# HISTORY AND CONSTRUCTION OF THE POTOMAC AQUEDUCT

# FOR THE WATER SUPPLY OF WASHINGTON

PRESENTED BY

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This Thesis has been prepared and presented as a part of the Initiation of Tau Beta Pi.

# F O R E W A R D

I wish to extend my appreciation to

Mr. P. O. Macqueen

Superintendent of the McMillan Park

Filter Plant for his cooperation.

# INTRODUCTION

L'Enfant planned fountains in the Public parks and a cascade of water in front of the Capitol. The water was to have been pumped from local streams. Well, cistern and spring water was depended on until 1850 for domestic use. At that time spring water was piped to the Capitol, White House and residential sections of the City.

In 1850 Congress appropriated $500.00 and the City $1000.000 to enable the War Department to make a study to determine the best method for obtaining a water supply for the City. Funds limited this study by Brevet Lieut. Col. George W. Hughes to Rock Creek.

In 1852 Congress appropriated $5000.00 for the same purpose. The assignment was made to Captain Frederick A Smith who did not start on the problem before his death. Lieut. M. C. Meigs took the task and made a lengthy but interesting report to Congress on February 12, 1853. Copies of this report are in existence and will be summarized to show the completeness of the study.

## SUMMARY OF SURVEY RESULTS AS PRESENTED TO CONGRESS BY MEIGS.

The water supplies of various Cities of theCountry have been designed on too small a scale and were soon taxed to their full capacity - as New York and Boston where the use of water was restricted for domestic purposes. Water for fountains and street flushing was not a waste as held by some Cities but an actual benefit since it cleaned the City and improved the sewerage system operation. To carry out the plans of L'Enfnat an adequate supply should be obtained.

In 1851 the water consumption of Philadelphia was found to average 33 gallons per person. Summer consumption was three times that of winter. At this same time the Croton Board of New York recorded 90 gallons per person per day. All records showed an ever increasing demand for water.

In estimating the population it was assumed that the City would grow at its present rate of 5,000 persons per year. At that rate the population would be 250,000 persons using 22,500,000 gallons of water at a rate of 90 gallons per person. Meigs also admitted that prosperity would increase this rate of growth.

Water is free in nature and should be supplied by the Government at cost. London was pointed to as a City having poor service and contamination, because six private monopolies controlled the supply. The cities already mentioned have taken over the duty of supplying water and Washington should do likewise.

In any system storage should be provided to carry over breakdowns and to act as a settling basin. It was stated that on occasions when the supply was unsuited that water from the reservoir could be used. Meigs proposed two hundred and fifty million gallons of storage which was an estimated ten day supply for 1890.

Tests of water were taken from Great Falls, Rock Creek, Little Falls and Georgetown at high and low tide and found to be of unrivaled purity by professor Toreey of New York.

Pumping from Georgetown was proposed but considered unwise because the river at this point was subject to tides and likely to be contaminated from the flats between Georgetown and Long Bridge where sewage might collect. Also steam engines are a source of danger. The Potomac has a narrow valley so floods cannot spread out but rise to great heights, putting engines at low elevations out of commission. The plan was considered out of the question and no estimates were made.

The study of Rock Creek was an expansion of the work by Colonel Hughes. The change was a higher dam further down the stream. Surveys showed only a limited supply of water of about twenty million gallons. Millers told of dry seasons with only about one fourth of that amount available with storage 9,860,000 gallons per day could have been served during a 45 day dry spell. The upper watershed was pasture land unsuited as source of water supply, also being close to town unrestricted factories might produce contamination. The limited supply does not justify the expenditure of $968,237.

This project included a masonry dam 41 ft. high and a circular brick conduit 6' in diameter falling one foot per mile. The project would have had small bridges, a receiving reservoir built of puddled earth covered by stone paving after the general mode of practice.

The Great Falls project included a dam 1541' in length and 8' in height across the Potomac at Great Falls to raise the water at low water level from 147 to 150 feet above mean tide. A conduit to the tail of Lock No. 18 with wasteweirs to relieve pressure was to be constructed and water to be taken under the canal by means of pipes to the gate house. Over head passages being deemed unsafe and too expensive. Valves in the gate house were to regulate the flow through a 7' circular conduit to receiving reservoir built by damming Little Falls or Powder Mill Creek and a distributing reservoir further at Dovers Rest. Water to a depth of 6' will deliver 36,015,400 gallons per day and half full 17,734,300 gallons per day.

The grade of the conduit would have several tunnels the longest 220 feet but in general the cuts were light. Cabin John required a bridge and was to have been crossed by six small arches of 60' span.

By lowering the head five feet in the reservoir it was estimated 142,304,500 gallons of water would be available and 250,000,000 could be had by reducing the head 14 feet.

Meigs was governed in his planning by the Croton and Cochituate systems. He showed points where reductions in cost could be made but did not advise any changes. The estimate was $1,630,618.

The Little Falls layout proposed a canal from Little Falls 6' by 100' located between the Chesepeake and Ohio Canal and the river to get water to a suitable location and by means of water power and a conduit, conduct the water into a stand pipe and reservoir. The amount of water which could be raised by this method was limited at the extreme by 18,000,000 gallons. The cost of this estimate was $1,306,789.

This system was a part of Great Falls plan and could eventually be extended to Great Falls as the pumping became too great.

> "In conclusion I have to recommend as, in my opinion, the best means of affording the City of Washington and Georgetown and unfailing and abundant supply of good and wholesome water the construction of the aqueduct from the Great Falls of the Potomac."

> "The source is pure and unfailing; the quantity inexhaustible; the expense when compared with its objects, moderate. Every dollar of capital expended will bring for centuries, nineteen gallons a day of good wholesome water into the City."

Other comments were the estimate was low and the only change to be made would be to increase the size of conduit from 7' to 9' and capacity to 67,595,400 gallons per day with only slight increase in cost.

Meigs acknowledged the use of the most accurate formulas of hydraulics by D'Auduisson of Revetment Walls by Poncelet and thickness of Arches by Peronnet.

