

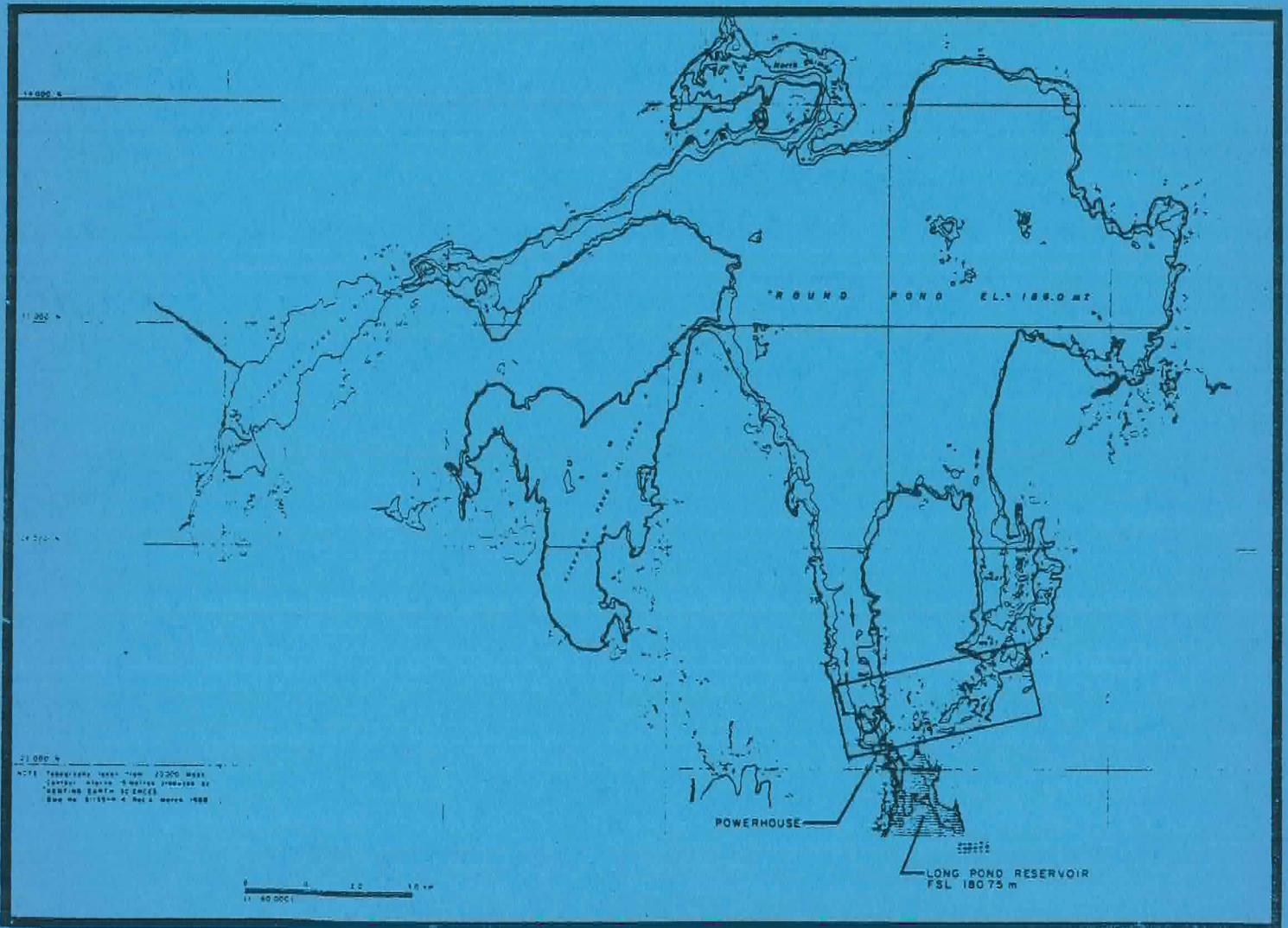


# NEWFOUNDLAND AND LABRADOR HYDRO

## Feasibility Study

### Round Pond Development

### Summary Report



NEWFOUNDLAND AND LABRADOR HYDRO  
FEASIBILITY STUDY  
ROUND POND DEVELOPMENT  
SUMMARY REPORT

PREPARED BY:

ENGINEERING DEPARTMENT

DATE: February 1989

# ROUND POND DEVELOPMENT

## SUMMARY REPORT

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## EXECUTIVE SUMMARY

During 1988, Shawinigan Newfoundland Limited carried out a final feasibility study of the Round Pond Development to confirm the viability of the development and to more accurately establish the capital cost estimate. The study addressed the major development parameters such as civil works and generating facilities. The program of work for their study consisted of hydrological studies (Regulation and Flood Analysis provided by Hydro staff), site surveys and geotechnical investigations, conceptual layouts, preliminary design and optimization studies as required for optimization of construction and equipment details, costs and energy benefits for the project.

Concurrent with Shawinigan's work, Hydro carried out a review of terminals, transmission, telecontrol, and environment requirements.

This report summarizes the findings of the work which gave the following results:

- (1) The Round Pond Development is technically feasible.
- (2) This development would consist of a single bulb (pit) type turbine unit with an installed capacity of 18 M.W. with a rated net head of 10.8 metres.
- (3) Average energy generation would be 132 GWH per annum.
- (4) A total of 33 months will be required for construction of the project.
- (5) The estimated capital cost of the development would be \$97.5 million including escalation and interest during construction. This costs is in July 1988 dollars and for this study, the escalation was calculated on an assumed on-power date of December 1991.

The Cost breakdown of the development is as follows:

| <u>Item</u>                           | <u>Cost</u>                   |
|---------------------------------------|-------------------------------|
|                                       | (\$ X 1,000)                  |
| 1. Generating Facilities              | 70,000                        |
| 2. Terminals                          | 760                           |
| 3. Transmission                       | 4,070                         |
| 4. Telecontrol                        | 1,080                         |
| 5. Environment                        | <u>870</u>                    |
| TOTAL PROJECT (excluding IDC & Escl.) | 76,780                        |
| 6. IDC                                | 11,870                        |
| 7. Escalation                         | <u>8,850</u>                  |
| TOTAL CAPITAL COST                    | <u>97,500</u><br><u>=====</u> |

- (6) This study has now been carried to the point which will allow us to proceed with Design and Construction if the project is deemed economically feasible.

ROUND POND DEVELOPMENT

SALIENT DATA

|                                     |       |                   |
|-------------------------------------|-------|-------------------|
| Drainage Area                       | 5054  | km <sup>2</sup>   |
| Average Natural Flow                | 163   | m <sup>3</sup> /s |
| Design Plant Flow                   | 193   | m <sup>3</sup> /s |
| Spillway Capacity (4 Gates)         | 2790  | m <sup>3</sup> /s |
| Gross Head                          | 11.3  | m                 |
| Full Supply Level (FSL)             | 192.0 | m                 |
| Maximum Flood Level (MFL)           | 195.0 | m                 |
| Installed Capacity (Single Pit)     | 18    | MW                |
| Average Annual Energy (Incremental) | 132   | Gwh               |
| Firm Annual Energy (Incremental)    | 128   | Gwh               |
| Access Road                         | 12    | km                |
| Transmission Line (69 kV)           | 44    | km                |

PART 1 - INTRODUCTION



1. INTRODUCTION

During 1987 and 1988, Fenco/Shawinigan Newfoundland Limited carried out a prefeasibility/feasibility study on the proposed Round Pond Development. The terms of reference for the study called for the consultant to proceed with the prefeasibility work with an option to extend the study to a final feasibility level prior to completion of a prefeasibility report subject to Hydro's approval.

The initial work in 1987 concentrated on the prefeasibility study which was based on a earlier desk study by Acres International Limited. The desk study had shown that a generation potential in the order of 10 MW was available between the Long Pond Reservoir and Godeleich Pond (tailwater of Upper Salmon Development).

During the prefeasibility work a survey was carried out to confirm the head and it was discovered that an additional five (5) metres of head was available. This meant that a higher generation potential in the order of 18 MW was available. The initial work also showed that the project was attractive and it was decided to proceed with a final feasibility study.

Work commenced on the feasibility study in November of 1987, however, due to the time of the year the geotechnical investigation program had to be extended until the spring of 1988.

Office Engineering work was carried out over the winter of 1987 with the field program carried out in May-June of 1988. Engineering work was then finalized and a feasibility report was submitted in September of 1988.

The program of work for Shawiningan's study consisted of hydrological studies, site survey and geotechnical investigations, conceptual layouts and preliminary design, optimization studies, preparation of a construction schedule and capital cost estimate for the major development parameters such as civil works and generating facilities.

Newfoundland Hydro staff provided assistance to this study by undertaking work on regulation studies and flood analysis and the access roads.

1. INTRODUCTION (Cont'd.)

Concurrent with Shawinigan's works, Newfoundland Hydro's in-house staff undertook a review of terminal station, transmission line, telecontrol and environment control and monitoring requirements for the development and prepared capital cost estimates for these facilities.

This report summarizes the results of the work by both Shawinigan and Hydro.

For the purposes of this study it should be noted that the work by Shawinigan on the major development parameters is referred to as the generating facilities while reference to project or development indicates the total development, including generating facilities, terminals, transmission, telecontrol and environmental requirements.

Economic analysis is not included as part of this study.

PART 2 - PROJECT

2. PROJECT

2.1 Geographical Location:

The proposed Round Pond Hydroelectric Development is located in south central Newfoundland at approximately 48° 07' N and 56° 01' W. It is situated approximately 25 km north of Bay D'Espoir (See Plate 2) and is located between the Bay D'Espoir and Upper Salmon developments. The Development is wholly contained within the Long Pond Watershed.

2.2 Site Description:

The proposed undertaking will develop the natural head available between Godaleich Pond (Tailrace of Upper Salmon Development) and Long Pond reservoir and utilize the regulated outflow from the existing Upper Salmon Generating Station and the natural drainage from Round Pond basin itself. The desk study undertaken by Acres in 1985 indicated a gross natural head of approximately 6.0 m for the Round Pond Development. However, the prefeasibility study by Shawinigan/Fenco in 1987, discovered a discrepancy between the datum for Long Pond Reservoir and Upper Salmon Development. After making the necessary corrections, the correct natural gross head for Round Pond Development is in the order of 12.0 m. (See Plate 3)

The present water elevation of Round Pond is 186.0 m and the normal water level of Long pond is 180.75 m. The Round Pond water level will be raised to a full supply level (FSL) of 192.0 m and low supply level (LSL) of 189.0 m. This will result in an additional flooded area of 800 hectares.

The selection of FSL was based on the following factors:

- (a) maximum energy generation
- (b) non-interference with the operation of the Upper Salmon Generating Station
- (c) protection of Godleich delta from flooding during normal operations.

Maximum flood level (MFL) was selected to be 195.0 m for the following reasons:

2.2 Site Description: (cont'd.)

- (a) protection of the Upper Salmon Power House
- (b) protection of any cabins in the Awhachanjeesh Pond area which has a present water level of 194.5 m.

The present outlet of Round Pond consists of two discharge channels. The west outlet is the main channel and is bounded by a relatively high west abutment and a lower east abutment. This channel consists of a series of rapids about 700 m long. The two channels create an island upstream from their confluence (approximately 400 m long and 250 m wide). This island will be submerged following completion of the project.

The project involves the damming of both discharge channels, and the construction of a power canal adjacent to the east channel, to convey water to a powerhouse located on the north bank of the entrance to Long Pond Reservoir. The project also includes an access road, transmission line, and telecontrol system.

The general layout of the project is shown in Plate 4.

PART 3 - GENERATING FACILITIES

3. GENERATING FACILITIES

3.1 General Description:

Two alternative access routes were considered. Both connect the development site to the existing Upper Salmon Access Road. One alternative entails a route travelling east and the other North from the existing access road. Both routes are 12 km long and are shown in Plates 2 and 5. Access to the freeboard dykes will be provided from the main dam.

The main dam including gated spillway will be approximately 1000 m long and will be constructed across the main channel, the island and the tributary channel. (See Plate 4). The gated spillway will consist of 4 gates each having a length of 11.5 metres and a height of 7.0 metres

Two small saddle dams, each with a maximum height of 2 m will be constructed on the east side of the power canal. Another saddle dam (No. 3), will be constructed approximately 2 km northeast of the powerhouse. This saddle dam will be approximately 1000 m long with a maximum height of 7.5 m.

A 250 m long power canal, with an uncontrolled intake located about 70 m upstream from the east channel control dam, will be excavated in overburden and bedrock. This canal will convey flow to a powerhouse located on the north shore of Long Pond Reservoir. A short tailrace (25 m long) will be excavated to streamline the discharge of flows into Long Pond Reservoir.

The main dams will be constructed in sequence, with flow diversion during construction being provided by existing channels and completed structures. The dams will maintain the head pond level in Round Pond which is controlled by the tailrace level of the Upper Salmon Generating Station. The dams are designed such that during probable maximum flood (PMF) conditions, Round Pond will be flooded to an elevation of 195.0 m. In case of plant shut-down the outflow from the Upper Salmon Generating Station plus local inflows can be discharged through the gated spillway.

3. GENERATING FACILITIES

3.1 General Description: (cont'd)

To provide access during plant shutdown and flood conditions, a concrete bridge will be constructed over the gated spillway.

The crest elevation of the main dam will be 196.5 m (approximately 1.5 m above the water level during the probable maximum flood condition.)

Provision has been made for fish passage facilities to be incorporated in the project as shown in Plate 6.

The powerhouse will contain a single unit to a total installed capacity of 18 Mega Watts. Water levels in the intake channel will be controlled by the unit. Trashracks will be provided to keep debris out of the intake. Stop logs will be provided for de-watering the unit. All hoisting, including trashrack cleaning, will be carried out by mobile crane.

3.2 Hydrology and Energy

Hydrology

Detailed hydrological analysis was not necessary for the proposed development as previous work was used for flood and energy estimates.

A regulation study (the Bay D'Espoir Regulation Study) was completed by Acres in late 1987. The model was further developed, using the latest system information and an expanded flow base of 37 years (1950 to 1986), and was calibrated against the existing Bay D'Espoir system. The model has the capability to determine the effects of adding new developments, such as Round Pond development to the total system. Energy generation estimates were computed using this method and flood modelling was carried out using the existing Bay D'Espoir Flood Model.

Drainage Areas

The Round Pond Development forms part of the Salmon River Drainage Basin and has a local drainage area of 950 Km<sup>2</sup> and utilizes a total of 5054 km<sup>2</sup> of the Bay D'Espoir Drainage System. After developing the Round



3.2 Hydrology and Energy (cont'd.)

Drainage Areas (cont'd.)

Pond site, the net drainage area of the Bay D'Espoir System will not be changed. A review of the local Round Pond catchment area shows that it may be possible to divert part of the D'Espoir Lake and Ahwachanjeesh Pond watersheds into the Round Pond Development, which could increase in drainage area to the total system by 236 Km<sup>2</sup>. These diversions were, however, studied separately by our Engineering Department were found to be marginal and were not considered in this study.

