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Atomic Safety & Licensing Board
U.S. Atomic Energy Commission
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Re: Consolidated Edison Company
of New York, Inc.
Indian Point Unit No. 2
AEC Docket No. 50-247

Gentlemen:

In accordance with the Board's request (Tr. 6199-6203) at the conference held on November 22, 1972 in the above-referenced proceeding, we are enclosing for the information of the Board a table setting forth a general description of the Bowline and Roseton plants. Applicant reserves its rights to object to the introduction of testimony concerning the Bowline and Roseton generating plants in accordance with the Applicant's position contained in its brief filed with the Commission on October 30, 1972 opposing HRFA-EDF's motion, dated October 16, 1972.

Very truly yours,

LEBOEUF, LAMB, LEIBY & MACRAE
Attorneys for Applicant

By [signature]
Leonard M. Trosten
Partner

Enclosure

cc w/enc:

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Honorable Louis J. Lefkowitz
✓Secretary, USAEC
Atomic Safety and Licensing Board Panel

TABLE 1 (1)

DESCRIPTION OF THE BOWLINE, ROSETON AND INDIAN POINT PLANTS[+]

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
A) GENERAL DESCRIPTION			
Location of the Plants (see Figure 1)			
-Miles above the Battery	37.5	65.5	43.0
-Miles upstream or down-stream of I.P.	5.5 Downstream	22.5 Upstream	--
-East Bank or West bank of the river	West bank	West bank	East bank
Size and Type of the Plants			
-No. of Units	2	2	2
-Electrical output capacity in MW:			
1st Unit	600	600	265
2nd Unit	600	600	873
Total	1200	1200	1138
-Type of generating units	Fossil	Fossil	Nuclear

TABLE 1 (2)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
Cooling Water System Characteristics			
-Type of system	Once-through	Once-through	Once-through
-Plant waste heat (BBTU/Day)			
1st Unit	62	60	47
2nd Unit	62	60	153
Total	124	120	200
-Cooling water flow (including service water) in gpm:			
1st Unit	384,000	328,000	318,000
2nd Unit	384,000	328,000	870,000
Total	768,000	656,000	1,188,000

TABLE 1 (3)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
-Flow reduction capability (percent of full flow)	67	50	60
-Plant temperature rise at full capacity operation and full flow (°F)			
1st Unit	13.5	15.4	12.3
2nd Unit	13.5	15.4	14.6
total	13.5	15.4	14.0
River Cooling properties			
-Minimum monthly average freshwater flow in cfs	4,000	4,000	4,000
-Maximum ambient temperature, °F	79	79	79

TABLE 1 (4)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
Description of the intake and discharge structures	Note 1	Note 1	
-Relative location of the intake and discharge structures	Figure 2	Figure 4	
-Intake structure:	Figure 3	Figure 4	Figure 5
.Depth of water withdrawal zone at MLW (ft)	18	25	26
.Mesh size of screens in inch square	3/8	3/8	3/8
.General approach velocity in fps	see Table 2 & 3	$\leq$0.75	.69 (Unit 1) .85 (Unit 2)
.Intake velocity at screens in fps	see Table 3	$\leq$1.6	1.01 (Unit 1) 1.25 (Unit 2)
-Discharge Structure:	Figure 3	Figure 4	Figure 6
.Type of discharge	Submerged diffuser	Submerged diffuser	Submerged near-surface
.Size of discharge port or slot	ϕ 3'	ϕ 3'	ϕ 4'x15'
Centerline to centerline repairing of ports or slots, feet	25	25	42

TABLE 1 (5)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
.Total number of ports or slots	16	14	7
.Depth of submergence to centerlines of ports or slots @ MLW in feet	15	19	11
.Jet initial velocity fps	15	16	10
<u>Comparison of Bowline and Roseton with Danskammer and Lovett Plants</u>	———	see Table 4	———
<u>Expected Schedule of Operation of the Plants</u>			
-Unit schedule for commercial operation			
1st Unit	1972	1972*	operating several years.
2nd Unit	1974	1973	1973

TABLE 1 (6)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
B) ENVIRONMENTAL ASPECTS OF THE POWER PLANTS			
Chemical Discharges			
-General description of the chemicals that will be discharged	Note 2	Note 2	
-Expected interaction with chemicals discharged from Indian Point	None	None	—
Thermal Discharges			
-Heat load BBTU/day	124	120	200
-River cross-sectional and tidal average temperature rise at plane of discharge during critical hydrological and climatological conditions °F	(Including I.P. effect - 3 units) 1.2	0.94	1.8
-River surface temperature rise for conditions as above	3.1	1.4	2.7
-Interaction with Indian Point thermal discharge	negligible	none	—

TABLE 1 (7)

Description	Bowline Units 1 & 2	Roseton Units 1 & 2	Indian Point Units 1 & 2
Fish Impingement	See Note 3	See Note 3	See Hearing‡ documents
Entrainment of Early Life Stages of Fishes			
-Location of the power plants relative to striped bass eggs and larvae concentrations	Figure 7	Figure 7	Figure 7
-Existing data on entrainment at Bowline and Roseton	See Note 4	See Note 4	See Hearing‡ documents

\+ The following documents were used as source materials for the information presented in this table:

<u>Bowline Plant</u>: Quirk, Lawler & Matusky Engineers, "Environmental Effects of Bowline Generating Station on Hudson River," Report submitted to Orange & Rockland Utilities and Consolidated Edison of New York, Inc., March 1971.

