A respected friend has furnished us with the following account of the principal articles of Imports and Exports, to and from Lower Canada, from the 1st of May 1820, to 1st December 1820.

Entered, 585 vessels,
147,754 tons, 6767 men.
Cleared, 5964 vessels.
Built 7 vessels this year.

IMPORTS.

106,423 Minots Salt.
118 Chests Hyson Tea.
2,071 Green do.
15,892 Puncheons Rum.
154 hhds. do.
4,489 Casks } Muscovado Sugar, 267,8012
1,569 bags } lbs.
311 Casks refined Sugar, 2,851,280.
55,378 lbs Coffee.

Value merchandize, 2½ per cent duty, £683, 553, 19 4.

EXPORTS.

319,048 Bushels Wheat.
45,349 bbls Flour.
28,678 do. Ashes.
9061 bushels Flaxseed
13 casks, 15 kegs Castorum.
106,517 Martins Skins.
3,066 Bear.
57,492 Beaver.
36,115 Muskrats.
5,799 Otter.
21,634 Dear.
1,804 Loupcerviers.
3,369 Fox.
4,942 Minx.
3,942 cased and open Cat.

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THE

OFFICIAL REPORTS

OF THE

CANAL COMMISSIONERS

OF THE

STATE OF NEW-YORK,

AND THE

ACTS OF THE LEGISLATURE

RESPECTING

NAVIGABLE COMMUNICATIONS

BETWEEN THE

GREAT WESTERN AND NORTHERN LAKES

AND THE

ATLANTIC OCEAN;

WITH PERSPICUOUS MAPS AND PROFILES.

PUBLISHED AT THE REQUEST OF THE BOARD OF CANAL COMMISSIONERS.

NEW-YORK:

T. & W. MERCEIN, PRINTERS.

1817.

John McCombe
presented by his Excellency
Dewit Clinton
17 Nov 1817

REPORT

OF THE

CANAL COMMISSIONERS.

THE commissioners constituted by the act, entitled "an act to provide for the improvement of the internal navigation of this state," passed 17th April, 1816, most respectfully present the following report to the legislature, being "a plain and comprehensive report of their proceedings," as required by the said act.

The duties enjoined upon the commissioners, are—

1st. To devise and adopt such measures as shall be requisite to facilitate and effect a communication, by canals and locks, between Lake Erie and the navigable waters of Hudson's river, and also between Lake Champlain and the said navigable waters.

2d. To examine and explore the country, for the purpose of determining the most eligible routes, for the contemplated canals; to cause surveys and levels to be taken, and maps, field-books and draughts to be made, and to adopt and recommend proper plans for the construction and formation of the said canals, and of the locks, dams, embankments, tunnels and aqueducts; and to cause all necessary plans, models and draughts thereof to be executed.

3d. To calculate and estimate the expense of the above operations.

4th. To ascertain whether to any, and to what amount, and upon what terms, loans of money can be procured, on the credit of the state, for the above purposes—and,

5th. To apply for donations of land or money, in aid of those undertakings, to the United States, to states interested, to corporate bodies, and to individuals.

The commissioners met in New-York, on the 17th day of May last, and after having organized the board, they conceived it best to effect, if practicable, the objects of the legislature, in the course of the season. With this view, they agreed to appoint three engineers for the Erie, and one for the Champlain canal; each engineer to be assisted by a surveyor, and a competent number of hands. The Erie canal was divided into three great sections, and an engineer assigned to each; the western section extending from Lake Erie to the Seneca river; the middle section from the said river to Rome; and the eastern section from Rome to the Hudson. In the course of their investigations, they found it expedient to appoint a fourth engineer, to explore and survey the country from Buffalo to the east line of the Holland purchase, on the south side of the mountain ridge, it being represented, that this route might be preferable to that on the north side.

The best artificial navigation in the United States, being the Middlesex canal, in Massachusetts, two of the commissioners, accompanied by two of the engineers, proceeded to examine it, in order to obtain practical information on the subject.

Another meeting of the commissioners was held at Utica, on the 15th day of July: after which, three of them explored, in person, the principal and most important parts of the route of the western canal, and superintended and directed the general operations of the engineers. And in the course of the season, two of those commissioners attended, in like manner, to the northern canal, while their colleagues continued to devote their attendance to the concerns of the other.

The dimensions of the western or Erie canal and locks, ought, in the opinion of the commissioners, to be as follows, viz. width on the water surface, forty feet, at the bottom, twenty-eight feet, and depth of water, four feet; the length of a lock, ninety feet, and its width, twelve

feet, in the clear. Vessels carrying one hundred tons may navigate a canal of this size: and all the lumber produced in the country, and required for market, may be transported upon it.

The route of the canal, as explored, has been carefully designated by bench marks, level pegs and other fixtures; and in obedience to special instructions, given by the commissioners, shafts have been sunk into the earth in various places, to ascertain its nature, with a view to a just estimation of the labour required, and of the expense to be incurred; and great pains have been taken to collect all the facts which might be requisite to elucidate the facilities in favour, and the impediments in the way, of this great undertaking.

From their own examination, the commissioners determined that it would be expedient to connect the west end of the great canal with the waters of Lake Erie, through the mouth of Buffalo creek. In adopting this determination, they were influenced by the following considerations: It is important to have, at that end, a safe harbour, capable, without much expense, of sufficient enlargement for the accommodation of all boats and vessels, that a very extensive trade may hereafter require to enter and exchange their lading there. The waters of Lake Erie are higher, at the mouth of the Buffalo, than they are at Bird island, or any point further down the Niagara; and every inch gained in elevation will produce a large saving in the expense of excavation, throughout the Lake Erie level.

That section of the route which extends from Buffalo to the east line of the Holland purchase, and lying south of the mountain ridge, as before described, was explored by William Peacock, Esq. as engineer, under the superintendance of Joseph Ellicott, Esq. one of the commissioners, who had been previously requested, by a vote of the board, to afford such superintendance.— In the details of this section, reference is made to Mr.

Ellicott's report to the president of the board, and to the field notes, draughts, maps and remarks of the said engineer, all of which are herewith presented.

Beginning, then, at a point in the little Buffalo creek, marked F, on the map, and extending two miles to the southern extremity of Black Rock, marked G, the line of the canal passes over a marsh, of which more than two feet of the surface consists of light muck resting upon a strong bed of clay, suitable for brick. The average depth of cutting, for this distance, will be nearly ten feet. To perform it will require the excavation of 33,350 cords of earth, which is estimated at $ 112 1-2, and would cost $ 37,518

From G to E, on the map is a mile, and includes the margin of Niagara river, at Black Rock. The rock here is composed of limestone, mixed, in the upper stratum, with flint; and as the average depth of cutting will be five feet, there must be excavated 49,960 perches of stone. At 62 1-2 cents per perch, this would cost $ 30,600

It is believed, however, that by erecting a wall near the river, and puddling it, for the lower bank, the canal may be made, for this mile, at an expense not exceeding half of the above estimate.

From the letter E, at Black Rock ferry, to L, at the Tonnewanta creek, the line of the canal continues along the margin of Niagara river, the distance being thirteen miles. A part of this distance will be completed, by moving earth enough to form the lower bank of the canal only; nevertheless, to cover the expense of making culverts and small embankments, at several creeks which cross the canal line, the average depth of excavation is calculated at five feet. This calculation will require the removal of 80,600 cords of earth, which, at one dollar, would amount to $ 80,600

At L, it is proposed to erect a dam, across the creek, of sufficient height to raise the waters thereof to the

level of Lake Erie. This height would be four feet deep and sixty-eight hundredths; and the expense of the dam is estimated at $ 8,500

Such a dam would produce a level surface, of from fourteen to twenty perches wide, and an abundant depth of water for seventeen miles up the Tonnewanta, to R. Both banks of this creek are bold; a towing path might be made on either for $ 600 per mile, and would therefore cost for the whole distance $10,200. Thus might the canal be completed, for seventeen miles, by using the bed of this creek, at the expense of $ 18,700

In most cases, experience is decidedly against making use of the channels of natural streams, on any part of the route of a canal navigation. These streams are so apt to produce injury to the artificial works with which they are connected, by freshets in the spring with a strong and muddy current, by want of water in the fall, and the sudden changes to which they are liable at all seasons, that they should be avoided, except as feeders, almost always when it is practicable. But to these remarks the Tonnewanta affords an exception. After the dam is built near its mouth, that part of it which it is intended to use, will have much more the character of a quiet narrow bay, or an artificial canal, than of a natural stream; and to give it still more of this character, provision might be made, with very little expense, at the point where its waters are first subservient to the canal, to turn all its superfluous freshets and floods down the Oak Orchard creek into Lake Ontario.

The expense of a lock near the dam, for the purpose of facilitating the navigation from Schlosser to Lake Erie, would be $ 10,000

At R, on the Tonnewanta, thirty-three miles from the west end of the canal, the Lake Erie level terminates. From this place to C, on the summit level between Lake Erie and the Genesee river, is twelve miles.

In this distance locks must be constructed for a rise of seventy-four feet and eighty hundredths. It would probably be expedient to divide this rise equally between ten locks, in which case the lift of each would be seven feet and forty-eight hundredths. Of these locks three might be placed at R, four at C, and the remaining three at some convenient place or places between. The expense of them would not exceed $ 100,000

Between R and C the country is remarkably even. The average quantity of earth to be excavated in each mile of this part of the route, is estimated at 3,786 cords, which, as the plough and scraper might be almost exclusively used, would not cost more than sixty-two and an half cents per cord. At this rate, twelve miles, the distance between R and C, would cost $ 28,275

The length of the summit level, from C to B, is seventeen miles; and it passes over a country so very level, that an average depth of four feet of excavation is all that will be required. To effect this, the removal of 5,050 cords of earth per mile, will be necessary, and such removal may be performed for seventy-five cents per cord, amounting, for seventeen miles, to $ 64,387

From D, on the Tonnewanta creek, to C, on the west end of the summit level, it is intended to construct a feeder sixteen feet wide and four feet deep. The length of this feeder will be four miles and sixty chains, and 2,640 cords of earth per mile must be removal in order to complete it; at seventy-five cents per cord, this would cost $ 9,443

From the end of the canal, at Buffalo, to B, at the east end of the summit level west of the Genesee river, is sixty-two miles. In his report relating to this section, Mr. Ellicott observes, that in the preceding estimates of expense little has been left to conjecture. The aggregate amount of these estimates is $ 379,523. To which he adds; for grubbing and clearing; for con-

ducting Bigelow's and Spring creeks into the summit level, near its east end; and for pay of engineers and officers to superintend the execution of the work,

$ 70,477

making the entire expense of these sixty-two miles

$ 450,000

It will be observed, that if the canal takes the direction here indicated, it will be raised seventy-four feet and eighty hundredths above the level of lake Erie, in which case recourse must be had to other reservoirs for its supply of water. Common prudence demands, that upon this subject every doubt should be removed, before this route is definitively adopted. Mr. Ellicott has had the sources of this supply guaged with great care, during the driest part of the last season, which has been more remarkable for severe drought than any ever before experienced in that part of the state.

Independently of waters deemed sufficient to repair the waste occasioned by evaporation and soakage, these sources consist of ten streams naturally flowing, or capable of being conducted into the summit level. When these streams were guaged, they afforded in the aggregate 253,435 cubic feet of water per hour, which would fill six hundred and seventy-three locks every day, and provide for the passage of 1,209,600 tons during eight months, in boats of thirty tons burden. Besides, the raising of one of the canal banks to the necessary height for a towing path, on the summit level, would produce the flooding of more than a thousand acres of land, which as a reservoir, together with the hourly discharge of the streams above mentioned, would be abundantly sufficient for all the wants of this level.

From the east end of this level, down the valley of Black creek, and along the west banks of the Genesee river, to the point where the route explored north of the mountain ridge passes that river, the face of the

country has not been scientifically examined. It is well known however to present no serious impediments to the construction of a canal; and its facilities are thought to be such, that if the difficulties occurring on the summit level do not prevent, the canal should certainly take this direction. The length of this unexamined section would be about thirty miles; and it would require locks for a fall of one hundred and thirty-nine feet and eighty hundredths. The expense of these locks might be estimated at $ 150,000
and all other expenses of this distance at $ 6,000 per mile, $ 180,000
making the entire cost from lake Erie to the Genesee river, in this direction, $ 780,000

At a point eleven miles up the Tonnewanta creek, from its mouth, that section of the route assigned to James Geddes, Esquire, as engineer, commences, and extends eastward to the Seneca river. In the details of this section, reference is made to the minutes, maps, profiles and draughts of the said engineer, herewith presented.

Pursuing this route, the canal never rises above the Lake Erie level. It would, therefore, derive its waters, until it descends to the Genesee level, and as much further as may be necessary, from that never failing reservoir.

Map No. I, includes six miles and forty-two chains of the route, on this section.

From the place of its commencement, at the distance of five miles and sixty-four chains, this route reaches the brow of the mountain ridge. For the first forty-four chains of this distance, it falls in the channel of a small stream, and for twenty-two chains the channel of that stream is sufficiently wide and deep for the canal. But a towing path on its margin would cost $ 7 50 per chain, $ 165

To give the other twenty-two chains the average width

and depth of the canal, 2438 cubic yards of earth must be excavated; at eighteen cents, this would cost $440

Add for towing path, at the same rate as above, 165

The expense of the next thirty chains, as a little deep cutting is to be encountered in it, is estimated at $3018

At this place, seventy-four chains northerly from the Tonnewanta creek, commences the deep cutting, which continues four miles and seventy chains to the brow of the ridge above mentioned, and there terminates the Lake Erie level, in this direction.

As the excavation of the canal, through this distance, constitutes one of the most serious difficulties presented on the whole route, great pains have been taken to avoid all impracticable data of calculation relating to it, and, at the same time, to give to the work such dimensions and construction as may be required, with the greatest attainable economy. Throughout this deep cutting the calculations embrace a width of water on the surface of the canal of twenty-seven feet; a bank from the bottom to an elevation of five feet on each side, of such a slope as that twelve inches rise will give a base of eighteen inches; a recess at this elevation, in one bank of two feet, and in the other of one; and an ascent of both banks from these recesses, to the natural surface of the earth, at an angle of forty-five degrees with the horizon. The earth here consists of a stiff brown clay, which in the banks of the Tonnewanta, stands fifteen feet high at a steeper slope than the one above proposed for the canal banks above the water. Of the recesses, the least is for a berm, the largest for a towing path, to be completed in a manner described below.

In order to conform to these calculations, the first sixty-one chains of this deep cutting, which rises from fourteen to seventeen feet above the bottom of

the canal, would require the excavation of 68,106 cubic yards; but as there flows through this distance a brook, which has scooped out a channel averaging three feet deep by thirty feet wide, there may be deducted 13,380 cubic yards from the number above stated, leaving to be actually excavated 54,726, which at twenty-five cents will cost $ 13,681

For the next forty chains and twenty links, the depth of cutting will average eighteen feet, and making for this distance a deduction, on account of the channel of the brook, at nearly the same rate as above, the number of yards to be excavated will be, 60,000, which at twenty-seven cents will cost $ 16,200

For the next forty-eight chains and eighty links, the average depth is nineteen feet seventy-five hundredths; number of yards to be excavated 97,442, which at twenty-eight cents will cost $ 26, 983

For the next two hundred and forty chains, the average depth is twenty-five feet, number of yards to be excavated 687,866, at thirty-one cents, will cost $ 213,238

The medium expense of excavating a cubic yard of earth, in this deep cutting, has been adopted from an estimate of the expense of such excavation to four different depths below the surface, viz: to 6 1-4 feet, to 12 1-2 feet, to 18 3-4 feet and to twenty-five feet; and the medium expense of such excavation to the first depth is estimated at $ 00 16

To the 2d at 26

To the 3d at 36

To the 4th at 46

Divide the aggregate of these sums by 4) 124

and the medium is 31

which is the rate per yard adopted, for the most part.

in the above calculations; and where it is not, to avoid fractions, a rate somewhat higher has been adopted.

In effecting this excavation, it is proposed to use the machine described in page eighty-two of a publication entitled "A treatise on Internal Navigation, &c." To the above items of expense, therefore, add, for making the machine, keeping it in repair, and moving it as may be wanted, $2,500

To construct a towing path through this deep cutting, it will be necessary to erect a dry stone wall, on the side of the largest recess above mentioned, three and an half miles long. This wall should be thirty inches thick at the bottom, twenty-four at the top, and six feet high. Let it be laid two feet below the water, to prevent injury by frost, and four feet above, with a suitable battering; fill up the space between it and the recess, and then the wall: the recess and the space between them filled up, will form a towing path six feet wide. Such a wall would consume 10,080 perches of stone, after they are laid up. They may be laid up at eighty-seven and an half cents per perch, amounting to $8,820

The stone could be furnished, from the north end of the deep cutting, without any expense, except that of moving them to the line of the wall, which, estimated at two dollars per cord, and making an allowance for waste of more than twenty-five per cent. would amount to $5040

For one mile and thirty chains of this deep cutting, no expense of erecting a wall to support the towing path is estimated. By sinking shafts, where the ground is dry, and sounding it with a pole where it is not, in various places, from the brow of the precipice southerly, it is found, that a rock of lime-stone must be excavated, for that distance, lying at from one to ten feet below the surface. But the number of cubic yards to be excavated in this rock will be so much diminished by

making the banks perpendicular, that after allowing a recess in one of them for a towing path six feet wide, and calculating the expense of such excavation at seventy-two cents per yard, which it is believed will be warranted by the data afforded in the two letters from Mr. Porter and the Messrs. Browns, subjoined to this report, the extra expense of this one mile and thirty chains will be $ 25,000

At the end of this deep cutting the line of the canal descends 65 feet to the level of Genesee river; and this descent is calculated to be effected by 8 locks, of which the whole expense is estimated at $ 73,586

The remainder of the route, on this map, is 51 chains, which exhibits an uneven surface, requiring, however, no considerable embankment or deep cutting, but in some places rugged with stone. The expense of it is estimated at $ 5,610

Many bridges will be required across this canal, but they need not be expensive. Make two stone abutments 22 feet apart; let 6 feet between them serve for a towing path, leaving 16 feet in width of water; let string-pieces be laid, from one of these abutments to the other, in sufficient numbers and size to support a flooring 20 feet wide; make this flooring of plank; over the whole place a suitable railing; and the average expense of such bridges will not exceed $ 300.

Much of the route of the canal will pass through woods, or land newly cleared. Considerable expense, in grubbing and clearing, will therefore be incurred.—This expense will be estimated at $ 1000 per mile.

Add, therefore, to the foregoing items of expense the cost of one bridge, $ 300
grubbing and clearing 6 miles and 42 chains $ 6,525
and the aggregate amount of expenses through the first map will be $ 401,271

Map No. 2 includes 7 miles and 34 chains. From

the beginning of the route on this map easterly, the extra expenses only will be estimated, in the first place, and afterwards the expense of excavation common to every mile, will be added.

At D, a hill, composed of a yellow slate gravel, is to be cut through, where 6,450 yards of earth must be moved, at 20 cents, $ 1,290

The next difficulty occurs in 34 chains of side-lying ground, of which the declivity is such, that a base line of 22 feet, gives a perpendicular line of ten and an half feet. Here it is proposed to erect two dry stone walls to support the two banks of the canal. If these walls are 15 feet high, they may be placed so far apart as to give a width of water on the surface of the canal exceeding 30 feet, and afford all needful support to the banks. Make them 3 feet thick, and they will consume 7480 cubic yards of stone. Stone of the best quality, and in great abundance, are to be found at the east end of the proposed walls, and it is believed they may be moved and laid up, at $ 1 40 per yard. $10,472

Over a small stream, which falls into the Eighteen mile creek, must be an embankment of 13,839 cubic yards, at 20 cents, $ 2,770

There are three other embankments to be made, in this map, which may be estimated at the price of the last, in the aggregate $ 8,310

At S occurs a little deep cutting	$ 710
a larger one near it is estimated at	1,485
On this map must be 10 small culverts,	1,000
and 2 bridges,	600

Between E and D, the slope of the hills is such as to require some extra expense; and between W and V the ground is stony and uneven. Both of these places are estimated at the sum of $ 6,000

For grubbing and clearing 6 miles and 40 chains, 6,500

Aggregate of extra's on this map $ 39,137

Map No. 3 includes 6 miles and 11 chains. The deep cuttings, on this map, are very inconsiderable; they are estimated, in all, at $ 2,200

The contents of the embankment required over the east branch of Eighteen mile creek, is 10,984 cubic yards, at near 20 cents, $ 2,000

Johnson's creek will require another embankment of 5,700 cubic yards, $ 912

But in addition to these sums the expense of large culverts must be incurred at both of these streams. In the bed of each of them lie strata of red sand stone, which may be taken up in pieces large enough to cover water-ways of sufficient size to discharge their floods.—The length of the water-way, at Eighteen mile creek, after due allowance for wing walls, must be 90 feet; at Johnson's creek it must be 100 feet. Double this length of wall, in order to make it on both sides of the water-way, make it 3 feet thick, and raise it 8 feet high, and then cover the walls and the space of 4 feet between them, with the sand stone above mentioned, 3 feet deep, and the solid contents of stone work required will be 600 perches. For this stone work, when complete, as the best of stone lie very handy, the expense need not exceed $ 1 12 1-2 per perch, in all $ 675

3 bridges, 900

Grubbing and clearing 6 miles and 11 chains 6,137

Aggregate of extra's on this map, $ 12,824

Map No. 4 includes 6 miles and 71 chains. At F is a valley, where an embankment is required, which with deep cutting between D and C, and the embankment at C will cost $ 2,400

At Oak Orchard creek, an aqueduct will be necessary 200 feet in length; and it may be constructed of stone abutments and piers supporting a wooden superstructure, to be replaced hereafter, perhaps, by one of stone or iron. The bottom of the creek, consisting of rock, is 28 1-2 feet below the contemplated surface of wa-

ter in the canal. Good stone are here on the spot, and two piers between the abutments, may be so placed, as with them to afford three spaces of 50 feet by 23 for the passage of the water below. This is the creek into which it is thought expedient to bring the upper floods of the Tonnewanta: And when it is considered, that its bed is smooth, rocky, and of considerable declivity, with a perpendicular fall, two chains below, of 25 feet, the provision for a water passage will probably be deemed adequate. The better to support the wooden part of this aqueduct, with the least possible diminution of the water-way, braces might be introduced with one end resting in the stone work of the abutments and piers, and the other end mortised into the string pieces stretching across the spaces between. The expense of this aqueduct is estimated at $ 10,000

The deep cutting, at the east end of it, requiring the moving of 9,256 cubic yards, consisting partly of sand stone, would cost, at 40 cents, $3,700

The embankment at the west end is estimated at 1,144

For uneven places, west of Oak Orchard creek, not heretofore enumerated, and from X to the east end of the map, $3,000

For 4 small culverts, 400

For 2 bridges, 600

For grubbing and clearing 6 miles and 71 chains, 6,912

Aggregate of extras on this map, $28,156

Map No. 5, includes 6 miles and 73 chains. At Fish creek an embankment is required to contain 5,364 cubic yards, which, as it is low, and there is sufficient deep cutting at both ends to supply the materials for making it, is estimated at 15 cents, $804

At Clark's brook another embankment is necessary, to contain 10,814 cubic yards, at 20 cents, $2,160

There are three places on this map of steep side-lying ground, of which the whole length is near a mile, and will require an extra expense of $4,000

Several other small difficulties are estimated at $3,000
2 culverts, 200
3 bridges, 900
Grubbing and clearing 6 miles and 73 chains, 6,937

Aggregate of extras on this map, $18,001

Map No. 6, includes 6 miles and 68 chains. At the west end of this map Otter creek crosses the line of the canal in a valley 51 feet below the level. To pass this valley an embankment is required of 48,024 cubic yards. This may be made from the deep cuttings on both sides of the valley; but as part of the earth must be brought some distance, it would not be safe to estimate the expense of raising this embankment at less than 25 cents, $12,006
This creek requires a culvert, with walls 180 feet long, which would consume, if properly constructed, 502 perches of stone. These stone must be transported more than two miles, and may be estimated, when laid into the walls, at $2 50 per perch, $1,255
From L east, for a mile and a quarter, the extra expense amounts to $2,500
Near G must be laid out, in deep cutting, embankment and removing sand stone, $2,200
The culvert at the west branch of Sandy creek, 200
5 small culverts, 500
2 bridges, 600
Grubbing and clearing 6 miles and 68 chains, 6,850

Aggregate of extras on this map, $26,111

Map No. 7, includes 7 miles and 58 chains. About a mile south of the west end of this map lies Jefferson lake, which is very deep, and covers 50 acres of land. From Genesee river west, the same level continues more than 60 miles. To prevent a current either from this river, at one end, or the waters of Lake Erie, at the other end of so long a level, and to supply all the waste of evaporation and soakage, it is desirable that a feed-

er be introduced as near the middle of it as practicable. The outlet of Jefferson lake might be converted into such a feeder, without expense, and would amply supply the necessary water.

At A will be required a small piece of deep cutting, and between U and T, a much larger one; this last extends 26 chains, but lies through a black ash swamp, with a clay bottom, and a hill of gravel. The average depth of cutting will be small, and the quantity of earth to be removed here and at A, will in the aggregate be 22,739 cubic yards, at 20 cents, $4,548

East of S is a hill to cut through, requiring the removal of 12,653 cubic yards, more difficult than the last, at 24 cents, $3,036

At Sandy creek, the highest embankment that occurs in the whole route, will be necessary. From the bed of the creek to the top water line of the canal, is 70 feet; but this embankment will be short, and at the west end of it lies a hill of gravelly clay, as convenient as possible to furnish the necessary earth. The number of cubic yards required to raise this embankment, is 73,222, which added to 5,525, the number necessary to pass the canal over a valley west of the hill above mentioned, make an aggregate of 78,747, estimated at 18 cents, $14,174

Here are large quantities of excellent stone to construct the culvert necessary for the passage of the creek. The width of so high an embankment, is inevitably great, at the bottom, requiring for a culvert, a proportionate length of wall. These walls here must be 240 feet long. To complete them would consume 758 perches of stone, of which the expense, when laid in the wall, is estimated at 1 37 1-2 per perch, in all $1,042

At R is required	1,000
4 bridges,	1,200
4 small culverts,	400
Grubbing 7 miles and 58 chains,	7,725
Aggregate of extras on this map,	$33,125

Map No 8, includes 6 miles and 18 chains. Several small deep cuttings and embankments upon it, are estimated, in the aggregate, at $6,000

At D, a hill must be cut through, requiring the removal of 17,512 cubic yards, at 25 cents, $4,378

3 bridges, 900

5 culverts, 500

Grubbing, 5 miles and 30 chains, 5,375

Aggregate of extras on this map, $17,153

Map No 9, includes 6 miles and 42 chains.

At Y, an excavation of 21,846

at R, 10,730

at A, 5,394

In all, 37,970 cubic yards is necessary.

At the first place, the greatest depth of excavation is 15 feet; at the other places 10 feet. These excavations are estimated at 30 cents per yard, $11,391

At Salmon creek, the embankment of 9,216

at O, 5,858

at Camp brook, 12,877 cubic yards is necessary.