To get the supply to the City the total estimate for the projects were:

| | |
|---|---|
| Rock Creek | $ 1,258,863 |
| Little Falls | $ 1,597,415 |
| Great Falls | $ 1,921,244 |

## HISTORY AND CONSTRUCTION

Congress accepted the Great Falls plan and appropriated $100,000. on March 3, 1853 to start surveys, preliminary work and obtaining of the right of way. The State of Maryland granted its consent to the proposed work by a special law on May 3, 1853, which was to take effect when the project was approved by the Chesepeake and Ohio Canal Company. This was obtained about a month later and the project was approved by President Pierce, on June 28, 1853. President Pierce made the decision at this time to use a 9' conduit.

The additional estimate for the change was $350,000 or about one sixth of the 7' estimate. If the 7' conduit had been selected it would have been necessary to have started construction on an additional new conduit in 1880 after only 20 years service. Construction of a new conduit was actually started in 1925 after 65 years of service.

Obtaining right of ways proved to be a long, difficult and expensive proceedure. Water power rights were protested by the Great Falls Manufacturing Company which claimed ownership of the adjoining land. A small tract above lock No. 20 of the Chesepeake and Ohio Canal was obtained and selected as the starting point. The inlet location was moved down the river from Conn Island shortening the conduit by 2,985'.

In November 1853 work was started near Great Falls on tunnels 1, 2 and 3 and the crossing of the Canal. In June 1854 the work stopped due to lack of funds. At this time all needed land had been condemned and a sandstone quarry at Seneca seven miles above Great Falls had been purchased. Work was suspended for a year and Meigs used the time to revise his hasty plans and estimates.

The appropriation of $250,000 March 4, 1855, made it possible to resume work. Bids had to be open for sixty days causing some delay. In 1856 $250,000 appropriated for existing liabilities did not permit the work to continue.

The conduit was about one fifth complete, six tunnels were started and 2028 feet of conduit were built. No bridges or reservoirs had been started. The fact that the suspension of work was increasing the cost and subjecting the structure to deterioration was brought to the attention of Congress by Meigs with the result that $1,000,000 in 1857 and $800,000 in 1858 was appropriated.

When shortage of funds caused the layoff in June 5, 1857, the project was 98% complete. Cabin John Bridge was the only large item remaining unfinished. At this time Little Falls discharged in to the Dalecarlia reservoir. The conduit was complete from there to the Georgetown Reservoir and water was introduced into the City, January 3, 1859.

In 1860 work was resumed with $500,000 appropriated with the provision that Meigs sign checks. He was transferred to Florida September 1, 1860, and was replaced by Captain Benham. Benham could not draw money and Meigs returned as Engineer February 22, 1861. During the first year of the Civil War work was again suspended and the labor transferred to the army to construct entrenchments on the Virginia shore.

Meigs was made Quartermaster General of the Army and the aqueduct was transferred to the Secretary of Interior, June 18, 1862. Under the latter office Cabin John Bridge was completed late in 1863, and a rock jetty was thrown out from the Maryland shore and 2' of Potomac water was introduced in the conduit December 3, 1863 and flowed in to the receiving reservoir for two weeks starting December 5.

After use from January 14 to February 24 leaks were repaired at Cabin John bridge and the conduit placed in regular service July 29, 1864 until September 1891. The upper end was partially drained in 1870 to remove a rock slide in tunnel No. 1.

The rock fill jetty from the Maryland shore was replaced by a masonry dam 600' long out to Conn Island in 1866 raising the water to 4' in the conduit. This dam was extended to the Virginia shore during 1855-56 with a crest elevation 148' and length of 2877'. In 1896 the height was raised to 150.5 giving a 75,500,000 capacity. Since that time flash boards have raised the water elevation to 152.5.

For all details of Cabin John bridge see "History and Construction of Cabin John Bridge" by Charles Mothershead Class '33.

In 1891 the reservoirs were complete and filled to permit an inspection made by Colonel Elliot. The recommendation for cleaning were carried out from 1895-96 removing 8,946 cu. yd. of mud and debris at such times as the conduit could be drained.

Congress set aside as an emergency fund $5,000 annually to be used for serious breakdowns. Colonel Longfit started the job of putting lining in the unlined tunnels in 1911. By using stored water during low consumption, 20 to 30 periods of 96 hours each could be had a year for this work. The work was continued under Colonels Langfit, Newcomer, Flagley and Fish until 1918. About 1000 feet of tunnel had been lined at a cost of over $50,000 and would have taken 28 years to complete.

Studies for a new conduit were under way and due to the shortage of labor, work was stopped in 1918. In 1925 the new conduit was completed and placed in service. The old conduit was drained during the fiscal year 1927 while Warren F. Brenizer Company, contractors, completely reconditioned the old structure at a cost of $201,286.24 including cross connections between the old and new conduit.

The old conduit was placed in service in 1927. It has been protected by the new construction 30 ft. away and should continue to give service for time to come with low maintenance. No repairs have ever been made on a two mile section between Delacarlia and Georgetown reservoirs and it appears to be in good shape just as left by Meigs.

The road over the aqueduct was first recommended in 1868. Farmers living along the conduit began using the clay fill as a highway and the ruts were so deep in some places as to expose the masonry. A macadamized road was deemed necessary to protect the aqueduct. This work was carried out 1870-75 at a cost of $46,000. The aqueduct maintenance greatly aided but a total of $200,000 has been spent on the road.

The property purchase for the receiving reservoir at Little Falls was a part of the Dalecarlia farm and the name was adopted for the Reservoir. Early maps have the name spelled Dalekarlia. According to Mr. Macqueen the old name Dalecarlia is the name of a Swedish province.

CONSTRUCTION AND MAINTENANCE

The work was divided into sections with complete estimates materials available and specifications when advertised for bids. Bidding was done on the unit cost basis because of character of work. Under the contracts let the contractor was payed on the basis of nine tenths of a monthly estimate made by the chief engineer provided there were no labor liens for the previous month. Claims for extra work had to be authorized each month by the engineer.

The government purchased all materials and supplied forms and centers for economy. The contractors were fined for waster or misuse.

