

THE FEDERAL ENERGY REGULATORY COMMISSION  
APPLICATION FOR LICENSE  
FOR A  
MINOR HYDROELECTRIC POWER PROJECT

PICKPOCKET DAM / EXETER 1 DAM HYDROELECTRIC PROJECT

THE TOWN OF EXETER  
10 FRONT STREET  
EXETER, NH 03833

BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION  
APPLICATION FOR LICENSE  
FOR A  
MINOR HYDROELECTRIC POWER PROJECT  
5 MEGAWATTS OR LESS

(1.) The town of Exeter, NH applies to the Federal Energy Regulatory Commission for a license for the Exeter 1 Dam / Pickpocket Dam Project, a small hydroelectric power project that is proposed to have a total capacity of 5 magawatts or less, under the Federal Power Act.

(2.) The location of the project is:

State:	New Hampshire
County:	Rockingham
Nearby Town:	Exeter, NH
Stream:	Exeter River

(3.) The exact name and business address of the Applicant is:

The Town of Exeter  
10 Front Street  
Exeter, New Hampshire 03833

(4.) The exact name and business address of each person authorized to act as agent for the Applicant in this application

are:

Dr. Charles Goodspeed  
Civil Engineering Dept.  
Room 236  
Kingsbury Hall  
University of N.H.  
Durham, N.H. 03824

- (5.) The Applicant is an incorporated township organized under the laws of the State of New Hampshire.
- (6.) (i) The statutory or regulatory requirements of the State of New Hampshire that affect the project as proposed with respect to bed and banks, and the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting and distributing power and in any other business necessary to accomplish the purpose of the license under the Federal Power Act follow. (Except as otherwise noted, all references are to the New Hampshire Revised Statutes Annotated.)

## Erection and Inspection of Dams

482:3 Preliminary Filing of Information. No person shall begin the construction or reconstruction of any dam until ten days after he has filed with the water resources board a statement of the height of the proposed dam and the location at which it is to be erected and such other information as the board may require.

482:16 Right Granted. Any person or corporation authorized by its charter or articles of agreement so to do may erect and maintain on his or its land, or on land of another with the owner's consent, a dam upon or across any stream, or may increase by flashboards or permanently the height of any dam already so maintained by him or it, for the purpose of raising the water to work any mill or mills on such stream or on another stream to which the same is tributary, or for the purpose of creating a reservoir of water or raising the level of a public or other lake or pond to control, conserve or equalize the flow of such stream or streams for the benefit of any such mill or mills, upon obtaining authority so to do as hereinafter provided.

482:19 Petition Before Flowing. Any person proposing to erect a dam, or to increase by flashboards or permanently the height of any existing dam, for any of the purposes provided in section 16, shall file a petition with the water resources board, setting forth the location, height and description of the proposed dam or proposed increase in any existing dam.

483:1 Termination of Rights. All rights, powers, privileges and franchises conferred upon any corporation, enabling it to construct and maintain mill dams upon the streams of this state and to flow lands or do any other act necessary to the development of hydro-electric energy, shall terminate and be forfeited at the end of six years from the date on which the act of incorporation took effect, unless the actual work of constructing such dams or power plants shall be commenced during such six years, and be prosecuted with reasonable diligence thereafter until such dams and plants are completed and in operation.

483-A:1 Excavating and Dredging Permit; Certain Exemptions.

I. No person shall excavate, remove, fill, dredge or construct any structures in or on any bank, flat, marsh, or swamp in and adjacent to any waters of the state without written notice of his intention to construct, excavate, remove, fill or dredge to the wetlands board. Said notice shall be sent by registered mail to the wetlands board at least 30 days prior to such constructing, excavating, removing, filling or dredging with a detailed plan drawn to scale of the proposed project. At the time of filing with the wetlands board, said person shall also file 3 copies of said notice, with a detailed plan, if a major project, but accompanied with a map showing the exact location of the proposed project with the town or city clerk. The town or city clerk shall forthwith send a copy of the said notice to the selectmen, mayor or city manager, the municipal planning board, if any, and the municipal conservation commission, if any, and may require an administrative fee not to exceed \$2. The copies of said notice shall be made reasonably accessible to the public.

II. The replacement or repair of existing structures in or adjacent to any waters of the state which does not involve excavation, removal, filling or dredging in any waters or of any bank, flat, marsh or swamp is exempt from the provisions of this chapter.

483-A:1-a [New] Definition. Without limiting section 1, the waters and adjacent areas within this state to which this chapter applies are defined as follows:

I. Wherever the tide ebbs and flows,

II. Wherever fresh water flows or stands and in all areas above tidal waters not included in paragraph I of this section, it shall apply (in addition to great ponds or lakes of ten acres or more in natural area as provided for in RSA 482:41-e to 41-i and RSA 488-A), to those portions of great ponds or lakes created by the raising of the water level of the same whether by public or private structure, and to all surface waters of the state as defined in RSA 149:1 which contain fresh water including the portion of any bank or shore which borders such surface waters, and to any swamp or bog subject to periodical flooding by fresh water including the surrounding shore.

III. "Mean high tide"

484:1 Investigation of Levels of Inland Waters. The water resources board may, upon its own motion or at the request of the attorney-general or upon complaint of not less than ten owners of property on any inland public water in the state, make a preliminary investigation of conditions affecting the use and enjoyment of any such public water, whenever it shall be of the opinion that such investigation would be in the public interest. If, as a result of any such preliminary investigation, it shall appear to the board that the management and control of any outlet of any such public water and the instrumentalities connected therewith are carried on or used in such manner that the value of shore property above or riparian rights below such outlet or the enjoyment of such water by the public is seriously and adversely affected, it may make further investigation with a view to ascertaining the respective rights of all interested parties, including the public. If, as a result of such further investigation after public hearing the board shall be of the opinion that such management and control is lawful, but that changes in the manner of the exercise of the right of management and control would be of benefit to others without undue injury to the owner of the outlet, it shall direct such changes as in its opinion would be of benefit to the public and private interests concerned.

362-A:1-a Definitions. In this Chapter:

I. *Cogeneration facility* means a facility which produces electric energy and other forms of useful energy, such as steam or heat, which are used for industrial, commercial, heating, or cooling purposes.

II. *Commission* means the New Hampshire Public Utilities Commission.

III. *Limited producer or limited electrical energy producer* means a qualifying small power producer or a qualifying cogenerator, with a total capacity of not more than 5 megawatts.

IV. *Person* means any individual, partnership, association, corporation, governmental unit or agency or any combination thereof.

V. *Primary energy source* means the fuel or fuels used for the generation of electric energy, except that such term does not include the minimum amounts of fuel required for ignition, startup, testing, flame stabilization, or control uses or the minimum amounts of fuel required to alleviate or prevent unanticipated equipment outages or emergencies directly affecting the public health, safety or welfare which would result from electric power outages.

VI. *Qualifying cogeneration facility* means a cogeneration facility which the commission determines meets such requirements, including requirements respecting minimum size, fuel use and fuel efficiency, as the commission may prescribe and which is owned by a person not primarily engaged in the generation or sale of electric power, other than electric power solely from cogeneration facilities or small power production facilities.

VII. *Qualifying cogenerator* means the owner or operator of a qualifying cogeneration facility.

VIII. *Qualifying small power producer* means the owner or operator of a qualifying small power production facility.

IX. *Qualifying small power production facility* means a small power production facility which the Commission determines meets such requirements, including requirements respecting fuel use, fuel efficiency and reliability, as the Commission may prescribe and which is owned by a person not primarily engaged in the generation or sale of electric power, other than electric power solely from cogeneration facilities or small power production facilities.

waste, renewable energy, or any combination thereof and which has a power production capacity which, together with any other facilities located at the same site, as determined by the Commission, is not greater than 20 megawatts.

362-A:2 Exemptions.

Qualifying small power producers and qualifying cogenerators shall be exempt from all rules and statutes relative to electric utility rates or relative to the financial or organizational regulation of electric utilities.

362-A:2-a Purchase of Output by Private Sector.

I. A limited producer of electrical energy shall have the authority to sell its produced electrical energy to not more than 3 purchasers other than the franchise electric utility. Such purchaser may be any individual, partnership, corporation, or association. The Public Utilities Commission shall review and approve all contracts concerning a retail sale of electricity pursuant to this section. The Public Utilities Commission shall not set the terms of such contracts but may disapprove any contract which in its judgment:

- (a) Fails to protect both parties against excessive liability or undue risk, or
- (b) Entails substantial cost or risk to the electric utility in whose franchise area the sale takes place, or
- (c) Is inconsistent with the public good.

II. Upon request of a limited producer, any franchised electrical public utility in the transmission area shall transmit electrical energy from the producer's facility to the purchaser's facility in accordance with the provisions of this section. The producer shall compensate the transmitter for all costs incurred in wheeling and delivering the current to the purchaser. The Public Utilities Commission must approve all such agreements for the wheeling and retains the right to order such wheeling and to set such terms for a wheeling agreement including price that it deems necessary. The Public Utilities Commission or any party involved in a wheeling transaction may demand a full hearing before the Commission for the review of any and all of the terms of a wheeling agreement.

III. Before ordering an electric utility to wheel power from a limited electric producer or before approving any agreement for the wheeling of power, the Public Utilities Commission must find that such an order or agreement:

- (a) Is not likely to result in a reasonably ascertainable uncompensated loss for any party affected by the wheeling transaction.

(c) Will not unreasonably impair the reliability of the electric utility wheeling the power.

(d) Will not impair the ability of the franchised electric utility wheeling the power to render adequate service to its customers.

Source, 1979, 411:1, *eff. Aug. 22, 1979*

**362-A:3 Purchase of Output of Limited Electrical Energy Producers by Public Utilities.**

The entire output of electric energy of such limited electrical energy producers, if offered for sale to the electric utility, shall be purchased by the electric public utility which serves the franchise area in which the installation of such producers are located.

**362-A:4 Payment by Public Utilities for Purchase of Output.**

Public utilities purchasing electrical energy in accordance with the provisions of this chapter shall pay rates per kilowatt hour to be set from time to time by the Commission. Such rates shall be based on the purchasing utility's avoided costs. The Commission may set long term rates which shall at the option of the qualifying small power producer or qualifying cogenerator, be based on the purchasing utility's avoided costs either calculated for the time of delivery or calculated for a specified term at the time the qualifying small power producer or qualifying cogenerator agrees to be obligated to deliver for the specified term. Nothing in this section shall limit the authority of any electric utility or any qualifying small power producer or qualifying cogenerator to agree to a rate for any purchase which differs from the rate or terms or conditions which would otherwise be required by the Commission.

**362-A:6 Tax Exemption of Small Scale Power Facilities.**

I. As used in this section, *small scale power facility* means any real or personal property used in the production of electric power by a qualifying small power production facility which uses water as a primary energy source, including the land, all rights, easements, and other interests thereto (excluding transmission lines from such facilities), and all dams, buildings, structures and other improvements situated thereon which are necessary or incidental to the production of power at the facility.

II. Any small scale power facility which begins commercial operation after August 29, 1981, may, at the option of the owner of such facility, be exempt from property taxation. If the owner of such facility elects to be exempt from taxation under this section, he shall enter into an agreement with the city or town in which the facility is located to make a payment in lieu of taxes. The payment shall be at least 2-1/2 percent, but not more than 5 percent, of the gross revenues of the facility in the preceding

calendar year. Should the owner of a small scale power facility and the city or town fail to agree on the percentage of gross revenues to be paid in lieu of taxes, the Commission shall determine the percentage of gross revenue payable by the owner in lieu of property taxes. An exemption under this section shall be allowed for a period of 20 years.

CHAPTER 362-A

Limited Electrical Energy Producers Act (LEEPA)

362-A:1 Declaration of Purpose. It is found to be in the public interest to provide for small scale and diversified sources of supplemental electrical power to lessen the state's dependence upon other sources which may, from time to time, be uncertain.

362-A:2 Exemption of Limited Electrical Energy Producers. Producers of electrical energy, not involving the use of nuclear or fossil fuels, with a developed output capacity for not more than 5 megawatts shall not be considered public utilities and shall be exempt from all rules, regulations and statutes applying to public utilities.

362-A:3 Purchase of Output of Limited Electrical Energy Produced by Public Utilities. The entire output of electric energy of such limited electrical energy producers, if offered for sale shall be purchased by the electric public utility which serves the franchise area in which the installations of such producers are located.

362-A:4 Payment by Public Utilities for Purchase of Output of Limited Electrical Energy Producers. Public utilities purchasing electrical energy in accordance with the provisions of this chapter shall pay a price per kilowatt hour to be set from time to time by the public utilities commission.

362-A:5 Settlement of Disputes. Any dispute arising from any provisions of this chapter may be referred by any part of the public utilities commission for adjudication.