<u>Roseton Plant</u>: Quirk, Lawler & Matusky Engineers, "Effect of Roseton Plant Cooling Water Discharge on Hudson River Temperature Distribution and Ecology" Report submitted to Central Hudson Gas & Electric Corporation, December 1969 - Some data presented in the above report were updated according to studies which are presently in development.

<u>Indian Point</u>: Testimony of John P. Lawler, Ph.D. on the Effect of Indian Point Units 1 & 2 Cooling Water Discharge on Hudson River Temperature Distribution, April 5, 1972.

<u>All Plants</u>: Lawler, John P. and Abood, Karim A., "Thermal State of the Hudson River & Potential Changes," Paper presented at Second Symposium on Hudson River Ecology, October 28-29, 1969, Sterling Forest Conference Center, Tuxedo, New York.
-Data Files of Quirk, Lawler & Matusky Engineers.

† Testimony of John P. Lawler, Ph.D., Quirk, Lawler & Matusky Engineers, on the Effect of Entrainment and Impingement at Indian Point on Population on the Hudson River Striped Bass, October 30, 1972.

* The first unit at Roseton is presently being tested. Commercial operation will probably begin at the end of 1972.

NOTES TO TABLE 1

Note 1 Description of the Intake and Discharge Structures of Bowline and Roseton Power Plants.

Bowline Plant:

Relative location of the intake and discharge structures of Bowline plant are shown on Figure 2. Details of these structures are depicted on Figure 3. Cooling water is drafted from Hudson River via Bowline Pond. Water flows into the pond through a short inlet channel, whose dimensions are designed to maintain low inlet velocity under all possible plant operating conditions. Table 2 indicates inlet velocities under different plant operating and river conditions.

The intake facility is located on the west bank of Bowline Pond. At the structure entrance, bar racks with relatively large openings are provided to prevent floating debris from entering the intake. In addition to the bar racks there are fine screens which prevent the passage of smaller objects and fish. Periodically motors are actuated which move the screens by means of a sprocket and endless belt so that debris may be removed and deposited in a trash receptacle. Should fish be found against the screens during this operation, provision is available for removal to a fish tank from which they can be returned to the pond waters.

To reduce velocities through the intake structure as much as possible and also to keep them uniform, the skimmer walls, which were originally provided in the intake structure, have been removed. Furthermore, to decrease the bar rack approach velocity, as well as to provide a three-dimensional escape route for fish which enter the intake through the bar racks, additional racks have been placed on each end of the intake structure. The pumps draw river water from a plenum so that when one or more pumps are out of service the intake velocity, rather than increasing as would be the case if each pump drew from its own wet well, will decrease. Table 3 indicates intake velocities at different locations and for different plant operating and river conditions.

As shown in Figure 2, circulating water from Units 1 & 2 is directed through two 10'-6" inside diameter steel pipes, each pipe leading from its respective unit to a submerged discharge diffuser approximately 1200 feet offshore. The two discharge diffusers, as shown on Figure 3, are pipes of the same diameter as, and oriented at right angles to, the main water circulating conduits. Each of the two diffusers is equipped with eight discharge nozzles spaced 25 feet on centers which have been designed to provide a jet exit velocity of 15 feet per second.

<u>Roseton Plant:</u>

Locations of the intake and discharge structures at the Roseton Generating Station are shown in Figure 4. The intake is located directly on the river edge and will withdraw water from a total depth of approximately 26 feet. Subsequent to passing through the condensers the flow enters a common 12 feet diameter pipe, which leads to a multi-port diffuser located approximately 500 feet downstream from the intake. The diffuser is oriented parallel to the longitudinal river axis, with 14 ports discharging essentially perpendicular to the river flow. Each port is 3 feet in diameter, submerged 20 feet below the water surface, with a center to center spacing of 25 feet. Initial jet discharge velocity will be approximately 16 ft/sec at full load.

The water passages and the screening system for the circulating water at the Roseton intake have been designed with particular attention to the need for protecting fish.

Two specific design provisions have been incorporated to insure minimum harm to fish in the screen area. These provisions are directed at protecting small size fish that are least able to manuever in the immediate vicinity of the screens.

1. Velocities in the entrance water passages will not exceed about 0.75 feet per second at mean low tide. Net velocity of water through the screen mesh will not exceed 1.6 feet per second. These velocities are in line with values currently being advocated for the reasonable protection of very small fish. The screening material will be 3/8" clear opening wire mesh.

2. The traveling screens will be located in such a manner that the riverside faces of the screens are flush with the front of the intake, thereby eliminating the more conventional screen well which tends to confuse and trap the smaller fish. The river current passes directly across the front face of the screens in the fish passage. This current will assist even the smallest fish to avoid impingement on the screen.

In order to protect the traveling screens from heavy river debris and ice, trash racks have been provided on the river side of the screens and also on the upstream and downstream ends of the water passage which passes in front of the screens. Supports for these trash racks, and the deck area which serves them, do not interfere with the clear flow of the river across the face of the screens.

The design of the front of the intake precludes any dead area where fish may tend to congregate or where the heated water from the ice control system may tend to concentrate and invite the presence of schools of fish.

Trash bars will be 3/8 inch wide at about 3 inches on centers. Any fish which enters the trash rack channel may pass through the trash rack and into a fish passage between the racks and the traveling screens. Fish too large to pass through the trash rack can move back to the river through the fish passage.