The profiles in the appendix show the greater part of conduit was built in open cuts. The preliminary contractor made the cuts and fills to the horizontal center line of conduit which defined the grade. The contracts for the conduit made the lower half of this excavation about 100' ahead of completed construction. In this way the lower half of ring was layed on solid earth for about 100'. Forms and centers were erected and the top half built. The excavation when suitable was backfilled on the completed structure and rammed to give the arch some support. See typical section and conduit specifications in the appendix.

This method was used in open construction to stay within the 200' free haul when using wheel-barrows.

In fills the brush, trees, stumps, and top soil were removed. The fill of earth free from organic matter and large stones was placed in 3" layers and rammed by hand. A 6" layer was permitted when puddling was used. The surface was roughened between layers to get the proper bond. The fills were 44' wide at the top on horizontal center line of this conduit with a 1:2 slope. They were then left for one year but usually several years to settle before the conduit was built.

With the limited equipment of the time consisting mainly of steam hoist derricks it was cheaper to tunnel than to make deep cuts. Mr. George H. Coryell of the Pennsylvania Railroad was made chief tunnel engineer. The original palns called for linings in the tunnels but in sound rock they were omitted to reduce the cost. See appendix typical section. A total of 5,392' of tunneling was done, ranging from 86' to 1437' in length.

Culverts were provided in 28 places. They were in general semi-circular brick arches or circular brick pipes of varied sizes with cut stoned end. In some places manholes were used to get to the cilvert elevation. Bridges 1, 2 and 3 were small arches of only minor importance.

A gate house was built at Great Falls over the entrance to the conduit and had ten cast iron gates, 2' x 5' for regulating the flow by raising or lowering in slots by screw jack action. The entrance of the conduit in the gate house at Great Falls has an elevation of 149.4' on the intrados of the arch ring falling about 9½ inches per mile. Water flows 9.28 miles from there to the Dalecarlia reservoir. In 1895 the original gates were broken and replaced waste weirs were constructed to prevent any operation under head. Breathing towers were constructed to further regulate the flow when only part full. There was no mention of the breathing towers in the original plans.

Sickness among the men was high and at several times the work was closed down due to outbreak of malaria. The sickness season of August, September and October frequently showed a drop in the labor force. This became known among the men and they did not like to work at Great Falls.

The common labor was white and only a few negro slaves were on the actual construction work between 1857- 1860. The labor force varied from fifty during lay off to a maximum of about 4,000 during periods of great activity. Themen lived in boarding houses furnished by the Government. See appendix.

The Washington Aqueduct was the third to be built in the United States. To appreciate the engineering feat one need only consider the size of the project and the absence of our modern equipment and methods of construction.

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# A P P E N D I X

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## SPECIFICATIONS FOR THE AQUEDUCT PREPARED BY MEIGS WHICH ARE OF PARTICULAR INTEREST

SPECIFICATIONS FOR CONDUIT - the Conduit will be of circular and generally of nine feet interior diameter; it will when of brick, generally be built of three separate four and a half-inch rings of hard brick. Where it passes through the ground risings as high as the intrados of the arch, the inner ring will sometimes be omitted, and the brick work reduced to nine inches.

In rock cuts and other deep cuts where suitable stone is on hand, concrete or rubble stone masonry will be substituted for brick, in whole or in part, particularly in the lower or reversed arch.

The center of the conduit at any point is the grade of the aqueduct at that place. The excavations and embankments will be made to the level of the grade at each place of operations before the contractor for the conduit will be allowed to commence his work there. The excavation for the lower semi-circle or reversed arch, however, will generally be made by the contractor for the conduit and it will be trimmed out but little in advance of the laying of the masonry.

BRICK MASONRY IN CONDUIT - the bricks, at the time of laying, will be thoroughly wet; every brick must be laid and pressed down into a full bed of mortar, which shall cover its bed and joint; and this bedding shall be done at one operation for each brick, so that no mortar need be worked in after the brick is placed. The inner edge of the joint of each course will be the least possible to admit of mortar between the bricks. The joint of mortar between each two rings will not be less than three-eighths of an inch in thickness.

STONE MASONRY OF CONDUIT - This will be made of small rubble stone, none of which will exceed fourteen inches in width or depth. Each stone will be laid in a full bed of mortar and hammered until the mortar is pressed out at the front and the joints are completely filled. Its inner surface will be well plastered with a coat of cement mortar and be floated smooth and even.

CONCRETE - One barrel of cement, (300 lbs. net) with two and a half barrels of sand and thirty cubic feet of stone will make a batch of concrete. The mortar having been spread on a bed of plank, the broken stone will be spread evenly over it and the whole mass turned over twice and thoroughly mixed with a hoe or shovel. When mixed and laid it shall be rammed into a compact and water tight mass. (Note-These proportions are roughly 1:2:10, which is much weaker than used at present.)

MORTAR - The mortar for masonry will be made of two and a half parts of sand to one part of cement. The sandand cement after being measured, will be mixed dry and small quantities only taken from the heap, will be mixed with water as required. (note - the mortar for concrete was made first and amount of water was kept low.)

CEMENT - all cement must pass the test of setting hard under water and not breaking up into lumps. Three hundred pounds net of cement will be estimated as one cask or barrel. (Note - This was of course natural cement as Portland cement was notmade at that time. It came from Maryland, New Jersey and Pennsylvania and was delivered on the dock in Georgetown. The inspectors tested small specimens which were considered good if the set occurred in 30 minutes or less.)

SAND - None but good clean sharp flint of silicious sand will be received. Proposals will state the number of bushels the bidder will undertake to deliver. (Note - the Contract price was 6 cents per bushel delivered on the bank of the canal in bins prepared for its reception. Competition was brisk and lower prices were obtained later.)

BRICK - None but well made hard burnt bricks, entirely acceptable to the engineer, will be received, and they must be made in moulds conforming in size to the municipal regulations of Washington City.