52:2 Effective Date. This act shall take effect on day after its passage.

Approved: June 23, 1978  
Effective Date: August 22, 1978

NE 78-232

NEW HAMPSHIRE ELECTRIC COOPERATIVE, INC.

NE 78-233

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

Rates for Sale of Power by Limited Electrical Energy Producers

..00..

S U P P L E M E N T A L O R D E R N O. 13,744

Upon consideration of the foregoing report which is made a part hereof; it is

ORDERED, that the following standards shall be met by Limited Electrical Energy Producers in consideration of qualification for sale of electric energy:

1. A hydro-electric generating station will undergo an annual audit of its capability to generate its capacity during the period November 1 through February 28 each year. The proof will consist of achieving the claimed capacity for a continuous two-hour (2) interval during the period noted above. The audit shall be performed under the direction of this Commission.
2. A stream flow analysis for the previous twenty (20) years will be made. Such analysis will be a mathematical computation to confirm that the median flow during that period would support the level needed to produce the capacity achieved during the two-hour (2) test period. Such analysis shall be performed under the direction of this Commission.
3. Generation output shall be recorded at least hourly. Monthly reports indicating each hourly production shall be submitted to this Commission.

4. Each producer shall implement procedures which will provide immediate notification to the purchaser in the event of plant shut-down and re-start.

All electricity generated during a twenty-four (24) hour period up to and including the amount proved by the two-hour (2) capacity audit shall be paid by the purchaser at the rate of four and one-half cents (4½) per kilowatt-hour (KWH).

All electricity generated in excess of that proven during the two hour (2) capacity test shall be paid at the rate of four cents (4) per kilowatt-hour (KWH), subject to annual adjustments to be made by this Commission.

By order of the Public Utilities Commission of New Hampshire this twenty-third day of July 1979.

  
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Vincent J. Iacopino  
Executive Director and Secretary

SMALL ENERGY PRODUCERS AND COGENERATORS

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F I F T H S U P P L E M E N T A L O R D E R N O. 14,280

Upon consideration of the foregoing Report, which is made a part hereof; it is hereby

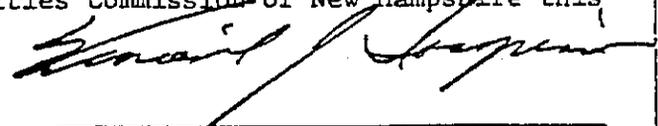
ORDERED, that all qualifying small power producers will receive 7.7¢ per KWH for all energy sold to any New Hampshire Electric Utility, and it is

FURTHER ORDERED, that all qualifying small power producers will receive 8.2¢ per KWH for reliable capacity provided to any New Hampshire Electric Utility except Granite State Electric, and it is

FURTHER ORDERED, that qualifying cogenerators are only included to the extent discussed in the Report, and it is

FURTHER ORDERED , that all electric utilities within the State provide quarterly information as to amount of KWH's purchased from small power producers,

By order of the Public Utilities Commission of New Hampshire this eighteenth day of June, 1980



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Vincent J. Iacopino  
Executive Director and Secretary

(6.) (ii)

The steps which the applicant has taken or plans to take to comply with each law cited above are as follows:

Inspection of Dams

482:3 The Applicant has submitted a request to the NH Water Resources Board for inspections of each dam.

483 All construction will be completed within 24 months after the Federal Energy Regulatory Commission license has been issued.

483-A1 Excavation and Dredging Permit; Certain Exemptions

The Applicant has filed a permit application with the New Hampshire Wetlands Board and awaits their decision as to the need or lack of need for a dredge and fill permit. A copy of the permit application is included as part of this license application.

484:1 Investigation of levels of inland waters

The Applicant will conform to such rulings that the New Hampshire Water Resources Board hands down concerning this art of the law.

(7.)

The proposed redevelopment project will have a total generating capacity of 1.5 MW using the existing Exeter 1 and Pickpocket Dams.

(a) Dam.

The Exeter 1 Dam is owned by the Town of Exeter. The dam is a 140 foot long, 8 foot high reinforced concrete gravity dam with concrete abutments. The flood capacity of the 111 foot spillway is approximately 3000 cfs.

The Pickpocket Dam is owned by the Town of Exeter. The dam is a 234 foot long, 9 foot high reinforced concrete gravity dam with concrete abutments. The flood capacity of the 140 foot spillway is approximately 2400 cfs.

(b) Intake Structure

The existing intake structure will be used for the proposed Exeter 1 site installation. The existing penstock will be removed and the new 6 foot diameter 350 foot long penstock installed.

A new intake structure will be created at the Pickpocket site. A new 6 foot diameter, 150 foot long penstock will be installed.

(c) Powerhouse.

A masonry structure will house the controls and switchgear. It also will serve as a work area to perform maintenance on the units. The building will be approximately 10' X 12' and will be located next to the discharge point. This structure will be erected at both the Exeter 1 and Pickpocket Dam sites.

(d) Tailrace.

The tailrace areas at both sites will require some excavation to accommodate the draft tubes and allow for proper expansion of the water discharging from the turbine/generator units.

(8) Lands of the United States Affected

There will be no National Parks, National Forest, Indian Reservations or Public Lands affected by this redevelopment project.

- (9) Construction of the project is planned to start within twelve months and is planned to be completed within twenty-four months from the date of issuance of the FERC license.

(10)

This application is executed in the State of New Hampshire, County of Rockingham for:

by \_\_\_\_\_,

who states that he is authorized to act in behalf of the Town, and being duly sworn, deposes and says that the contents of this application are true to the best of his knowledge or belief. The undersigned applicant has signed this \_\_\_\_\_ day of \_\_\_\_\_, 1986.

Town of Exeter  
(Applicant)

By: \_\_\_\_\_

Subscribed and sworn to before me, a (Notary Public, or title of other official authorized by the State of New Hampshire, this \_\_\_\_\_ day of \_\_\_\_\_, 1986.

\_\_\_\_\_  
(Notary Public or Other  
Authorized Official)

(1) A Brief Description of the Existing Dam and Impoundment Proposed to be Utilized by the Small Hydroelectric Project

(A) Dam: The Pickpocket Dam on the border of Exeter and Brentwood, New Hampshire spans the Exeter River. Pertinent data regarding the dam is shown below:

Dam Type ..... Reinforced Concrete  
Total Length ..... Two Hundred Thirty-Four (234) Feet  
Spillway Length ..... One Hundred Thirty (130) Feet  
Crest Elevation ..... 103.8 Feet MSL  
Abutments ..... Concrete  
Maximum Height of Dam ..... Eight (8) Feet

Approximately thirty (30) feet downstream from both the Pickpocket and Exeter Dams is a second reinforced concrete gravity structure constructed for a retention pool at the time that the fish ladders were installed. Four foot-long stoplogs are used in the retention dams for pool control. The Exeter 1 Dam in downtown Exeter is located at the entrance to the Squamscott River. Pertinent data regarding the dam are shown below:

Dam Type ..... Reinforced Concrete  
Total Length ..... One Hundred Forty (140) Feet  
Spillway Length ..... One Hundred Eleven (111) Feet  
Crest Elevation ..... 36.5 Feet MSL  
Abutments ..... Concrete  
Maximum Height of Dam ..... Nine (9) Feet

(B) Impoundment : Pertinent data regarding the impoundment of the Pickpocket and Exeter dams is summarized in the following two tables:

Pickpocket Dam . . . . .	Dam 29.07
Normal Pool Elevation . . . . .	103.8 FT MSL
Surface Area . . . . .	22 Acres
Normal Storage Capacity . . . . .	350 Acre Feet
Length of Spillway . . . . .	130 Feet
Flood Discharge Capacity . . . . .	2400 CFS
Drainage Area . . . . .	86.2 Sq. Mi.

Exeter Dam . . . . .	Dam 82.01
Normal Pool Elevation . . . . .	36.5 FT MSL
Surface Area . . . . .	36 Acres
Normal Storage Capacity . . . . .	545 Acres
Length of Spillway . . . . .	111 Feet
Flood Discharge Capacity . . . . .	3000 CFS
Drainage Area . . . . .	102.7 Sq. Mi.

(C) Gate Structure: The existing spillway gate for the Exeter Dam is a four foot six inch (4'-6") by five foot wooden gate with wheel and gear control. The new penstock will utilize the existing penstock and headworks. The existing floodgate will remain as is and be used in the same manner. The existing spillway gate for the Pickpocket Dam will remain and be used for flood control. A new control gate and headworks will be needed for the Proposed penstock.

(D) Powerhouses (turbine bays): Both Pickpocket and Exeter Dam will require a new powerhouse to house the generating units, power panels and maintainance equipment. The powerhouse structures will measure approximately ten (10) feet by ten (10) feet , and will be constructed of reinforced concrete with a brick exterior. The powerhouse structure will consist of one open bay, which will contain one turbine and generator.

(E) Discharge Basin: For both dams discharge from the turbine will be returned to the Exeter River below the spillway and the retention pool. The discharge basin will be 12 feet deep, 20 feet long and 12 feet wide. This basin will act to reduce exit velocities from the turbine.

(F) Intake: Both Dams will require dredging of a channel in the river bed upstream of the intake structures, to remove accumulated sediment.

(G) Transmission Lines: All power generated from both facilities will be sold to Exeter Hampton Electric Company. Both dams are close to utility lines and specific details about connection is waiting for design from Exeter Hampton Electric Company.

(H) Both dams will pass 55 cfs minimum flow as recommended by the U.S. Fish and Wildlife Services.

(2) The Number of Existing and Proposed Generating Units At the Project, Including Auxiliary Units, the Capacity of Each Unit , Any Provisions for Future Units, and A Brief Description of Any Plans for Retirement or Rehabilitation of Existing Generating Units.

(A) There are currently no existing generating units in operation at the Exeter1/Pickpocket Dam Projects.

(B) Technical data regarding the proposed generating units are summarized below:

Pickpocket Dam

Number of Generating Units	1
Maximum Turbine Discharge (cfs)	203
Minimum Turbine Discharge (cfs)	41
Turbine Power (Kw)	133
Total Installed Capacity (Kw)	133

Exeter Dam

Number of Generating Units	1
Maximum Turbine Discharge (cfs)	257
Minimum Turbine discharge (cfs)	51
Turbine Power (Kw)	269
Total Installed Capacity (Kw)	269

(3) The Type of Each Hydraulic Turbine Of the Small Hydroelectric Power Project.

(A) The Exeter 1/Pickpocket Dam Hydroelectric Power Plants will be operated in an automatic run-of-the-river mode and controlled by means of a headwater level indicator. Provisions for remote supervisory control and fully manual operation shall also be included in the turbine/generator control system.

The instantaneous load delivered by the turbines to the utility grid will be based on turbine operating limits as specified by the turbine manufacturer. Appropriate load levels shall be

computed by a programmable controller.

Table A-1 depicts the expected operating regimes of the Exeter 1 Dam/Pickpocket Dam Facilities under normal and adverse water conditions.

TABLE A-1

<u>Impoundment Stage</u>	<u>Available flows</u>	<u>Mode of Operation</u>
Normal Pool	Less than Min. flow capacity of single turbine.	Generating facility shutdown due to low water availability. Flows discharged over spillway and through fishladder.
Normal Pool	Min. flow for turbine to Max. Plant Hydraulic Capacity	Automatic run of river. The facility will be controlled by maintaining headwater based on availability of generating flows.
Above Normal Pool	Greater than Max. Plant Hydraulic Capacity	Full plant capacity- Excess flows passed over spillway and through fishladder, as well as through existing gateworks as necessary.

(5) A Graph Showing A Flow Duration Curve for The Project, Or, If flow Data Are Not Available From U.S.G.S. Records, The Estimated Average Annual Stream Flow In Cubic Feet Per Second.

(A) Average annual flow for forty-five (45) years of record (Oct. 1934 - Sept. 1979) proportioned from a similar watershed, are presented in figures A-1 and A-2. The U.S. Geologic Survey does not gage the stream flow in the Exeter River. The flow duration curves are extrapolated from measured flow data of the Lamprey River. The U.S. Geologic Survey gage for the

Lamprey River is the following:

<u>USGS GS No.</u>	<u>Location</u>	<u>Drainage Area</u> (sq. mi)	<u>Period of Record</u>
01073500	Lamprey Rvr.	183	1934 - 1979

The drainage area at the Pickpocket Dam is 86.2 sq. miles, and the drainage area for the Exeter Dam is 102.7 sq. miles. The synthesized curves for each site were developed by transposing average annual flows at the Lamprey River gage to the intervening area by the ratio of the drainage areas.

(Pickpocket : 86.2sq.mi./ 183 sq.mi.)  
(Exeter : 102.7sq.mi/ 183 sq.mi.)