They are estimated at 25 cents per yard, $7,000

Other small embankments and excavations on this map are estimated at 2,400

The culvert at Salmon creek, 480

Another at Camp brook, 400

2 small culverts, 200

6 bridges, 1,800

5 miles and 40 chains of grubbing and clearing, 5,500

Aggregate of extras on this map, $29,171

Map No. 10, includes 6 miles and 24 1-2 chains.—At L, the surface of the earth rises 18 feet above the

bottom of the canal, and will require the excavation of 7,589 cubic yards. This earth is easy to move, at 30 cents, $2,276

Several small places of uneven ground, from K to F, are all estimated at $4,000

Rush brook runs through a valley 26 feet too low, and more than two chains wide. Here must be an embankment of 6,000 cubic yards, at 20 cents, $1,200

Stone are not to be found near this place, and a culvert of suitable size will cost $480

For steep side-lying ground near the east end of this map, $1,500

3 culverts, 300

2 bridges, 600

Grubbing and clearing 6 miles and 24 chains, 6,300

Aggregate of extras on this map, $16,656

Map No. 11, includes 4 miles and 49 chains, west of the Genesee river, and 1 mile and 55 chains more easterly, inclusive of the river, in all, 6 miles and 24 chains. Between K and I an embankment is necessary to be 6 feet high for near 1000 feet in length. It must contain 6222 yards, at 20 cents, $1,244

At G, on the north side of Fort brook, the line of the canal is crossed by a ridge, on which a lateral cut may easily be made to carry navigation within half a mile of the harbour at the mouth of Genesee river. Fort brook runs in a ravine which will require an embankment of 6000 yards, and which, including the necessary culvert, and the deep cutting at G, are estimated at $1,600

From this brook to the Genesee river the surface of the ground is uneven, and may require an extra expense of $1,200

Note.—The route of the canal, south of the mountain ridge, will here intersect the route north of that ridge. The distance from Buffalo to the point, eleven miles up the Tonnewanta creek, is 27 miles

from that point, to the Genesee river, on the north route, 72 10 1-2 chs.

The whole distance in that direction is 99m. 10 1-2ch.

It is proposed to pass the Genesee river, by a dam ten feet high, with a bridge some distance above it, for a towing path. The place of passing is a few chains south of the village of Rochester. The width of the river here, when low, is near 130 yards; when raised by the dam, it will spread over the west bank to a width of more than 400 yards. The current is rapid and shallow, in consequence of a considerable declivity in its rocky bottom. Half a mile below this place, the Messrs. Browns have built a dam across the river, eighteen inches high, and secured it immoveably to the rock below, by large iron bolts, for less than one dollar per foot, in length. Guided by this experience, it is calculated that a dam of the necessary strength, 440 yards long, may be built here for $8,150

The distance in the direction south of the ridge is supposed to be 92 miles. The whole expense, from Buffalo to the point, eleven miles up the Tonnewanta, including a proportionate part of the allowance for grubbing, superintendance, &c. as estimated on Mr. Peacock's section, is $205,877 The whole expense, from that point to the Genesee river, as estimated on Mr. Geddes's section, is as follows: Whole expense of excavation, for 6 miles and 42 chains, $401,271
Total amount of extras, thence to Genesee R. 224,378
Expense of each mile, after all extras are calculated, for 65 miles 48 1-2 chains, at $2250, (for which allowance see a subsequent part of the Report) 147,611

On this sum $773,260
Add for contingencies, 5 per cent. 38,663
For superintendance, draining, and fencing, at the rate of $1000 per mile for 72 miles and 10 1-2 chains, 72,125

The total amount is $884,048
Which, added to the expense from Tonnewanta to Buffalo, above stated, 205,877

Makes the aggregate cost of the canal from Buffalo to the Genessee river, on the north route, $1,089,925
On the south route, this cost is estimated at 780,000
Leaving a balance of expense in favour of the south route, by these estimates, of $309,925

Such a dam, 10 feet high, would set the water back three miles, and while it would drown but little land, would render the river navigable, with boats, for more than 30 miles above. The top of it would serve as a waste wier or tumbling bay to discharge the floods of the river, for which purpose, as well as for retarding the current so much as to give safety to the boats towed across the river, its great length would be an eminent advantage. The bridge for a towing path should be permanent, not floating, like the one over Concord river on the Middlesex canal; but it might be light, and with so good a foundation to build on, notwithstanding the necessity of security against the current and floodwood of the spring freshets, it is estimated at $10,000

On each side of the Genesee river, a lock of three feet lift must be placed, to prevent the floods from extending themselves into the canal east and west, in such a manner as to endanger its banks and fill it with sediment. These locks are estimated at $12,000

From the east bank of this river, there must be deep excavation for the distance of seventy chains. It lies through a black ash swamp, of which the upper surface is a black soil resting on clay. For a small part of the distance, the excavation must be ten feet deep, for the rest less. The number of cubic yards to be moved here, is 47,055, estimated at 17 cents, $8000

3 bridges,	900
4 culverts,	400
Grubbing and clearing 6 miles and 24 chains,	6,300

Aggregate of extras on this map, $49,794

Map No. 12, includes 7 miles and 25 chains. Near the west end of this map, after continuing upon one level for almost seventy miles, the line of the canal falls 49 feet. Here six locks will be necessary, estimated at $60,000

Between these locks and C, are several places of deep

cutting, in all of which 45,600 cubic yards of earth must be removed.

This earth is sand and loam, at 20 cents,	$9,120
Stone's creek requires a culvert estimated at	320
Between B and A, are extras requiring	1,530
At Nye's creek an embankment,	1,324
And a large culvert,	380
From this creek to the end of the map, there are five small places of deep cutting, estimated in all at	$2,225
4 bridges,	1,200
7 culverts,	700
Grubbing and clearing 6 miles,	6,000
Aggregate of extras on this map,	$82,799

Map No. 13, includes 6 miles and 51 1-2 chains. There are 2 small ridges at T and R, which will require the excavation of 5000 cubic yards, at 20 cents, $1,000

At A, an excavation is necessary 157 yards long at the bottom, and 20 feet deep, from its summit. The number of cubic yards to be moved is 13,000, at 30 cents, $3,900

The next place of difficulty is the Irondequot valley, where an embankment is required to be 20 chains long on the top, and from the lowest part of the valley 65 feet high. On the east side of this valley rises a steep hill, consisting of sand and loam, 50 feet above the level of the canal. This hill will furnish, in the most convenient situation, all the earth required for the embankment; and to remove this earth, temporary wooden rail-ways might be used with great advantage. To make this embankment 34 feet wide at the top, and 229 at the bottom, it would consume 147,000 cubic yards, which, considering the facilities above mentioned, are estimated at 20 cents, $29,400

At the base of this embankment must be made a water-way with walls of stone. If wing walls be made 15 feet high, at the ends of this water-way, its length will not exceed 184 feet. Calculate 3 walls of that length

each, 3 feet thick and 10 feet high, and their solid contents will be 129 cords. To this add, for wing-walls, and to cover the water-way, 71 cords, and for waste at the rate of 25 per cent. 50 cords more, and the whole quantity of stone required will be 250 cords. This may be delivered on the spot for $5 per cord, $1,250
Laying it into the wall at 87 1-2 cents per perch, 1,144
A little east of O, must be a small embankment, to support which, and the natural ridge on which the canal runs for 3 and an half chains eastward, stone walls, 12 feet high, will be necessary on both sides, $687
The hill west of N, is a high pile of sand, of which it will be necessary to move 12,600 cubic yards, at 12 1-2 cents, $1,383
The expense of several small embankments and deep cuttings, from M to the east end of this map is estimated at $9,525
7 culverts, 700
3 bridges, 900
Grubbing and clearing 3 miles and 40 chains, 3,500

Aggregate of extras on this map, $53,389

Map No. 14, includes 6 miles and 26 chains. This map presents a deep cutting 3 miles long, running through a black ash swamp, of which the upper surface is light muck resting upon a hard clay. The depth of excavation will, in no place exceed 4 feet; and it is thought that the extra expense required here will not be more than equal to the removing from the bottom of the canal 2 and a half feet in depth, of this excavation. Let this bottom be 18 feet wide, and with the requisite slope of the banks, there must be removed, in this distance, 31,827 cubic yards, estimated at 38 cents, $8,911
For other small expenses on this map, 960
2 bridges, 600
Grubbing 6 miles and 26 chains, 6,325

Aggregate of extras on this map, $16,796

Map No. 15, includes 6 miles and 65 chains. Near the west end of this map a feeder may be introduced into the canal from Mud creek. And if this feeder should ever prove deficient, a correct examination has ascertained that this deficiency may be amply supplied by one from the outlet of the Canandaigua lake, introduced at the same place. The feeder from Mud creek must be 43 chains long, and if it is 20 feet wide and 3 feet deep, it will require the excavation of 6,307 cubic yards, at 12 1-2 cents, $789

Several small excavations and embankments are estimated, in the aggregate, $5,140

At Red creek, for culverts, 600

A feeder from the same creek, a mile long, and excavated 3 feet wide and 3 feet deep, is estimated at $500

On this map are 4 locks, by which the line of the canal falls 33 feet—expense of these locks, $40,000

1 culvert, 100

4 bridges, 1,200

Grubbing 2 miles and 40 chains, 2,500

Aggregate of extras on this map, $51,829

Map No 16, includes 8 miles and 32 chains. At four little streams between the west end of this map and the lock east of B, small embankments will be necessary, which, with steep side-lying ground and deep-cutting, in the same distance, are estimated at $2,000

This lock will have a lift of 9 feet, estimated at 10,000

Adjoining the lock east, deep cutting, 1,200

At the end of this deep cutting a feeder may be conveniently introduced, from Sherman's mill-pond in Mud creek. This feeder must be 20 chains long; and if it be calculated 4 feet in width, and the same in depth, it will require the excavation of 782 cubic yards of earth, at 15 cents, $117

For a small embankment at Clark's creek, 100

Note.—The word perch, in this report, uniformly stands for 24 solid feet and seventy-five hundredths.

A mile east of this brook commences a piece of deep cutting, 36 chains long, very favourably situated for disposing of the excavated earth. The depth of excavation no where exceeds 7 1-2 feet, and the number of cubic yards to be removed is 19,100, at 12 1-2 cents, $2,387

Other uneven places to the east end of the map,	1,580
4 bridges,	1,200
10 culverts,	1,000
Grubbing and clearing 60 chains,	750
Aggregate of extras on this map,	$20,334

Map No. 17, includes 10 miles and 51 1-2 chains.—At the west end of this map must be a lock of 9 feet lift, estimated at $10,000

All the small inequalities of surface between the lock and the hill west of H, are estimated at $2,174

At Battey's brook, which is a permanent stream, a feeder may be brought into the canal by a cut 27 chains long. If this feeder is 6 feet wide, and 4 feet deep, it will require the excavation of 1,584 cubic yards, at 15 cents, $238

The hill west of H, and the one west of I, are composed of sand, and lie on the margin of Mud creek. To pass through them, the excavation of 24,750 cubic yards is necessary, at 15 cents, $3,700

To secure a passage for the creek here, add 600

East of IIP is a shallow embankment required of 17 chains in length. The number of cubic yards to be moved, 6,540, at 20 cents, $1,308

To obviate the difficulty presented by side-lying ground between this embankment and K, is allowed $1,000

West of K, a piece of excavation is necessary, of which the greatest depth is 16 feet. The earth here consists of sand and a yellow slate gravel, and there are 26,410 cubic yards of it to remove, estimated at twenty-five cents, $6,602

At A, another lock is wanted, of five feet lift, estimated at $7,000

Adjoining this lock on the east, an embankment of 5,330 cubic yards is required, at 18 cents, $960

Near the east end of this map occurs a place of deep cutting, 52 chains in length, through a swamp, which no where rises more than three feet above the surface of the water in the canal. It will require the excavation of 12,520 cubic yards, at 15 cents, $1,878

5 culverts,	500
5 bridges,	1,500
6 miles of grubbing and clearing,	6,000

Aggregate of extras on this map, $43,460

Map No. 18, includes 7 miles and 20 chains. Near the west end of this map a lock of 9 feet lift is necessary, estimated at $10,000

At the distance of two and an half miles further east, must be placed another lock of six feet lift, $7,000

Small embankments and excavations from the west end of the map to the last lock above mentioned, $3,700

Adjoining the lock on the east, an embankment over a small brook, to contain 6,800 cubic yards is required, at 18 cents, $1,224

Between this embankment and P, for little inequalities of surface, in the aggregate, $2,000

At P, an embankment over a black ash swamp, 630

From the east lock above mentioned to the end of this map, a distance of near four miles, some provision must be made against the highest floods of the Canandaigua outlet, with which Mud creek intersects at the village of Lyons. This provision is intended to be made by giving to the south bank of the canal an additional elevation of two feet, which will require a proportionate increase of its width at the base. This enlargement of the south bank will require for every yard run of its continuance, an extra embankment of 9 cubic yards,

amounting in four miles, at 15 cents per cubic yard, to $9,504
8 culverts, 800
2 bridges, 600
Grubbing and clearing 6 miles, 6,000

Aggregate of extras on this map, $41,458

Map No. 19, includes 6 miles and 60 chains. From the east end of it to the east side of the Seneca river, where the section of Mr. Geddes terminates, is two miles and 6 chains, which are not laid down on a map because they pass over a level marsh, where there is no difficulty in choosing the route. The first 3 miles and 76 chains of this map run on a side hill of a gentle slope, presenting few difficulties. For this distance, the whole expense of excavating the canal and forming its banks, may be estimated at $5,500 per mile, in all, $21,725

At the end of this side-hill, commences the Cayuga marsh, over which the canal is to be conducted, for 4 miles and 60 chains. When the waters of Seneca river are low, the surface of this marsh is about 3 feet above them; when they are highest, in the spring floods, it is near 2 feet below them. At the west end of the marsh, the level of the canal is 9 feet higher than the surface of Seneca river, in low water. To secure a convenient passage over this marsh at all times, it is proposed to place a lock of 4 1-2 feet lift at its west end, estimated at $6,000

From this lock, eastward, there must be an embankment sufficient to preserve the water, in the canal, 18 inches above the general level of the marsh. An excavation 40 feet wide, and 2 1-2 feet deep would furnish earth enough for these banks, calculating them to be raised 2 feet above the top water line of the canal, in order to guard against floods. But the spongy nature of this earth, renders it indispensible, that in both banks great precaution should be used to prevent leakage.—At the Montezuma salt works, a canal has been dug

through a part of this same marsh, which was there found to rest upon a bed of dark blue clay. Let a partition of pile plank, then extending the whole length of the marsh, be driven through each of the banks. If these plank are 7 feet long, and driven into the earth 2 feet 9 inches below the bottom of the canal, they will stand 3 inches above the upper surface of the water within the banks. And this, it is presumed, would constitute an adequate precaution against leakage. Constructed in this way, the expense of one chain in length, of both banks, is estimated as follows :

For removing 200 cubic yards of earth, at 20 cents,	$40
924 feet of 2 inch pine plank jointed, grooved, and driven,	32
Gravelling towing path (which might be done by boats after the water is let into the canal)	8
Whole expense per chain,	$80
Amounting in 4 miles and 60 chains to	$30,400

At the east end of the marsh must be placed another lock, of 4 1-2 feet lift, to let the boats which may navigate the canal, fall down to the level of Seneca river when its waters are lowest ; estimated at $6,000
In high water the gates of this lock would stand open, offering no delay. A bridge 10 chains long, across the Seneca river, is all that remains to connect this section with that which includes the route between this river and Rome. For all the purposes of a towing path, this bridge may be built as follows. At intervals of 16 1-2 feet across the river, drive down a pair of large oak piles; connect each pair of these piles by framing on their top a piece of timber 10 feet long ; stretch across these pieces of timber from one pair of piles to another 4 string pieces 12 inches by 4, and cover them with a flooring of 2 inch oak plank. The expense of such a bridge would be—

For each pair of piles delivered on the spot,	$1	
Driving them,	2	
Timber connecting each pair of piles and framed on,	1	
4 string pieces at 66 cents,	2	64
165 feet 2 inch plank for a floor,	3	36
Add for a suitable railing,	1	50
Aggregate for every 16 1-2 feet,	$11	50
And the whole expense of the bridge is	$460	

Aggregate of estimates on this map, $64,585

It cannot fail to be remarked, from the foregoing details, that the sources, on which reliance is placed, for feeding the canal, in this section, are permanent and most abundant; and that the country over which it runs, exhibits a singular regularity of surface. The route of the canal, as explored, pursues one level for 69 miles and 51 1-2 chains, and another for 20 miles and 40 chains. So uniformly is the declivity to the north, that from the foot of the mountain ridge, to the entrance of Mud creek valley, a distance of more than 90 miles, no stream crosses the canal except in that direction, and there is not a single mile in which the north bank of the canal will not be the lowest.

Recapitulation of distances and expenses on this section.

No. of Map.	Miles & Chains.	Extra Expense.	Whole Estimate.
1 includes	6 42		$401,271
2	7 34	$39,137	
3	6 11	12,824	
4	6 71	28,156	
5	6 73	18,001	
6	6 68	26,111	
7	7 58	33,125	
8	6 18	17,153	
9	6 42	29,171	
10	6 24 1-2	16,656	

11	6	24		49,794	
12	7	25		82,799	
13	6	51	1-2	53,389	
14	6	26		16,796	
15	6	65		51,829	
16	8	32		20,334	
17	10	51	1-2	43,460	
18	7	20		41,458	
19	8	66			64,585

Whole distance,	136	02	1-2	$580,193
From distance deduct	15	28		for 1st and 19th maps.

Total amount of extras as above,					$580,193
Add to extras for	120	54	1-2	being at the rate of $2,250 per mile, after all extras are calculated,	$271,532

On this section, which is in general very free from porous earth, there are, including embankments, 8 1-2 miles, in parts of which, puddling may be required.—Little experience, in relation to the expense of this operation, has been afforded in this country; but it is presumed, from that little, that the whole expense of puddling in these 8 1-2 miles will not exceed $30,000

Total of the foregoing items is	$1,347,581
Add for contingencies, 5 per cent.	67,379
Add also for engineers, superintendance, fencing, and draining, at the rate of $1,000 per mile,	136,025
The entire expense of this section is	$1,550,985

The estimate of $2,250 per mile above adopted for excavation, after all the extras have been calculated, is founded upon a consideration of the number of cubic yards to be excavated in a variety of different slopes, and in level land. A base of 40 feet, giving a perpendicular of 2,28 feet, it is believed comes nearer than any other, to indicating the general slope of this section.—In land lying on this slope, the average dimensions of the canal, would require an excavation, of which a cross

section would contain 74.17 superficial feet; and a similar section of the banks would contain 62.12 superficial feet; and in this case the quantity of excavation necessary, in a mile, would be about 14,500 cubic yards. To this quantity, has been added almost a fourth part, making 18,000 cubic yards, which, estimated at 12 1-2 cents, an ample price, considering that all the rough places are previously made smooth, and the whole line reduced to the *minimum* depth of cutting, amount to the $2,250.

The Seneca river, at low water, is 194 feet lower than Lake Erie; and to provide for this descent, 25 locks, besides the two guard locks at Genesee river, are located on the canal line. The lift of some of these locks is small, owing to the unusual evenness of the country. At places where there are embankments and deep cuttings, of which the dimensions are not particularly stated, the calculations have been such as to give a width of water, in the surface of the canal, never less than 27 feet. From the end of this section, eastward, to Rome, there is a rise, in the line of the canal, of 48 1-2 feet; thence the line descends to the Hudson.

The middle section of the canal extends from Rome to the Seneca river, and is about 77 miles in length. It was surveyed and laid out by Benjamin Wright, Esq. who acted as the engineer. Its route is accurately delineated in the maps, profiles, and minutes, herewith presented.

As a great part of the route of this section lies through low lands, where the timber is very heavy, with large roots, the estimate for grubbing and clearing is at the rate of $1,500 per mile. This is supposed to be too high, as machines have been invented and successfully applied, for this purpose, which greatly facilitate labour and diminish expense.

This section begins at Rome, at the point marked A.

on the map, the red line designating the route, by courses and distances accurately measured.

Mile 1*st*, May be considered as excellent for a canal. It requires the excavation of 2,700 cubic yards, at 12 1-2 cents, $3,375
For grubbing and clearing 65 chains, 1,200—$4,575

Mile 2*d*, Passes nearly the whole distance over swampy or low ground, which has, however, generally a hard gravelly clay bottom, at 1 1-2 or 2 feet below the surface. Part of the swamp is miry from 8 to 10 feet below the surface. The probability is, that owing to the surface being so near a level, no puddling will be necessary. Upon the whole, this mile is good for a canal, and will not require more than an average of 4 feet excavation—it may be estimated thus,
For excavation of 20,000 cubic yards,
at 20 cents, $4,000
Grubbing, &c. 1,500—$5,500

Mile 3*d*, Passes over clay and gravel, intersected with some spots of low ground, where there is one foot of black mud, and under that, hard gravel and clay.—In this distance, a lock of 6 feet descent will be necessary. The land, where this lock is to be located, will afford an excellent foundation for a lock, and the ground descends so fast as to make it easy of excavation, and to bring the level of the lock chamber, within a few rods, upon the surface. An aqueduct will also be necessary over Wood creek, of the length of 40 or 50 feet, which must be made of wood, or cast iron, laid upon stone piers, as there is not sufficient space below for a regular turned arch of masonry to admit the waters to pass.—An embankment of 510 cubic yards will be essential. After passing Wood creek, the ground is clay or gravel, and varies very little from the level to the end of the mile. The expense is for excavation of 21,000 cubic yards, at 12 1-2 cents, $2,625
For grubbing, &c. 1,500
embankment of 510 c. yds. at 20 cts. 102
aqueduct over Wood creek, 2,500—$6,727

Mile 4th, Passes over clayey and gravelly land, with some small undulations. There are 2 spots below the level, and a ravine with a small brook also below the level. 3 culverts may be necessary—2,200 cubic yards of embankment, and 4,000 of extra excavation, in consequence of cutting off some small points of ridges.—

Expense for 3 culverts,	$300	
For 24,000 c.yards of excavation, at 20 c.	3,300	
2,200 do. embankment, at 20 cents,	440	
grubbing, &c.	1,500	–$5,540

Mile 5th, Passes over ground which is gravelly, mixed with small flat stones, and its surface is undulating. There are 4 or 5 places where the land is too low, and 4 points of ridges, where it is from 2 to 6 feet too high. They are all short, and may be avoided by a serpentine course. The ridges consist of gravel, and the valleys of clay. The water in Stoney creek is 14 feet below the level, and here must be an embankment 14 chains long, and 9 1-2 feet high. Two culverts of 7 1-2 feet diameter, will be requisite for the passage of the waters of that creek.

Expense for 2 culverts,	$2,000	
for embankment of 5,300 c. yds. at 20 cts.	1,060	
excavation at 12 1-2 cents,	3,750	
Grubbing, &c.	1,500	—$8,310

Mile 6th, Passes over the same kind of ground as the last. There is an irregular summit between Stoney creek and a small brook in this mile; and some deep cuttings are required to gain a good course. The brook is 8 feet below the level; from it to the termination of the mile, the ground is very near the level, and descends gently to the north. Expense for embankment 1,700 cubic yards, at 20 cents, $340

For 1 culvert,	100	
excavation of 31,000 c. yds. at 15 cts.	4,650	
Grubbing, &c.	1,500	—$6,590

Mile 7th, Passes over a gravelly and sandy soil good

for a canal. An embankment 12 chains long, and averaging 5 feet deep, will be required. The one half of it may be saved by a diverging course. In the remainder of the mile is a small stream, which does not require a culvert, and no extra excavation is necessary.

Expense for embankment of 9,200 cubic yards, at 20 cents, $1,840
For 3 culverts, 300
excavation of 20,500 c. ys. at 12 1-2 cts. 2,562
Grubbing, &c. 1,500—$6,202

Mile 8th, Passes over gravel, with some mixture of clay and sand strata. There is a ravine made by a brook up which the line passes for 7 or 8 chains. The water in the brook, where it turns north, and leaves the line of the canal, is 5 feet below the bottom of the canal, and may be admitted into it without injury.—

Expense for embankment of 1,100 cubic yards, at 20 cents, $220
For excavation of 27,500 c. y. at 12 1-2 c. 3,437
grubbing, &c. 1,500—$5,157

Mile 9th, Is good for a canal, although it passes over swampy ground for a considerable part of the whole distance. In the swamp there is only one foot of mud, and the substratum is clay, or clay and gravel mixed. There is a point of a ridge near the commencement of this mile, which is 4 feet above the level; and there is one small stream, which forms no regular bed, but collects the waters of low grounds lying south of the line. It dries up in summer, and may be admitted into the canal without injury. Expense for excavation of 24,100 cubic yards, at 12 1-2 cents, $3,012
For grubbing, &c, 1,500—$4,512

Mile 10th, In the first part passes over the swampy grounds before mentioned; and there are one or two islets or spots of hard land in the swamp, over which the line passes, which may be easily avoided, if necessary. This hard land is stones mixed with clay. Drum

creek, which is 3 1-4 feet below the level, may be admitted into the canal without injury, as it is a short and sluggish stream, and of course, will not introduce much earth. There are some scattering undulations of sand, but the land is generally clay and gravel. Expense for dam across Drum creek, $300
For excavation of 21,600 c. yds. at 12 1-2 c. 2,700
grubbing, &c. 1,500
$4,500

Mile 11*th*, Passes over some points of ridges from 2 to 4 feet above the level, which may be avoided by a winding course. They are however narrow, and composed of gravel and loam. After passing them, the line runs over excellent ground declining gradually and uniformly to the north west. The soil is loamy and well adapted for a canal. The extra excavation will be 11,520 cubic yards. Expense for excavation of 37,520 cubic yards, at 12 1-2 cents, $4,690
Grubbing, &c. 1,500
$6,190

Mile 12*th*, At the beginning passes over a point of land four feet above the level, which may be avoided by bending a little to the north ; thence it proceeds over loamy land, good for a canal, and declines to the north west. The line here passes over two brooks, which will not require culverts, if it is desirable to take them into the canal. The westerly brook will require some embankment. There is a little ridge west of the brook, that might be shunned, but the deep cutting would produce sufficient earth to make the embankment. The general declivity of this mile is from one to three degrees. Expense for excavation of 27,000 c. yards at 12 1-2 cents, $3,375
For culvert, 100
Grubbing, &c. 1,500
$4,975

Mile 13*th*, Continues on loamy gravelly soil like the

last, with the desired level and the favorable declivity. At the distance of 25 or 30 chains on the line, the ground rises gradually to 1 1-2 feet above the level and continues so for ten chains, when it gradually declines to the required level and then below it. There are 2 dead swampy streams, where embankments will be necessary, and where culverts will probably be wanted. A few strata of sand on this mile, and for the last part the ground is swampy and very flat. The embankments will be 1,800 cubic yards. The water stands on the surface of the ground, which retains it.

Expense for embankment of 1,800 c. yards at 20 cents,	$360	
For 2 culverts,	200	
For excavation of 21,600 c. yards at 12 1-2 cents,	2,700	
For grubbing, &c.	1,500	
		$4,760

Mile 14*th*, Begins in swampy grounds, the timber hemlock, and the surface covered with moss. At 15 chains distance, there is a small brook requiring a culvert 3 1-2 feet below the level, and also an embankment 150 feet long, of the average height of 6 feet. After passing the brook, the ground is 1 1-4 feet too low for 10 or 12 chains to another brook laying only 3 1-2 feet below the level. Soon after leaving the last brook, the land rises to three feet above the level, and lays in ridges crossing the line at right angles. This elevation continues for 14 or 15 chains, when the line falls to the level, and soon after too low by 13 feet in a ravine, where the top length of the required embankment will be 7 chs. and 80 lks. After passing this ravine, the line may be continued straight, or by making a bend a part of the embankment may be saved. The straight course is to be preferred.

