REPORT

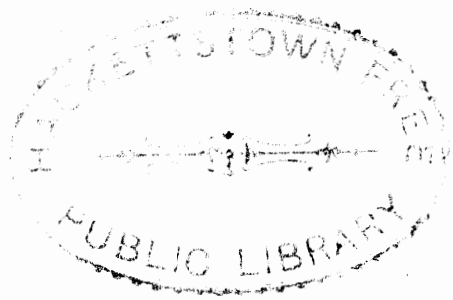
ON

FINAL DISPOSITION

OF THE

DELAWARE AND RARITAN CANAL

IN ACCORDANCE WITH CHAPTER 203, P. L. 1941



DEPARTMENT OF CONSERVATION AND DEVELOPMENT
DELAWARE AND RARITAN CANAL COMMISSION
STATE OF NEW JERSEY
1942

JOINT REPORT
BOARD OF CONSERVATION AND DEVELOPMENT
AND
DELAWARE AND RARITAN CANAL COMMISSION

on the

- UTILIZATION OF THE DELAWARE AND RARITAN CANAL -

BOARD OF CONSERVATION AND DEVELOPMENT
State House Annex, Trenton, New Jersey

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INDEX

TO THE ONE HUNDREDTH AND SIXTY-SIXTH SESSION OF THE LEGISLATURE
OF NEW JERSEY

This report is submitted under the authority of and in compliance with the requirements of Chapter 203 P.L. 1941 which made available to the Board of Conservation and Development funds with which to make a study and to recommend final disposition of the Delaware and Raritan Canal property. Some definite plan for the future of the canal is evidently imperative. The final decision of the Federal War Department, that the federal government will take no interest at the present time in the rehabilitation of the property as a traffic waterway puts squarely up to the State the question of what to do with the canal. To maintain the property, practically unused and unusable as it has been, involves a cost of $50,000 per year for its maintenance in safe and sanitary condition, and the property as it is will produce only a fraction of the funds necessary for this annual expense.

From a great many angles and in the minds of a great many people, as well as in the opinion of both of the State agencies which have participated in preparation of this report, the total abandonment and dismantlement of the canal would be unwise and uneconomical. The canal has certain historic value, the water rights have a very material financial and economic value and the property itself has substantial values to the State. Its abandonment would cost almost as much as, if not more than the rehabilitation of the property for some useful purpose, and abandonment would be a capital outlay for which there would be little compensation and from which there would be no subsequent revenue. Any use proposed will return to the State a revenue and, in the opinion

of the Board, an increasing revenue, which eventually can and should largely cover not only maintenance but amortization charges.

The time available and the funds provided for this study have not made it possible to make complete studies of a number of the phases of the situation - some of them engineering, some legal and some economic. It is felt, however, that these deficiencies in the study are not of a nature to invalidate the facts as presented or the judgments and recommendations.

It is pointed out that it will be short-sighted for the State to continue a substantial annual money outlay for the maintenance of the canal, which cannot help increasing as time goes on, without making arrangements for some use of the property, with the revenues which the property can produce from such uses to offset the annual cost involved.

It is certainly time that some decision be made as to what is to be done with the canal. It is hoped that this report may be of substantial value in reaching such a decision.

BOARD OF CONSERVATION AND DEVELOPMENT

Henry L. Moeller,
President

November 16, 1942

I

HISTORY

The Delaware and Raritan Canal Company was incorporated by the Legislature of the State of New Jersey by act of Feb. 4, 1830 (P.L. 1830, p. 73). Construction was started shortly afterward and the canal was completed and opened to traffic in June, 1834. From that time up to and including 1932 the canal was continuously operated for commercial traffic, except for short winter time shut-downs.

In conformity with a supplemental act, passed Feb. 3, 1831 (P.L. 1831, p. 65), the canal was constructed with a surface width of 75 feet and a depth of 7 feet, with locks 100 feet long and 24 feet wide. Subsequently, around 1850, the length of the locks was increased to 210 feet.

In 1831 the Delaware and Raritan Canal Company was consolidated with the Camden and Amboy Railroad Company, and, by an act approved Feb. 27, 1867 (P.L. 1867, p. 114), consolidation was permitted between the Delaware and Raritan Canal Company, the Camden and Amboy Railroad and Transportation Company, and the New Jersey Railroad and Transportation Company, under the corporate name of "The United New Jersey Railroad and Canal Company".

By an act approved March 14, 1872 (P.L. 1872, p. 1298) there was confirmed a lease of the property of the United New Jersey Railroad and Canal Company by the Pennsylvania Railroad Company for a term, (not stated in the act), of 999 years.

The volume of traffic on the canal steadily declined thereafter, and on Feb. 27, 1933 the Pennsylvania Railroad Company advised the Board of Public Utility Commissioners that it did not plan to reopen the canal on

March 1st of that year but intended to abandon its operation on and after that date. The canal was not reopened, and after the Board of Public Utilities had dismissed a subsequent application by the railroad company for leave to abandon, and while proceedings were pending in the Chancery Court, the United New Jersey Railroad and Canal Company as lessor, and the Pennsylvania Railroad Company as lessee, offered to convey to the State their respective interests in the canal property, with certain reservations.

II

PRESENT LEGAL STATUS OF CANAL

By Legislative action approved May 3, 1934, (Chap. 139, P.L. 1934) the State of New Jersey took possession of the Delaware and Raritan Canal, from the United New Jersey Railroad and Canal Company, pursuant to the rights reserved in Section 17 of the original Canal charter, as follows:

> "PROVIDED ALWAYS, that in case the said company shall not complete the canal and feeder within the time herein before limited, or, if after the same is completed, shall abandon the said canal and feeder, or cease to use and keep the same in repair, at any time, for three successive years, that then and in that case this charter shall be annulled, and the title to the lands over which said canal and feeder shall pass, shall be revested in the person or persons from whom the lands were taken by concession or by inquisition as aforesaid, their heirs or assigns; PROVIDED ALWAYS, if the State of New Jersey shall take possession of said canal and feeder, then the said canal and feeder, and the title to the said lands shall be, and hereby are vested in the State of New Jersey, to be used or disposed of as the Legislature may deem proper."

By agreement with the State, the Pennsylvania Railroad Company (Lessee of the property of the United New Jersey Railroad and Canal Company) was permitted to retain certain portions of the canal lands and easement rights.

In 1936, by act of the State Legislature, (Chap. 44, P.L. 1936) the northern portion of the Trenton-Bordentown section of the canal was transferred to the City of Trenton, and subsequently filled in by the city.

The balance of the canal property is now available for such use as may be determined by the State Legislature, with possible limitations in the form of old water privileges provided for in the original grants and by early agreements of the canal.

According to a brief prepared by the Delaware and Raritan Canal Commission in connection with the 1941 proposal to use the canal as a potable water supply, there are seven water agreements recorded as the total of all such grants that are of importance. The brief concludes

> "Various questions of law present themselves. The present feeling is, however, that these water rights, assuming that they still persist and have value, are not of sufficient monetary worth as to be a factor of any considerable importance in determining the merits of the potable water proposal".

Legislative determination of the ultimate use of the canal will also involve consideration of diversion rights. The right to continue the diversion of water from the Delaware River for such use as the Legislature deems proper seems clear under Section 17 of the Charter above quoted, but it is recognized that the utilization of the canal for any purpose other than transportation might give rise to argument which would delay the realization of any such use. In this connection it is noted that the acquisition, by the State of Pennsylvania, of the Lehigh Canal from Easton to Bristol as a recreational waterway, is recognition of the right of New Jersey to convert the Delaware and Raritan Canal to other than transportation use.

In regard to the matter of diversion rights, an opinion rendered by Duane E. Minard, Special Counsel, is recorded in the "Special

Message of A. Harry Moore, Governor of New Jersey, to the 163rd Legislature of New Jersey on the Delaware and Raritan Canal as a Source of Water Supply for New Jersey". The complete opinion is available in the above mentioned message (page 13 et seq.) and the concluding paragraphs are quoted herewith:

> "It seems, therefore quite clear, that, independent of the rights acquired by the State in the Delaware and Raritan Canal and Feeder, and independent of the amount of water habitually withdrawn for canal purposes and independent of whether the water is diverted at the source of the feeder and carried through it into the canal or whether the water is withdrawn from the river at some other point, the State has the right to divert water from Delaware River for public purposes, without the consent of Pennsylvania, to the extent that such diversion will not cause substantial damage in the State of Pennsylvania.
>
> "As above noted, the use or disposal of the canal and feeder is subject to the action of the Legislature.
>
> "Since any legislation, whether it takes the form of disposing of the canal and feeder or converting the use to be made thereof to water supply purposes or the form of authorizing an entirely new water supply project, will be carefully scrutinized by our sister States, who were disappointed by the decision of the Delaware Diversion Case, for grounds of reopening the decree in that case, or for the basis of a new suit, the utmost caution should be exercised in the preparation of such legislation."

Presumably the prior maximum quantity of water used in the operation of the canal establishes the extent of diversion which would certainly not cause substantial damage in the State of Pennsylvania.

The decision of the United States Supreme Court in the Delaware Diversion Case was made while the Delaware and Raritan Canal was still used for commercial transportation and presumably took cognizance of the long established canal withdrawal from the Delaware River. The effect of this decision, if any, on the continuation of this diversion during periods of flow low enough to bring into operation the principle of compensating flow from New York State, may be a factor in the Legislative determination of the ultimate use of the canal.

III

PHYSICAL PROPERTY

(1) Delaware River Diversion Dam:- The feeder takes water from the Dalaware River above Raven Rock from a pool formed by wing dams from the New Jersey shore at Bulls Island and from the opposite Pennsylvania shore. The New Jersey side of this low diversion dam is of concrete, while the section on the Pennsylvania side is of timber. The wings do not meet at the center of the river but leave a clear channel approximately 100 feet wide. At times of extremely low river flow this gap is closed temporarily in order to maintain the flow in the feeder.

(2) Raritan River Dam:- A low masonry dam across the Raritan River below Bound Brook forms a pool from which, through intake gates, water can be drawn to feed the last five miles of the canal to New Brunswick.

(3) Waterway and Embankment - Feeder:- The feeder runs generally parallel to the Delaware River for a distance of 22 miles from the intake at Bulls Island to its junction with the main canal in Trenton. At full level the waterway is 50 feet wide at the surface and 5 feet deep. A narrow embankment from Bulls Island to Stockton, 3 miles, separates the feeder from the Delaware River, and from Stockton to Trenton the roadbed of the Belvidere and Delaware Railroad forms the west bank of the feeder. Through Trenton the channel is greatly constricted, one section of the embankment, along Passaic Street, being protected by a vertical concrete wall. Other masonry walls and timber bulkheads protect portions of the embankment in Titusville, Lambertville, and Prallsville.

(4) Waterway and Embankment - Main Canal:- From its junction with the feeder in Trenton the main canal runs to New Brunswick by way of Bound Brook, a distance of approximately 36 miles. At full level the waterway has a surface width of 75 feet and a depth of 7 feet. A narrow embankment separates the canal from Stony Brook near Port Mercer, from Carnegie Lake for most of its length, from bends in the Millstone River near Kingston, Rocky Hill and Griggstown, and from the Millstone and Raritan Rivers from just below Zarephath to New Brunswick. Two short sections of this embankment above Bound Brook have been strengthened with concrete retaining walls, and the north bank from the Trenton City Line to Bakers Basin is protected by masonry. Dry masonry and rip-rap are used extensively along the banks at the water line.

(5) Locks - Feeder:- Flow in the feeder is controlled in the 14 foot drop from Bulls Island to Trenton by the intake gates at Raven Rock and gates in Prallsville, both originally built as locks, and by the present lock in Lambertville. The lock walls are masonry and the gates are of wood, with hand-operated wickets, or adjustable openings, to control the flow.

(6) Locks - Main Canal:- The flow in the main canal, dropping about 55 feet from Trenton to New Brunswick, is controlled by seven locks, 210 feet long and 24 feet wide, with masonry walls and plank flooring. At some of the locks the downstream miter gates have been removed, but the upstream wooden drop gates all remain and serve as dams to maintain the various levels. The flow passes under these gates through wickets, the opening in which may be adjusted from the top of the lock wall by means of hand-wheels and connecting rods.

(7) Feedways:- Around each lock except No. 12 (Five Mile Lock at Raritan Dam) is a feedway, or by-pass channel, by means of which a nominal flow can be fed from one level to the next without passing through the lock. The water is admitted to these channels through hand-operated iron or wooden slide gates set in concrete or masonry head walls.

(8) Spillways and Flood-Gates - Feeder:- Protection from damage due to flood-flow is provided in the form of overflow spillways and flood-gates. A few of the overflows are in the form of concrete walls and aprons, but most are timber bulkheads to protect the bank, sometimes with the addition of stone rip-rap to prevent or reduce erosion. Flood-gates are single or multiple hand-operated iron or wooden slide gates in concrete or masonry headwalls, opening to permit excess flow to be discharged into the nearest natural stream. In some cases flood-gates are incorporated in the overflow spillways as an additional precaution. In the feeder there are three overflows, two with gates, and three flood-gates above Stockton, and one set of flood-gates in Trenton at Perdicaris Place. Between Stockton and Trenton there are also several concrete overflow spillways built integrally with structures in the embankment of the Belvidere and Delaware Railroad which forms the west bank of the feeder.

(9) Spillways and Flood-Gates - Main Canal:- At each lock the local feedway channel discharges flood overflow into the adjacent natural stream, thus permitting the feedway gates to serve as flood-gates. In addition, there are overflow spillways adjacent to each lock, and at various locations along the canal where access is available to drainage channels. In all there are 13 overflow spillways and 9 flood-gates in the main canal from Trenton to New Brunswick.

(10) Aqueducts and Culverts - Feeder:- The feeder crosses two streets in Trenton through concrete aqueducts and over Alexauken and Swan Creeks in Lambertville through wooden aqueducts. Smiths Creek (20 foot twin arches) and Jacobs Creek (25 foot arch) and three smaller streams pass under the feeder through masonry culverts.

(11) Aqueducts and Culverts - Main Canal:- The canal crosses the Millstone River at its entrance to Carnegie Lake through a wooden aqueduct 240 feet long and 60 feet wide. In addition, there are 27 masonry culverts, varying in size up to double 12 foot arches, carrying streams under the canal to the Delaware, Millstone and Raritan Rivers.

(12) Drainage Inflow - Feeder:- With the exception of the streams which flow under the feeder aqueducts and through culverts to the river, most of the run-off from that portion of the Delaware River Watershed east of the feeder flows into the feeder. Four large streams - Raven Rock Brook, Lockatong, Johnson, and Wickecheoke Creeks, draining an area of approximately 25 square miles, - enter the feeder and overflow into the Delaware River opposite or near the points of entry. In addition, there are over 50 storm drains and smaller streams flowing into the feeder. Street drains in Lambertville empty into the feeder and within the City of Trenton about 22 per cent of the area of the city, or 1200 acres, drains directly into the feeder and canal.

(13) Drainage Inflow - Main Canal:- As noted above, a large portion of the drainage from the City of Trenton flows into the canal. Most of the larger streams between Trenton and New Brunswick are carried under the canal through culverts, but there are sizeable streams entering it near Port Mercer, Kingston, and between Bround Brook and New Brunswick.

As with the feeder, there are many small streams and drainage ditches emptying into the canal.

(14) Bridges:- There are 63 Canal bridges, 13 concrete and 17 of wood over the feeder, and 4 steel and 19 of wood over the main canal. Four of the original wooden swing bridges have been replaced with fixed simple spans; the rest have been reinforced by additional piling and can no longer be opened. In most cases the machinery formerly opening the steel bridges has been removed or disconnected, and the concrete bridges, mostly in the City of Trenton, are fixed spans.

(15) Buildings:- There are 12 dwellings on the feeder and 25 on the main canal, located at locks and bridges. A group of frame buildings on Academy Street in Trenton are used for the canal administrative office, workshop and material storage. In addition, there are a few buildings still owned by the canal along the filled-in section in Trenton.

(16) Land Areas:- In addition to the channel right-of-way, the canal property includes several larger contiguous parcels, totaling over 350 acres, on Bulls Island, at Lambertville and Jacobs Creek (river frontage), at Bakers Basin, at the intersection of the canal and State Highway Route #26 (the Super Highway) with 1,000 foot highway frontage, between Kingston and Rocky Hill, and in several locations along the Raritan River between Weston and New Brunswick.

(17) Bordentown Terminus:- Since the filling in of the Trenton section, the Bordentown terminus of the canal is isolated from the rest of the property. Between 2 and 3 miles of open channel remain of the Bordentown section, and one lock at the outlet to the Delaware River. Considerable land area is included in the canal property at this lock, and there

are two dwellings and miscellaneous sheds.

(18) New Brunswick Terminus:- For any proposed future use of the canal except transportation, the last level, from the Deep Lock (No. 13) to the outlet into the Raritan River, apparently has more value for some use by the City of New Brunswick than for any State use. Therefore, this section has not been included in the study of proposals for State development of the canal.

IV

PRESENT ADMINISTRATIVE STATUS

The act of May 3, 1934, empowering the State to take possession of the Delaware and Raritan Canal, provided that its maintenance and repair should be in charge of the Highway Department. However, before this act became effective (On July 4, 1934) another act (Chap. 238, P.L. 1934) effective immediately, was approved on June 11, 1934, conferring on the Department of Conservation and Development the duty and powers of administering and maintaining the canal.

