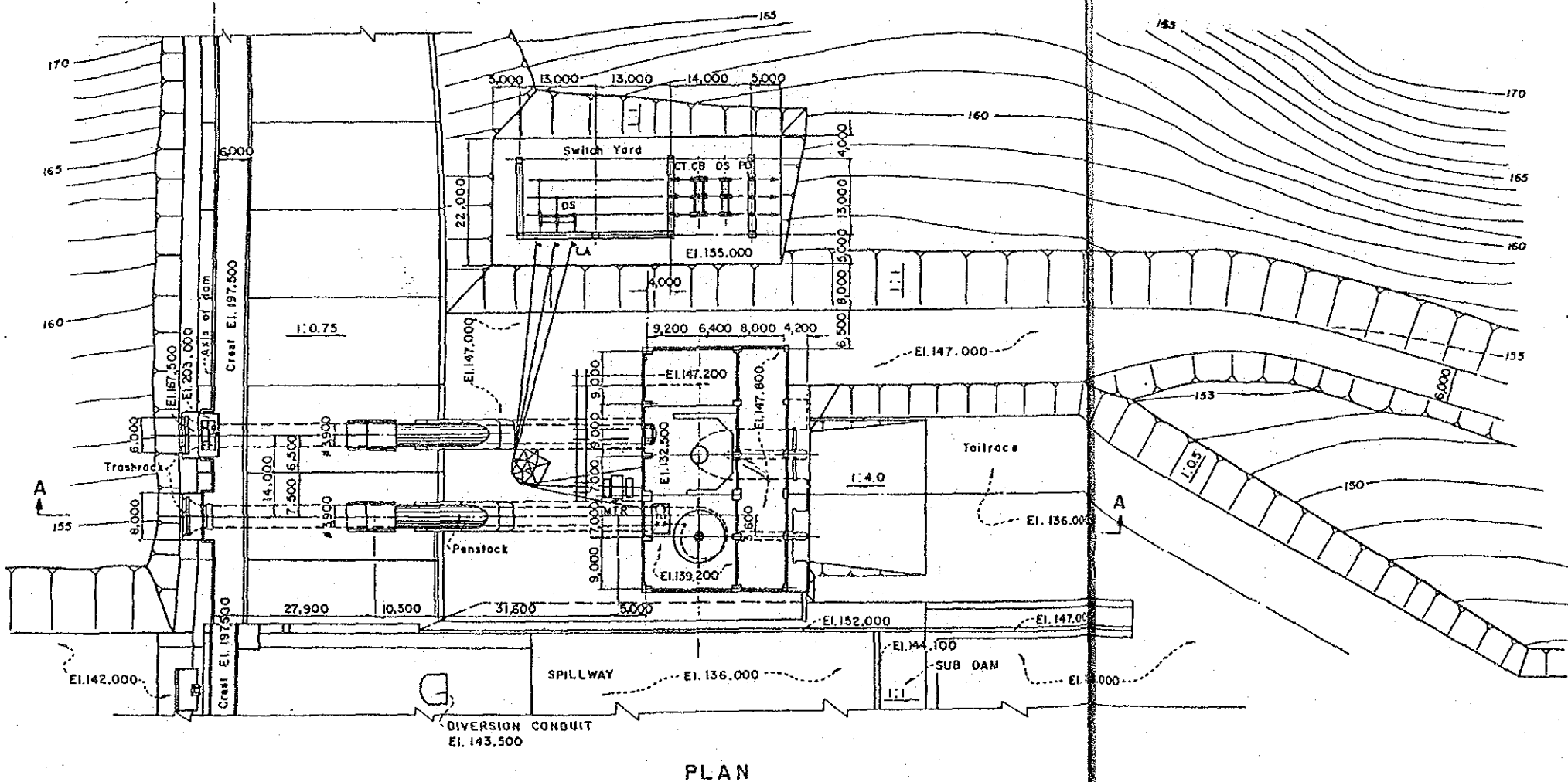
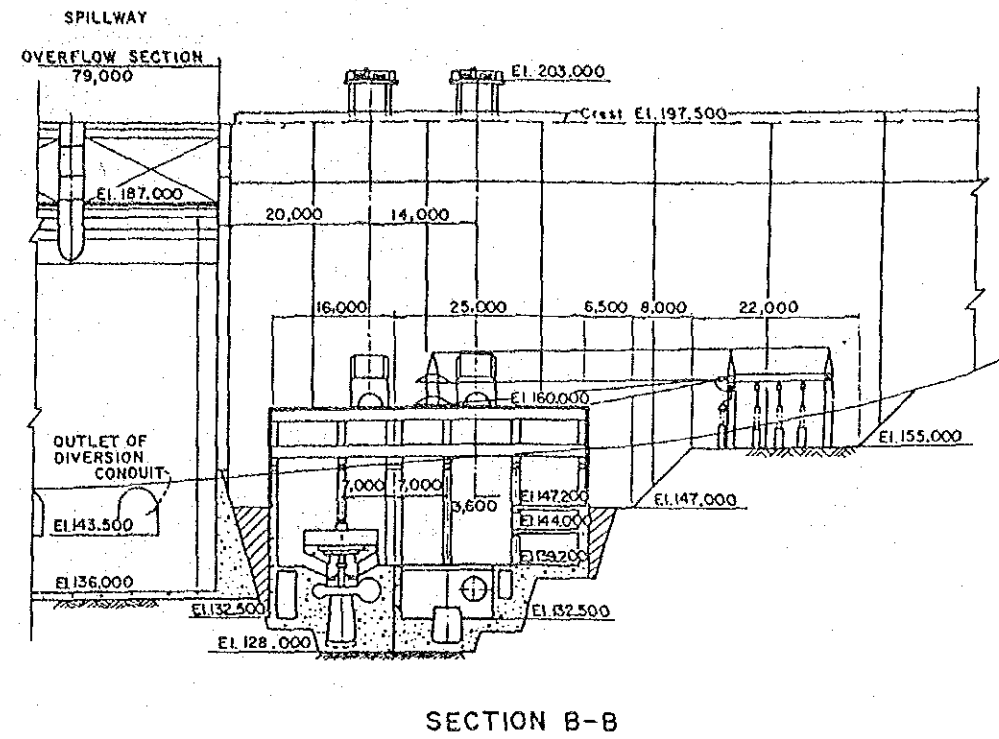
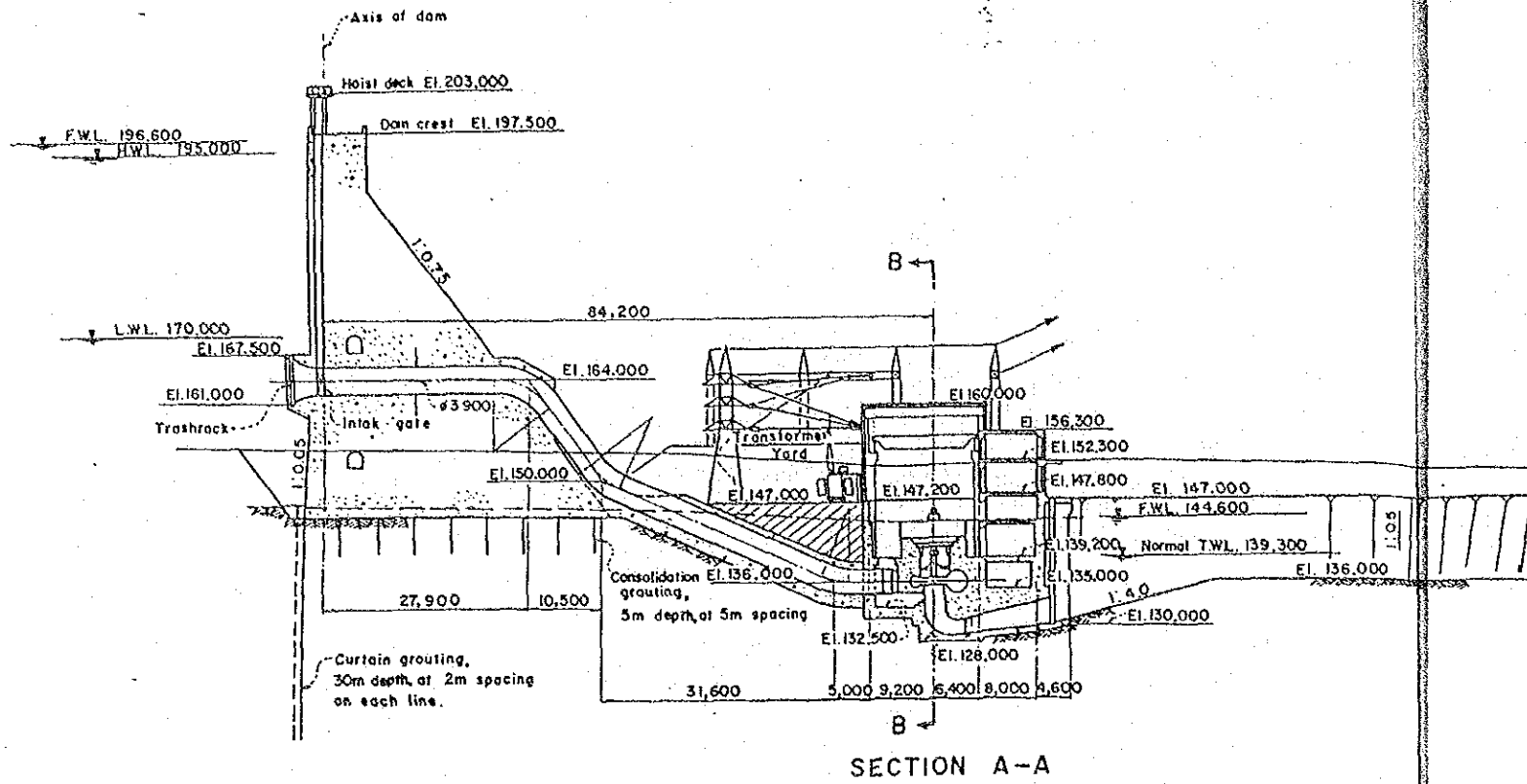
DOWNSTREAM ELEVATION



|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br>MORAGAHAKANDA DAM<br>ELEVATIONS OF FIRST SADDLE DAM                        |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |

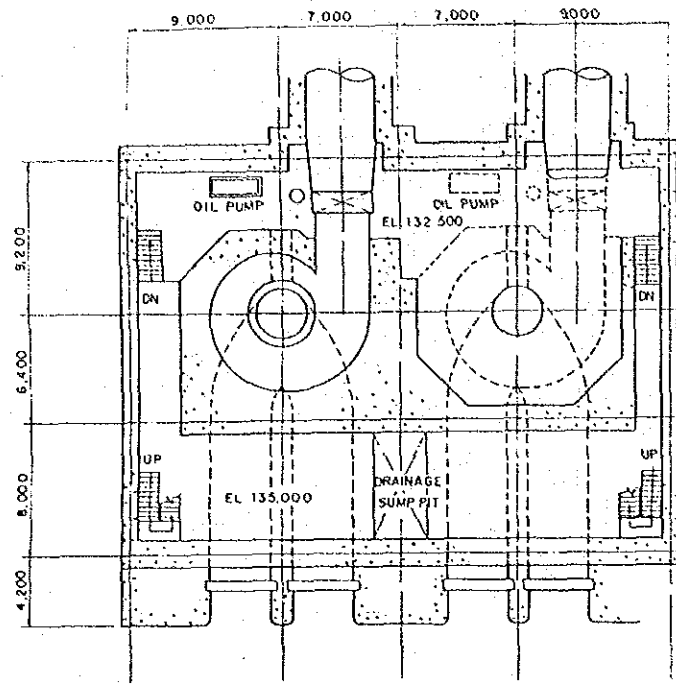


|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br>SPILLWAY SECTION OF FIRST SADDLE DAM                                       |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |

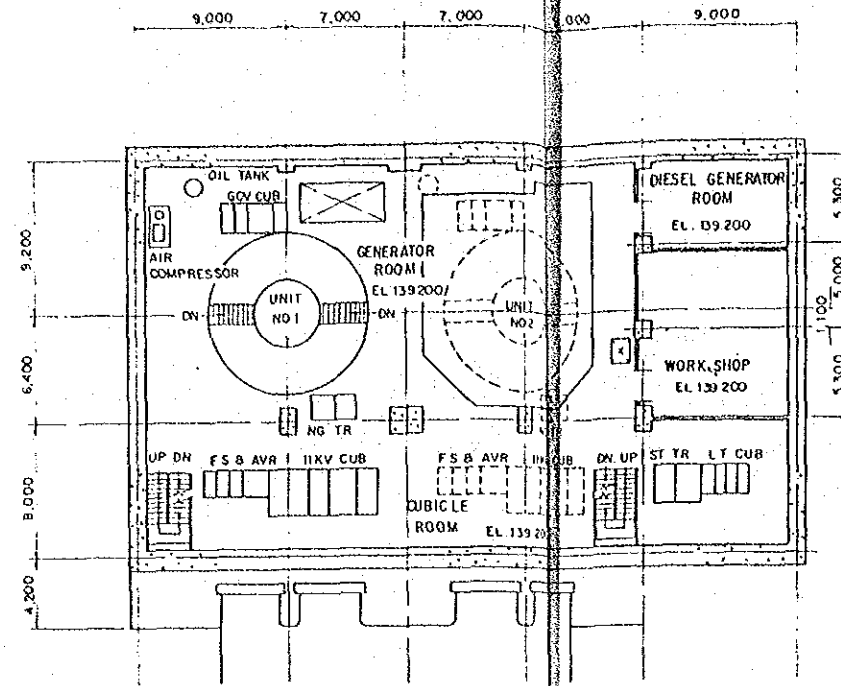


|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS   |          |
| POWER STATION   |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |

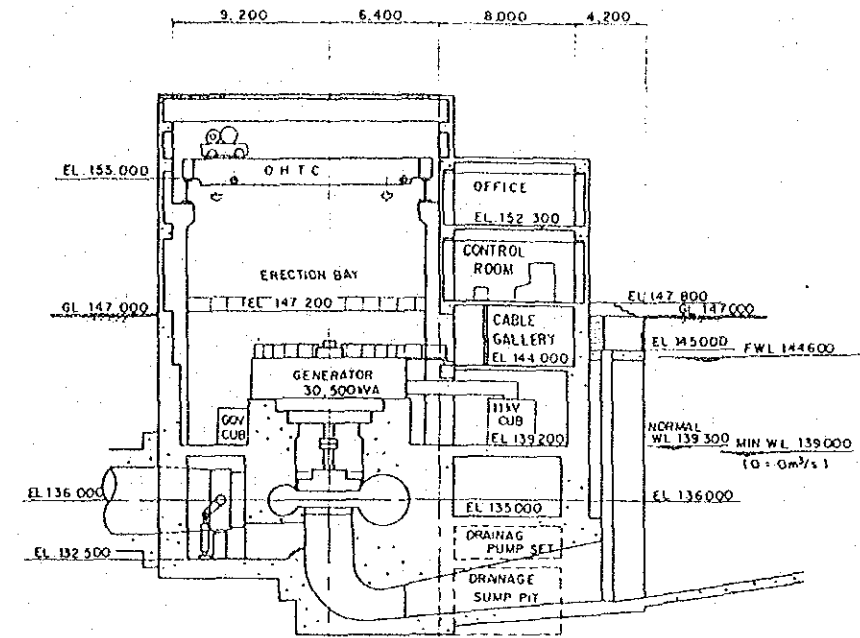




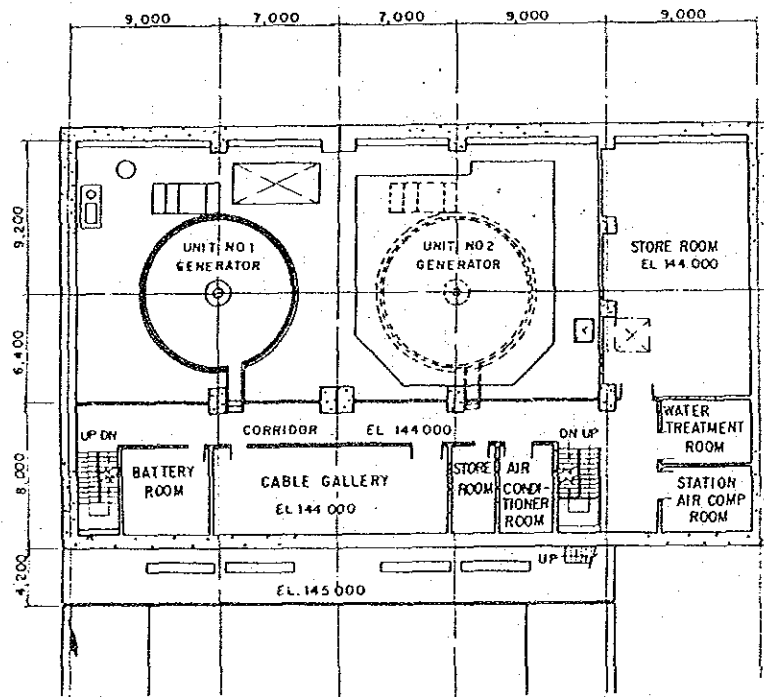
PLAN EL. 132.500 AND 135.000



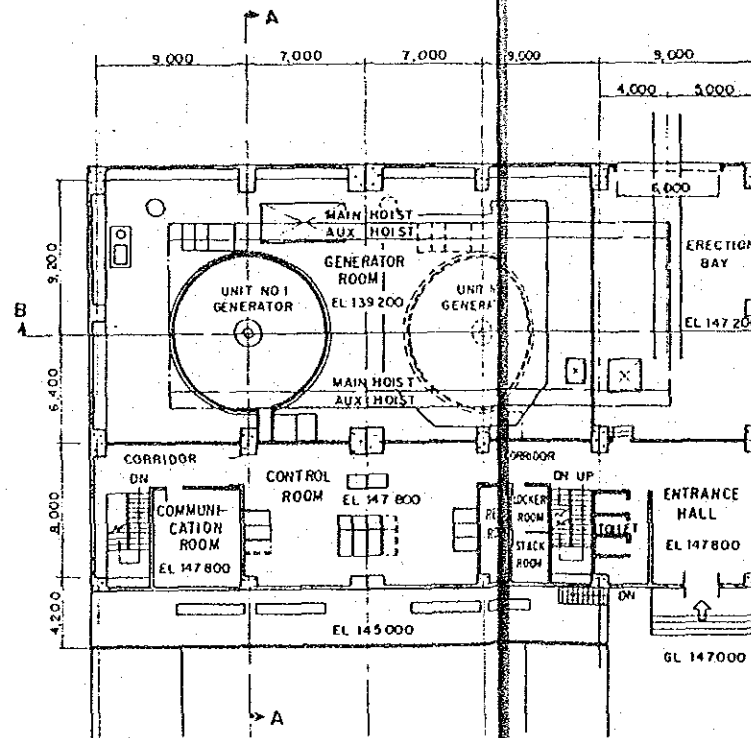
PLAN EL. 139.200



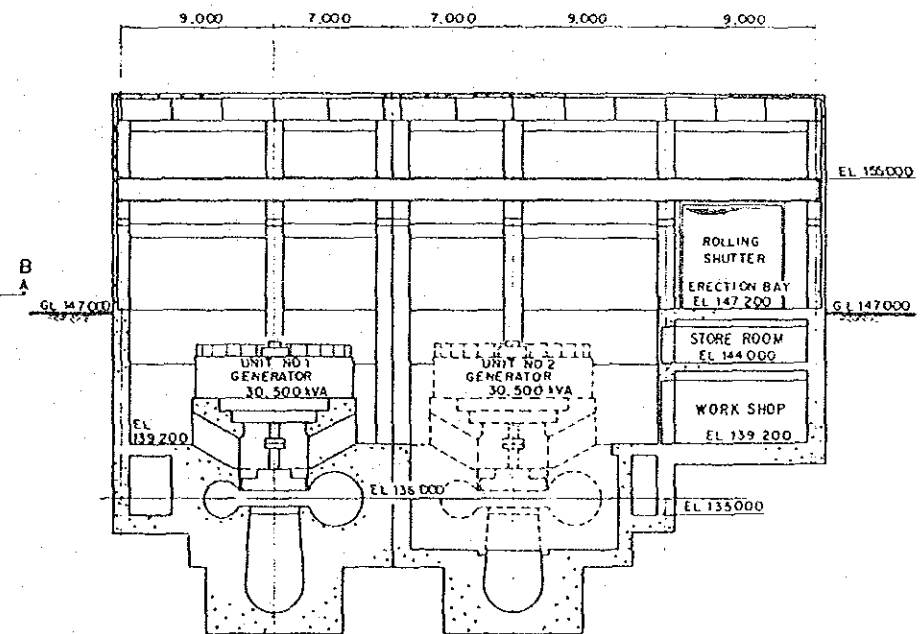
SECTION A - A



PLAN EL. 144.000

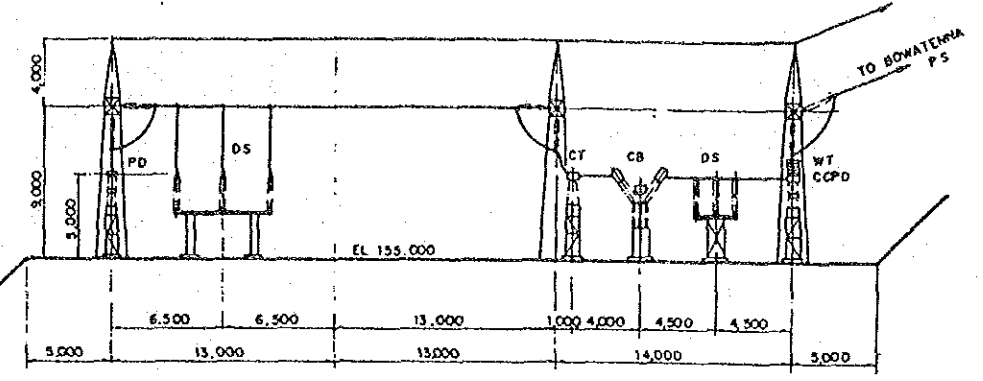
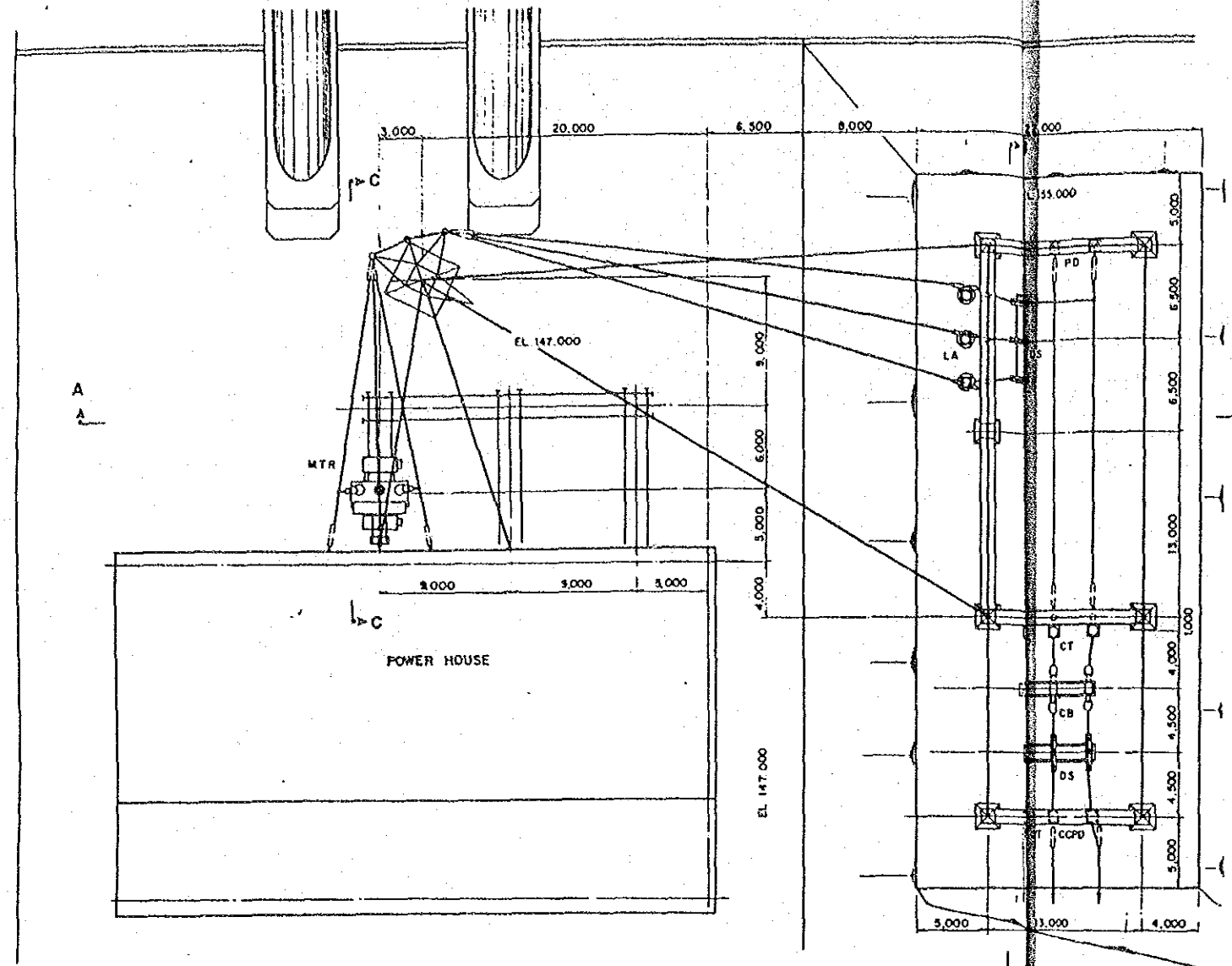


PLAN EL. 147.200 AND 147.800

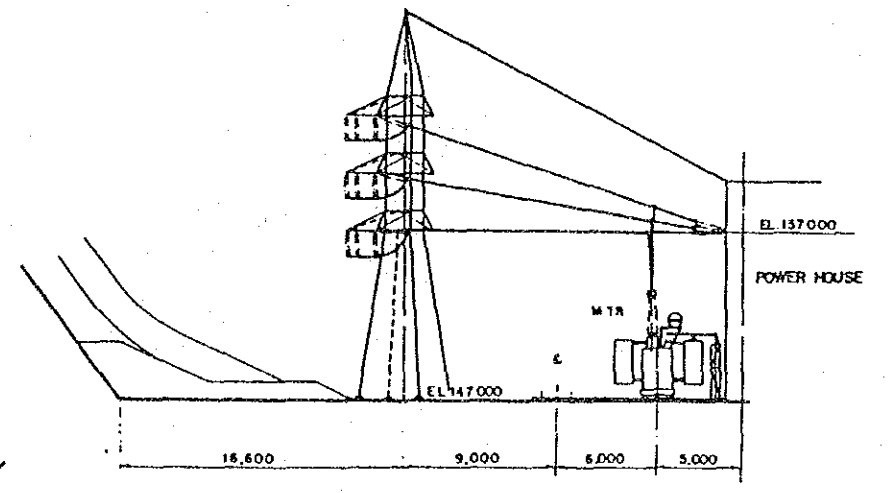


SECTION B - B

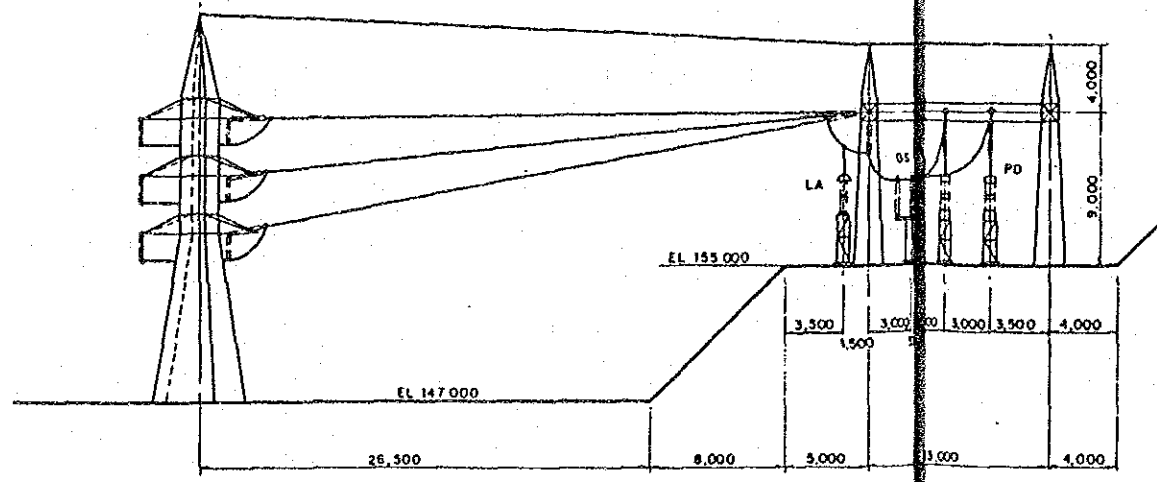
|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br>POWER STATION<br>ARRANGEMENT OF INDOOR EQUIPMENT                           |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |



SECTION B-B



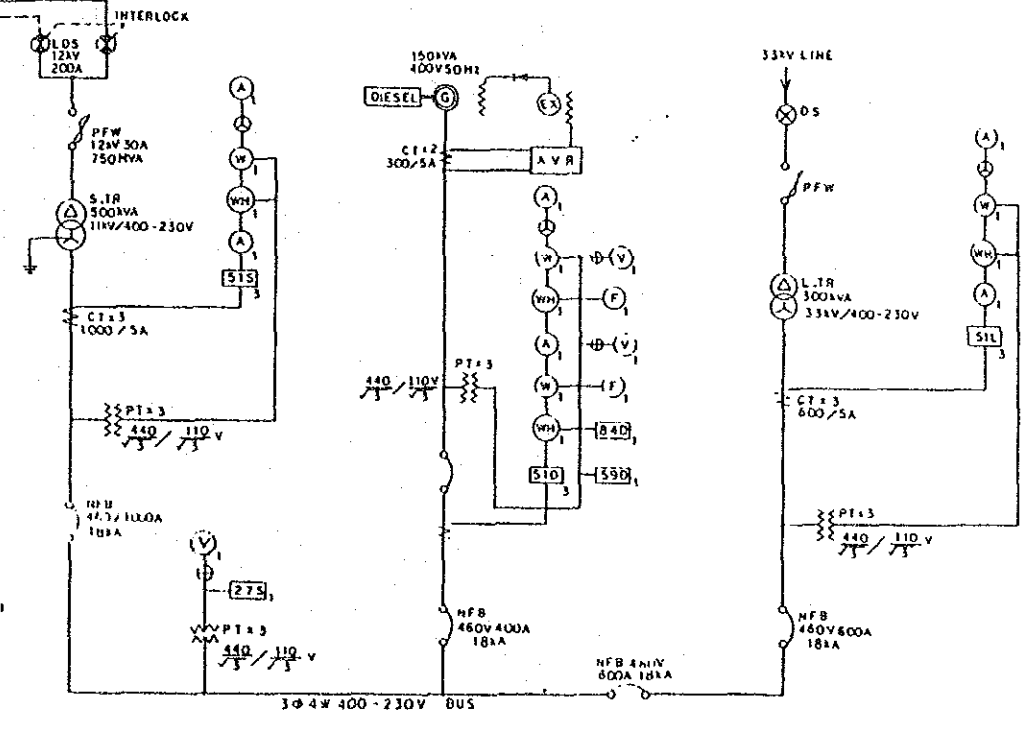
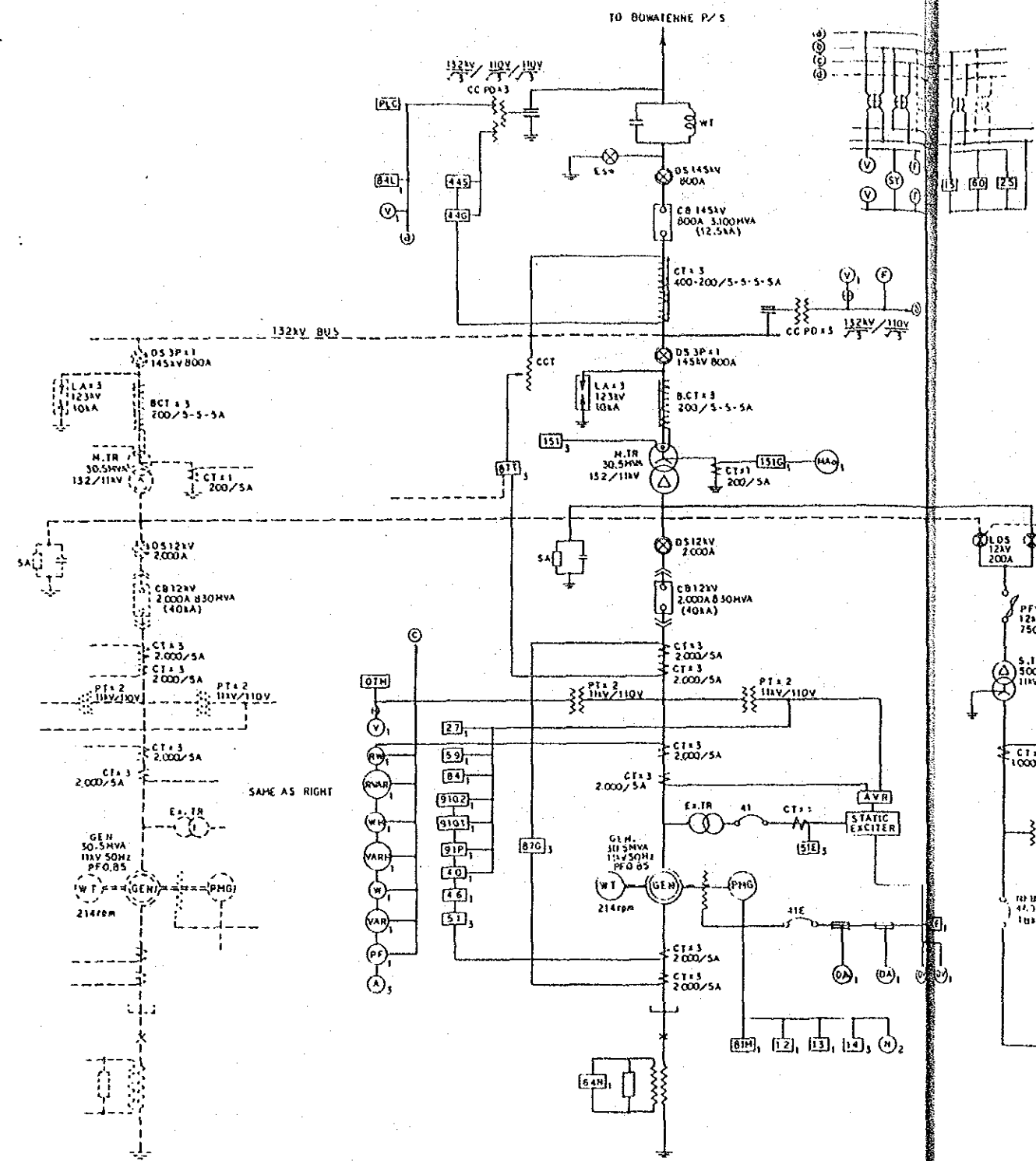
SECTION C-C