Expense for embankment of 5,170 cubic yards, at 20 cents,	$1,034
For excavation of 24,100 c. yds. at 12 1-2 cts.	3,012

For 1 culvert, 100
Grubbing' &c. 1,450
———$5,596

Mile 15*th*, Requires, in order to cross the Oneida creek, an embankment of 50,600 cubic yards, and an aqueduct of 100 feet in length. After crossing the creek, the course is straight and good, the ground being in some places a little too high. Near the end of this mile is a place where water runs most of the year, where a culvert will be required and an embankment of 3 chains long, averaging 3 1-2 feet high. In this swampy ground, the soil is sandy. Expense for embankment of 50,600 c. yards, at 20 cents, $10,120
For aqueduct of wood over Oneida creek, 5,000
another embankment of 1,200 c. yds. 240
excavation of 17,400 c. yds. at 12 1-2 c. 2,175
1 culvert, 100
grubbing, &c. 1,075
———$18,710

Mile 16*th*, Passes over a very flat country, and the soil is sandy loam with some gravel on the ridges, interspersed by narrow glades of ash timbered land, which has from 1 to 2 feet of black mud, and then hard clay. The general face of the country declines a little to the north west. 1,500 cubic yards of excavation will be required. Expense for excavation of 21,600 cubic yards at 15 cents, $3,240
For grubbing, &c. 1,500
———$4,740

Mile 17*th*, Passes over ground like the last for thirty chains, when the bottom land along the Cowaslon creek commences. An embankment of 14,000 cubic yards, to keep the level, will be required here. This embankment may be avoided by passing through a cedar swamp. The first course is, perhaps, the best. Expense for embankment of 14,000 cubic yards at twenty cents, $2,800

For aqueduct of wood over the Cowaslon,	$2,500	
excavation of 17,500 cubic yards at 12 1-2 cents,	2,187	
grubbing, &c.	1,300	
		$8,787

In this mile, a feeder of 2 miles and 70 chains in length, may be introduced from the Oneida creek.

This feeder may be made navigable, as a lateral canal, to Oneida Castleton, a village at Oneida castle owned by the state. In all probability no water from Oneida creek will be wanted for the canal, but considering that the state land at the village and in its vicinity will be trebled in value by this lateral canal, it will be an object to make it on that account only. The whole of the Cowaslon creek may be thrown into the same feeder. Making the feeder 24 feet wide on the top and twelve feet at the bottom, with a depth of four feet, would cost, for excavation of 42,224 cubic yards, $7,603

For grubbing, &c.	3,000
dam across Oneida creek,	1,000
guard lock,	5,000
	$16,603

As this is not necessary as a feeder, the expense of it is not properly chargeable to the canal.

Mile 18th, Is all in low swampy ground, with one or two feet of black mud upon a hard clayey and gravelly soil. The whole has a little descent north west, and there are 2 small streams, which arise from springs, and run without forming beds much below the surface. They may be admitted into the canal without injury. Expense for excavation of 21,500 cubic yards at 20 cents, $4,300

For one culvert,	100	
grubbing, &c.	1,500	
		$5,900

Mile 19*th*, Passes below a step or ridge. The land is clay and gravel, descending gently to the north, and is as good as nature could form it for a canal. Expense for excavation of 26,000 cubic yards at twelve and an half cents, $3,250
For grubbing, &c. 1,500
———$4,750

Mile 20*th*, Passes upon ground similar to the last for nearly half the distance. At the Canastota creek the water is six and a quarter feet below the top water line of the canal. The best way to dispose of this small creek is to erect a dam of six and a quarter feet high and pass the canal through the pond. This will only overflow two or three acres, and two mill dams about half a mile distant will receive almost all the alluvion. After crossing the creek, the land is gravelly, and for ten chains is on an average two feet too high. The rest is excellent for a canal, descending gradually from two to three degrees north. If the Canastota creek is carried under the canal by deepening its bed, 3050 cubic yards of embankment will be required; if a dam is adopted, the expense will not be considerable. Expense for excavation of 21,540 cubic yards at 12 1-2 cents, $2,692
For a dam across Canastota creek, 900
grubbing, &c. 700
———$4,292

Mile 21*st*, Is all excellent for a canal, the ground being gravel, clay, or loam, with a descent of 2 or 3 degrees north, and requiring no extra excavation or embankment. Expense for excavation of 20,000 cubic yards, at 12 1-2 cents, $2,500
For grubbing, &c. 500
———$3,000

Mile 22*d*, Passes through a cedar swamp, which has hard bottom under 2 feet of black mud. The surface is rather below the level, but there is a general declivi-

ty of from 1 to 2 degrees north; it is, therefore, easy to gain, if desired, a higher surface. There are 4 small runs of water on this mile, none of them requiring culverts but one. At the latter end of this mile the line ascends the summit of a ridge 16 1-2 feet above the level. This is run over to keep a good course, and will require an extra excavation of 15,840 cubic yards. An embankment adjoining eastward will require a small part of this earth; and if a bend be made northerly to avoid this point of a hill, it will increase the embankment. Perhaps it will be best to cut off only a part of the point of the hill, and thereby save one half of the extra excavation. Expense for excavation of

35,800 cubic yards, at 15 cents,	$5,370
For 2 culverts,	200
grubbing, &c.	1,500
	———$7,070

Mile 23*d*, Passes over excellent land for a canal, which consists of clay and loam, and descends gradually to the north from 2 to 3 degrees. Expense for excavation of 26,000 c. yds. at 12 1-2 cts. $3,250

For 1 culvert,	100
grubbing, &c.	1,200
	———$4,550

Mile 24*th*, For the first part, passes over clay and loam exactly on the required level. The best course is to pass over the mill pond in the Canasaraga creek; and this will require an embankment of 7,500 cubic yards, and an aqueduct of wood or cast iron, 40 feet long. A feeder, if necessary, can easily be obtained from this creek. Expense for embankment of 7,500 cubic yards,

at 20 cents,	$1,500
For aqueduct of wood,	2,500
excavation of 20,000 c. yds. at 12 1-2 cts.	2,500
	———$6,500

Mile 25*th*, Is all excellent, with a descent north, and soil of loam or gravel. Expense for excavation of

26,000 cubic yards, at 12 1-2 cents,	$3,250	
For grubbing, &c.	1,500	
		$4,750

Mile 26*th*, Passes over clay and gravel. In some places there are rough loose stones, which may be useful, and in one place the ground is from 1 1-2 feet to 3 inches above the level. Expense for excavation of

30,500 cubic yards, at 15 cents,	$4,575	
For grubbing, &c.	1,500	
		$6,075

Mile 27*th*, Is excellent for a canal, from the beginning to the Chitteningo creek, over which it passes.—Some of the ground consists of clay, and some of the rich black mould, or bottom of the creek, which is very nearly on the level wished. The creek may be passed by making a dam 4 feet 3 inches high, and this would form a pond of the proper level, and very little land would be overflown. All the water of this creek may be taken out, for the canal, at a designated point, without injuring any hydraulic establishments. As the line advances to a small spring brook, an embankment will be required. For the residue of the mile, the line passes over land excellent for a canal, and descending gradually to the north east. Expense for excavation of

20,000 cubic yards, at 12 1-2 cents,	$2,500	
For 1 culvert,	100	
embankment of 4,250 c. yds. at 20 cts.	850	
dam across the creek,	2,000	
grubbing, &c.	500	
		$5,950

Mile 28*th*, Shortly after its commencement, passes a run of water, which may be admitted into the canal without injury. The ground to the vicinity of Beaverdam creek is loam and gravel, with a gradual declination, and is as good as can be desired. This creek is 11.71 feet below the level of the canal, which renders a considerable embankment necessary, and the estimate

is formed upon that presumption, although a less expensive route may probably be adopted. This creek may be used as a feeder. It affords one-fourth as much water as the Chitteningo, and rises from springs. Expense for embankment of 20,000 cubic yards at 20 cents, $4,000
For excavation of 18,500 c. yds. at 12 1-2 c. 2,312
aqueduct over creek, 2,000
——— $8,312

Mile 29*th*, Is as conveniently formed for a canal as may be, with a descent north of from two to five degrees, and a soil of black and chocolate loam. Expense for excavation of 26,000 cubic yards, at 12 1-2 cents, $3,250
For grubbing, &c. 1,500
——— $4,750

Mile 30*th*, Is excellent, and passes only one stream of water, which is two and an half feet below the top water-line of the canal, and which must be admitted into it. This can be done without injury, as there is a mill-dam building a few rods above this place, where all the alluvion will be deposited, and the water discharged into the canal tolerably pure. Expense for excavation of 26,000 c. yds. at 12 1-2 cts. $3,250
dam, 500
grubbing, &c. 400
——— $4,150

Mile 31*st*, Passes over excellent ground, except a small elevation three and an half feet above the level. Expense for excavation of 27,000 cubic yards at 12 1-2 cents, $3,375
For grubbing, &c. 1,500
——— $4,875

Mile 32*d*, Is also excellent, except an elevation, the highest point of which is fourteen and three-fourths feet above the top water-line, and which will require an extra excavation of 23,500 cubic yards. Expense

for extra excavation of 23,500 cubic yards, which may be partially saved by lengthening the canal, at twenty cents, $4,700
For excavation of 26,000 c. yds. at 12 1-2 c. 3,250
grubbing, &c. 1,500
———$9,450

Mile 33*d*, Is excellent until it reaches the valley of the outlet of the little lakes, where an embankment is required. Here a reservoir might be made at little expense. Expense for embankment of 15,000 cubic yards, at 20 cents, $3,000
For aqueduct, 200
excavation of 18,500 c. yds. at 12 1-2 c. 2,312
———$5,512

Mile 34*th*, Is all excellent for a canal, running along at the foot of a hill; the ground descending three degrees generally, and well adapted for excavation. Expense for excavation of 20,000 cubic yards at 12 1-2 cents, $2,500
For grubbing, &c. 1,500
——— $4,000

Mile 35*th*, Passes over a low place requiring a small embankment. In another place the ground is full of springs, which may be all admitted into the canal. In one place the line runs on a steep side-hill, requiring some additional work. The residue of the mile is excellent. Expense for excavation of 20,000 cubic yards at 12 1-2 cents, $2,500
For extra work in moving earth to low places, 700
——— $3,200

Mile 36*th*, Commences with the steep bank mentioned in the last, after which the ground assumes a more regular and easy slope, and is good for a canal until it reaches Lime-stone creek, which will require an embankment four and an half feet high and fifteen chains long. The water of the creek is 4.89 feet below

the top water-line. By deepening the bed of the creek and doubling its width, the water may be made to pass under a wooden or cast iron aqueduct. After crossing the creek, the ground is excellent to the end of the mile. Expense for embankment of 8,300 cubic yards, at 20 cents, $1,660
For aqueduct, 5,000
extra work on steep bank, 1,000
excavation of 20,000 c. yds. at 12 1-2 c. 2,500
grubbing, &c. 300
$10,460

Mile 37*th*, Commences by cutting off the point of a hill. It then crosses a swamp for 32 chains, which is two feet too low. The swamp appears very soft, is covered with cedar and pine, and a stake may be driven down ten feet. No serious difficulty is apprehended in carrying the canal over it, but the embankment will be more than it appears, owing to the sinking of the mud of the swamp. There are three spring brooks in it, which may be made to fill a canal dug two feet in the present swamp, and that would enable dirt-boats to pass from hill to hill, for the purpose of taking earth to make this embankment, as easy as it could be carted on. After passing this swamp, there is no obstacle to the end of the mile, the ground descending north from three to four degrees. Some springs come out of the hill on or about the level. Expense for embankment of 9,000 cubic yards at 20 cents, $1,800
excavation of 26,000 c. yds. at 12 1-2 c. 3,250
grubbing, &c. 1,500
$6,550

Mile 38*th*, Passes over excellent ground at the foot of a hill, until it reaches the low ground adjoining Butternut creek, which will require an embankment and an aqueduct. Water may be obtained by a feeder from this creek of the length of three-fourths of a mile.

Expense for embankment of 19,000 cubic yards at 20 cents, $3,800
For aqueduct, 5,000
excavation of 16,000 c. yds. at 12 1-2 cts. 2,000
grubbing, &c. 1,100
———$11,900

Mile 39*th*, Is over excellent loamy soil, with a north descent of from one to three degrees, and one spring brook which may be admitted into the canal without injury. Expense for excavation of 20,000 cubic yards, at 12 1-2 cents, $2,500
For grubbing, &c. 1,100
———$3,600

Mile 40*th*, Passes over loam, and is as good as could be wished. Expense for excavation of 20,000 cubic yards, at 12 1-2 cents, $2,500
For grubbing, &c. 1,150
———$3,650

Mile 41*st*, Is excellent for a canal, the soil being loamy and gravelly, with a descent from one to two degrees northerly. Several copious springs of water come out of the hill on the left above the canal, which may be admitted into it without injury. The hill on the left is 200 feet high and steep. Expense for excavation of 26,000 c. yds. at 12 1-2 cts. $3,250
For grubbing, &c. 1,500
———$4,750

Mile 42*d*, Begins in swampy ground, which it passes over at the northerly edge, and then runs along the hard land. The swamp is eight inches below the level on an average, and is an open bog with no bottom of hard stuff within ten feet. After gaining the hard land, the ground is gravelly and good to the end of the mile. Expense for excavation of 26,000 cubic yards at 20 cents, $5,200
For grubbing, &c. 1,500
———$6,700

Mile 43d, Is gravelly, except a short distance of cedar swamp with moss bottom, but in fact hard and good ground. A small spring brook may be admitted into the canal without injury. Expense for excavation of 26,000 cubic yards, at 15 cents, $3,900
For grubbing, &c. 1,500
———$5,400

Mile 44th, Requires two locks, there being a descent of nineteen feet; an aqueduct over the Onondaga creek, two culverts and considerable embankments, which will cost twenty-five cents per cubic yard, owing to the difficulty of obtaining earth. Expense for excavation of 12,000 c. yds. at 12 1-2 cts. $1,500
For embankment of 31,600 c. y. at 25 cts. 7,900
two culverts, 300
aqueduct 200 ft. long and 30 ft. high, 10,000
grubbing, &c. 750
———$20,450

Mile 45th, Is occupied by the Salina plains, and is all too low, the ground hard and gravelly except along Harbor creek, which is a cedar swamp. Four culverts will be necessary, and an embankment of 130,500 c. yards, at 25 cents per yard, and an aqueduct over the creek. Expense for 4 culverts, $450
For embankment, 32,625
aqueduct, 1,000
———$34,075

Mile 46th, Although excellent for a canal, with a loamy soil, will require considerable embankments, besides culverts and excavation. It is supposed that the route here may be more advantageously arranged. Expense for embankment of 19,510 cubic yards at 20 cents, $3,902
For 4 culverts, 750
excavation of 22,000 c. y. at 12 1-2 cts. 2,750
grubbing, &c. 600
———$8,002

Mile 47*th*, Descends gently to the north, and contains a rich black gravelly loam, is excellent for a canal except a ravine, which will require an embankment. Expense for embankment of 1450 cubic yards, at twenty cents, $290
For one culvert, 100
excavation of 26,000 c. y. at 12 1-2 cts. 3,250
grubbing, &c. 1,500
——— $5,140

Mile 48*th*, Passes over smooth good land for a canal, with a gradual descent of from one to two degrees north until it approaches the swamp of Mill brook. Here the land is nearly level, and there is one foot of mud, but gravel and clay below. There are several small spring brooks in the swamp, which may be received into the canal. Mill brook is 4.96 feet below the water line of the canal. A dam one hundred feet long must be raised across this creek, four feet ten inches high; very little embankment is wanted. Expense for excavation of 26,000 cubic yards, at twelve and an half cents, $3,250
For dam across Mill brook, 750
grubbing, &c. 1,500
——— $5,500

Mile 49*th*, Is excellent. One small culvert and a few yards of extra excavation are wanted. Expense,
For one culvert, $100
excavation of 26,000 c. yds. at 12 1-2 c. 3,250
grubbing, &c. 1,200
——— $4,550

Mile 50*th*, Is uncommonly good for a canal. Expense,
For excavation of 20,000 c. yds. at 12 1-2 cts. 2500
grubbing, &c. 1400
———$ 3,900

Mile 51*st*, Soon after its commencement, turns north, to pass over the Nine mile creek, and crosses a piece

of low clay ground, the lowest of which is 2.84 feet below the level, but rises gradually to it each way. The nature of the soil, and the very little extra earth wanted to make the banks, warrant a belief, that nothing need be added to the expense, in order to make a canal across it. Near to the Nine mile creek, the line rises so as to be 2.89 feet above the banks, and the water of the creek is 4 feet deep on an average, and 11.82 feet below the top water line. This is a mill pond, and the water may be settled 4 feet by carrying the dam 10 or 12 rods up the stream, so as to be above the canal. If an aqueduct of wood or cast iron is constructed, there will be no necessity of altering the dam. The 8 feet below the bottom of the canal will make the elevation of the aqueduct sufficient, as the water never rises more than 4 or 5 feet in the greatest freshets. This aqueduct will be 200 feet long. After passing the creek, the bank is 3 1-2 feet above the level, but the ground soon descends to the level. The earth is loam and easy of excavation. Farther on, there are two small ravines, in which there is no water, but embanking, and perhaps culverts or cast iron pipes of 6 inches diameter, ought here to be placed, in order to drain off the waters that may collect above the canal. A feeder may be easily made to bring the waters of the creek into the canal, which will, at the same time, serve as a branch canal, and without any lock will carry navigation up to a very large quarry of excellent gypsum. Expense,

For excavation of 28,500 c. y. at 12 1-2 cts.	$3,562	
aqueduct,	10,000	
3 culverts,	300	
grubbing, &c.	500	
		$14,362

Mile 52d, Presents excellent ground for a canal, which is loam, and descends easterly. There are 4 small and short ravines, requiring 3 culverts, of which two may be cast iron pipes of 6 inches diameter. The other ought to be of 3 feet diameter. A little extra excavation

will be requisite. Expense,

For embankment of 2100 c. yds. at 20 cts.	$420	
3 culverts,	300	
excavation of 28,500 c. yds. at 12 1-2 cents,	3,562	
Grubbing, &c.	1,500	
		$5,782

Mile 53d, Passes over excellent land, a mixture of clay and loam, lying with a descent of from 1 to 2 degrees north. There is a small run of water, where an embankment 4 feet high will be wanted, and probably a culvert or cast iron pipe. Expense,

For embankment of 2500 c. yds. at 20 cts.	$500	
1 culvert,	100	
excavation of 26,000 c. yds. at 12 1-2 cts.	3,250	
grubbing, &c.	1,500	
		$5,350

Mile 54th, Requires some culverts and extra excavation. A part of the line passes along the edge of a brook, where there is a steep bank a little too high, and at the foot of it a flat 4 or 5 feet too low, and this edge of the bank must give the earth to make the bank below sufficiently elevated. Expense,

For 3 culverts,	$300	
excavation of 28,500 c. yds. at 12 1-2 cts.	3,562	
grubbing, &c.	950	
		$4,812

Mile 55th, Commences at the beginning of a deep cutting, through a marl meadow swamp. The soil is all soft and must be removed by manual labour, and the work must be so managed as to drain the lands as it proceeds. As the ground is all swamp and very bad, the excavation is set down at 50 cents per cubic yard. Expense,

For extra excavation of 77,400 cubic yards, at 50

cents, $38,700
mean excavation of 26,000 c. y. at 12 1-2 c. 3,250
grubbing, &c. being very bad, 3,000
———$44,950

Mile 56th, Is a continuation of the same swamp. Expense,
For extra excavation of 98,000 cubic yds. at 50 cents, $49,000
mean excavation of 26,000 c. yards,
at 12 1-2 cents, 3,250
grubbing, &c. 3,000
———$55,250

Mile 57th, Contains the west end of the same swamp. Expense,
For extra excavation of 44,000 c. yards,
at 25 cents, $8,800
mean do. of 26,000 do. at 12 1-2 do. 3,250
grubbing, &c. 2,000
———$14,050

Mile 58th, Passes over a very flat piece of ground, requiring a little extra excavation at the east end.—Hand's brook and Camp's brook will both fall into the canal on this mile; and it is not easy to find a method to dispose of the water of the former, while the canal is digging. For this purpose it will perhaps be necessary to create for it a new channel. Expense,
For excavation of 28,500 c. y. at 15 cts. $4,275
extra labour to divert Hand's brook, 1,500
grubbing, &c. 1,500
———$7,275

Mile 59th, Is all excellent, requiring nothing extra but a culvert. Expense,
For excavation of 26,000 c. y. at 12 1-2 c. $3,250
1 culvert, 100
grubbing, &c. 1,400
———$4,750

Mile 60*th*, Is excellent, except a little low ground, h ich will require small embankments near Carpenter's brook, and at another place. A dam must be erected across the brook 150 feet long. As the water in the brook is 6.08 feet below the level, a dam of 6 feet high will make the water in the pond on a level with the canal. Expense,

For excavation of 20,000 c. y. at 12 1-2 cts.	$2,500	
dam above mentioned,	1,800	
embankment of 1,100 c. y. at 20 cts.	220	
grubbing, &c.	1,500	
		$6,020

Mile 61*st*, Passes over a summit between Carpenter's brook and the Skaneatelas outlet. The swamp is from 1 to 3 feet, composed of a soft mossy spongy substance, and then a gravelly clay. Expense,

For excavation of 29,000 c. y. at 18 cts.	$5,220	
grubbing, &c.	1,500	
		$6,720

Mile 62*d*, Passes over very suitable ground for a canal, with the exception of the point of a hill, until it arrives at the low land, which extends to Skaneatelas outlet. A little embankment and a small culvert are required. Expense,

For extra excavation of 2300 cubic yards at 18 cents,	$414	
embankment of 960 do. at 20 do.	192	
excavation of 22,000 do. at 12 1-2 do.	2,750	
1 culvert	100	
grubbing, &c.	1,500	
		$4,956

Mile 63*d*, Requires a very small embankment where it begins. Thence to the Skaneatelas outlet is all flat bottom land. The water of the stream is rapid, and the surface is 5.66 feet below the level. A dam raised to that height would do no injury, as it would not overflow 1 1-2 acres of land, and there is no mill below this

point to the junction of the outlet with Seneca river. A little embankment on the west side of the outlet will be necessary; or perhaps a dam 200 feet long, for the water to waste over, would be adviseable. The remaining embankment is as small as to require little or no estimate of expense. At the latter end of the mile, the ground is very favourable (with the exception of a small piece requiring extra excavation) and declines from 1 to 2 degrees northerly. There is a brook only 1.50 feet below the level of the top water line, which will require a culvert, or perhaps it may be admitted into the canal without injury, if a small dam is made across it 2 or 3 chains above, to deposit alluvion in case of freshets.—Taking the waters of this brook will not injure farms below, as they are lost in a swamp. Expense,

For dam raised on piles and embankment with it,	$2,000	
excavation of 22,000 c. y. at 12 1-2 cts.	2,750	
1 culvert, perhaps	100	
grubbing, &c.	500	
		$5,350

Mile 64*th*, Is all excellent for a canal; the ground descends northerly. The excavation is easy, the soil being loamy. A point of a hill, of which the summit is nine and a half feet above the level, must be cut through; and there is a low place at the west end, requiring some earth to straighten the course. Expense

for embankment and extra excavation,	$800	
excavation of 24,000 c. yds. at 12 1-2 cts.	3,000	
grubbing, &c.	1,200	
		$5,000

Mile 65*th*, Is equally excellent, except a small point of land 5.75 feet above the level, where the line is rather circuitous, in order to avoid a cedar swamp. Expense for excavation of 27,000 cubic yards at 12 1-2 cents,

	$3,375	
grubbing, &c.	1,500	
		$4,875

Mile 66*th*, Passes over the points of several elevations, which rise from two to six feet above the level, and may be avoided by a very crooked course. They are all easy to excavate, and will require no deep cutting exceeding six feet, and generally on each side of them the ground will require a little raising. Expense for extra excavation of 3,700 cubic yards, at twenty cents, $740
mean excavation of 26,000 c. y. at 12 1-2 c. 3,250
grubbing, &c. 1,500
———$5,490

Mile 67*th*, Lays with a northerly descent of from one to two degrees, and is a rich black loam. A culvert and a little embankment will be necessary. The line runs over some ground a little above the level. At one place runs a small stream, which may be let in without injury. Expense for excavation of 27,000 cubic yards, at 12 1-2 cents, $3,375
2 culverts, 200
embankment of 2,000 c. yds. at 20 cts. 400
grubbing, &c. 900
———$4,875

Mile 68*th*, Begins a little east of Bread creek. On the flat or bottom land, made by the creek, there are some places three feet below the level (where water runs in very great freshets) which may be rendered good with little expense; and perhaps a small culvert may be necessary here. Bread creek is only 4.85 feet below the top water line. This is a rapid stream, and the best plan to cross it is to erect a dam. The alluvion of the creek might be kept out of the canal by erecting stop gates, on each side of the pond, which would oblige the water to pass over the dam; or, in addition to this, waste gates may be so fixed in the dam as to draw from the bottom of the canal, and the water thus discharged would carry off all the alluvial matter through these waste gates. After crossing this creek, the ground is

excellent, with a gentle declination to the north, till near the end of the mile, where a culvert may be wanted. Expense,

For a dam on piles across Bread creek,	$1,500	
excavation of 26,000 c. y. at 12 1-2 cts.	3,250	
1 culvert,	100	
grubbing, &c.	300	
		$5,150

Mile 69*th*, Descends from one to two degrees northerly, and is all excellent for a canal. One small culvert will be necessary. Expense,

For excavation of 26,000 c. y. at 12 1-2 c.	$3,250	
1 culvert,	100	
grubbing, &c.	250	
		$3,600

Mile 70*th*, Commences near Spring brook, which is 4.97 feet below the level. A dam of that height would give the water in the pond the requisite level. Some raising of the banks is necessary near the creek, as the flat land along it lies about two feet below the top water line. Between Cold spring and Tyler's brook, the ground is above the level, in one place near four feet, declining each way. The deep cutting here is no serious objection to a straight course. Expense,

For extra excavation of 11,400 cubic yards, at 15 cents,	$1,710	
mean do. of 26,000 do. at 12 1-2 do.	3,250	
dam across Cold spring brook,	1,000	
		$5,960

Mile 71*st*, Is good for a canal. Some little extra excavation will be necessary at the east end. Near the west end, the ground is too steep, where, in some places the descent is six or eight degrees. The Tyler's brook is a small stream, only 1.50 feet below the bottom of the canal, into which it may be brought. If, however, this produces too much alluvial matter, it may be conveyed over the canal. Expense,

For excavation of 27,000 c. y. at 12 1-2 c. $3,375
extra labour to dispose of the water of Tyler's brook, 500
grubbing, &c. 1,000
$4,875

Mile 72*d*, Passes on good ground for some distance, until an embankment becomes necessary to pass the flats of the Owasco outlet. This creek is twelve and an half feet below the top water line of the canal, and will require an aqueduct 150 feet long. After gaining the high land, which is very steep, with a sharp ridge 11 feet above the level, the line falls very soon below the level, and then rises again above it. It soon descends again; after which the route is good, until it becomes necessary to make a lock and descend eight feet. Thence to the end good, but requiring a little embankment. Expense,

For embankment of 21,000 cubic yards, at twenty-five cents, $5,275
aqueduct, 5,000
excavation of 20,000 c. y. at 12 1-2 c. 2,500
grubbing, &c. 225
$13,000

Mile 73*d*, Is crooked and uneven. Four culverts will be required for the streams rising in the hills south of the canal, and some points of hills must be cut off to straighten the course. Expense,

For excavation of 32,000 c. y. at 12 1-2 c. $4,000
4 culverts, 400
grubbing, &c. 1,400
$5,800

Mile 74*th*, Descends to the north west, and is all good. There is one point 3 feet too high, which may be easily avoided by a bend. Two culverts are required. Expense,

For excavation of 26,000 c. y. at 12 1-2 c. $3,250
2 culverts, 400
grubbing, &c. 1,500
$5,150

Mile 75th, Is very good for a canal to Crane brook, where there is ground from 2 to 3 feet too low. In this brook, the water is 8.13 feet below the top water line. This stream dries up in summer, and therefore would not yield water when wanted. It rises high in freshets, and ought to pass under the canal. The bed of the creek may be doubled in width, and by that means, with deepening the channel a little, a passage may be found for the floods. Some extra excavation will be necessary, in order to avoid a swamp. Expense,

For embankment of 16,000 cubic yards, at twenty cents,	$3,200	
aqueduct over Crane brook,	3,500	
excavation of 18,000 c. y. at 12 1-2 cts.	2,250	
grubbing, &c.	1,500	
		$10,450

Mile 76th, Commences near the bed of Great brook, which is lost in a swamp. The bed is formed near its junction with Crane brook. On this mile a lock of 9 feet descent must be made, for which the ground is very favourable, and will require but little excavation. From the lock to the end of the mile, the ground is low and apparently swampy. It consists of clay, and an embankment may be easily made, as there is no part more than three and an half feet below the top of the canal. Some points of hills must be cut off to straighten the route, and three culverts are required. Expense,

For embankment of 18,500 cubic yards, at twenty cents,	$3,700	
aqueduct over Great brook	1,500	
excavation of 16,000 c y. at 12 1-2 cts.	2,000	
3 culverts to drain the land above embankments,	300	
grubbing, &c.	1,400	
		$8,900

Mile 77th, Begins in clayey ground, 3 feet too low. After passing this, two points of land (the easterly one coming in from the south, and the other from the north)

four or five feet above the level, of a loamy soil, must be cut off. The valley of a brook, which must be crossed, will render an embankment and a culvert essential. Expense,

For embankment of 9,300 cubic yards, at twenty cents,	$1,860
1 culvert,	150
excavation of 18,000 c. y. at 12 1-2 cts.	2,250
	$4,260

Here the middle section of the canal terminates in the Seneca river, at the point and on the level, reached by Mr. Geddes.