Energy

Annual average energy out-put from this development is estimated to be 132 Gigawatt hours (Gwh) and annual firm energy is estimated to be 128 Gwh.

The following is the annual system energy output in GWh for the Bay D'Espoir System with and without the Round Pond Development:

| <u>System Output</u> | <u>Existing (Without Round Pond)</u> |                  |              |
|----------------------|--------------------------------------|------------------|--------------|
|                      | <u>Firm</u>                          | <u>Secondary</u> | <u>Total</u> |
| Round Pond           | --                                   | --               | --           |
| Upper Salmon         | 475                                  | 65               | 540          |
| Bay D'Espoir         | 2209                                 | 344              | 2553         |
| TOTAL                | 2684                                 | 409              | 3093         |

| <u>System Output</u> | <u>Existing With Round Pond</u> |                  |              |
|----------------------|---------------------------------|------------------|--------------|
|                      | <u>Firm</u>                     | <u>Secondary</u> | <u>Total</u> |
| Round Pond           | 109                             | 23               | 132          |
| Upper Salmon         | 474                             | 66               | 540          |
| Bay D'Espoir         | 2229                            | 324              | 2553         |
| TOTAL                | 2812                            | 413              | 3225         |
| TOTAL INCREMENTAL    | 128                             | 4                | 132          |

The analysis shows that there would be a net benefit to the Bay D'Espoir system with addition of the Round Pond Development.

### 3.3 Mechanical & Electrical

#### Unit Selection

##### General

The gross head available for generation at the Round Pond site is approximately 11.3 m with a plant flow of 193 m<sup>3</sup>/s. The types of generating equipment suitable for these parameters are:

- (a) S-type or tube turbines
- (b) Straflow or Bulb (Pit) turbines
- (c) Fixed blade propeller or adjustable blade propeller (Kaplan) units.

Fixed blade units were eliminated early on in the studies because of their lack of flexibility and hence lower overall efficiencies when used in single unit arrangements for run-of-river plants. Francis units were not considered for this project because the head at Round Pond is lower than suggested minimum head for that unit.

A detailed evaluation of the above turbine types showed that the best selection was a bulb (pit) type unit. The main factor for this decision was cost. Further refinement of the selected unit proved that a single unit arrangement was the most cost effective.

The selected unit is a single bulb (pit) type unit.  
(See Plate 7)

Bulb units are turbine units through which water flows axially from the intake to the draft tube outlet. The equipment itself comprises a horizontal shaft Kaplan turbine with either fixed or movable guide vane rings, driving an A.C. generator mounted inside a waterproof housing placed in the centre of the water passage (hence the term "Bulb"). The Pit turbine follows essentially the same principle but instead of the generator being completely enclosed in the "bulb" it is housed in a steel "pit" which is accessible from the powerhouse floor. The development of the "Pit" turbine in the past few years has been due to the increased reliability of planetary gearing systems, which has enabled the physical size of the generator to be reduced.

### 3.3 Mechanical & Electrical (cont'd.)

#### Unit Selection (cont'd.)

##### General (cont'd.)

The turbine has the following characteristics:

|                               |                           |
|-------------------------------|---------------------------|
| Net Head                      | - 10.8 m                  |
| Design Flow                   | - 193.1 m <sup>3</sup> /s |
| Rotational Speed of Turbine   | - 129 rpm                 |
| Rotational Speed of Generator | - 600 rpm                 |
| Runner Dia.                   | - 4.75 m                  |
| Maximum Turbine Output        | - 19.10 MW                |
| Overall Efficiency            | - 93%                     |

The generator is a synchronous unit with the following characteristics:

- voltage 13.8 kV
- speed 600 rpm
- p.f. 0.9
- Generator output 22.0 MVA
- efficiency 98%

There will be four spillway gates, each 11 m wide by 7.5 m high, operated by a fixed hoist structure. These gates will be capable of discharging the regulated probable maximum flood (P.M.F.) of 2790 m<sup>3</sup>/s.

One 40 tonne travelling crane will be installed in the powerhouse for equipllation and servicing.

### 3.4 Construction

#### (a) General

A 'Water to wire' package for design, tender, fabrication, supply and installation of turbine-generator is proposed. This is the longest delivery item which will take approximately 24 months. The other project activities are scheduled to fit the turbine-generator schedule.

The overall program for the construction of Round Pond Development recognizes a total duration of 33 months for engineering and construction work, assuming project release to be early April of the first year. This time span includes 10 months for engineering, tendering and award and overlapping with 28 months for site works and construction management.

3.4 Construction

(b) Materials

The civil work consists primarily of excavation and fill, concrete work and cleaning. The approximate quantities of such work are summarized as follows:

| <u>Description</u>  | <u>Quantity</u> |                |
|---------------------|-----------------|----------------|
| Earth excavation    | 172,000         | m <sup>3</sup> |
| Rock excavation     | 28,000          | m <sup>3</sup> |
| Imperious Fill      | 366,500         | m <sup>3</sup> |
| Granular Fill       | 77,800          | m <sup>3</sup> |
| Rockfill            | 92,800          | m <sup>3</sup> |
| Reinforced Concrete | 21,900          | m <sup>3</sup> |
| Reinforcing Steel   | 1,300           | tonne          |
| Clearing            | 500             | ha             |

Imperious fill will be obtained from excavation or from till deposit near the development.

Rock from excavation will provide, after due processing, for coarse and fine materials, for rockfill and aggregate for concrete. Concrete will be site mixed.

(c) Manpower

Peak manpower requirements for the generating facilities are expected to be as follows:

| <u>Construction Year</u> | <u>Peak Manpower Requirements</u> |
|--------------------------|-----------------------------------|
| Year 1                   | 235 Man months                    |
| Year 2                   | 1,235 Man months                  |
| Year 3                   | 645 Man months                    |
| TOTAL                    | 2,115 Man months                  |

This does not include any manpower requirements outside the main project site for Transmission, Telecontrol, Environmental and Switchyard work.

(d) Construction Camp

Construction camp facilities will be located near Awchanchjeesh Pond. This will consist of trailer type bunkhouses, kitchen/dining facilities, etc. for the main work force, engineering staff, Owner's representatives and equipment erectors.

### 3.5 Cost Estimate For Generating Facilities

The following is a summary of the cost estimate for the design and construction of the generating facilities for the project (in July 1988 Dollars).

|                                   |                    |
|-----------------------------------|--------------------|
| 1. Civil Works                    | \$27.2 Million     |
| 2. Electrical-Mechanical          | 20.0 Million       |
| 3. Temporary Facilities           | 6.5 Million        |
| 4. Eng. & Construction Management | 6.5 Million        |
| 5. Owner's Cost                   | 3.4 Million        |
| 6. Contingencies                  | <u>6.4 Million</u> |
| TOTAL (excluding IDC & Escl.)     | 70.0 Million       |

Detailed cash flow sheet for the generating facilities is shown in Appendix I.

### 3.6 Dead Storage

The volume of water contained between the minimum operating level of 189.0 m. (3 metres below the FSL of 192.0 m), and the existing lake level (El.186.0) has been defined as the Dead Storage Volume. The Development has been penalized with the cost the fuel equivalent for this volume of water to compensate for lost production at the Bay D'Espoir plant during reservoir impoundment. The energy which will be lost (based on FSL of 192.0 m) at Bay D'Espoir has been estimated to be 75 Gwh. The fuel equivalent cost has been evaluated to be \$2.25 million (based on 30 mills/kwh, in 1987 \$). This cost is not included in the Generating Facility Costs shown in section 3.5 or in the Total Project cost in section 8.

### 3.7 Plant Operation

Round Pond Development is a permanent facility with an assumed life span of 60 years. Operation of the facility will include inspection and maintenance activities. The operation of Round Pond Development will be remotely controlled similar to the Upper Salmon Development.

The Plant will essentially be a Run-of-River operation, utilizing regulated flow from the Upper Salmon Development and the unregulated flow from the local Round Pond drainage area.

PART 4 - TERMINALS

4. TERMINALS

A single 22 MVA, 13.8/69 kV outdoor type transformer will be installed in a switchyard adjacent to the powerhouse. A single line schematic diagram of the switchyard is attached (See Plate 8). The switchyard cost including electrical equipments is estimated to be \$760,000, with the following details:

|                                   |           |
|-----------------------------------|-----------|
| 1. Equipment and Material         | \$445,000 |
| 2. Eng. & Construction Management | 215,000   |
| 3. Corporate Overhead             | 33,000    |
| 4. Contingency                    | 67,000    |
|                                   | <hr/>     |
| TOTAL (excl. IDC & escl)          | \$760,000 |

Cost and Cash Flow Sheet for Terminals is attached in Appendix I.

PART 5 - TRANSMISSION



5. TRANSMISSION:

The 69 kV transmission line is proposed for the development. The following alternatives for transmission were briefly reviewed.

- i) A new 25 kV line from Round Pond to TL234 intersection at Upper Salmon Road and a switchyard at this intersection.
- ii) A new 25 kV line to the existing Upper Salmon switchyard to connect to the existing 25 kV system.
- iii) A new 69 kV line to Upper Salmon intersection similar to alternative i).
- iv) A new 69 kV line from Round Pond to the existing Bay D'Espoir 69 kV switchyard.

All these alternatives were reviewed for each alternative of the access road route selection, discussed in section 3.1.

No detailed study was undertaken to evaluate these alternatives. The 25 kV line alternatives were considered only in the preliminary stage of the study, and was dropped from further consideration when additional head was identified and the unit size was increased to the order of 18-20 MW. At that point, a 69 kV line was the only choice, either to TL234 or to the existing 69 kV facilities at Bay D'Espoir.

It was decided that a new 69 kV line from Round Pond Powerhouse to Bay D'Espoir 69 kV switchyard would be used for study. This scheme is practical as it does not involve any 230 kV line or station work, but provided a degree of back up to the 69 kV load (PDD) at Bay D'Espoir.

The routing for the line from the powerhouse is along the proposed access road to Upper Salmon road (See Plate 5). From that intersection, the routing for the new line is generally parallel to the existing route of TL234 from Upper Salmon to Bay D'Espoir.

The transmission line is approximately 44 km long and constructed of standard 'H' frame structures. Engineering and construction of the line is scheduled to be completed in two years.

5. TRANSMISSION: (cont'd.)

The transmission line selected is the lowest evaluated cost alternative which meets the technical requirements and is estimated to cost \$4.07 million as follows:

|                                   |                |
|-----------------------------------|----------------|
| 1. Material & Direct Construction | \$2,900,000    |
| 2. Property & Survey              | 240,000        |
| 3. Eng. & Construction Management | 390,000        |
| 4. Corporate Overhead             | 170,000        |
| 5. Contingency                    | <u>370,000</u> |
| TOTAL (excl. IDC & Escl.)         | \$4,070,000    |

Cost and Cash Flow Sheet for Transmission is attached in Appendix I.

PART 6 - TELECONTROL

6. TELECONTROL

A schematic layout for monitoring and communications equipment for the plant is shown in Plate 9. This shows the interactions of this project with the proposed Granite Canal and Island Pond Developments.

The cost for Telecontrol work for Round Pond Development is estimated to be \$1.08 million and will include the following:

- i) Operational voice and supervisory data channels and support equipment required for remote control of the plant and spillway.
- ii) Plant access to the Public Switch Telephone Network.
- iii) Teleprotection of the transmission line.
- iv) VHF mobile communications to the plant.

Following is the detail for the estimated cost:

|                                   |             |
|-----------------------------------|-------------|
| 1. Equipment and Materials        | \$790,000   |
| 2. Eng. & Construction Management | 150,000     |
| 3. Corporate Overhead             | 45,000      |
| 4. Contingency                    | 95,000      |
|                                   | <hr/>       |
| TOTAL (excl. IDC & Escl.)         | \$1,080,000 |

Cost and Cash Flow Sheet for Telecontrol is attached in Appendix I.

The estimated cost is based on the following assumptions:

- i) Godalich Hill tower is capable of supporting additional antenna loading.
- ii) Radio frequencies are available from Department of Communications
- iii) The existing GDH building can support additional equipment installation.
- iv) Microwave trunking facilities are available.
- v) Satellite trunking facilities are available.
- vi) A communications tower is not required at spillway.

6. TELECONTROL (cont'd.)

vii) All supervisory master station modifications are provided by the Energy Management System.

viii) The remote terminal station can support additional Powerline Carrier equipment.

A general review of the scope of work will be required with regard to the availability of existing common facilities for Island pond and Granite Canal Development

PART 7 - ENVIRONMENT

7. ENVIRONMENT

Environmental concerns expressed by the Minister of Environment and Lands following registration of the Round Pond Hydroelectric Development in December, 1987 included waterfowl breeding habitat, caribou, raptors and moose. The Minister required that Hydro prepare an environmental impact statement (EIS) before the project could proceed. Hydro decided to delay initiation of the EIS until 1989, pending approval by Management Committee.

One of the major concerns associated with the Round Pond Development is the potential impact on fish movement from Long pond Reservoir to spawning habitat in the West Salmon River. Hydro will probably have to provide fish passage facilities between Long Pond and Round Pond. This requirement will be defined during the environmental impact assessment. Approximately \$20,000 was spent in 1988 to obtain preliminary information on the fish passage issue.

The costs of a fish passage facility (capital and operating) were not included in the environmental cost estimates. However, estimated flows and duration of release were used in preparation of the Energy Estimates. These parameters and associated costs will be refined during the environmental impact assessment. Alternative mitigation measures, such as provision of spawning channels will also be investigated.

Costs associated with environmental work will be incurred before, during and after construction. It is estimated that the costs of the EIS, environmental compliance monitoring and effects monitoring will be approximately \$870,000.

Following is the detail for the Estimated Cost:

|                             |               |
|-----------------------------|---------------|
| 1) Environmental costs      | \$755,000     |
| 2) Corporate Overhead       | 40,000        |
| 3) Contingency              | <u>75,000</u> |
| TOTAL (excl. IDC and Escl.) | \$870,000     |

Cost and Cash Flow Sheet for Environment is attached in Appendix I.

PART 8 - PROJECT SCHEDULE AND COST



8. PROJECT SCHEDULE & COST

The overall program for the Round Pond Development is scheduled to be completed in 33 months, including detailed engineering design.

The period for site works includes two winter seasons during which construction activities can be expected to be curtailed. Work on transmission line, telecontrol and terminal would be incorporated in this schedule. Work to be undertaken by the Environmental Department is scheduled for year 1 and year 2 and will include follow up after completion of the project.