In addition to the administrative functions delegated to the Department of Conservation and Development, there was created pursuant to joint Resolution Number 9 of the Legislative Session of 1935, the Delaware and Raritan Canal Commission. The duties of the Commission are set forth in Chapter 18, of the Laws of 1937 (P.L. 1937, p. 34). Compactly stated, these are:

(a) To collect and collate necessary information as to costs, maintenance, potential traffic and savings to the public in the continuation by the Federal government of an improved Delaware and Raritan Canal. In furtherance of this duty the Commission made an exhaustive study and presented

a thoroughly documented brief to a special board of Army Engineers at a public hearing in Newark, New Jersey, on October 21, 1937. The proposal was formally rejected by the Army Engineers on April 18, 1941, and an Appeal Brief was subsequently filed by the Commission. A final adverse decision on the proposal was rendered by the Federal authorities on May 20, 1942.

(b) To report to the Legislature its recommendation for the ultimate use or disposal of the Delaware and Raritan Canal and its appurtenances. In connection with this duty the Commission filed progress reports with the Legislature and is joining with the Department of Conservation and Development in the presentation of this present report.

V

NEED FOR PERMANENT USE DESIGNATION

(A)

IMPROVEMENT OF PHYSICAL CONDITION

The sole present revenue to the State from the canal is the rental from dwellings and certain privileges; (water rights, utility privileges, etc.) The income from these sources (from 140 leases) for the fiscal year 1941-42, was $9753.44.

A continued indefinite status of the canal, with the limited maintenance program almost certain to result, will gradually deprive a State asset of its value, if not actually change it to a liability. Base maintenance has been justified for the interim while waiting decision as to whether there was federal interest in the reopening of the canal for transportation, but it will be both uneconomical and unwise longer. The deficiencies of a "most-critical-needs-only" program affect all phases of

the canal maintenance. With the possibility of development of the canal as a traffic waterway eliminated, it will be necessary to make provision for annual maintenance unless the canal as a waterway is to be abandoned and dismantled. On the basis of its present condition and use this maintenance will involve not less than $50,000 annually. If the canal is developed for any specific use or uses, the improvements necessary to these uses will reduce the annual maintenance costs far below this figure, in certain cases to not more than half the present maintenance needs, beside providing revenue producing benefits to the State which will pay or more than pay the maintenance costs.

Whether or not the canal is continued idle as at present, or is put to use, most of the improvements listed just below will be necessary soon. It will be less expensive to rebuild and recondition canal structures in one program of capital improvements than to continue to rebuild some each year, with the consequent extravagant cost of maintenance on the continually deteriorating balance of these features. The major items involved are:

(1) Buildings - Personnel must be available at all times to control water flow and especially for emergency action during flood conditions. Because of this it is necessary that dwellings be maintained at each lock. The funds available to maintain the present buildings have been extremely limited, and as a result all are in need of major repairs. In any program of canal improvement a saving in capital expenditure and maintenance may be effected by razing many of the canal dwellings, but at least eight should be put into condition for occupancy by operating personnel. The most important locations for such dwellings are at Lambertville, Trenton

(flood gates), Kingston, Griggstown, Zarephath, South Bound Brook, Raritan Dam and the Deep Lock in New Brunswick (Lock No. 13).

It is also necessary to maintain the administrative office and workshops on Academy Street in Trenton.

To make the necessary building repairs, most of which can be done by the present canal personnel, it is estimated that a sum of $12,000 will be required, mostly for materials.

(2) Bridges - The bridges have reached a point beyond a matter of individual maintenance. Each year the most dangerous must be rebuilt. The Highway Department, in January, 1942, estimated that the cost of reconditioning all bridges, including the complete rebuilding of five, would be $100,000. Since then the rebuilding of one bridge and funs currently available will reduce the amount necessary for permanent rehabilitation of all bridges to $85,000.

It is a question, since these bridges are State owned parts of the public highway system of the State, whether their reconstruction and maintenance should be made a part of the State Highway program or be continued as a responsibility of another agency.

(3) Waterway - There are, of course, long standing weaknesses, mostly dating far back into the period of private canal operation, requiring repair or treatment beyond the capacity of ordinary maintenance. Because the bulk of available funds have had to be applied to the bridges as a matter of public policy, the waterway and water control structures have received insufficient attention. As a result the rate of deterioration has been most rapid in these features and they will require a capital expenditure. Until this is done the flow in the canal will continually decrease.

with the consequent danger of the development of sluggish and stagnant conditions, and there will be a growing danger of major damage by failures due to high water. Major and obvious weaknesses and actual failures in embankment and water control structures have been repaired, but often in emergency form only. The necessity of having to forego work on minor weaknesses has lead to an ever present danger of unforseen failures and flood damage.

It will be necessary to remove a large silt deposit at the feeder intake and to remove other deposits and weeds from the feeder itself. The deposit at the intake will recur and must be removed periodically, but maintenance of full flow will reduce the tendency for silt deposits throughout the feeder and canal. Bank protection and reinforcement is advisable between Raven Rock and Prallsville, along Stony Brook (near Port Mercer) and on sections of the towpath between the canal and the Millstone River and Raritan River.

It is estimated that the cost of reconditioning the waterway and embankment will be $35,000.

(4) Aqueduct and Culverts - The most expensive single item in the reconditioning of the canal is the rebuilding of the aqueduct across the Millstone River at Carnegie Lake. In a flow test on May 29, 1942, by the U.S. Geological Survey, it was found that, with a flow of 146 cubic feet per second (cfs) just above the aqueduct, the leakage through it into Carnegie Lake was 50 cfs (equivalent to 32 million gallons per day).

It is not possible to examine this structure at the present time, therefore the estimated construction cost of $116,000 is based on an estimate ($100,000 for a smaller aqueduct than the present structure)

made by the Delaware and Raritan Canal Commission in 1937, adjusted from August 1937 to July 1942, in accordance with the Engineering News-Record construction cost index.

Few, if any, major repairs are needed on the culverts carrying streams under the feeder and canal, but repointing of the masonry in many of them to avoid damage from seepage and frost action is necessary at an estimated total cost of $10,000.

(5) Locks - The locks are the means of controlling the flow of water in its 70 foot fall from the Delaware River at Raven Rock to the Raritan River at New Brunswick. With navigation abandoned the downstream gates are unnecessary and some have already been removed. The upstream wooden gates, acting as dams, must be kept in repair until eventually replaced. It is no longer necessary that these gates be movable, and it is proposed that they be replaced by reinforced concrete walls with wheel operated flow gates. In most locks the masonry is in poor condition, and it is proposed to repoint such masonry throughout. The gates and walls at Raven Rock and Prallsville are included with the locks for this type of work. The estimated cost of reconditioning the locks is $50,000.

(6) Spillways, Feedways, Control Gates - Various overflow spillways along the canal should be paved as a matter of bank protection. Flood gates and feedway gates should be reconditioned or replaced and headwalls repaired. Some feedways should also be paved. These facilities provide essential emergency protection and the feedways will permit at least a partial flow around locks undergoing repair or the proposed reconditioning work. The estimated cost of improving these facilities is $24,000.

(7) Miscellaneous Items - There are other items which may be deferred for future attention. Individually they are comparatively inexpensive and it will be feasible to care for them as part of the maintenance program when necessary. Such items include additional culvert repairs, improvement of the Delaware Diversion Dam, and repairs to the aqueducts in Lambertville.

More extensive improvements, requiring further study, and not necessary immediately, are the fluming of the Trenton section and caring for storm drainage inflow in Trenton and Lambertville.

(8) Summary - The total estimated cost of reconditioning the canal is $365,200 including an allowance of 10% for engineering and contingencies, involving the following:

(a) Building	$12,000.00
(b) Bridges	85,000.00
(c) Waterway	35,000.00
(d) Aqueducts and culverts	126,000.00
(e) Locks	50,000.00
(f) Spillways, etc.	24,000.00
	332,000.00
Engineering & contingencies	33,200.00
	365,200.00

(B)

PRESERVATION OF STATE'S DIVERSION RIGHTS

A permanent utilization plan for the canal, with increased funds for waterway maintenance to permit full flow, will preserve the State's right of diversion from the Delaware River. On the other hand, failure to take advantage of and maintain the State's present diversion rights will unquestionably prejudice such rights in the future. Since the permissible diversion is dependent on a "non-damaging" effect on neighboring states, the uninterrupted use of the diversion rights (used

for a period of almost one hundred years with no proven case of substantial damage below the diversion point) supports the State's right to at least that quantity as a matter of precedent.

The New Jersey Geological Survey Final Report, Vol. III, Water Supply, 1894 (p. 228) states: ".....324 cubic feet per second (210 million gallons daily) being permanently diverted to supply the canal." Actually a part of this water was returned to the Delaware River at Bordentown, but the amount so returned was a small proportion of the total.

VI

ADVANTAGES OF DESIGNATING SOME PERMANENT USE

The advantages of early Legislative action dedicating the canal to some permanent utilization plan are twofold.

(a) In the first place, a definite use status, permitting long range planning and justifying adequate maintenance and development, will preserve in full the State's diversion rights while improving the physical value of the canal.

(b) In the second place, establishment of the canal as a permanent State facility will permit realization on its present as well as its future value. For example, there exists at the present time a potential demand for industrial water which could be supplied from the canal (see Appendix D), but no existing manufacturing plant will undertake the construction necessary to obtain and use this water while the status of the canal remains uncertain. Further, no water-using industry will establish itself in the vicinity of the canal, depending on it as a source of water, unless the permanence of such a supply is assured. (See letter of Mr.

Edwin C. Butler, Industrial Broker, Appendix E). Again, the canal and feeder at many points now constitute an essential factor in local fire protection facilities which cannot be replaced. Also, provision of only a few camping and picnic sites, and boat and bathing centers, possible in combination with appropriate permanent utilization plans, would permit immediate public realization on the recreational value of the canal.

VII

THE POSSIBLE ALTERNATIVES

(A)

ABANDONMENT

The time and facilities available for the preparation of this report have not permitted the necessary engineering, legal, and other studies for the presentation of a factual and accurate estimate of the costs involved, or the implications in other ways, in total abandonment of the canal. The certain reduction of assessable values of many canal-side properties is, for instance, one type of loss which will result from abandonment of the canal. Such action involves the settling of outstanding water-rights, the cost of filling the canal bed and treatment of drainage as a sanitary measure, and a period of several years to dispose of the canal right-of-way, of comparatively little value as narrow additions to adjoining farm lands. The case of the Morris Canal will serve as an example of the difficulties and cost of abandonment and dismantling. The State expended $1,730,465.14 for the abandonment and dismantling of the 90 miles of the Morris Canal. The greater part of this cost was covered by funds from the Lehigh Valley R.R., previous owner of that canal, and

from the sale of valuable canal properties in the metropolitan section of the State. No such sources of funds are available for abandoment of the Delaware and Raritan Canal and the entire cost would have to be found from State funds in some form.

(B)

USE FOR HIGHWAYS AND/OR PARKWAYS

The possibility of using the canal right-of-way for highways or parkways, either exclusively or in combination with other uses, has been considered. In this connection the State Highway Department was asked for an opinion as to the need for, or possibilities of, the canal right-of-way for highway purposes. In reply the State Highway Engineer stated that the narrowness and location of the right-of-way of the canal would render it of no material benefit to the Highway Department, therefore no further study was made of the possibility of such use (See Appendix C for correspondence). As an express highway or through connection, sometimes proposed, the canal right-of-way offers little value because it would connect only areas now liberally served by such highways. Even if the property were suitable for such use it would constitute a roundabout route rather than direct service.

(C)

CONTINUATION AS A COMMERCIAL WATERWAY

In 1933 the Somerset Canal Association and the Association for the Preservation and Improvement of the Delaware and Raritan Canal advocated that the State take possession of the already abandoned but still usable canal, to rehabilitate and operate the canal as a State enterprise or to

turn it over to the Federal government for operation. After the State took possession of the canal, the above Associations were succeeded by the Delaware and Raritan Canal Commission, created pursuant to Joint Resolution Number 9, of the Legislative Session of 1935, the duties of which were to investigate and recommend an ultimate use or disposal of the canal and to promote Federal improvement and operation of the canal. The Commission since its inception has taken all possible action to interest the Federal Government in rehabilitating the canal and is now joining in this report and recommendation as to ultimate use of the canal.

In support of the Federal rehabilitation proposal, the Commission, after exhaustive study, submitted a thoroughly documented brief in support of the plan at a public hearing before a special board of Army Engineers in Newark, N.J. on October 21, 1937.

The full text of this brief is available for reference in the "Report of the State of New Jersey Delaware and Raritan Canal Commission to the Legislature of the State of New Jersey, February 11, 1938". The proposed improvements recommended consisted of deepening the canal to 14 feet, widening it to a bottom width of 75 feet, a surface width of 131 feet and the construction of new locks 310 feet long and 45 feet wide with smaller auxiliary locks to accommodate pleasure boats. It was proposed to modify the former route through Trenton by construction of a by-pass departing from the old route of the canal in the vicinity of Bakers Basin and running generally southwest to the Delaware River near Duck Island, approximately two miles above Bordentown. The proposed route of the by-pass would reduce the over-all length of the canal approximately 4 miles (See Appendix I). The estimated total cost for such

a barge canal, including construction, right of way, engineering and contingencies, was $19,897,286, including $281,400 to be furnished by the State for right-of-way.

The Commission investigated the economic value of the proposed barge canal by means of an industrial survey to determine with some precision the potential traffic on the canal if improved and the savings which would result to those using the canal. The information obtained from signed questionnaires indicated the savings to the public in commercial traffic would amount to $1,920,000 per annum, with additional savings to pleasure boats and other craft of approximately $600,000 or a total saving of $2,520,415.77 annually.

The estimated annual cost of maintenance and operation, including interest on capital expenditure for construction and right of way acquisition and for amortization of capital cost, was $1,123,970.88, indicating that the above savings would exceed two dollars for each dollar of carrying charge, maintenance, and operating expenses.

The fact that the proposed improved canal would provide the missing link in the U.S. Intracoastal Waterway from Boston to Miami (See Appendix I) had great bearing on the normal traffic expected, and, as demonstrated by the present emergency, the canal would be of inestimable value in war time.

Upon request, the Commission supplied additional data and reports to the Board of Army Engineers from time to time. On April 18, 1941, an adverse finding was rendered by the Army Board of Engineers, based on the following points:

(a) That the canal is not economically justified by commensurate prospective benefits.

(b) That no great public demand exists for the waterway.

(c) That suitable and sufficient local cooperation has not been offered.

On August 27, 1941, the Commission filed a Brief on Appeal from this adverse finding, in which they refuted the above points. However, after final deliberation, which included consideration of the defense needs of the country, an adverse report was submitted, on February 23, 1942, by the Board of Engineers for Rivers and Harbors to the Chief of Engineers, U.S. Army, who concurred in the adverse finding in forwarding it, on March 5, 1942, to the Secretary of War. The latter, in presenting the report on May 20, 1942, to the Speaker of the House of Representatives, stated that the Bureau of the Budget had been consulted and had advised that authorization of the improvement, which the Chief of Engineers reported to be inadvisable, would not be in accord with the program of the President. A letter dated June 1, 1942, to the Delaware and Raritan Canal Commission from the Operations Branch, Construction Division, U.S. Army Engineers, enclosed copies of the above listed letters of transmittal and stated that on the basis of the action involved any further action on the proposed Federal improvement of the canal was not considered advisable at this time.

(D)

USE AS A POTABLE WATER SUPPLY

While a decision was pending on the proposed Federal traffic improvement plans, Governor A. Harry Moore, on May 24, 1938, proposed a potable water supply plan for New Jersey to utilize the water-rights and

rights-of-way available through the Delaware and Raritan Canal, and under date of February 13, 1939, issued a special message on the subject. The full text of the proposal, with supporting data and plans, is available for reference in the "Special Message of A. Harry Moore, Governor of New Jersey, to the 163d Legislature of New Jersey on the Delaware and Raritan Canal as a Source of Water Supply for New Jersey".

A map of the proposed plan is included as Appendix J of this present report. The following description of the plan is quoted from "Appendix B - Report on Delaware and Raritan Canal Water Supply Project for New Jersey, made to the Special Committee on Water Supply by Engineering Committee, Charles H. Capen, Howard T. Critchlow and Harry P. Croft, May 1940". The same engineers prepared the details of the original plan set forth in the "Special Message" and the quotation below describes the recommendations of that plan with certain changes made subsequent to its original presentation.