# A V E R A G E   C O S T S

| | |
|---|---|
| Earth Excavation | $ .151 cu. yd. |
| Hard rock excavation | 1.25 " " |
| Soft rock excavation | .75 " " |
| Laying brick | 2.25 " " |
| Laying stone masonry | 3.00 " " |
| Furnish Seneca Sand stone | .26 cu. ft. |
| Concrete in place including only transporting mixing and laying | 3.25 cu. yd. |
| Tunnel excavation | 6.00 cu. yd. |
| Brick | 8.25 thousand |
| Masons, stone cutters, plasterers, carpenters and painters | 2.00 -3.00 per day |
| Unskilled labor | 1.00 -1.25 " " |
| Slave labor | 1.20 " " |
| Boarding house | 10.00-12.00 monthly |

## CLASSIFICATION OF TYPICAL PAYROLL IN 1858

| | |
|---|---|
| Assistant Engineers | 5 |
| Surveymen & inspectors | 50 |
| Skilled mechanics | 700 |
| Unskilled laborers | 1100 |
| Overseers | 30 |
| Clerks | 20 |
| Cooks & waiters | 60 |
| Slaves | 12 |
| Teams | 40 |

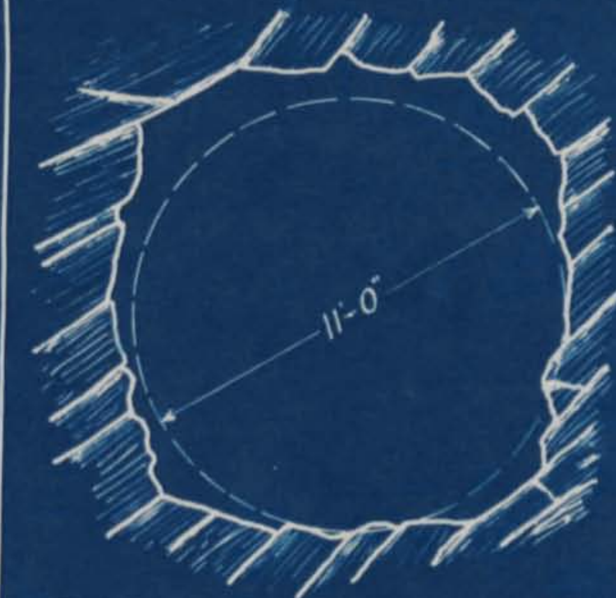
# R E L A T E D   D A T A

| | |
|---|---|
| Drainage Area above Great Falls | 11,050 sq. miles |
| Average discharge | 11,900 cu. ft. per. sec. |
| Average discharge | 8,700 mil. gals. per day. |
| Average demand of Washington | 80 mil. gals. per day. |
| Maximum demand of Washington | 110 mil. gals. per day. |
| Capacity old conduit | 80 mil. gals. per day. |
| Capacity new conduit | 120 mil. gals. per day. |

Dalecarlia Hydro Electric Plant using waste-water up to

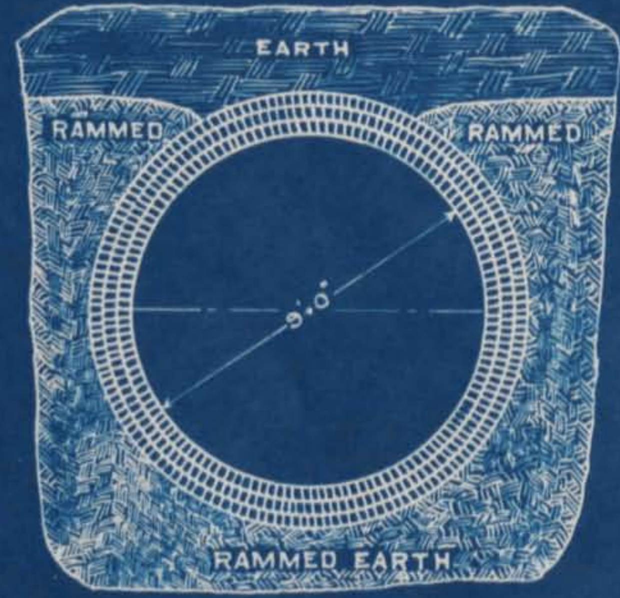
120 mil. gals. per day.

The quantity of Water for Power will decrease as the City demand increases.