(a) Schedule

Following is the total project construction schedule including terminal, telecontrol, and environment.

|    | <u>Description</u>  | <u>Construction Year</u> |
|----|---|--------------------------|
| 1. | Release of Project,<br>Detail Engineering,<br>Access Road, Clearing,<br>Spillway and Environment                                  | Year One                 |
| 2. | Spillway, Dams, Power Canal<br>Powerhouse, Environment,<br>Telecontrol and Transmission   | Year Two                 |
| 3. | Powerhouse, Electrical,<br>Mechanical, Environment,<br>Telecontrol, Transmission,<br>Switchyard, impoundment and<br>Commissioning | Year Three               |

(b) Cost

The total development cost in July, 1988 dollars is as follows:

| <u>Item</u>                           | <u>Cost</u>  |
|---------------------------------------|--------------|
|                                       | (\$ x 1,000) |
| 1. Generating Facilities              | 70,000       |
| 2. Terminals                          | 760          |
| 3. Transmission                       | 4,070        |
| 4. Telecontrol                        | 1,080        |
| 5. Environment                        | <u>870</u>   |
| TOTAL PROJECT (excluding IDC & Escl.) | 76,780       |

8. PROJECT SCHEDULE & COST (Cont'd.)

(b) Cost (cont'd.)

|    |            |              |
|----|------------|--------------|
| 6. | IDC        | 11,870       |
| 7. | ESCALATION | <u>8,850</u> |

TOTAL CAPITAL COST: 97,500  
=====

Cost and Cash Flow sheets for the total Project is attached in Appendix I.

**REFERENCES**

## REFERENCES

1. Round Pond Hydroelectric Development - Preliminary Studies. Acres International Ltd., November 1985.
2. Feasibility Study, Round Pond Hydroelectric Development, Volume I, Report. Shawinigan/Fenco Newfoundland Ltd. September, 1988.

APPENDIX I

CASH FLOW SHEETS

i) Total Project

Prepared by: Lavalin\*

CAPITAL BUDGET PROPOSAL

Round Pond  
Hydroelectric Development  
In-service Dec. /91

Approved by: \_\_\_\_\_

Capital Cost Estimate & Cash Flow Requirements

1989 Fiscal Year : Prepared: 88/08/08

ESCLN % (Base Jul/88) 87/88= .0537 88/89= .0508 89/90= .0516 90/91= .0384 91/92= .0298 92/93= .0383

| Period               | ----- Main Development----- |              |              | Environ    | Tele-      | O/H@         | Cont.      | Sub        | ESCLN        | I.D.C.        | Total        | Cash          |               |               |        |
|----------------------|-----------------------------|--------------|--------------|------------|------------|--------------|------------|------------|--------------|---------------|--------------|---------------|---------------|---------------|--------|
|                      | Constr.                     | Eng.& Mgmt   | Owners       | -ment      | Control    | Trans.       | Stns.      | 1.0%/4.5%  | Total        | ESCLN         | I.D.C.       | Proj.         | Flow          |               |        |
| 1988                 |                             |              |              | 365        |            |              |            | 18         | 37           | 420           | 14           | 16            | 450           | 428           |        |
| 1989                 | Jan                         |              |              |            |            |              |            |            |              | 0             |              |               | 0             | 0             |        |
|                      | Feb                         |              |              | 15         |            |              |            | 1          |              | 16            | 1            | 14            | 31            | 11            |        |
|                      | Mar                         |              |              |            |            |              |            | 0          |              | 0             | 0            | 0             | 0             | 0             |        |
|                      | Apr                         |              |              |            |            |              |            | 0          |              | 0             | 0            | 0             | 0             | 0             |        |
|                      | May                         |              | 585          | 134        | 17         |              |            | 9          | 78           | 823           | 39           | 18            | 880           | 440           |        |
|                      | Jun                         |              |              |            |            |              |            | 0          |              | 0             | 0            | 4             | 4             | 418           |        |
|                      | Jul                         |              |              |            |            |              |            | 0          |              | 0             | 0            | 8             | 8             | 0             |        |
|                      | Aug                         | 417          | 586          | 255        | 17         |              |            | 15         | 126          | 1,416         | 83           | 31            | 1,530         | 763           |        |
|                      | Sep                         |              |              |            |            |              | 2          | 0          |              | 2             | 0            | 16            | 18            | 740           |        |
|                      | Oct                         |              |              |            |            | 3            |            | 0          |              | 3             | 0            | 24            | 27            | 3             |        |
|                      | Nov                         | 2,986        | 585          | 255        | 15         | 3            |            | 42         | 383          | 4,269         | 295          | 64            | 4,628         | 2,294         |        |
|                      | Dec                         |              |              |            |            |              |            | 0          |              | 0             | 0            | 47            | 47            | 2,272         |        |
| <b>Total 1989</b>    | <b>3,403</b>                | <b>1,756</b> | <b>644</b>   | <b>64</b>  | <b>6</b>   | <b>2</b>     | <b>0</b>   | <b>67</b>  | <b>587</b>   | <b>6,529</b>  | <b>419</b>   | <b>226</b>    | <b>7,174</b>  | <b>6,941</b>  |        |
| 1                    | 1st Qtr                     | 2,955        | 586          | 255        | 0          | 10           | 4          | 0          | 42           | 380           | 4,232        | 357           | 300           | 4,889         | 2,311  |
| 9                    | 2nd Qtr                     | 9,336        | 585          | 255        | 35         | 4            | 240        | 0          | 125          | 1,055         | 11,635       | 1,125         | 502           | 13,261        | 8,787  |
| 9                    | 3rd Qtr                     | 14,030       | 586          | 255        | 18         | 5            | 329        | 10         | 180          | 1,541         | 16,954       | 1,806         | 871           | 19,631        | 15,498 |
| 0                    | 4th Qtr                     | 8,239        | 585          | 255        | 15         |              | 21         | 42         | 106          | 975           | 10,238       | 1,207         | 1,266         | 12,711        | 15,297 |
| <b>Total 1990</b>    | <b>34,560</b>               | <b>2,342</b> | <b>1,020</b> | <b>68</b>  | <b>19</b>  | <b>594</b>   | <b>52</b>  | <b>453</b> | <b>3,951</b> | <b>43,059</b> | <b>4,495</b> | <b>2,938</b>  | <b>50,492</b> | <b>41,893</b> |        |
| 1                    | 1st Qtr                     | 3,353        | 586          | 255        | 15         | 0            | 186        | 53         | 56           | 419           | 4,923        | 642           | 1,671         | 7,236         | 8,426  |
| 9                    | 2nd Qtr                     | 5,116        | 585          | 255        | 17         | 13           | 1,507      | 306        | 149          | 596           | 8,544        | 1,203         | 2,027         | 11,774        | 8,083  |
| 9                    | 3rd Qtr                     | 5,040        | 586          | 255        | 42         | 884          | 928        | 230        | 162          | 652           | 8,779        | 1,365         | 2,345         | 12,489        | 9,881  |
| 1                    | 4th Qtr                     | 2,206        | 586          | 255        | 5          | 15           | 459        | 0          | 72           | 717           | 4,315        | 696           | 2,662         | 7,673         | 7,772  |
| <b>Total 1991</b>    | <b>15,715</b>               | <b>2,343</b> | <b>1,020</b> | <b>79</b>  | <b>912</b> | <b>3,080</b> | <b>588</b> | <b>440</b> | <b>2,384</b> | <b>26,561</b> | <b>3,906</b> | <b>8,704</b>  | <b>39,170</b> | <b>34,161</b> |        |
| 1                    | 1st Qtr                     |              |              |            | 180        |              |            |            | 9            | 18            | 207          | 44            |               | 251           | 2,227  |
| 9                    | 2nd Qtr                     |              |              |            |            |              |            |            | 0            | 0             | 0            | 0             |               | 0             | 0      |
| 9                    | 3rd Qtr                     |              |              |            |            |              |            |            | 0            | 0             | 0            | 0             |               | 0             | 0      |
| 2                    | 4th Qtr                     |              |              |            |            |              |            |            | 0            | 0             | 0            | 0             |               | 0             | 0      |
| <b>Total 1992</b>    | <b>0</b>                    | <b>0</b>     | <b>0</b>     | <b>180</b> | <b>0</b>   | <b>0</b>     | <b>0</b>   | <b>9</b>   | <b>18</b>    | <b>207</b>    | <b>44</b>    | <b>0</b>      | <b>251</b>    | <b>2,227</b>  |        |
| <b>Total Project</b> | <b>53,678</b>               | <b>6,441</b> | <b>2,684</b> | <b>756</b> | <b>937</b> | <b>3,676</b> | <b>640</b> | <b>987</b> | <b>6,977</b> | <b>76,776</b> | <b>8,877</b> | <b>11,884</b> | <b>97,537</b> | <b>85,650</b> |        |

ii) Generating Facilities



Prepared by: Lavalin\*

CAPITAL BUDGET PROPOSAL

Round Pond

Approved by: \_\_\_\_\_

Capital Cost Estimate & Cash Flow Requirements  
1988 Fiscal Year : Prepared:88/08/08 (R)

Hydroelectric Development  
In-service Dec. /91

| Escln % (Base Jul/88) |                 | 86/87=       | IDC %        | Annual = | 12.683   | Qtrly =   | .03030     | Mthly =      | .01000        | 90/91=       | .0401         | 91/92=        | .0406         |
|-----------------------|-----------------|--------------|--------------|----------|----------|-----------|------------|--------------|---------------|--------------|---------------|---------------|---------------|
| Period                | Construct Costs | Eng. & Mgmt  | Owners Costs | O/H      | Cont.    | Sub Total | Escln      | I.D.C.       | Total Proj.   | Cash Flow    |               |               |               |
| 1989                  | Mar             |              |              | 0        |          | 0         | 0          | 0            | 0             | 0            |               |               |               |
|                       | Apr             |              |              | 0        |          | 0         | 0          | 0            | 0             | 0            |               |               |               |
|                       | May             |              | 585          | 134      | 8        | 72        | 799        | 37           | 4             | 840          | 418           |               |               |
|                       | Jun             |              |              |          | 0        |           | 0          | 0            | 4             | 4            | 418           |               |               |
|                       | Jul             |              |              |          | 0        |           | 0          | 0            | 8             | 8            | 0             |               |               |
|                       | Aug             | 417          | 586          | 255      | 14       | 126       | 1,398      | 81           | 16            | 1,495        | 740           |               |               |
|                       | Sep             |              |              |          | 0        |           | 0          | 0            | 16            | 16           | 740           |               |               |
|                       | Oct             |              |              |          | 0        |           | 0          | 0            | 24            | 24           | 0             |               |               |
|                       | Nov             | 2,986        | 585          | 255      | 42       | 383       | 4,251      | 293          | 47            | 4,591        | 2,272         |               |               |
|                       | Dec             |              |              |          | 0        |           | 0          | 0            | 47            | 47           | 2,272         |               |               |
| <b>Total 1989</b>     | <b>3,403</b>    | <b>1,756</b> | <b>644</b>   | <b>0</b> | <b>0</b> | <b>0</b>  | <b>64</b>  | <b>581</b>   | <b>6,448</b>  | <b>411</b>   | <b>166</b>    | <b>7,025</b>  | <b>6,859</b>  |
| 1                     | 1st Qtr         | 2,955        | 586          | 255      | 42       | 380       | 4,218      | 356          | 282           | 4,856        | 2,287         |               |               |
| 9                     | 2nd Qtr         | 9,336        | 585          | 255      | 112      | 1,055     | 11,343     | 1,089        | 479           | 12,911       | 8,503         |               |               |
| 9                     | 3rd Qtr         | 14,030       | 586          | 255      | 164      | 1,541     | 16,576     | 1,771        | 841           | 19,188       | 15,390        |               |               |
| 0                     | 4th Qtr         | 8,239        | 585          | 255      | 100      | 908       | 10,087     | 1,188        | 1,225         | 12,500       | 14,811        |               |               |
| <b>Total 1990</b>     | <b>34,560</b>   | <b>2,342</b> | <b>1,020</b> | <b>0</b> | <b>0</b> | <b>0</b>  | <b>418</b> | <b>3,884</b> | <b>42,224</b> | <b>4,404</b> | <b>2,827</b>  | <b>49,455</b> | <b>40,991</b> |
| 1                     | 1st Qtr         | 3,353        | 586          | 255      | 46       | 419       | 4,659      | 600          | 1,620         | 6,879        | 8,267         |               |               |
| 9                     | 2nd Qtr         | 5,116        | 585          | 255      | 66       | 596       | 6,618      | 926          | 1,954         | 9,498        | 6,402         |               |               |
| 9                     | 3rd Qtr         | 5,040        | 586          | 255      | 65       | 588       | 6,534      | 989          | 2,207         | 9,730        | 7,534         |               |               |
| 1                     | 4th Qtr         | 2,206        | 586          | 255      | 34       | 305       | 3,386      | 551          | 2,448         | 6,385        | 5,730         |               |               |
| <b>Total 1991</b>     | <b>15,715</b>   | <b>2,343</b> | <b>1,020</b> | <b>0</b> | <b>0</b> | <b>0</b>  | <b>211</b> | <b>1,908</b> | <b>21,197</b> | <b>3,066</b> | <b>8,229</b>  | <b>32,492</b> | <b>27,932</b> |
| 1                     | 1st Qtr         |              |              |          | 0        |           | 0          | 0            | 0             | 0            | 1,968         |               |               |
| 9                     | 2nd Qtr         |              |              |          | 0        |           | 0          | 0            | 0             | 0            | 0             |               |               |
| 9                     | 3rd Qtr         |              |              |          | 0        |           | 0          | 0            | 0             | 0            | 0             |               |               |
| 2                     | 4th Qtr         |              |              |          | 0        |           | 0          | 0            | 0             | 0            | 0             |               |               |
| <b>Total 1992</b>     | <b>0</b>        | <b>0</b>     | <b>0</b>     | <b>0</b> | <b>0</b> | <b>0</b>  | <b>0</b>   | <b>0</b>     | <b>0</b>      | <b>0</b>     | <b>0</b>      | <b>1,968</b>  |               |
| <b>Total Project</b>  | <b>53,678</b>   | <b>6,441</b> | <b>2,684</b> | <b>0</b> | <b>0</b> | <b>0</b>  | <b>693</b> | <b>6,373</b> | <b>69,869</b> | <b>7,881</b> | <b>11,222</b> | <b>88,972</b> | <b>77,750</b> |