SECTION A-A

SCALE : 1 / 200

|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS<br><b>ARRANGEMENT OF<br/>OUTDOOR EQUIPMENT</b>                                |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |



| LEGEND |                                  | LEGEND |  |
|--------|----------------------------------|--------|--|
| A      | AMMETER                          | GPT    | GROUNDING POTENTIAL                    |
| V      | VOLT METER                       | EX.TR  | EXCITER TRANSFORMER                    |
| W      | WATT METER                       | N      | TACHOMETER                             |
| F      | FREQUENCY METER                  | AVR    | AUTOMATIC VOLTAGE REGULATOR            |
| CC     | COUPLING CAPACITOR               | RW     | RECORDING WATTMETER                    |
| PD     | POTENTIAL DEVICE                 | RVAR   | VAR RECORDING METER                    |
| CCT    | COMPENSATING CURRENT TRANSFORMER | NFB    | NO FUSE BREAKER                        |
| DCI    | BUSHING CURRENT TRANSFORMER      | 12     | OVER SPEED RELAY                       |
| WT     | WAVE TRAP                        | 13     | SYNCHRONOUS SPEED RELAY                |
| LA     | LIGHTNING ARRESTOR               | 14     | UNDER SPEED RELAY                      |
| M.T.R  | MAIN TRANSFORMER                 | 27     | UNDER VOLTAGE RELAY                    |
| DS     | DISCONNECTING SWITCH             | 40     | LOSS OF FIELD RELAY                    |
| CB     | CIRCUIT BREAKER                  | 445    | SHORT CIRCUIT DISTANCE RELAY           |
| LOS    | LOAD DISCONNECTING SWITCH        | 44G    | GROUND DISTANCE RELAY                  |
| CT     | CURRENT TRANSFORMER              | 46     | NEGATIVE-PHASE SEQUENCE RELAY          |
| PT     | POTENTIAL TRANSFORMER            | 51     | OVAR CURRENT RELAY                     |
| E.SW   | EARTHING SWITCH                  | 59     | OVAR VOLTAGE RELAY                     |
| PF     | POWER FACTOR METER               | 64     | OVAR VOLTAGE GROUND RELAY              |
| PFW    | POWER FUSE                       | 81M    | GOVERNOR                               |
| DA     | DC AMMETER                       | 84     | VOLTAGE RELAY                          |
| DV     | DC VOLT METER                    | 87     | DIFFERENTIAL CURRENT RELAY             |
| VAR    | VAR METER                        | 91Q    | REACTIVE POWER RELAY                   |
| VARH   | VAR HOUR METER                   | 91P    | POWER RELAY                            |
| WH     | WATT HOUR METER                  | 151    | OVAR CURRENT RELAY FOR 132KV CIRCUIT   |
| SY     | SYNCHROSCOPE                     | 151G   | -DITTO- FOR 132KV CIRCUIT GROUND RELAY |

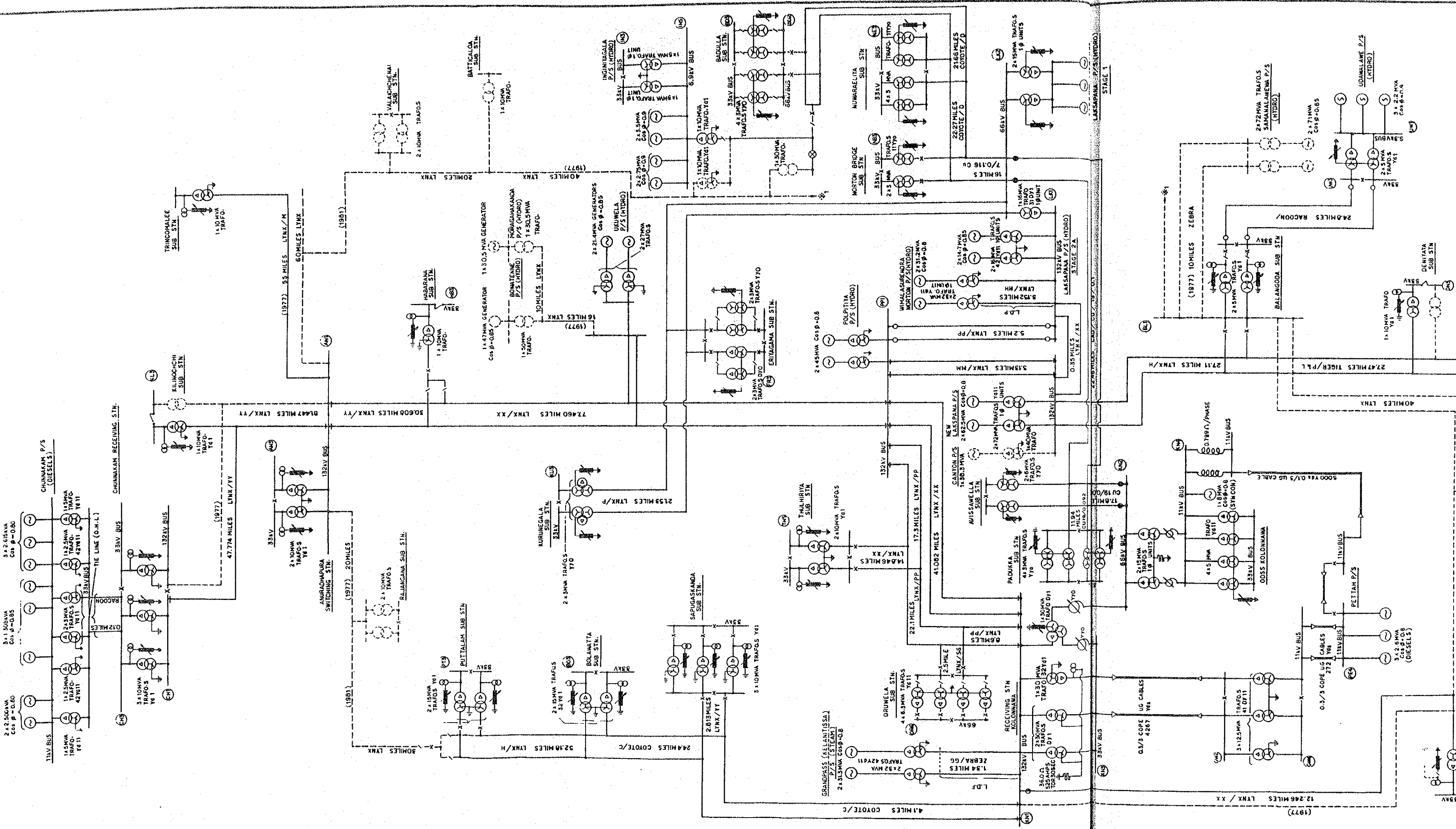
GOVERNMENT OF DEMOCRATIC SOCIALIST  
REPUBLIC OF SRI LANKA  
MINISTRY OF MAHAWELE DEVELOPMENT