(B) The estimated average annual streamflow at the Pickpocket Dam is 136.00cfs, and 160.00 cfs at the Exeter 1 Dam.

(6) Estimations Of:

(i) The average annual generation in kilowatt hours is:

Pickpocket Dam : 460,000 Kwh/yr

Exeter Dam : 940,000 Kwh/yr

(ii) The average and design head of the power plants are:

Pickpocket Dam :

(A) Average Head: 10.5 ft.

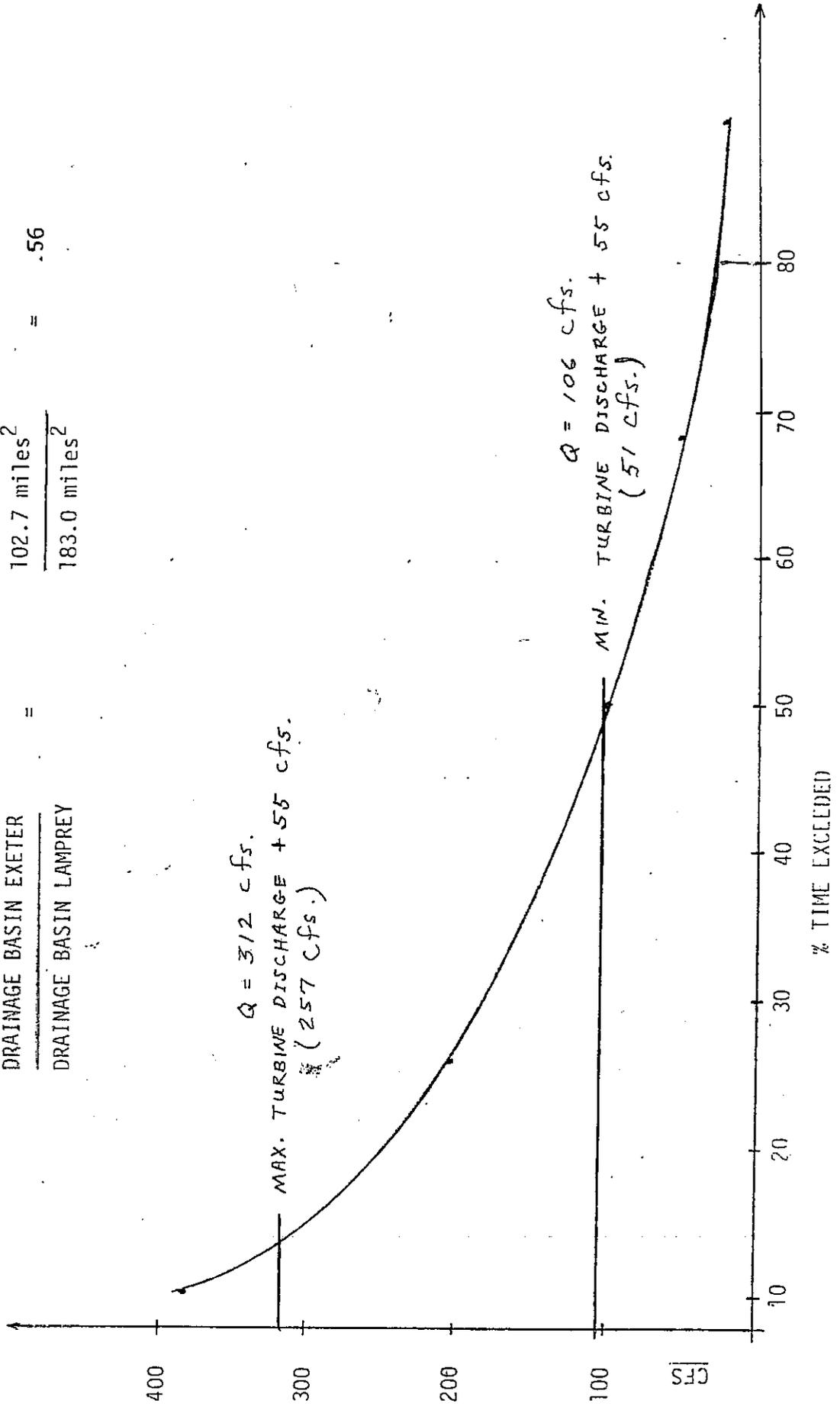
(B) Design Net Head: 10.0 ft.

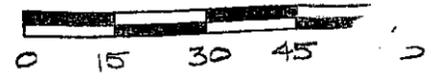
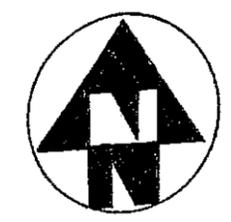
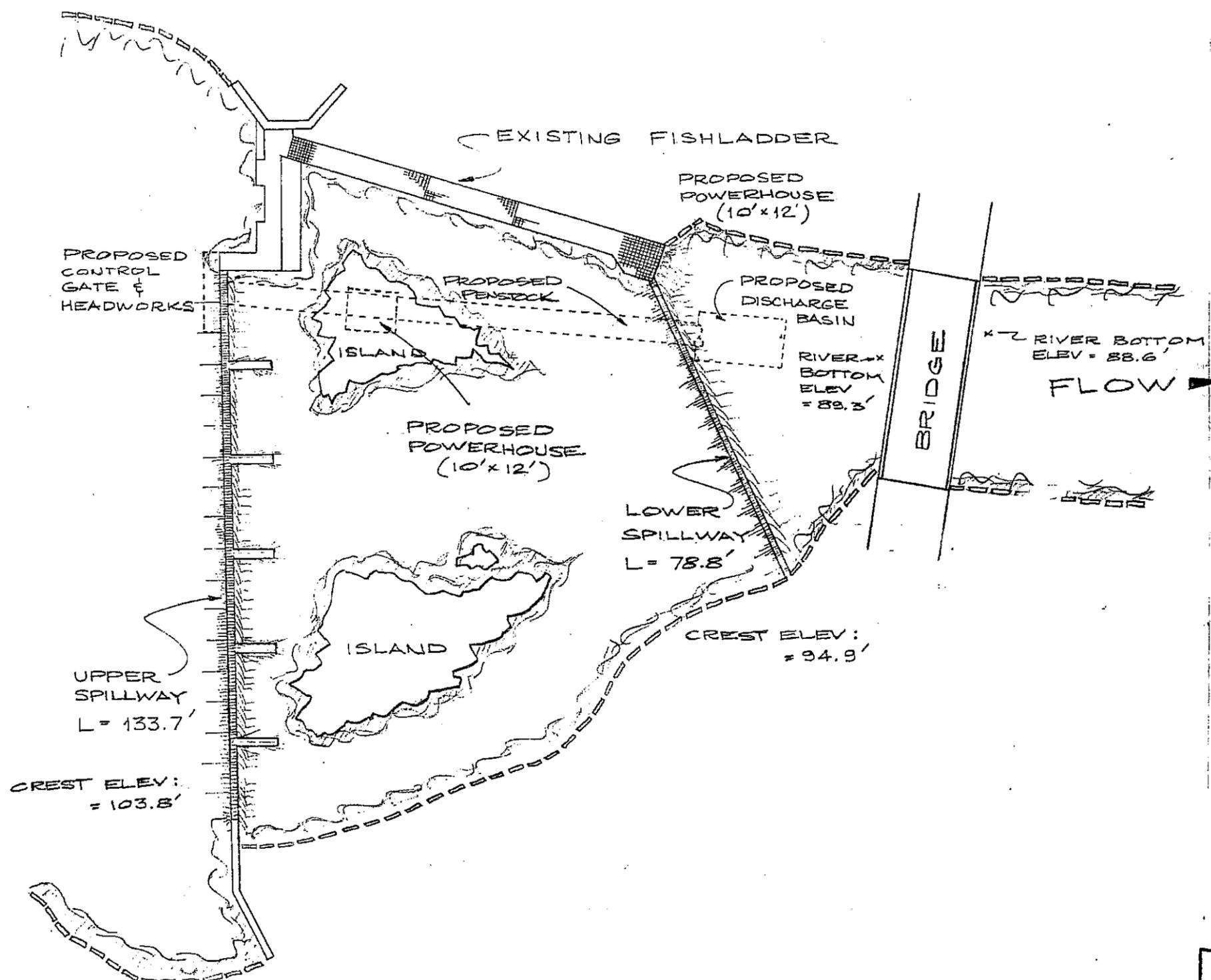
FIGURE 1

FLOW DURATION CURVE FOR EXETER RIVER

Calculated by Proportioning Flow Data of Lamprey River  
by Ratio of Drainage Areas

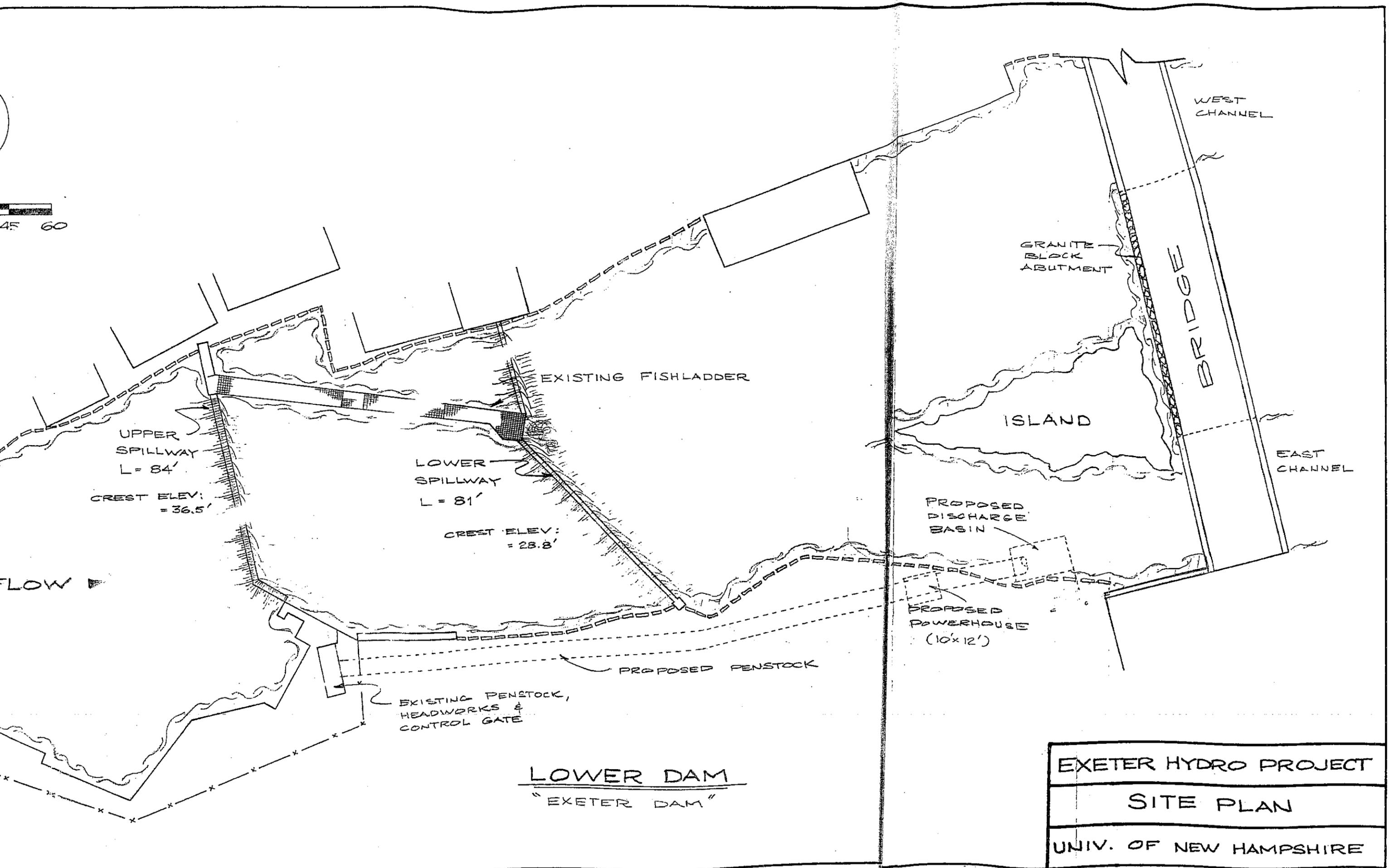
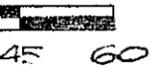
$$\frac{\text{DRAINAGE BASIN EXETER}}{\text{DRAINAGE BASIN LAMPREY}} = \frac{102.7 \text{ miles}^2}{183.0 \text{ miles}^2} = .56$$





UPPER DAM  
 "PICKPOCKET DAM"

EXETER HYDRO PROJECT
SITE PLAN
UNIV. OF NEW HAMPSHIRE



LOWER DAM  
"EXETER DAM"

EXETER HYDRO PROJECT
SITE PLAN
UNIV. OF NEW HAMPSHIRE

EXHIBIT E

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## Environmental Report

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### 1) Description of Environmental Setting

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The proposed hydroelectric facilities will be installed on each of two run-of-the-river dams on the Exeter River, County of Rockingham, Exeter, NH. Dam 82.01, the Exeter 1 Dam, is located in the downtown stretch of the river, at the entrance to the Squamscott River. Dam 29.07, the Pickpocket Dam, is located approximately five miles upstream from the Exeter 1 Dam on the Exeter-Brentwood town line.