iii) Terminals

Prepared by: G. Holden

CAPITAL BUDGET PROPOSAL

Capital Cost Estimate & Cash Flow Requirements

Round Pond Line Termination

Approved by: \_\_\_\_\_

1988 Fiscal Year : Prepared: 88/02/02

In-service: 91/12/31

| Period            | Civil Works | E/M Instln | Matrls Purch. | Constr. Internal | Design Eng. | Proj. Mgmt | O/H @ 4.5% | Cont @ 10.0% | Sub Total  | Rscln      | I.D.C.    |            | Cash Flo (Excl. ID |
|-------------------|-------------|------------|---------------|------------------|-------------|------------|------------|--------------|------------|------------|-----------|------------|--------------------|
|                   |             |            |               |                  |             |            |            |              |            |            | Total     | Proj.      |                    |
| 1990 Jan          | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Feb               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Mar               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Apr               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| May               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Jun               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Jul               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Aug               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| Sep               | 4           | 0          | 0             | 0                | 6           | 0          | 1          | 0            | 11         | 1          | 0         | 12         | 7                  |
| Oct               | 4           | 0          | 0             | 0                | 10          | 0          | 1          | 0            | 15         | 2          | 0         | 17         | 12                 |
| Nov               | 0           | 0          | 0             | 0                | 12          | 0          | 1          | 0            | 13         | 2          | 0         | 15         | 19                 |
| Dec               | 0           | 0          | 0             | 0                | 16          | 0          | 1          | 0            | 17         | 2          | 1         | 20         | 24                 |
| <b>Total 1990</b> | <b>8</b>    | <b>0</b>   | <b>0</b>      | <b>0</b>         | <b>44</b>   | <b>0</b>   | <b>0</b>   | <b>2</b>     | <b>54</b>  | <b>8</b>   | <b>1</b>  | <b>63</b>  | <b>62</b>          |
| 1991 Jan          | 0           | 0          | 0             | 0                | 17          | 0          | 1          | 0            | 18         | 3          | 1         | 21         | 20                 |
| Feb               | 0           | 0          | 0             | 0                | 14          | 0          | 1          | 0            | 15         | 2          | 1         | 18         | 17                 |
| Mar               | 10          | 0          | 0             | 0                | 12          | 0          | 1          | 0            | 23         | 4          | 1         | 28         | 14                 |
| Apr               | 30          | 0          | 20            | 0                | 3           | 3          | 3          | 0            | 59         | 9          | 1         | 69         | 7                  |
| May               | 40          | 0          | 110           | 0                | 2           | 5          | 7          | 0            | 164        | 27         | 2         | 192        | 44                 |
| Jun               | 20          | 0          | 60            | 0                | 4           | 9          | 4          | 0            | 97         | 16         | 3         | 116        | 186                |
| Jul               | 0           | 10         | 50            | 0                | 5           | 9          | 3          | 0            | 77         | 13         | 4         | 95         | 139                |
| Aug               | 0           | 44         | 20            | 0                | 5           | 29         | 4          | 0            | 102        | 18         | 6         | 126        | 127                |
| Sep               | 0           | 0          | 5             | 0                | 2           | 51         | 6          | 64           | 127        | 22         | 7         | 156        | 101                |
| Oct               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 8         | 8          | 139                |
| Nov               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 9         | 9          | 0                  |
| Dec               | 0           | 0          | 0             | 0                | 0           | 0          | 0          | 0            | 0          | 0          | 9         | 9          | 0                  |
| <b>Total 1991</b> | <b>100</b>  | <b>54</b>  | <b>265</b>    | <b>0</b>         | <b>64</b>   | <b>105</b> | <b>29</b>  | <b>64</b>    | <b>681</b> | <b>113</b> | <b>51</b> | <b>845</b> | <b>794</b>         |
| Beyond            |             |            |               |                  |             | 0          | 0          | 0            | 0          | 0          | 0         | 0          | 0                  |
| <b>Total Proj</b> | <b>108</b>  | <b>54</b>  | <b>265</b>    | <b>0</b>         | <b>108</b>  | <b>105</b> | <b>32</b>  | <b>64</b>    | <b>736</b> | <b>121</b> | <b>52</b> | <b>908</b> | <b>856</b>         |

iv) Transmission

Prepared by: T.J. Gardiner

**CAPITAL BUDGET PROPOSAL**  
 Capital Cost Estimate & Cash Flow Requirements  
 1989 Fiscal Year : Prepared: 88/08/09

230 KV Transmission Line  
 Upper Salmon - Round Pond  
 In-service : 91/12/31

Approved by: \_\_\_\_\_

| EscIn %           |             | 87/88=       | .0485        | 88/89=     | .0507      | 89/90=     | .0467     | 90/91=   | .0356      | 91/92=     | .0266        | 92/93=     | .0334      | (Est.Base: Jul/88) |
|-------------------|-------------|--------------|--------------|------------|------------|------------|-----------|----------|------------|------------|--------------|------------|------------|--------------------|
| Period            | Owner       | Constr.      | Survey       | Design     | Proj.      | Insp.&     | O/H @     | Cont @   | Sub        | Total      | EscIn        | I.D.C.     | Proj.      | Cash Flow          |
|                   | Matrls      | Servcs       | & Land       | Eng.       | Mgmt       | Comm.      | 4.5%      | 10.0%    | Total      |            |              |            |            | (Excl. ID          |
| 1989              | Jan         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Feb         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Mar         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Apr         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | May         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Jun         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Jul         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Aug         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Sep         | 0            | 0            | 0          | 2          | 0          | 0         | 0        | 0          | 2          | 0            | 0          | 2          | 2                  |
|                   | Oct         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Nov         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Dec         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
| <b>Total</b>      | <b>1989</b> | <b>0</b>     | <b>0</b>     | <b>0</b>   | <b>2</b>   | <b>0</b>   | <b>0</b>  | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>2</b>     | <b>0</b>   | <b>0</b>   | <b>2</b>           |
| 1990              | Jan         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Feb         | 0            | 0            | 0          | 0          | 0          | 0         | 0        | 0          | 0          | 0            | 0          | 0          | 0                  |
|                   | Mar         | 0            | 0            | 0          | 4          | 0          | 0         | 0        | 0          | 4          | 0            | 0          | 4          | 4                  |
|                   | Apr         | 0            | 0            | 0          | 2          | 0          | 0         | 0        | 0          | 2          | 0            | 0          | 2          | 2                  |
|                   | May         | 0            | 0            | 174        | 4          | 0          | 0         | 8        | 186        | 20         | 1            | 207        | 186        | 186                |
|                   | Jun         | 0            | 0            | 56         | 4          | 0          | 0         | 3        | 63         | 10         | 2            | 75         | 70         | 70                 |
|                   | Jul         | 0            | 0            | 0          | 4          | 0          | 0         | 0        | 4          | 0          | 3            | 7          | 5          | 5                  |
|                   | Aug         | 0            | 174          | 0          | 7          | 26         | 0         | 9        | 216        | 20         | 3            | 239        | 34         | 34                 |
|                   | Sep         | 0            | 97           | 0          | 6          | 15         | 0         | 5        | 123        | 10         | 3            | 136        | 24         | 24                 |
|                   | Oct         | 0            | 0            | 0          | 6          | 0          | 0         | 3        | 60         | 69         | 10           | 83         | 203        | 203                |
|                   | Nov         | 0            | 0            | 0          | 8          | 0          | 0         | 0        | 8          | 0          | 6            | 14         | 197        | 197                |
|                   | Dec         | 0            | 0            | 0          | 7          | 0          | 0         | 1        | 8          | 0          | 8            | 16         | 8          | 8                  |
| <b>Total</b>      | <b>1990</b> | <b>0</b>     | <b>271</b>   | <b>230</b> | <b>52</b>  | <b>41</b>  | <b>0</b>  | <b>0</b> | <b>29</b>  | <b>60</b>  | <b>683</b>   | <b>70</b>  | <b>30</b>  | <b>783</b>         |
| 1991              | Jan         | 0            | 0            | 0          | 9          | 0          | 0         | 0        | 9          | 0          | 8            | 17         | 9          | 9                  |
|                   | Feb         | 46           | 0            | 0          | 9          | 0          | 0         | 2        | 57         | 10         | 8            | 75         | 9          | 9                  |
|                   | Mar         | 113          | 0            | 0          | 9          | 0          | 0         | 5        | 127        | 20         | 8            | 155        | 67         | 67                 |
|                   | Apr         | 466          | 0            | 0          | 9          | 0          | 0         | 21       | 496        | 70         | 9            | 575        | 147        | 147                |
|                   | May         | 451          | 143          | 10         | 5          | 29         | 0         | 29       | 667        | 90         | 13           | 770        | 608        | 608                |
|                   | Jun         | 51           | 244          | 31         | 5          | 63         | 0         | 18       | 412        | 60         | 20           | 492        | 653        | 653                |
|                   | Jul         | 0            | 244          | 0          | 3          | 63         | 0         | 14       | 324        | 50         | 25           | 399        | 312        | 312                |
|                   | Aug         | 0            | 244          | 0          | 2          | 63         | 0         | 14       | 323        | 50         | 28           | 401        | 373        | 373                |
|                   | Sep         | 0            | 244          | 0          | 2          | 63         | 0         | 14       | 323        | 50         | 32           | 405        | 373        | 373                |
|                   | Oct         | 0            | 244          | 0          | 2          | 63         | 6         | 33       | 310        | 658        | 100          | 37         | 795        | 380                |
|                   | Nov         | 0            | 72           | 0          | 2          | 23         | 25        | 0        | 122        | 20         | 43           | 185        | 811        | 811                |
|                   | Dec         | 0            | 0            | 0          | 2          | 0          | 20        | 0        | 22         | 0          | 49           | 71         | 338        | 338                |
| <b>Total</b>      | <b>1991</b> | <b>1,127</b> | <b>1,435</b> | <b>41</b>  | <b>59</b>  | <b>367</b> | <b>51</b> | <b>0</b> | <b>150</b> | <b>310</b> | <b>3,540</b> | <b>520</b> | <b>280</b> | <b>4,340</b>       |
| <b>Total Proj</b> |             | <b>1,127</b> | <b>1,706</b> | <b>271</b> | <b>113</b> | <b>408</b> | <b>51</b> | <b>0</b> | <b>179</b> | <b>370</b> | <b>4,225</b> | <b>590</b> | <b>310</b> | <b>5,125</b>       |

v) Telecontrol

Prepared by: Telecontrol

**CAPITAL BUDGET PROPOSAL**

Capital Cost Estimate & Cash Flow Requirements

Round Pond Development

Approved by: \_\_\_\_\_

1989 Fiscal Year : Prepared: 88/01/18

In-service: 91/12/31

I.D.C.% = 12.68% Annual 1.00% Mthly 3.03% Qtrly

Bscln % 87/88= 4.62% 88/89= 4.72% 89/90= 4.77% 90/91= 4.40% 91/92= 3.96% 92/93= 3.60% (Est. Base: Jul/87)

| Period            | Constr. Servcs | Equip. Purch. | Matrls Purch. | Constr. Internal | External Eng. | Design Eng. | Proj. Mgmt | O/H @ 4.5% | Cont @ 10.0% | Sub Total    | Bscln      | I.D.C.    | Total Proj.  | Cash Flo (Excl. ID |
|-------------------|----------------|---------------|---------------|------------------|---------------|-------------|------------|------------|--------------|--------------|------------|-----------|--------------|--------------------|
| 1989 Jan          |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Feb               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Mar               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Apr               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| May               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Jun               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Jul               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Aug               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Sep               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Oct               |                |               |               |                  |               |             | 3          | 0          | 0            | 3            | 0          | 0         | 3            | 3                  |
| Nov               |                |               |               |                  |               |             | 3          | 0          | 0            | 3            | 0          | 0         | 4            | 3                  |
| Dec               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| <b>Total 1989</b> | <b>0</b>       | <b>0</b>      | <b>0</b>      | <b>0</b>         | <b>0</b>      | <b>6</b>    | <b>0</b>   | <b>0</b>   | <b>0</b>     | <b>6</b>     | <b>1</b>   | <b>0</b>  | <b>7</b>     | <b>7</b>           |
| 1990 Jan          |                |               |               |                  |               |             |            | 5          | 0            | 5            | 1          | 0         | 6            | 6                  |
| Feb               |                |               |               |                  |               |             |            | 5          | 0            | 5            | 1          | 0         | 6            | 6                  |
| Mar               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Apr               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| May               |                |               |               |                  |               |             |            | 2          | 0            | 2            | 0          | 0         | 3            | 2                  |
| Jun               |                |               |               |                  |               |             |            | 2          | 0            | 2            | 0          | 0         | 3            | 2                  |
| Jul               |                |               |               |                  |               |             |            | 2          | 0            | 2            | 0          | 0         | 3            | 2                  |
| Aug               |                |               |               |                  |               |             |            | 3          | 0            | 3            | 0          | 0         | 4            | 4                  |
| Sep               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Oct               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Nov               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Dec               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| <b>Total 1990</b> | <b>0</b>       | <b>0</b>      | <b>0</b>      | <b>0</b>         | <b>0</b>      | <b>19</b>   | <b>0</b>   | <b>1</b>   | <b>0</b>     | <b>20</b>    | <b>2</b>   | <b>3</b>  | <b>25</b>    | <b>22</b>          |
| 1991 Jan          |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Feb               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Mar               |                |               |               |                  |               |             |            | 0          | 0            | 0            | 0          | 0         | 0            | 0                  |
| Apr               |                |               |               |                  |               |             |            | 3          | 0            | 3            | 1          | 0         | 4            | 4                  |
| May               |                |               |               |                  |               |             |            | 5          | 0            | 5            | 1          | 0         | 7            | 6                  |
| Jun               |                |               |               |                  |               |             |            | 5          | 0            | 5            | 1          | 1         | 7            | 6                  |
| Jul               |                | 226           | 27            | 35               |               |             |            | 5          | 13           | 306          | 54         | 1         | 361          | 49                 |
| Aug               |                | 328           | 40            | 35               |               |             |            | 8          | 19           | 430          | 77         | 3         | 509          | 364                |
| Sep               |                | 147           | 18            | 10               |               |             |            | 5          | 8            | 188          | 34         | 7         | 230          | 472                |
| Oct               |                | 5             | 1             | 1                |               |             |            | 5          | 1            | 11           | 2          | 11        | 24           | 211                |
| Nov               |                |               |               |                  |               |             |            | 5          | 0            | 5            | 1          | 12        | 17           | 12                 |
| Dec               |                |               |               |                  |               |             |            | 4          | 94           | 98           | 19         | 13        | 130          | 117                |
| <b>Total 1991</b> | <b>0</b>       | <b>706</b>    | <b>86</b>     | <b>81</b>        | <b>0</b>      | <b>41</b>   | <b>0</b>   | <b>45</b>  | <b>94</b>    | <b>1,051</b> | <b>190</b> | <b>47</b> | <b>1,288</b> | <b>1,241</b>       |
| <b>Total Proj</b> | <b>0</b>       | <b>706</b>    | <b>86</b>     | <b>81</b>        | <b>0</b>      | <b>66</b>   | <b>0</b>   | <b>46</b>  | <b>94</b>    | <b>1,077</b> | <b>192</b> | <b>51</b> | <b>1,320</b> | <b>1,270</b>       |

vi) Environment



Prepared by: D. Kiell

CAPITAL BUDGET PROPOSAL

Round Pond  
Development  
Complete: Oct. '92

Approved by: \_\_\_\_\_

Capital Cost Estimate & Cash Flow Requirements  
1989 Fiscal Year : Prepared: 88/03