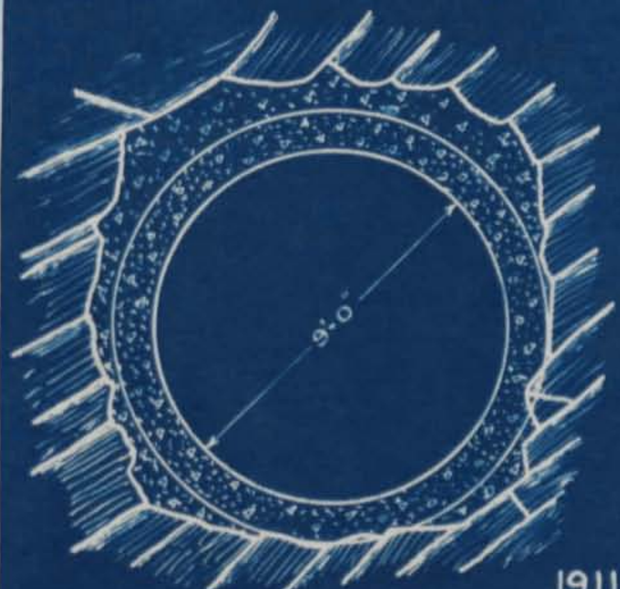



TYPICAL TUNNEL SECTION
As left by Meigs

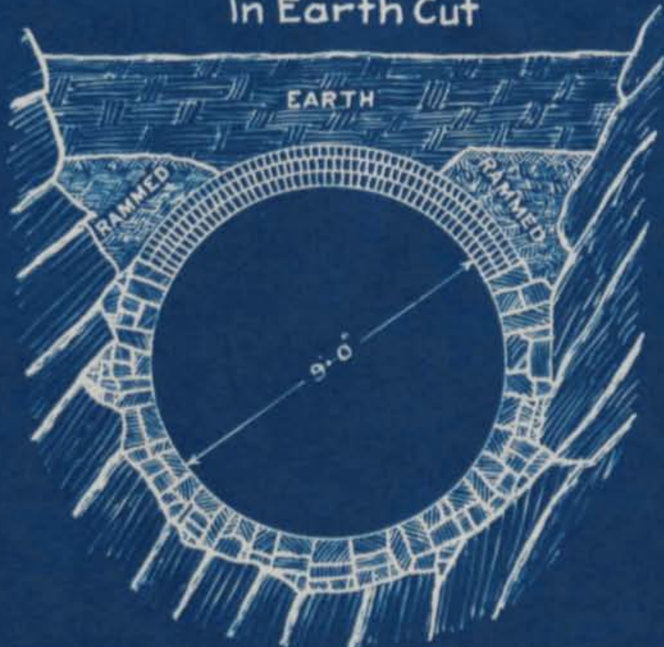

CONDUIT SECTION
In Earth Cut



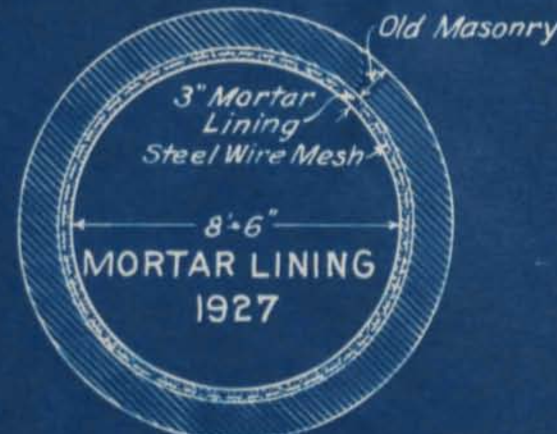

CONDUIT SECTION
In Fill




TYPICAL CONCRETE LINING-1911 TO 1927



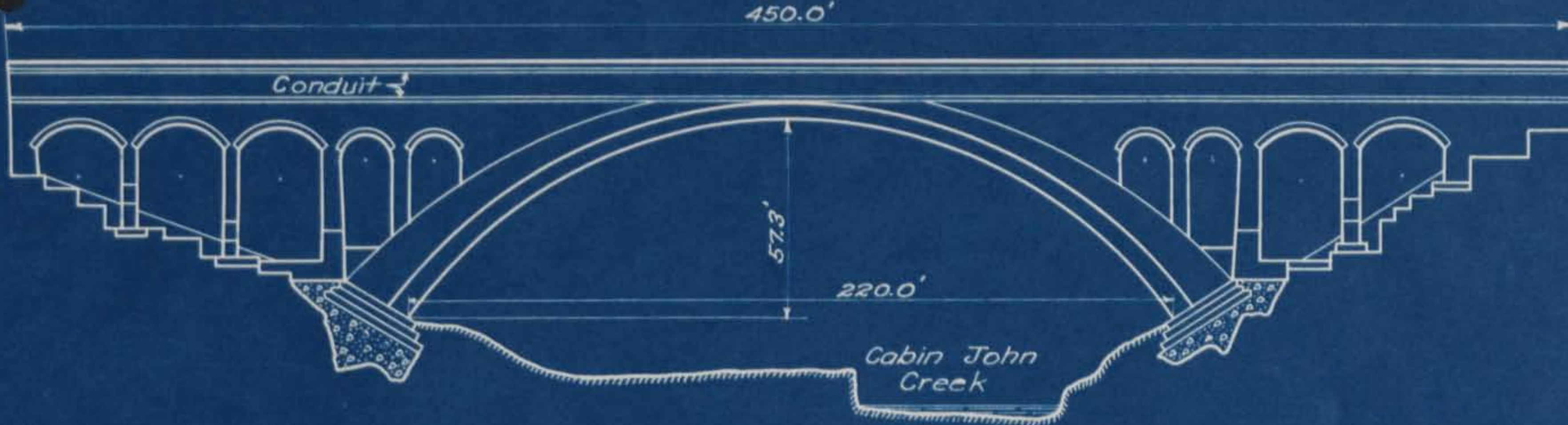

SECTION IN ROCK CUT



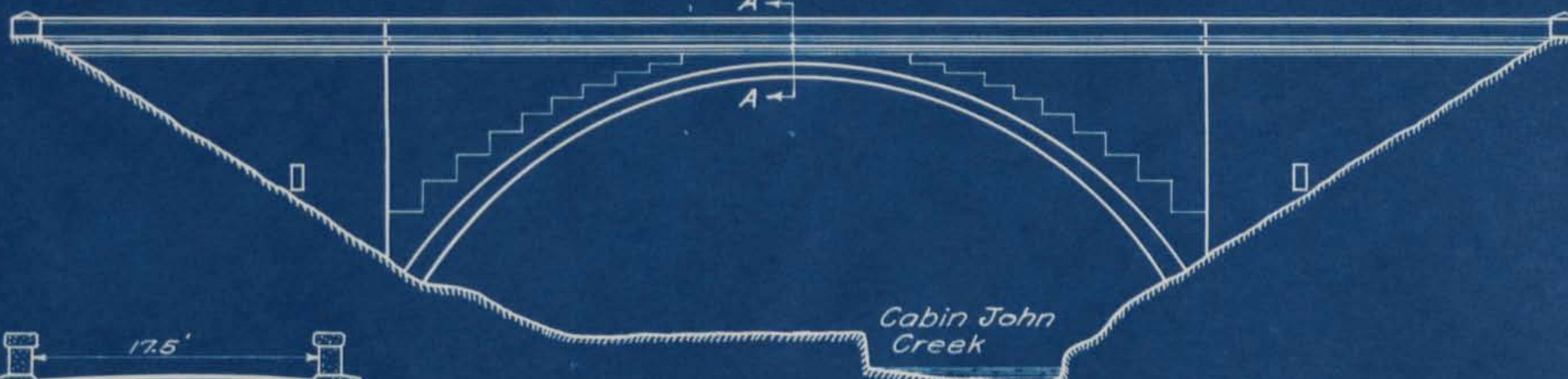

Approx. 2700 Lin. Ft. Lined

WASHINGTON AQUEDUCT
SECTIONS-OLD CONDUIT
Scale: 1" = 5'

C.P.H.