The exuberant supply of water for the canal, in this section, must be at once perceived from an inspection of the topographical map. At its commencement, the waters of the Mohawk river will be used, and they can be increased to any extent, by introducing a feeder from Fish creek. Independently of numerous small brooks, the canal can derive as much water as can be desired from the Oneida, the Cowaslon, the Canasaraga, the Chitteningo, the Black, the Limestone, the Butternut, the Onondaga, the Nine-mile, the Skaneateles, the Bread, the Cold-spring, the Owasco, and the Crane creeks; some of which are the outlets of lakes, and others originate from perennial springs in high lands, and will never be affected by the clearing of the country.

The adaptation of the grounds of this section, for a canal, is peculiar and extraordinary. After proceeding two miles and fourteen chains, it will be necessary to descend 6 feet; after which, the line of the canal proceeds 41 1-2 miles on one level. A descent of 19 feet then takes place, from the foot of which another level extends 30 miles. For the remainder of the distance to the Seneca river, there are three departures from the level—one of 8, one of 9, and 1 of 6 1-2 feet. Thus the whole extent of this section, occupying 77 miles, will require but 6 locks.

In many places inexhaustible beds of gypsum exist, which can, by means of this canal, be conveyed cheaper to the great agricultural counties of the state, than it can be procured by importation. And nothing is more easy than, by a short lateral canal of 1 1-2 miles in length, to form a communication between Salina and the great canal, thus furnishing fuel to the works, and salt to the whole country. A level has been carried from that of the canal, at the foot of the two locks near Onondaga creek, which would require no greater depth of excavation than 4 feet, in any place, and no embankment, culvert, or lock.

A connexion by locks can easily be made with the Onondaga lake. And if it is thought adviseable, a canal uniting the great canal with the Oneida lake, can be effected. The level of the canal is 51 feet above the Oneida lake, and the expense of this lateral communication, may be estimated as follows:

Three miles of canal, at an average cost of excavation, including every thing, of $5,000 per mile,	$15,000
Lockage of 51 feet,	51,000
6 large culverts,	1,200
Embankments, &c.	4,000
	$71,200

The estimates, per mile, herein before stated, excluding the above estimate for a lateral canal to Oneida lake, and also the expense of a feeder from Oneida creek, in the aggregate, amount to $609,696

There are other expenses to be added. The line of the canal passes over 46 roads, where bridges will be required, and these are estimated at $500 a piece, (probably too much.) $23,000

A feeder from Limestone creek, 20 chains long. Expense,

For excavation of 3,500 c. y. at 12 1-2 c.	$437	
guard gate and dam,	1,500	
		$1,937

A feeder from Butternut creek, 60 chains long. Expense,

For excavation of 10,500 c. y. at 12 1-2 c.	$1,312	
dam and guard gates,	1,500	
grubbing, &c.	1,100	
		$3,912

A feeder from Nine-mile creek, 3 miles long. Expense,

For excavation of 42,242 c. y. at 12 1-2 c.	$5,280	
dam and guard gates,	1,500	
grubbing, &c.	3,000	
		$9,780

A feeder from the Owasco outlet, 15 chains long. Expense,

For excavation of 3,000 c. y. at 12 1-2 cts.	$375	
raising 5 1-2 feet on a mill dam,	2,000	
guard gates, &c.	500	
		$2,875

Expense of two guard locks, of 2 feet lift each, at Chitteningo creek, to prevent floods from entering the canal,	$6,000
of two stop-gates at Carpenter's brook,	1,800
do. at Bread creek,	1,800
do. at Cold-spring brook,	1,800
2 locks, of 2 feet lift each, at Skaneateles, to prevent water from rushing into the canal in freshets. It is not certain that these will be necessary.	6,000
6 locks for an ascent of 48 1-2 feet, allowing per foot $1,250,	60,625

The whole of this section passes through earth of such a texture, or so situated, as to be deemed secure from leakage. Puddling will, therefore, be requisite only for some of the high embankments, estimated at $10,000

The aggregate amount of all preceding items is $739,225

Add five per cent. for contingencies,	$36,961	
for engineers, superintendance, and expenses connected therewith, at $1,000 per mile,	77,000	
The total amount of estimates for the middle section is		$853,186

The five per cent. for contingencies is borrowed from the European mode of forming estimates; and the charge of $1,000 per mile for engineers, superintendance, &c. is too liberal.

The eastern section of the canal extends from Rome to the Hudson river; and Charles C. Broadhead, Esq. was employed as engineer, to act upon that part of it which lies between Rome and Schoharie creek. He has accordingly levelled over and explored the route, within these limits; and in the following details thereof, reference is had to his minutes, maps, and profiles, herewith presented.

Beginning, then, at a stone placed by Mr. Wright in the south west bank of the Rome canal, standing 45.100 of a foot above the level of the water, (being the point marked A on Mr. Wright's map,) and proceeding down the Mohawk river along the south shore thereof, the route is described and estimated as follows:

Mile 1*st*, Passes, for 36 chains, over rich bottom lands, then 16 chains of alder swamp. The residue is gravel and loam, descending to the north. The Little Oneida creek crosses the line in the swamp, with its bed 2.59 feet below the level. An embankment, in the swamp, will be required, of 16 chains long, and from 1 to 4 1-2 feet high, with a culvert to pass the water of the creek. Expense,

For embankment of 3,230 c. y. at 20 cts.		$646
excavation 27,500 do. at 12 1-2 do.		3,437
1 culvert,		100

dam across Little Oneida 500

———$4,683

Mile 2*d*, Passes over 60 chains of gravel, mixed with clay, the rest sandy. The line for 20 chains runs near the edge of a swamp. A small run of water crosses the line, where a culvert will be necessary. Expense,

For excavation of 26,700 c. y. at 12 1-2 c. $3,337

1 culvert, 100

———$3,437

Mile 3*d*, Passes over gravel, clay, and loam, with some places stony and descending to the north, in some places steep. The line may be so varied, in this mile, as to avoid extra digging, by lengthening it. Expense,

For excavation of 52, 120 c. y. at 18 c. $9,381

1 culvert, 100

———$9,481

Mile 4*th*, Passes over flat stony land, consisting of loam and clay for the first 20 chains. The residue is loam and sand, descending northerly. The line, for the greatest part of this mile, runs at the foot of a hill near the edge of a swamp, and 16 chains of it lies through woods. Expense,

For excavation of 26,800 c. y. at 12 1-2 c. $3,350

2 culverts, 200

grubbing and clearing, 300

———$3,850

Mile 5*th*, Passes over land of a description similar to the last, except that 64 chains lies through wood land. There are 2 small runs of water, which may be admitted into the canal without injury, or if passed under, they will require 2 culverts. Expense,

For excavation of 34,190 c. y. at 14 cts. $4,786

2 culverts, 200

grubbing, &c. 1,200

———$6,186

Mile 6*th*, Passes generally over clay and loam, gent-

ly declining to the north. The route lies between the edge of a swamp and the foot of a hill. There are, in this mile, 56 chains of wood land, and a fine quarry of building stone contiguous to the line. There are two streams which require culverts. Expense,

For excavation of 38,140 c. y. at 14 cts.	$4,339	
2 culverts,	200	
grubbing, &c.	800	
		$5,339

Mile 7th, Passes, for the first 24 chains, along a steep side hill, the residue of the mile descends gently to the north. The earth is generally sand and clay, with some stone. It is easy to excavate. There is one small stream, and a fine quarry of building stone. Expense,

For excavation of 21,960 c. y. at 12 1-2 c.	$2,745	
2 culverts,	200	
embankment of 1,670 c. y. at 20 cts.	334	
		$3,279

Mile 8th, Passes generally over sand and loam, of which the surface is pretty even. In this mile the Oriskany creek crosses the line, where an embankment, 15 chains long, and from 4 to 13 feet high, will be necessary. The bed of the creek is 14 feet below the level, and a canal, from a woollen manufactory, which crosses the line here, is 5.30 feet below the level. A culvert will be wanted for the little canal, and large water ways for the creek; but these will be provided for in the estimate of an aqueduct, by which the creek and canal will best be passed. By throwing a dam across the Oriskany 5 feet high, at a point 46 chains above the line, the water may be brought, in a feeder, into the canal, as represented on the map. Expense,

For aqueduct over creek and canal,	$15,000
excavation of 20,500 c. y. at 12 1-2 c.	2,575
embankment near the 48th station, of 2,640 c. yards. at 20 cents,	528
feeder 46 ch. long, requiring the excavation of 12,130 c. y. at 15 cents,	1,719

For embankment on feeder, of 2,810 c. y.
at 20 cents, $562
dam and guard gate, 1,000
——— $21,384

Mile 9th, Passes generally over a soil composed of sand and loam, easy to excavate. The route passes over the side of the Oriskany hill, which is in some places very steep, and which has at its foot a miry cedar and tamarack swamp. A ravine must be crossed where it is one chain and fifty links wide, and 6 1-4 feet deep.—This will require an embankment and small culvert.—By a route bending to the north, the deep cutting might be avoided. Expense,
For excavation of 40,200 c. y. at 12 1-2 c. $5,025
1 culvert, 100
——— $5,125

Mile 10th, Passes over earth easy to be excavated, but considerably uneven. Three small streams, requiring 2 culverts, cross the line. These streams rise in a sandy hill, considerably above the level, and in freshets bring down much sand in their waters. But if it should be thought adviseable, they may be let into the canal, by a side cut, with very little expense, and without injury. Expense,
For excavation of 27,000 cubic yards, at twelve and
an half cents, $3,375
embankment of 6,260 c. y. at 20 cts. 1,252
1 culvert, 250
——— $4,877

Miles 11 & 12th, Are described together. The first part of the 11th mile passes over level ground, and near the edge of the bank above the bottom land. Here two routes have been explored for a short distance, (see map.) If the north route is adopted, which is probably the best, an embankment of 45 chains long, and from 7 to 8 feet high, will be necessary, with a culvert sufficient to pass the waters of the Sadaque-

da creek, which is 50 links wide. The bed of this creek is 11 1-2 feet below the level. Near the east end of the 12th mile, is a ravine, requiring an embankment of 4 chains long, and from 4 to 13 1-2 feet high, under which must be a culvert to pass a small stream. If the south route should be adopted, less embankment will be necessary, but deep cutting will be incurred; besides, it is probably more difficult to cross the mill canal, than the stream below, and the old bed of the stream must be crossed in either case. Expense of

Mile 11*th*, For embankment of 28,000 cubic yards, at 25 cents, $7,000
excavation of 1,450 do. at 12 1-2 do. 4,815
embankment of 4,220 do. at 20 do. 844
$9,659

Mile 12*th*, Embankment of 39,900 cubic yards, at 25 cents, $9,775
2 culverts, 250
aqueduct over the Sadaqueda creek, 6,000
excavation of 7,000 c. y. at 12 1-2 cts. 875
$17,100

Mile 13*th*, Passes over loam, of which the excavation is very easy. It descends gradually to the north. Two culverts will be required. Expense,
excavation of 26,800 c. y. at 20 cts. $3,350
2 culverts, 250
$3,600

Mile 14*th*, Passes over earth easy to excavate, and it descends gently to the north. At Nail creek an embankment will be required of 8 chains in length, on the top, and 6 chains long on the bottom. The bed of the creek is 14 1-2 feet below the level; it is also 30 links wide. Here must be a culvert. If the north route of the canal is adopted, (see 11th mile) an embankment on the last part of this mile will be required, of 20 chains long, and from 5 to 8 feet high, and this embankment extends

into the next mile. If the south route is adopted, there will be required from 3 to 4 feet extra deep cutting for 34 chains. Expense,

For embankment of 17,240 c. y. at 20 cts.	$3,448	
excavation of 41,200 c. y. at 15 cts.	6,180	
aqueduct over Nail creek,	500	
		$10,128

Mile 15th, On the north route, will require from its commencement, an embankment from 5 to 20 feet high, and 44 chains long, including Ballou's creek and ravine, where a culvert will be wanted, larger than common, as the creek is 50 links wide, and large enough in the spring to carry a grist-mill, though nearly dry in the summer. On the south route, there would be required about 60 chains of extra deep cutting, and an embankment over Ballou's creek and ravine, of 4 chains and 50 links in length, and from 12 to 15 feet deep, including the culvert. Expense,

For excavation of 85,000 c. y. at 12 1-2 c.	$10,625	
embankment of 6,300 do. at 20 do.	1,260	
aqueduct over Ballou's creek,	500	
		$12,385

Mile 16th, Passes over a gravelly loam, descending to the north. An embankment is necessary, 2 chains long and 14 1-2 feet high, with a small culvert under it. Expense,

For embankment of 4,920 c. y. at 20 cts.	$984	
culvert,	100	
excavation of 32,000 c. y. at 12 1-2 cts.	4,000	
		$5,084

Mile 17th, Passes over land like the last. Clark's creek and ravine cross the line, where an embankment will be wanted, 4 chains 50 links long on the top, and 3 chains 50 links at the bottom, and 13 1-2 feet high, including a culvert. This creek rises high in the spring, and its bed is 30 links wide. Another embankment is necessary on this mile, to be 3 chains 50 links long on

the top, and 2 chains 50 links at the bottom, and 6 1-2 feet high, including a small culvert. Expense,

For embankment of 14,560 c. y. at 20 c.	$2,912	
excavation of 35,200 do. at 15 do.	4,280	
aqueduct over Clark's creek,	500	
2 culverts,	600	
		$8,292

Mile 18*th*, Passes over sand, gravel, and loam. Several creeks, runs, and ravines, cross the line, requiring embankments and culverts, as follows: 1st ravine, 2 chains 50 links long on the top, and 50 links less on the bottom. It is 11 1-2 feet deep, and requires a culvert. The 2d ravine is 1 chain 50 links long on the top, and 1 chain on the bottom, and 17 1-2 feet deep. The 3d is 2 chains 25 links long on the top, 1 chain and 25 links on the bottom, and 11 3-4 feet deep. The 4th is Ferguson's creek, 25 links wide, and 6 3-4 feet below the level, and may be made still lower 4 or 5 feet. This creek rises in a hill, and in a wet season swells much over its banks. Here a small embankment will be required of from 1 to 2 1-2 feet high, and 8 chains long. Another ravine and run cross the canal west of Ferguson's creek, of 2 chains 25 links across on the top, 1 chain 25 links on the bottom, and 6 1-2 feet deep, where an embankment will be necessary. Expense,

For excavation of 55,120 c. y. at 15 c.	$8,268	
embankment of 14,615 do. at 20 do.	2,923	
5 culverts,	1,000	
		$12,191

Mile 19*th*, Passes over land easy to excavate, but includes 6 small creeks and ravines, where so many embankments and culverts will be required. Expense,

For excavation of 23,500 c. y. at 12 1-2 c.	$2,937	
embankment of 18,926 do. at 20 do.	3,787	
6 culverts,	600	
		$7,324

Mile 20*th*, Passes generally along a pretty steep side

hill, the soil being of sand and loam. Dederick's creek crosses the line, and requires an embankment 2 chains long, and 11 1-2 feet deep, where a culvert is necessary. There are, besides this creek, four small runs, requiring 3 culverts. Expense,

For embankment of 3,820 c. y. at 20 c.	$764	
excavation of 26,800 do. at 12 1-2 do.	3,350	
4 culverts,	400	
		$4,514

Mile 21*st*, Passes over ground easy to excavate, and generally on a side-hill. The surface is here uneven, requiring several small embankments and culverts. Expense,

For embankment of 4,000 c. y. at 20 cts.	$800	
excavation of 38,330 do. at 12 1-2 do.	4,791	
4 culverts,	400	
		$5,991

Mile 22*d*, Passes over uneven land, easy to excavate, in which, beside smaller ones, there is a ravine requiring an embankment 6 chains long, and from 12 to 16 feet deep. Expense,

For embankment of 18,930 c. y. at 20 c.	$2,786	
excavation of 38,000 do. at 12 1-2 do.	4,750	
5 culverts,	800	
		$8,336

Mile 23*d*, Passes over land which is, in some places, wet and stony, but generally consists of sand, loam, and gravel. Here is a brook, 30 links wide, running in a ravine, which requires an embankment 3 chains long and 16 1-2 feet high. Expense,

For excavation of 51,500 c. y. at 15 cts.	$8,725	
embankment, 9,170 do. at 20 do.	1,834	
1 culvert,	200	
		$10,759

Mile 24*th*, Passes over 16 chains of bottom land, and the rest stony and gravelly. Here are several ravines

and runs of water, of which the principal one is Meyer's creek, which in time of high water is a mad stream overflowing the flats. There are, however, in this mile, no difficulties which may not easily be overcome with small embankments, suitable culverts, and an aqueduct over Meyer's creek. Expense,

For embankment of 9,853 c. y. at 20 cts.		$1,970
excavation of 22,500 do. at 12 1-2 do.		2,812
3 culverts,		300
aqueduct over Meyer's creek,		2,000
		$7,082

Mile 25th, Passes, for the most part, over a flat, filled with round stones, for the rest along the side of a hill, consisting of sand, gravel, and loam. There is here a ravine 4 chains and 80 links long on the top, 4 chains on the bottom, and 10 feet deep. There will also be required an embankment over Dygert's creek, 7 chains and 40 links long and 9 feet high. This creek is 20 links wide, and must have a culvert. Expense,

For embankment of 17,320 c. y. at 20 c.		$2,474
excavation of 29,500 do. at 12 1-2 do.		3,675
3 culverts,		750
		$6,899

Mile 26th, For the first 56 chains, passes over land descending gradually to the north, of which the earth is gravel and loam. The residue is rich bottom land.—For 42 chains of this mile, embankments are necessary, of which the largest is required at Steel's creek, which lies 13 1-2 feet below the level. This creek requires a passage at least 30 links wide, being at times swollen and rapid. The greatest part of the embankment in this mile might be avoided by a more southerly route, but in that case the high point of a hill must be cut through. Expense,

For excavation of 4,780 c. y. at 12 1-2 c.		$937
embankment of 42,500 do. at 25 do.		10,525
1 culvert and aqueduct over Steel's		

creek, $2,500
——— $13,962

Mile 27*th*, For one-third of the way, runs over a steep side hill; the residue descends gradually to the north. An embankment of 16 chains long, and from 4 to 13 feet high, will be required over a low piece of ground, which cannot be avoided. Expense,

For embankment of 19,700 c. y. at 20 c. $3,940
excavation of 18,500 c. y. at 12 1-2 c. 2,312
1 culvert, 200
——— $6,452

Mile 28*th*, For about 48 chains, runs along a ridge of round stones, for the rest it runs over flat land. An embankment 4 chains long, and from 4 to 13 feet high, is required in crossing Fulmer's creek, where a small aqueduct is necessary. Expense,

For embankment of 3,600 c. y. at 20 cts. $720
excavation of 20,000 c. y. at 12 1-2 c. 2,500
aqueduct, 2,500
——— $5,720

Mile 29*th*, For about 14 chains, runs along land which has a gentle slope to the north. The next 32 ch. runs along the foot of a steep hill, called the dug-way, where a rough stone wall will probably be necessary on both sides of the canal; on the north side to support the bank of the canal, and on the south side to prevent the hill from falling into it. The residue of the mile passes over bottom land, overflowed in the spring and fall, where an embankment and a wall, of from 3 to 14 feet high, and 40 chains long, will be wanted, on the north side of the canal, to protect it against the floods of the Mohawk. Within 20 or 30 rods are plenty of good building stone. Expense,

For stone wall at the dug-way, $5,000
embankment and other stone wall, 8,250
excavation of 4000 c. y. at 12 1-2 cts. 500
1 culvert, 200
——— $13,950

Mile 30*th*, For about 50 chains, runs between the foot of a steep hill and the river, over gravel and hard earth difficult to excavate. The residue of the soil is loam and sand. An embankment will be required of 26 ch. long, and from 3 to 16 feet high, to pass a ravine, where a small culvert will be necessary. Expense,

For embankment of 49,650 c. y. at 15 c.	$7,464	
excavation of 24,000 do. at 12 1-2 do.	3,000	
1 culvert,	100	
		$10,564

Mile 31*st*, Passes over gravelly loam and bottom land. Here is considerable deep cutting, and the line might be varied so as to avoid it in part, but in that case it would pass through a burying ground. Expense,

For excavation of 65,100 c. y. at 15 c.	$9,766	
1 culvert,	100	
		$9,866

Mile 32*d*, For 60 chains, passes over a gravelly loam, and for the residue over lime stone, of which a part is solid rock. A small embankment will be necessary on this mile. Expense,

For embankment of 4,400 c. y. at 20 cts.	$880	
excavation of 21,500 c. y. at 12 1-2 c.	2,687	
do. through the lime stone rock,	4,000	
2 culverts,	200	
		$7,767

Mile 33*d*, For about twelve chains, continues over the lime stone ridge mentioned above. The rest of this mile consists of uneven gravel and loam, interspersed with stone. Three culverts will be required, and a considerable embankment. Expense,

For embankment of 10,500 c. y. at 20 c.	$2,100	
excavation of 18,000 do. at 12 1-2 do.	2,250	
do. rock,	2,500	
3 culverts,	300	
		$7,150

Mile 34th, For the most part, passes over land which is gravelly, and in some places hard and stony. Probably a little below the surface some rock will have to be excavated. A brook on which there is a grist-mill crosses the line. This brook may be conducted into the canal with little expense. Expense,

For excavating rock and earth, 34,000 cubic yards at 55 cents,	$18,700	
embankment of 5,300 c. y. at 20 cts.	1,060	
2 culverts,	300	
		$20,060

Mile 35*th*, The description of the last mile applies to this, even to the receiving into the canal a small stream of water. Expense,

For excavating rock and earth 26,580 cubic yards at 50 cents,	$13,290	
2 culverts,	300	
		$13,590

Miles 36, 37, and 38, these three miles include the route of the canal at the Little Falls, and are described together. 57 chains of the 36th mile pass along the foot of Fall hill to A, on a piece of ground about one chain wide between the hill and the bottom land. This part is gravelly with some loose stone, and solid rock, and has an uneven surface, with the appearance of having fallen from the hill. Near the house of Col. Bellinger, a small stream crosses the line, and here the deep cutting may be partly shunned by passing north of his house. From A to B, is a ravine 14 chains 50 links long, in which there is a fall of 46 feet, requiring to be descended by five locks. The banks of the ravine consist of rock, and rise from 4 to 40 feet, leaving a width between them of from 50 to 100 links. At B, the line runs on the beach of the Mohawk, and little or no excavation will be necessary from A, at the upper end of the ravine, to the island in the river. From B, to the head of this island, it is proposed to build a dam

of sufficient height to exclude the waters of the Mohawk from running on the south side of the island, the island itself, and the north bank of the ravine between A and B, being, at present, higher than such a dam would require to be. From B to C, which is opposite to the lower end of the island, at a place where the canal line enters another ravine, is about 24 chains. At C, the water is six feet deep with a bottom of rock. Just below the upper entrance of the ravine at C, it is proposed to build another dam, 20 feet high, and extending from the lower end of the island across to the south shore of the river. Such a dam would set the water back to the foot of the locks at B, with a depth all the way between, sufficient for the canal. From C to D, a distance of 28 chains, the ravine last above mentioned extends, and is separated from the Mohawk on the north by a rough irregular bank of rock and earth, which seems to have been thrown, from the precipice on the south, with such violence as to be separated from it at the bottom, for the space of from 4 to 6 rods, which forms the width of the ravine. There are here two places where a passage for the canal must be excavated through granite rock. The first of these places extends from the bank of the river eastward, and is 4 chains long, and at the highest point, 6 1-2 feet above the level. The second is 5 chains 50 links long, and at the highest point, 13.47 feet above the level. From D to E, is 57 chains, over which the line runs along the foot of Fall hill, where the width of ground between a mountain of rock, on one side, and the bank of the river, on the other, is not more than from 50 to 100 lks. For the north bank of the canal, throughout this distance, it will be necessary to build a substantial stone wall. and to line it, on the inside, with a considerable quantity of tight or well puddled earth. Here must also be a lock with a descent of 6.85 feet. From E to the end of the 38th mile, the line passes over rich bottom land, which is not overflowed by the river, but which requires 3 culverts. Expense,

For excavation of 40,600 c. y. at 12 1-2 c. $5,750
do. of rock for canal and locks, in all 97,500 c. y. at 75 cents, 73,125
stone wall between the river and Fall hill, 4,560
2 dams, one at the head and the other at the foot of the island, 25,000
3 culverts, 300
——— $108,735

Mile 39*th*, Passes over land easy to excavate, lying betweeen the bottom land and a hill. Expense,
For excavation of 29,496 c. y. at 12 1-2 cts. $3,687

Mile 40*th*, Passes over some loam, some clay, and some loose round stone, in general not quite so easy to excavate as the last, and requiring one culvert. Expense,
For excavation of 32,124 c. y. at 12 1-2 c. $4,015
1 culvert, 100
——— $4,115

Mile 41*st*, Passes for the most part over bottom land easy to excavate. The Nowendaga creek, of which the bottom is dark lime stone, crosses the line in this mile. This creek is 50 links wide between its banks, and may be conducted over the canal, as it lies much above the level near the route. The deep cutting cannot be avoided. Expense,
For excavation of 73,616 c. y. at 18 cts. $13,250
2 dams, gates, &c. at the creek, 5,000
——— $18,250

Mile 42*d*, Runs generally along the foot of the high ground, and at the edge of the bottom land. In some places it is stony, and the bottom land in this mile is low and swampy. Two culverts will be required.—The deep cutting may be avoided by crooking a little to the north. Expense,
For excavation of 26,800 c. y. at 12 1-2 c. $3,350