Capability is provided at the Roseton Generating Station for reducing circulating water flow during those seasons where maximum cooling water flow is not required, particularly during the winter months where colder river ambient temperatures result in reduced fish activity. Throttling capability of approximately 50% of full flow during these periods will result in velocities of less than 0.5 feet per second through the entrance water passage.

Note 2 Chemical Discharges at Bowline and Roseton Power Plants

The following flows will be discharged from the Bowline Generating Station to the Hudson River:

1. Boiler blowdown
2. Air preheater wash water
3. Sodium hypochlorite addition for slime control

These flows are directed to the circulating water discharge thereby providing for an approximate dilution of 1/5000.

Sodium hypochlorite will be added to the circulating water to control slime growth when water temperatures are greater than 59°F. The maximum chlorine residual should not exceed 0.5 mg/l.

Since the Bowline plant (Unit 1) only recently became operational, data are not yet available for actual operating conditions. Therefore, the information presented herein is based upon design estimates. The discharge has been designed to meet all presently applicable waste discharge and water quality criteria.

It is not expected that there will be any interaction of chemicals released from the plant with those from Indian Point Unit 2.

With the exception of the waste treatment plant discharge, the only chemical added to the intake water at the Roseton Generating Station is sodium hypochlorite for the control of slime growth on piping and pump internals.

Operating experience at the station will determine the dosage necessary to keep chlorine residuals at a minimum.

All other contaminated flows from the Roseton Generating Station are directed to the waste treatment basins. Normal daily flows to the basins result from boiler blowdown and demineralizer regeneration.

The basins are operated as a sequence of batch reactors. Diffused air lines are placed in the tanks for mixing should coagulation and flocculation chemicals be added to the waste flow. After sedimentation, the waste water is directed to a neutralization basin where the pH is monitored and acid or caustic is added and mixed if required. After neutralization, the waste water can be recycled to the sedimentation basins if further treatment is required. An oil inspection station is located on the discharge line after the neutralization basis to remove any oil contaminants.

Details of the operational procedure for the waste treatment basin and chlorination facility will become available as experience with the system increases. It should be noted, however, that all systems have been designed to meet the presently applicable waste discharge and water quality criteria.

Because of the significant distance separating the location of the Roseton and Indian Point Stations, no significant interaction of chemicals released from these plants is expected.

Note 3 Fish Impingement at Bowline and Roseton Power Plants

The Bowline Generating Station Unit 1 has recently reached significant levels of commercial power generation. However, testing and shakedown have been conducted since July 1972. Since that time, no fish problems associated with traveling screen operation have been observed.

Testing and shakedown has recently been undertaken at Unit 2 at Roseton. Commercial operation is expected to begin in December 1972. To date no fish problems have been observed at the Roseton Generating Station.

There are no fish impingement data presently available from the Lovett Generating Station. Data at Lovett, however, could not be used to extrapolate expected impingement at either Roseton or Bowline. The Lovett Station intake is located on the river's edge whereas the Bowline intake is located in Bowline Pond. The chemical, physical and biological parameters in the Lovett area are therefore more reflective of the general river than are those of Bowline Pond. Similarly, data presently available indicate that the fish population in the river near Lovett is not equivalent to the population in the Roseton area and hence impingement data at Lovett could therefore not be used to reflect expected impingement at Roseton.

As discussed above, the difference in river fish population between the Danskammer area and Lovett/Bowline areas negates the ability to extrapolate directly data from Danskammer to expected impingement at Bowline.

The Danskammer and Roseton Stations are separated by approximately 3,000 ft. and are subject to essentially the same river fish population. However, the difference in intake structure design at these two stations does not allow extrapolation of impingement data.

The Roseton Station intake is located on the river edge and has been designed to minimize fish impingement by providing low intake velocities and fish escape routes. The Danskammer traveling screens are at the end of an intake canal approximately 500 ft. long. The difference in intake orientation velocities and design objectives could negate any correlation of fish impingement.

Note 4 Existing Data on Fish Entrainment at Bowline and Roseton Power Plants

There are no existing data at either the Bowline or Roseton Stations on entrainment.

TABLE 2

Bowline Pond Inlet Velocities✦

Water Level	Operating Conditions	Velocity FPS
Mean Water Elev. +1.75	3 pumps/unit = 768,000 gpm	0.54
	2 " /unit = 632,000 gpm	0.44
	1 " /unit = 370,000 gpm	0.26
	2 " /unit - throttled condition = 514,000 gpm	0.36
Mean Low Water Elev. 0.00	3 pumps/unit = 768,000 gpm	0.61
	2 " /unit = 632,000 gpm	0.50
	1 " /unit = 370,000 gpm	0.29
	2 " /unit - throttled condition = 514,000 gpm	0.41
Low Low Water Elev. -2.25	3 pumps/unit - 768,000 gpm	0.74
	2 " /unit = 632,000 gpm	0.60
	1 " /unit = 370,000 gpm	0.35
	2 " /unit - throttled condition = 514,000 gpm	0.49

✿ Source: Bechtel Drawing No. 7757-C-2050

✦ All velocities refer to condition of both units operating.