> "The Delaware and Raritan Canal Water Project considers the utilization of the canal properties as a feeder for a new water supply project for the Metropolitan District of New Jersey. The properties studied to that end extend from the feeder intake on the Delaware River at Raven Rock, New Jersey, to a point near Bound Brook, a distance of 49 miles.
>
> "This plan provides that a maximum of 230 million gallons daily (m.g.d.) and an average of 180 m.g.d. will be diverted and transported by gravity with provisions for taking 30 m.g.d. at Trenton for use in that area. The remainder of 200 m.g.d. maximum and 150 m.g.d. average will be delivered by gravity to a pumping station at Bound Brook. Provision, however, is made for taking by gravity up to 10 m.g.d. of water from the canal at Bound Brook for use of the New Brunswick area.
>
> "An electrically operated pumping station of 200 m.g.d. capacity will lift the water through a

pressure aqueduct 4.16 miles into a storage reservoir at Dock Watch Hollow, north of Bound Brook. This basin has a total area of about 1,500 acres, and its rim varies in elevation, the lower places being 460 feet above sea level. The entire basin of 1,500 acres should be acquired in order to better control the entire natural drainage area. Water would be stored up to an elevation of 460 feet, and could be drawn down to 360 feet as required, the total storage thus available being about 15 billion gallons.

"Immediately below the dam the water will be filtered and then carried in a transmission main of 200 m.g.d. capacity 20.75 miles to a point at the southern terminus of the 60 inch diameter supply main of the Wanaque system at the Newark-Elizabeth boundary.

"The original estimate of cost of the recommended plan was $33,743,000. In order to raise the dam at Dock Watch Hollow to the proposed maximum height, an expenditure of $3,950,000 additional will be required. This will bring the cost to $37,693,000 under recommended plan of the engineering report.

"In the supplemental report (dated April, 1939) requested by Governor Moore, consideration is given to the use of a compensation reservoir on a tributary of the Delaware River. Such a reservoir site can be located on Musconetcong River or Flat Brook and the cost of site and construction is estimated at $3,000,000. If the entire project is built at once, the total cost would be $40,693,000.

"It is believed that use of Federal Aid will require certain changes in methods of construction that will add to the cost.

"In order to arrive at the total cost under Federal Aid through the Works Progress Administration, a separate tabulation has been prepared and is attached to this report (See Table 1). [Omitted from this 1942 report] This table shows the total cost to be $20,712,500 for Federal contribution and $20,350,000 for the State, or a combined total of $41,062,500. This does not include $2,000,000 for construction cost of the compensation reservoir which may be deferred. These estimates are, of course, tentative and may be subject to some reasonable revision."

The estimated total annual cost of the original plan proposed in the "Special Message" was $2,815,000. Of this the total annual cost

for operating was $1,125,000. A Supplemental Report by the Engineering Committee dated April 1939 states that an additional $60,000 per year will be required for pumping into an enlarged Dock Watch Hollow Reservoir.

Careful consideration was given to this proposal in the Report of the Special Legislative Committee on Water Supply in December 1940, on which no further legislative action has been taken.

(E)

USE AS AN INDUSTRIAL WATER SUPPLY.

The choice of sites for the location of many types of industry is dependent on the availability of an adequate water supply and means of discharge. The canal area offers such sites, well served by railway facilities, main highways and connecting roads, and by adequate housing areas. Furthermore, use of the canal as a source of industrial water bears a favorable releation to the present potable water situation.

The possibility of such use has, therefore, been investigated and the findings are presented in this report as Supplemement I.

As noted above, (p. 16) the estimated cost of reconditioning the canal is $365,200.00. Its use as an industrial water supply would involve an estimated annual cost of $73,260.00 for both maintenance and operation, including interest at 5% on the capital expenditure for construction. Against this cost the present capacity of 50 million gallons per day (m.g.d.), capable of increase to 150 m.g.d., has a potential income value, at an assumed minimum rate of $10 per million gallons, of at least $150,000 annually. In addition to its income value, the canal as an industrial water supply would prove a State asset through increased tax ratable and employment.

(F)

USE AS A RECREATIONAL WATERWAY

New Jersey as a whole lags far behind its neighboring states in the provision of recreational areas, and facilities in the crowded urban sections are critically inadequate. Considered in the light of recreational needs, the canal is uniquely located in that it traverses or is adjacent to the most densely populated region of the State, yet is itself almost entirely in open country. Other states, notably Pennsylvania with the Lehigh Canal, and Indiana with the Whitewater Valley Canal, are realizing on the recreational value of such properties, and the Federal Government has extensively developed the Chesapeake and Ohio Canal at Washington for such use.

The readily accessible Delaware and Raritan Canal is suitable for bathing, boating, fishing, camping, and similar activities; the possibilities have been studied and this report presents in Supplement II the findings regarding such recreational use, considered both from the standpoint of a sole realization on the present dormant status of the canal and as a secondary possibility in combination with other designated utilization.

The estimated cost of constructing the recreational facilities proposed for initial development is $23,350. The estimated annual operating and maintenance cost of these features is $10,000. On the basis of experience elsewhere, under normal conditions, the number and types of facilities proposed should produce initially an income of $2,000 per year, with an increasing revenue from year to year, eventually nearly, if not entirely, absorbing the full cost of operation of the

recreational facilities. In addition to direct revenue, recreational use of the canal offers assets in the form of increased local realty values and business opportunities, and a great, though intangible, asset in the form of public health and morale.

It is noted here for emphasis that recreation use of the property need involve no location or concentration of use objectionable to existing local owners, and can be accomplished at very low cost.

(G)

COMBINATION AND PROGRESSIVE POSSIBILITIES

Use of the canal as a potable water source would be an irrevocable disposition, excluding or severely limiting any combination or secondary use.

Its legislative designation as a recreational waterway would hold the canal in at least its present status for future development and at the same time, at slight additional cost, permit some immediate realization on its potential value. Designation as a combination industrial water supply and recreational waterway would permit larger immediate benefits and open the way to much greater future value. Such development would also preserve the diversion rights and improve the physical condition of the canal for future conversion to a potable water supply, if sufficiently urgent, or for a remotely possible revival of its Federal improvement for transportation. It should be noted that any reservation binding the canal to the possibility of such future conversions is not recommended since it would seriously limit its potential value as an industrial water supply.

VIII

RECOMMENDATIONS

It is recommended:

1. That the Legislature authorize the Department of Conservation and Development to hold the Delaware and Raritan Canal for use as a combined industrial water supply and State Park.

2. That the Legislature provide $400,000 for use by the Department of Conservation and Development for rehabilitation and reconstruction of the canal, its structures and appurtenances, for use as an industrial water supply and waterway park.

3. That the Legislature provide maintenance funds for use by the Department of Conservation and Development for maintaining the canal, its structures and appurtenances, until such time as the income from the canal is equal to or more than the amount needed for maintenance:- Such annual appropriation to be $50,000 per year unless or until reduced by improvements to the canal properties.

4. That the Legislature provide for the amortization of the capital investment involved from earnings of the canal in excess of the maintenance costs as the income of the canal makes possible such amortization.

5. That the Legislature provide so that immediate use of the canal for recreation purposes may be begun by the Department, pending final arrangements for the reconstruction and rehabilitation of the canal for the dual purposes involved in this recommendation.

SUPPLEMENT I

INDUSTRIAL WATER SUPPLY

INDEX

I

IMPORTANCE OF INDUSTRIAL WATER SUPPLY

The manufacturing processes of certain types of industries are completely dependent on the availability of an ample water supply. Included in such industries are pulp and paper manufacturers, textile dyers and finishers, the producers of plastics (a comparatively new and rapidly expanding industry), the metallurgical industries, cellulose and rayon industries, and chemical manufacturers.

Many such industries in the metropolitan area, of necessity relying on the expensive treated water from municipal and public utility systems, pay large sums annually for the water used in their manufacturing processes, with a consequent increase in the cost of their product, although they do not need water of potable quality.

A large proportion of the increase in the State's potable water consumption during the last 10 years has been accounted for by manufacturing industries so located that they have had to use potable water for their industrial water supply.

II

PRESENT STATUS OF WATER SOURCES

With the status of the potable water supply such that at the present time the State must consider measures to relieve the situation, use of potable water for manufacturing purposes, aside from cost considerations, has reached if not exceeded its limit. Only recently an industry in the city of Lambertville found itself unable to depend on the local water system for a supply adequate for manufacturing purposes, and applied to the Department of Conservation and Development for emergency use of water from the canal.

One of the proposals considered for utilization of the canal is its development as a part of a potable water system. It is worth noting in this connection that the alternative use as an industrial water supply will also have an effect in relieving the present potable water situation.

In addition to the question of limited available supply, the use of potable water for manufacturing purposes is subject to probable further increased costs as standards are raised and treatment facilities improved.

The ideal solution for the large water-consuming industries is a location on natural water courses, and such was the general practice in the past. However, such sites are no longer readily available, especially in areas with the necessary transportation facilities, labor supply, and other industrial requirements. Furthermore, natural stream flow is not always reliable, and is also subject to reduction by various subsequent developments. In recent years the Calco Company at Bound Brook (See Appendix D) has been affected by low flow in the Raritan River and is currently faced with a further reduction in its available water in the form of increased withdrawal by a co-user, the Elizabethtown Water Company.

Similar conditions have recently led to the development by the DuPont, Hercules and Titanium Companies of a reservoir system, for industrial use, near Old Bridge, and many years ago the Paterson textile industries established their own water system.

Driven wells are generally more reliable than the smaller streams as a source of water. However, records of the State Geologist

indicate that the recent increased industrial development in the vicinity of Bound Brook and New Brunswick has so lowered the ground water table in that area as to make inadvisable any drilling of additional large volume wells.

While the cost of well-water varies, information from the New Jersey Council indicates from general industrial experience that the cost will average $30 per million gallons for drilling, pumping and maintaining well systems. In comparison with this figure, water-rates tentatively set up for the canal range from $10 to $20 per million gallons. (See Appendix A)

III

GENERAL SUITABILITY OF CANAL AREA

One of the factors affecting the desirability of industrial sites is the availability of transportation facilities. The canal area is served by three main railway lines at Bound Brook and by the Pennsylvania Railroad from Trenton to Bakers Basin and at Princeton, Kingston, East Millstone and New Brunswick, while the feeder is closely paralleled throughout by another Pennsylvania Railroad line. (See Appendix F).

Good transverse roads throughout provide ready access from the canal and feeder to State Highway routes 26 (Super Highway), 27, 28, 29, 30 and 31. (See Appendix F).

Electric power is available, if desired, throughout the length of the canal and feeder.

Land values along the canal are generally low and there are no use restrictions. Possible zoning regulations might be advisable to protect the recreational and residential possibilities of the canal, and its

vicinity, but ample, and, of course, the most suitable areas could be reserved for industrial development.

The problem of the disposition of industrial wastes is common to practically all sites in the State and is not held to be a determining factor in considering the suitability of the canal area for industrial development.

Housing facilities are available within or near much of the area traversed by the canal and the possibilities of expanding such facilities are ample for any probable development.

IV

PROPOSED PLAN

(A)

CONSTRUCTION

As noted in the Report which this supplements, reconditioning of the waterway, embankment, and control structures is necessary, regardless of intended use, in order to preserve full diversion rights, protect the physical condition of the canal, reduce the cost of maintenance and safeguard adjoining property from injury. Since the maximum potential income from use as an industrial water supply is dependent on maintenance of full flow, the improvements recommended in the Report are especially necessary in developing the canal for such industrial use.

(1) Buildings - The buildings recommended for reconditioning in the Report will be needed for the use of necessary personnel in the operation of the canal as an industrial water supply. The buildings on Academy Street in Trenton will be needed as at present for administration and service.

(2) Bridges - As noted in the Report, it will be cheaper to rebuild and repair all the bridges now in one intensified program than to continue to rebuild one or two each year. Under a multi-use State program for the canal it is debatable whether the cost of bridge maintenance should be entirely charged to any one use. However, if they are to remain a responsibility of the Department of Conservation and Development, bridge construction and maintenance will prove least burdensome if it is a feature of the proposed industrial water supply system.

(3) Waterway and Embankment - Since the potential value of the canal as an industrial water supply is directly dependent on the volume of flow available, the recommended cleaning of the channel and bank repairs, assuring the safe maintenance of full flow, are obviously improvements which must be included in the development of the industrial water supply.

(4) Aqueduct and Culverts - The loss through the Carnegie Lake aqueduct, as noted in the Report, is 32 million gallons per day when the canal is flowing full. At the tentative minimum sale rate of $10 per million gallons, the value of the water thus lost would more than pay the total annual cost of operating and maintaining the industrial water supply, and replacement of this structure will have to be one of the first items considered in developing the canal for such use. Culvert masonry should be repaired now to avoid increased cost later.

(5) Locks - As with all other flow-control features, the proposed improvements to the locks will be necessary for industrial water supply use, to reduce future maintenance as well as improve flow-control.

(6) Spillways, Feedways, Control Gates - Improvements to these features, affording flood protection and providing means of maintaining at

least a partial flow around locks undergoing repairs, will be necessary for industrial water supply use as well as for general canal maintenance as recommended in the Report.

(7) Miscellaneous Items - The additional culvert repairs, improvement of the Delaware River diversion dam, aqueduct repairs in Lambertville, fluming of the Trenton section of the canal, and caring for storm drainage inflow in Trenton and Lambertville, all noted in the Report as not immediately necessary, may also be deferred in developing the industrial water supply.

(B)

SALE AND DISTRIBUTION OF WATER

Some water from the canal is now sold by the State under contract, and the same method can be applied to the distribution of all water from the proposed industrial water supply system. There are certain factors which will have to be considered in operating under this method, as noted in the correspondence from present and potential consumers. (See Appendix D) Contracts would have to be for long terms, and means would have to be found to definitely insure that rates would remain fixed, or be subject, before change, to review by some competent agency. Otherwise industry would hardly make an appreciable investment dependent on a water supply from the canal. Under contract distribution the consumption would be metered, and details regarding inlet structures, possible treatment, or other special conditions would be subject to arrangement with the individual prospective consumer.

(c)

OPERATION AND MAINTENANCE

Because of the very poor physical condition of the canal when it was taken over by the State, present maintenance necessarily takes the form of a succession of construction jobs, - extensive repairs to, or complete rebuilding of, facilities so deteriorated as to make ordinary maintenance insufficient.

Construction of the facilities proposed for the reconditioning of the canal and use as a permanent industrial water supply would reduce the requirements for maintenance to normal, and bring the work well within the capacity of the present canal personnel.

Operation of the canal as a permanent industrial water supply system will require only such additional personnel as are necessary to handle the full flow.

V

PRACTICABILITY

There are no serious technical difficulties involved in the development of the canal as a permanent industrial water supply. Its present capacity is approximately 50 million gallons per day (m.g.d.) and can be increased to 75 m.g.d. by eliminating the loss through the Carnegie Lake aqueduct. Preservation of this flow is dependent only on maintenance of the existing facilities. The proposed reconditioning construction is necessary in order to reduce the cost of maintenance and to insure against serious failures under flood conditions, now always a menace. Any deferment of these improvements will result in increased annual cost and will also increase the difficulties attendant on maintaining the

full flow.

The proposed construction and cleaning of the intake and channel, restoring them to normal, should increase the capacity of the canal to over 100 m.g.d., and future fluming of the Trenton section and possible treatment of other sections of embankment should result in an ultimate capacity of about 150 m.g.d.

Operation for industrial use, even at ultimate capacity, would be much simpler than during the days of navigation, and maintenance will be less difficult and less expensive than at present.

From a commercial standpoint, the proposed industrial water supply is also entirely practical. Assuming a rate of $10 per million gallons for the sale of the water, the proposed development will become self-sustaining at a consumption of approximately 25 m.g.d., and the immediate or near-future potential demand approximates 15 m.g.d. (See Appendix D)

The areas involved in industrial zones which such a water supply would create are not confined to the immediate canal right-of-way, but could include sites a considerable distance from the canal itself, these zones being limited only by natural local factors and the volume of water needed.

Comments of industrial real estate brokers (See Appendix E) indicate the general suitability of the canal area and prospects of a future demand for industrial sites requiring a water supply such as the canal might furnish. In view of these prospects, initital development for a consumption of 50 m.g.d. is warranted. In this connection it should be noted that while some consumers may draw their total daily supply over

the full 24 hour period, others might concentrate their daily consumption into a shorter period, thus requiring a larger canal capacity for these concentrated periods. The proposed reconditioning of the canal will increase the capacity to over 100 m.g.d., thus providing an ample factor of safety in available water in addition to reducing maintenance costs.

VI

TIME FOR ACCOMPLISHMENT

The canal is immediately suitable for use as an industrial water supply and is, in fact, already so used on a small scale. Legislative designation of a permanent status for such use would permit further immediate realization on the existing potential demand. Provision of State funds would permit complete development of the proposed plan, with construction of the necessary improvements to be accomplished during operation of present water use. The actual construction under these conditions would require a period of from one year to eighteen months.

VII

VALUE

A consumption of 50 m.g.d. at a rate of $10 per million gallons, has a potential income value of $150,000 annually on the basis of a 300 day year. The annual cost, interest on the capital outlay, together with operation and maintenance, will be only about half of this figure. This would permit amortization of the capital investment by a substantial sum annually. The determination of the State policy regarding the amount of income to be returned from such a utility is a matter beyond the scope of this study. However, consideration should be given also to the indirect

value of such a development. The industries using large volumes of water usually require a comparatively large number of employees, and account for an appreciable share of the local tax ratables. These factors might justify full State maintenance of the canal for industrial water supply, or a policy of furnishing the water at cost.