For embankment of 2,100 do. at 20 do. $820
2 culverts, 200
——— $4,470

Mile 43*d*, Will require an embankment 12 ch. long, and from 4 to 6 feet high. The earth is chiefly gravel and loam. There is a piece of deep cutting which cannot be avoided. Over the low ground, a stone wall, 20 chains long, and from 6 to 10 feet high, to support one of the banks of the canal, will be wanted. Expense,
For embankment of 6,600 c. y. at 20 cts. $1,320
excavation of 40,100 c. y. at 14 cts. 5,614
stone wall, 1,600
1 culvert, 100
——— $8,634

Mile 44*th*, Passes over gravel and loam, generally full of round stones. In some places it is wet and boggy, but with a hard bottom. Two small embankments are necessary. There is here a small stream which may be received into the canal. Fxpense,
For embankment of 13,600 cubic yards, at twenty cents, $2,720
excavation of 26,800 c. y. at 12 1-2 cts. 3,350
1 culvert, 100
———$6,170

Mile 45*th*, Passes over ground descending gently to the north; in some places stony, and in others boggy, not hard to excavate. Some embankment and a culvert will be necessary. Expense,
For embankment of 2,640 c. y. at 20 cts. $528
excavation of 26,800 do. at 15 do. 4,020
1 culvert, 200
———$4,748

Mile 46*th*, Passes over ground which will answer to the description of the last mile, except that two runs of water cross the line, requiring each a culvert. Expense,
For excavation of 30,000 c. y. at 15 cts. $4,500
2 culverts, 200
———$4,700

Mile 47*th*, Passes over land generally descending to the north, with its surface gravelly and stony. Here Mill brook, a small rapid stream, crosses the line. Expense,

For embankment of 3,160 c. y. at 20 cts.	$632	
excavation of 24,500 do. at 12 1-2 do.	3,068	
dam to pass Mill brook,	2,500	
		$6,200

Mile 48*th*, Passes over land generally descending gently to the north, but of which, 16 chains has a steep descent, and consists of clay. Several small streams cross the line, requiring embankments and culverts. Expense,

For excavation of 40,200 c. y. at 12 1-2 c.	$5,025	
embankment of 528 do. at 20 do.	105	
3 culverts,	500	
		$5,630

Mile 49*th*, Passes from the end of the last mile to A, over steep side-lying ground, consisting of gravel and clay. The residue of the mile runs along the beach of the river, at the foot of an almost perpendicular hill, consisting of rock and blue clay, full of springs. Here will be required a stone wall, on both sides of the canal, for 40 chains. Expense,

For stone walls,	$9,600	
embankment,	6,250	
excavation of 20,700 c. y. at 12 1-2 c.	2,575	
1 culvert,	200	
		$18,625

Mile 50*th*, Passes over a steep side-hill of clay and gravel, easy to excavate. Two small runs cross the line, of which one is 8 3-4 feet, and the other 9 1-2 feet below the level. Expense,

For excavation of 17,850 c. y. at 15 cts.	$2,677	
embankment of 14,750 do. at 20 do.	2,950	
2 culverts,	200	
		$5,827

Mile 51*st*, Runs, for 66 chains, at the foot of a hill, where the line may be varied so as to require but little extra excavation. Three embankments will be required, of which the largest must be 14 chains long, and from 7 to 10 feet high, and 3 culverts will be required. Expense,

For excavation of 20,150 c. y. at 12 1-2 c. $2,517
embankment of 16,192 do. at 20 do. 3,238
3 culverts, 950
———$6,705

Mile 52*d*, Runs, from its commencement, 32 chains over bottom land, where an embankment, 5 feet high, will be required. In this distance, the Esquago creek crosses the line. This stream is 2 chains 30 links wide between its banks, and 12 1-4 feet below the level, and one of the most violent creeks on the whole section, requiring an aqueduct. Expense,

For embankment over the Esquago flats, of 39,600 cubic yards, at 25 cents, $9,960
excavation of 13,120 do. at 12 1-2 do. 1,640
aqueduct, 9,500
———$21,040

Mile 53*d*, Passes along the edge of a hill of gravel, chiefly easy to excavate. Two small runs cross the line here, which may be admitted into the canal without expense. One culvert will be necessary. Expense,

For excavation of 23,150 c. y. at 12 1-2 c. $2,893
1 culvert, 100
——— $2,993

Mile 54*th*, Passes over soil like the last. The Kaates kill crosses the line in this mile. It takes its rise in the hills south, and is a violent stream in freshets, bringing down large quantities of gravel and sand. It lies too high to pass under the canal, and must therefore be crossed by making a dam high enough to raise the water to the level. The superfluous waters of this stream

can be discharged from the canal by suitable waste gates. Expense,

For excavation of 24,360 c. y. at 15 cts.	$3,654	
dam and waste gates,	3,550	
1 culvert,	100	
		$7,304

Mile 55th, Passes generally along the foot of a ridge of lime stone, good for building. The Canajohary creek crosses in this mile, on a bed 8 1-4 feet below the level, and may be sunk down to 14 feet below the level by clearing out the stream for 15 chains below the line. This is a mad stream, sometimes overflowing its banks, in consequence of being obstructed by ice lodged on the island lying 10 chains below the line. Over this stream, which is 1 chain 60 links wide between its banks, there must be an aqueduct, and an embankment 8 ch. long, and from 1 1-2 to 8 1-4 feet high. Expense,

For excavation of rock and earth, 22,800 cubic yards, at 40 cents,	$9,120	
embankment of 4,100 c. y. at 20 cts.	820	
aqueduct and deepening the creek,	10,000	
		$19,940

Mile 56th, Runs along at the foot of a lime stone hill, over land consisting of sand, gravel, and some stone.—Expense,

For excavation of 25,350 c. y. at 25 cts.	$6,337

Mile 57th, Passes for 45 chains along a side hill, of which 20 chains are very steep. The earth is clay and gravel. Here will be required, on both sides of the canal, a dry stone wall, one to keep the hill from slipping into the canal, and the other to support the north bank, and protect it against the Mohawk. One culvert will be necessary to pass a stream which lies 5 3-4 feet below the level. Expense,

For excavation of 30,270 c. y. at 25 cts.	$7,567	
stone wall,	3,200	
1 culvert,	500	
		$11,267

Mile 58th, Passes generally over ground descending gently to the north, and consisting of gravel and sand, with considerable quantities of stone in some places.—The deep cutting may be avoided by bending the line to the north. The Plattikill crosses the line of this mile, and is a mad stream, 1 ch. 60 links wide within its banks. It brings down in the spring of the year flood wood and gravel. There is a saw mill on it 4 chains above the line. This stream may be passed by a dam with suitable waste gates, without injuring the mill site. Expense,

For embankment of 4,280 c. y. at 28 c.	$850	
excavation of 23,100 c. y. at 15 cts.	3,465	
dam and gates,	8,250	
1 culvert,	100	
		$12,671

Mile 59th, Passes over land descending gradually to the north, and which has, in some places, gravel and stone. Expense,

For embankment of 14,256 c. y. at 20 c.	$2,851	
excavation of 20,460 do. at 18 do.	3,682	
1 culvert,	200	
		$6,733

Mile 60th, Passes, for 50 chains, on a strip of land about one chain wide, at the foot of a precipitous and rocky hill, called the Nose. The place of elevated ground, between the hill and the river, appears to have been formed by the successive falling of fragments from the precipice. Here it will be necessary to erect a stone wall 30 chains long. 20 chains of this mile pass along a steep side-hill, and near the edge of a swamp. The soil is a gravelly loam, and some embankment will be necessary. Expense,

For stone wall and embankment to pass the Nose,	$7,250	
excavating rock and earth, 15,550 c. yards, at 20 cts.	3,110	
1 culvert,	200	
		$10,560

Mile 61*st*, Generally runs winding round the foot of a stony ridge, to near the end of the mile along the edge of a swamp. The earth consists of gravel, sand, and stone, difficult to excavate. At a place called the Little Nose, deep cutting will be required, through granite rock, for a stretch of 8 chains, and from two to 19 feet deep. An embankment of 40 chains long, and from 4 to 7 feet high, will be necessary near the beginning of the mile; and a small stream 6 3-4 feet below the level will require a culvert. Expense,

For embankment, culvert, and stone wall, to pass Little Nose, $4,500

excavating earth of 22,500 c. yds. at 20 cents, 4,500

excavating rock at Little Nose, 12,848 cubic yards at 75 cts. 9,636

———$18,636

Mile 62*d*, Is partly occupied by the Little Nose described in the last mile. The greatest part of this distance the line runs over fine bottom land, near the edge of hard land on a ridge. But here passes the Wassenhaw creek, which is twenty links wide, and where an embankment 13 chains long, and from 7 to 9 feet high, and a stone wall and dam, will be necessary. Expense,

For stone wall and dam, $5,690

excavation of 13,150 c. y. at 12 1-2 c. 1,643

embankment of 14,580 c. y. at 20 cts. 2,916

———$10,249

Mile 63*d*, Runs over land descending gently to the north, and in some places wet and stony, but not difficult to excavate. Expense,

For excavation of 25,160 cubic yards, at 15 cts. $3,774

Mile 64*th*; Passes, for the first 20 chains, over bottom lands, where an embankment 16 chains long will be wanted, of from 1 to 8 feet high. Here crosses Printup's creek, which now runs in a channel 30 links wide, and 9 3-4 feet below the level, but which has uniformly

scooped out a channel, now dry and abandoned, to the depth of 8 1-4 feet below the level. The deep cutting cannot be avoided. It consists of gravel and loose stone. Expense,

For excavation of 34,270 cubic yards, at fifteen cents, $5,140
embankment of 11,264 do. at 20 do. 2,252
aqueduct over the creek, 4,000
1 culvert, 250
——— $11,642

Mile 65th, Runs along and at the foot of a steep side hill of gravelly loam, except 16 chains, which consists of lime stone, of which a small part, where a ridge puts down to the river, will have to be excavated. West of this ridge, an embankment 16 chains long, and from 4 to 7 1-2 feet high, will be required on the north side of the canal. The stone here is good for building and easily obtained. Expense,

For excavation of 22,300 c. y. at 20 cts. $4,460
excavation of rock, 1,600
embankment of 9,800 c. y. at 20 cts. 1,960
——— $8,020

Mile 66th, Runs on the margin of a steep side hill, near the edge of the flat. The hill is mostly loose slate and gravel, mixed in places with other stone. Two small runs of water cross the line. Expense,

For excavation of 31,500 c. y. at 18 cts. $5,670
3 culverts, 300
——— $5,970

Mile 67th, Runs over land which resembles the last, except that there is a greater proportion of sand, loam, and gravel, making it easier to excavate. Expense,

For excavation of 35,150 c. y. at 15 cts. $5,272
1 culvert, 200
——— $5,472

Mile 68th, Runs over land like the last. Expense,

For excavation of 35,150 c. yds. at 15 cts. $5,472

Mile 69*th*, Runs over land like the last. Expense,
For excavation of 35,150 c. y. at 15 cts. $5,472
1 culvert, 200
———$5,672

Mile 70*th*, Passes, for the most part, along and at the foot of a steep side hill. Here two creeks cross the line, Aurey's kill and Ishes kill, over the first of which an embankment will be necessary of 16 chains in length, and from 8 to fourteen feet high; over the other is required another embankment fourteen chains long, and from 2 to 13 1-2 feet high. The north bank of the canal between these creeks must be supported by a stone wall. The deep cutting may be avoided by bending to the north. Expense,
For embankment of 50,940 c. y. at 20 c. $10,188
stone wall, 4,960
2 aqueducts, 10,000
excavation of 13,200 c. y. at 12 1-2 c. 1,650
———$26,798

Mile 71*st and* 27 *chains.* This distance runs along and at the foot of a steep hill, of which the earth is gravel, sand, and clay, easy to excavate. Expense,
For excavation of 39,200 c. y. at 12 1-2 cts. $4,900

The aggregate amount of all the foregoing items, is $718,012

The details of the line explored by Mr. Broadhead terminate on the west side of the Schoharie creek, 71 miles and 27 chains from Rome. In the course of this distance, the line of the canal falls precisely 132.85 feet. To accommodate this fall, 16 locks are placed, at various distances, pointed out on the map, where the ground is favourable, and the materials for making them easily to be obtained. The expense of lockage is estimated at $1,250 per foot lift, $166,062 50

At the little Falls, and several short distances in the

highest embankments, and where the line passes over small round stone, puddling will probably be necessary; but the route, in general, lies over land in which there is no danger of leakage. To cover the expenses of this item, an allowance is made of $20,000

The quantity of water which may be introduced into the canal, on this section, is such as to leave no solicitude on that subject. And no calculation of the expense of feeders from the Mohawk is made, because, at several places where dams and walls are to be erected against that river, its waters may be admitted into the canal, without additional expense.

There are required on the route between Rome and the Schoharie creek, 45 bridges, at $500, $22,500

Allow for 210 bridges to accommodate farms, at $200 42,000

And the amount is	$970,574 50
On which add 5 per cent.	48,528 50
And for engineer, superintendance, &c. at the rate of $1,000 per mile,	71,500
The aggregate of all expenses on this section, is	$1,090,603

It may here be remarked, as a feature of the country traversed by this canal, not less favourable than the evenness of its surface, that, from three miles above the Little Falls of the Mohawk, westward for 240 miles, the route will not require the excavation of a single yard of any kind of rock.

Mr. Brodhead's level approaches the Schoharie creek, on its west side, at an elevation of about 22 feet above its surface. There are two modes of crossing this creek, either of which might be adopted. A dam may be made across the creek at A, (on Mr. Brodhead's map) which shall raise the water 10 feet, when the canal may be let down, by a lock, into the pond, which this dam

will create, and a floating bridge may be stretched across it for a towing path. But it is believed, from the examinations and levels heretofore made between this creek and the Hudson river, that it would be the better mode to cross the creek on an aqueduct bridge, in order to keep up the line of level, with a view of passing the more easily two slaty ridges, four or five miles below Schenectady, near Alexander's mills.—Should this plan be adopted, the bed of the creek, which is about 400 feet wide, should be increased to a width of 700 feet, so as to give the water an unobstructed passage under the aqueduct. This aqueduct may be composed of wood, supported by two abutments and sixteen piers of stone, each of which piers would occupy about 10 feet of the width of the stream.

The commissioners have not been able to procure a level and survey to be made from the Schoharie creek to the Hudson. They had in their employ, four engineers on other parts of the line of the western canal, and one on the northern, neither of whom had time to level and survey that part of the line above mentioned; nor could they find a sixth engineer, who would undertake to finish the Mohawk route. But although they are prevented from submitting to the Legislature a report of this part of the line, with all that minuteness of detail which is exhibited in relation to other parts, yet they possess information, which, for all general purposes, is equally satisfactory. This part of the line was formerly examined by Mr. Weston, an English engineer, and pronounced to be practicable without a very serious expense. It has also been heretofore twice levelled and surveyed, by Mr. Benjamin Wright, in various ways, with the same result. The commissioners, therefore, confidently state, that the navigation may be continued from the Schoharie creek to the Hudson by a canal along the valley of the Mohawk.

From the examinations of Mr. Weston and Mr. Wright, above mentioned, as well as from the personal

knowledge of the commissioners, it is believed that the canal, from the aqueduct last mentioned, ought to be continued down along the south side of the Mohawk to Lansing's mills, which are situated a short distance above the Cohoes. From this point the canal may leave the Mohawk, and be directed towards the Hudson, which it will approach opposite to the village of Lansingburgh, and it may thence be continued along the valley of the Hudson, at a proper distance from its margin, until it reaches the city of Albany, where it is to be connected with the river.

This location of the canal will afford to the village of Waterford an opportunity of enjoying its benefits, by the construction of a side cut, to be connected with the main canal above the Cohoes. The village of Lansingburgh and the city of Troy, may also, by lateral canals, participate in its advantages; and thus, the cities of Albany and Troy, and the villages of Lansingburgh and Waterford, may be placed on grounds of fair competition, not less advantageous to the growth of those cities and villages, than beneficial to the general interests of trade, and the prosperity of the state.

This route, from Schoharie creek to the city of Albany, will comprehend a distance of 42 miles. It is proposed to give the canal on this route a fall of one inch in a mile. The whole descent in this route will be 286 feet.

The expense, by a liberal calculation, may be estimated as follows :

For 283 feet lockage, at $1,250,	$353,750
3 aqueducts over small streams, at $5,000,	15,000
1 road aqueduct,	3,000
aqueduct over Schoharie creek,	30,000
24 bridges, at $500,	12,000
25 culverts, at $200,	5,000
excavation, embankment, puddling, towing path, and grubbing 42 miles, at $14,000,	588,000

For contingencies add 5 per cent.	$50,337
engineers, superintendance, and expenses connected therewith,	49,000
The aggregate amount is,	$1,106,087

There are certain items of expense applicable to all the sections of the canal, and not heretofore enumerated, of which the amount cannot be very precisely calculated. The items alluded to, here follow, with such estimates as, it is believed, will not be found unreasonable, to wit:

For utensils, such as carts, ploughs, scrapers, wheelbarrows, iron bars, pick-axes, shovels, chains, &c.	$40,000
temporary workshops for carpenters, smiths, stone-cutters, and for lime houses,	5,000
dwelling houses for clerks and lock-keepers,	10,000
barracks for the workmen,	20,000
Making the aggregate of these general expenses,	$75,000

RECAPITULATION OF EXPENSES.

From Lake Erie to a point 11 miles up the Tonnewanta,	$205,877
Tonnewanta to the Seneca river,	1,550,985
Seneca river to Rome,	853,186
Rome to the Schoharie creek,	1,090,603
Schoharie creek to Albany,	1,106,087
Add for general expenses,	75,000
In the aggregate,	$4,881,738

But, if the route south of the mountain ridge, in the country west of the Genesee river, is adopted, in preference to the northern route, then deducting $309,925

The aggregate of expense will be $4,571,813

OF DISTANCES.

	Miles.	Chains.
From Lake Erie to the point up the Tonnewanta,	27	
Tonnewanta to Seneca river,	136	2 1-2
Seneca river to Rome,	77	
Rome to Schoharie creek,	71	27
Schoharie creek to Albany,	42	
The Aggregate distance is	353	29 1-2

OF RISE AND FALL.

From Lake Erie to Seneca river, a fall of	194 ft.	by 25 locks.
Seneca river to Rome, a rise of	48.50	6
Rome to Schoharie creek, a fall of	132.85	16
Schoharie creek to Albany, a fall of	286	30
The aggregate of rise and fall, in feet, is	661.35	by 77 locks.

Lake Erie is 564.85 feet higher than the Hudson, and 145 1-2 feet higher than Rome.

The average expense, per mile, of this canal, according to the foregoing estimates, taking the north route beyond the Genesee river, is a little more than $13,800

With respect to that part of their duty, which relates to loans on the credit of the state, the Commissioners have to state, that at an early day they addressed a letter on this subject to William Bayard, of the city of New-York, and that he has taken measures to ascertain whether a loan can be procured in Europe, but has not yet had time to learn whether his measures have been successful. The Commissioners entertain no doubt but that as much money can be obtained in this country, as may be required for the canal, on the cre-

dit of the state, at an interest of 6 per cent. by the creation of a funded debt, and that ample funds may be appropriated for the payment of the interest, and the gradual extinguishment of the debt without the imposition of taxes.

The Commissioners have also attended to that requisition of the act respecting subscriptions and donations. They have applied to the United States, and to the states of Vermont, Kentucky and Ohio, as having a common interest with New-York in the contemplated canals, and where they feel persuaded that a favourable disposition exists. The letter to the members of Congress from this state will show the view which the Commissioners have taken of the fund contemplated by Congress for internal improvements. But if no extraneous aid should be afforded, it will at all times be in the power of this state to levy high transit duties on the articles transported to and from those states and the territories of the United States, and thereby secure, eventually, a greater fund than can possibly arise from any present contributions from those quarters. It is to be hoped, however, that the necessity of this measure may be superseded by a cordial and liberal cooperation. But it cannot reasonably be expected, that the efforts of one state are solely and gratuitously to produce an expensive and stupendous work, intimately identified with the interests of many, and directly or indirectly connected with the prosperity of all.

The Commissioners appointed agents to receive subscriptions in this state, and they also prepared and distributed forms of cessions of land and donations in money: one form relates to gratuitous grants of land for the ground through which the canal will pass, and the other is a contribution to the fund for making it. Agents have also been appointed in Vermont and Ohio for the same purpose.

There is reason to believe, from the cessions already made, and the favourable dispositions manifested, on this

occasion, that the land, occupied by the canal, will, generally speaking, be granted gratuitously. Some donations in land have been made, and more are expected. And many circumstances concur in promising that a munificent spirit will be evinced as soon as the state undertakes this great project.

The Commissioners have thus, agreeably to the duties required of them, confined themselves to a plain statement of facts, and it is not their intention to deviate from the prescribed course. Their investigations have shown the physical facility of this great internal communication, and a little attention to the resources of the state will demonstrate its financial practicability. And they may be permitted to remark, that unless it is established, the greater part of the trade, which does not descend the Mississippi, from all those vast and fertile regions west of the Senaca lake, will be lost to the United States.

All which is respectfully submitted.

DE WITT CLINTON,
S. VAN RENSSELAER,
SAMUEL YOUNG,
MYRON HOLLEY.

Albany, February 15, 1817.

POSTSCRIPT.

Mr. Ellicott, one of the Commissioners, not being able to attend the meeting of the board, was not consulted on the details of this Report; but he approves its general principles.

The engineer employed on the northern canal, not having yet completed his returns, the Commissioners will make it the subject of another communication, with which they will connect their application to Congress and to some of the states—their correspondence—and various other documents, connected with their duties, not herewith presented.

REPORT

OF THE

Board of Commissioners, on the Northern or Champlain Canal.

THE advantages which will result from the connection of Lake Erie with the navigable waters of the Hudson by means of a canal, have been so frequently elucidated, and are indeed so obvious to every one who possesses a correct geographical knowledge of the west, that it has been deemed unnecessary to enumerate them. But, presuming that the benefits to be derived from a similar communication with Lake Champlain, are not fully understood or duly appreciated, the commissioners ask the indulgence of briefly pointing out a few of the most prominent of these benefits.

That part of this state which is contiguous to Lakes George and Champlain, abounds in wood, timber, masts, spars, and lumber of all kinds, which, transported by the Northern Canal, would find a profitable sale along the Hudson and in the city of New-York, instead of being driven, as much of those articles have heretofore been, to a precarious market, by a long and hazardous navigation to Quebec.

Some idea may be formed of the immense quantity of lumber which would be conveyed on the contemplated canal, from the following statement, made on the best authority, and which embraces only that small section of the northern part of this state, from whence the transportation is carried on to the city of New-York, or to intermediate markets.

Within that tract of country, embracing the borders of Lake George, and the timber land north and west of the great falls in Luzerne, there are annually made, and transported to the south, two millions of boards and

plank: one million feet of square timber, consisting of oak, white and yellow pine, beside dock logs scantling and other timber to a great amount.

A considerable portion of the northern part of this state is rough and mountainous, and, in a great measure, unfit for agricultural improvements. These broken tracts are covered with native forests, which, by the contemplated canal, would furnish vast supplies of wood and lumber for many years; and thus the great and increasing population which occupies the margin of the Hudson, would be supplied with boards, plank, timber, fencing materials, and even fuel, with less expense, than from any other quarter; while, at the same time, the lands to the north, considerable tracts of which belong to the people of this state, would be greatly increased in value.

The mountains in the vicinity of Lakes George and Champlain produce a variety of minerals, among which are found, in inexhaustible quantities, the richest of iron ores. Several forges are in operation in the counties of Washington, Warren, Essex, and Clinton, the number of which may be indefinitely increased: and the iron which they produce is very little, if at all, inferior in quality to the best iron manufactured in the United States: nor can it be doubted that, after the completion of the contemplated canals, the middle and western part of this state would be furnished with this necessary article on more advantageous terms than it can at present be procured.

The inhabitants of a large tract of country on both sides of Lake Champlain, embracing a considerable portion of the state of Vermont, would find, by the northern canal, a permanent market in the city of New-York, or at intermediate places, for their pot and pearl ashes, and also for all their surplus agricultural productions, from whence they would also be cheaply supplied with all the necessary articles of foreign growth.

The iron of the northern part of this state, which at present is unwrought in the mine, and the fine marble of Vermont, which now lies useless in the quarry, would be converted to useful and ornamental purposes in the west in exchange for salt and gypsum; and thus the large sums which are annually sent abroad for the purchase of iron, of salt, and of gypsum, would be retained among our citizens, and added to the permanent wealth of the state.

In short, the connexion of Lake Champlain with the Hudson, by means of a canal, would greatly enhance the value of the northern lands; it would save vast sums in the price of transportation; it would open new and increasing sources of wealth; it would divert from the province of Lower Canada, and turn to the south, the profits of the trade of Lake Champlain; and, by imparting activity and enterprise to agricultural, commercial, and mechanical pursuits, it would add to our industry and resources, and thereby augment the substantial wealth and prosperity of the state.

The examination and levels for this canal, have been made under the direction of the commissioners, by Col. Lewis Garin, and the line for the same has been marked out upon the maps herewith presented. There are two places of departure from the Hudson, in order to connect that river with Lake Champlain, each of which affords a very favourable route, in point of soil, to be excavated, and of materials for the artificial works. One of these routes, by commencing at the mouth of Fort Edward creek, and pursuing the valley of that creek to the summit level, and then following the ravine of Wood-creek, will reach Whitehall, in the distance of twenty-two miles. This route was formerly deemed most eligible by a board of commissioners composed of general Schuyler and others. It is, however, supposed, by the engineer, that the other route may be preferable, which commences about six miles further down the river, near the mouth of Moses' kill, and which by the natural chan-

nal of this kill, and of Dead-creek, joined to a short length of artificial canal, forms the summit level from whence it proceeds—partly by the natural channel of Wood-creek, and partly by artificial cuts, which greatly shorten the distance—to Whitehall. The length of this route is twenty-eight miles, and it passes over a soil which is, in general, remarkably favourable, consisting principally of vegetable mould, loam and clay. At the northern termination of the canal, a few yards of lime-stone excavation will be necessary; this, however, is not deemed an unfavourable circumstance, as the stone are of such a quality as will be useful in the construction of locks, and it may be remarked that the materials for the construction of the locks between Lake Champlain and the Hudson can be procured with little difficulty.

Between the Hudson and Lake Champlain nine locks will be necessary, viz. three at the Hudson of 7,779 feet lift each, by which the summit-level will be attained, and by a deep cutting the greatest depth of which will be 12,465 feet, and the length of which is about two miles; the summit-level will be extended fifteen miles, and will terminate about one mile south of Fort Ann. At this place two locks will be necessary of 6,217 feet lift each. Between this point and Whitehall, two locks, the first of 8,223 feet lift, and the next of 9,243 feet lift, are to be made. At Whitehall, the canal is to be connected with Lake Champlain by two locks of 8,550 feet lift each.—About fifteen miles of this route will need no excavation, as the canal for that distance will occupy the natural channels of Moses' kill, Dead creek and Wood creek. In order to turn off as much as possible the superfluous waters of freshets, and to ensure at all times a sufficiency of water on the summit-level, it is proposed to erect a dam across Half-way brook of eighteen feet in height, half a mile above the mouth of the said brook, and by a natural ravine leading to the south, to direct so much of the water of said brook to the summit-level, and from thence by several waste-wiers, into the Hudson, as may be necessary for the convenience of the canal.

The water in the canal is not to be less than thirty feet wide at the surface, twenty feet at the bottom, and three feet deep, and the locks to be seventy-five feet long and ten feet wide in the clear.

By the mode of calculation heretofore adopted by the commissioners, the whole expense between Lake Champlain and the Hudson, at the mouth of Moses' kill, will not exceed two hundred and fifty thousand dollars.