TABLE 3

Bowline Point Intake Velocities

Water Elevations	Pumps Operating Total Flow GPM	Velocities* - FPS V1	V2 Bar Racks	V3	V4 Screen	V5	Q cfs	C
Mean Water Elev. 0.00	3 - 384,000	0.55	0.72	0.66	1.29	0.65	855	115
	2 - 316,000	0.45	0.59	0.54	1.06	0.79	700	130
	1 - 185,000	0.27	0.35	0.34	0.67	0.93	411	130
Mean Low Water Elev. -1.75	3 - 384,000	0.59	0.77	0.70	1.38	0.69	855	115
	2 - 316,000	0.48	0.63	0.58	1.13	0.85	700	130
	1 - 185,000	0.29	0.37	0.36	0.72	1.00	411	130
Low Low Water Elev. -4.00	3 - 384,000	0.65	0.81	0.77	1.53	0.76	855	115
	2 - 316,000	0.55	0.66	0.64	1.25	0.93	700	130
	1 - 185,000	0.31	0.39	0.40	0.79	1.10	411	130
Mean Water Elev. 0.00	2 257,000 Throttled Condition	0.37	0.48	0.44	0.86	0.64	572	
Mean Low Water Elev. -1.75	2 257,000 Throttled Condition	0.39	0.51	0.47	0.92	0.69	572	
Low Low Water Elev. -4.00	2 257,000 Throttled Condition	0.43	0.54	0.52	1.02	0.76	572	

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* These velocities are defined as follows:

V1 = the average approach velocity to the bar racks is based on the exterior clear port areas.

V2 = based on the clear area of the bar racks.

V3 = the approach velocity to the screens. Port width for computing V3 i[s] assumed to be 16 ft.

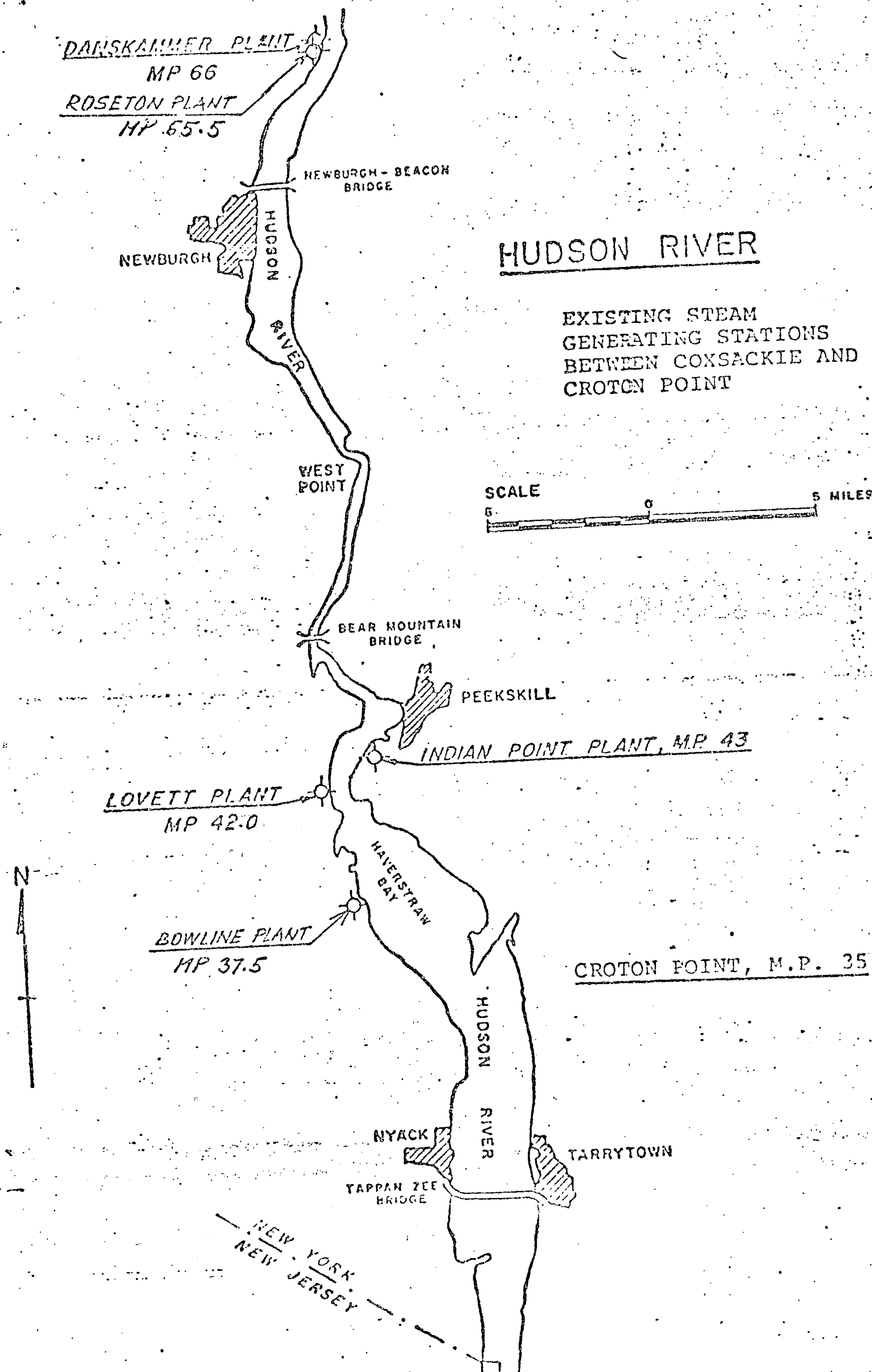
V4 = the flow velocitites through the screens. Q for one pump operation is based on the ratio of one screen clear area to the side port clear area. Q for two pump operation is based on equal velocities through the screens and one side port.