### A) Vegetative Cover

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The land in the project vicinity of Dam 29.07 consists primarily of fields, wooded hills, and natural swamps. The land at the Dam 82.01 site is situated in downtown Exeter. The west bank is bordered by residential and commercial buildings. The bank on the east side is grass-covered with a small number of pine trees, oak trees, poplar trees, and alders.

### B) Fish and Wildlife Resources

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#### 1) Fish

According to the New Hampshire Fish and Game Department, the Exeter River contains creek chubsuckers, Eastern chain pickerel, common white sucker, pumpkinseed, largemouth and smallmouth bass, brown bullhead and yellow perch fish. There are no known threatened or endangered species in either reach of the river.

The New Hampshire Fish and Wildlife Service and the State Fish and Game Department have developed and operate a fish

passage at each damsite to allow salmon to return to spawning grounds.

## 2) Wildlife

The Exeter River is a likely habitat for racoon, red fox, grey squirrel, cottontail rabbit, whitetail deer, Eastern chipmunk, woodchuck and muskrat. In addition, several species of birds reside in the area including swallows, warblers, wrens, sparrows, redwings, grackles, and mallard, black and wood ducks.

## C) Water Quality and Quantity

-----

The Exeter River is a freshwater river with an approximate drainage area of 103 square miles. The New Hampshire Water Supply and Pollution Control Commission lists the Exeter River as a Class B water quality river, indicating that it is both swimmable and fishable.

## D. Land and Water Uses

-----

The land area of Dam 29.07 consists mainly of wooded hills and natural swampland. For Dam 29.07 the land on the west bank of the river is comprised mainly of residential and commercial buildings. On the east bank, the stretch of grass-covered land has a small number of trees and picnic tables which serve as a public leisure and recreational area.

The ponds behind both dams are utilized as fishing grounds

by many citizens. The pond area behind Dam 82.01 provides the Town of Exeter with its drinking water supply and fire protection. Phillips-Exeter Academy makes use of the river water in their ice rink cooling system.

#### E. Recreational Uses

-----

As previously mentioned, many citizens fish on the ponds behind the dams. The commercial area on the west bank of Dam 82.01 limits use of the dam area due to lack of public access. The east bank can provide minor recreational activity on the grassy area.

#### F. Historical and Archeological Resources

-----

At Dam 29.07, there has been an archeological excavation resulting in the uncovering of prehistoric artifacts. Between 1955 and 1956 discoveries of Indian pottery were made at the low knoll situated in the vicinity of the dam. Dam 82.01 is located within the historic district of Exeter. Both plans for development are being proposed under the consultation of a New Hampshire Historical Society representative.

## G. Scenic and Aesthetic Qualities

---

The two Exeter, NH hydroelectric facilities will be located on the Exeter River. The upstream site of Pickpocket Dam on the Exeter-Brentwood town line is in the southwest corner of Exeter. The river takes a circuitous route which could have been caused by the formation of a glacial knoll. The glacial knoll, consisting of large boulders buried in sediment, is situated along an east-west line of the Exeter River.

## 2. Description of Environmental Impacts Expected From Construction of the Proposed Hydropower Facilities

---

### A. Vegetative Cover

---

The construction of the hydroelectric facility of Dam 29.07 will necessitate the alteration of one of two small islands of vegetative debris. At the upper site, Dam 82.01, the existing residential and commercial buildings on the west bank will not be interfered with. The east bank will require the removal of some vegetation in order to install the penstock. This area is to be relandscaped upon completion of the project.

### B. Fish and Wildlife Resources

---

Construction of the hydroelectric facilities will take place during the late summer months when flows are at a minimum. To insure the protection of young fish which will be developing in the ponds behind both dams, coffer dams will be utilized to close off the construction area. Hydro-facility operations will run

from January to June of each year. Migration downstream of mature fish occurs during the months of October to November, thus operation of the turbine systems will not coincide with fish movement downstream.

#### C. Water Quality and Quantity

Installation of the two facilities will not adversely affect the water quality. The temperature of the water will remain unchanged and the dissolved oxygen level of the water may actually be increased by the agitating action of the turbines.

When the hydroelectric facilities are in operation, flow will be maintained above the U.S. Fish and Wildlife Services minimum requirement of 55 cfs to insure the successful operation of the fish ladders. The turbines will not operate July through December, when the minimum flow requirements will not be met. The water running through the turbine system will discharge into a basin, which will act as a pool to reduce the velocity of the exiting water. Therefore, downstream erosion is not expected.

#### D. Land and Water Uses

The only land area that will be affected by the installation of the hydropower facilities is the east bank at Dam 82.01. As previously stated, this area directly along the bank is to be relandscaped upon completion of the project and should not detract from the leisure and recreational area directly behind

it. Water uses will not be altered as the proposed projects are run-of-the-river operations.

#### E. Recreational Uses

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Utilization of the pond areas behind the dams for fishing will not be affected by these run-of-the-river operations.

#### F. Historical

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The project at Dam 29.07 is located near an area of historic significance. Dam 82.01 is located within the historic district of Exeter. The New Hampshire Historical Society will be contacted if historically significant items are discovered during the project development.

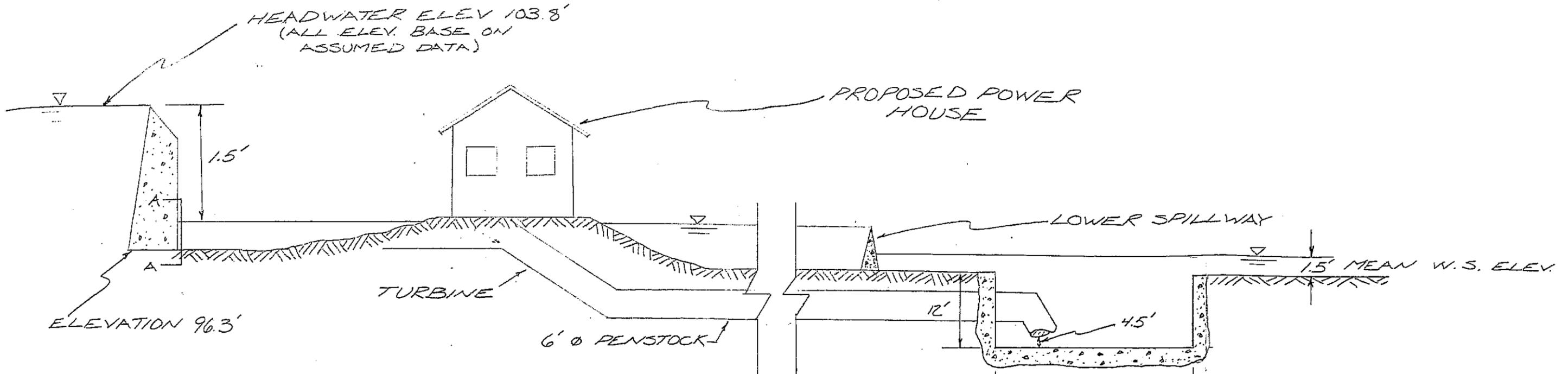
#### G. Scenic and Aesthetics

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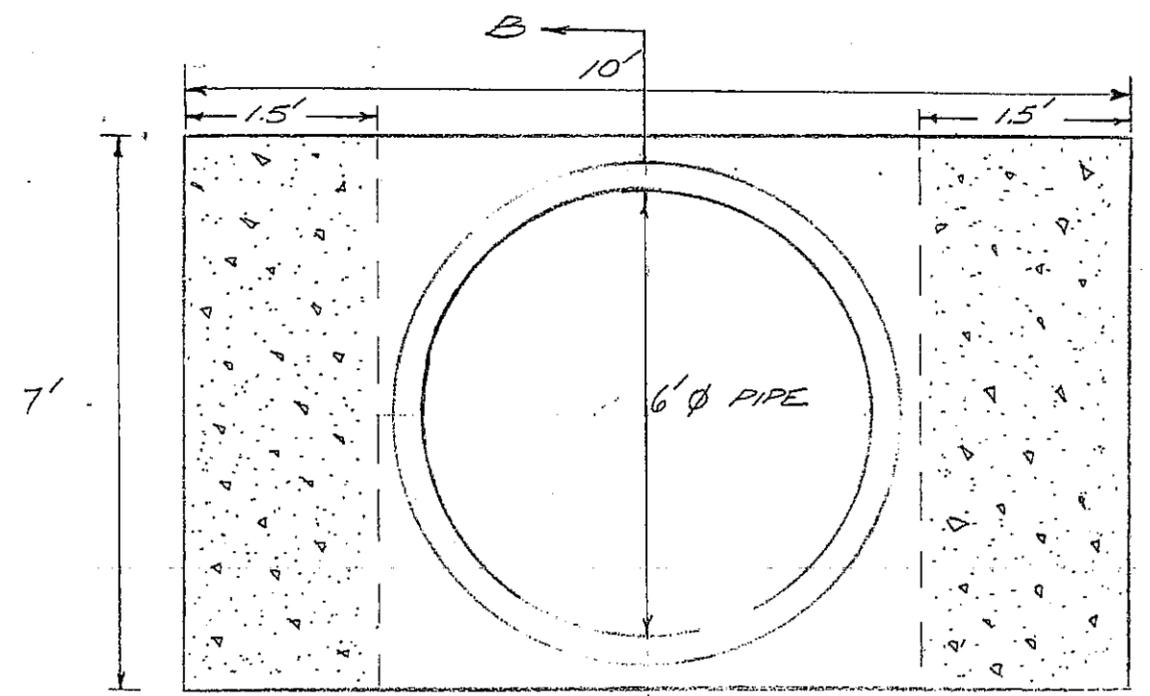
A single story powerhouse structure will be erected at each dam sites. The power houses will occupy approximately 120 square feet of land (dimensions 10 ft by 12 ft) each. At the upper dam site, the powerhouse will be situated on the northernmost island that is currently covered with vegetative debris. At the lower dam site, the powerhouse will be on the east bank.

EXHIBIT G

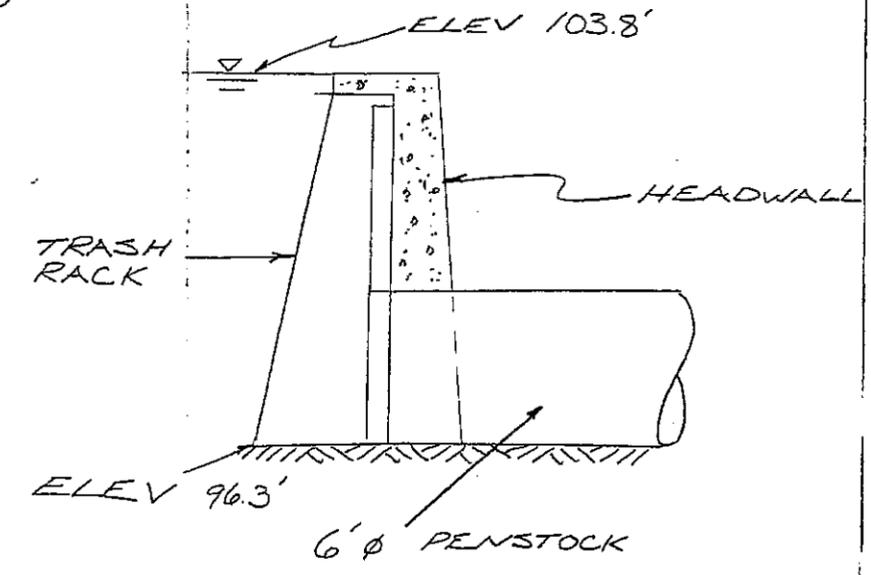
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SECTION A-A