From the mouth of Moses' kill it is proposed to improve the channel of the Hudson for the purposes of navigation as far south as the village of Stillwater at the head of Stillwater falls. This may be effected in the following manner. By erecting a dam of three feet in height across the Hudson, at the head of fort Miller falls, the river above as far as fort Edward, would at all times afford a sufficiency of water for boats drawing three feet. To overcome the descent of Fort Miller falls, a side cut or artificial canal of about one mile in length, and with two locks of 10,321 feet lift each, will be necessary.—These works, including the dam, locks, excavation, towing path, and all other expenses, may be estimated at fifty thousand dollars.

Two and a half miles below the south end of this canal, at the head of Saratoga falls, a dam three feet in height is to be made across the river, and a side cut round the falls similar to the above, of about one mile in length, with two locks of 6,198 feet lift each. It is believed that all the artificial works at this place may be constructed for thirty-five thousand dollars.

Thirteen miles below this place, at the head of Stillwater falls, another dam of three feet in height, will in like manner ensure a good boat navigation up to the Saratoga falls.

The cost of this dam, the construction of a towing-path, with several bridges, the purchase of Schuyler's mill, which it is supposed will be necessary, together with all the other expenses of this section, are estimated at fifty thousand dollars.

From the village of Stillwater at a point above the dam last mentioned, it is proposed to cut an artificial canal to the village of Waterford, where it is to be connected with the Hudson. This canal will be supplied with water from the river at its upper end. Its length will be nearly twelve miles, and the whole descent is 76,464 feet: which will require eight locks. The excavation of this canal for some distance near the upper end, will be considerably expensive, as it passes through a slate rock; the middle and lower parts, however, are very favourable.

The expenses from Stillwater to Waterford, may be estimated as follows:

76 feet lockage at $1000 per foot,	76,000
12 miles of excavation and towing-path with bridges, culverts, and other necessary works, at an average of $30.000 per mile,	360,000
Recapitulation of Expenses.	
From Whitehall to the Hudson,	$250,000
Dam, side cut, and other works at Fort Miller falls,	50,000
Do. at Saratoga falls,	35,000
To Stillwater including dam, &c.	50,000
From Stillwater to Waterford, including lockage,	436,000
Add for contingencies, engineers, and superintendance,	50,000
Total,	$871,000

Whether the canal from Lake Champlain enters the Hudson at Fort Edward creek or at Moses' kill, is not very material in the estimate of expense; and the commissioners wish to be explicitly understood, that they consider this question as still open, and as one which will require mature deliberation. It is ascertained that both routes are equally practicable.

The termination of the northern canal in the Hudson at Waterford, will afford the cities of Albany and Troy, and the villages of Lansingburgh and Waterford, a full participation of its benefits; and its ap-

proximation to the great western canal, will open the most beneficial channels of communication between every great section of the country, and furnish every facility for promoting the activity and enlarging the sphere of inland trade, which constitutes one of the principal elements of national opulence, prosperity, and greatness. And before the lapse of half a century, those who succeed us will witness, in the consolidation of those cities and villages into one great city, a union of interests and sympathies, which will totally dissipate the apprehensions and jealousies that may now exist.

All which is respectfully submitted.

DE WITT CLINTON,
S. VAN RENSSELAER,
MYRON HOLLEY,
SAMUEL YOUNG.

Albany, 18*th March*, 1817.

APPENDIX.

APPLICATION TO CONGRESS.

To the honourable the Senate and house of Representatives of the United States in Congress, the representation of the Commissioners of the state of New-York, in behalf of the said state, respectfully showeth—

That the Legislature of the said state, in April last, passed an act to provide for the improvement of their internal navigation, of which act we take the liberty of transmitting herewith a copy. In this it will be seen that a board of commissioners is constituted, and that, among other duties enjoined upon them, they are required to make application to the government of the United States, for cessions, grants or donations of lands or money, for the purpose of aiding in opening a communication, by means of canals, between the navigable waters of Hudson's river and lake Erie, and the said navigable waters and lake Champlain. To fulfil this requisition, then, is the object of this address.

Next to the establishment and security of the right to self-government, we flatter ourselves that no subject requiring legislative interference, can be found more interesting than the one which we are charged to lay before your honourable body. And we venture to solicit your favourable consideration of it, in full confidence that an enlightened public spirit may justly give to it such a measure of patronage as cannot fail to produce signal benefits to the nation.

The benefits to be acquired by the United States, from the construction of these canals, will most obviously and immediately affect their pecuniary and political interests. More remotely, indeed, they will exert a favourable influence upon every object embraced within the scope of an enlightened and paternal policy. If we

consider the extent and fertility of our territory north-west of the Ohio; the large proportion of it, which yet remains unsold; the disposition and the ability which our eastern fellow-citizens possess to purchase and to improve it, we cannot be insensible of the great pecuniary advantage which would result from opening to them a safe, easy, and economical passage into that territory. Every dollar saved to them, in the expenses of removing thither, would operate to enhance the value of the public lands, and, at the same time, to hasten their settlement: and it is obvious, that a canal from the Hudson to lake Erie would save a very large portion of these expenses. The number of persons to be affected by this consideration, cannot be accurately stated. It certainly would not be small. We are well assured, that in the course of one year, since the war, more than twelve thousand new settlers, almost exclusively from the east, have established themselves within the limits of this state west of the Genesee river.

Whatever adds to the value of all that land produces must increase the value of land itself. To a country, which depends upon a distant market for the sale of its surplus productions, it is of great importance to afford every possible facility of transportation; for all that is taken from the expense of transportation is added to the value of the articles transported: and by cheapening the rate of carriage, many articles are rendered valuable which would otherwise be worthless.

Moreover, if habit or the necessary accommodation of life, require that such a country should consume foreign goods to the amount of all its surplus productions, it is evident that the landholder there enjoys a two-fold benefit in every increased facility of transportation. Perhaps the whole of the country between the great lakes, the Mississippi, and the Ohio (certainly the greater part of it,) would derive from the completion of our principal canal greater advantages for distant communication than any country, so far inland, has hitherto enjoyed,

and incomparably greater than that country can ever derive from any other means. Regarded, then, merely as a measure of pecuniary wisdom, we trust your honourable body will make such an appropriation in favour of it as will ensure its accomplishment.

But considerations of a political nature seem to us, most urgently to recommend the construction of these canals. The great influence exercised over the western Indians, even in our own territory, by the subjects of a foreign government, we have always had numerous reasons to wish destroyed. This influence depends materially, upon establishments erected for the promotion of the fur trade. Any measure that would open, between one of our sea-ports and the region where furs are collected, a road in all respects preferable to any other, besides drawing to our own citizens a profitable commerce, would tend, eventually, to the subversion of that influence, and, in the mean time, offer to us important facilities for controlling it.

The trade carried on between our country and the Canadian provinces is already considerable, and is rapidly growing. The fruits of the earth from the southern shores of Erie and Ontario, and from the borders of Champlain, find their way to the ports of our northern neighbours cheaper than they can to any, which offers a market, of our own, and are there exchanged for the various commodities of foreign countries. This trade is, indeed, profitable to many of our citizens who engage in it, but it is much more so to the British. Subject to their control, they direct it to the advancement of all their public interests. And it is no mean instrument of that advancement. It is evidently the vital spirit of their internal navigation, which it cannot fail to exalt into a consequence that may hereafter greatly affect us. Would not the prosecution of our projects to complete effect, result, immediately, in giving to the citizens of the United States the entire profits of this trade, and to government all the security and influence connected with a thickly

settled frontier, and a most decided superiority of shipping on the lakes?

Nothing can be more certain, than that the continuance of our Union is essential to our freedom. The means of this continuance are to be found only in the strength of our common interests. Whatever extends and consolidates these interests, then must be of distinguished importance to government: and can any thing be imagined, more efficaciously conducive to these objects, than opening to distant sections of our country the means of easy and profitable intercourse? Virtuous and enlightened men among us, have long delighted themselves with looking forward to the period, when a canal communication between the Hudson and lake Erie would afford, to half the United States, more ample means of promoting every social interest, than have heretofore, in any country, been furnished by the accomplishment of any human enterprise.

The advantages of canals were not entirely unknown to ancient governments. Among them, the wisest and most powerful executed works of this kind, in every direction through their territories, for the purposes of agriculture, commerce, and war. The vestiges of many of these are still discoverable, and they are doubtless to be reckoned among the most impressive memorials that remain of ancient greatness. When we recollect the instrumentality which canals have formerly exhibited in collecting the blessings of wealth, strength, and a crowded population for every country through which they passed, and see those very countries, by the neglect and ruin of them, reduced to their original barrenness, can we suppress a conviction of their immense utility? But, it is not alone from history, and the faint traces of them which have survived the lapse of many centuries, that the advantages of these improvements are to be known. There are proofs more conclusive. Our own times furnish them. In contemplating the present state of Europe, it is impossible not to be struck with the number and extent

of her canals. And we perceive that they abound most in those countries where the wants of the social state and the means of power, have been most diligently explored, and are most profoundly understood. We see them there enabling extensive empires to hold in speedy administration, to every public object, all the resources of their remote sections; and, at the same time, increasing those resources prodigiously by the economical exchanges of which they are the occasion. Experience is always a safe guide. It is especially to be trusted when it has been acquired in the midst of difficulties and dangers, and has been sanctioned by the wisdom of different nations. If, then, in the pressing exigencies of recent events, when every power of national defence and annoyance has been exerted, when all the capacities of men, as individuals, and in political combination, have been remarkably evolved, we observe in that quarter of the globe, a perpetually growing attention to the subject of canals, is it not expedient, is it not wise for us to engage in making them? No country is more susceptible of all their benefits than ours: none of larger extent presents fewer impediments to their construction. They constitute improvements peculiarly fit for a republic. They contribute equally to the safety and opulence of the people, and the reputation and resources of the government. They are equally desirable in reference to the employments of peace, and the operations of war. In whatever light they are viewed, they seem to combine the substantial glories of the most splendid and permanent utility.

But if the execution of those of which we are the advocates be impracticable, or would involve an expense disproportionate to their value, they can have no claim upon the favour of the national legislature. On these topics we entertain no doubts. The minute examination which has been made this season, under our superintendence, of all the lands which these canals will traverse, has convinced us, that an expenditure not exceeding ten millions of dollars would be sufficient to perfect them.

Shall they remain unattempted? The state of New-York is not unaware of her interests, nor disinclined to prosecute them; but where those of the general government are united with hers, and seem to be paramount, she deems it her duty to ask for their assistance. Wherefore, in her behalf, we solicit your honourable body to make such an appropriation, in lands or money, to aid in the construction of these canals, as you, in your wisdom, may think reasonable and just.

By order, and in behalf of the said commissioners, at a meeting held in Albany, on the 10th of November, 1816.

DE WITT CLINTON, *President.*

Copy of a letter to the Governor of the state of Ohio.

Albany, 11th November, 1816.

SIR,

By an act of the legislature of the state of New-York, passed at last session, a board of commissioners was constituted for the purpose of ascertaining the practicability of connecting, by a canal, the navigable waters of the Hudson river with Lake Erie. As the organ of that board, and in compliance with the requisitions of said act, I beg leave, through you, to solicit the attention of the honourable the legislature of the state of Ohio, to this interesting subject.

A careful examination, by competent engineers, of the route of the contemplated canal, fully authorizes the belief that it can be made at an expense, which, although considerable, will be vastly overbalanced by the utility of the object. A facility in the transportation to market of the abundant productions of the west,—a rapid and easy interchange of commodities of foreign and domestic growth—an increasing activity in commercial and agricultural pursuits, and a consequent enhancement in the value of lands, are some of the most obvious benefits to be realized from a communication between the great lakes and the Atlantic, by means of a navigable canal.

Nor can it be disputed, that from the local situation of the state of Ohio, the luxuriance of her soil, her growing wealth and increasing population, she will be among the first to enjoy these advantages.

As the citizens of the state of Ohio, in common with those of the state of New-York, will enjoy the benefits of this improvement in the means of internal communication, it seems to be the dictate of justice, that with them, they should also participate in the expense.

The legislature of the state, distinguished for patriotism and liberality, are therefore respectfully invited to partake with New-York, in the lasting advantages and immortal honour resulting from the accomplishment of an object so important.

I have the honour to be, &c.

DE WITT CLINTON, *President*
of the Board of Canal Commissioners.

His Excellency the Governor of Ohio.

The foregoing letter was communicated by the governor, to the senate and house of representatives of the state of Ohio, as follows:

"I communicate to you copies of a letter from De Witt Clinton, Esq. president of the board of canal commissioners, in the state of New-York. That state contemplates making a canal which will connect the navigable waters of the Hudson river with Lake Erie.

The advantages of such a water communication to the state of Ohio generally, and in a particular manner to the northern part of it, are so manifest, that I am persuaded you will not hesitate to give the subject that careful examination, its great importance requires.

I recommend to your consideration the propriety of using such means as you may deem proper to ascertain the practicability and expense of the contemplated canal. Should the information obtained on these points be satisfactory, it will become the duty of the people of Ohio to give all the aid in their power, to-

wards effecting an object, in which they are so deeply interested."

On the subject of this communication, a joint committee of both houses of the legislature of the state of Ohio was appointed, who made the following report:

The joint Committee to whom was referred the Communication of his Excellency the Governor of the eleventh ult. together with the accompanying Letter from the Honourable De Witt Clinton, on the subject of the contemplated Canal from Lake Erie to the Hudson River, have had the same under consideration, and now submit the following Report:—

From a view of the subject submitted to their consideration, your committee are fully impressed with the belief, that the making of a Canal from the Hudson river to Lake Erie, is an object of the first importance to this state, and the United States in general, both in a commercial and in a political point of view. The facility which it will afford to the exportation of the surplus produce of our luxuriant soil, and the consequent encouragement of agricultural and commercial enterprise, are effects too obvious to pass unnoticed, and of too much importance to be neglected; as affording a safe, easy, and expeditious mean of a mutual interchange of commodities between different sections of our common country, highly advantageous to all, as increasing the commercial connection, friendly intercourse, and ties of interest, and by these means strengthening the bonds of union between remote parts of the nation. The contemplated Canal presents advantages vastly superior to those resulting from any work of the kind accomplished by the industry of man in any age or country.

From a geographical view of the state of Ohio, extending for a great distance on its northern frontier along the extensive navigable waters of the St. Lawrence, presenting all the advantages of a northern mar-

ket, and washed on the eastern and southern boundaries by one of the great branches of the Mississippi, affording an easy access to a southern market, and a facility in obtaining the various productions of the south; connecting the northern with the southern, and the western with the Atlantic States: considering its happy climate and the luxuriant fertility of its soil, intersected by navigable rivers, and unbroken by mountains, we are struck with its natural advantages, which, if improved by an enlightened and liberal policy, will render the situation of Ohio inferior to that of no state in the Union, or country in the world.—Among these improvements the contemplated Canal is unquestionably of the first importance. Sensible that a work of such magnitude cannot be effected without the united and vigorous exertions of those interested; and fully impressed with the belief that the greatest advantages will result to the United States generally, and particularly to the state of Ohio, as well as the state of New-York, from the completion of the contemplated Canal; your committee are clearly of opinion, that true policy, as well as justice, require the state of Ohio, to lend its aid to the accomplishment of a work of such incalculable utility: —We are at the same time sensible that the funds of this state will not permit us to aid in the undertaking in that proportion which might be expected from the relative population of the state.

Your committee have had no accurate means of ascertaining the probable expense of the proposed Canal; but from the best information they have been able to obtain, they are induced to believe that the work is not only practicable, but can be accomplished at an expense within the reach of those interested; and from the enterprising spirit and enlightened policy of the State of New-York, they feel little hesitation in believing that it will be undertaken.

Your committee are at present unable to point out or recommend any particular method of aiding in the

proposed work, not being in possession of any information relative to the system or plan which may be adopted by the State of New-York, for effecting the object.

Your committee respectfully submit for consideration the following resolutions.

Resolved by the General Assembly of the State of Ohio, That this state will aid as far as its resources will justify, in making the contemplated Canal from Lake Erie to the Hudson river, in such manner as may be deemed most adviseable, when the plan or system which may be adopted by the State of New-York for the accomplishment of that work, may be known; and that His Excellency the Governor, be requested to open a correspondence with the Honourable De Witt Clinton, or such other persons as he may think necessary; and take such other means as he may deem adviseable, in order to ascertain the practicability and probable expense of making said Canal; the probable time when the same will be commenced; the plan which may be adopted to carry it into effect, and such other information as he may deem important or useful, and communicate the same to the General Assembly at their next session.

Resolved, That His Excellency the Governor, be requested to transmit a copy of the foregoing Report and Resolution to the Executive of the State of New-York, and to the Honourable De Witt Clinton, president of the Board of Commissioners for the Canal from Lake Erie to Hudson's river.

THOMAS KIRKER,
Speaker of the House of Representatives.
ABRAHAM SHEPHERD,
Speaker of the Senate.

January 27th, 1817.

Secretary of State's Office, Columbus, Ohio, 14th February, 1817.

I Certify the foregoing to be a correct Copy of the original remaining on file in this office.

JER. M'SIM,
Secretary of State.

This report was enclosed to the President of the Board of Commissioners, by His Excellency the Governor of that State, in the following letter.

Executive Office,
Columbus, Feb. 10th, 1817.

SIR,

Your letter of 11th of November, was received in due time, and communicated to the General Assembly of Ohio, as you will perceive, by the resolutions, which I have the honour now to enclose to you. Any information which you may deem proper to communicate, in addition to that requested by the first resolution, will be thankfully received and laid before the legislature of Ohio, at their next session.

Very Respectfully,
T. WORTHINGTON.

De Witt Clinton, Esquire.

Applications, similar to the one herein before contained to Ohio, have been made, by the Commissioners, to the states of Vermont and Kentucky, from whom no answers have hitherto been received.

Miscellaneous particulars of information, respecting the Middlesex canal, near Boston, in the state of Massachusetts.

The following information, respecting the Middlesex canal, was obtained in May last, by two of the Commissioners, who visited, and carefully examined that canal, throughout its whole extent, and committed to writing on the spot, the result of their own observations, as well as the answers to all their inquiries, which were obligingly given, by the very intelligent agent (Mr. Sullivan) of the canal company.

The canal is 27 miles long, and connects the tide-water, in Boston harbour at Charlestown, with the Merrimack river. The water in the canal is 30 feet wide at

its surface, 20 feet at its bottom, and 3 feet deep. The Concord or Sudbury river crosses the line of the canal on the summit-level, 22 miles from Charlestown, and 5 miles from the junction of the canal with the Merrimack, and wholly supplies it with water for locking down each way from the summit-level. From tide-water to the summit-level is an ascent of 104 feet, and from thence to the Merrimack a descent of 32 feet. There are, in all, 20 locks of different lifts, of which the highest is 12 feet. These locks are 75 feet long in the clear, 10 feet wide at the bottom, and 11 feet at the top.

Boats for the transportation of merchandise and produce carry 14 tons, and are drawn by one horse 3 miles an hour. Packet-boats pass the whole length in 5 hours coming down, and 7 hours going up. To each boat there are three men; two, however, are sufficient to manage the boat on the canal, the other being wanted only on the Merrimack river. From the summit-level down the canal there is a current which exceeds in no place half a mile per hour, there being a fall or descent in the canal of one inch per mile. The expense of transporting a ton the whole length of the canal is $3 50, of which sum $1 70 is toll, and $1 80 is freight.

Across the canal there are 50 bridges made by the canal company; they consist of 2 stone abutments (one on each side of the canal) 20 feet apart: from one of these abutments to the other, are laid sills or string-pieces of wood covered with plank, and of sufficient height for the towing horses to pass under. The towing-path under the bridges occupies 6 or 7 feet.

Two miles from the lower end of the canal, Mystick river, a turnpike road, and the canal, run a little distance parallel with each other, the road being between the canal and river. Here is afforded a good opportunity of comparing the relative advantages of these three modes of conveyance.

Heavier boats than those above-mentioned, are used on the canal for transporting fire-wood, lumber, &c.; they are shaped like a scow, are 75 feet long, 9 1-2 feet wide, and carry 25 tons of wood.

The towing-path is generally 8 feet wide, so that horses and oxen may easily pass each other. On the opposite side of the canal, where a towing-path is not wanted, the upper surface of the bank or embankment is five feet wide, and this is found to be sufficient. A branch-canal, or side-cut is made to connect the main canal with Mystick river near Medford; this is owned by a separate company, and is principally used for transporting timber to Medford for ship-building.

The canal company was incorporated in 1789, and the next year commenced the work of making the canal.—When the canal was begun, the price of labour by the month was $8. The canal was opened for use in 1804, though not completed in 1808, when Mr. Sullivan took charge of it. Some repairs and new constructions have been made every year since. In assessments upon the proprietors, there has been laid out on the canal $528,000, and about $50,000 more, derived from tolls, has been expended in buildings, wharves, &c. At Medford is a swivel bridge, which is found to be very inconvenient. The principal articles transported on the canal are wood, timber, lumber of all kinds, pot and pearl ashes, rye, oats, provisions, and building stone from the Merrimack to Boston. Last year 12,000 cords of wood were transported down the canal, and there are more tons of timber in rafts brought down, than of wood.

More than one half of the whole length of the canal is more or less embanked or raised above the natural surface of the ground. Above Medford is an aqueduct across the Mystick river, of which the abutments are 100 feet apart, and between them are three stone piers, each 8 feet thick, for supporting the aqueduct. The tide flows up the Mystick river above this place. The surface of the water in the aqueduct, is 10 feet above the surface of the water in the river below, at high water. This aqueduct consists of a kind of trough made of timber and plank, which has stood 16 years, but is beginning to decay. The timber is framed together in the usual

way of carpenter's work by tenants and mortises, and strengthened by braces. As tenants soon rot and give way, it might have been made on a better and more durable construction with knees and bolts in the manner of ship-building. At the upper end of the aqueduct, is a lock of 12 feet lift.

Mr. Weston, an English engineer, took the levels of the whole length of the line of this canal, part of the way on two routes. He estimated the expense of making it at 100,000*l.* sterling. The company went on to make the canal without any further aid from any European engineer, and found Mr. *Weston's* levels to be correct.

Over Syms' river is an aqueduct, of which the abutments are 120 feet apart, with three intervening piers. The water in the aqueduct is 30 feet higher than the water in the stream below. These aqueducts all afford convenient waste-weirs. When the water is not drawn off from the canal at the commencement of winter, the expansion of its freezing spreads and injures the timbers of the aqueducts; wherefore it is the practice just before the winter sets in, to draw off about one third of the water.

Half a mile above the last mentioned aqueduct is deep cutting 40 rods in length through loose sand and gravel. In the deepest part of the excavation is 20 feet below the natural surface of the earth; and the part excavated, is here, from 90 to 100 feet in width at the top. The earth was chiefly carried away in wheel-barrows, some in carts, to an embankment just above, on the right side. Half a mile higher up, the earth is very porous, and on the right side, the water leaks out through or under an embankment: this might have been prevented by putting 2 or 3 feet of water-tight stuff in the bottom of the canal.

Near this place are two water-gates, by which the water of the canal is drawn off in the spring for the purpose of clearing out the earth, stones, &c. which fall into it and injure the navigation. The expense of this, is perhaps $500 a year.

Mr. *Sullivan* states that he has had a steam-boat on the Merrimack river for the purpose of towing boats; he found that a man by a rope could easily hold a boat in tow immediately astern of the steam-boat, which it would require a horse, on the bank of the river, to tow with the same velocity: such, in his opinion, is the great diminution of the resistance of the water to the head of a boat which is drawn in the wake of another boat.

For some weeks in the spring the canal leaks much more than it does the remainder of the season: this is because the banks had been recently swelled and loosened by the action of the frost. Three men with a horse and boat are, in the summer, constantly employed to keep the banks and particularly the towing-path in order.

The lands within six miles of the canal on each side, have increased one-third in price; while land in the country generally retains its former value. In the State of New-Hampshire, through which the Merrimack flows, timber is now worth from 1 to 3 dollars per ton standing; before the canal was made it was worth nothing; so that in the article of timber alone, that State is supposed to have been benefited to the amount of at least 5,000,000 of dollars. The wood-land there has risen in price, since the opening of the canal, from $2 per acre to $6, $8 and $10 per acre.

In Woburn, a pretty high embankment, which was made in the winter, across a marsh, sunk down in the spring at the breaking up of the frost, so that its top was just level with the natural earth: another embankment was then raised upon it. Near this place the canal, by a deep-cutting of 25 feet, passes through a hill. An embankment at Maple meadow in the town of Wilmington, is near 80 rods long, and 25 feet high to the top of the towing-path. At a place called the sinking meadow in the above named town, an embankment is made across a marsh of about 30 rods in extent. When this embankment was commenced, it was found that the dirt and stuff carried on to form the embankment kept gradually sink-

ing into the marsh; when measures were taken to ascertain how much it would sink; the labourers continued to carry on stuff which gradually went down until the whole embankment sunk to the depth of 60 feet! The great expense of making this embankment across the marsh might have been foreseen and prevented. The depth and softness of the marsh might have been ascertained by sounding it with an iron rod, and by conducting the canal circuitously around its margin, a solid foundation might have been secured.

By the act of incorporation, the Legislature authorized the company to occupy 5 rods of land in width on one side of the centre of the canal, and 3 rods on the other. If the owners of the land did not apply for pay within a year, it was deemed a donation. In the statement of monies expended, before made, are included the costs of several law-suits, the building of boats, of offices, the purchase of 70 acres of land, and the erection of mills at Billerica. The land and mills cost $10,000. There is no income derived from hiring out water privileges for hydraulic operations. The canal receives its whole supply of water from the Concord river; and if any were let out for hydraulic purposes, a current would be created, the inconveniences of which would probably more than counterbalance all the advantages of income.

Either through design or accident, logs, stumps and sticks were in some places left in the banks when the canal was made; and these, having now become rotten, leave unsound places, through which the water escapes. A great part of the canal was made by contractors in small parts or jobs, and where two jobs of embankment met each other, the workmen did not, in some cases, take the precaution to prevent the stones, as they threw on the stuff, from rolling down together from each end of the separate job, and thereby forming a loose porous and leaky place in the embankment.

The aqueduct over the Shawsheen river is, between the abutments, 140 feet. The water in it, is 35 feet

higher than the surface of the river below. This aqueduct has been made 20 years; it is, like the other aqueducts on this canal, made of wood, and is so much decayed as to require temporary props to support it.—There are three piers between the abutments, and, between the outside pier and the abutment on each side, there is a kind of wooden pier. On the inside or river side of both the abutments, and on both sides of the piers at suitable distances, large horizontal timbers are embedded, which serve to support the lower ends of the aqueduct braces: when these timbers become rotten the stone work will probably fall down. From each end of this aqueduct to the distance of 500 feet is an embankment nearly 35 feet high.

During the war, the timber used to repair the Constitution frigate was brought down the canal to Boston, and that used to build the Independence seventy-four, except the live oak, was procured through the same channel, as also were many of the masts and spars, &c. which were furnished at Boston to our vessels of war. Without the canal this part of the country could not have supplied these necessary articles.

In approaching the Concord river, the canal passes through half a mile of deep-cutting, 300 feet of which is excavated by blasting through a hard granite rock.—In some places, this blasting was carried 7 feet into the rock and from 14 to 20 feet wide. The deep-cutting for this half mile, is from 12 to 20 feet.

Across the Concord river, a few rods below the line of the canal, a dam 150 feet long and 8 feet high is made. This creates a pond, out of which, through the deep-cutting last mentioned, the water flows and supplies the canal 22 miles to Charlestown at the tide-water. From the other side of the pond the water flows through the canal 5 miles to the Merrimack river. The water which supplies the 22 miles of canal passes through a horizontal aperture of 6 feet by 1, with a head of 2 feet water above the upper side of the aperture. The towing-

path is carried across the pond by means of a floating bridge, a part of which is occasionally drawn up to let the logs, timber and drift-wood which collect above pass through. There are two waste gates in the dam, by which the height of the water in the pond can, in some measure, be regulated.