VIII

LEGAL FACTORS

In connection with the legal question regarding the amount of permissible diversion, discussed in the Report, an ultimate capacity of not less than 150 million gallons per day (m.g.d.) for the proposed industrial water supply seems justified on the basis of the long established operating flow of the canal. However, in the event of a contested right to the full diversion, and if the ultimate capacity were set at less than 150 m.g.d. there would still remain assurance of a self-sustaining utility.

In regard to the old water privileges, utilization as an Industrial Water Supply will maintain the status-quo in the case of the present inactive private water agreements and will permit continued fulfillment of such uses now in effect. It is worth noting that at least one of such privileges now existant is of considerable benefit to the State in the form of taxes and employment.

IX

COST

(A)

CONSTRUCTION

The cost of constructing the improvements proposed for initial

development will be approximately as follows:

Buildings	$12,000
Bridges	85,000
Waterway and Embankment	35,000
Carnegie Lake Aqueduct	116,000
Culverts	10,000
Locks	50,000
Spillways, feedways, Control Gates	24,000
	332,000
Engineering and contingencies	33,200
Total	$365,200

(B)

OPERATION AND MAINTENANCE (Annual)

Interest @ 5%	$18,260
Personnel (maintenance and operation)	25,000
Materials and Equipment	30,000
Total Annual Cost	$73,260

X

RELATION TO OTHER PROPOSALS

The proposed industrial water supply is not adaptable to combination with highway use, which would involve a heavily reinforced conduit at prohibitive cost, or with a transportation waterway, which would limit industrial water use to cases where the water was returned to the canal, or with a potable water supply, which would require all the available flow.

However, it would be entirely feasible to make extensive recreational use of the canal in combination with industrial water supply utilization and, since such water supply use would require reconditioning and full maintenance of the canal, recreational use could be combined with it at no additional cost for reconditioning the canal.

On the other hand, the additional use for recreation will not increase the maintenance cost for industrial water supply nor interfere with its operation. Possible zoning would reserve the most suitable areas for industrial development, and any improvements connected with recreational use would enhance adjacent industrial sites. From a social standpoint, a recreational development immediately accessible from an industrial area is a highly desirable feature.

XI

SUMMARY

(1) General Considerations - There is a definite need for new industrial water sources to relieve the demand on developed potable water and water-supplied industrial sites in New Jersey; the Delaware and Raritan Canal area, considered as a possible answer to such need, meets the requirements of industrial sites in general.

(2) Proposed Plan - To promote immediately the full use of the present capacity of the canal; to undertake such rehabilitation, advisable in any case, as will eliminate the existing danger to adjoining property from flood damage, improve the flow and reduce the cost of maintaining it; to develop to the ultimate capacity gradually thereafter as a part of the operating program.

(3) Practicability - There are no especially difficult technical problems involved in utilizing the canal as an industrial water supply. Its present capacity, with maintenance-reducing reconstruction, will be sufficient to make such a project self-supporting at reasonable rates; its commercial practicability is indicated by the data received from present and potential consumers and from New Jersey industrial brokers.

(4) Value - In addition to its income value, the canal as an industrial water supply will prove a State asset by increasing tax ratables and employment - the latter benefits alone might justify State improvement and maintenance of the canal for such use.

(5) Legal Factors - Use of the canal as an industrial water supply would preserve the status-quo of the outstanding water-agreements and involve only the question of the amount of permissible diversion. If this amount should be limited, the development can still be self-sustaining at less than the flow required for navigation.

(6) Time for Accomplishment - The canal is already used on a small scale as an industrial water supply and further immediate use is possible with its present capacity. The proposed improvements to increase its capacity will require from one year to eighteen months.

(7) Cost - The cost of constructing the proposed facilities to improve the present flow and reduce the cost of maintaining the canal, is estimated at $365,200. Annual operation and maintenance costs of the industrial water supply, including $18,260 for carrying charges on the capital cost of reconditioning the property is estimated at $73,260. With a prospective annual income of at least $150,000, this would permit amortization of the reconstruction costs at the rate of at least $75,000 per year.

(8) Relation to Other Proposals - Recreational use can be made of the canal in combination with its utilization as an industrial water supply with advantages resulting to both uses; other proposals are not adaptable to combination with the industrial water supply.

SUPPLEMENT II

RECREATIONAL WATERWAY

INDEX

I

NEED FOR ADDITIONAL RECREATIONAL FACILITIES

New Jersey lags far behind its neighboring states in the provision of public recreational facilities. On a per capita basis this state offers only 7.7% of the area dedicated to such use in Pennsylvania and only 11% of that provided by New York State. In addition to its own per capita recreational deficiency, consideration should be given to the present loss of a very appreciable potential revenue from out-of-state visitors.

The urban areas of the state are notably deficient in the provision of parks and playgrounds. On the generally accepted standard of 10 acres per 1000 of population, the urban sections now present an average of less than one-third of normal requirements, and in general the facilities available vary inversely with the density of population, and consequent need. Ideally, the necessary areas should be provided within the municipalities, but practically, sites of the character needed are not generally available locally and the cost of such development would be prohibitive. The next best solution involves consideration of the nearest available sites.

The greatest concentration of population lies in a belt extending from Camden to Trenton and across the state to the Newark-Jersey City-Paterson area, with the maximum density at the ends of the strip. The Delaware and Raritan Canal is uniquely located in that it traverses the central third of this belt, connecting the more densely populated ends, yet is itself almost entirely in open country. The population of the areas easily accessible to the Canal right-of-way is such that a

using volume of from 100,000 to 200,000 persons per year is conservative. Already publicly owned, the canal constitutes one of the available areas so badly needed to supplement inadequate urban recreation facilities.

The nearest existing State owned areas are Washington Crossing, Voorhees, and Cheesequake State Parks, all capable of expansion only at considerable expense and now all overloaded by normal use.

II

SIMILAR PROJECTS

The Lehigh Canal in Pennsylvania is now State owned and publicly proclaimed available for barge parties, boating, swimming and hiking; two recent publicity articles being noted in the New York Times of May 31, 1942 and June 14, 1942. To quote from the latter, "Any one leaving New York at 4 P.M. can be in Lambertville by 5:45, walk across the bridge to New Hope, spend the night there and start out fresh the next morning." From New Jersey's point-of-view "any-one" might far better spend the night in Lambertville and start out the next day along the Delaware and Raritan Canal Feeder.

In Indiana a movement is under way to restore the Whitewater Canal, similar in age and construction to the Delaware and Raritan Canal, and convert it into a State Park.

The Chesapeake and Ohio Canal was purchased by the Federal Government in 1938 and shortly afterward the National Park Service began restoration of the Georgetown Division. The rebuilt section of that canal is now available to the public for boating, hiking, fishing, picnicking, and ice-skating. The locks are not operated but equipment is installed

to aid in portaging. (For description, map, and photographs see Appendix K).

III

JUSTIFICATION FOR SUCH USE

The Delaware and Raritan Canal offers possibilities of recreation use by a large number of people and for a wide variety of activities, some of which are not now available to the public in this part of the state. The canal also has now and will have increasingly an historical value.

The continuance of the canal for either or both of these uses alone is a question on which there might be a wide difference of opinion. The cost of the general canal maintenance and of necessary replacement of present structures would involve a considerable figure if charged against recreation use only.

However, since recreation use of the canal can be combined with some of the other proposed uses of the property; since recreation development can be begun at once and at small cost of itself; since such development will in no way impair or prevent any other use of the canal later, and will also add immediately to the income from the property, such use is presented as a desirable consideration.

It is assumed in this connection that the canal is not to be abandoned and dismantled and that, therefore, the normal maintenance costs will continue and need not be charged to this particular use.

IV

SUITABILITY OF CANAL LOCATION AND PROPERTIES

The feeder, 22 miles long, paralleling the Delaware River from Raven Rock to Trenton, offers unspoiled natural beauty north of Stockton and many fine stretches south of that point. Near Raven Rock the canal property includes the lower third of Bull's Island, 14 acres, exceptionally suitable for recreational development on the Delaware River itself. Enlarged portions of the right-of-way, including Delaware River frontage, are available at Lambertville and Jacobs Creek for possible bathing and boat concessions and campsites. The feeder is readily accessible throughout its length, the southern portion by paved highways and the section from Stockton to Raven Rock by a parallel public road. (See Appendix H).

The main section of the canal passes into open country at the outskirts of Trenton and presents, for the entire distance of approximately 36 miles to New Brunswick, an almost uninterrupted scenic waterway, bordered by a natural tree-growth standing much as it has through all the years since the canal was built. Enlarged sections of the right-of-way at Bakers Basin, between Kingston and Rocky Hill, and between the canal and the Raritan River from Weston to New Brunswick offer camping and picnic sites. The canal is readily accessible by main highways at New Brunswick, Bound Brook, Kingston, Princeton, Bakers Basin and Trenton, and for almost its entire length from Carnegie Lake to New Brunswick a public road runs along its bank (See Appendix G).

Where the canal intersects State Highway #26 (the Super Highway) the property includes two tracts of approximately 20 acres each, one of

them extending from the highway to the canal with a 1000 foot frontage on the highway. Together these areas constitute an ideal site for a recreational center; - picnic areas, camp sites, bathing and boat concessions and embarkation point for vacationers making canoe camping trips. (See Appendix G).

The Bordentown terminus of the canal, near Duck Island, includes a sizeable tract, with considerable river-frontage, well suited to recreational development. Of all the canal property this is the only portion not easily accessible to the public now, but its potentialities warrant careful consideration of an extension of the present traffic access, for which the canal right-of-way is available, from Trenton down the river to this island. (See Appendix G).

V

PROPOSED PLAN

(A)

ACTIVITIES

The canal in its present condition, with the provision of simple and inexpensive recreation facilities, is immediately suitable for a wide variety of outdoor activities. Such use either could be temporary, if not compatable with the ultimate disposition of the canal, or could be coordinated and combined with some other use which would absorb or share the costs of general maintenance and of necessary capital replacements and improvements. Therefore, the recreation activities proposed for immediate development represent a minimum realization on the present status of the canal, and do not involve provision for the major reconstruction

and repairs advisable to preserve the canal as it is or to make other use of the properties. (See Report p.11). Decision as to the locations and types of recreational development should consider the character of the neighborhood, local planning and possible future local needs.

(1) Bathing - At several locations along the canal there is already considerable bathing use. For the present it would seem advisable to provide bath-houses and sanitary facilities at three or four of the most suitable locations. Provision could be made to include in these bath-houses a stand for the sale of soft-drinks and candy, with the whole unit to be operated as a concession, eliminating the need for any additional State personnel. These units might also serve in winter as ice-skating shelters. Later, similar facilities could be provided at additional sites, even eventually at each of the locks.

Official sanction of swimming in the canal will involve the question of sanitation and pollution. The fact that fish-life appears throughout at least the greater part of the length of both the feeder and the canal, would indicate that the water is nowhere badly polluted. Periodical inspection and testing would be advisable, but whether or not it is used for swimming, the sanitary condition of the canal would in any case be subject to the State's anti-pollution laws and the approval of the State Department of Health.

(2) Fishing - Stocking of the canal with Bass and Pickerel and Panfish would be highly desirable and would provide much pleasure for fishermen who must now travel considerable distances to find fishing conditions which could easily be supplied by the canal. No special provision need be made but the canal could well serve also for sportsmen's

contests and demonstrations. In this connection it should be noted that the factor of distance assumes special significance during the present emergency. Many of New Jersey's 150,000 fresh-water fishermen, lacking transportation to their usual fishing grounds, would welcome the availability of a well-stocked canal.

(3) Boating - The canal is eminently suitable for small-boat use, both localized and in the form of extended trips. Vacationers now can, by portaging around the locks and some bridges, make a canal trip of almost 60 miles from New Brunswick to Raven Rock and then continue on up or down the Delaware River. The canal is the natural link for canoe and small boat traffic between the Raritan and Delaware River watersheds. Satisfactory initial development would consist of concession stands for the renting of rowboats and canoes at selected locations, and the provision of short paths for portaging around obstructions. Later, ramps could be provided to facilitate the passing of boats over lock-gates. Privately owned boats and canoes would of course add to the users, and special uses of the canal such as the Outboard Motor Trials held annually at Bakers Basin could be expanded.

Use of power boats, including outboard motors, should be limited as to horsepower and speed or be restricted to areas with special bank protection.

(4) Camping - Initial development for camping would include clearing the campsites, and providing water supply, sanitary, cooking and tenting facilities at 20 or 25 locations along the canal. The number of campsites could be increased when necessary. Provision for trailer camps could be included in the future.

(5) Picnicking - Present development of picnic sites would include the provision of tables, fireplaces, water supply, sanitary, and parking facilities, at a few suitable locations (for example, at Bull's Island, at Route #26 bridge, at 5 mile Lock, and possibly at Bordentown). Other sites are available for similar development in the future.

(6) Trails - No immediate special provision will be necessary for hiking, riding and bicycle trails, but such trails (generally on the towpath) may be developed gradually as part of the maintenance program.

(7) Barges - Development in the future might include provision for barge parties such as are now available on Pennsylvania's Lehigh Canal and the old Chesapeake and Ohio Canal at Washington. For instance the section from Rocky Hill to East Millstone would provide a stretch of about 8-1/2 miles and would involve the restoration of one lock and the necessary adjustments at four old bridges.

(8) Cabin Camps and Hostels - The canal properties offer ample possibilities for future development of cabin camps, such as those already so much in demand in our State Parks and State Forests or even for Youth Hostel centers, if or when the demand justifies such facilities. The initial cost of such features does not justify their consideration under present conditions or until the future of the canal has been definitely decided.

(B)

PRACTICABILITY

There are no technical difficulties involved in the recreational development of the canal, which in its present condition is suitable for the activities proposed. The necessary facilities are

simple and inexpensive. Legislative approval of the recreational use of the canal would permit publicity and organized development and control of activities which already exist spontaneously on a small informal scale.

(C)

OPERATION

In general, administration of the recreational facilities of the canal should follow the procedure used in the State Parks and State Forests. In addition to the normal canal maintenance staff, necessary so long as the canal remains as a canal, the recreation program outlined for initial development will require an operating personnel of 5 park guards for patrol and to furnish information and handle fire and camping permits in the manner in which such business is handled in other park areas.

The facilities proposed will require very little maintenance and it should be possible for the guards to handle any necessary reconditioning during the winter months.

(D)

FINANCING

In view of the small sum required for initial recreational development it is believed that it could best be financed by direct Legislative appropriation, in addition to the regular canal maintenance funds. Thereafter the recreational features of the canal, operating in a State Park status, would progressively absorb an increasing proportion of the cost of operation. Consideration should also be given to the possibility of Federal participation, on an historical-value

basis, in the development of the canal property as a State Park. The development of its recreational possibilities is a project which makes the canal a better than average property for the application of any work-for-relief program. The property is nearby to centers of population. The work would be largely by common labor, with considerable variety and a possibility of flexibility as to type and timing.

VI

TIME FOR ACCOMPLISHMENT

Legislative designation of recreational use as a permanent feature of the canal would permit immediate action by the existing canal maintenance staff in clearing and preparing sites. Construction of the recreation facilities proposed can start as soon as funds are available. Development of practically all of the initial facilities can be accomplished in from 6 to 9 weeks on a contract basis. The greater part of such development could be done by the existing maintenance crew of the canal in a somewhat longer period at little if any extra cost for labor, if necessary materials are provided. Fuller development could be scheduled during operation to meet demands as they develop later.

VII

VALUE

The greatest benefit from any recreational program is intangible - but the health and morale of its citizens, affecting all production and general progress, is of far reaching importance to any State. Aside from such intangible value, development of the Delaware and Raritan Canal as a state park will produce an appreciable and grow-

ing income from concessions, campsites, and picnic areas, and should result in increased realty values and local business opportunities in the entire canal area.

VIII

LEGAL FACTORS

Recreational use of the canal raises no legal problems. Such use will require the smallest water diversion of all proposals - the present flow is sufficient - and the status-quo of the outstanding water agreements, whether used or unused, will be preserved.

IX

COST

(A)

CONSTRUCTION

The estimated cost of constructing the facilities proposed for initial development will be approximately as follows:

Bathing	- 4 locations	$9,000
Boating	- 3 "	2,350
Camping	- 25 "	2,500
Picnicking	- 3 "	8,000
Administration		1,500
		$23,350

(B)

OPERATION AND MAINTENANCE

As noted in the Report the cost of maintaining the canal in its present status will approximate $50,000 annually, regardless of whether any use is made of it. The estimated annual cost (below) of operating and maintaining the proposed recreational features does not include this general canal maintenance figure, but must be added to it to arrive

at the total annual cost to the State for the recreation use immediately proposed, if such recreation use is the only one authorized.

Estimated Cost (on the basis of the initial development and use proposed)

Recreation Personnel	$6,000
Equipment and supplies	600
Maintenance of facilities	3,400
	$10,000

Estimated Income (on the basis of the initial development and use proposed)

The number and types of recreation facilities proposed, on the basis of experience elsewhere under normal conditions, should produce an income of $2,000 per year with an increasing revenue from year to year, eventually nearly if not entirely absorbing the full cost of operation of any recreation use.

X

RELATION TO OTHER PROPOSALS

Recreational use in varying degrees is possible in combination with all other proposed uses, although with most of the plans suggested such use would be limited.