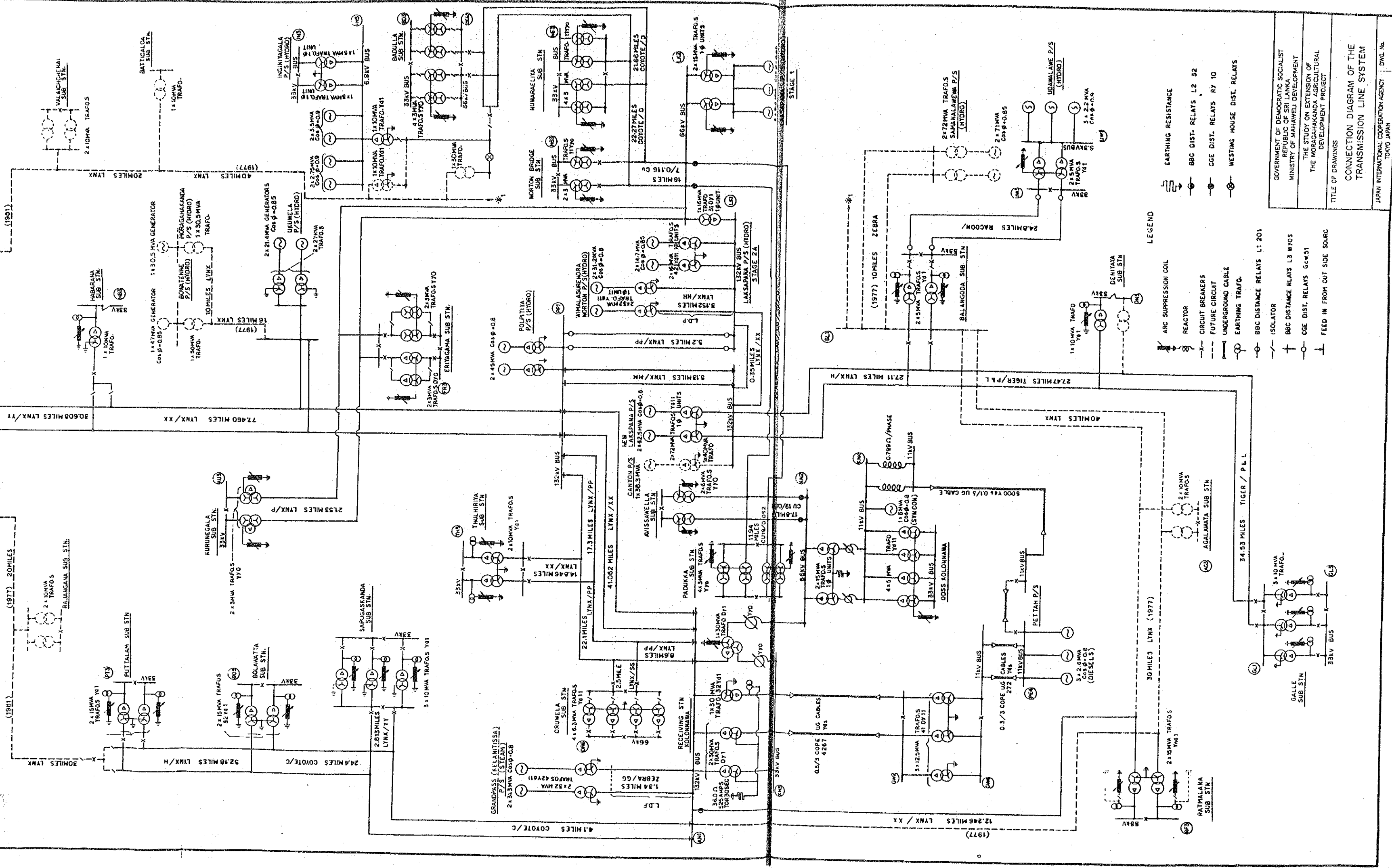
THE STUDY ON EXTENSION OF  
THE MORAGAHAKANDA AGRICULTURAL  
DEVELOPMENT PROJECT

TITLE OF DRAWINGS  
MORAGAHAKANDA POWER STATION  
MAIN SINGLE DIAGRAM

JAPAN INTERNATIONAL COOPERATION AGENCY  
TOKYO JAPAN

DWG. No.







- ARC SUPPRESSION COIL
- REACTOR
- CIRCUIT BREAKERS
- FUTURE CIRCUIT
- UNDERGROUND CABLE
- EARTHING TRAF.
- BBC DISTANCE RELAYS L1 201
- ISOLATOR
- BBC DISTANCE RELAYS L3 WYOS
- CCE DIST. RELAYS Gw=51
- FEED IN FROM OUT SIDE SOURCE
- EARTHING RESISTANCE
- BBC DIST. RELAYS L2 92
- CCE DIST. RELAYS RY 10
- WESTING HOUSE DIST. RELAYS

GOVERNMENT OF DEMOCRATIC SOCIALIST  
 REPUBLIC OF SRI LANKA  
 MINISTRY OF MAHAWELE DEVELOPMENT  
 THE STUDY ON EXTENSION OF  
 THE MORAGAHAKANDA AGRICULTURAL  
 DEVELOPMENT PROJECT  
 TITLE OF DRAWINGS  
 CONNECTION DIAGRAM OF THE  
 TRANSMISSION LINE SYSTEM  
 JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) DWG. NO.  
 TOKYO JAPAN

| DESCRIPTION   | UNIT  | Q'TY      | 1ST YEAR |   |   |   | 2ND YEAR |   |   |   | 3RD YEAR |   |   |   | 4TH YEAR |   |   |   | 5TH YEAR |   |   |   | 6TH YEAR |   |   |   |
|---|-------|-----------|----------|---|---|---|----------|---|---|---|----------|---|---|---|----------|---|---|---|----------|---|---|---|----------|---|---|---|
|   |       |           | 1990     |   |   |   | 1991     |   |   |   | 1992     |   |   |   | 1993     |   |   |   | 1994     |   |   |   | 1995     |   |   |   |
|   |       |           | 1        | 2 | 3 | 4 | 1        | 2 | 3 | 4 | 1        | 2 | 3 | 4 | 1        | 2 | 3 | 4 | 1        | 2 | 3 | 4 | 1        | 2 | 3 | 4 |
| <b>A. DAM &amp; POWER STATION</b>   |       |           |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (1) Preparatory works   | -     | L.S       |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (2) Road relocation with public utilities                                 | -     | L.S       |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (3) Construction, diversion channel<br>(Main dam)                         | cu.m  | 604,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (4) Primary & main coffer dam   | -     | -         |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (5) Excavation, all classes   | cu.m  | 580,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (6) Grouting  | lin.m | 21,000    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (7) Embankment, core, filter & rock<br>(First saddle dam)                 | cu.m  | 2,430,000 |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (8) Excavation, dam & spillway, all classes                               | cu.m  | 310,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (9) Grouting  | lin.m | 17,000    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (10) Dam concrete   | cu.m  | 376,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (11) Spillway & power intake concrete                                     | "     | 28,200    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (12) Diveresion conduits<br>(Second saddle dam)                           | set   | 5         |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (13) Excavation, all classes  | cu.m  | 177,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (14) Grouting   | lin.m | 22,000    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (15) Embankment, core, filter rocks<br>(Poworhouse & Outdoor & witchyard) | cu.m  | 431,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (16) Excavation, all classes  | cu.m  | 119,000   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (17) Substructure works   | "     | 11,800    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (18) Superstructure works   | -     | L.S       |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (19) Hydromechanical works  | lot   | 1         |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (20) Generating Equipmnt w/auxilialies                                    | "     | 1         |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (21) Transmission line  | km    | 16.0      |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| <b>B. IRRIGATION DEVELOPMENT</b>  |       |           |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (22) Preparatory works<br>(Newland development)                           | ha    | 13,900    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (23) Irr. & Drainage canals w/structures                                  |       |           |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (24) On - farm (Downstream dovlopment)                                    | ha    | 13,900    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (25) Rehabilitation,existing irr. facilities<br>(Rehabilitation works)    | "     | 40,000    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (26) On - farm (Downstream development)                                   | "     | 38,100    |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| (22) Social Infrastructure  | -     | L.S       |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |
| Month, Cumulative   |       |           |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |

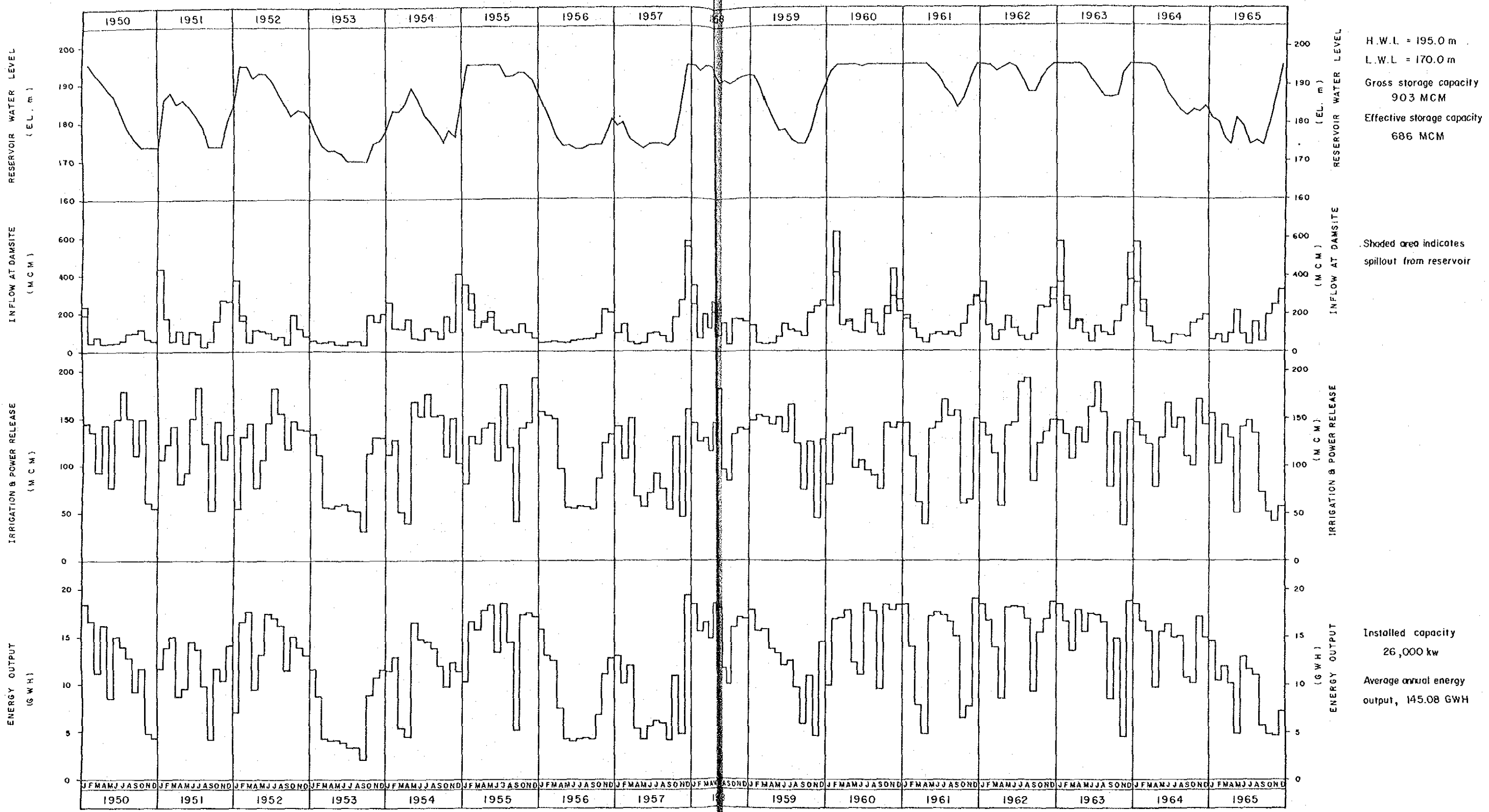
Legends ;  
 : Critical path work  
 : Design, manufacture and transportation

GOVERNMENT OF DEMOCRATIC SOCIALIST  
 REPUBLIC OF SRI LANKA  
 MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION OF  
 THE MORAGAHAKANDA AGRICULTURAL  
 DEVELOPMENT PROJECT