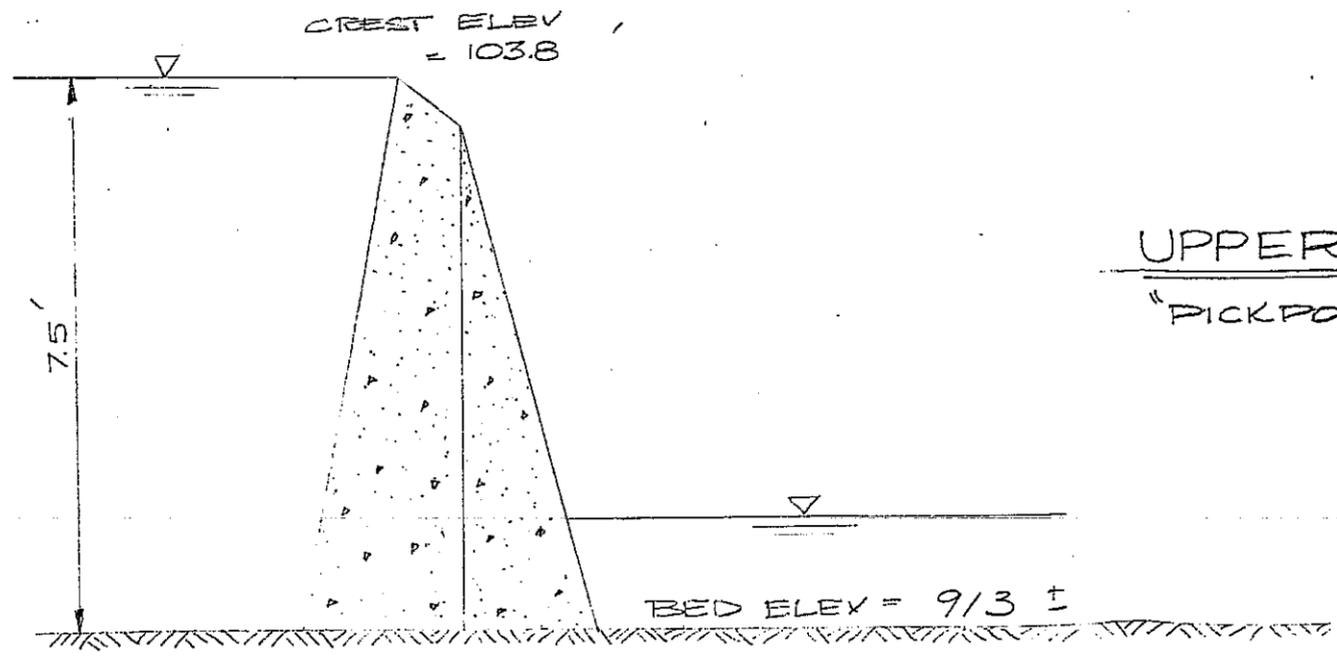
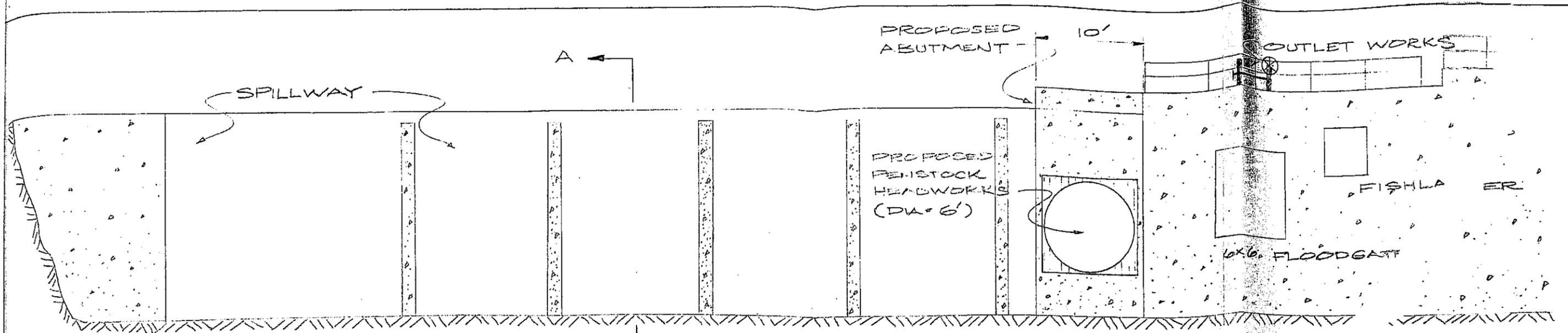
NEW UPSTREAM HEADGATE



SECTION B-B

UPPER DAM

PICKPOCKET DAM	
HYDRO PROJECT	
PROFILE/DETAILS	
SCALE AS SHOWN	EXHIBIT B
DATE: 4-25-86	

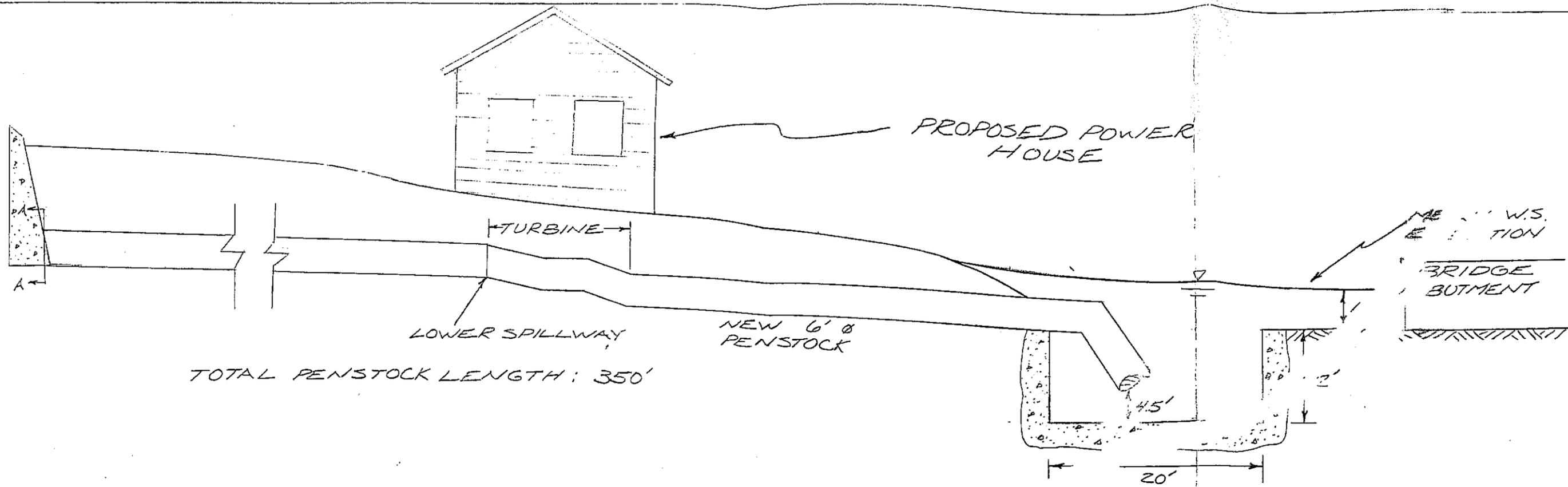


UPPER DAM  
"PICKPOCKET DAM"

EXETER HYDRO PROJECT

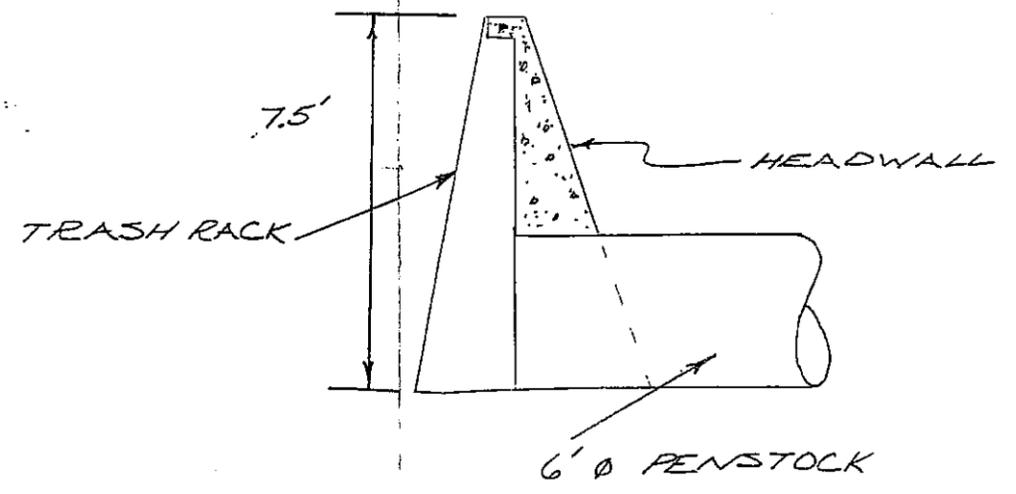
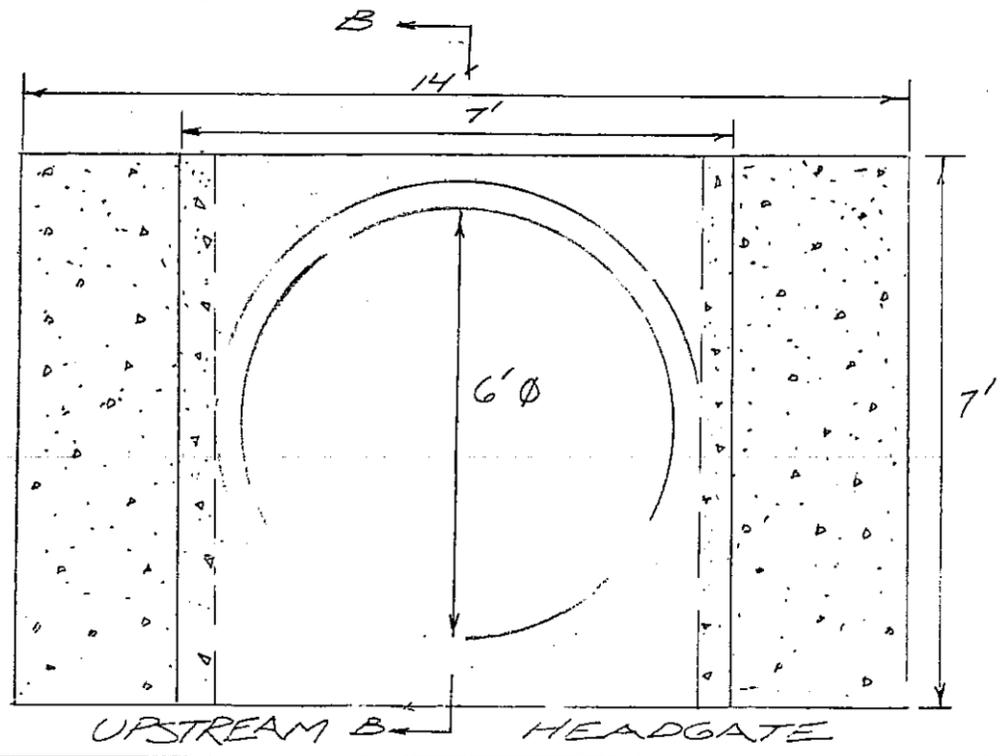
UPSTREAM VIEW