If the canal is later developed for potable water use, the proposed covered aqueduct would permit trails for hiking, riding and bicycling. Suitable portions of the present canal properties could still be utilized for camp and picnic sites but largely without the water features so valuable for recreation use. The Bound Brook-New Brunswick section and the Bordentown area and other such sites would remain available for recreational development as herein suggested.

If the canal is reopened for navigation, the areas proposed herein for recreation use might be utilized on a more limited scale in combination with the proposed improvement and operation of the canal. It might also be possible to arrange for boating and fishing and use of the towpath for riding and hiking.

If the canal is developed as an industrial water supply, full recreational use as herein proposed would be possible. Present and potential water supply users are and will be located clear of the canal right-of-way, and a system of zoning and landscaping can be worked out to the mutual advantage of both uses. Suitable regulation of industrial discharge is already required by State law, and recreational use would not interfere with the flow required for industrial use.

XI

COST OF COMBINATION USE

Combination utilization will not affect the direct cost of the facilities proposed for recreational use, but will have the beneficial affect of sharing or absorbing the unavoidable cost of normal canal maintenance. If recreation were to be the only use made of the canal, at an actual annual cost of $9,000.00 or $10,000.00 for that purpose, such use would also have to carry the $50,000 required annually for regular canal maintenance, resulting in an extravagant total cost for recreation, especially in view of the fact that much of the construction and repairs actually necessary on the canal are not required for recreational use of itself. However, combination utilization with any of the other proposals, all of which require full flow and consequently depend on complete canal maintenance, will place in its true relationship

the cost of recreational use. In fact, use such as that proposed for industrial water supply could well support the entire cost of recreational activity as a by-product exempt from all carrying charges.

XII

SUMMARY

(1) General considerations - There is a definite need for additional recreational areas in the State, and particularly in the urban sections near the canal; the canal property offers a suitable and well located area for such use.

(2) Proposed plan - To construct initial facilities, publicize the status of the canal and promote its use for recreation; subsequently to expand the facilities as need arises during operation.

(3) Practicability - There are no difficult technical problems involved in utilization of the canal for recreation, and indications are that there will be an excellent public response.

(4) Time for accomplishments - Initial facilities can be made available in from 6 to 9 weeks; further development can be made as required during operation.

(5) Value - Recreational use of the canal offers assets in the form of a small initial income from concessions and fees, an indirect value through increased local realty values and business opportunities, and a great though intangible asset in the form of public health and morale.

(6) Legal factors - Because of its comparatively small water requirement the recreational use of the canal introduces no new legal problems, and maintains the status-quo in regard to existing water agreements.

(7) Cost - Construction of the facilities proposed for initial development would cost approximately $25,000, with an annual operating and maintenance cost of $10,000.00. If no other use is made of the canal, there must be added to this maintenance figure an annual cost of $50,000 for general canal maintenance.

(8) Relation to other proposals - Limited recreational use can be made of the canal as an addition to all other proposed uses. Full recreational development is possible in combination with industrial water supply utilization, to the mutual advantage of both uses.

APPENDIX

INDEX

TYPICAL WATER COSTS

In dollars per thousand gallons, according to rates filed with N.J. Public Utility Comm. and rates of Newark, N.J. Department of Public Affairs, Division of Water.

Note: All except Canal water is of potable quality, delivered under pressure. CONSUMPTION ON WHICH RATES ARE QUOTED	EQUIVALENT DAILY CONSUMPTION IN GALLONS (75 days per quarter)	ELIZABETHTOWN WATER CO., CONSOLIDATED (Optional Wholesale Rates)	HACKENSACK WATER CO. New Milford (lowest) District	COMMONWEALTH WATER CO.	PLAINFIELD-UNION WATER CO.	BOUND BROOK WATER CO.	CITY OF NEWARK, N.J.	MIDDLESEX WATER CO. (To large consumers through their own mains.)	TENTATIVE DELAWARE AND RARITAN CANAL RATES
2000 cubic feet per year	50						.461		
10,000 c.f. per year	250						.215		
1st. 50,000 gal. per qtr.	To 667					.45			
1st. 10,000 c.f. per qtr.	To 1000			.30	.234				
1st. 40,000 c.f. per year			.225						
Next 100,000 gal. per qtr.	To 2000					.30			
Next 150,000 gal. per qtr.	To 4000					.15			.02
Over 300,000 gal. per qtr.	Over 4000					.10			.02
Next 90,000 c.f. per qtr.	To 10,000			.227	.194				.02
40,000-400,000 c.f. per yr.			.209						.02
2,002,000 c.f. per year	50,050						.092		.02
Next 900,000 c.f. per qtr.	To 100,000			.167	.154				.02
400,000-4,000,000 c.f. per yr.			.193						.02
Over 1,000,000 c.f. per qtr.	Over 100,000			.12	.114				.02
Over 4,000,000 c.f. per yr.			.16						.02
First 6,000,000 c.f. per qtr.	To 600,000	.19*							.02
Next 4,000,000 c.f. per qtr.	To 1,000,000	.16*							.02
Excess of 10,000,000 c.f. per qtr.	Over 1,000,000	.134*					.092		.015
	To 3,000,000								.015
	Over 3,000,000							.085	.01

Reducing rate

Uniform rate

Uniform quotation of $.85 per million gallons, minimum not stated

*Minimum $5300 per quarter

Feb. 4, 1942

APPENDIX B

Del. & Rar. Canal
Diversion
1913-1934.

From Bulletin 33, Dept. of Cons. & Devel. "Surface Water Supply of N.J." Page 245.

3/1- 12/31-1913 to 1923	160 sec. ft.
3/1- 9/30- 1924	160
10/1 - 11/30 - 1924	140
4/1 - 9/30 - 1925	140
10/1- 12/31- 1935	130
3/1- 11/30- 1926	130
3/1- 12/31- 1927	130
3/1- 9/30- 1928	130

APPENDIX B

UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

228 Federal Building,
P.O. Box 967, Trenton, N.J.
December 6, 1941

Mr. H.W. Acken
D & R Canal Office
342 Academy Street
Trenton, N.J.

Dear Mr. Acken:

In accordance with your verbal request of yesterday, I enclose herewith a tabulation showing results of current meter measurements which have been made by engineers from this office in the Delaware and Raritan Canal at the Calhoun Street bridge, Trenton, from November 1928 to October 1941 inclusive.

Yours very truly,

O.W. Hartwell
District Engineer.

APPENDIX B

Measurements of Discharge of

DELAWARE AND RARITAN CANAL AT CALHOUN STREET, TRENTON

In cubic feet per second

Date	Discharge
1928	
November 24	68
1929	
April 2	103
May 24	98
July 2	104
August 8	90
September 14	86
October 25	104
December 12	108
1930	
April 25	128
June 7	141
July 22	96.6
October 20	114
November 25	102
1931	
March 19	110
May 6	118
July 23	73
August 28	80
October 2	100
October 23	109
December 3	87
1932	
January 26	46.4
April 16	81
May 17	117
July 18	76
September 7	75
November 22	58

Date	Discharge
1933	
February 28	3.4
May 4	5.8
June 19	39.9
July 21	17.6
August 28	26.2
September 25	35.3
October 25	48.1
November 25	48.8
1934	
January 22	-3.0
March 31	32.2
April 30	32.6
May 28	30.1
June 26	86
July 30	96
August 25	82
September 29	76
October 26	80
November 23	77
December 28	0
1935	
February 20	-2
March 23	52.8
April 25	86
May 27	81
June 20	103
July 26	73.5
August 27	62.2
September 25	91.3
October 25	99.6
December 2	47.2
December 21	13.2

(Sheet 1 of 2 sheets)

Measurements of Discharge of

DELAWARE & RARITAN CANAL AT CALHOUN STREET, TRENTON

In cubic feet per second (cont'd)

Date	Discharge
1936	
January 17	0.2
May 28	92.8
June 22	75.9
July 31	87.6
September 4	60.8
September 29	73.2
October 23	66.1
December 3	95.2
December 29	0
1937	
February 5	-5
February 16	-2.5
March 19	1
April 20	1
May 24	0
June 28	90.6
July 30	66.7
August 31	72.7
September 30	85
October 26	89.8
November 22	94.8
December 28	40.8
1938	
January 19	52.8
February 25	51.0
March 31	58.9
April 30	108
May 31	104
June 14	124
June 14	124
June 14	121
June 30	113
June 30	119
June 30	119
August 19	95.3
October 12	63.5
November 18	59.9
December 20	54.8
1939	
January 27	31.7
February 21	86.3
April 1	75.0
April 25	103
May 25	90.1
June 28	100
July 14	82.2
September 7	10.7
October 26	101
November 18	104
December 21	0
1940	
January 13	0
February 28	66.5
March 21	91
May 3	113
May 24	102
June 22	117
August 10	64.5
August 31	46.8
September 30	62.8
October 24	86.4
November 16	75.2
December 19	13.7
1941	
January 17	40.9
February 20	55.8
March 22	91.4
April 22	111
May 24	109
June 28	71.0
July 26	62.7
August 23	71.3
September 27	16.4
October 25	49.5

APPENDIX C

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421, State House Annex
Trenton, New Jersey

January 12, 1942

Mr. James Logan,
State Highway Engineer
State House Annex
Trenton, N.J.

Dear Mr. Logan:

In making the study and subsequent report to the Legislature on the utilization of the Delaware and Raritan Canal, it is the desire of this Department that all possible uses be considered. One of the possibilities is the dedication of the Canal right-of-way, or portions of it, to Highway or Motor Parkway use.

For such use the Canal property might be turned over completely to the Highway Department, or the Highway possibilities might be realized in combination with other utilization also under consideration.

Listed below, with comments regarding the main features involved in Combination, as well as exclusively Highway use, are the possibilities noted so far in our study. It would be appreciated if you would indicate which of these uses you consider inapplicable, and add to the list any possibilities which we may have overlooked.

Solely Highway Use

Involves filling Canal bed, disposition of drainage, compensation to holders of permanent water-rights (or construction of means of providing such water).

1H. Feeder as one-way (southbound) portion of proposed Route 29A.

2H. Trenton-Bound Brook section of Canal as Motor Parkway. (This area already served by existing highways, but Parkway might tie in with State Planning Board's future Park Development of Millstone Valley.)

3H. Bound Brook-New Brunswick section of Canal as one-way (northbound) portion of Easton Turnpike (County road- State Aid? Involves flood-protection).

4H. New Brunswick section of Canal as by-pass for Route S-28 (Riparian rights involved, also flood protection)

Combination Use with Potable Water Supply

Involves heavy reinforcement of aqueduct under Highway (unlimited traffic) and lighter reinforcement of aqueduct under Parkway (traffic limited to private cars).

1P. Feeder as one-way (southbound) portion of proposed Route 29A (heavy reinforcement of aqueduct)

2P. Trenton-Bound Brook section of Canal as Motor Parkway (lighter reinforcement of aqueduct)

3P. Bound Brook-New Brunswick section of Canal as one-way (northbound) portion of Easton Turnpike (involves reinforcement of $2\frac{1}{2}$-3mgd water conduit supplying Johnson and Johnson, flood-protection).

4P. New Brunswick section of Canal as by-pass for Route S-28 (Involves filling Canal bed, riparian rights and flood-protection).

Combination Use with Industrial Water Supply and/or Recreational Waterway

1I. Feeder as portion of proposed Route 29A (Involves construction of heavily reinforced aqueduct under)

3I. Bound Brook-New Brunswick section of Canal as portion of Easton Turnpike (involves construction of $2\frac{1}{2}$-3mgd water conduit under, also flood-protection)

4I. New Brunswick section of Canal as by-pass for S-28 (involves filling Canal bed, riparian rights, and flood protection).

After elimination of the inapplicable suggested uses, further study, cost-estimates, etc. may be made on the remaining possibilities.

Yours truly,

H.W. Acken
Special Assistant
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

APPENDIX C

STATE OF NEW JERSEY

STATE HIGHWAY DEPARTMENT

Trenton

February 3
1 9 4 2

Mr. H.W. Acken, Special Assistant
Department of Conservation & Development
Trenton, New Jersey

Dear Mr. Acken:-

Acknowledgement is herewith made of your letter of January 12, in reference to the utilization of the Delaware and Raritan Canal.

Following your visit to my office, at which time we held a conference in reference to the subject matter of your letter, please be advised that the Highway Department believes that the existing canal bed and feeder would be of no value for right of way purposes for future State Highways, with the exception of the possible use of the canal feeder right of way from the north edge of Trenton north along the Delaware River where it parallels the existing river road. This is a legislated State Highway, but has never been taken into the system.

The existing right of way of the canal and some of the feeder is in a location where, at the present time, we can see no future needs for a State Highway. The existing right of way is narrow and would have to be added to by parallel and additional acquisitions which would probably be as expensive as buying a full width right of way in a more suitable location.

The existence of perpetual water rights and of troublesome drainage situations would plague the designing engineer beyond the utility of the right of way. Consequently, we must add that we believe that for this reason alone, if not the others, the existing right of way of the abandoned canal would be of no material benefit to the Highway Department.

Yours very truly,
STATE HIGHWAY DEPARTMENT

James Logan
State Highway Engineer

JL:CW

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421 State House Annex
Trenton, New Jersey

June 18, 1942

Mr. John A. Clark, Vice President
Public Service Corporation
Newark, New Jersey

Dear Sir:

This Department under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial Water Supply. In order to evaluate the possibilities of such use, we have already written to potential consumers to determine future prospects of a demand for water from the Canal, and we would like also to investigate the effect upon present consumers of a possible change in the status of the Canal.

To this end it would be very much appreciated if you would furnish us information along the following lines:

1. What is your present average daily water requirements from the Canal?
2. Does the expected normal growth of your business involve an increasing water requirement?
3. If you expect an increase in water requirements, what would be your estimated average daily demand for the next 5 years? (assuming peace-time conditions)
4. To what extent are you dependent upon the Canal as a source of water?
5. Are there any special provisions or conditions, technical or financial, which you believe should be considered in the possible development of the Canal as a permanent Industrial Water Supply?

Yours truly,

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. Acken
Special Assistant

HWA:LD

APPENDIX D

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

80 Park Place
Newark, N.J.

June 23rd, 1942.

Department of Conservation and Development
Trenton
New Jersey

Attention Mr. H.W. Acken

Gentlemen:

In reply to your letter of June 18th, 1942 asking us some questions concerning the use of Delaware and Raritan Canal water at our Trenton Plant, we have assembled the following information:

1. The present average daily water requirement is 730,000 gallons per day. This water is used for cooling purposes and is returned to the canal. With better circulation of water in the canal, this quantity of water would be reduced.

2. We would expect that there would be a moderate increase in our water requirements.

3. We would estimate our average water requirements at approximately 800,000 gals. per day, subject to adjustment if the water temperature of the canal should go up or down.

4. At the present time, the canal is our sole source of cooling water. We would have to provide ourselves with either a cooling pond or tower, if the use of canal water were denied us.

5. Obviously, we are interested in the continued maintenance of a water supply in the canal. In establishing rates, we believe consideration should be given to customers who return the water they use to the canal. We also feel that the rate should recognize the value of the service, and not be set so high as to induce industrial users to develop alternative supplies.

Very truly yours,

(John A. Clark)
Vice President in Charge of
Gas Operation

JBB:MC

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421 State House Annex
Trenton, New Jersey

June 18, 1942

Mr. Frank A. Cosgrove, Treasurer
Johnson and Johnson
New Brunswick, New Jersey

Dear Sir:

This Department under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial Water Supply. In order to evaluate the possibilities of such use, we have already written to potential consumers to determine future prospects of a demand for water from the Canal, and we would like also to investigate the effect upon present consumers of a possible change in the status of the Canal.

To this end it would be very much appreciated if you would furnish us information along the following lines:

1. What is your present average daily water requirement from the Canal?
2. Does the expected normal growth of your business involve an increasing water requirement?
3. If you expect an increase in water requirements, what would be your estimated average daily demand for the next 5 years? (assuming peace-time conditions)
4. To what extent are you dependent upon the Canal as a source of water?
5. Are there any special provisions or conditions, technical or financial, which you believe should be considered in the possible development of the Canal as a permanent Industrial Water Supply?

Yours truly,
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. Acken
Special Assistant

HWA:LD

APPENDIX D

JOHNSON & JOHNSON

New Brunswick, N.J.
June 26, 1942

Department of Conservation & Development
State House
Trenton, N.J.

Gentlemen: Attention: Mr. H.W. Acken, Special Assistant

Receipt is acknowledged of your letter of June 18, respecting your study of the utilization possibilities of the Delaware & Raritan Canal.

The following are answers to your questions:

1- From May 23 to June 23, a period of one month, our average daily consumption of canal water was 2,446,183 gallons per day;

2 & 3 - Inasmuch as our present plant is operating at full capacity, it is unlikely that our water requirements will increase;

4- The canal is our sole source of industrial water supply; and

5- Based upon our own experience, we believe that the canal should be maintained by the State as a permanent industrial water supply and that if so maintained it would attract to the State industries requiring large quantities of water sufficiently pure for industrial use.

Very truly yours,
JOHNSON & JOHNSON

F.A. Cosgrove
Treasurer
ms

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

Del. & Rar. Canal
Y-1 INDUSTRIAL WATER SUPPLY

421 State House Annex
Trenton, N.J.

January 28, 1942

Mr. V.L. King, Technical Director
Calco Chemical Co.
Bound Brook, N.J.