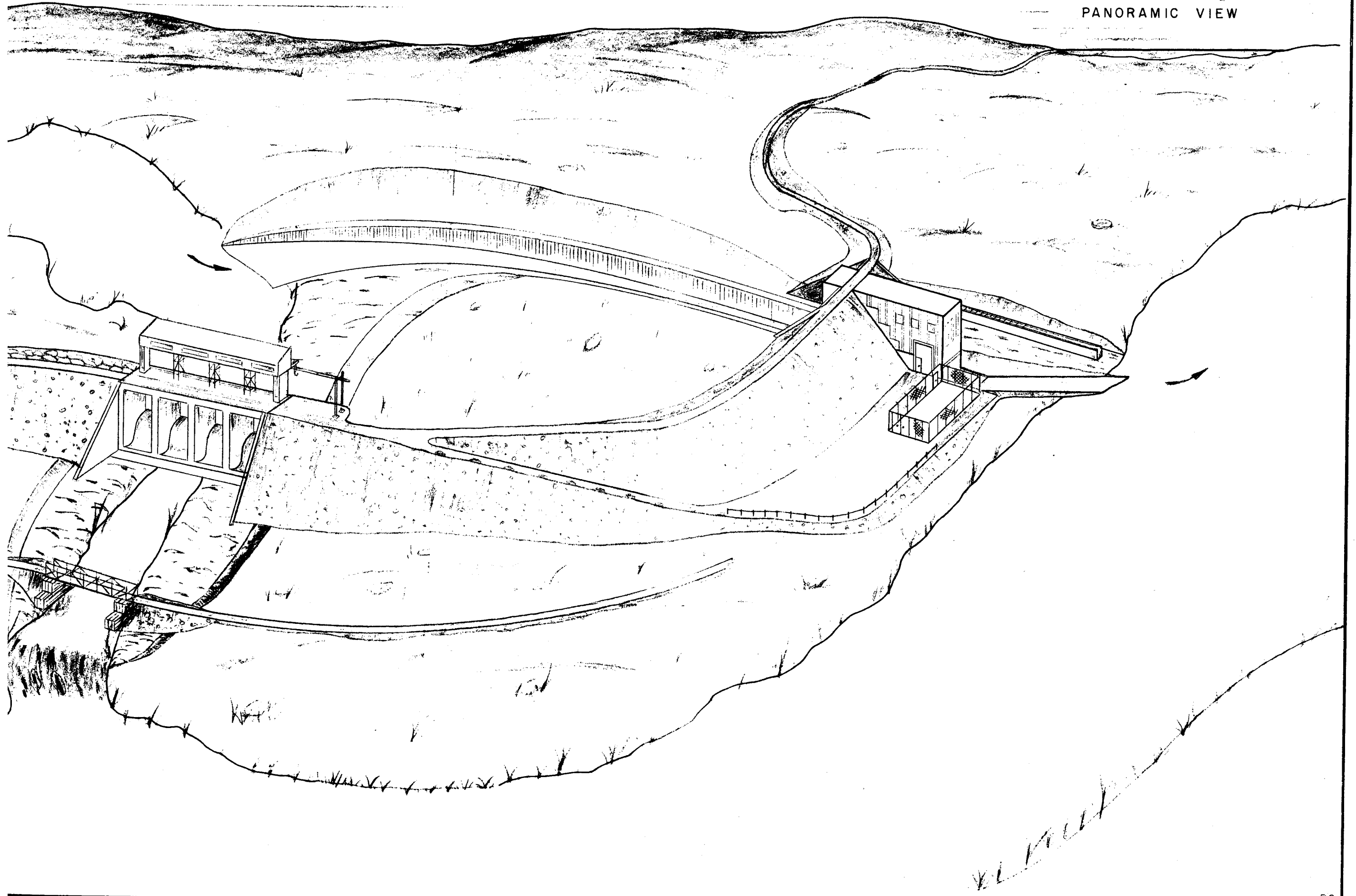
ESCLN % (Base Jan/88)    IDC %    Annual =    12.68%    Qtrly =    3.030%    Mthly =    1.00%  
87/88=    .0537    88/89=    .0508    89/90=    .0516    90/91=    .0384    91/92=    .0298    92/93=    .0383

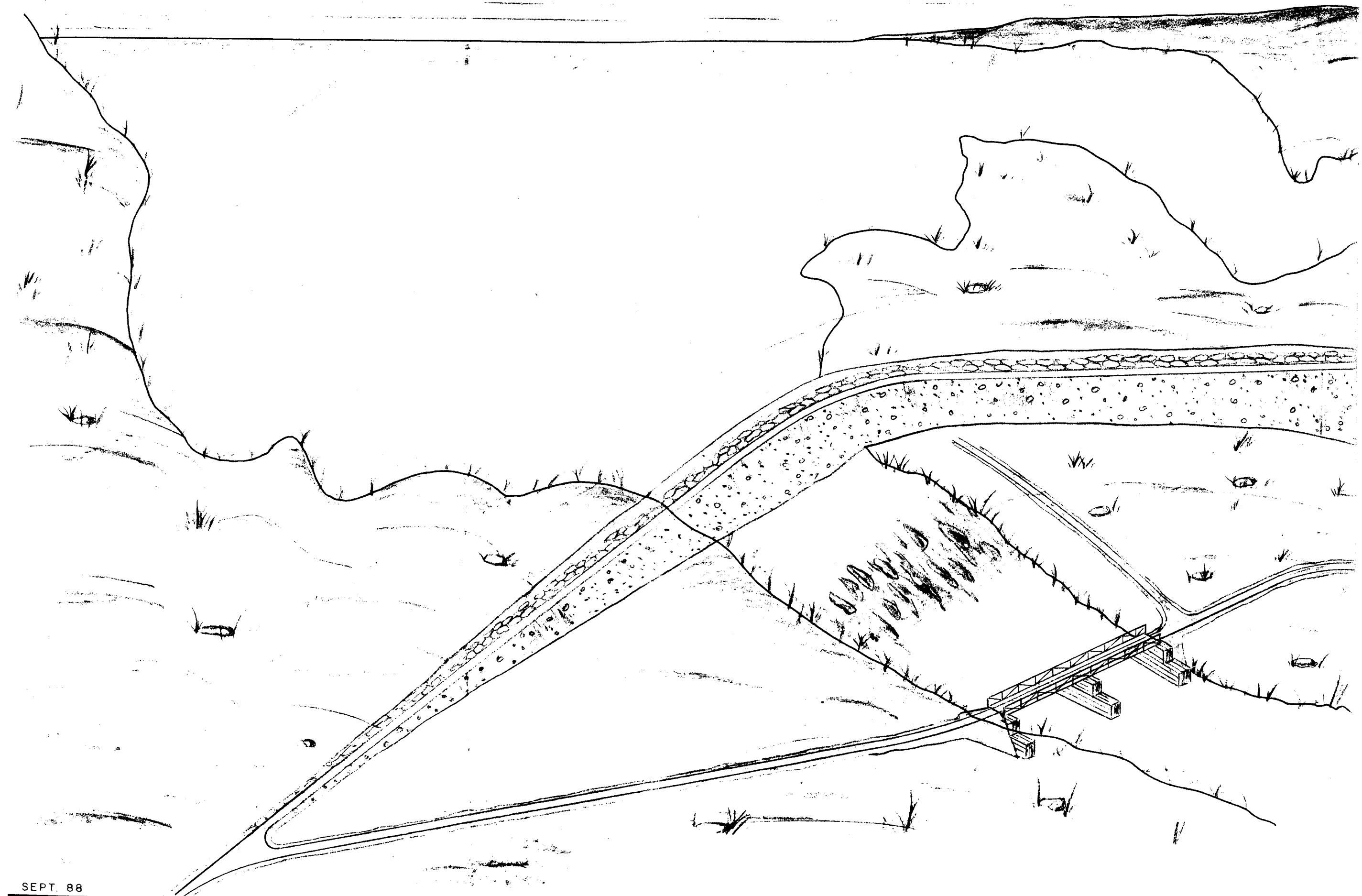
| Period               | Environmental Monitoring |          |          |          |          |          |          | O/H#      | Cont.     | Sub 0 Total | Escln     | I.D.C.     | Total Proj.  | Cash Flow  |    |
|----------------------|--------------------------|----------|----------|----------|----------|----------|----------|-----------|-----------|-------------|-----------|------------|--------------|------------|----|
| 1988 Jan             | 2                        |          |          |          |          |          |          | 0         |           |             | 2         | 0          | 0            | 2          | 1  |
| Feb                  | 7                        |          |          |          |          |          |          | 0         |           |             | 7         | 0          | 0            | 7          | 4  |
| Mar                  | 6                        |          |          |          |          |          |          | 0         |           |             | 6         | 0          | 0            | 6          | 4  |
| Apr                  | 7                        |          |          |          |          |          |          | 0         |           |             | 7         | 0          | 0            | 7          | 7  |
| May                  | 40                       |          |          |          |          |          |          | 2         |           |             | 42        | 1          | 0            | 43         | 25 |
| Jun                  | 26                       |          |          |          |          |          |          | 1         |           |             | 27        | 1          | 0            | 28         | 36 |
| Jul                  | 68                       |          |          |          |          |          |          | 3         |           |             | 71        | 2          | 1            | 74         | 51 |
| Aug                  | 90                       |          |          |          |          |          |          | 4         |           |             | 94        | 3          | 2            | 99         | 85 |
| Sep                  | 58                       |          |          |          |          |          |          | 3         |           |             | 61        | 2          | 2            | 65         | 80 |
| Oct                  | 34                       |          |          |          |          |          |          | 2         |           |             | 36        | 2          | 3            | 41         | 51 |
| Nov                  | 22                       |          |          |          |          |          |          | 3         | 37        |             | 62        | 3          | 4            | 69         | 52 |
| Dec                  | 5                        |          |          |          |          |          |          | 0         |           |             | 5         | 0          | 4            | 9          | 35 |
| <b>Total 1988</b>    | <b>365</b>               | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>18</b> | <b>37</b> | <b>420</b>  | <b>14</b> | <b>16</b>  | <b>450</b>   | <b>428</b> |    |
| 1 1st Qtr            | 15                       |          |          |          |          |          |          | 1         |           |             | 16        | 1          | 14           | 31         | 11 |
| 9 2nd Qtr            | 17                       |          |          |          |          |          |          | 1         | 6         |             | 24        | 2          | 14           | 40         | 22 |
| 8 3rd Qtr            | 17                       |          |          |          |          |          |          | 1         |           |             | 18        | 2          | 15           | 35         | 23 |
| 9 4th Qtr            | 15                       |          |          |          |          |          |          | 0         |           |             | 15        | 2          | 17           | 34         | 19 |
| <b>Total 1989</b>    | <b>64</b>                | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>3</b>  | <b>6</b>  | <b>73</b>   | <b>7</b>  | <b>60</b>  | <b>140</b>   | <b>74</b>  |    |
| 1 1st Qtr            | 0                        |          |          |          |          |          |          | 0         |           |             | 0         | 0          | 17           | 17         | 9  |
| 9 2nd Qtr            | 35                       |          |          |          |          |          |          | 2         |           |             | 37        | 5          | 19           | 61         | 21 |
| 9 3rd Qtr            | 18                       |          |          |          |          |          |          | 1         |           |             | 19        | 3          | 20           | 42         | 32 |
| 0 4th Qtr            | 15                       |          |          |          |          |          |          | 0         | 7         |             | 22        | 3          | 21           | 46         | 24 |
| <b>Total 1990</b>    | <b>68</b>                | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>3</b>  | <b>7</b>  | <b>78</b>   | <b>11</b> | <b>77</b>  | <b>166</b>   | <b>85</b>  |    |
| 1 1st Qtr            | 15                       |          |          |          |          |          |          | 1         |           |             | 16        | 3          | 23           | 42         | 22 |
| 9 2nd Qtr            | 17                       |          |          |          |          |          |          | 1         |           |             | 18        | 3          | 24           | 45         | 20 |
| 9 3rd Qtr            | 42                       |          |          |          |          |          |          | 2         |           |             | 44        | 8          | 26           | 78         | 37 |
| 1 4th Qtr            | 5                        |          |          |          |          |          |          | 0         | 8         |             | 13        | 3          | 23           | 39         | 34 |
| <b>Total 1991</b>    | <b>79</b>                | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>4</b>  | <b>8</b>  | <b>91</b>   | <b>17</b> | <b>96</b>  | <b>204</b>   | <b>113</b> |    |
| <b>Total 1992</b>    | <b>180</b>               |          |          |          |          |          |          | <b>9</b>  | <b>18</b> | <b>207</b>  | <b>44</b> | <b>0</b>   | <b>251</b>   | <b>259</b> |    |
| <b>Total Project</b> | <b>756</b>               | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>37</b> | <b>76</b> | <b>869</b>  | <b>93</b> | <b>249</b> | <b>1,211</b> | <b>959</b> |    |