TITLE OF DRAWINGS  
 MORAGAHAKANDA  
 CONSTRUCTION TIME SCHEDULE

JAPAN INTERNATIONAL COOPERATION AGENCY | DWG. No.  
 TOKYO JAPAN



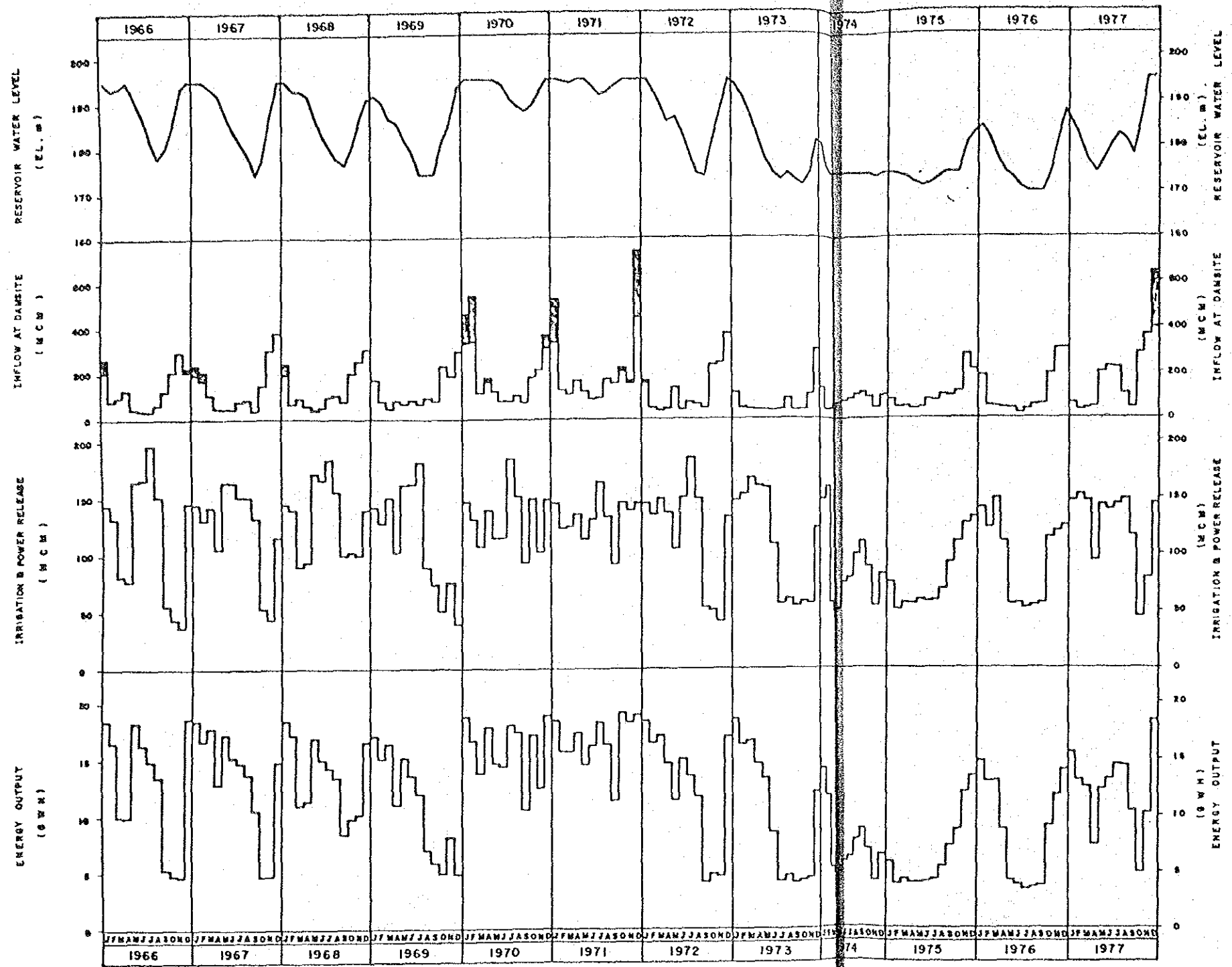
H.W.L = 195.0 m  
 L.W.L = 170.0 m  
 Gross storage capacity  
 903 MCM  
 Effective storage capacity  
 686 MCM

Shaded area indicates  
 spillout from reservoir

Installed capacity  
 26,000 kw  
 Average annual energy  
 output, 145.08 GWH

|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS   |          |
| RESERVOIR OPERATION STUDY (1)   |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |





H.W.L. = 195.0 m  
 L.W.L. = 170.0 m  
 Gross storage capacity, 903 MCM  
 Effective storage capacity, 686 MCM

Shaded area indicates  
 spillout volume from reservoir

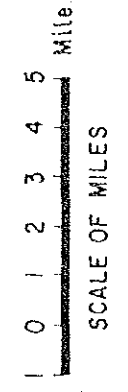
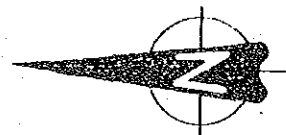
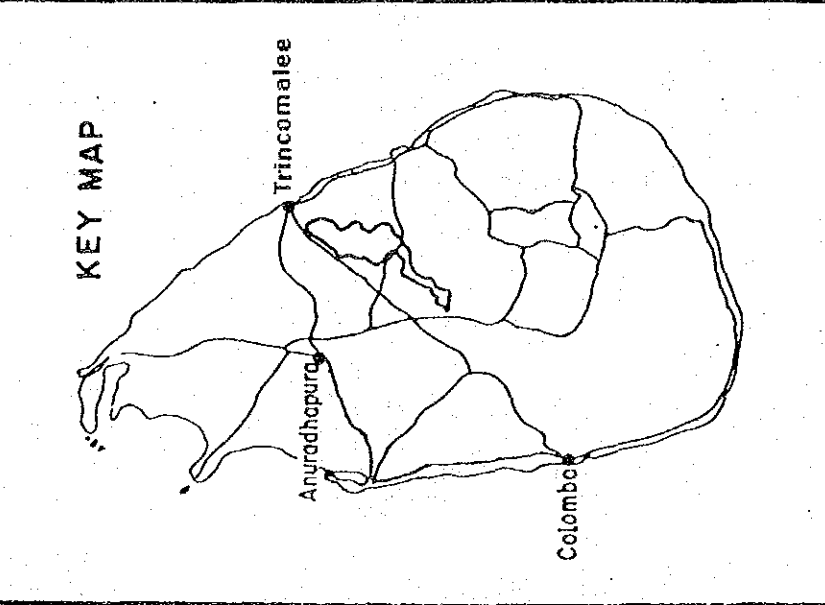
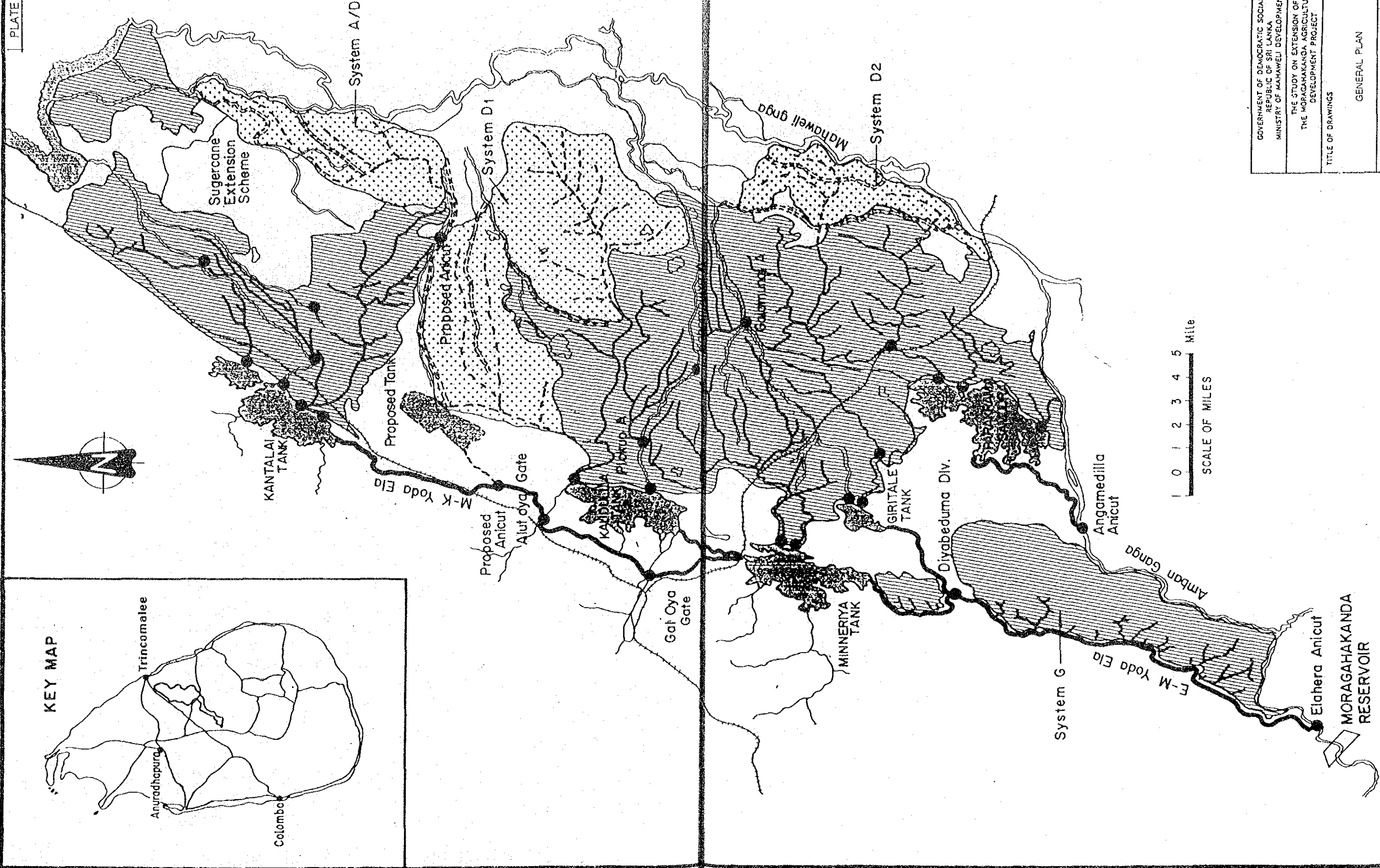
Installed capacity, 26,000 kw  
 Average annual energy output, 145.08 GWH

|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS   |          |
| RESERVOIR OPERATION STUDY (2)   |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |