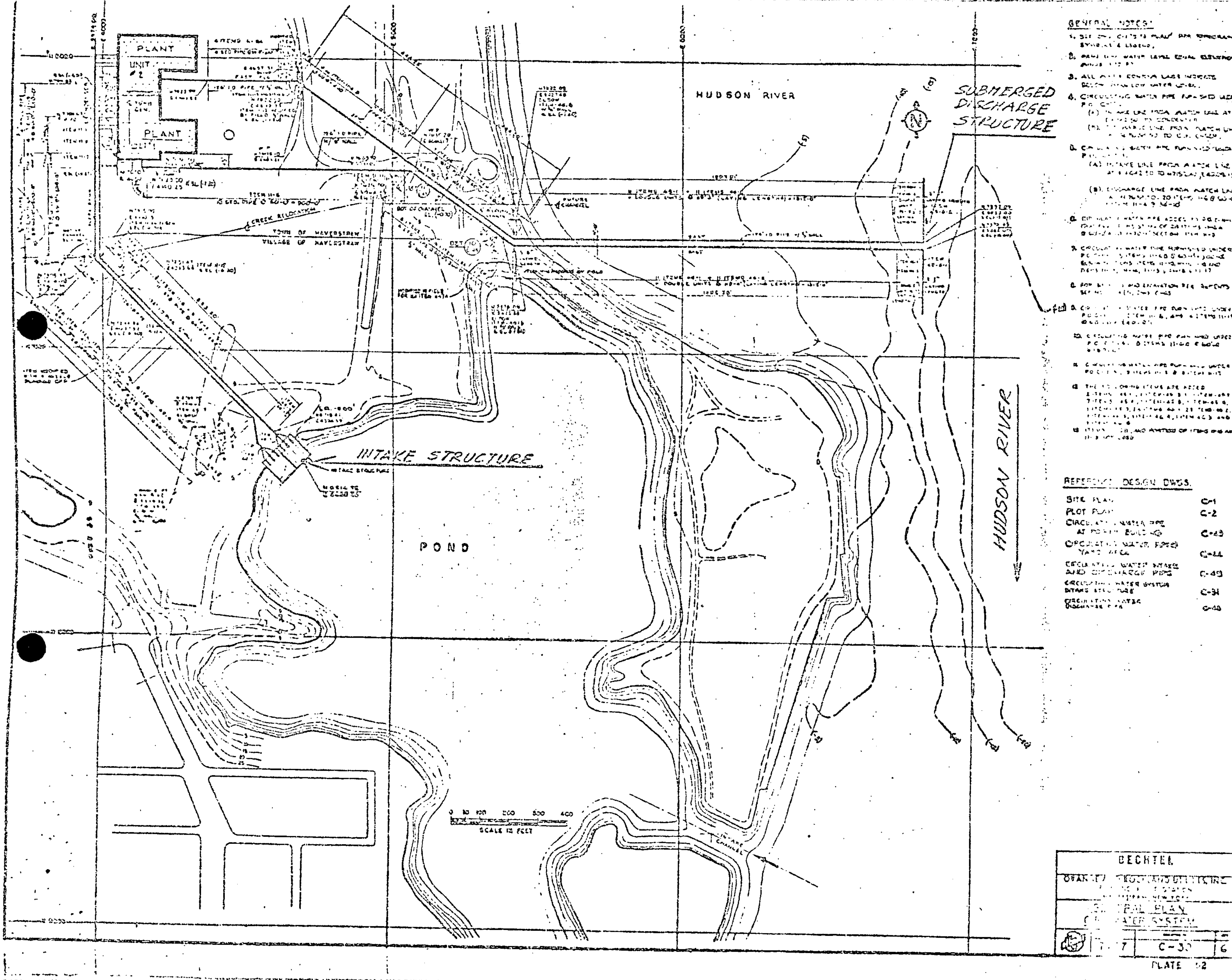
V5 = based on pump chamber area.

Table 4

COMPARISON OF BOWLINE AND ROSETON WITH LOVETT AND DANSKAMMER POWER PLANTS

Description	Bowline 1 & 2	Roseton 1 & 2	Lovett	Danskammer
on of Plants				
above the Battery	37.5	65.5	42.0	66.0
bank or West bank of the River	West Bank	West Bank	West Bank	West Bank
f Plants				
f units	2	2	5	4
total electrical output in MW	1200	1200	503	511
of generating units	Fossil	Fossil	Fossil	Fossil
g Water System Characteristics				
heat EBTU/Day	124	120	57	54
ng Water flow GPM	764,000	656,000	323,000	308,000
temperature rise °F	13.5	15.4	14.8	14.5
ption of the Intake Structures	Modern design minimizing fish impingement	Modern design minimizing fish impingement	Earlier design	Earlier design
ption of the Discharge Structure				
of [illegible]scharge	Submerged diffuser	Submerged diffuser	Units 1-3- surface discharge Units 4&5- submerged near-surface discharge	Surface discharge
elocity (if applicable) in fps	15	16	Units 4&5 weak jets about 2 fps	