APPENDIX II

PLATES

PLATE 1  
ROUND POND HYDROELECTRIC DEVELOPMENT  
FEASIBILITY STUDY  
PANORAMIC VIEW





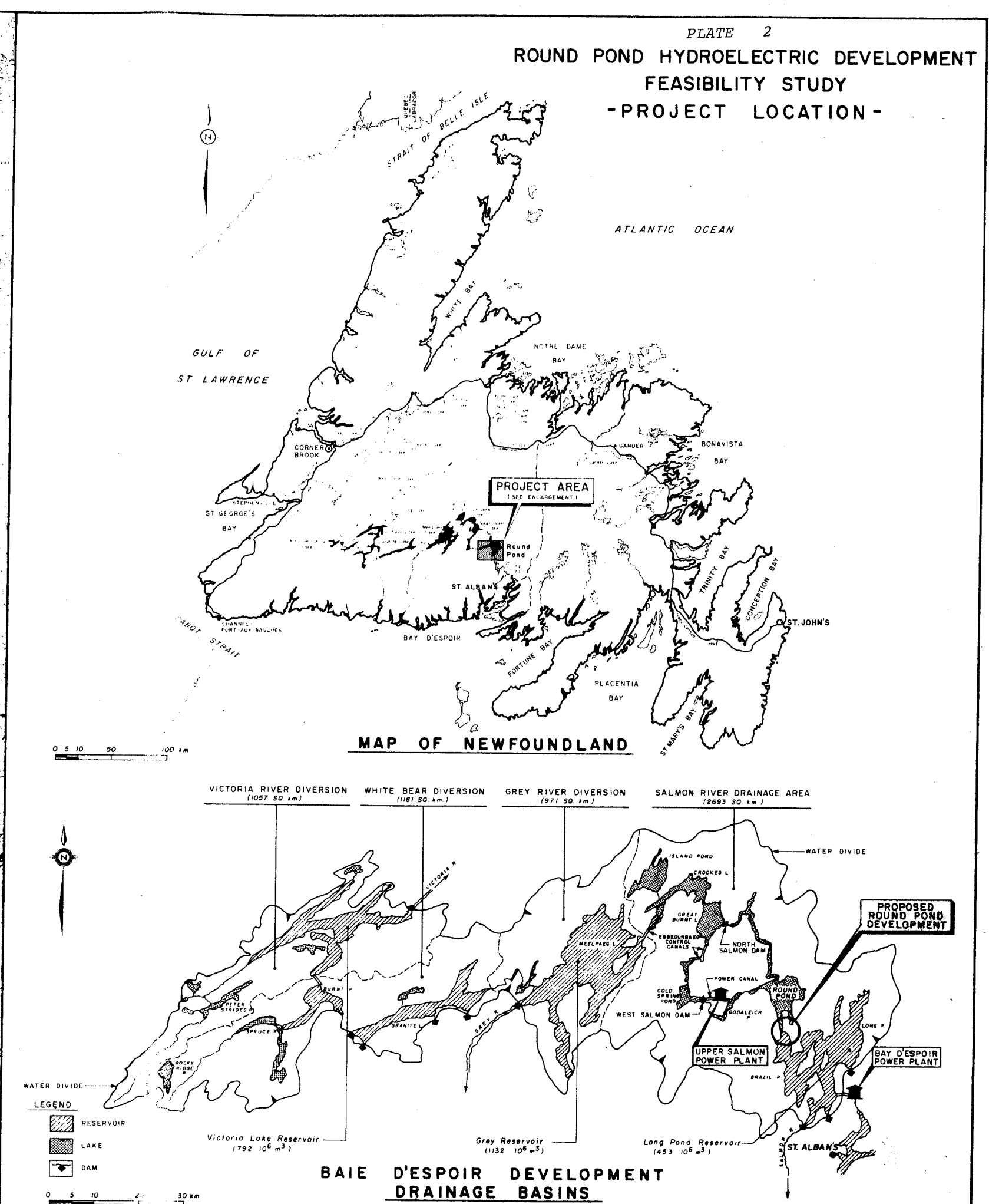
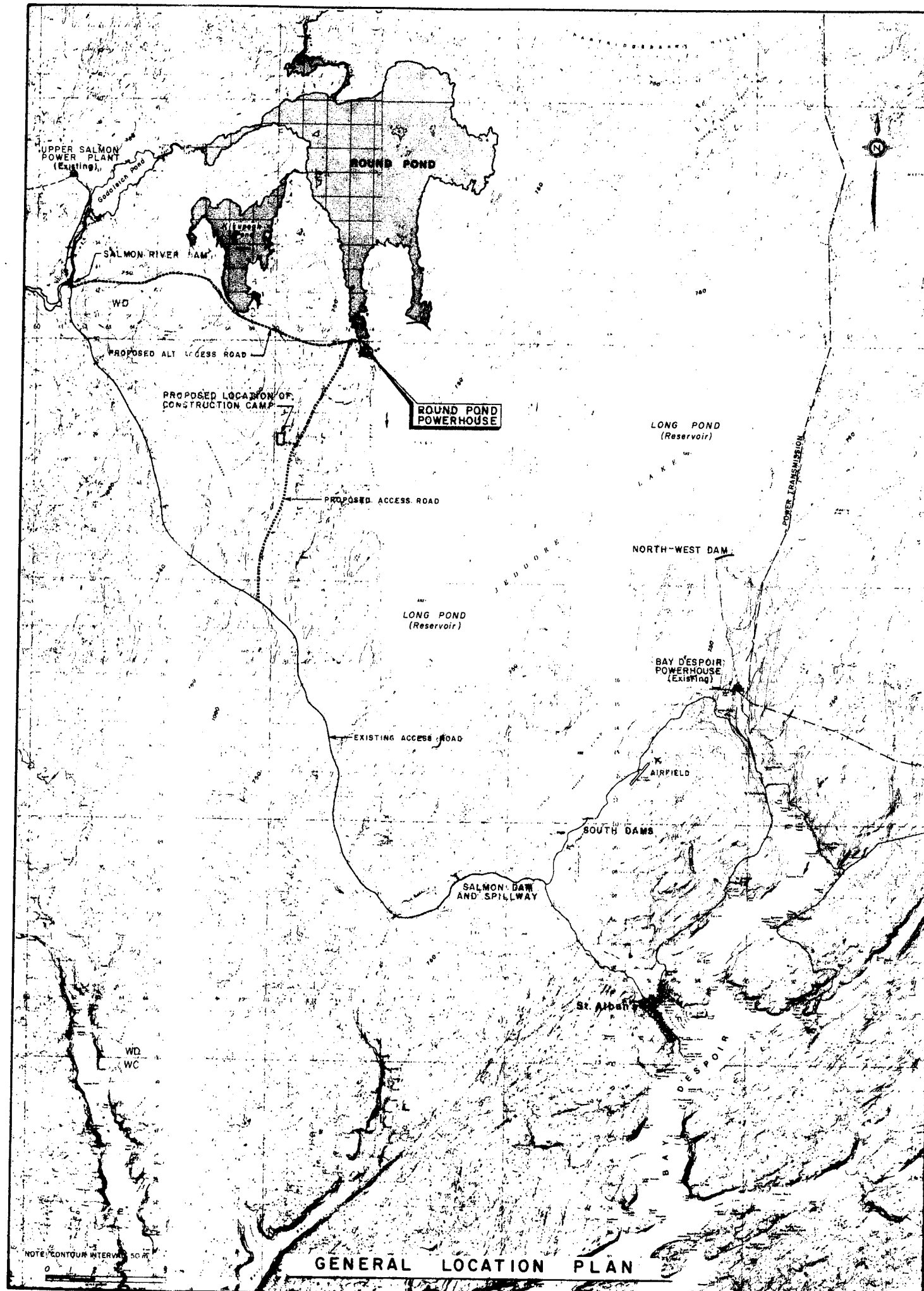
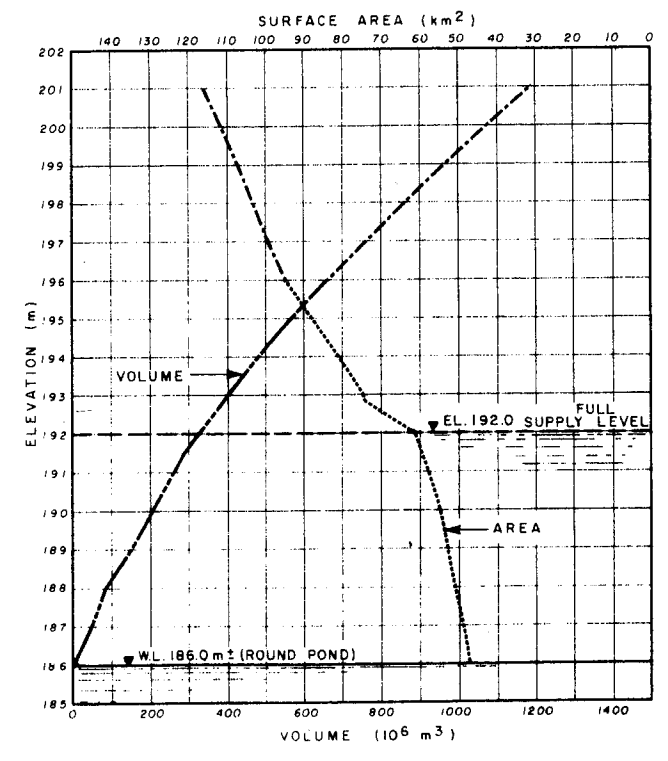
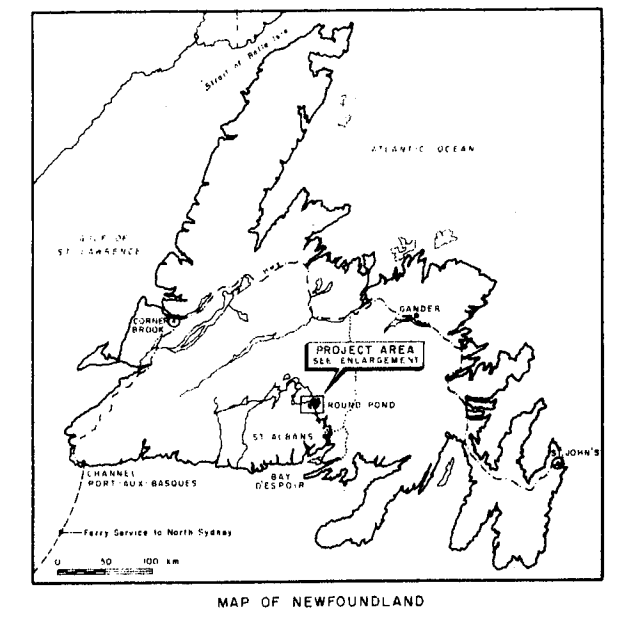
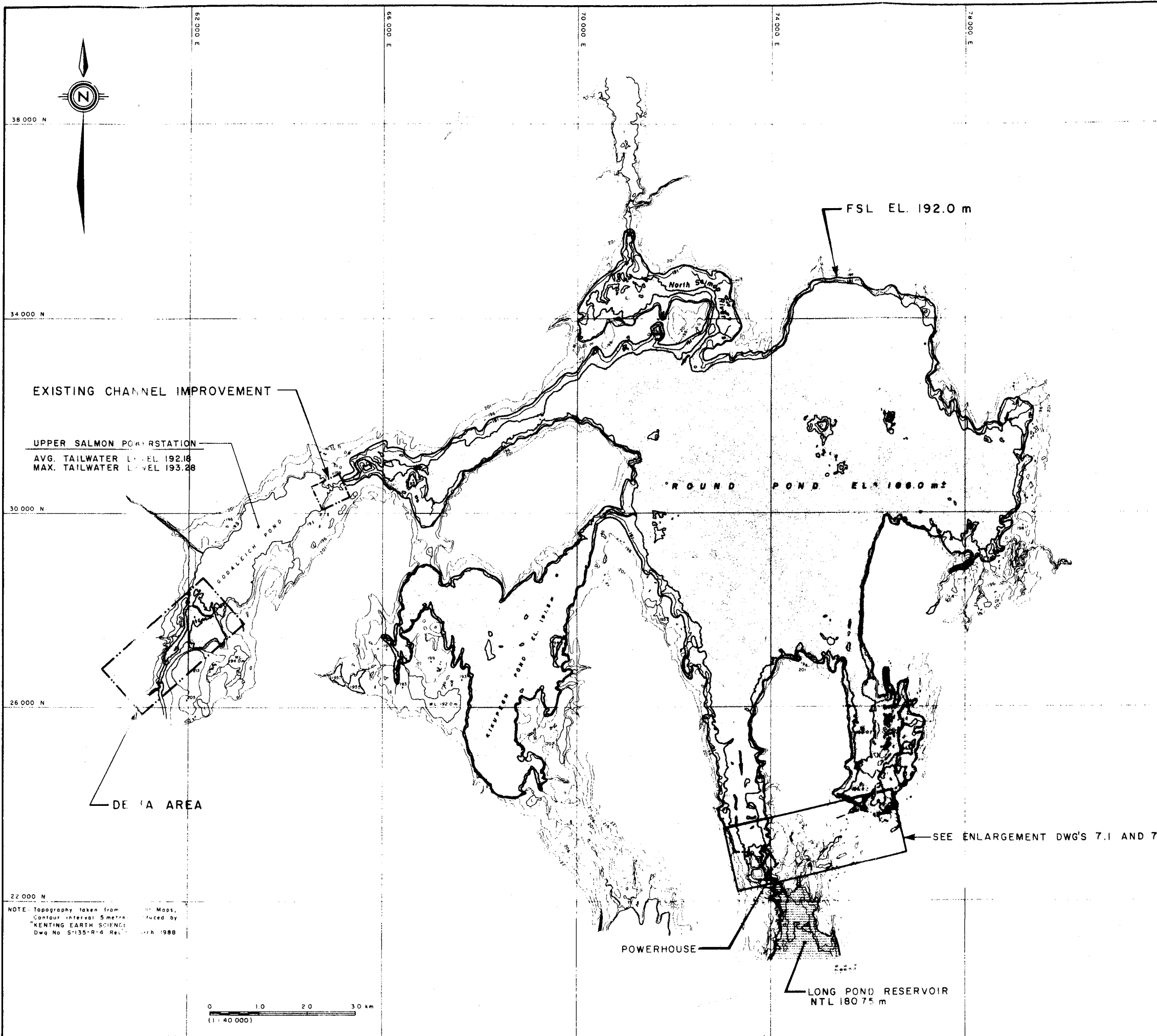
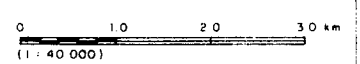


PLATE 3  
 ROUND POND HYDROELECTRIC DEVELOPMENT  
 FEASIBILITY STUDY  
 - RESERVOIR -

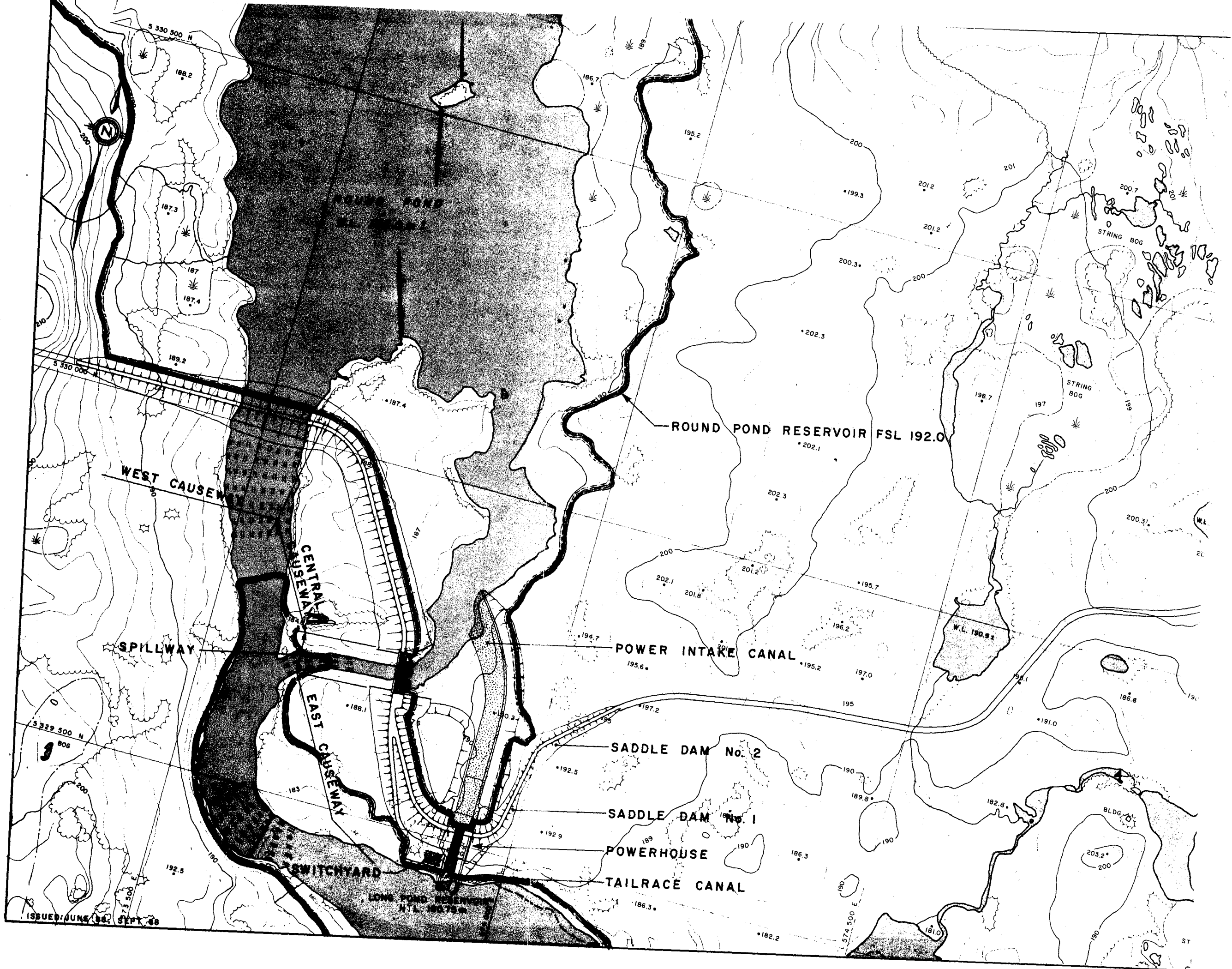


NOTE: Topography taken from Maps, Contour interval 5 metres, produced by KENTING EARTH SCIENCE, Dwg No S-135-R-4 Rev. 1, 1988