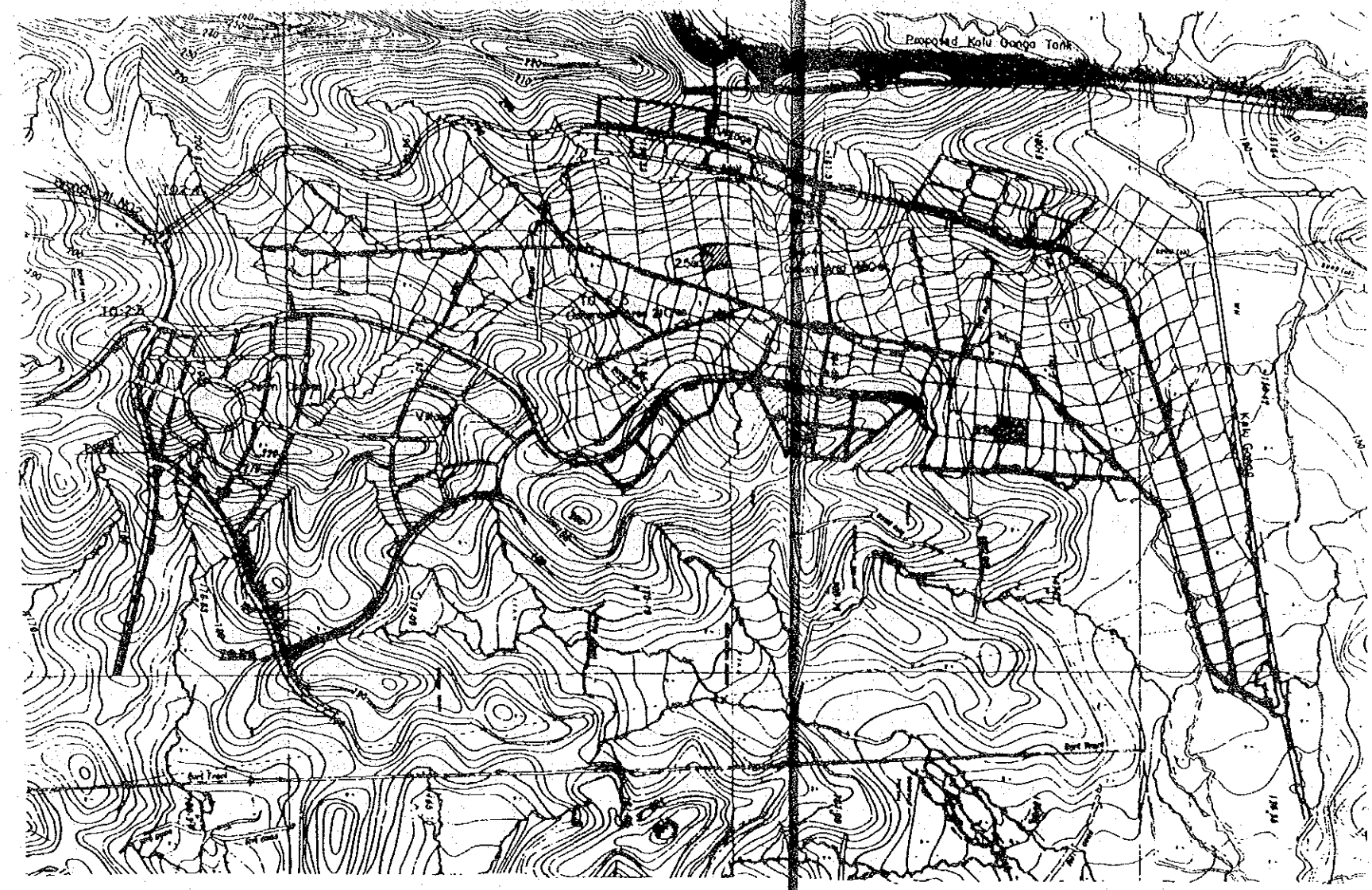


# IRRIGATION



|   |
|---|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELE DEVELOPMENT |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |
| TITLE OF DRAWINGS   |
| GENERAL PLAN  |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   |
| DWG. No.  |

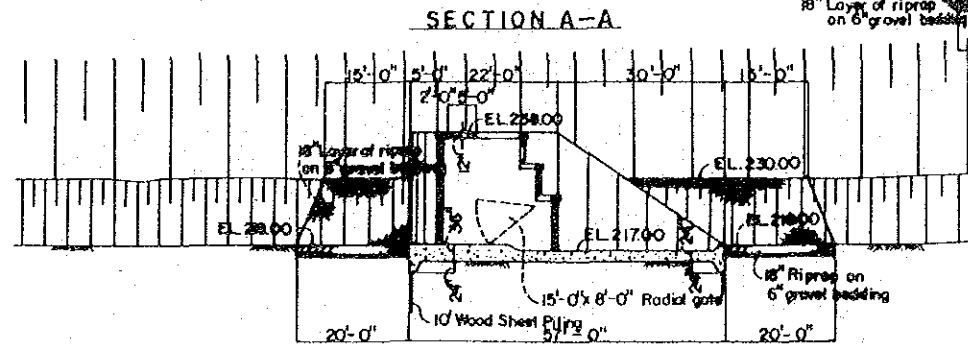
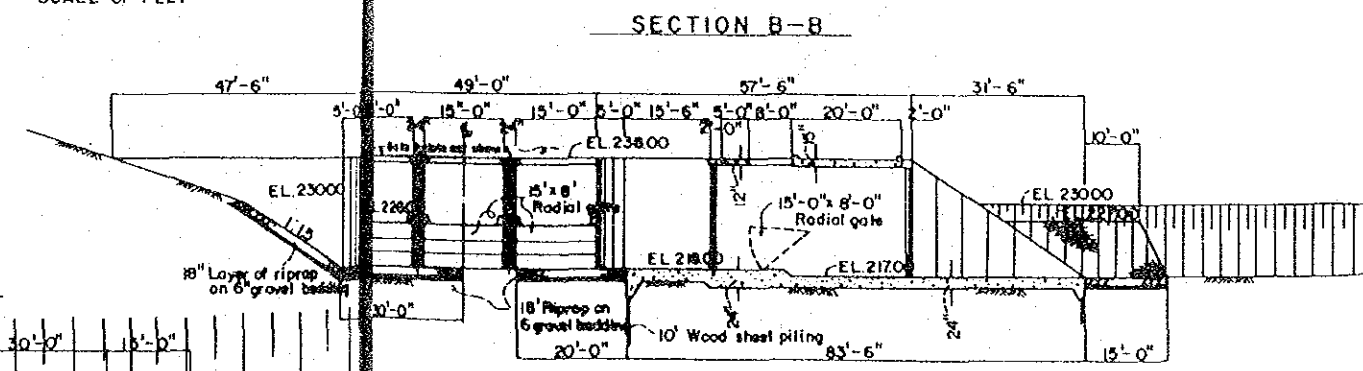
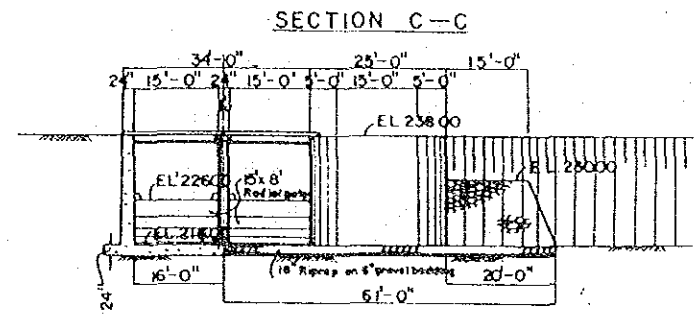
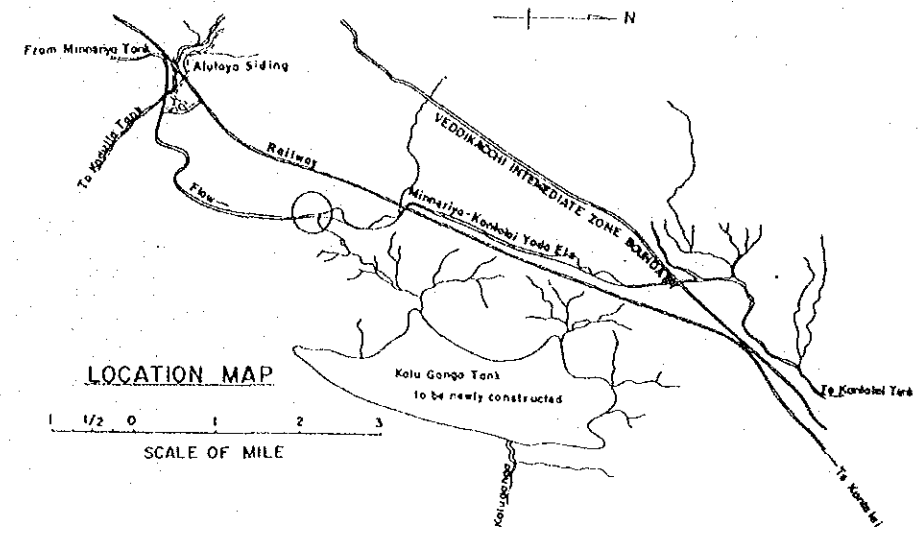
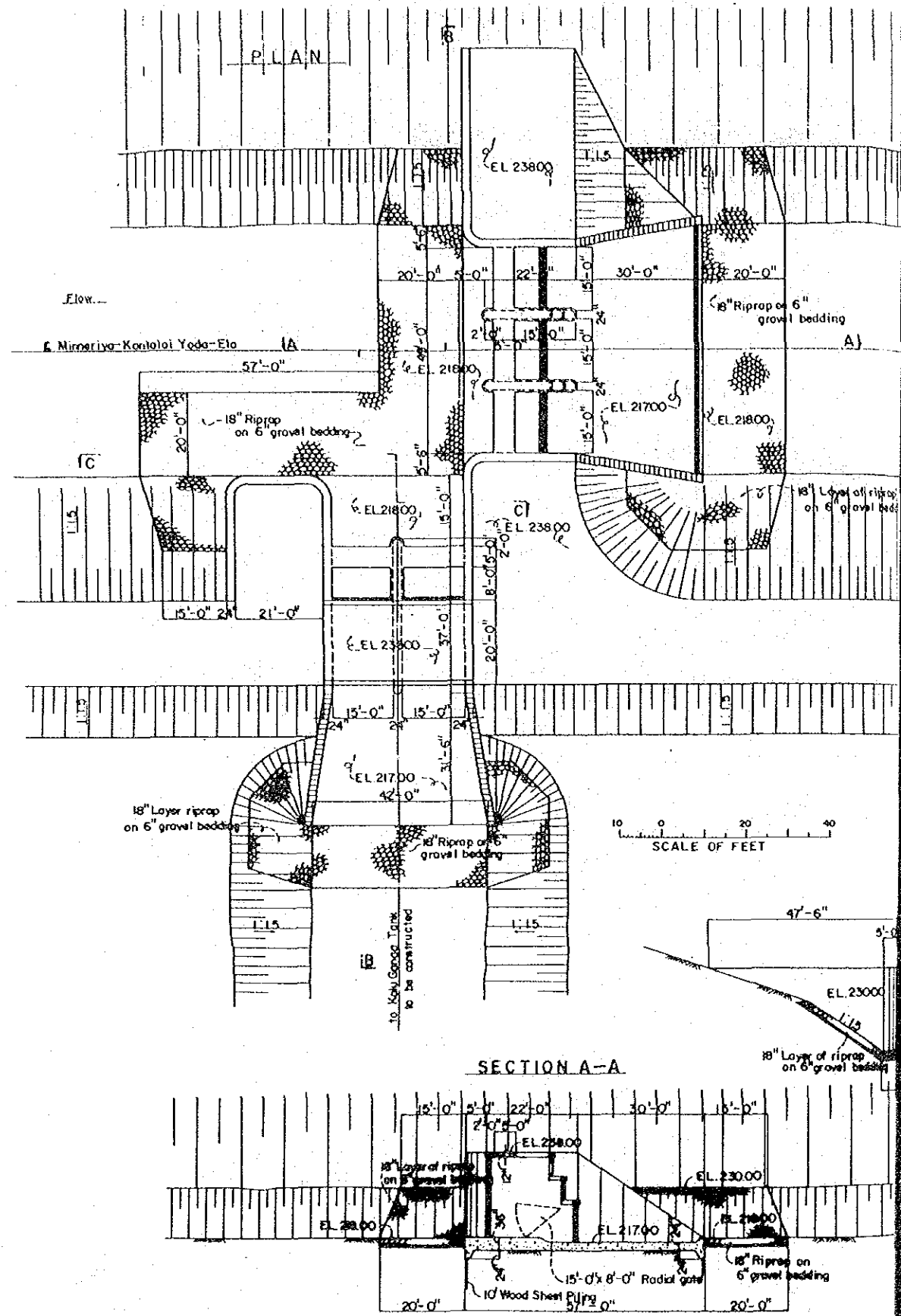
LAYOUT IN SAMPLE AREA SYSTEM D1