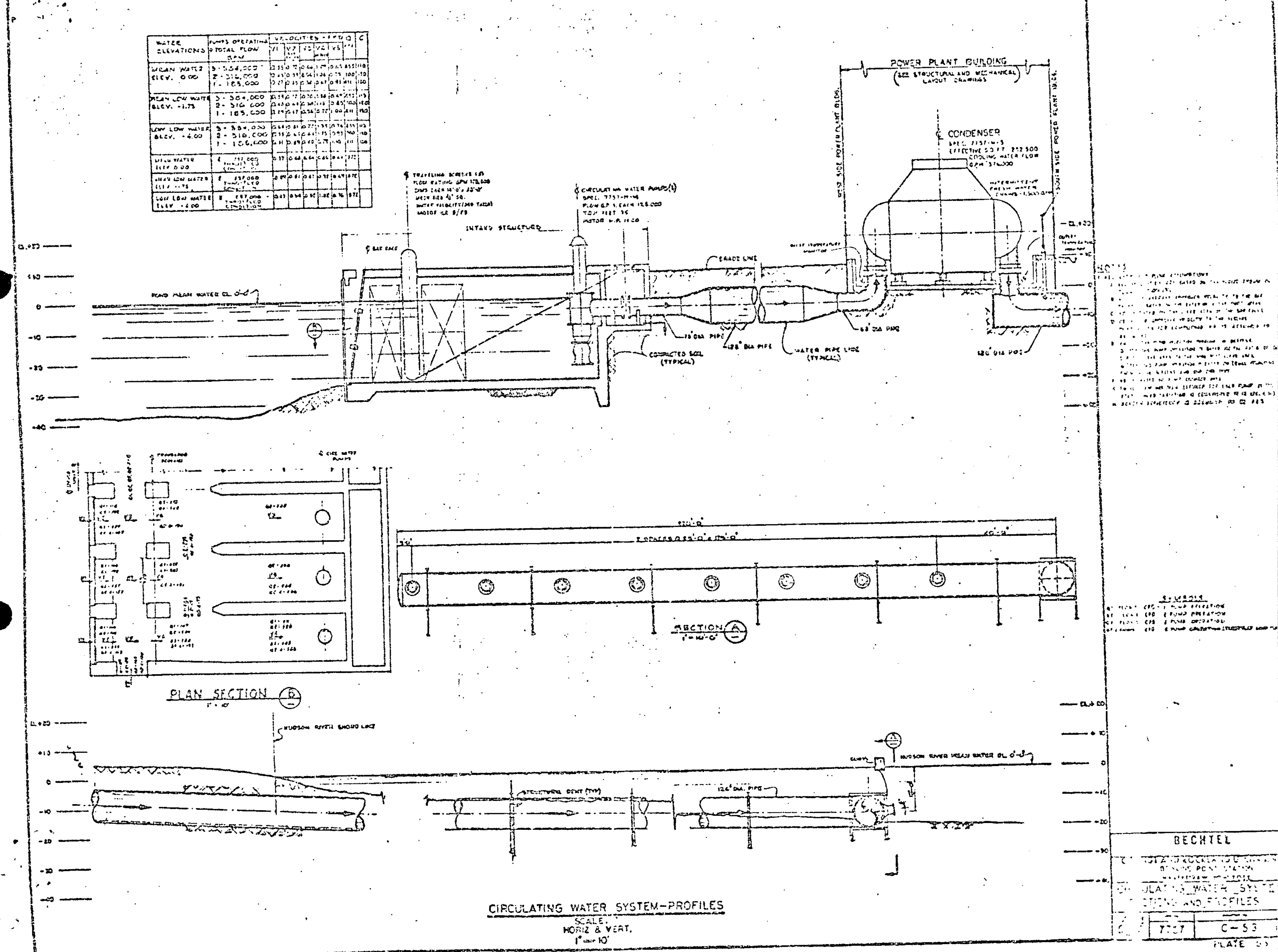

HUDSON RIVER
EXISTING STEAM GENERATING STATIONS BETWEEN COXSACKIE AND CROTON POINT
DANSKAMMER PLANT
MP 66
ROSETON PLANT
MP 65.5
NEWBURGH - BEACON BRIDGE
NEWBURGH
HUDSON
RIVER
WEST POINT
SCALE
5
0
5 MILES
BEAR MOUNTAIN BRIDGE
PEEKSKILL
INDIAN POINT PLANT, MP 43
LOVETT PLANT
MP 42.0
HAVERSTRAW BAY
N
BOWLINE PLANT
MP 37.5
CROTON POINT, M.P. 35
HUDSON
RIVER
NYACK
TARRYTOWN
TAPPAN ZEE BRIDGE
NEW YORK
NEW JERSEY