UNIV. OF NEW HAMPSHIRE



SECTION A-A

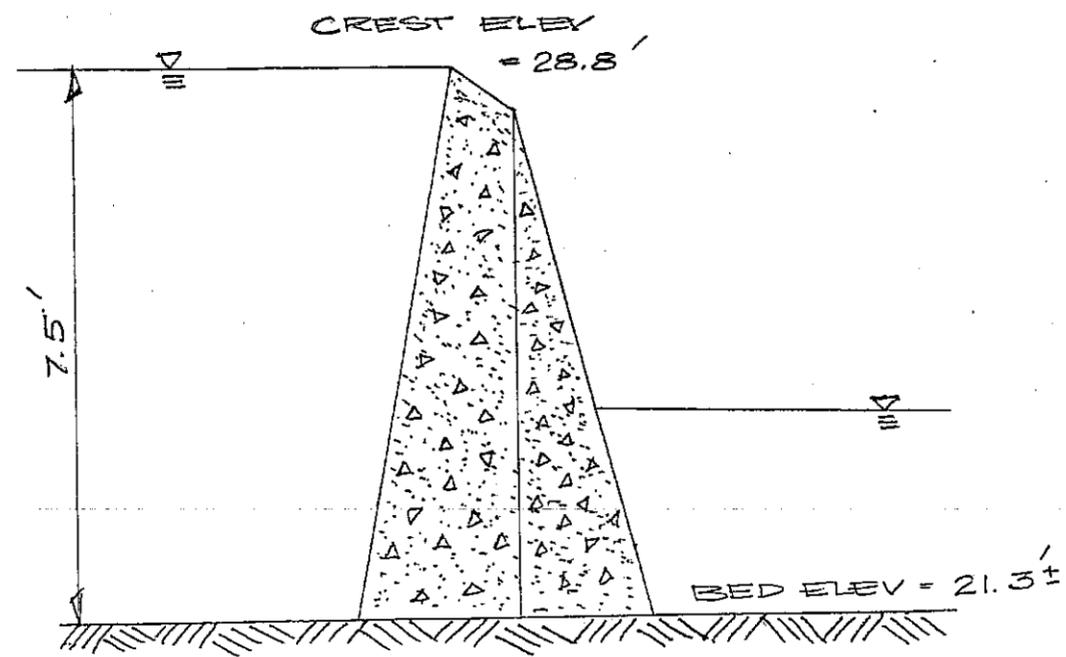
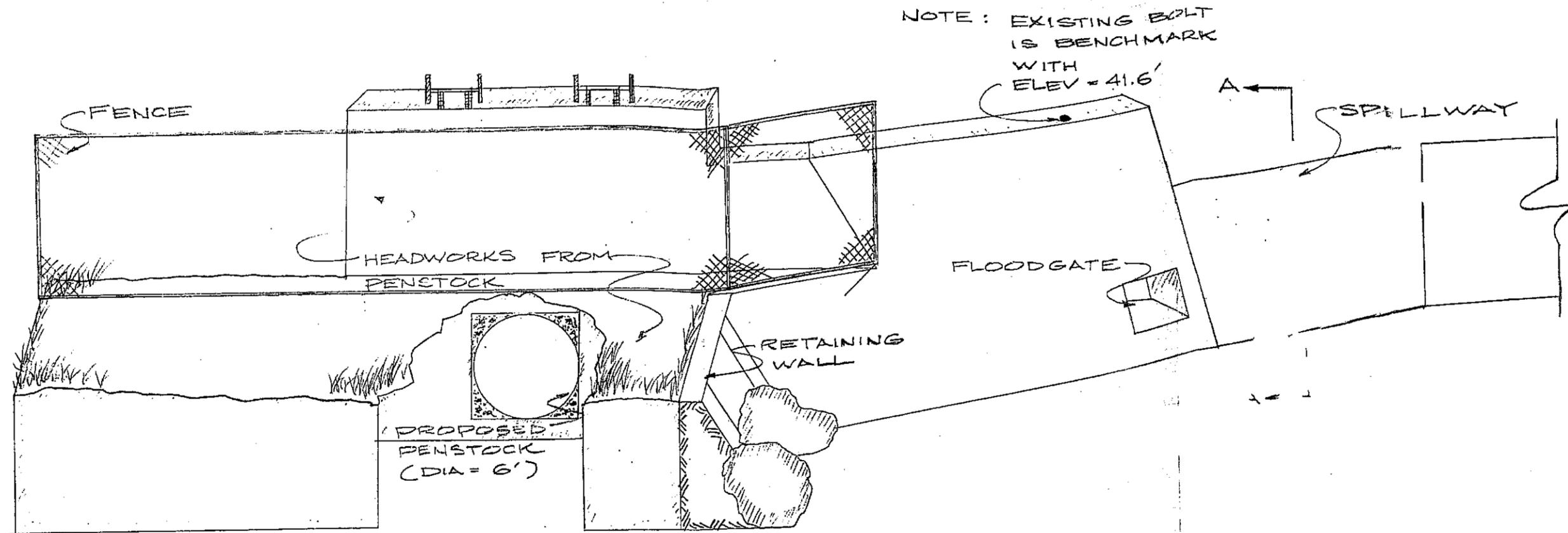
EXISTING PENSTOCK HEADWORKS OPENING: 14'x7'  
 PROPOSED PENSTOCK HEADWORKS OPENING: 7'x7'



SECTION B-B

LOWER DAM

EXETER DAM HYDRO PROJECT	
PROFILE/DETAILS	
SCALE AS SHOWN	EXHIBIT A
DATE: 4-25-86	



LOWER DAM  
"EXETER DAM"

EXETER HYDRO PROJECT
UPSTREAM VIEW
UNIV. OF NEW HAMPSHIRE

PART II

ECONOMIC ANALYSIS

UPPER DAM (PICKPOCKET)

Item	Nominal Cost	Amount of Material	Total Cost
<b>I) Civil Works</b>			
Pipe Installation/Excavation	\$150/ft	120 ft	\$18,000
Concrete Cradles	\$100/yd	40 yds	\$4,000
Power House	--	--	\$5,000
Discharge Basin Excavation	\$40/yd	100 yds	\$4,000
Steel Walkway	--	--	\$4,000
			-----
		subtotal =	\$35,000
<b>II) Turbine/Generators</b>			
Hardware	--	1 Turbine	\$188,200
Installation	\$600/day	5 Days	\$3,000
			-----
		subtotal =	\$191,200
<b>III) Electrical</b>			
Interconnection Study	--	--	\$5,000
Control Panel with:	--	--	\$28,590
Water Level Sensing Device			
Relays			
			-----
		subtotal =	\$33,590
<b>IV) Hardware</b>			
Gates	--	1 gate	\$5,000
Penstock	\$250/ft	120 ft	\$30,000
Miscellaneous	--	--	\$30,000
			-----
		subtotal =	\$ 65,000
		TOTAL COST =	\$324,790

LOWER DAM (EXETER)

Item	Nominal Cost	Amount of Material	Total Cost
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I) Civil Works

Pipe Installation/Excavation	\$120/ft	350 ft	\$42,000
Concrete Cradles	\$100/yd	50 yds	\$5,000
Power House	--	--	\$5,000
Discharge Basin Excavation	\$40/yd	100 yds	\$4,000
			-----
		subtotal =	\$56,000

II) Turbine/Generators

Hardware	--	1 Turbine	\$222,100
Installation	\$600/day	5 Days	\$3,000
			-----
		subtotal =	\$225,100

III) Electrical

Interconnection Study	--	--	\$5,000
Control Panel with:	--	--	\$33,890
Water Level Sensing Device			
Relays			
			-----
		subtotal =	\$38,890

IV) Hardware

Gates	--	--	exists
Penstock	\$250/ft	350 ft	\$87,500
Miscellaneous	--	--	\$40,000
			-----
		subtotal =	\$127,500

TOTAL COST = \$447,490

PROJECT FEASIBILITY

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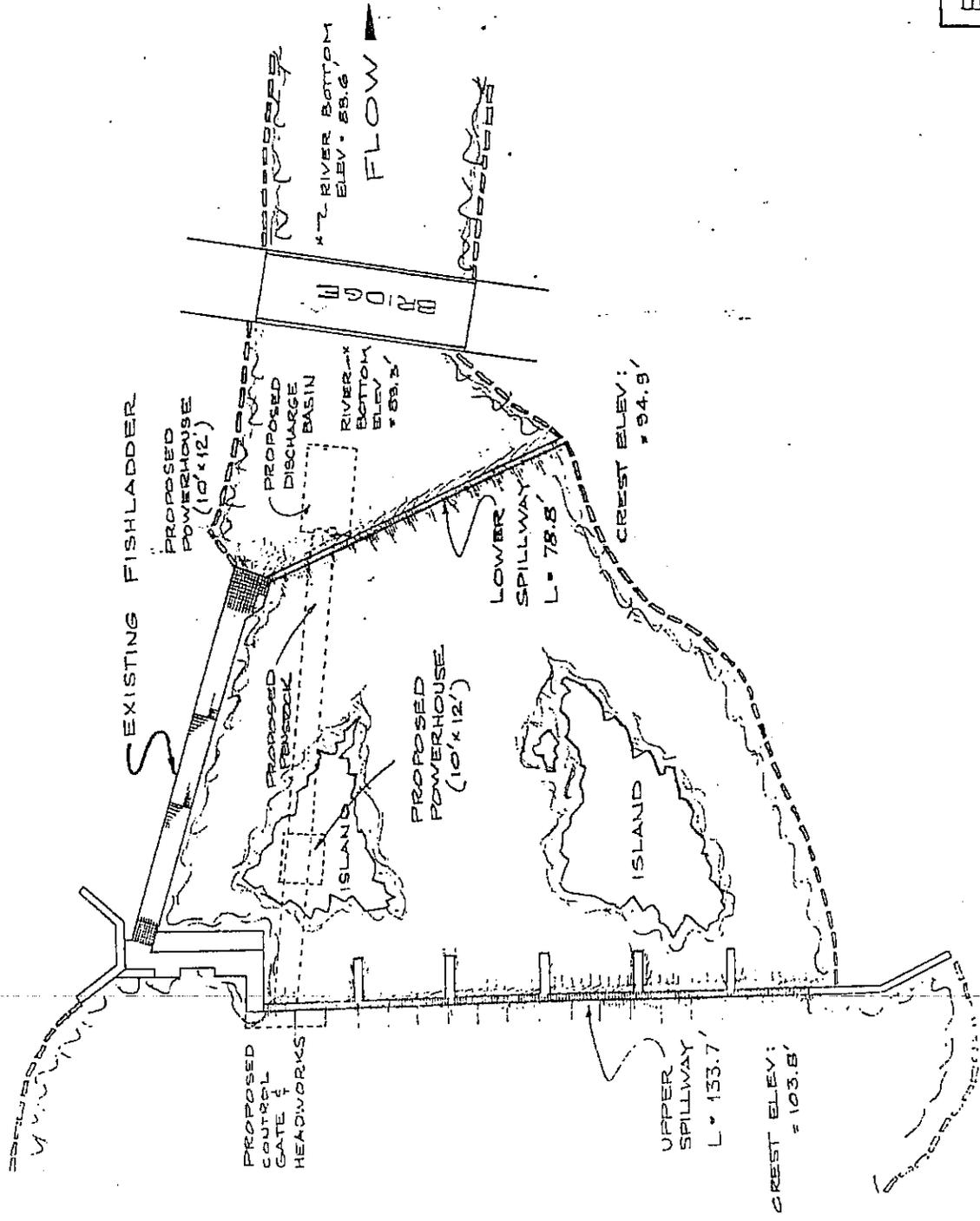
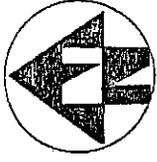
ASSUMPTIONS:

-----

Real Interest Rate = 11%/year  
 Project Life = 20 years  
 Unit Price for Power = 10 /kW hr

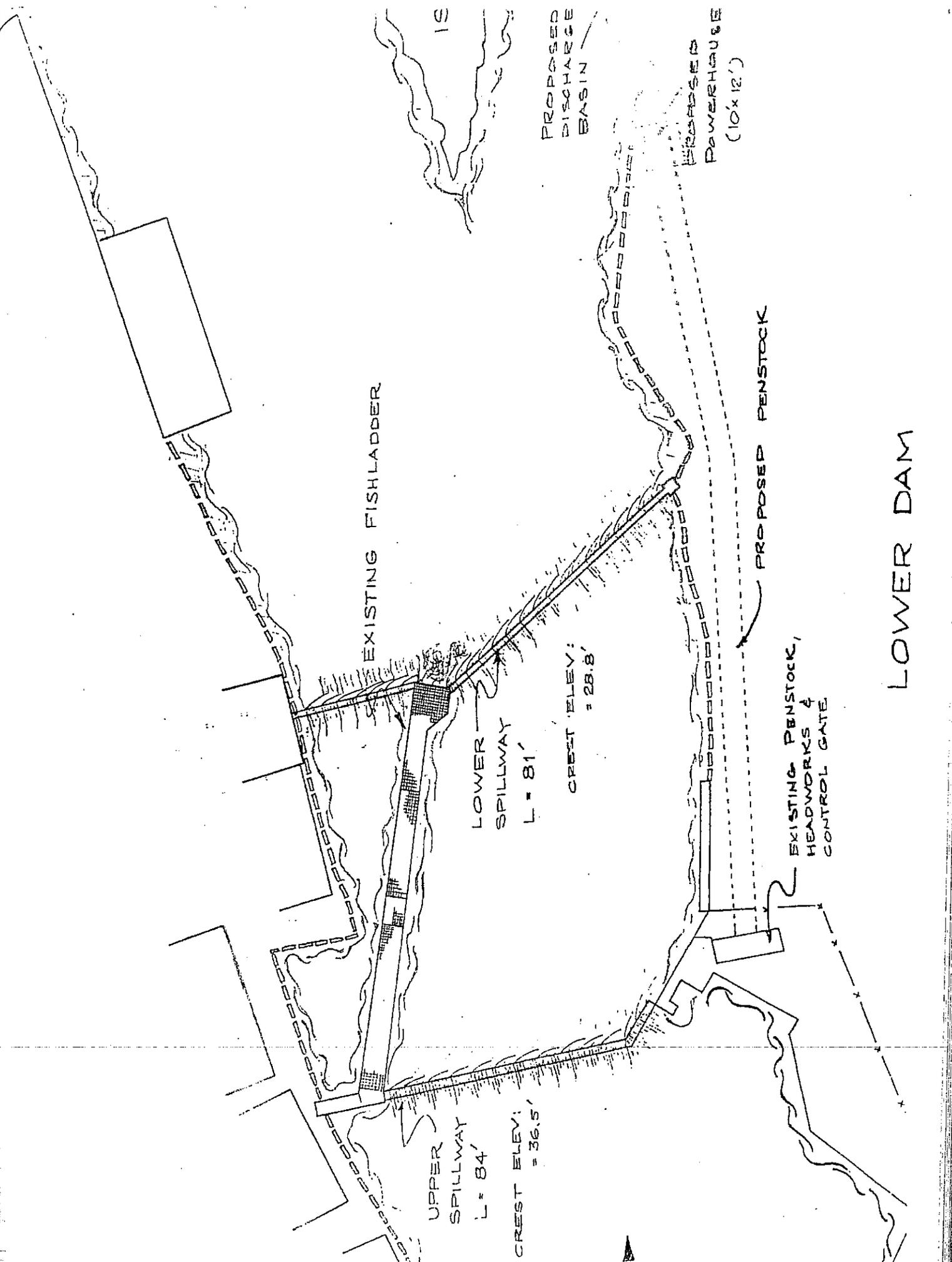
	UPPER DAM (PICKPOCKET)	LOWER DAM (EXETER)
TOTAL POWER	460,000 kW hr/year	940,000 kW hr/year
TOTAL REVENUE	\$46,000/year	\$94,000/year
GROSS (Capitol) COST	\$324,790	\$447,490
RETURN ON GROSS	14.2%	21.0%
With 100% Financing:		
ANNUAL COST	\$40,785	\$56,194
ANNUAL PROFIT	\$5,215	\$37,806