LONGITUDINAL SECTION THROUGH CONDUIT



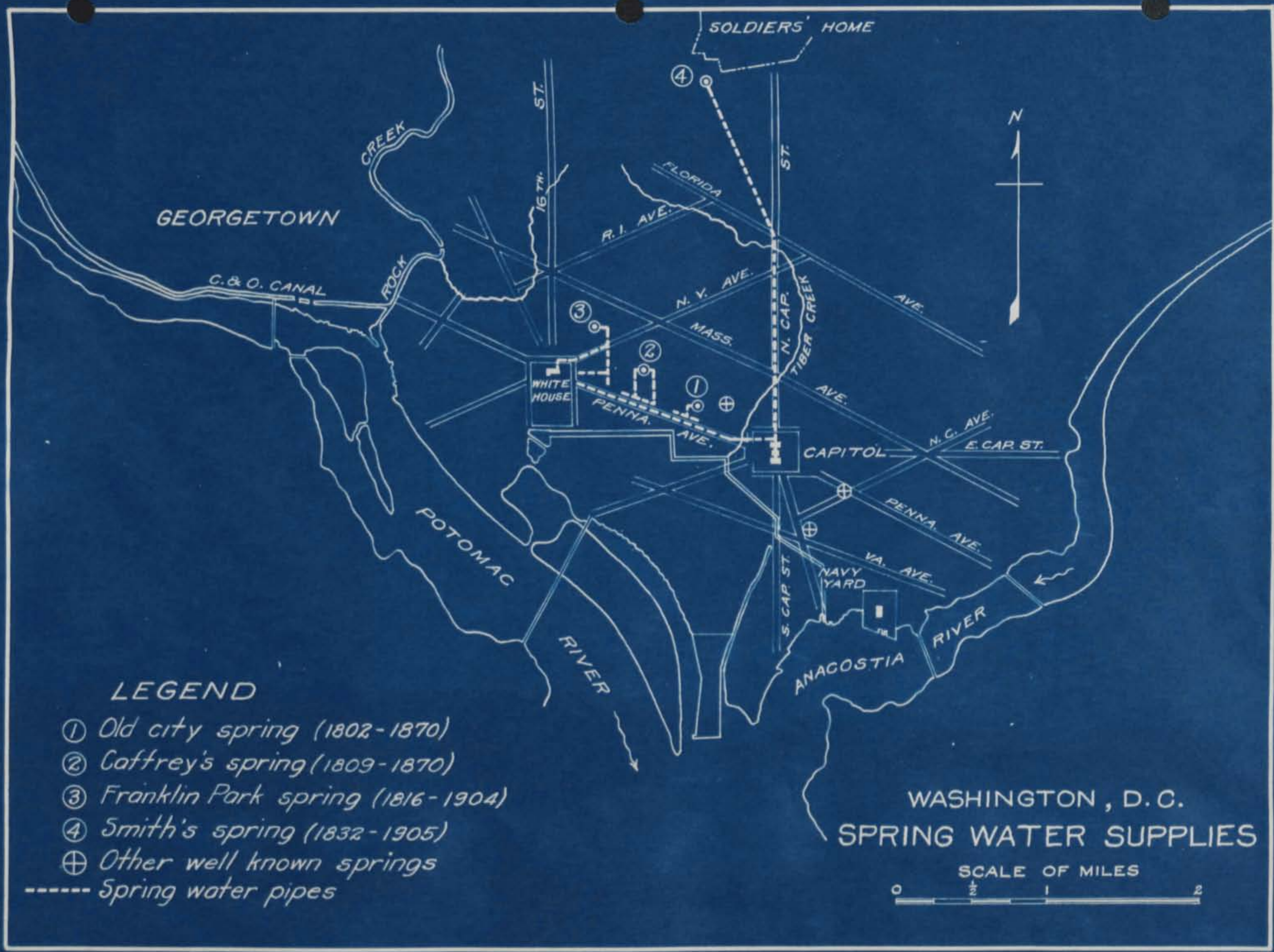

ELEVATION


SECTION A-A
SCALE: 3/32" = 1'

WASHINGTON AQUEDUCT

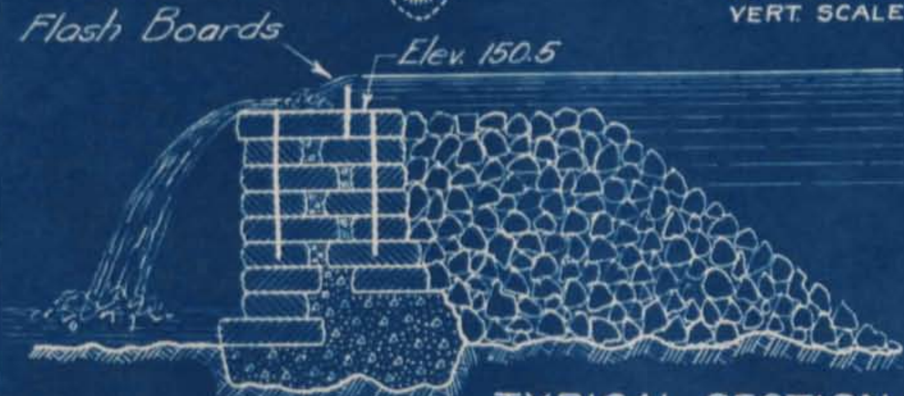
# CABIN JOHN BRIDGE

SCALE: 1" = 50'


SOLDIERS' HOME
GEORGETOWN
CREEK
ROCK
C.&O. CANAL
16TH. ST.
N. CAP. ST.
FLORIDA
R.I. AVE.
N.Y. AVE.
MASS. AVE.
TIBER CREEK
WHITE HOUSE
PENNA. AVE.
CAPITOL
N.C. AVE.
E. CAR. ST.
PENNA. AVE.
VA. AVE.
NAVY YARD
S. CAP. ST.
POTOMAC RIVER
ANACOSTIA RIVER
N
LEGEND
① Old city spring (1802-1870)
② Caffrey's spring (1809-1870)
③ Franklin Park spring (1816-1904)
④ Smith's spring (1832-1905)
⊕ Other well known springs
------ Spring water pipes
WASHINGTON, D.C.
SPRING WATER SUPPLIES
SCALE OF MILES
0 ½ 1 2


LOCATION PLAN
SCALE: 1" = 400'