Dear Sir:

Reference is made to our conversation of Jan. 21, in regard to a possible interest of the Calco Co. in a proposal for future use of the Delaware and Raritan Canal as an Industrial Water Supply.

As explained at that time, such use is one of several possibilities now being studied by this Department, under mandate from the State Legislature to make a report and recommendations on the permanent utilization of the Canal.

In order to evaluate the possibilities of the Canal as an Industrial Water Supply we are making inquiries of present and potential users and would appreciate very much the following information.

Where a reply is contingent upon the possible rates to be charged, the following tentative rate may be used as a basis of consideration. This rate is by no means final, and comment on it will be appreciated. In this connection it should be noted that unless the Industrial Supply Utilization can be economically justified, such use of the Canal cannot be recommended in the final report to the Legislature. The rate does not include cost of intake structures or purification treatment as it is assumed that such details will be arranged by conference in individual cases:

2¢ per 1000 gal.	($20 per million gal.)	up to 1,000,000 gal. per day
1.5¢ " " "	($15 " " ")	1,000,000 to 3,000,000 gal/day
1.0¢ " " "	($10 " " ")	over 3,000,000 gal. per day

1. In the event that the Canal is set up as a permanent Industrial Water Supply would the Calco Co. be interested in securing water therefrom?

2. What would be the estimated average daily requirement from the Canal for a period of 5 years after its establishment (assuming peacetime conditions)?

3. What is your present average daily water requirement?

4. Source and estimated capacity of your present water supply?

5. To what extent, if any, would the growth of your present business be dependent on obtaining water from the Canal?

In regard to your expressed interest in securing immediate access to a water supply from the canal, it is requested that you apply to:

Mr. C.P. Wilber, Director
Dept. Conservation and Development
State House Annex
Trenton, N.J.

stating the amount of water desired and the approximate location on the Canal from which it is to be taken. The Department can then proceed with the matter through its regular channels.

Yours truly,

H.C. Acken
Special Assistant
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

APPENDIX D

CALCO CHEMICAL DIVISION

AMERICAN CYNAMID COMPANY

February 18, 1942

Mr. Charles P. Wilber, Director
Department of Conservation and Development
State House Annex
Trenton, N.J.

Dear Mr. Wilber:

Receipt of Mr. H.W. Acken's letter of January 28 is hereby acknowledged.

The answers to your questions may be summarized as follows:

We presently take about 20,000,000 gallons of water per day from the Raritan River for manufacturing use. It is estimated that the normal expansion of our plant would increase our requirement in five years to perhaps 33,000,000 gallons per day or more. The Raritan River is our main source of supply of industrial use water. Our only other source of supply are driven wells from which we obtain not more than 500,000 gallons per day.

The Elizabethtown Water Company draws from the river about 10,000,000 gallons per day at a point upstream. It is authorized to draw up to 20,000,000 gallons per day. In recent years the warm weather low flow of the river has been only little more than sufficient to supply our requirements and that of the Water Company. It would be insufficient to supply our anticipated future need plus the entire authorized withdrawal of the Water Company and therefore there will be no further expansion of our present plant unless an additional supply of industrial use water is made available. Lacking such an increased supply, additional manufacturing facilities which we will need in the future will be constructed elsewhere and we are already considering other locations.

In the event that the Canal is set up as a permanent industrial water supply, we would be interested in securing water therefrom. Indeed, as we have just stated, unless this is done, further enlargement of our plant in this location which has been consistently growing thus far will be discontinued.

With reference to the rates suggested for the use of water, it is unlikely that we would increase our manufacturing facilities here

in case such a schedule of rates were adopted. The rates suggested would represent an important item in manufacturing costs and would be a major factor in determining whether to construct additional manufacturing plants here or elsewhere. It will be impossible for us to say whether the suggested rates would be justifiable until we have completed our investigation of other available sites.

However, be this as it may, there would be no assurance that the rates originally fixed would remain stable. They might subsequently be raised to confiscatory levels. We would not construct any substantial additions to our present plant which would be wholly dependent upon a source of industrial water supply the cost of which was uncertain and might render the investment unprofitable.

It is our view that the State of New Jersey benefits greatly from the presence of large industrial organizations and that it would be a sound investment for the State to retain the continuing expansion of our plant by assuring an adequate supply of industrial water, particularly inasmuch as it can be done at relatively moderate cost.

Yours very truly,

CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY

V.L. King
Technical Director

vlk/mdd

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421 State House Annex
Trenton, N.J.

March 24, 1942

Mr. Frank Ryan, Asst. to Plant Sup't.
Johns-Manville
Manville, New Jersey

Dear Sir:

This Department, under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in the preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial-Water Supply. In order to evaluate the possibilities of such use, we are seeking data from potential consumers now located near the Canal, and would appreciate information along the lines indicated below.

As noted in our conversation this morning, this data is sought for the purposes of study only; furnishing the information requested does not bind the Johns-Manville to any commitments.

The following tentative water-cost rate may be used as a basis of consideration. This rate is by no means final and your comment on it will be appreciated. This rate does not include cost of intake structures, meter charge, or possible purification treatment as it is assumed that such details will be arranged by conference in individual cases:

2¢ per 1,000 gal.	($20 per million)	up to 1,000,000 gal. per day
1.5¢ " " "	($15 " ")	1,000,000 to 3,000,000 gal. per day
1.0¢ " " "	($10 " ")	over 3,000,000 gal. per day

1. What is your present average daily water requirement?
2. Source and estimated capacity of your present water supply?
3. Does the expected normal growth of your business involve an increasing water requirement?
4. In the event that the Canal is set up as a permanent Industrial-Water Supply, would your organization be interested in securing water therefrom?

5. What would be your estimated average daily requirement from the Canal for a period of 5 years after its establishment? (assuming peace-time conditions)
6. Are there any special provisions or conditions, technical or financial, upon which your favorable consideration of an Industrial-Water Supply Canal would depend?

Yours truly,
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. ACKEN
Special Assistant

JOHNS-MANVILLE

Manville, New Jersey
May 5, 1942

Mr. H.W. Acken, Special Asst.
Department of Conservation and Development
Trenton, New Jersey

Dear Mr. Acken:

Replying to yours of March 24th, we have gone into this matter in considerable detail and would report as follows:

Our present daily average water requirement is approximately 12,000,000 gals. with peaks of approximately 20,000,000 gals.

The Raritan River supplies us with sufficient water for our present requirements.

We do not expect that our water requirements at this plant will be increased to any appreciable extent.

It is not probable that we would, at any time, be interested in securing water from the Delaware River via the canal.

We cannot think of any special provisions or conditions, technical or financial, which would be favorable to us in the event of an industrial water supply being available through the Delaware and Raritan Canal.

Yours very truly,

Frank Ryan

FR:HM

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421 State House Annex
Trenton, New Jersey
March 24, 1942

Mr. H.W. Ahlbeck, Works Engineer
Bakelite Corporation
Bound Brook, New Jersey

Dear Sir:

This Department, under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in the preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial-Water Supply. In order to evaluate the possibilities of such use, we are seeking data from potential consumers now located near the Canal, and would appreciate information along the lines indicated below.

As explained in our conversation of February 24, this data is sought for purposes of study only; furnishing the information requested does not bind the Bakelite Corp. to any commitments.

The following tentative water-cost rate may be used as a basis of consideration. This rate is by no means final and your comment on it will be appreciated. This rate does not include cost of intake structures, meter charge, or possible purification treatment as it is assumed that such details will be arranged by conference in individual cases:

2¢ per 1,000 gal.	($20 per million)	up to 1,000,000 gal. per day
1.5¢ " " "	($15 " "	) 1,000,000 to 3,000,000 gal per day
1.0¢ " " "	($10 " "	) over 3,000,000 gal. per day

1. What is your present average daily water requirement?
2. Source and estimated capacity of your present water supply?
3. Does the expected normal growth of your business involve an increasing water requirement?
4. In the event that the Canal is set up as a permanent Industrial-Water Supply, would your organization be interested in securing water therefrom?

5. What would be your estimated average daily requirement from the Canal for a period of 5 years after its establishment? (assuming peace-time conditions)
6. Are there any special provisions or conditions, technical or financial, upon which your favorable consideration of an Industrial-Water Supply Canal would depend?

Yours truly,

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. Ackèn
Special Assistant

APPENDIX D

BAKELITE CORPORATION

Bound Brook, N.J.

Canal Water Supply. April 14, 1942

State of New Jersey
Dept. of Conservation and Development
Trenton, N.J.

Attention Mr. H.W. Acken

Gentlemen:

We are replying here to the six questions asked in your letter of March 24th.

1. Average daily water requirement: approximately 120,000 gallons of Elizabethtown water plus 750,000 gallons of deepwell water.

2. The available, supply from Elizabethtown is not accurately known but the demand could be substantially increased. The estimated capacity of well water supply is 1,300,000 gallons per day.

3. Expected normal growth of business involves increasing water requirements.

4. Our organization would be interested in securing water from the canal if set up as a permanent industrial water supply.

5. Estimated peacetime daily requirement approximately 800,000 gallons per day.

6. Favorable consideration would depend upon cost of water, quality of the water, and dependability of the supply.

Yours very truly,
BAKELITE CORPORATION

H.W. Ahlbeck
Works Engineer

HWA:JJT

APPENDIX D

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421, State House Annex
Trenton, N.J.

March 24, 1942

Mr. O.H. Waechter, Genl. Supt.
Ruberoid Company
South Bound Brook, New Jersey

Dear Sir:

This Department, under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial-Water Supply. In order to evaluate the possibilities of such use, we are seeking data from potential consumers now located near the Canal, and would appreciate information along the lines indicated below.

I have been referred to you in this matter by Mr. Burns of your organization, and, as explained to him on March 18, this data is sought for the purposes of study only; furnishing the information requested does not bind the Ruberoid Co. to any commitments.

The following tentative water-cost rate may be used as a basis of consideration. This rate is by no means final and your comment on it will be appreciated. This rate does not include cost of intake structures, meter charge, or possible purification treatment as it is assumed that such details will be arranged by conference in individual cases:

2¢ per 1,000 gal.	($20 per million)	up to 1,000,000 gal. per day
1.5¢ " " "	($15 " ")	1,000,000 to 3,000,000 gal. per day
1.0¢ " " "	($10 " ")	over 3,000,000 gal. per day

1. What is your present average daily water requirement?
2. Source and estimated capacity of your present water supply?
3. Does the expected normal growth of your business involve an increasing water requirement?
4. In the event that the Canal is set up as a permanent Industrial-Water Supply, would your organization be interested in securing water therefrom?

5. What would be your estimated average daily requirement from the Canal for a period of 5 years after its establishment? (assuming peace-time conditions)
6. Are there any special provisions or conditions, technical or financial, upon which your favorable consideration of an Industrial-Water Supply Canal would depend?

Yours truly,

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. Acken
Special Assistant

THE RUBEROID CO.
500 Fifth Ave.
New York

April 1, 1942

Mr. H.W. Acken
Special Assistant
Department of Conservation & Development
State of New Jersey
Trenton, New Jersey

My dear Mr. Acken:

Your letter of March 24th to Mr. O.H. Waechter, has been referred to this office for reply.

We note that your Department is studying the possibilities for utilization of the Delaware and Raritan Canal as a permanent industrial water supply and that in order to evaluate such possibilities you are asking for data from industrial plants located near the canal.

The South Bound Brook, New Jersey, Plant of The RUBEROID Co. has drilled and is now using water from deep artesian wells at the rate of about 150 G.P.M. It is not likely that we would have any use within our Plant for the water from the Delaware and Raritan Canal, because the artesian water supply seems to be more than adequate for our requirements. In addition to the artesian water supply we are, of course, connected with the Bound Brook Water Company.

In so far as we are concerned, we would like to see the canal maintained for the uses which are now made of it.

Yours very truly,

The RUBEROID Co.

F.E. Byrnes
Asst. to Vice President

FEB/mas

APPENDIX E

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

421 State House Annex
Trenton, N.J.
March 31, 1942

To State-wide Operating
Industrial Brokers.
List furnished by
N.J. Council

Dear Sir:

This Department, under mandate from the State Legislature, is making a study of the utilization possibilities of the Delaware and Raritan Canal, in preparation for a report and recommendation as to the ultimate permanent use of the Canal.

One of the proposals being studied is the utilization of the Canal as a permanent Industrial-Water Supply. In order to evaluate the possibilities of the Canal for such a use, we are seeking data and authoritative opinions from industrial Real Estate Brokers, and would appreciate from you information along the lines indicated below.

For your information, the Canal has a present capacity of 50 million gallons per day, runs almost entirely thru farm land, is served by electric power lines, offers adequate transportation facilities in the form of major railroads and through-highways, and is located in relation to centers of population as shown on the attached map.

The following tentative water-cost rate may be used as a basis of consideration. This rate is by no means final and your comment on it will be appreciated:

2¢ per 1000 gal	($20 per million)	up to 1,000,000 gal per day
1.5¢ " "	($15 " ")	1,000,000 to 3,000,000 gal per day
1.0¢ " "	($10 " ")	over 3,000,000 gal per day

On the basis of the above information and your specialized knowledge of the Industrial Real Estate situation and requirements, your comments on the following points will be extremely helpful:

1. Are there enough water-supplied Industrial Sites in New Jersey to meet the present demand?

2. What are the post-war prospects of a demand for water-supplied Industrial Sites?

3. Have you had any recent inquiries or leads regarding Industries now seeking sites? What was the daily water requirement involved? (Mention of the types of industry will be appreciated if you do not feel free to furnish specific names)

4. Do you consider the Canal area generally suitable for Industrial Sites?

5. What is your opinion regarding use of the Canal as a permanent Industrial-Water Supply? Are there any special conditions or provisions which you believe should be made to insure the practicability of such a plan?

Yours truly,
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

H.W. ACKEN,
Special Assistant

APPENDIX E

A.V. CARKHUFF

Industrial Real Estate

Newark, New Jersey

July 2, 1942

Department of Conservation and Development
State House
Trenton, N.J.

Attention: H.W. Acken, Special Assistant

Gentlemen:

Replying to your recent inquiry regarding the value of the Delaware and Raritan Canal as a permanent industrial development and its utilization as a water supply and inland water way.

I have specialized for the past 20 years in locating industries in the state of New Jersey and in making transportation, market and labor surveys for nationally known manufacturers. During the course of that work particularly in recent years, it has been most difficult and in some instances impossible to find proper locations for major industries using substantial amounts of water for industrial uses and at the same time requiring water transportation facilities.

In my opinion, the Delaware and Raritan Canal is particularly adapted for the development of industries with such requirements. The area is accessible, it is served by ample railroad and motor highway facilities and I am certain that if the canal were permanently established it would be the means of attracting many major industries to this particular area. Some of the Major Industries who located in this area, selected their present sites only because of the availability of unlimited industrial water supply. In addition to the maintenance and development of the canal we must bear in mind that any rate schedule must be reasonable to permit competition with like areas where sweet water supply is unlimited and must be stabilized to give assurances to new industries that there will be no increase in rates.

Very truly yours,

A.V. Carkhuff

AVC:SMM

JAS. A. O'CONNELL CO.
REAL ESTATE

New Brunswick, N.J.
June 30, 1942

Department of Conservation & Development
Att'n. Mr. H.W. Acken, Special Assistant
State House
Trenton, N.J.

Gentlemen:-

I received your inquiry concerning the possibility of the utilization of the Delaware and Raritan Canal as a permanent industrial water supply.

Industrial locations have been a major part of my real estate work for several years. It has been becoming increasingly difficult to find suitable locations for large industries requiring substantial amounts of water for industrial use.

In my judgment the Canal area is especially suitable for the development of sites for such industries. The Canal area has ample railroad and highway facilities and if the Canal were established as a permanent source of industrial water supply, it is my opinion that it would continue to serve the present industrial establishments and attract other industries requiring large amounts of industrial water.

There are, as you know, several large manufacturing plants in this area now which located here originally because of the availability of a plentiful industrial water supply. The Canal area is suitable for further development of this kind.

Of course, the rate schedule must necessarily be reasonable and stabilized for a long period. Obviously, no corporation would make a substantial investment in a new plant unless it were assured of a permanent supply at reasonable, long time rates.

Very truly yours,

Jas. A. O'Connell

O'C/D

APPENDIX E

W.M. DICKINSON CO.

Trenton, N.J.

June 12, 1942

Department of Conservation and Development
State House
Trenton, N.J.

ATTENTION: Mr. H.W. Acken, Special Assistant

Gentlemen: Re: Delaware & Raritan Canal

Reviewed your letter of March 31st and have made a study of utilizing possibilities of this stream and believe there are not enough water supplying industrial sites in New Jersey to meet the present and possible future demands. Inquiries do come to us from time to time for sites needing water supply for various purposes and believe the canal area is generally suitable for a variety of industrial sites.

It is the opinion of the writer that the canal should be made a permanent industrial water supply for purposes of this kind.

Very truly yours,

W.M. DICKINSON CO.

By
V.P. Bradley

VPB:ELH

APPENDIX E

THE KIEB COMPANY

Realtors

Newark, New Jersey
June 4th, 1942

Mr. H.W. Acken, Special Assistant
Dept. of Conservation & Development
Trenton, N.J.