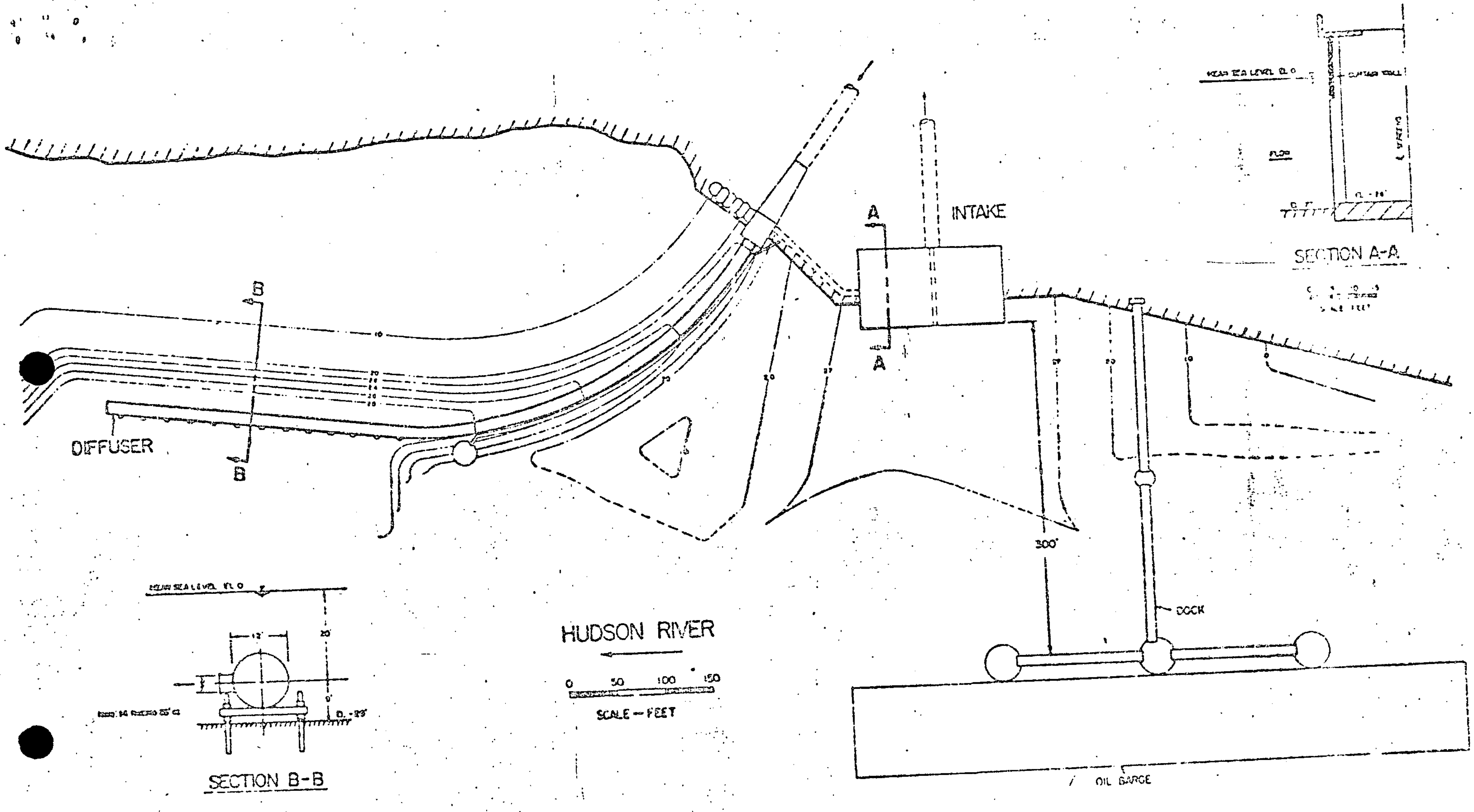
PLANT
UNIT #2
PLANT
HUDSON RIVER
SUBMERGED DISCHARGE STRUCTURE
TOWN OF HAVERSTRAW
VILLAGE OF HAVERSTRAW
CREEK RELOCATION
INTAKE STRUCTURE
POND
HUDSON RIVER
SCALE IN FEET
INTAKE CHANNEL
GENERAL NOTES:
REFERENCE DESIGN DWGS.
SITE PLAN C-1
PLOT PLAN C-2
BECHTEL
C-30
PLATE

FIGURE 2

FIGURE 3



POWER PLANT BUILDING
CONDENSER
INTAKE STRUCTURE
GRADE LINE
COMPACTED SOIL (TYPICAL)
WATER PIPE LINE (TYPICAL)
PLAN SECTION
SECTION
HUDSON RIVER SHORE LINE
HUDSON RIVER MEAN WATER EL. 0'-0"
CIRCULATING WATER SYSTEM–PROFILES
SCALE: HORIZ & VERT. 1" = 10'
BECHTEL
7757
C-53
PLATE