PROFILE
HOR. SCALE: 1" = 400'
VERT. SCALE: 1" = 20'



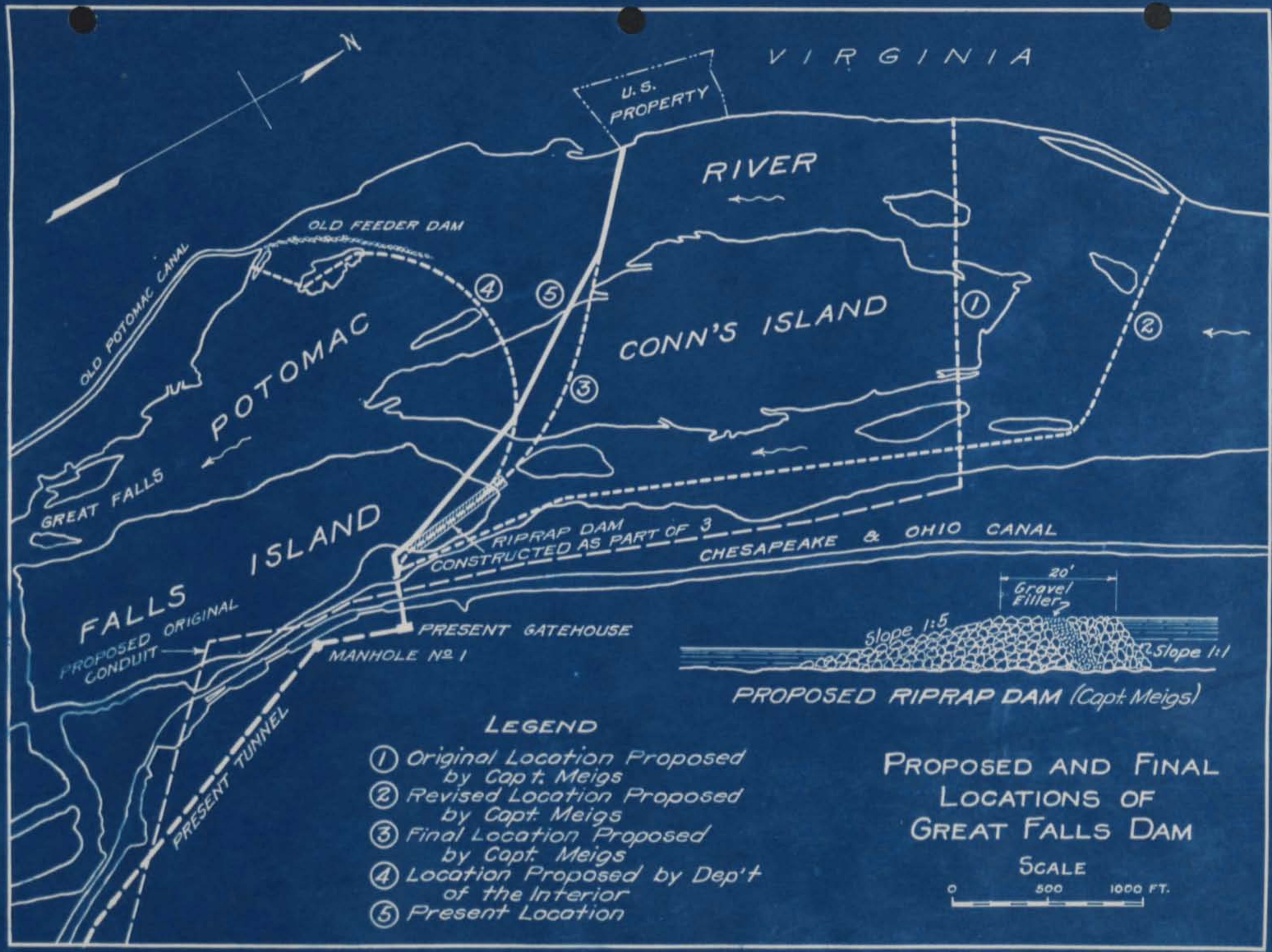

TYPICAL SECTION OF DAM
SCALE: 1" = 10'

| | |
|---|---|
| Total Length | 2,877 Ft. |
| Maximum Height | 24 " |
| Average Height | 13 " |

WASHINGTON AQUEDUCT

# GREAT FALLS DAM

Scale as Indicated




PROPOSED AND FINAL LOCATIONS OF GREAT FALLS DAM

Head Conn Island Original Location of Dam

Actual Location of Dam

Great Falls Below the Dam.

Head of Little Falls from Conduit Road.

Bi-Conduit at Dalecarlia opened for Alterations.
The picture resembles prints of actual construction.

Gate House at Great Falls.

Intake of Old Conduit is Under the Crane. Also Section of the Masonry Dam.

Large Calvert No. 12

Entrance of Manhole down to circular brick pipe under Conduit.

Cabin John Bridge or Bridge No. 4. Part of Inverted Siphon of New Conduit

Bridge Number 3.

Dalecarlia Reservoir. Small house contains gates for draining the Reservoir.

Dalecarlia Reservoir.

Old Gate House Dalecarlia Reservoir

Georgetown Reservoir.

Breathing Tower and Road.

Gate Connections between old and new Conduit.

Sign Found at Crossroads along Conduit Road.

Conduit Road & fill over new Conduit on the Right.

COPIES OF ORIGINAL PICTURES MADE DURING ACTUAL
CONSTRUCTION FROM CAPT. M. C. MEIGS SCRAP
BOOK.

SOME ORIGINAL PRINTS CAN ALSO BE FOUND AT
MACMILLAN PARK.

OPEN CUT SHOWING FINAL EXCAVATION JUST AHEAD OF ACTUAL CONSTRUCTION, PATH AT SIDE WAS PRELIMINARY EXCAVATION LEVEL. TEMPLE LOWER BRICK HALF OF RING COMPLETE, COMPLETED CONDUIT FORMS IN PLACE WITH EARTH BACKFILLED ALMOST TO END. EXTRA FORMS IN THE BACKGROUND.

BRIDGE NO. TWO UNDER CONSTRUCTION MOUTH OF TUNNEL AT LEFT.