Dear Mr. Acken:

The subject matter of your letter of March 31st, is a difficult one to answer concretely. I think the most constructive thought I might give would be in answer to question #5.

It seems to me that there would be room for industries on the Delaware and Raritan Canal as a water supply provided it were possible for the real estate brokers to assure any prospects that it would not be necessary to go through the legislature or to take any other means of obtaining water supply, except to apply to the Delaware and Raritan canal for the volume of water that they want at the stated prices existent for that service.

In other words, the average real estate broker would hesitate to show various sites along the Delaware and Raritan Canal if he knew in advance that it would be a matter of considerable time to get the approval for the use of water.

Yours very truly,

THE KIEB COMPANY

By
Edwin C. Butler
Vice Pres. & Secretary

APPENDIX F

PHILLIPSBURG
Voorhees State Park
High Bridge
Annandale
Clinton
C.R.R. OF N.J.
Bedminster
SUMMIT POP. 16,165
NEWARK POP. 429,760
IRVINGTON POP. 55,328
JERSEY CITY POP. 301,173
N.Y.
BAYONNE POP. 79,198
ELIZABETH POP. 109,912
BROOKLYN
LINDEN POP. 24,115
PLAINFIELD POP. 37,469
RAHWAY POP. 17,498
STATEN ISLAND
Milford
Frenchtown
SOMERVILLE 8720
BOUND BROOK 7,616
MANVILLE
WOODBRIDGE POP. 27,191
DELAWARE & RARITAN CANAL
RARITAN RIVER
LEHIGH VALLEY R.R.
FLEMINGTON 2617
PERTH AMBOY POP. 41,242
SOUTH AMBOY 7,802
RARITAN BAY
Millstone
P.R.R.
NEW BRUNSWICK POP. 33,180
DELAWARE & RARITAN CANAL
PHIL. & READING R.R.
MILLSTONE RIVER
LINCOLN HIWAY
Griggstown
SOUTH RIVER POP. 10,714
Cheesequake State Park
Raven Rock
Stockton
P.R.R.
Ringoes
Rocky Hill
Kingston
Old Bridge
Matawon
LONG BRANCH
PENNSYLVANIA
New Hope
LAMBERTVILLE 4,447
DELAWARE RIVER
DEL. CANAL FEEDER
Washington Crossing State Park
Pennington
PRINCETON 7,718
Lawrenceville
SUPER HIGHWAY
PENNSYLVANIA RAILROAD
HIGHTSTOWN 3,486
FREEHOLD 6,952
Yardley
TRENTON POP. 124,697
BORDENTOWN 4,223
BRISTOL
Manasquan
Lakewood