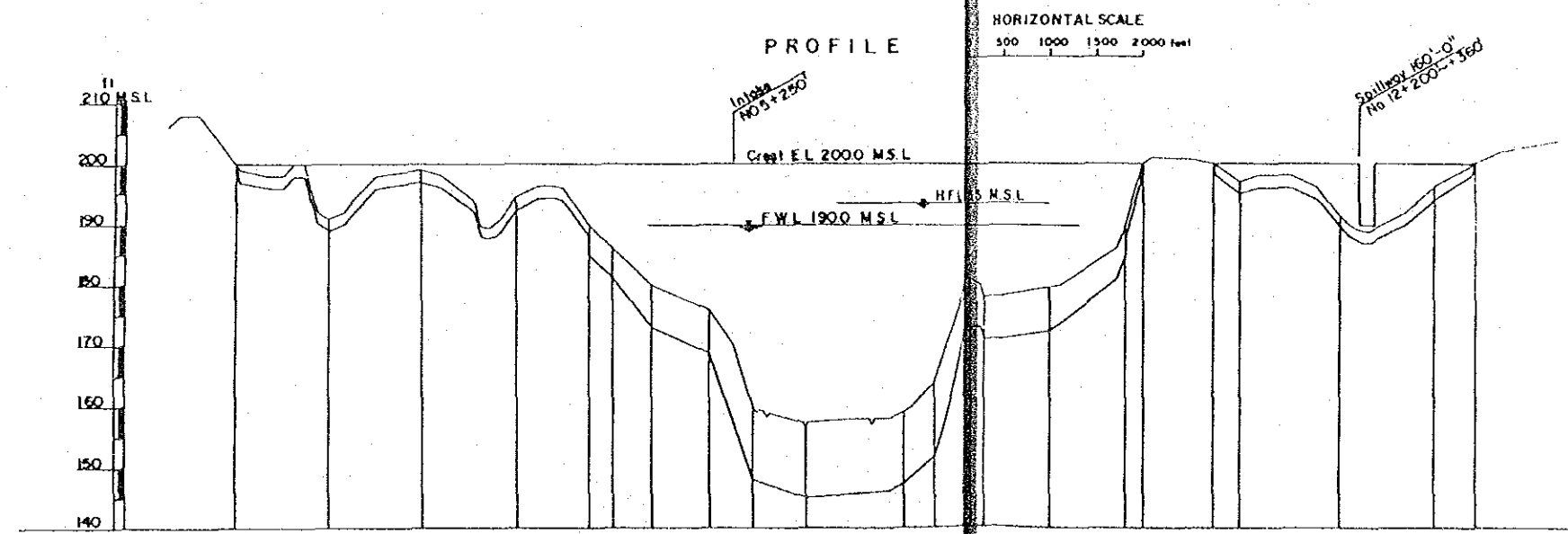
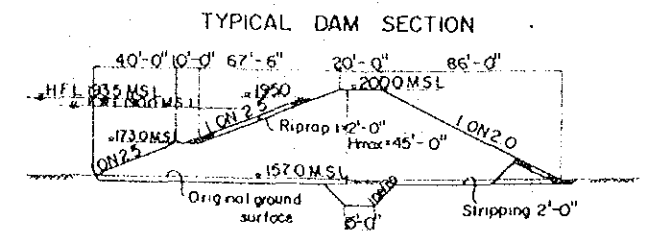
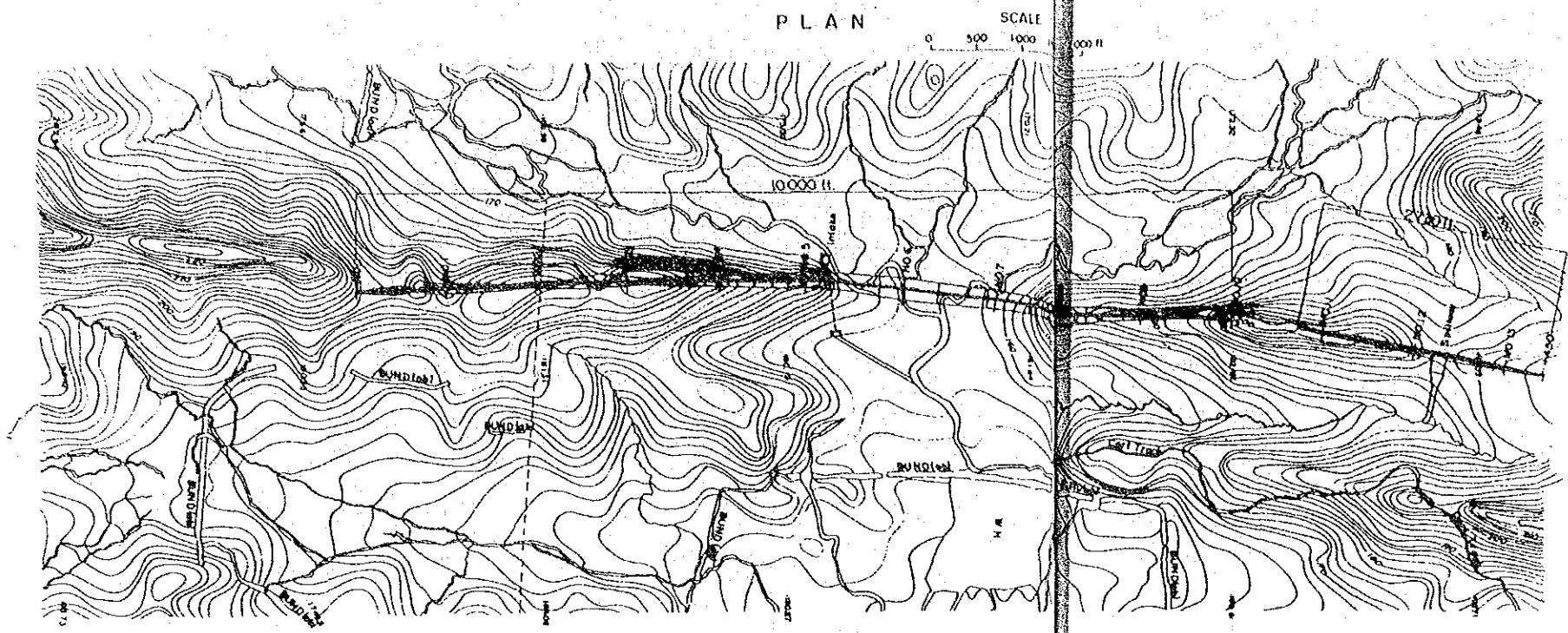
LEGEND

- Distributary ———
- Field Channel - - - - -
- Check Gate ⊗
- Turnouts ⊕
- Roads = = = = =
- Secondary Drainage = = = = =
- Field Drains - - - - -

|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELE DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS   |          |
| LAYOUT IN SAMPLE AREA SYSTEM D1   |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |



|   |          |
|---|----------|
| GOVERNMENT OF DEMOCRATIC SOCIALIST<br>REPUBLIC OF SRI LANKA<br>MINISTRY OF MAHAWELI DEVELOPMENT |          |
| THE STUDY ON EXTENSION OF<br>THE MORAGAHAKANDA AGRICULTURAL<br>DEVELOPMENT PROJECT              |          |
| TITLE OF DRAWINGS   |          |
| YODA ELA INTAKE   |          |
| JAPAN INTERNATIONAL COOPERATION AGENCY<br>TOKYO JAPAN   | DWG. No. |



|                           |      |       |       |       |      |      |      |      |      |      |       |      |      |      |      |       |      |       |       |       |      |
|---------------------------|------|-------|-------|-------|------|------|------|------|------|------|-------|------|------|------|------|-------|------|-------|-------|-------|------|
| BOTTOM OF CUTOFF          | 2000 | 1890  | 1970  | 1928  | 1880 | 1830 | 1730 | 1690 | 1480 | 1450 | 1470  | 1520 | 1710 | 1725 | 1810 | 2000  | 2000 | 1950  | 1895  | 1942  | 2000 |
| EXISTING GROUND ELEVATION | 2000 | 1910  | 1990  | 1948  | 1900 | 1862 | 1800 | 1760 | 1600 | 1570 | 1590  | 1640 | 1780 | 1795 | 1860 | 2000  | 2000 | 1970  | 1915  | 1962  | 2000 |
| DISTANCE in x100ft.       | 0.00 | 10.00 | 10.00 | 10.00 | 7.40 | 2.60 | 3.90 | 6.10 | 4.40 | 5.60 | 10.00 | 3.40 | 2.20 | 7.80 | 8.10 | 1.90  | 7.20 | 2.80  | 10.00 | 10.00 | 4.50 |
| STATION NUMBER            | NO 0 | NO 1  | NO 2  | NO 3  | +740 | NO 4 | +390 | NO 5 | +440 | NO 6 | NO 7  | +340 | +220 | NO 9 | +810 | NO 10 | +720 | NO 11 | NO 12 | NO 13 | +450 |

GOVERNMENT OF DEMOCRATIC SOCIALIST  
 REPUBLIC OF SRI LANKA  
 MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION OF  
 THE MORAGAHAKANDA AGRICULTURAL  
 DEVELOPMENT PROJECT

TITLE OF DRAWINGS  
 KALU GANGA TANK PLAN, PROFILE & SECTION

JAPAN INTERNATIONAL COOPERATION AGENCY  
 TOKYO JAPAN

DWG. No.