MOUTH OF TUNNEL SHOWING TRACK CARS AND WORKMEN. NOTE SIZE OF STONE BLOCKS.

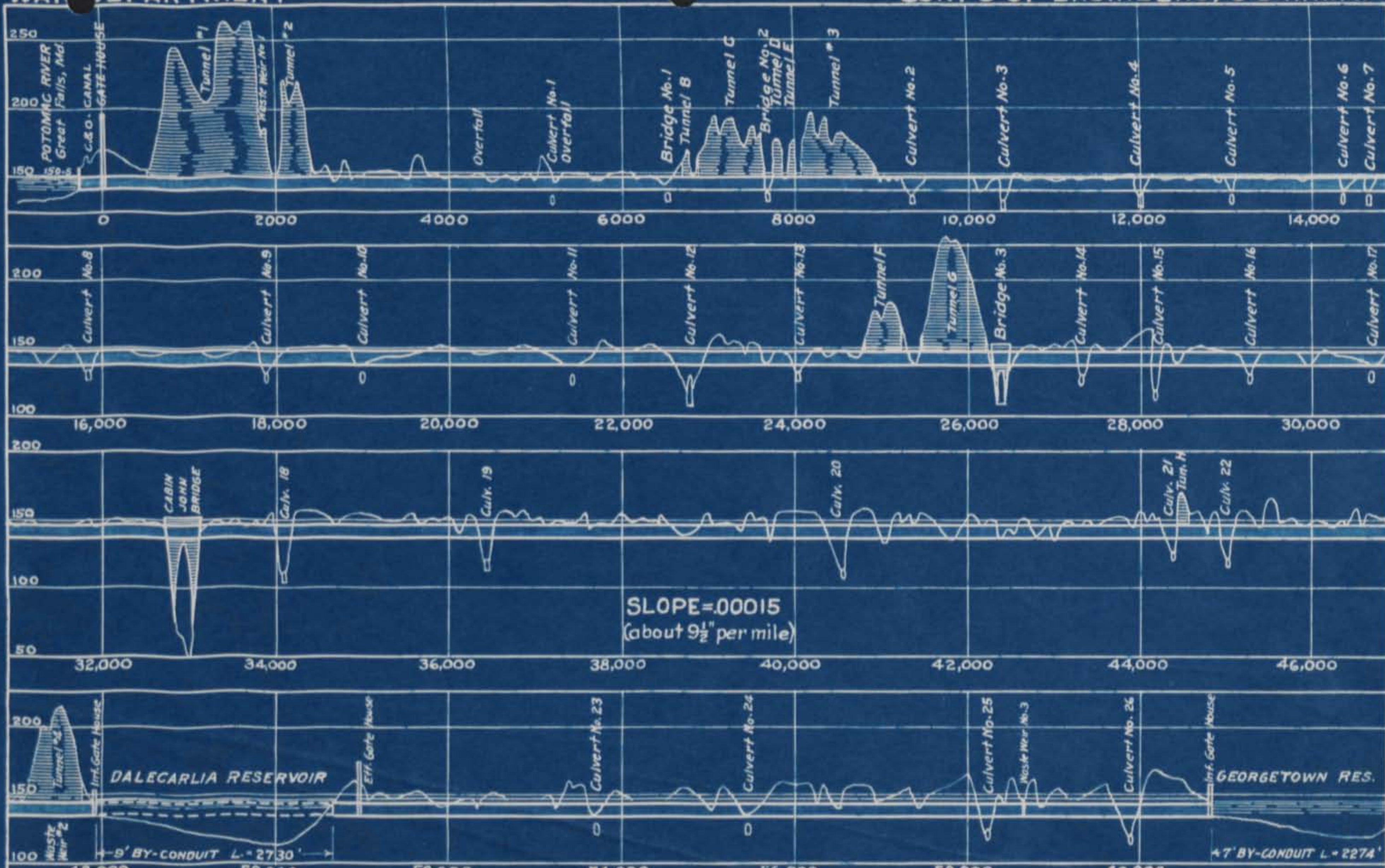
WORKING ON OPEN CUT AND CONDUIT IN BACKGROUND.

WAGON ON CART WHEELS, WHEELBARROWS, PICK

MATLOCK, SHOVEL, CROW BARS AND TOOL BOX

CAN BE SEEN IN THIS PICTURE.

WAR DEPARTMENT — CORPS OF ENGINEERS, U.S. ARMY.




NOTE: Inlet to Gate House, Gt. Falls - Arched Conduit, Length 273 Ft.
11 Tunnels, aggregating " 5,392 "
Brick Conduit, 9 feet inside diameter " 52,680 "
Culverts 26; Bridges 4; Waste Weirs 3.
Distance - Inlet Gt. Falls to Inf. Gate House, Dalecarlia Reservoir = 48,195 Ft.
" Effluent, Dalecarlia Res. to Inf. G. H. Georgetown Res. = 10,150 "
Total Distance, excluding Dalecarlia Reservoir = 58,345 Ft.

# WASHINGTON AQUEDUCT
## PROFILE - OLD CONDUIT

Scales: HOR. 1" = 1600' VERT. 1" = 100'

C. P. H.

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Military Engineering -- Sept. Oct., 1927 -- MacMillan Park

Filter Plant.

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## S U M M A R Y

The City of Washington was feeling the affects of a limited water supply in 1850 when a preliminary study was made. Another study was made in 1852 by Lieutenant M. C. Meigs, who submitted rough plans and estimates for three possible sources, namely, Rock Creek, Little Falls and Great Falls. The last named plan was recommended and accepted because of its unfailing supply.

Congress appropriated over $3,000,000 for the project at various times from 1853 until the job was completed in all details in 1885. Water flowed in conduit in 1863 but actual service started in July 1864.

A dam at Great Falls raises the head so that water flows by gravity to a receiving reservoir, Delecarlia, and the Georgetown reservoir a distance of 11.05 miles.

The famous Cabin John bridge is a part of the aqueduct and was the largest single stone arch in the world for a number of years.

A new conduit has been built and put into service. The old structure has been completely reconditioned and is still in active service working at full capacity.