PART III  
PRESENTATION REPORT



EXETER HYDRO PROJECT  
SITE PLAN  
UNIV. OF NEW HAMPSHIRE

UPPER DAM  
"PICKPOCKET DAM"



19

PROPOSED  
DISCHARGE  
BASIN

PROPOSED  
POWERHOUSE  
(10x12')

EXISTING FISHLADDER

LOWER  
SPILLWAY  
L = 81'

CREST ELEV:  
= 28.8'

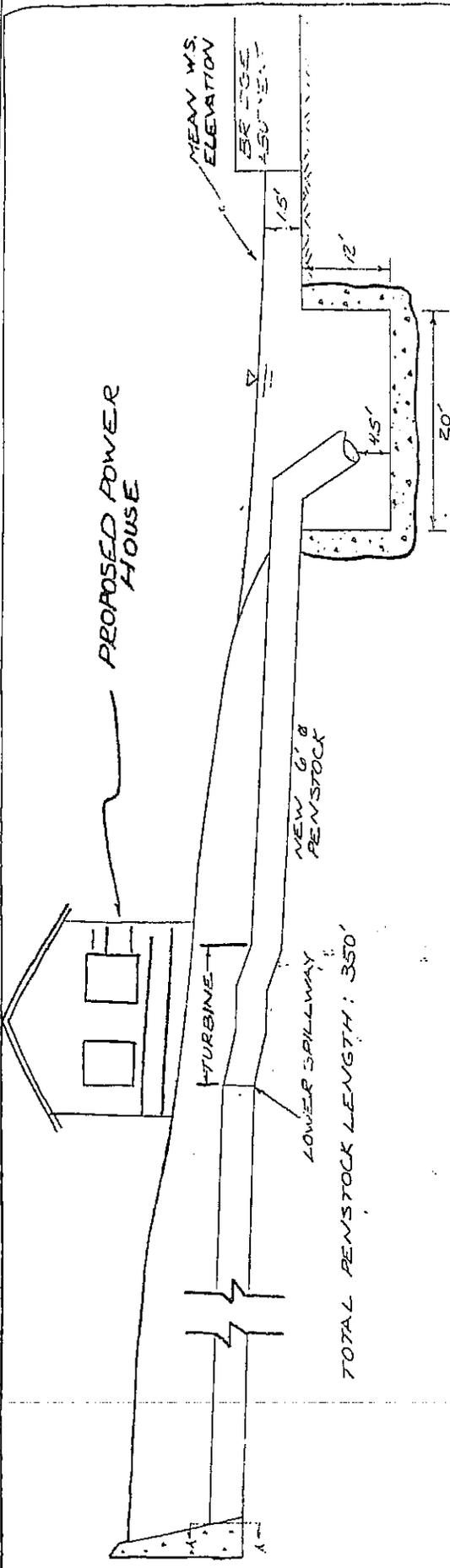
PROPOSED PENSTOCK

EXISTING PENSTOCK,  
HEADWORKS &  
CONTROL GATE

UPPER  
SPILLWAY  
L = 84'

CREST ELEV:  
= 36.5'

LOWER DAM



PROPOSED POWER HOUSE

TURBINE

LOWER SPILLWAY

TOTAL PENSTOCK LENGTH: 350'

NEW 6' Ø PENSTOCK

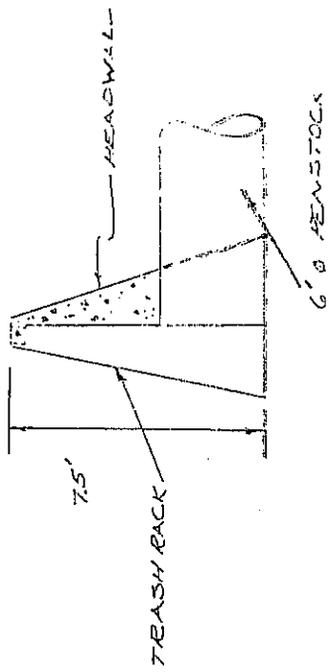
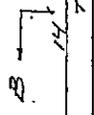
MEAN W.S. ELEVATION

BRIDGE ELEVATION

SECTION A-A

EXISTING PENSTOCK HEADWORKS OPENING: 14'x7'

PROPOSED PENSTOCK HEADWORKS OPENING: 7'x7'



SECTION B-B

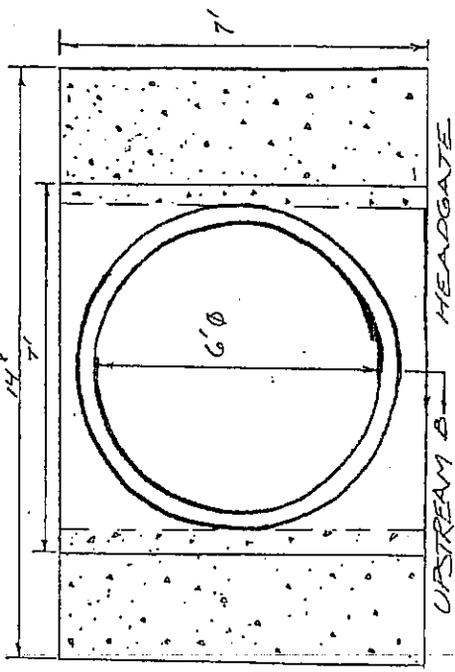
EXETER DAM  
HYDRO PROJECT

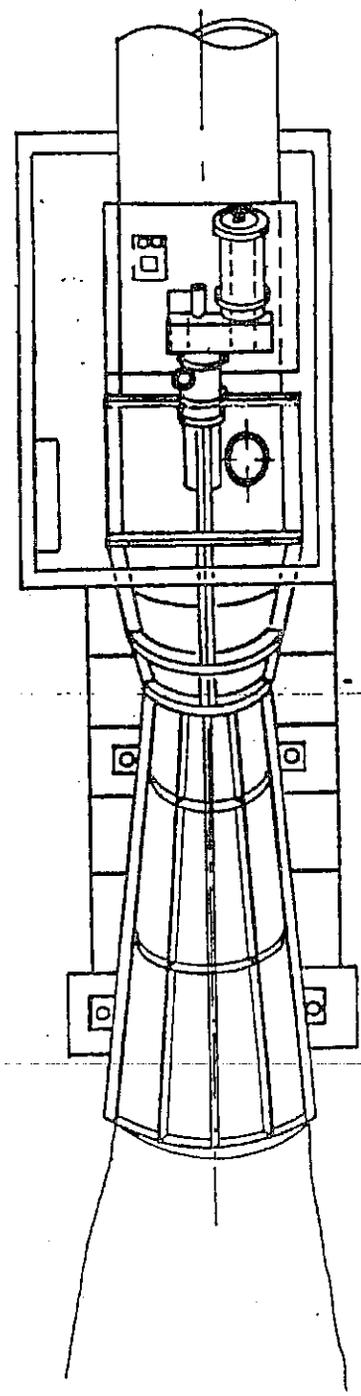
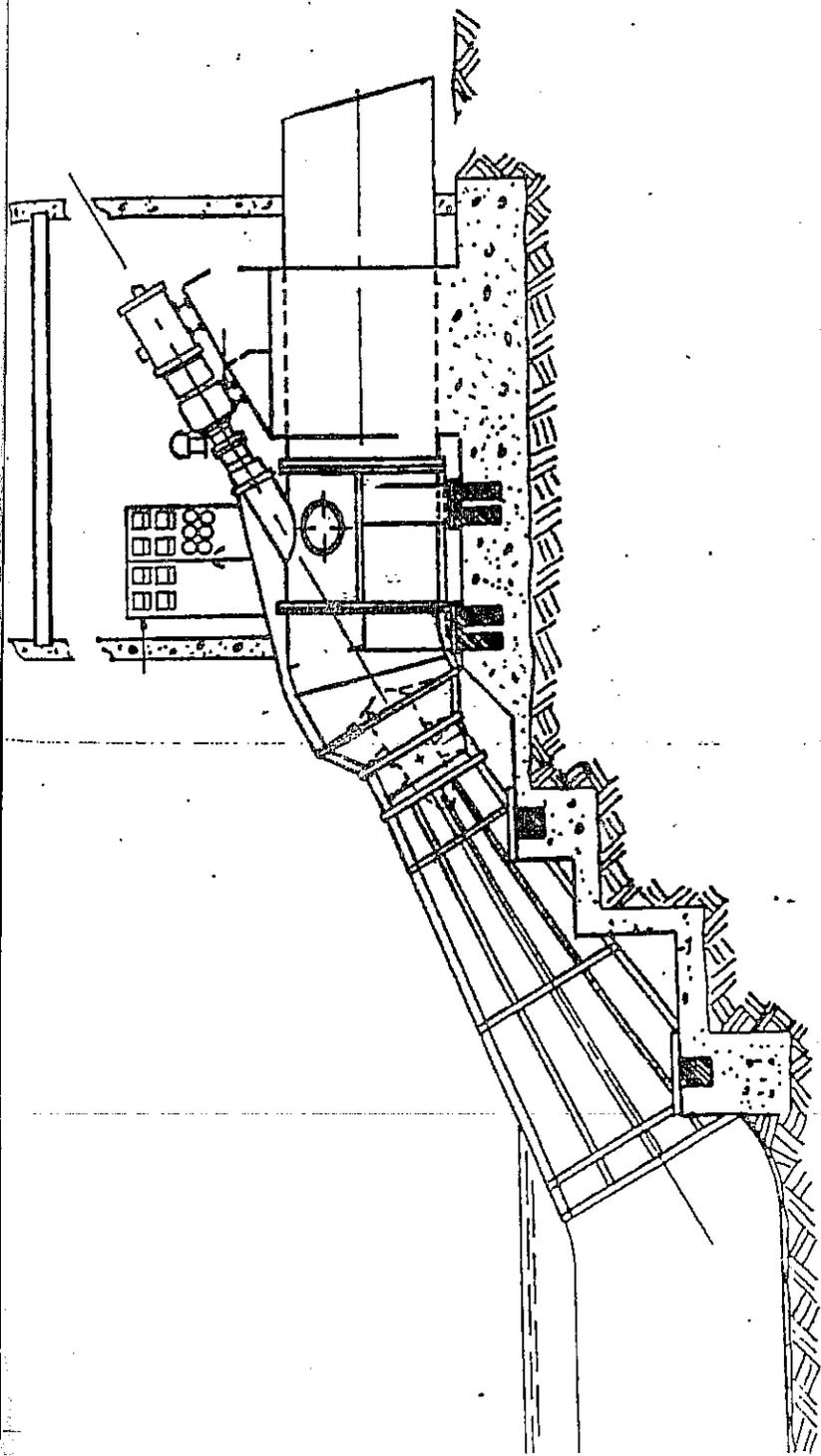
PROFILE/DETAILS