ISSUED: JUNE 1962, SEPT 68

LONG POND RESERVOIR  
N.T.S. 100 75



FEASIBILITY STUDY  
ROUND POND HYDROELECTRIC DEVELOPMENT  
PROPOSED ACCESS ROAD AND  
TRANSMISSION LINE

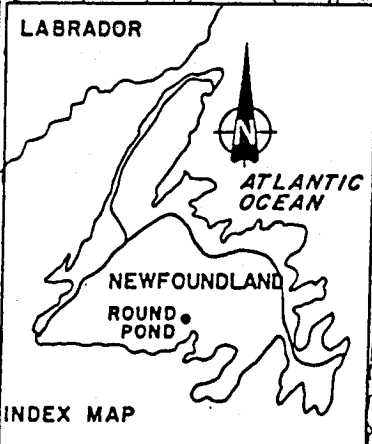
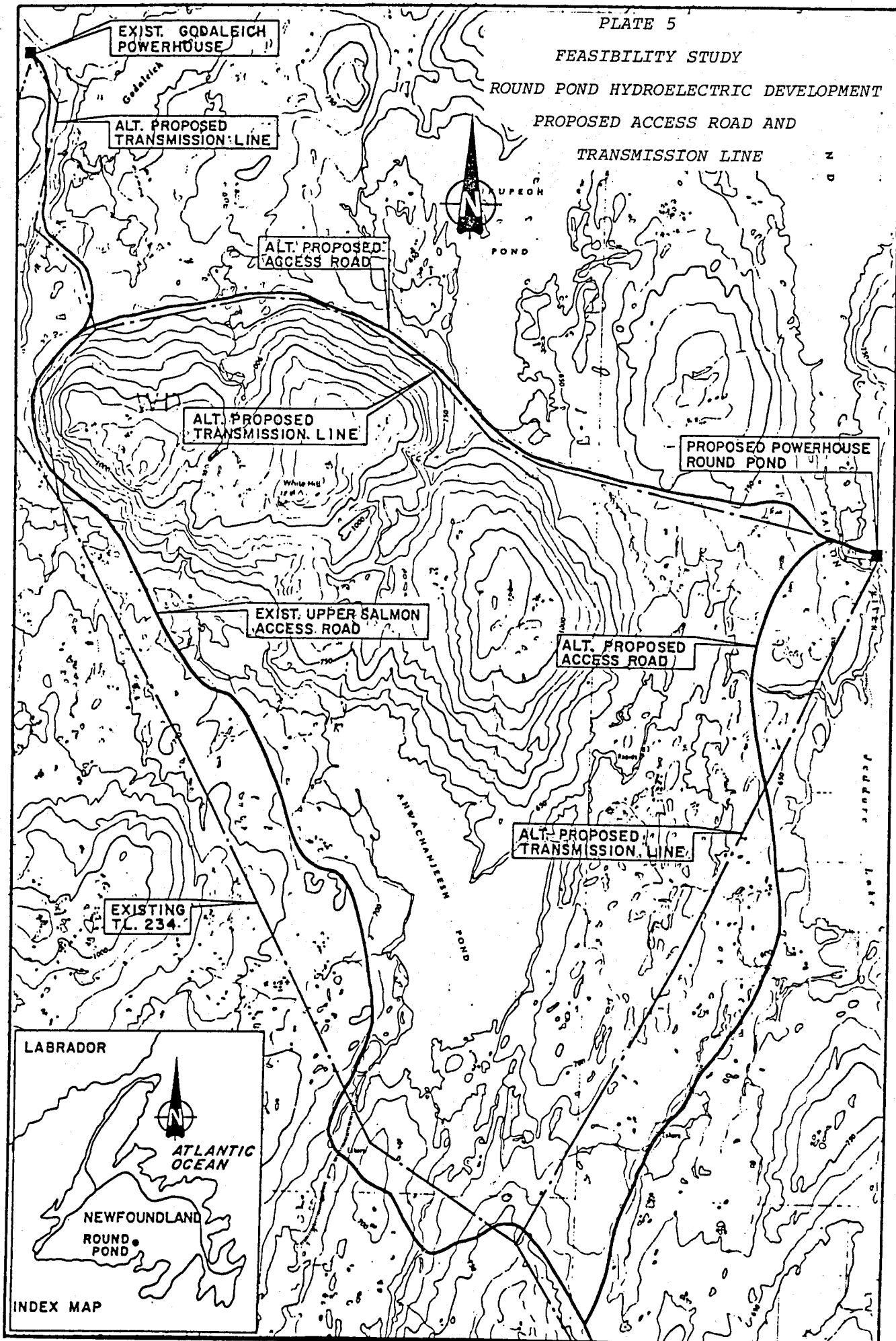
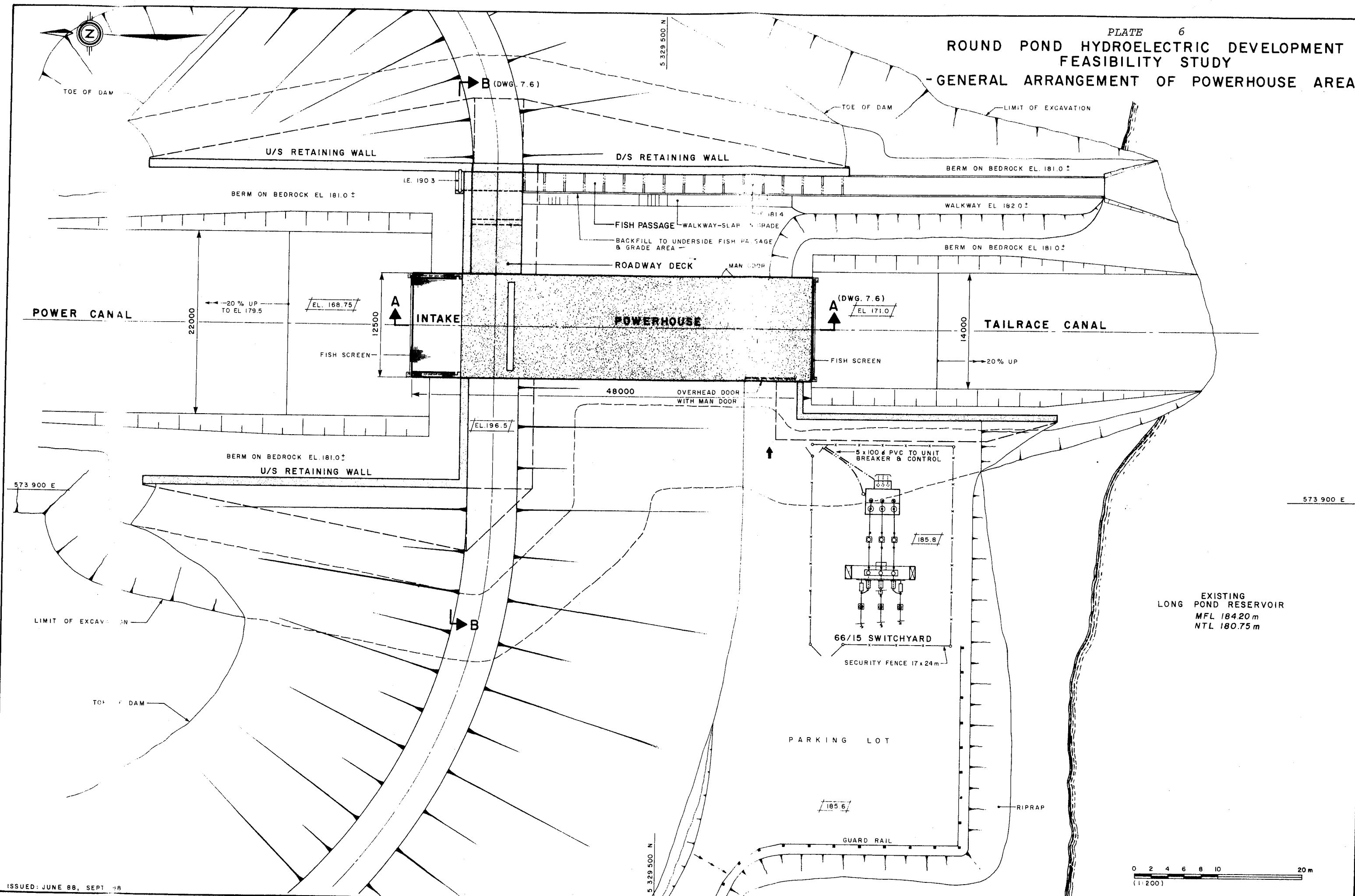


PLATE 6  
**ROUND POND HYDROELECTRIC DEVELOPMENT  
 FEASIBILITY STUDY**  
**- GENERAL ARRANGEMENT OF POWERHOUSE AREA -**



EXISTING  
 LONG POND RESERVOIR  
 MFL 184.20 m  
 NTL 180.75 m

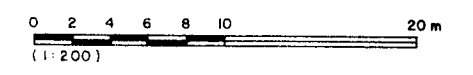
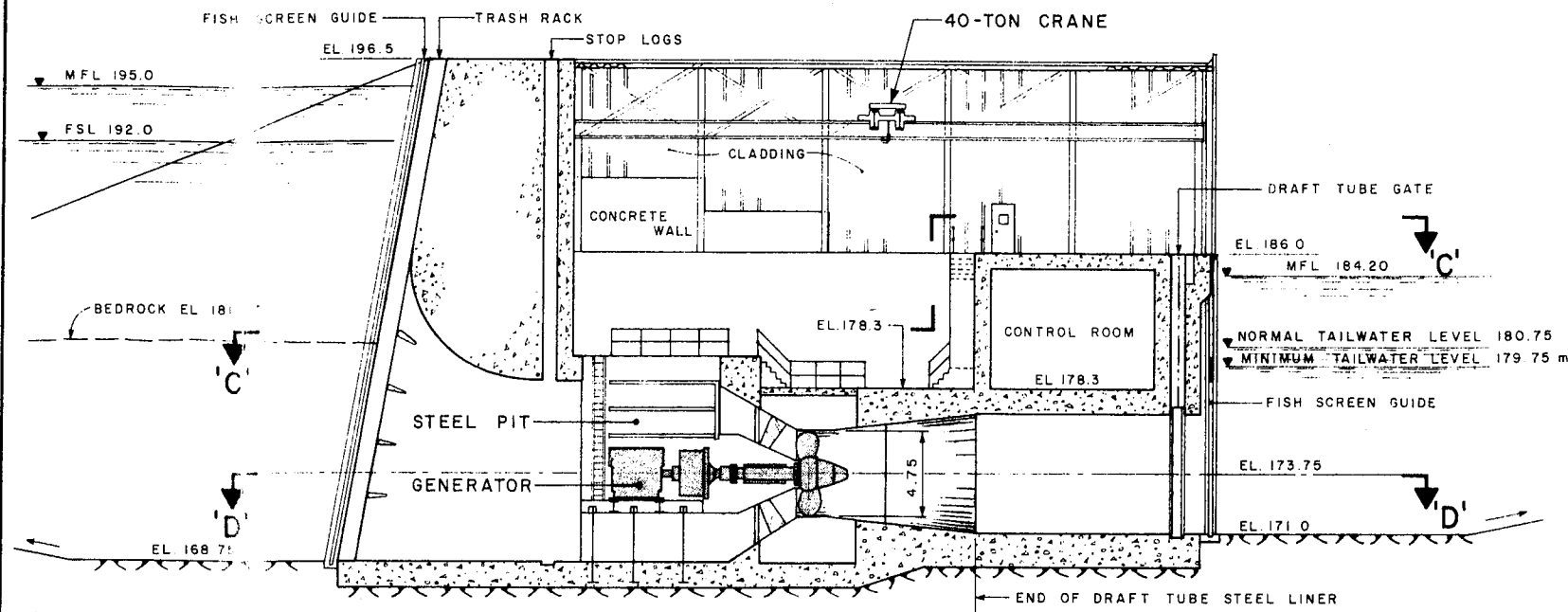
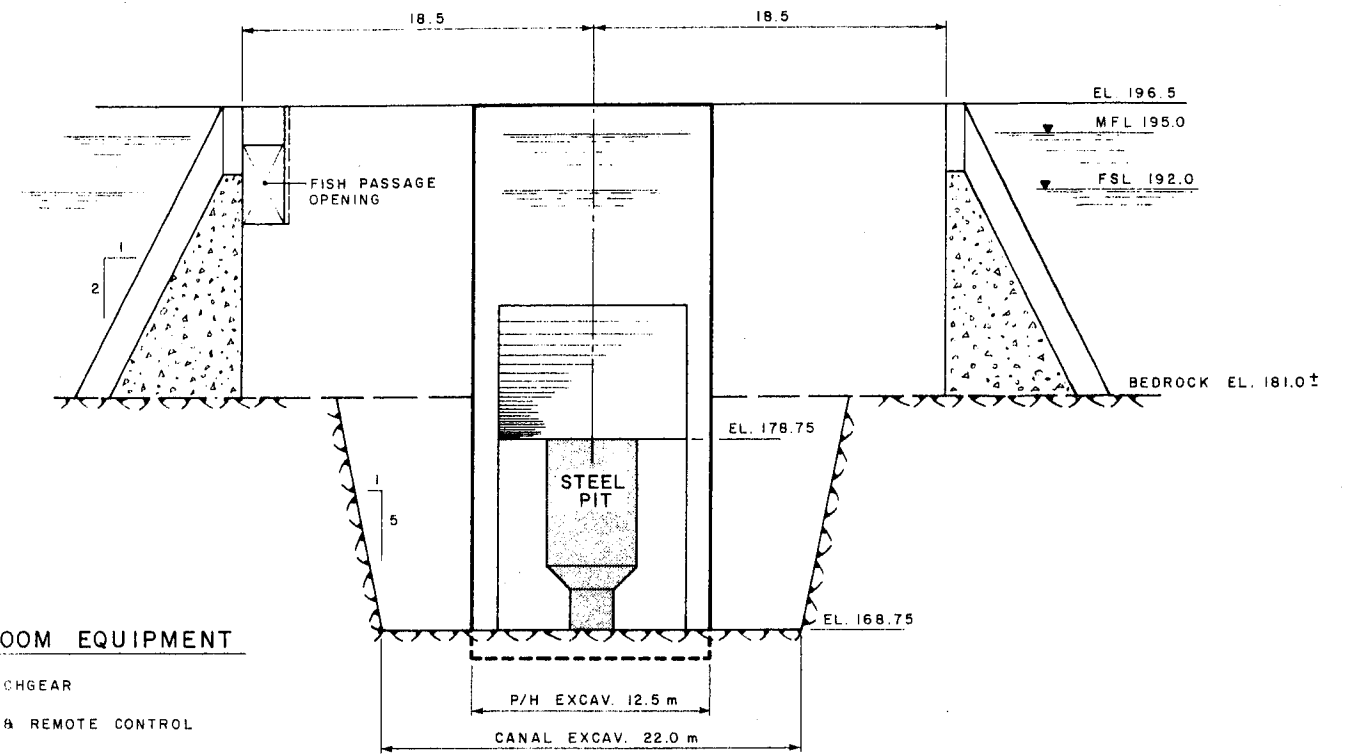