In Chelmsford, within 60 rods of the Merrimack, is an aqueduct of which the abutments are 110 feet apart, and there are ten wooden piers to support it. The water in the aqueduct is 16 feet higher than the stream below. Between this aqueduct and the Merrimack is a fall of 32 feet, and 3 locks of durable stone masonry in tarras mortar. Where the canal joins the Merrimack, a basin is excavated 10 or 12 feet below the natural surface of the earth, and 5 feet below the surface of the river at low water. The extent of the basin is about 200 feet on the shore of the river, and half that distance on a line at right angles with the shore, being nearly semi-circular. There are in all 7 aqueducts on the canal, but those not mentioned above are very inconsiderable: there are also several culverts.—Grass grows in the bottom of the canal, and obstructs the passage of the water in autumn to such a degree, that at the lower end of the canal, 22 miles from its source, the water is sometimes 9 inches lower than it otherwise would be. To remedy this inconvenience a man is employed, who wades along the canal and mows off the grass under water with a scythe. During the winter season, while the canal was not used, the muskrats would sometimes burrow into and endanger the breaking of the banks; in consequence of which the company had offered a bounty of 50 cents for every one that should be destroyed within a certain distance of the canal. This bounty had caused their destruction to such an extent that very little apprehension was entertained of their doing injury.

It was the original design of the company to employ three officers on the canal, viz. a superintendant, a trea-

surer and clerk; but that project has been abandoned, and those three officers are now united in Mr. Sullivan. His compensation is a salary of $1500 a-year, besides 5 per cent. on all the tolls or receipts, which are warranted not to fall short of $20,000 per annum.

The receipts of the company from the canal are rapidly increasing. The income in 1808, was $7000, in 1809, $9000, in 1810, $14,000, in 1811, $17,000, last year $25,000, and this year (1816) it will, undoubtedly, exceed $30,000.

Copy of a Letter to Paul Busti, Esq. Agent of the Holland Land Company, from the President of the Board of Commissioners.

New-York, 4th January, 1817.

SIR,

I am charged by the commissioners of canals, to solicit your attention to the donations of lands heretofore promised by the Holland Land Company, but which was not consummated, on account of the late war, which rendered it almost impracticable for the state to embark in an undertaking of such magnitude and expense, at that time.

The commissioners are anxious to know, with all convenient speed, whether you will renew the grant, and add to it the lands through which the canal will pass, and which may be necessary for the operation, on condition that the canal shall be completed within twenty years. The lands of course will not be taxed.

Your prompt answer will oblige the board of commissioners, who are required by law to make a report to the legislature, on the subject of the canal, some time in the beginning of February; and I have only to add, that the whole route has been surveyed, that the practicability and comparative cheapness of the canal, has been satisfactorily ascertained, and that a liberal spirit manifested

by the great landed proprietors, on this occasion, may have a benign effect, in promoting this great object.

Very respectfully, I am, Sir,
Your obedient servant,
DE WITT CLINTON, *President*
of the Board of Canal Commissioners.

Paul Busti, Esq.

Answer to the foregoing Letter.

Philadelphia, January 9th, 1817.

SIR,

I have had the honour of receiving your letter of the 4th instant, on the subject of the renewal of the donation of lands, heretofore made, by the Holland Land Company, for promoting the execution of canal navigation, from Lake Erie to the Hudson river, but which, in consequence of a postponement of this great undertaking, has reverted to the company.

I am not prepared to give a definite reply to your inquiry. I must content myself, for the present, to assure you, that the disposition of the Holland Land Company, to aid so important a work, remains unaltered. The only question has been, the best manner in which they can give effect to their wish of contributing towards effecting it. With this view, I have some time since consulted Jos. Ellicott, Esq. (the company's agent at Batavia,) on this subject, and flatter myself with having it in my power, shortly, to offer to the board of canal commissioners, the Holland Land Company's donation, in lands, on such terms as, I trust, will be perfectly satisfactory to the gentleman commissioners, and furnish a further proof

of the sincere disposition of my constituents, to aid undertakings of public utility.

I have the honour to be, very respectfully, Sir,
Your most obed't servant,
PAUL BUSTI.

De Witt Clinton, Esq. President
of the board of Canal Commissioners, &c. &c.

(*Second answer from the same.*)
Philadelphia, February 22nd, 1817.

SIR,

Agreeably to the promise conveyed by my respects of the 9th ult. I have now the honour of waiting on you with the Holland Land Company's offer of contributing to the making of a canal navigation from the east end of Lake Erie to the Hudson river.

After mature reflection and consultation with Mr. Ellicott, on the most proper means of giving effect to the Holland Land Company's disposition of aiding a public undertaking of such magnitude, and promising such important advantages to your patriotic state, I have come to the determination of renewing, on the same terms, the offer heretofore made and accepted by the gentlemen commissioners in 1814, but which, in consequence of the late war, was not consummated. I have been led to this selection by the conviction that I shall have the happiness of reconciling the liberal views of my constituents, with the most sanguine expectations of your board. The acceptation in 1814, of this grant, forms the ground of this conviction. I have now the pleasure to repeat my offer of conveying to the state of New-York, two tracts of land situate in the county of Cattaraugus and state of New-York, containing upwards of one hundred thousand acres of land, on condition that the canal shall be completed within twenty years; that the land shall not be taxed during that period, and in case of failure, that it shall revert to the company, or the state remain accountable for any part sold or disposed of. For the par-

ticulars of the terms and conditions, on which the grant was heretofore made, and is now renewed, I beg your reference to the enclosed copy of the proposed act to be passed by the legislature, and of the conveyance then executed by the Holland Land Company, but since annulled. In case any lots in the two tracts should have been sold, they must of course be excepted; but I believe no such sale has taken place. As a further proof that the best wishes of my constituents for the success of this stupendous work, have not been weakened by the lapse of time, since the first offer reverted, I feel myself authorized to add to that grant the ground actually the property of the Holland Land Company, through which the canal shall pass, with sufficient tow-paths along its sides, the breadth of which grant, however, not to exceed four rods. This additional grant I offer on condition that the canal company shall make, within the time limited for the completion of the canal, a good and safe harbour for vessels navigating Lake Erie, at or near the mouth of Buffalo creek. To this condition, I am persuaded no objection will be made. It is so intimately connected with the free and full use of the canal, that it really forms a most important part of it. That a safe and commodious harbour at the east end of Lake Erie, is at present much wanted, and would be an object of vast importance to the trade which passes through that inland sea, by offering security to their vessels, and facilities for the loading and unloading of them, is a truth known to every one acquainted with that part of your state. It appears to me equally evident that the benefits resulting from the canal navigation, must in a good measure depend on its connexion with the navigation both above and below it, and that it necessarily becomes an object of the last importance to afford every possible facility for the transfer of the cargoes of the canal boats to the vessels navigating the waters above and below them. Were I not fearful of trespassing on your valuable time, much more might be added in support of this measure, but it

certainly has not escaped the clearer penetration of the gentlemen commissioners, and I ought to apologize for saying so much on a subject, the utility of which appears so evident.

I am ready to confirm the foregoing, in the same manner as was done in 1814: I will convey the lands and site for the canal, on the conditions above stated, to the people of the state of New-York. The deed to remain as an escrow in the hands of T. L. Ogden, Esq. of New-York, to become absolute on the passage of the proposed act by the legislature, provided it be passed within one year from the date of the deed.

I flatter myself with the hope of having fully met the wishes of your board, and of having afforded them and the state of New-York another unequivocal proof that my constituents feel the liveliest interest in the welfare of your state, and that they are not the last in offering their mite in contributing to its prosperity.

I have the honour to be,
With great respect,
SIR,
Your most obedient servant,
PAUL BUSTI,
Agent of the Holland Land Company.

DE WITT CLINTON, Esq.
President of the Grand Canal Company, &c. &c.

To the Members of Congress from the State of New-York.

The Commissioners of canals, for this state, have seen, with great pleasure, the outlines of a plan for appropriating a considerable fund to the internal improvement of the country; and they take the liberty of respectfully presenting to you some considerations connected with this subject, which have an important bearing on the public prosperity.

1st, As to the rule to be adopted for distribution:

2d, As to the authority making the application of the monies.

It appears to the Commissioners, that there ought to be no hesitation, with regard to the ratio. The population of each state will be a fair and unexceptionable standard. In this case, the state would be entitled to about $85,000 annually. The interests of Ohio being identified with ours, in relation to the Erie canal, and those of Vermont, with regard to the Champlain canal, it is reasonable to suppose, that the contributions from those quarters, arising from the same source and applied to the same objects, would augment the annual dividend, received by the state, to $140,000.

If it be admitted, as it undoubtedly ought to be, that the Erie canal will not cost more than six millions of dollars, and the Champlain canal a million, the greatest interest paid for the money borrowed would not exceed $420,000 annually; but as the whole sum would not be wanted at once, it is obvious that the allotment to this state would form an accumulating fund, which with other resources amply within our power, would enable us to execute these great works without imposing any taxes.

With regard to the second point for consideration, the commissioners are of opinion, that it would be a wise arrangement to confide the expenditure of the money to the state government, on condition that it be applied to the canals in question.

The commissioners are aware, that some of you may not be friendly to the contemplated canals; but they trust, that on the presumption that these works will be undertaken, none of you will be hostile to the appropriation of an adequate revenue, which will promote the object, without any inconvenience to your constituents.

Done at Albany, the 22d day of January, 1817.

By order of the commissioners.

DE WITT CLINTON, *President.*

(*Letter from the Hon. Philetus Swift, President of the Senate.*)

Albany, 5th March, 1817.

DEAR SIR,

In answer to your inquiries concerning the canal made for my mills in Phelpstown, I can state, that it is 260 rods long, 40 feet wide on the surface, and 30 feet at the bottom, with a depth of water of from 4 to 5 feet. It runs through good intervale land; and 160 rods of it, being new, was grubbed and cleared, and dug by the job, for $2 50 a rod. About one half of this 160 rods lay along an old water-course, which in many places was only to be made wider and deeper: The other half was to be dug from 1 1-2 to 3 1-2 feet deep. For the distance of 30 rods it was dug 1 1-2 feet deep; and the earth here was, for the first foot in depth, a good soil, such as is common in intervales; for the next 2 feet, it inclined to clay, below which there was a clean gravel. Much of the above excavation was done for a dollar a rod. Where it was deepest the land was level, and after grubbing and clearing, smooth; so that the plough and scraper alone were used in moving it. Having attended personally to the progress of the job-work abovementioned, and carefully calculated the expense of it, at the time, I was then satisfied, as I am now, that the whole cost of excavation where it was deepest, including grubbing and clearing, did not exceed $5 for a rod. A rod included about 75 cubic yards. The cost of each yard, therefore, was a little short of 7 cents. It should be remembered, that this work was done in the year 1806, when the price of labour was less than it is now.

I am, Sir, with great respect,
Your obedient servant,
PHILETUS SWIFT.

Hon. DE WITT CLINTON,
President of the board of Canal Commissioners.

Copy of a letter from the Hon. A. Porter, of the County of Niagara, to one of the Commissioners.

Niagara Falls, January 3d, 1817.

DEAR SIR,

Your letter of the 9th of August last was received, requesting of me answers to the following questions, viz.

What is the kind of rock, through which your canal is excavated?

What is the length, width, and depth of such excavation?

What was the expense of it?

What, in your opinion, would be the expense of excavating a canal, 30 feet wide and 5 feet deep, for one mile, through the common limestone rock, lying between Lake Erie and Genesee river?

In reply to these inquiries I would answer. The kind of rock is horizontal strata or layers of limestone, of from 6 to 24 inches thick. The horizontal joints, between these layers, are so open, that there is very little difficulty in separating the layers. These layers are separated by perpendicular cracks, dividing them into irregular and unequal slabs, of from one to 6 or 8 feet square. These slabs are so sound as to blast well, and are very pure limestone, so that an auger, suitably tempered, will not batter, but will last until the friction on the stone wears it out.

The length of my canal is 20 rods, its width 7 1-2 feet, on an average, its depth in the rock five feet, besides one foot of earth on the top of the rock.

It cost about $500.

To excavate a mile of the same kind of rock, the same width and depth, would of course cost $8000. My canal being the depth required, viz. five feet, and one fourth part of the width required, viz. 7 1-2 feet, it follows that four times as much rock would require to be removed from a canal 30 feet wide and five feet deep, as from one of the size of mine: In that proportion, then, it would cost $ 32,000 per mile. It is however my opinion, that one of 30 feet wide, would by no means cost in the same proportion, for the following reasons:

First, because in first making an opening, the rocks are all bound together in such a manner, that it is difficult to remove any single stone or rock without blasting; and at least one half of the blasts have little or no effect. Whereas, after an opening is made, the rock being separated both by horizontal and perpendicular joints, many of them may be removed without breaking, either by hand or by the aid of cattle; and those too large to be removed whole may be broken by a sledge or with a single blast.

Secondly, the width of the canal will enable you to remove very large rocks, by the aid of oxen, much easier than they could be hoisted by a windlass, which was the way most of mine were done, as its width made it difficult to remove them with oxen. Many of those which I was obliged to blast to enable me to handle them, might have been removed by oxen, could I have used them. From these reasons I have no doubt, that a canal through the same kind of rock, which mine passes, (and it is the same as that which prevails generally between Lake Erie and Genesee river) of 30 feet wide and 5 feet deep, might be made for double what one of the size of mine would cost, viz. it might be made for $16,000 per mile.

I am, Sir, with great respect,

Your obedient servant,

AUGUSTUS PORTER.

Myron Holley, Esq.

Copy of a letter from Matthew Brown, jun. and Francis Brown, Esquires, to one of the Commissioners.

Gates, Genesee County, January 1st, 1817.

Myron Holley, Esquire,

SIR,

Your letter, of September last, requesting information respecting the cost of making a canal, at the Falls on Genesee river, which we were then engaged in, to supply our mills, factory, &c. was duly received. We should have noticed the contents of that letter immediately, but did not complete the work until late in the fall, so that we could not ascertain the cost accurately

until now. We have given below a statement of the different items, in the expense of making the canal, that you may see the nature of the costs in effecting works of this kind.

Men's labour 1535 days, at 62 1-2 cts.	$959 37
Team's labour 312 do. 50 cts.	156 00
do. by contract,	100 00
Mason's work, by contract, laying dry wall,	55 00
Blacksmith's bills repairing tools, &c.	142 43
13 kegs of powder, at $14	182 00
Tools worn out and destroyed, say,	25 00
Use of carts and waggons,	40 00
Subsistence for men at 16s. per week, the common price for boarding,	435 00
Subsistence for teams at 16s. per week,	90 00
Add for the work done by contract, on a part of the canal, the nature of the work the same,	1300 00
Superintending 6 months, say	383 39
Amount of the whole expenditure,	$3868 19
The length of the canal now finished is 74 rods, through limestone, at $5227 per rod,	$3867 98
The width with perpendicular banks is 30 feet, the average depth 5 1-2 feet, 7448 cubic yards, at 52 cts.	$3872 96

It will be proper to observe, that in making this canal, the stone suitable for constructing buildings and other uses, were removed at considerable distance and piled: that opening the bank and constructing guard gates for two miles; also, the fragments unfit for use in building, have been removed to fill up and make a street on the bank, the expense of all which is included in this estimate.

We do not hesitate to say, in our opinion, a canal of 30 feet wide and 5 1-2 feet deep, may be worked through any limestone quarry known in this country, for $16,000 per mile.

We are, respectfully,
Your obedient servants,
MATTHEW BROWN, Jr.
FRANCIS BROWN.

Extract of a letter from the Hon. Joshua Forman, first Judge of Onondaga county, dated at Onondaga, 20th November, 1816, and addressed to the President of the board of Commissioners.

"You request me to give you a statement of the canals I have dug for mills near this place. I cannot give you the exact length or total cost of them, but the data I can furnish you will enable you to calculate what it would produce per mile. The first was the one passing the Turnpike in Onondaga Hollow; which was let to be dug nearly half a mile in length, 24 feet wide at top, and 18 feet at bottom, and an average of 4 feet deep, at the rate of 50 cents per cord of 128 cubic feet of excavation. This was run through a meadow free of roots, the soil clay, with some bars of gravel crossing the canal at bottom. The second was at Salina, which was about 40 feet wide at top and 30 feet at bottom, averaging 4 feet deep through uncleared land, and the soil a hard gravel, at seventy-five cents the cord.

The last was about 60 rods, 18 feet at bottom and about 3 1-2 feet deep, through an alluvial soil, which, after digging down 2 feet, proved full of logs and quicksand for a foot or more above a hard gravel. This was let at 50 cents the cord, but the contractor complained of the unexpected difficulty, and had a reasonable allowance made him of about 12 1-2 cents per cord. As to the other two, the first did not make more than ordinary wages, but the same man took the second, and made money in it."

Copy of a letter to one of the Commissioners, from Col. Mynderse, who lives at the Seneca Falls, and who is largely interested in the improvement of the navigation of the Seneca river, now partly completed, in that place and its vicinity.

Seneca Falls, 17th February, 1817.

DEAR SIR,

Your favour, of the 17th ult. requesting an

account of the improvements making in the navigation of the Seneca river, at this place, came duly to hand, and would have been early noticed but for the absence of Mr. Lewis, the engineer and contractor, and Major De Zeng, who has had the occasional superintendance of the work. These gentlemen being alone able to furnish the information required with accuracy, I sent them immediately, on receipt of your letter, a transcript of its contents, desiring them to send me an answer; but not hearing from them, I proceed to give you such information as I possess on the subject. I regret that it is not in my power to be more particular and correct.

There are nine chamber locks and three guard locks, contemplated to be erected, in the whole distance, to wit, one chamber lock of about 2 feet lift, immediately at the outlet of the Seneca lake; two chamber locks at the foot of the canal at Scawyas, of about nine feet lift each; one chamber lock at the little Scawyas rapid, of about 4 feet lift; two chamber locks at the Seneca Falls, of eight and a half feet lift each; one lock at the same place, of about nine and a half feet lift; one other lock at the same place, of eight and a half feet lift, and one chamber lock at the foot of the Seneca Falls rapid, of about five feet lift. There is one guard lock at the entrance of the canal at Scawyas; one at the entrance of the upper canal at the Seneca Falls, and one at the entrance of the fourth canal, at the same place.

Of these three are completed, one guard and two chamber locks at Scawyas, and the chamber lock at Little Scawyas. One guard lock is completed, at the Seneca Falls, and two chamber locks at the same place are nearly completed, and the site of another is excavated, and the materials for it are on the ground, prepared to be laid up early in the spring. Some progress has also been made towards the three remaining locks.

The materials with which these locks are constructed are stone: the inner face of the walls are of hewn stone neatly joined and well incorporated with the body of the walls, which are laid up with common lime-stone found on the spot, in good lime-mortar and grout.

The walls of the locks are six feet in thickness, and supported with substantial embankments on the outside. I am not possessed of data on which to found an accurate estimate of the cost of each particular lock.

The whole distance of excavation, exclusive of the sites of the locks, is as follows:

1st. A canal at Scawyas, on the Waterloo side of the river. This canal is about 250 rods in length. The expense of making it is estimated at about $3000.

No rock or other hard substance was met with in digging this canal.

2d. A canal at commencing at the dam near the head of the Seneca Falls rapid. This canal is 36 rods in length, and is conducted along a lime-stone ledge. One of its embankments is altogether artificial: It is faced on both sides with stone, to prevent wear by the fall of rains or otherwise. Extraordinary expense was incurred in making this canal, owing to the stony nature of the soil. The cost was about $900.

3d. A canal of about 22 rods long is not quite finished; will cost about $300.

4th. A canal, together with a low dam of about 150 feet long across the river is about 102 rods in length, and cost including the said dam about $1200.

A mill-race was used for a part of this canal, by which the expense was considerably lessened.

5th. This canal, which will be about 40 rods in length, must for about one half of its length be cut to a considerable depth into a slate rock. Nothing has yet been done to it. It will cost at least $1000

6th. This canal will be about 120 rods long, but from the favourable nature of the ground it may be easily made. It cannot cost to exceed $1000.

The canals are to contain at all times three feet of water, and are to be 24 feet wide at the bottom, and not less than 30 feet on the surface of the water.

There are three dams thrown across the river, of from 3 to 4 feet in height, constructed of stone and timber. Each cost about $400. The principal dam is at the head of the Seneca rapids—is about 200 feet in length, 10 feet high and 10 feet thick at the base, diminishing towards the top to 3 feet. This dam is built of stone in a neat and substantial manner, and gravelled on the upper side. It cost, I understand, $1800.

The Seneca lock navigation company are bound to erect two bridges over the canals, where they intersect public roads. One of these is completed. It is built with stone abutments, and covered with square timber and plank. It is supposed to have cost $150.

The other bridge is to be built in the same manner, and will probably cost the same sum.

The extent of navigation improved by these locks and canals, from the Seneca lake to the lower lock at the foot of the Seneca rapids is about 12 miles. The aggregate amount of locking is about 64 feet. The length of artificial canalling will be about 550 rods. The bed of the river is used where its depth of water is sufficient, and where no natural obstructions exist.

The locks are 70 feet in length, in the clear between the gates, and 12 feet in width, and are capable of passing a barge of 20 tons burden.

The stone with which the inner walls of the locks are faced are obtained, at considerable expense, from a quarry near the head of the Seneca lake, about 50 miles distant.

The whole expense of making this navigation, it is calculated will amount to $55,000

It certainly will not exceed $60,000.

Mr. Lewis, the engineer, although very able and competent to such works, possessed no practical knowledge of the subject when he commenced operations here:

Much expense was consequently incurred which might and would have been avoided had he had more experience. I feel confident, that the whole work might now, with the experience we have acquired, be done for $45,000

I may yet receive a communication, on this subject, from Mr. Lewis. If so, and it should contain any thing useful to you, I will do myself the honour to transmit it to you.

I am, Dear Sir, your very obedient servant,
W. MYNDERSE.

Myron Holley, Esq.

(*Copy of a letter to the President of the Board of Commissioners, from John L. Sullivan, Esquire, who has personally examined the most celebrated canals in England, France, and Holland; has had the charge of constructing several short canals, with locks, dams, &c. around falls, in the Merrimack river, and has for eight years been superintendant of the Middlesex Canal, in Massachusetts.*)

Albany, March 7, 1817.

The Hon. De Witt Clinton,
President of the Board of Canal Commissioners.

Sir,

In compliance with your request in behalf of the board of commissioners, I have given all the attention in my power at this time, to the report on the proposed canal, and shall with pleasure proceed to state my impression of the estimates in general, premising, however, that without seeing the ground, it would be presumption to offer a *decisive opinion* on the expense. It is therefore with the utmost deference to the engineers, and other gentlemen who have assisted in making them, that I shall express mine, from a comparison of the description of the route with works of this nature, with which I am intimately acquainted.

In comparison with the Middlesex canal the description given of the country is *peculiarly favourable;* in

the proportion I should think of three to one. That is, for the whole distance, the Middlesex canal per mile is three times as difficult or expensive, as to the work to be done by excavation and embankment, as the New-York state canal will be. And none of the heavy jobs will compare with what has been often done in Europe. In making the comparison, it will be recollected, that the dimensions of the canal are as 4 to 7; the mean width and depth of Middlesex being 25 by 4; your canal, 35 by 5.

The estimates have been made from the best sources of information in the country, and from experiments: I conclude, therefore, that the *easy-work* can be done accordingly, but it would cost much more *in our part of the country*, if executed without the aid of labour-saving machinery, as wages now are.

The embankments will, I believe, generally cost three times as much as excavation; and it is obvious to remark, that where they are extensive, the earth to form them must be carried the whole distance; and the quantity of earth required will very much exceed in square yards at the place whence it is taken, the measurement of the bank. No doubt the Board have attended to these and other local circumstances: but in the estimate the difference does not appear to be sufficient.

The *waste-wiers*, *safety gates*, and other constructions to control the streams, feeders, &c. not expressly contained in the estimates, ought not I think to have been assigned to the 5 per cent. added for contingencies, because that allowance is to be made as well on them as on other objects of expenditure.

The allowance of 10,000 dollars per lock appears to me to be ample. The cost of the aqueducts depends on so many local circumstances, that I can only say it seems to me very probable that the estimate for them is high enough; constructed of stone piers and the trunks of wood; but much will depend on the previous prepara-

tion, and the season of the year in which the work is done.

In some instances the digging of the eastern route is represented as partly light and partly difficult. Where the *pick axe* is to be used, the digging will cost double what it will where it may be done by the shovel alone; or, if the light loam or sand may be excavated for 12 to 20 cents, hard gravel and clay should be estimated, in my opinion, from 30 to 50 cents per yard.

The middle and western sections appear to be on the whole high enough. The eastern to Schoharie crosses so many streams, and there being some difficult digging, and considerable *wall* required to sustain the banks of the canal and adjacent high grounds, that I doubt if the estimate has sufficiently considered all these circumstances; but it does not appear to be on the whole a more difficult route than that of the Middlesex in proportion to its distance; I say this, however, with deference to the gentlemen of the board who have seen both.

But on the whole, as the country is so generally favourable, as labour-saving machines can be used, and as there will probably be no land or damages to pay for, the estimate appears to be high enough.

In making a comparison with the Middlesex canal, having no minutes with me, I can only do it from recollection. The accounts, while this canal was in the process of construction, were not kept so as to admit of our knowing what any particular piece of work cost. My analysis of it, therefore, will be wholly from judgment, formed from my knowledge of the ground, and some experience in other places.

The Middlesex canal is 27 miles in length; its depth is intended to carry at least 3 feet of water. The banks, where formed, are meant to be one foot above the water.

The width generally 30 feet on the surface, and on the bottom 20 feet. In carrying the work on it was found necessary to purchase some estates, the whole of which was not essential to the canal. The lands were

generally paid for, where most valuable. There was some considerable expense attending litigations, and perhaps some mistakes, which are not likely to happen in the proposed work. The whole expense in assessments has been 520,000 dollars; not including the application of income for several years past, in renovating and completing it; and the buildings, wharves, &c. necessary to the business. As neither of these objects of expenditure apply to the present question, I shall leave them out, and also deduct 50,000 dollars as having been applied to the other works leading to the principal canal.

Analysis of the cost of Middlesex Canal, in the state of Massachusetts.