SCALE AS SHOWN  
DATE: 4-25-86

EXHIBIT A

LOWER DAM





PACKET DAM:  
10' NET DESIGN HEAD

FLOW DURATION CURVE

FOR EXETER RIVER

CALCULATED BY PROPORTIONING FLOW DATA  
OF LAMPREY RIVER BY RATIO OF DRAINAGE AREAS

$$\frac{\text{DRAINAGE BASIN EXETER}}{\text{DRAINAGE BASIN LAMPREY}} = \frac{86.2 \text{ mi}^2}{183. \text{ mi}^2} = 0.47$$

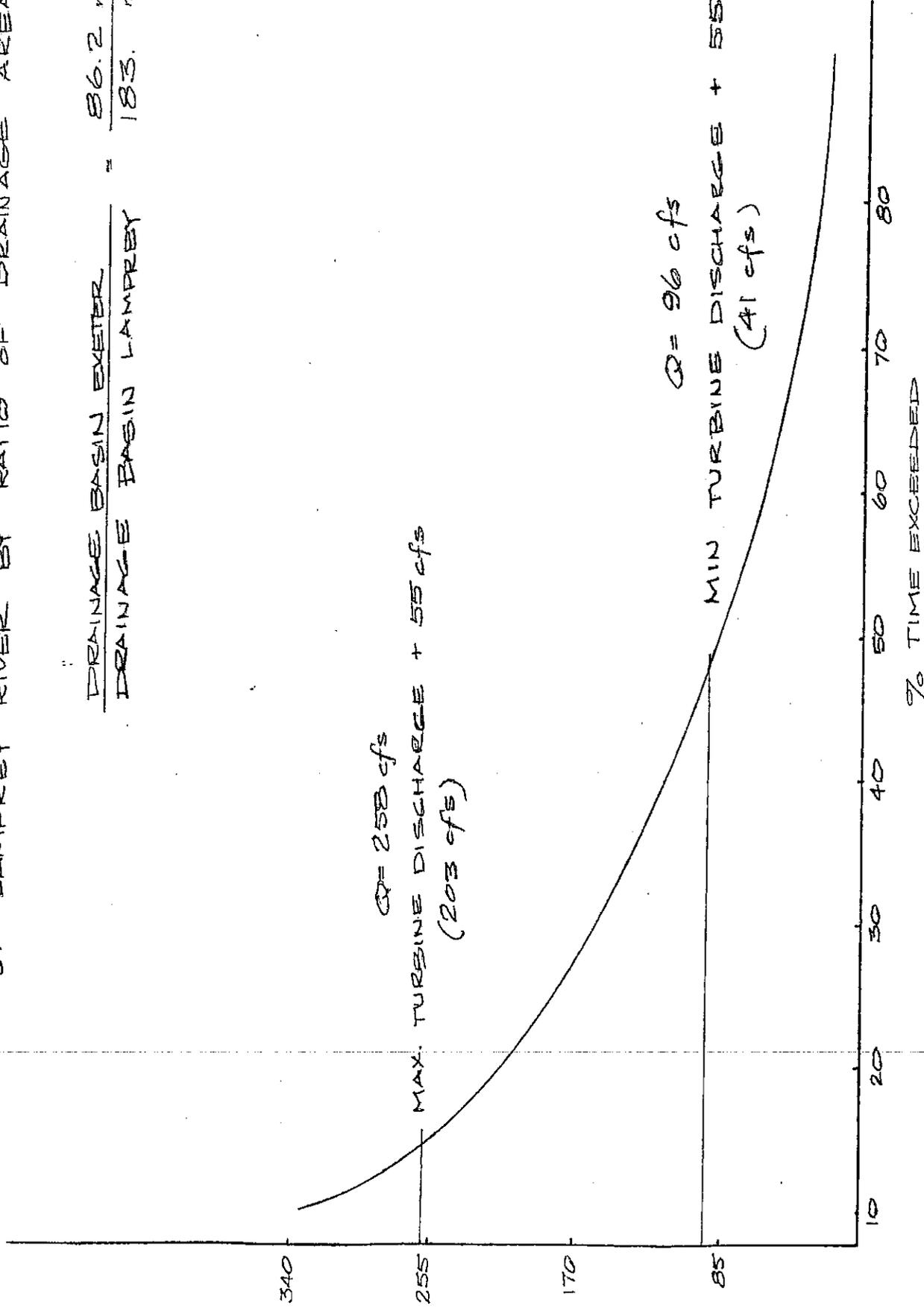
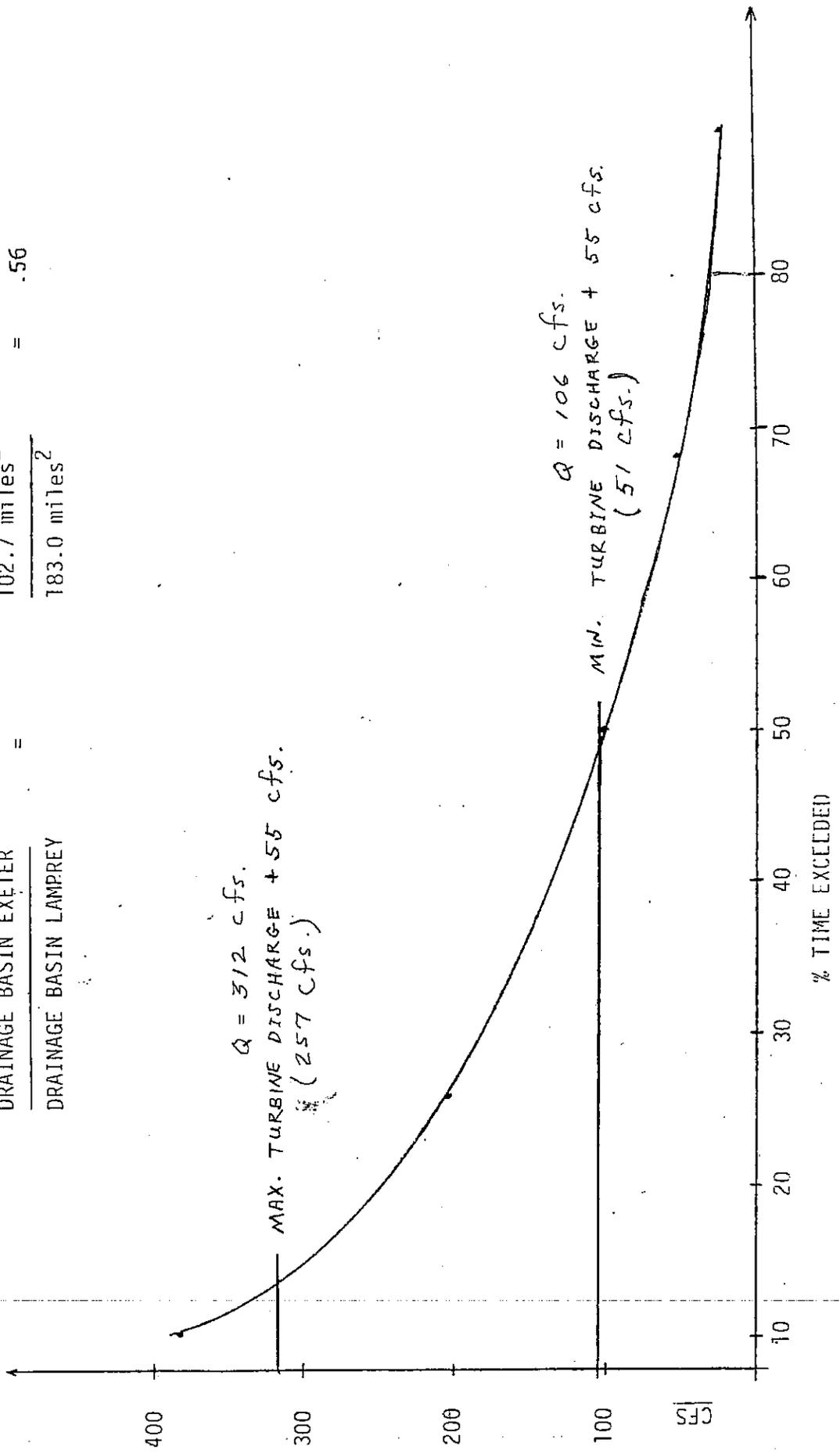


FIGURE 1

FLOW DURATION CURVE FOR EXETER RIVER

Calculated by Proportioning Flow Data of Lamprey River  
by Ratio of Drainage Areas

$$\frac{\text{DRAINAGE BASIN EXETER}}{\text{DRAINAGE BASIN LAMPREY}} = \frac{102.7 \text{ miles}^2}{183.0 \text{ miles}^2} = .56$$



EXETER RIVER

PICPOCKET DAM: 10 FT HEAD

$$\frac{\text{DRAINAGE BASIN EXETER}}{\text{DRAINAGE BASIN LAMPREY}} = \frac{86.2 \text{ MILES}^2}{1830 \text{ MILES}^2} = 0.47$$

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
POWER	38	78	61	145	179	772	444	243	139	20	6.5	6

OPERATION: JAN → JUN

AVERAGE POWER GENERATION: 460,000  $\frac{\text{KW-HRS}}{\text{YR}}$

EXETER DAM: 16 FT HEAD

$$\frac{\text{DRAINAGE BASIN EXETER}}{\text{DRAINAGE BASIN LAMPREY}} = \frac{102.7 \text{ MILES}^2}{183.0 \text{ MILES}^2} = 0.56$$

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
POWER	45	92	72	171	210	908	522	286	164	23	8	7

OPERATION: JAN → JUN

AVERAGE POWER GENERATION: 940,000  $\frac{\text{KW-HRS}}{\text{YR}}$

**ENVIRONMENTAL CONSIDERATIONS  
LISTED IN EPRI MANUAL**

**ANTICIPATED EFFECTS AFTER  
PROJECT COMPLETION**

**Reservoir Water Level Changes**

No change.

**Downstream Flow Changes**

Minimal - operating in Run  
of the River mode.

**Bank and Recreational Effects**

Consistent with present  
surroundings.

**Seismic Effects**

Same as above.

**Archaeological Effects**

In process of contacting  
officials.

**Historical Site**

Same as above.

**Wildlife Habitat Effects**

Minimal - no change in  
reservoir. Some excavation  
of small debris island.  
Decreased flow over spill-  
way.

**Botanical Resources**

Same as above.

**Fishery Considerations**

Design in cooperation with  
fish ladder expert.

**Water Quality**

No temperature change or  
addition of pollutants.

**Environmental Benefits**

Possible improvement of fish  
ladders and increase in  
dissolved oxygen levels.

<u>CLASS</u>	<u>DESCRIPTION</u>	<u>POTENTIAL ENVIRONMENTAL IMPACT</u>
I	New Dam and Reservoir With Altered Downstream Flows	Major
II	New Dam and Reservoir With Downstream Flows Not Altered (Diversion Dam, Canal, Drop, etc.)	Moderate
III	Existing Dam With Altered Reservoir Water Levels and Altered Downstream Flows	Major
IV	Existing Dam With Reservoir Water Levels and Downstream Flows Unchanged	Minimal

## HYDROPOWER PROJECTS PERMITTING PROCESS

### I. STATE REGULATORY AGENCIES - PERMITS REQUIRED

- A. Water Resources Board - RSA 482
- B. Wetlands Board - RSA 483
- C. Water Supply & Pollution Control Commission - RSA 149

### II. FEDERAL REGULATORY AGENCIES

- A. Federal Energy Regulatory Commission - License or Exemption Required
- B. U. S. Army Corps of Engineers - 404 Permit
- C. Environmental Protection Agency - 401 Permit  
(Actually issued by N. H. W. S. P. C. C.)

### III. REVIEWING AND COMMENTING AGENCIES - SETS STIPULATIONS

- A. N. H. Fish & Game Commission
- B. U. S. Fish & Wildlife Service
- C. N. H. Historic Preservation Office
- D. N. H. Public Utilities Commission
- E. National Marine Fisheries Service
- F. U. S. Department of Interior - Heritage Conservation and Recreation Service
- G. N. H. Department of Resources and Economic Development

UPPER DAM (PICKPOCKET)

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Item	Nominal Cost	Amount of Material	Total Cost
<hr style="border-top: 1px dashed black;"/>			
I) Civil Works			
Pipe Installation/Excavation	\$150/ft	120 ft	\$18,000
Concrete Cradles	\$100/yd	40 yds	\$4,000
Power House	--	--	\$5,000
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Steel Walkway	--	--	\$4,000
			-----
		subtotal =	\$35,000
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			-----
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Relays			
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Relays			
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Penstock	\$250/ft	350 ft	\$87,500
Miscellaneous	--	--	\$40,000
			-----
		subtotal =	\$127,500
			-----
TOTAL COST =			\$447,490

PROJECT FEASIBILITY

=====

ASSUMPTIONS:

-----

Real Interest Rate = 11%/year  
 Project Life = 20 years  
 Unit Price for Power = 10 /kW hr

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