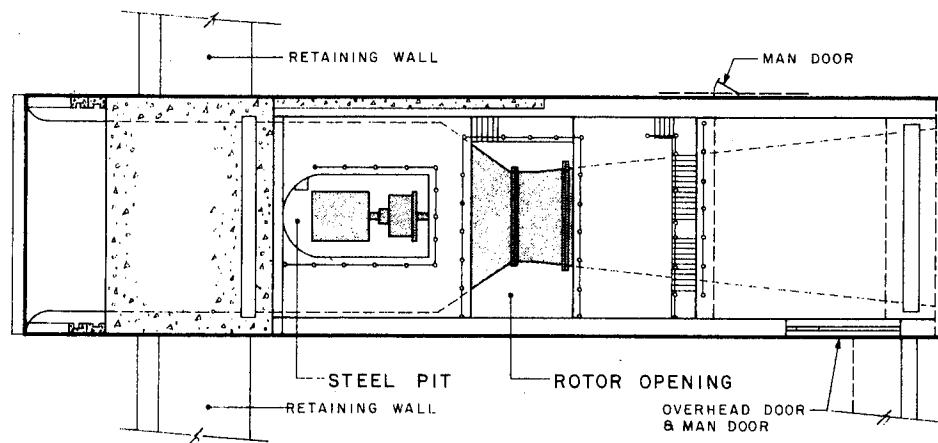
PLATE 7  
 ROUND POND HYDROELECTRIC DEVELOPMENT  
 FEASIBILITY STUDY  
 - POWERHOUSE -



SECTION 'A-A' (DWG. 7.5)  
 1:200



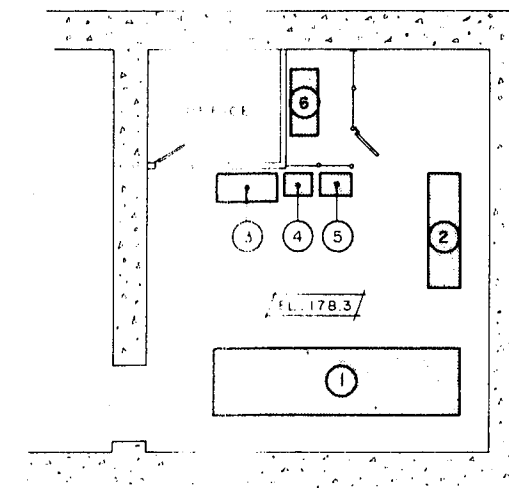
ELEVATION 'B-B' (DWG. 7.5)  
 1:200



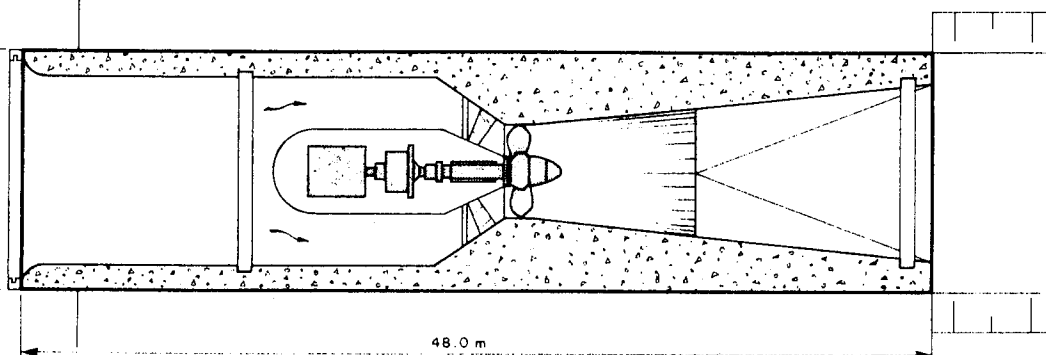
SECTIONAL PLAN 'C-C'  
 1:200

CONTROL ROOM EQUIPMENT

- ① POWER SWITCHGEAR
- ② PROTECTION & REMOTE CONTROL
- ③ STATION SERVICE BOARD
- ④ CHARGER
- ⑤ DC BOARD
- ⑥ STATION BATTERY



CONTROL ROOM LAYOUT  
 1:100



SECTIONAL PLAN 'D-D'  
 1:200



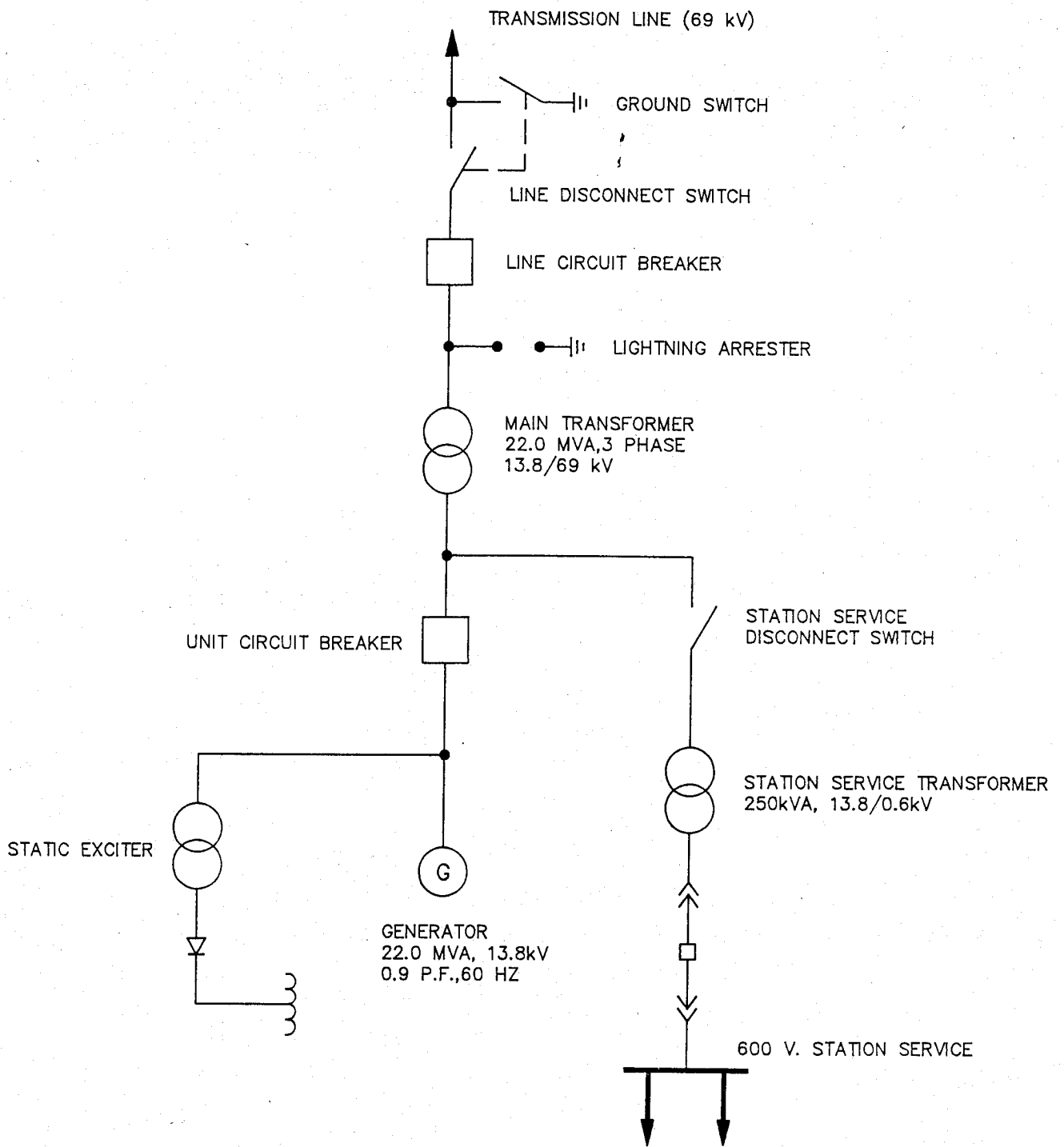
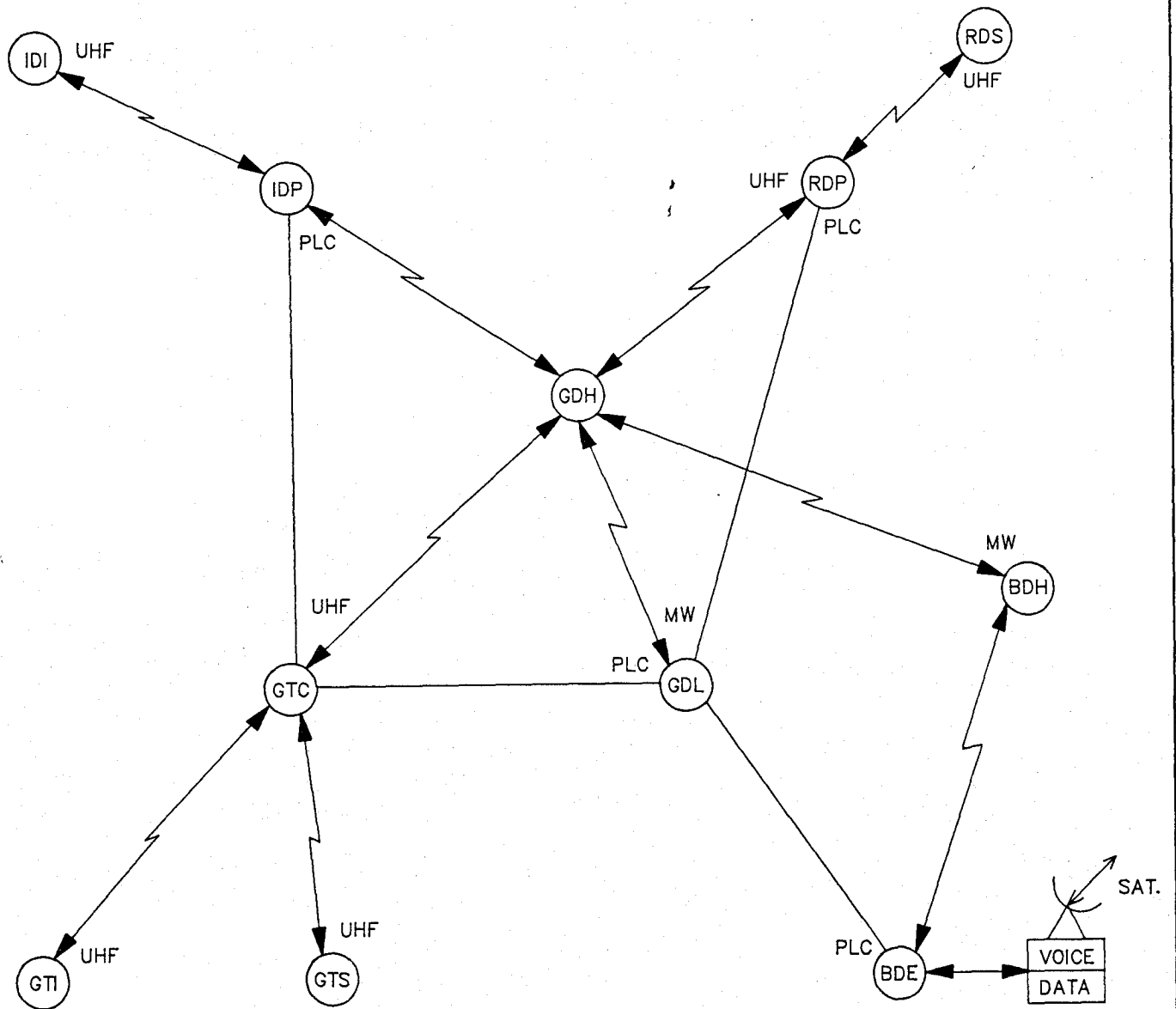


PLATE 8

ROUND POND DEVELOPMENT  
 SWITCHYARD  
 SINGLE LINE DIAGRAM



LEGEND :

|     |                          |     |                         |
|-----|--------------------------|-----|-------------------------|
| GDH | GODALEICH HILL           | IDI | ISLAND POND INTAKE      |
| GDL | GODALEICH POWERHOUSE     | IDP | ISLAND POND POWERHOUSE  |
| GTS | GRANITE CANAL SPILLWAY   | BDH | BAY D'ESPOIR HILL       |
| GTI | GRANITE CANAL INTAKE     | BDE | BAY D'ESPOIR POWERHOUSE |
| GTC | GRANITE CANAL POWERHOUSE | RDP | ROUND POND POWERHOUSE   |
|     |                          | RDS | ROUND POND SPILLWAY     |

PLATE 9

ROUND POND DEVELOPMENT  
 PROPOSED COMMUNICATION NETWORK  
 (With Granite Canal & Island Pond Development)