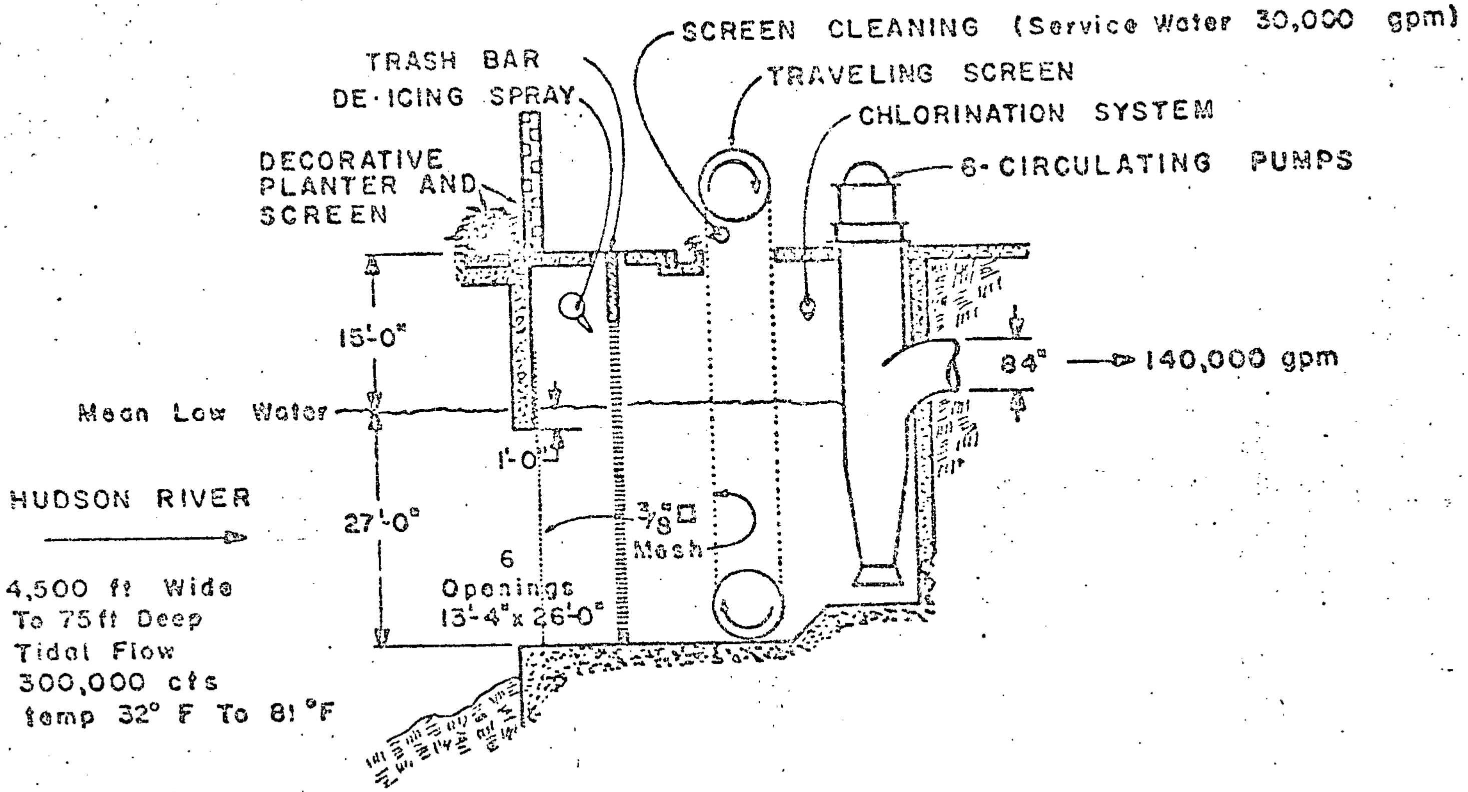
GENERAL ARRANGEMENT OF ROSETON COOLING WATER STRUCTURES

Hydrothermal Model Studies

Roseton Power Station

Quirk, Lawler & Matusky Engineers

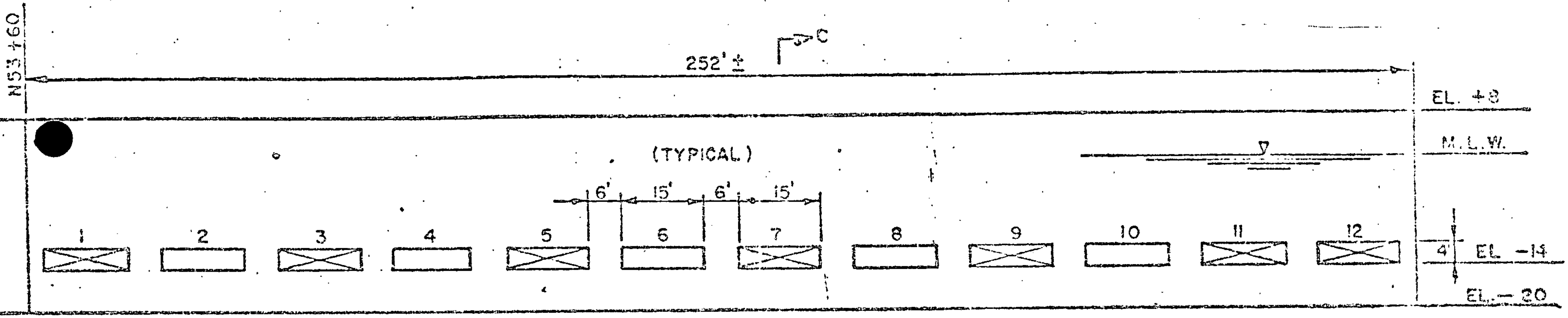
ARL



Diagrammatic Sketch of Intake Structure.
Indian Point Unit 2

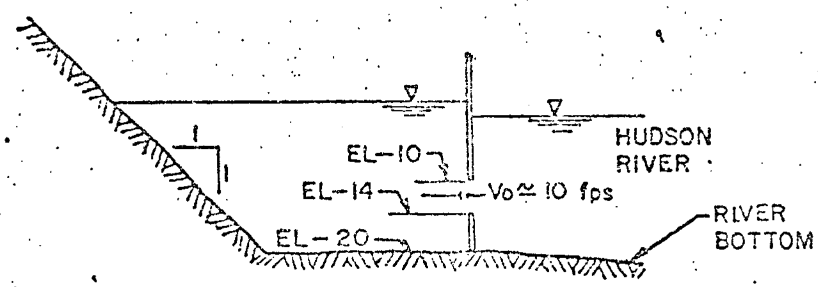
FIGURE 5

DETAILS OF INDIAN POINT UNITS 1 & 2 DISCHARGE STRUCTURE



NOTE: FOR DISCHARGE FROM UNITS 1 & 2,
PORT NUMBERS 2, 4, 6, 8, 10 WILL BE BLOCKED

ELEVATION
(LOOKING S-E)



AS SECTION C-C
(REVISED DESIGN)

FIGURE 6

LOCATION OF BOWLINE, ROSETON AND INDIAN POINT POWER PLANTS RELATIVE TO STRIPED BASS EGG AND LARVAL CONCENTRATIONS IN THE HUDSON RIVER