0 5 10
Scale - Miles

DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

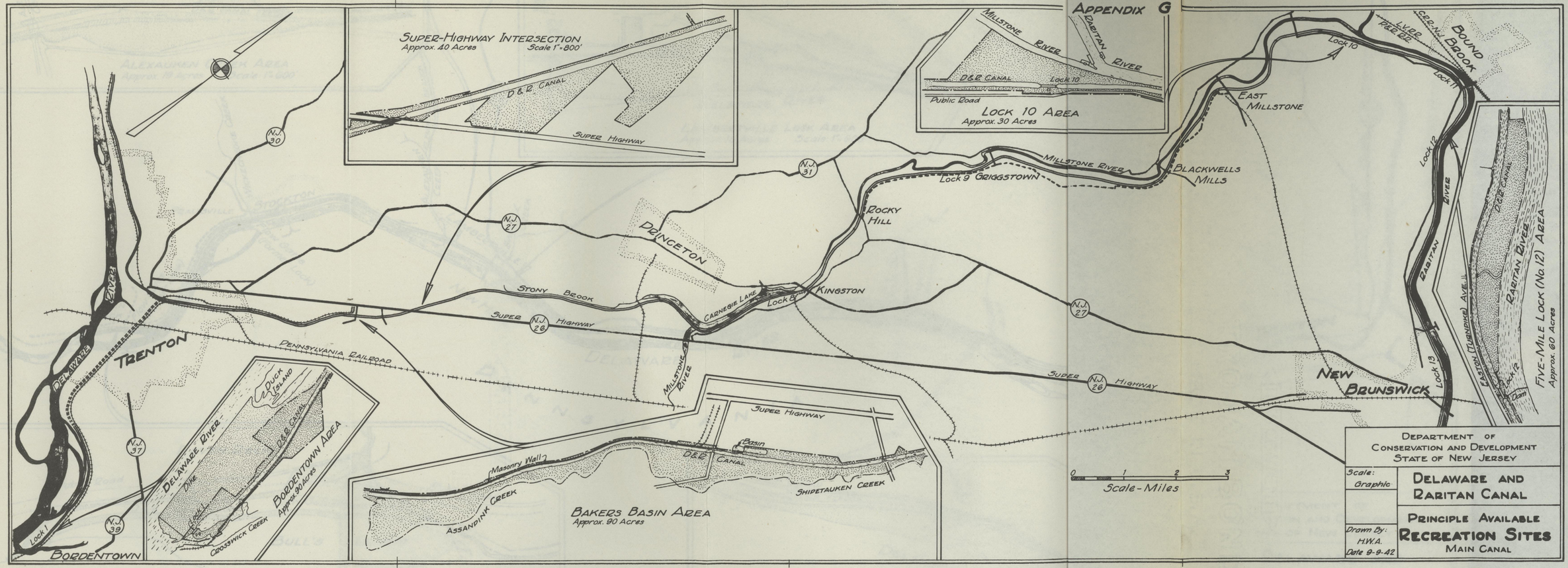
Scale: Graphic

Drawn By: H.W.A.
Date 9-4-42

DELAWARE AND RARITAN CANAL

LOCATION MAP

APPENDIX G



DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

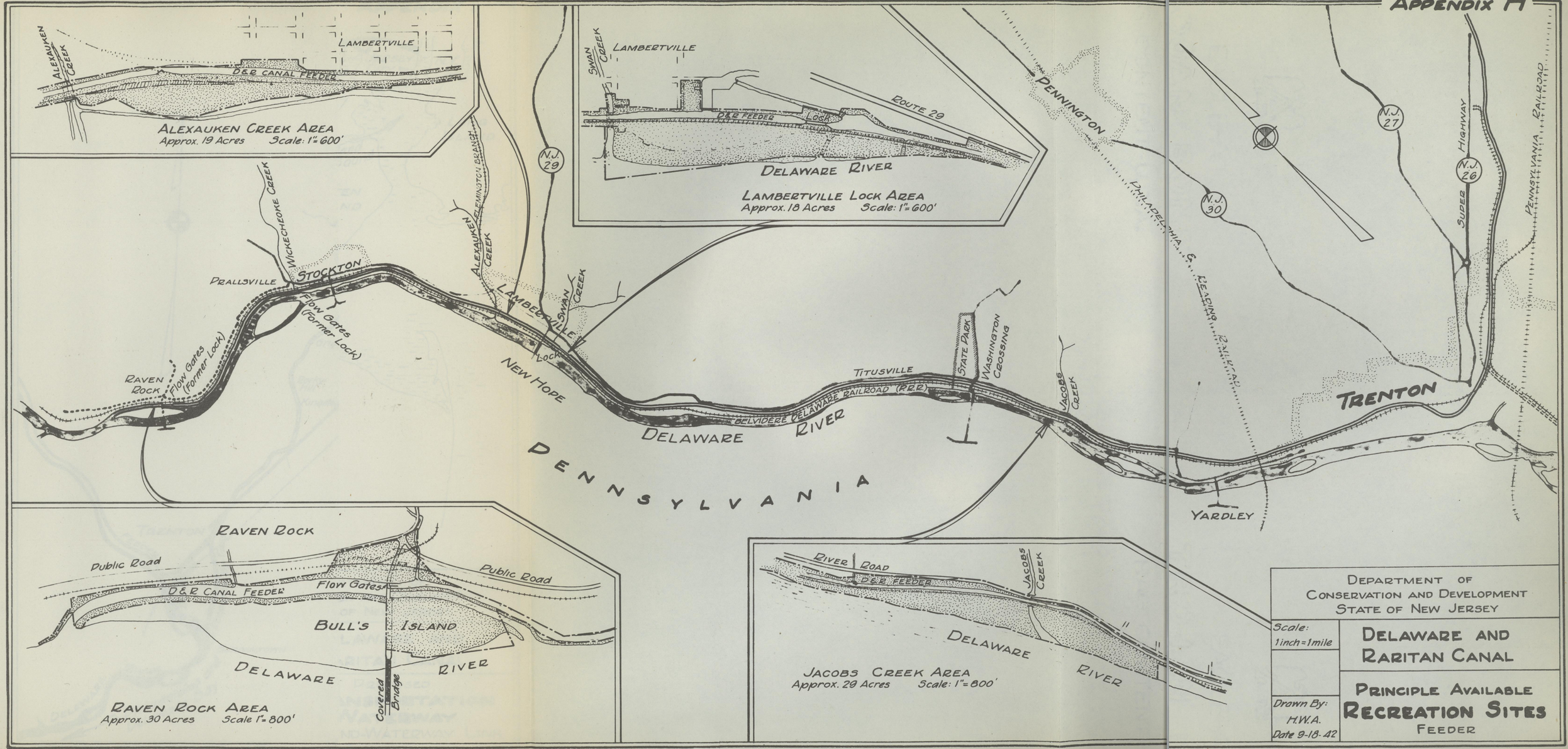
Scale: Graphic

Drawn By: H.W.A.
Date 9-9-42

DELAWARE AND RARITAN CANAL

PRINCIPLE AVAILABLE RECREATION SITES
MAIN CANAL

APPENDIX H



DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

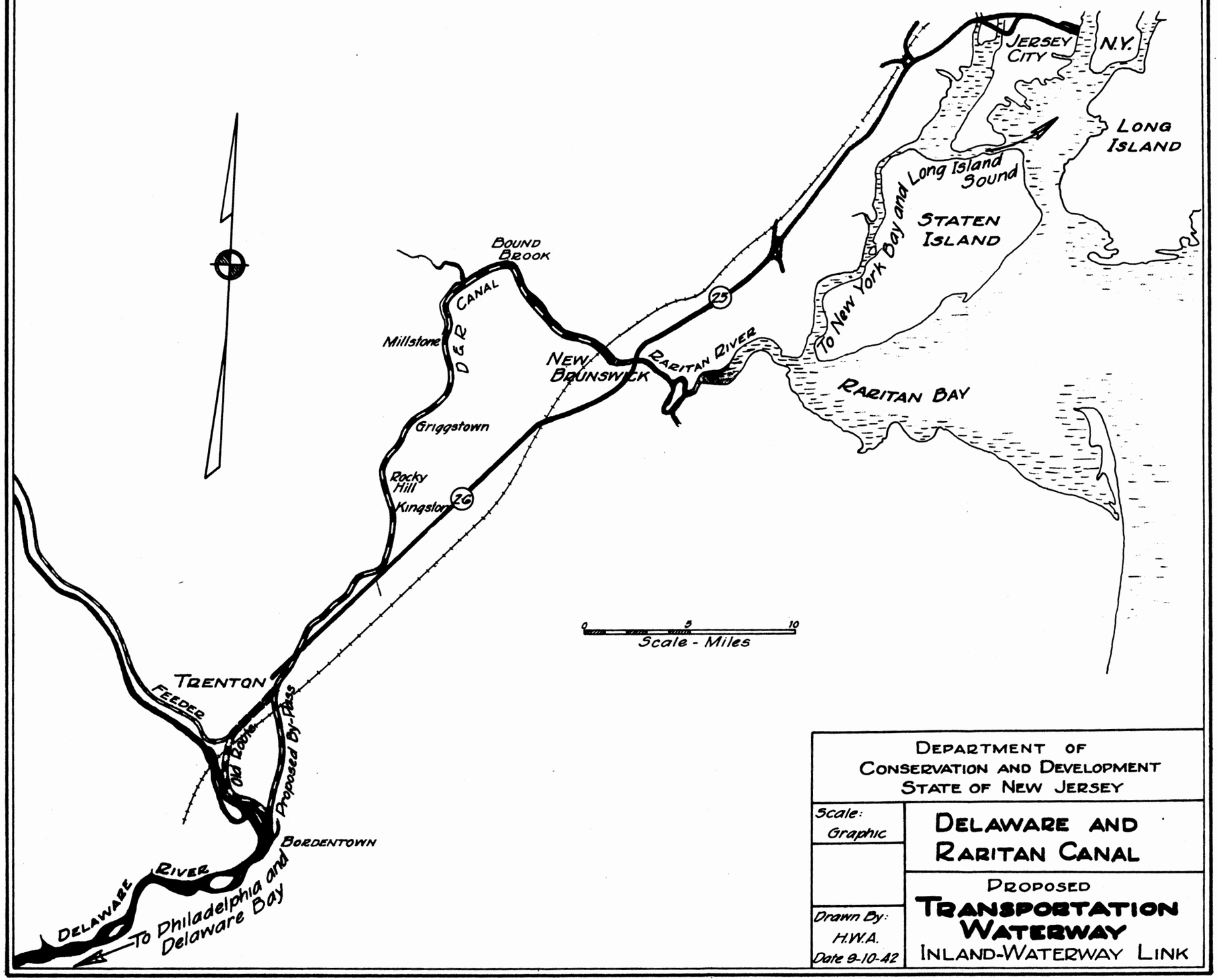
Scale: 1 inch = 1 mile

Drawn By: H.W.A.
Date 9-18-42

DELAWARE AND RARITAN CANAL

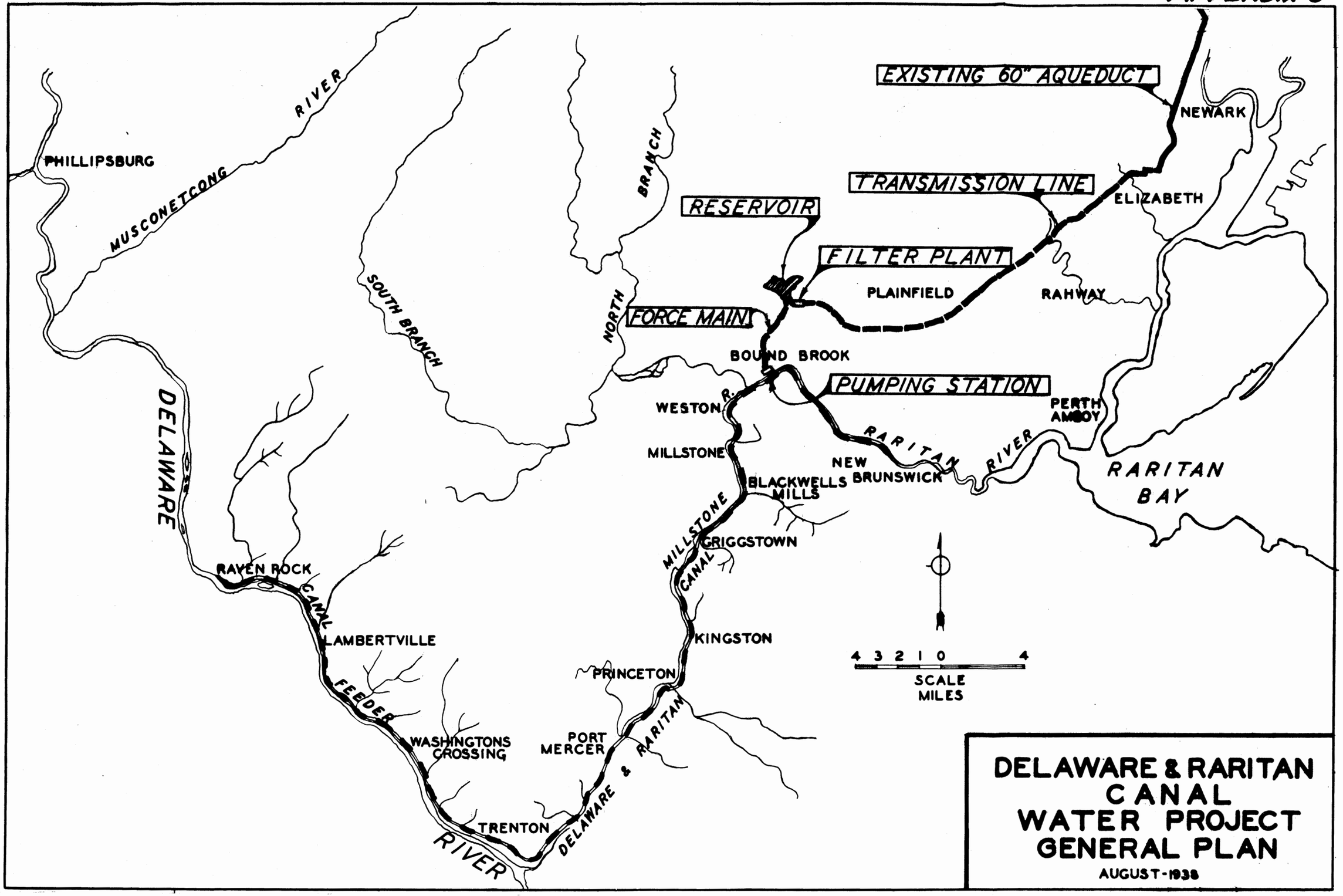
PRINCIPLE AVAILABLE RECREATION SITES

FEEDER



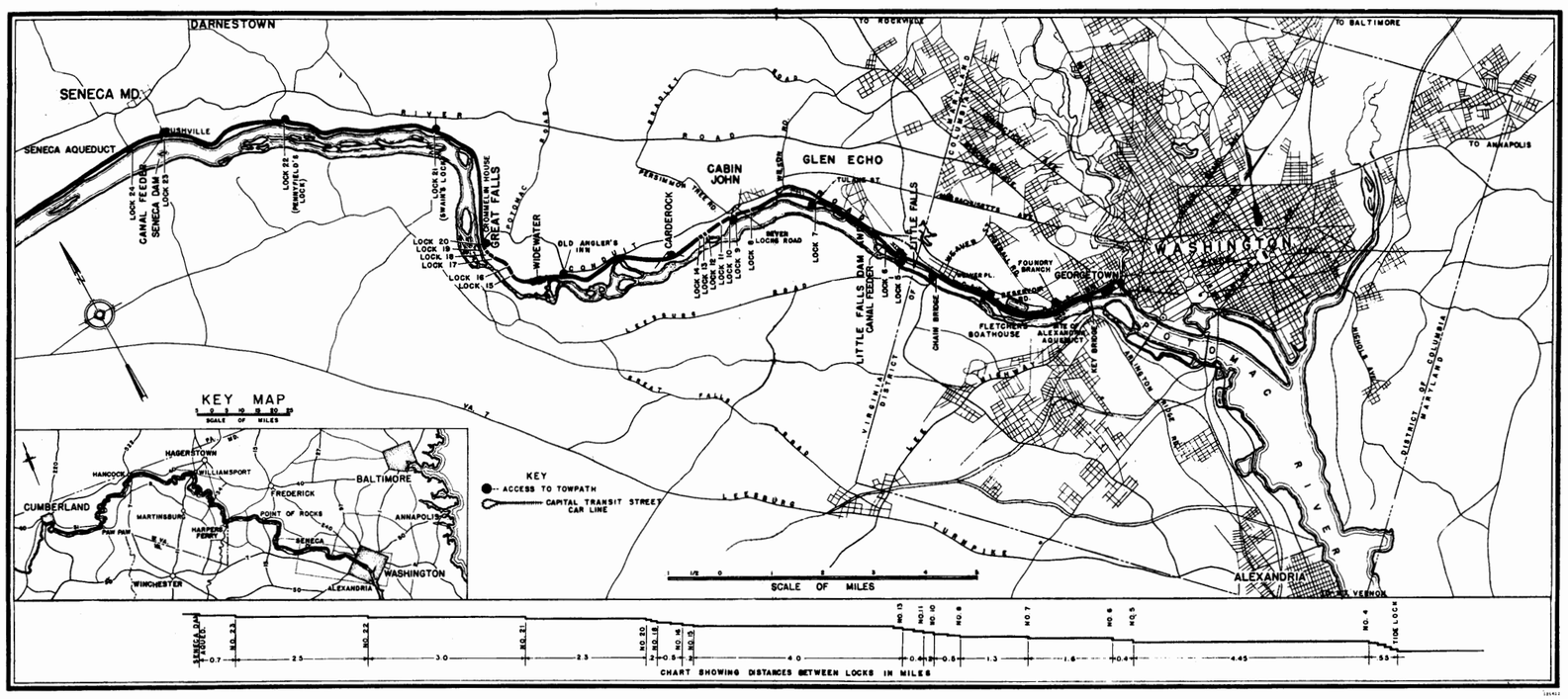
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

Scale: Graphic	DELAWARE AND RARITAN CANAL
	PROPOSED TRANSPORTATION WATERWAY
Drawn By: H.W.A. Date 9-10-42	INLAND-WATERWAY LINK



DELAWARE & RARITAN CANAL WATER PROJECT GENERAL PLAN

AUGUST-1938



WHAT TO DO AND SEE

Canoeing, boating, hiking, fishing, picnicking, nature walks, and ice skating are welcomed. Canoes and rowboats may be rented at Great Falls. Privately owned canoes also may be used. Personnel is not available to operate the locks, but equipment is being installed to aid in portaging. By selecting the longer levels, trips of 3 and 4 miles in each direction may be made without passing a lock.

Georgetown to Seven Locks.--The short narrow levels of the canal in Georgetown, once the busy congested tidewater terminal, afford one of the most picturesque scenes along the canal, including the first four lift locks joined by small canal basins, old Wisconsin Avenue Bridge, and the north abutment of the Alexandria Aqueduct (36th Street). The feeder canal for the Georgetown level at Lock 5 was originally a part of the old Potomac Canal around Little Falls. Nearby, at the north abutment of the Little Falls Dam, the ceremony which launched the construction of the canal was staged on July 4, 1828. The series of locks between Number 8 (Cabin John) and Number 14 (Carderock) is known as "Seven Locks."

Widewater.--The construction of the canal in this region differs from any other section of the Georgetown Division. By utilizing an inactive river channel, blocked from the main stream by the towpath embankments, the early canal engineers saved vast amounts of blasting and excavation. The extended width and increased depth of this flooded channel give Widewater the appearance of an unruffled mountain lake, while the high rugged rock formations through which it passes lend added beauty and interest to the scene. Widewater may be reached by a foot bridge which crosses the canal near Old Angler's Inn.

Great Falls.--This is the most popular area on the restored section of the canal. To reach the towpath the visitor passes Great Falls Tavern, built between 1828 and 1831, and crosses the canal by a bridge at Lock 20. Here the hiker may turn left (east) and walk along the series of six locks toward Widewater. To the right (west) from Lock 20 the visitor may hike, or canoe, along one of the longest and most scenic levels of the canal. An excellent view of the Great Falls of the Potomac may be seen from Conn Island which is reached by a suspension bridge located near the tavern.

Locks 21, 22, 23.--This section of the Georgetown Division seems far removed from the hubbub of urban life. The long levels, quiet and not frequently visited, make this section of the canal well suited for nature walks and canoe trips. Pleasant views of the river and canal, the old stone lockhouses at Locks 21 and 22, and the Seneca feeder canal and dam at Lock 23 may be seen in this area.

PARK REGULATIONS

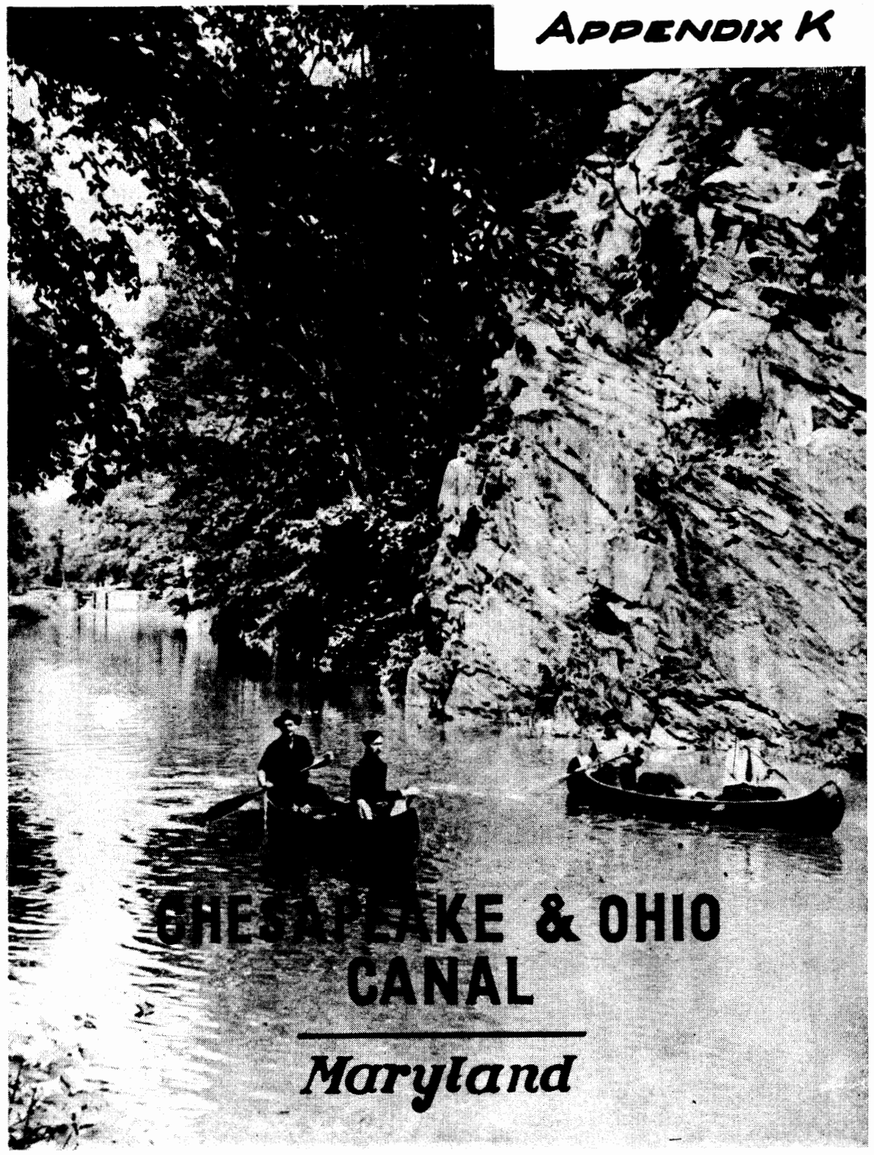
It is unlawful to tamper with the locks or any of the other canal structures; to disturb flowers, shrubs or trees; to mar or deface signs and buildings; to throw trash or lunch refuse on the towpath or in the canal.

Horseback riding, swimming, hunting, and the use of power boats are prohibited.

Fires must not be built unless a permit is secured from National Capital Parks, Room 1211, Interior Building. Anglers must not fish along sections of the canal in Maryland without first complying with the game laws of that State.

December 1940

APPENDIX K



UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, Secretary
NATIONAL PARK SERVICE
NEWTON B. DRURY, Director

CHESAPEAKE AND OHIO CANAL
(National Capital Parks)

The natural passageway to the West afforded by the Potomac River Valley has played an important role in the growth and development of our Nation. Through it have passed the Indian trail, colonial wagon road, canal, railroad, telegraph and telephone, and the modern super-highway. By these constantly improving modes of communication the widely separated eastern and western regions of the fast growing Union were firmly linked both socially and commercially. The Chesapeake and Ohio Canal, constructed during the great canal building era, illustrates one of the most interesting early phases of the development of our national communication system. The canal is preserved by the National Park Service so that contemporary and future Americans may see and enjoy one of the early attempts of the Nation's fathers to provide easy access between the older East and the expanding frontiers of the West.

Potomac Canal, 1785–1828
Chesapeake and Ohio Canal, 1828–1924

Prior to the American Revolution, internal transportation was largely confined to the East along the tidewater reaches of the rivers and bays on the Atlantic coast. Soon after the settled frontier had extended beyond the Allegheny Mountains consideration was begun of a plan to provide easy means of communication between the East and West by a navigable waterway. As early as 1754, George Washington, then still in his twenties, began to contemplate and foster a system of river and canal navigation along the Potomac Valley. It was largely through his long and untiring efforts that the Potomac Company was organized in 1785 to carry out this plan. As the first president of the company, Washington was actively engaged in the project. He frequently visited the working parties assigned to clearing the obstructions from the river channel and building short skirting canals around the treacherous river falls. Although he resigned this office when he became the President of the United States, Washington's interest in the affairs of the Potomac Company never waned.

In 1802 the Potomac Company canals were substantially completed. Small raft-like boats, propelled by hand with the aid of the river currents, then began to bring furs, lumber, flour, and farm produce to Georgetown. Upon reaching the impassable Great Falls of the Potomac the boats entered the company's outstanding skirting canal. Here, on the Virginia banks of the river, a canal 1,200 yards long, 25 feet wide, and 6 feet deep conveyed boats through five lift locks over an elevation of more than 76 feet. Four other short canals, with a total length of slightly more than 3 miles, were built by the company at Seneca Falls and Houses Falls, on the Virginia side of the river, and Little Falls and Shenandoah Falls, on the Maryland side. Although the canals and locks of the Potomac Company were considered a great engineering accomplishment, the improvements to the river channel were inadequate. Disappointment grew as it became known that after the expenditure of more than one-half million dollars the navigation of the Potomac was possible only at times of high water.

Influenced largely by the success of the Erie Canal, the popularity of the continuous canal began to increase rapidly in the second decade of the nineteenth century. There followed in the 1820's and 1830's a great canal building era when the construction of more than 4,000 miles of canals was begun or planned. The failure of the Potomac Company to provide a dependable water route to the West and the feverish canal building of the era contributed greatly to the successful organization of the Chesapeake and Ohio Canal Company in 1828. Anxious to enjoy a large share of the trade with the rapidly growing West, promoters in Maryland, Virginia, and the District of Columbia planned a canal of some 360 miles in length connecting Georgetown on the Potomac River with Pittsburgh on the Ohio River. On July 4, 1828, John Quincy Adams, then President of the United States, formally began this tremendous undertaking by lifting the first shovelful of earth near Little Falls. In 1831 water was admitted into the first completed division: that section which is now restored between Georgetown and Seneca. Soon afterwards the Chesapeake and Ohio Canal Company began to encounter financial and legal difficulties. The increased cost and long delays in construction caused by these troubles forced the stockholders to give up the contemplated route beyond Cumberland, where the canal was to cross the Alleghenies and extend to Pittsburgh.

Navigation of the canal was begun as the divisions were completed, first from Georgetown to Seneca (1831), then to Harper's Ferry (1833), to near Hancock, Maryland (1839) and finally to Cumberland in 1850. Canal boats carrying coal, flour, grains, and lumber were seen on the canal until 1924 when diversion of traffic to the more modern transportation agencies caused its abandonment.

A typical canal boating scene of 2 decades ago

CANAL DIMENSIONS, STRUCTURES, AND BOATS

Distances and Elevations.—The length of the canal is 184.5 miles. The total rise, or incline, between Georgetown and Cumberland is approximately 605 feet. The difference in elevation on the restored section of the canal, extending 22.1 miles between Georgetown, D. C., and Seneca, Maryland, is about 190 feet.

Dimensions of the Canal.—The width of the canal varies. The Georgetown level (between Georgetown and Little Falls) is approximately 80 feet wide and 7 feet deep. Above Little Falls (Lock 5) the canal measures about 60 feet wide and 6 feet deep. The towpath is generally 12 feet wide.

Locks.—There were 74 lift locks between Georgetown and Cumberland, each having the capacity to lift or lower a boat approximately 8 feet. Twenty-three of these are located on the restored Georgetown Division. The locks measure 100 feet long, 15 feet wide, and about 16 feet deep. Inlet locks at various points along the canal and a tide lock, or outlet lock, at the mouth of Rock Creek in Georgetown, originally gave entrance to and exit from the canal and river.

The small iron paddle gates located near the bottom of the large wooden lock gates admit and release the water from the lock chamber. Boats moving down the canal were lowered from the upper to the lower level by entering a full lock through the upper gates. When the boat was within the lock, the upper gates were closed and the water released through the paddles in the lower gates. When the level of the water in the lock reached that of the lower level of the canal the gates were opened, and the boat passed out into the canal. This process was reversed for boats going up the canal. The boat entered through the lower gates, whereupon the lock was filled by opening the paddles in the upper gates. When the water in the lock reached the height of the upper level the gates were opened, and the boat was drawn from the lock.

Lockhouses.—Many of the trim stone lockhouses seen on the Georgetown Division were begun in 1828 soon after the construction of the canal got underway. The locktender was allowed the use of the lockhouse, a garden plot on the adjacent company land, and was paid a small salary to compensate him for his labors.

Canal Boats.—In the 1870's, during the heyday of the canal, as many as 540 boats were navigating the Chesapeake and Ohio Canal. A typical boat measured 92 feet long and 14 feet 6 inches wide and carried 110 to 120 tons of cargo. Three to five mules were required for the boating "outfit;" two or three were in use whenever the boat was in motion. The relief team was carried "aboard boat" in the forward house, or stable. Feed for the teams was stored in the small center "hayhouse," while the boat captain and his family, or the crew, lived in the small aft cabin.

Bridges and Underpasses.—Pedestrian and vehicular access across the canal was provided at frequent intervals. Narrow pivot foot bridges were found at each lock. These bridges were so constructed that they could be swung to one side when a boat entered the lock. Stoutly constructed bridges, which could also be swung from across the lock, were provided at some points where vehicular access across the canal was necessary. At Foundry Branch, Fletcher's Boathouse and Carderock, on the Georgetown Division, arched stone underpasses, or tunnels, give access to the river from the berm side of the canal.

ADMINISTRATION

The Chesapeake and Ohio Canal was purchased by the Federal Government in 1938. The canal occupies most of a narrow right-of-way, consisting of 5,253 acres, bought by the Chesapeake and Ohio Canal Company between 1828 and 1850. Restoration of the Georgetown Division, extending 22.1 miles between Georgetown, D. C., and Seneca, Maryland, was begun by the National Park Service of the Department of the Interior soon after the area was acquired. This work was sufficiently advanced in September 1940 to readmit water to this section.

Lock 20 and Great Falls Tavern