Description of the Levels.	Em-bank-ment.	Exca-vations.	Locks.	Aque-ducts.	Cul-verts.	Bridges	Lands & Extras
1st. In Charlestown.							
The mills and contiguous land--reserving the part used for the landing,							10,000
1st Lock in the tide,			7000				
2nd Lock in the tide.			3000				
Digging the first level about 600 feet in length, say		1000					
3rd Lock. (All the Locks except those at Chelmsford, consist of walls to sustain the banks of the Lock pit							
containing 300 perches. { in length 100 feet, height 12, thickness 3.							
In most instances the stone were brought from a distance.							
The frame of the Locks were of yellow pine, then considered as durable as white oak; and as expensive. The gates were of oak. The length of the wood work about 100 feet. The width 11 feet at top and 10 at bottom. The lift generally 8 feet.			5000				
2d Level.							
To 1 mile through valuable clay land, containing about 10 acres, at 500							5000
2d mile, 300							6000
3d mile, 300							2000
4th mile, 200							
Where the excavation is of the ordinary depth of four feet, I will assume the contents to be 30,000 cubic yards, 1st 2 miles, I estimate the excavation at 20 cts.		12,000					
Extra excavation for basins, 15,000 yards, at 25 cents.							3750
2 miles of embankment of 50 cents, including the excavation of some stone,	30,000						
4 Culverts,					400		
10 Bridges,						3000	
1 Aqueduct, 110 feet in length, surface of water, 10 feet above the tide, standing on 3 piers, 2 abutments.							
Height of them 12 feet, 20 feet length, average 6 feet thick.				3000			
300 perch at 3 dollars, the stone being brought from some distance.							
Materials, pine.							
Carpentry.							
Piling the ends, labour, &c.							
1st 4 miles, 1st and 2d levels.	30,000	13,000	15,000	3000	400	3000	26,750
3d Level.							
1 Lock			3000				
2 miles, at 20 cents, (easy)		12,000					
1 mile at 40 cts. deep, (easy)		12,000					3000
30 acres at 100 dollars,					100		
1 Culvert,							
1 Aqueduct, twice as large as the former,				6000			
1st 7 miles.	30,000	37,000	18,000	9000	500	3000	29,750

Description of the Levels.	Em-bank-ment.	Exca-vations.	Locks.	Aque-ducts.	Cul-verts.	Bridges	Lands & Extras
	30,000	37,000	18,000	9000	500	3000	29,750
4th Level, 3 1-2 *Miles.*							
3 Locks,			9000				
2 miles at 20 cts.		12,000					
1-2 mile at 60 cts. 25 feet deep part of the way,		9000					
3 culverts and 2 waste-ways,					600		
Land 30 acres at 50 dollars,							15,000
2 Bridges,						500	
1st 10 Miles,	30,000	58,000	27,000	9000	1100	3500	31,250
5th Level, 6 *Miles.*							
3 miles at 20 cts.		18,000					
1 mile at 60 cts.		18,000					
2 miles of bank, average 40	24,000						
7 culverts and waste-ways,					1000		
1 Aqueduct,				2000			
Land,							1800
Extra excavation of rock,							1000
1st 16 miles,	54,000	97,000	27,000	11000	2100	3500	34,050
6th Level, 2 *Miles*							
Excavation, 1 mile,		6000					
Embankment, 1 mile, 60 cts.	18,000						
1 Lock,			3000				
4 bridges,						1200	
1 small aqueduct,				2000			
20 acres, at 30 dollars,							600
1st 18 miles,	72,000	100000	30,000	13000	2100	4700	34,650
7th Level, 5 *Miles.*							
3 miles excavation, 20		18,000					
2 miles embankment, 40	24,000						
1 aqueduct,				10000			
1 Lock,			3000				
6 Bridges,						1800	
8 Culverts,					800		
Land, 50 acres at 15 dollars,							750
Excavation of rock, say 3000 perch, at 5 dollars,							15,000
1 Guard Lock therein,			1000				
1st 22 miles canal, including the tide work at Charlestown,	96,000	121000	34,000	23000	2900	6500	50,400
Concord River.							
First purchase of mill site,							10,000
Improvement,							10,000
Dam,							1000
8th Level, 5 *Miles.*							
1 Guard Lock, excavated in the Ledge; (cost uncertain) no wood work but the gates, say			5000				
3 miles at 20 cts.		18,000					
2 miles embankment, at 40	24,000						
2 Aqueducts,				10000			
6 Culverts,					600		
6 Bridges,						1800	
3 Stone Locks,			15,000				
Excavation of the basin,							1000
Purchase of land and erection of Stores,							3000
27 Miles,	120000	139000	54,000	33000	3500	8300	75,400
					Omitted 3300		
							11,600

Summary of the different divisions of expenditure on the Middlesex Canal.

Lands and extraordinary purchases, and excavation of rock—		$75,400
Bridges, (some of them less expensive)		11,600
Culverts,		3,500
Aqueducts,		33,000
Locks,		54,000
Excavation,		139,000
Embankments,		120,000
		448,000
Contingencies,		22,000
		470,000

To reduce this comparison to the par of the most favourable representation of the proposed canal, the following deductions should be made—

Lands and extras,	$75,400	
2-3 the bridges,	7,000	
And as the proportion of locks is as 1 to 5, so 1-5 would be	$11,000	
To which add for superior size and quality,	10,000	
	21,000	
Leaving of this item to be deducted	33,000	
	115,000	
and 2-3 the embankments	80,000	
In all		$195,000
Which deducted from 470,000, leaves		275,000
Amount brought over, being cost of Middlesex canal divested of its peculiarities,— equal to $10,500 per mile,		275,000
At this rate, the New-York state canal would cost for the 353 miles—at $10,500 per mile, or		3,706,500

Allowance for increased size of the trunk being as 7 to 4—supposing 1-20 the distance to be embankment; leaving 330 miles, at $2,812 additional, is $927,960

$4,634,460

In this, there is no estimate of superior workmanship and materials in the aqueducts.

If, however, it were presumed that the route might be full as difficult as that of the Middlesex, the estimate would stand thus:

If 27 miles cost 470,000 dollars, 353 miles would cost $6,500,000

To which add for increase of size and depth as above, 927,960

$7,427,960

And to this is to be added the superiority of work.

But, it being conceded that the ground is on the whole more favourable, this may be too high—especially as the Middlesex was not excavated by machines; but labour at *that time* was low. Common men had from $8 to $10 per month.

The works to extend the navigation from the junction of the canal with the Merrimack, up that river to Concord, New-Hampshire, cost as follows, viz.—

Wicasee lock and canal, thus described.—A rapid for half a mile between an island and the western shore, is crossed with a dam of stone and timber, 200 yards: this raises the water above, about a foot, which saved digging on the other side of the island, where the lock is placed. This side afforded a passage for high water, six rods wide. From the lock to its entrance is 1900 feet. This space was encumbered with masses of rock of every size, and with earth, estimated at 4000 square yards. The lock is placed in the middle of the stream; its side walls are 100 feet in length, connected with the shore by wing-walls, each about 50 feet. The wing walls are faced with plank driven into the bottom and extended into the shores. The walls hav-

ing no support, were necessarily thick, to sustain the pressure of the lock and the shock of the freshets. They are 12 feet high, and average 8 feet thick; contain 1200 perch. The stone was split out large, and drawn 1-2 a mile, loaded for the most part on to a boat with a crane and windlass, and thence laid. The foundation was difficult, the bottom was encumbered with stones, the water from 2 to 7 feet deep, and not being clear, the work of deepening, filled up, and laying the walls under water was done by feeling, diving, &c.

The whole expense including quantities of powder—much iron, boats, utensils, barricks, bedding, and the dam, was 14,000 dollars.

The labour was performed by about 100 men, between the middle of July and November.

Cromwell's lock is similar, with 120 rods of dam extending to the head of the rapid. It contains about 600 perch of stone, brought from the distance of a mile.

Whole expence about	$9,000
Moors' falls has two locks, with 200 rods of dam. Here was much excavation of earth and removal of stone,	15,000
Coos, a similar lock with less dam,	5,000
Goffs lock,	7,000
Short falls,	6,000
Grffiin's,	4,000
Merrill's falls lock,	10,000

All these walls were of split stone, difficult to be got on, and much iron was used.

Amoskeig canal is the greatest work of the kind on this navigation. The fall around which it is carried is one mile in length, and the perpendicular measurement 45 feet. 2000 feet is excavated. The rest of stone and dams. The whole expense is uncertain, but the part which was rebuilt the last season, may serve the purpose of comparison in some measure, viz. three locks connected together, each 100 feet in length, from 10 to 11 feet wide, lift each 8 feet. The walls of one side

without embankment, the other with. The contents of these walls being 8 feet average outside, and 5 feet average inside—is 6 1-2, say 7 feet thick, and 12 feet high, will be 2000 perch.

The old work was first removed; the old locks were supported by wooden ties above; few of the stone answered anew.

The stone were split, carted half a mile, loaded on to boats, brought down six miles, unloaded on a platform, loaded on to trucks, brought three hundred feet to the locks, unloaded on a stage, then worked into the walls.

The drought of last season, impeded the boating considerably. The locks are of white oak timber, and white pine plank, the whole of the best workmanship of the kind.

The expense, including wages, boarding, spirits, implements, and materials, was little more than 10,000 dollars.

Hookseld Canal consists of two locks, two basins, and a guard gate and stone dam. The stone was got out and boated over the river. There was considerable excavation, (including the purchase of a mill-seat.) The whole expense has been 15,000 dollars.

Bow Canal is a work of uncommon difficulty and variety. The perpendicular fall is 25 feet. Near its upper entrance, a dam is thrown across the river, which is here 200 yards wide. The guard gates are supported by stone abutments, 14 feet high. One half of the first 300 feet was ledge 6 feet deep, and 20 feet wide, say 1400 perch.

The next 300 feet was made by an embankment supported by a wall 12 feet high, 6 feet at bottom, and 4 at top, standing in the river, containing about 800 perch.

The next 250 feet is carried through a hill or ledge of rock, of a slaty kind, but hard enough to be blasted, 12 feet wide and 16 deep, containing about 2000 perch of excavation, 1900 yards.

The next 300 feet is excavated in gravel, on the

slope of a hill, sustained on one side by a wall 8 feet high, 4 at bottom and 2 at top, battering back more than usual.

Then comes the three locks, each 90 feet in length, containing about 2000 perch. The lower lock is set 4 feet below the low water mark. It was necessary to keep the pit clear by bailing and pumping. From the locks a low water channel was made. The stone were drawn from a quarter to half a mile, after being split. This work, including the purchase of 5 acres of land, cost 21,000 dollars.

These canals give a net income of 6, 7, 8 per cent. and are increasing fast in productiveness.

The Middlesex gave 32,000 dollars, or about 3 per cent. net income.

The following general observations may not be unacceptable to the board.

It is found to have been bad economy on the Middlesex canal, to have constructed any thing of perishable materials. Had all the locks been laid in cement, and constructed in the best manner, the property would have yielded dividends of income, and sustained its prospective value to a higher degree than at present.

The canal will be interrupted for three weeks, the ensuing summer, to put up a new aqueduct over Shawshine river. Other similar interruptions may be expected, whenever the other aqueducts and locks must be rebuilt. If the winter season is taken for the work, it will be more difficult and more expensive.

Probably for 50 per cent. additional for the aqueducts, they may be made of iron. Were it double, I should still deem it the best economy.

If this communication, which is very hasty and imperfect, can be of any use to the board, I shall have much pleasure in the reflection of having contributed, in any degree, to the great object of their attention.

With the highest respect,

I am, Sir, your most obed't. serv't,

JNO. L. SULLIVAN.

Albany, March 8th, 1817.

SIR,

The joint committee, to whom was referred the report of the commissioners constituted by the act to provide for the improvement of the internal navigation of this state, wishing to avail themselves of the opportunity now offered, request the commissioners (though the information required does not form a part of their official duties) to assist them in completing such a system of finance as will meet the contemplated improvements, and best subserve the public interest, with the least possible burthen upon the people.

I am, sir,

Your humble servant,

Wm. D. FORD, *Chairman.*

To the Hon. DE WITT CLINTON,
President of the Board of Commissioners.

Albany, 10th March, 1817.

SIR,

The canal commissioners had the honour of receiving your letter, of the 8th instant, requesting their opinion, on the best plans of ways and means for making the Erie and Champlain canals.

It will require considerable time to prepare and digest a complete, judicious, and well organized system of finance, for those important objects. And perhaps the session is so far advanced, that the legislature will not be able to bestow that attention on it, which their duty inculcates, and which the public interests demand.

But the commissioners have no hesitation in stating, that these important communications can be opened without any direct tax; that the resources of the state are abundantly ample; and that a preliminary arrangement may be made, which will answer every desirable purpose.

Notwithstanding the perfect conviction of the com-

missioners, that these canals can be made without any serious inconvenience to the financial operations of the state, yet they are persuaded, that it is due to the counsels of prudence, to bring the solidity of their opinions to the touchstone of experiment before the whole system is undertaken.

Under this impression, the commissioners recommend the adoption of immediate measures for purchasing the interest of the Western Inland Lock Navigation Company; for commencing and completing a canal navigation between Rome and the Seneca river, and between lake Champlain and the Hudson river at a convenient point below Baker's falls.

If the middle section of the western canal is made before the rights of The Western Inland Lock Navigation Company are purchased, it may induce the latter, in consequence of the increased value of their property, to rise in their demands. And if the state, after a fair trial of the experiment, shall only complete the canals now proposed, and proceed no further in the whole work, yet these partial operations will open valuable and important communications, and be greatly beneficial to the community.

The commissioners being of opinion, that those designated objects can be accomplished, in two or three years, and at an expense not exceeding one million and a half of dollars, would respectfully recommend, that a board of commissioners, to be denominated the commissioners of the fund for internal improvements be constituted; that it consist of the comptroller, the secretary, the attorney general, the surveyor general, and the treasurer; and that the powers and duties of the said board shall embrace the following objects:

1st. To borrow on the credit of the state a sum not exceeding a million and a half of dollars by the creation of funded debt, with interest at six per cent. payable semi-annually, and the principal reimbursable in twenty years, or at any time before, in the option of the state.

2d. The said commissioners shall keep an account of all monies received for the said fund, which monies shall be kept in the treasury of the state, and shall pay over from time to time, such monies as shall be required for the execution of the powers committed to them, by the commissioners constituted by the act to provide for the improvement of the internal navigation of this state.

3d. The said commissioners of the fund shall as soon as the said purchase, or the whole or any part of the said works is completed, have power to establish and receive reasonable tolls, and to take all the necessary measures for that purpose.

4th. The annual application of 60,000 dollars of the monies arising from auction duties, and the whole of the monies which the state may derive from the sale of unappropriated lands, shall be pledged for the payment of the said debt and the interest thereof, and shall be received, by the said commissioners, and applied to that purpose. And they shall have power to apply any unappropriated money, in the Treasury, to make good any deficiency or suspension, in the payment of the said funds, or to borrow on the faith of the state, any monies that may be necessary, to be reimbursed from the said funds when the same shall be received.

5th. The said commissioners shall, at the opening of the next session of the legislature, report a plan of finance, for the execution of the whole of the said canals, and also of a sinking fund, for the extinguishment of the debt.

The commissioners have proposed this plan for the following reasons:

1st. In a free government, where the people compose the sovereign authority, it is chimerical to contemplate the execution of a stupendous plan of internal navigation, without the adoption of a wise and economical system, which shall conciliate the affections, and secure the favourable opinion of those who are the source of all legitimate power. To attempt to raise by taxa-

tion the whole sum as it will be required, will impose a burthen on the people which will be destructive of the project.

2nd. The annual revenue of the state is now upwards of 924,000 dollars, and its ordinary expenses about 547,000 dollars, leaving a surplus of near 400,000 dollars applicable to extraordinary demands on the treasury, and to the extinguishment of the state debt. The auction duties, for the last year, amounted to about 160,000 dollars. Sixty thousand dollars of this fund may be therefore appropriated annually to the payment of interest as before stated, without interfering with any other claims, and without any inconvenience to the treasury. It will be also recollected that the direct tax of the United States, which last year drew from our treasury $365.620 38, has ceased to operate.

3rd. The appropriations before mentioned from the duties on auctions, and the partial avails of the sale of public lands, will be at least equivalent to an immediate grant of one and a half million of dollars. On a supposition that the western canal will cost five, and the northern one million of dollars, the commissioners of the fund for internal improvement, will, besides devising a sinking fund, have only to recommend a plan for raising 270,000 dollars annually, being the interest of 4,500,000 dollars. For this purpose, the following, among many other subjects, may be indicated: and it must be explicitly understood, that as only an annual revenue of 90,000 dollars will be required, until the canals from Rome to the Seneca river, and from Lake Champlain to the Hudson, below Baker's falls, are finished, it will not be necessary to use the funds now appropriated, until the happening of those events, and that they will be of course in a state of rapid accumulation.

The whole of the unappropriated lands of the state, considering the value of several villages, and of the Indian reservations, and the quantity on hand, may be

safely estimated at two millions of dollars. If the whole were sold on the usual credit, the annual interest would bring 120,000 dollars.

A revenue may be derived from steam boats, without injuring the proprietors, to the amount of $30,000 annually.

The income from the salt springs will be next year about $10,000. It is believed that this sum may be augmented, without the least inconvenience to the community, to $40,000.

There are some places, which will be benefitted in an extraordinary degree, by the canals. An annual assessment, say of $50,000 on them, would not be felt, and would be reasonable; and it might be continued until the present grants of lotteries shall be satisfied, when that sum might be raised by substituting lotteries.

The donations already made, and which may be reasonably expected, will probably amount to a million of dollars in value.

The revenue, originating from the few sources here pointed out, will be amply sufficient to meet the whole sum required, which is 360,000 dollars annually, or the interest of $6,000,000.

Auction duties,	$60,000
Sales of public lands,	120,000
Steam boats,	30,000
Salt springs,	40,000
Assessments and lotteries,	50,000
Donations,	60,000
	$360,000

It is admitted that the whole of this property cannot at once, be rendered productive; but it must also be conceded, that it can be rendered so, contemporaneously at least with the exigencies that will require it.

As soon as the canals, or any important section of them are completed, a great revenue will accrue to the state, which will speedily extinguish the whole debt; and this will arise in two ways.

1st. From the artificial mill sites, and the infinite variety of hydraulic uses, to which the surplus waters may be applied, but these privileges ought never to be sold in perpetuity, but leased, and kept under the control of the state, so that no individual can gain an interest in them, that may become prejudicial to the public.

2d. From the imposition of light tolls or transit duties, on vessels and cargoes descending the canals, to be increased on those ascending.

The late Mr. Fulton, from data furnished by the custom-house, calculated that 400,000 tons of freight are annually carried on the Hudson. And from a comparison between the country trading on that river, with the territory embraced by the western canal, he estimated that there would be annually transported on the latter, one million tons of commodities. He further was of opinion that the cost of transportation on the canal from Buffalo to Albany would be three dollars and fifty-three cents a ton, and from Albany to New-York, two dollars and fifty cents a ton. A toll of fifty cents a barrel, or twenty-five cents a hundred on merchandize, would amount on a ton to five dollars, making eleven dollars and three cents for the expense of carrying a ton on the whole route, or one dollar and ten cents for a barrel of flour, which would be by no means burthensome or oppressive, when we consider,

1st. That the present cost of transportation by land, from Buffalo to Albany, is $100 a ton.

2d. That the toll now paid, for a barrel of flour, passing the locks of the Western Inland Lock Navigation Company, the distance of only one hundred miles, is fifty-two cents, and for a ton of goods five dollars and twenty-five cents, besides a considerable duty upon the vessels. The same charge, for the whole extent of the western canal, a distance of 353 miles, which is now made by that company for less than one-third of the distance, would in a short time produce the enormous

income of $5,000,000; but lowering the duty to one dollar a ton, the whole expense of this magnificent operation would be defrayed in a few years, and an immense revenue would be secured to the state, which would enable it to patronize literature and science; to promote education, morality, and religion; to encourage agriculture, manufactures, and commerce, and to establish the interests of human improvement upon an imperishable basis, and to an incalculable extent.

We have the honour to be most respectfully,
Your most obedient servants,
By the Commissioners,
DE WITT CLINTON, *President.*

WM. D. FORD, Esq.
Chairman of the Joint Committee of the Senate and Assembly, on Canals.

Copy of a letter to William Bayard, Esq. relative to a loan of money.

New-York, 23d May, 1816.

SIR,

The commissioners appointed for the purpose of reporting to the legislature, on the subject of a canal navigation between Lakes Erie and Champlain, and Hudson's river, are directed, with a view to the accomplishment of those important objects, to ascertain whether a loan of money can be obtained on the credit of the state of New-York, and also the terms of such loan.

The commissioners, having full confidence in your disposition to promote this great undertaking, and in your ability to obtain the information required, solicit your early attention to this subject, and beg leave to indicate the following points as material to the inquiry; the amount of the sum that can be loaned; the rate of

interest; the place where the interest is to be paid; and the duration of the loan.

Very respectfully, your obed't. serv't,
DE WITT CLINTON,
In behalf of the Commissioners.

Wm. Bayard, Esq.

FORMS OF CESSIONS OF LANDS.

Whereas the Legislature of the state of New-York, by an act entitled "An act to provide for the improvement of the Internal Navigation of the State," passed April 17, 1816, did appoint Commissioners authorised and required (among other things) to make application in behalf of the People of this State, for cessions, grants, or donations of land, for the purpose of aiding in the construction of a contemplated Canal to connect the waters of Lake with the navigable waters of the Hudson River: Now THEREFORE, in consideration of the benefits which will result to community in general, and to myself in particular: AND ALSO, in consideration of the sum of one dollar to me in hand paid by the said commissioners in behalf of the said State, I hereby, for myself and my heirs, give, grant, cede, and for ever transfer to the People of the State of New-York, for the purposes aforesaid, the following piece or parcel of land, to wit:

PROVIDED HOWEVER, that if the said Canal shall not be completed within twenty years from the date hereof, then the above grant and the cession hereby made shall be null and void.

Dated this day of one thousand eight hundred and sixteen.

SIGNED, SEALED, AND DELIVERED, }
IN THE PRESENCE OF }

Whereas the Legislature of the State of New-York, by an Act, entitled "An Act to provide for the improvement of the internal Navigation of this State," passed April 17, 1816, did appoint Commissioners authorized and required (among other things) to make application in behalf of the People of this State, for cessions, grants, or donations of land, for the purpose of aiding in the construction of a contemplated Canal to connect the waters of Lake with the navigable waters of the Hudson River: AND WHEREAS, it is supposed that the said Canal will pass through lands belonging to me, NOW THEREFORE, in consideration of the benefits which will be conferred upon all who own real property in the vicinity of the said Canal, and upon myself in particular: AND ALSO in consideration of the sum of one dollar to me in hand paid by the said Commissioners in behalf of the said State, I hereby, for myself and my heirs, give, grant, cede, and for ever transfer to the People of the State of New-York, all the lands belonging to me which shall be necessarily occupied by the site of the said Canal, and also by the site of the Towing Paths, Feeders, Aqueducts, Reservoirs, Spoil Banks, and Culverts connected therewith.

Dated this day of one thousand eight hundred and sixteen.

SIGNED, SEALED, AND DELIVERED, }
IN THE PRESENCE OF }

In Assembly, March 19, 1817.

REPORT

OF THE

JOINT COMMITTEE ON THE SUBJECT OF THE CANALS.

The joint Committee, to whom were referred the report of the Commissioners appointed in the act for the improvement of the internal navigation of this state, with the documents thereto annexed, and the minutes, draughts, maps, and profiles of the engineers employed by the said Commissioners, relating to the contemplated Canals from Lake Erie to the Hudson, and from Lake Champlain to the same,

RESPECTFULLY REPORT—

That they have applied their best faculties to the investigation of the important subjects submitted to them; and the result has been a settled conviction, that the highest interests of this state require, of the Legislature, the adoption of suitable measures for the immediate commencement of these canals.

The minute and copious detail of facts, stated by the Commissioners, in relation to the length, direction, location, and dimensions of these canals, the difficulties and facilities occurring throughout the course of each, and the manner of construction recommended for the various works necessary to their completion, appears to your committee to be very satisfactory. In estimating the expense of these great undertakings, it was not to be supposed that no errors would be committed; and it is probable that for some items, the estimates will, in the application of them to practice, be found too low, and for others too high. The aggregate amount of

these estimates, however, as well as many particulars which compose it, seems to be well warranted, by the different data appended to the report of the commissioners. And your committee have observed, with great pleasure, that the benefits of actual experiment, in regard to most of the expenses incidental to the construction of canals, is far more extensively furnished by our own country than is generally imagined.

If then, it is rationally established, that the expenses of the western canal will not differ materially from five millions, and those of the northern canal from one million of dollars, is it best for the state of New-York immediately to engage in the accomplishment of these measures?

This state is favourably situated for the encouragement of every public interest. It contains inexhaustible quantities of salt, gypsum, and iron ore, with a great variety of other valuable materials for manufacturing establishments. The thirty million acres of its territory offer to agricultural industry no uncertain or penurious reward. An unrivalled river navigation for more than one hundred and sixty miles, terminating on the sea-board, at a port, which is capacious, healthy, and easy of access; its interior boundary line, passing for more than half its length through the waters of Erie, Ontario, and Champlain, and the numerous navigable lakes included within its limits, afford to its citizens the most decided commercial advantages.

In such circumstances, its prosperity is not surprising. It was to be expected, that under the direction of prudence and patriotism, its wealth, population, and security would be rapidly advanced. And this advance, which is every where observable, is not the less gratifying because it was natural and probable. It is, on that account, more likely to be permanent. But has it not nearly reached its maximum, with respect to the southern and middle district, unless some new means of aiding it are speedily discovered and applied? Con-

sirable portions of these districts are now almost replete with inhabitants, who by their industry and enterprise, have taken possession, and made the most, of nearly all the bounties which nature has spread out before them. And beyond the slow progression of improvement to be produced by the invention of happier methods of applying labour, and the more perfect division of mechanical occupation, what will enlarge the borders of their cities and villages hereafter?

As the eastern and western districts have increased in numbers and opulence, they have loaded the Hudson with their surplus produce, and the merchandize for which they have exchanged it; and this trade has been the chief aliment of all the increase which has latterly been exhibited at the mouth and along the banks of that river. But the remote sections of these districts are contiguous to the territory of a foreign power, and are washed by navigable waters, which flow into the ocean through that territory. It is for the interest, and will therefore be the policy of that power, to invite commercial intercourse with those sections. Facilitated by the course of their streams, and the declivity of their country, our citizens have already extensively engaged in this intercourse.—And, if nothing is done to divert them from it, it is easy to foresee, that it will become permanent, and soon embrace within the number of its agents, all those who live beyond the high lands, in which our rivers running to the north originate; including the most fertile part of the state, which is hastening also to become the most populous.

Our eastern and western districts having been settled from the south and the east, roads from these points were, of course, first opened. These roads were extended and improved with the diffusion and age of the new settlements. And as they were, for several years, better, in proportion to their proximity to the Hudson, this circumstance, added to the ties of acquaintance, friendship, and consanguinity, retained the settlers, for a long

time and universally, in a business-connexion with our own cities. But these roads are now carried through to the farthest borders of the state; and on the margin of the waters where they terminate, a dense, active, and intelligent population is collected. Stimulated by the energetic impulse of private emolument, these people are making new roads and improving the old, erecting store-houses and wharves, building vessels of every description calculated to facilitate transportation, and at various places extending into the country, by artificial constructions and the improvement of natural streams, navigable communications with the northern waters. The enterprising spirit of these people is laudable. It has heretofore added to the wealth of the state, while it has enriched themselves. And unless it is directed into new channels, it will hereafter lavish the productions of our soil, to the amount of several millions a year upon our northern neighbours. This unwelcome result, it appears to your committee, that the present state of things, is rapidly maturing; and to render it still more inauspicious, it will inevitably produce the effect of sending to a permanent foreign residence, many of our most useful citizens.

Shall we look on with unconcern, and see so large a portion of the means, within our power, of conferring a perpetually increasing strength and respectability upon our body politic, for ever averted? Or shall we adopt an easy, an obvious, an effectual method of reclaiming for ourselves and our posterity, to the remotest generations, all these means, amplified into their fullest proportions by a warmer patronage than the frozen outlet of the St. Lawrence can ever afford?

The decision of this question is now emphatically devolved upon the state. It is a question, in which the interests of every district, county, and town, are deeply implicated. There are places, indeed, which will enjoy, more immediately, and in a higher degree, the incalculable advantages of these canals; but these

advantages will most assuredly, and in no parsimonious measures, reach and enrich every part of the state.

It has been observed by a perspicacious statesman of our country, that "in proportion as the mind is accustomed to trace the intimate connexion of interests which subsists between all the parts of a society united under the same government; the infinite variety of channels which serve to circulate the prosperity of each to and through the rest; in that proportion will it be unapt to be disturbed by solicitudes and apprehensions which originate in local discriminations. It is a truth, as important as it is agreeable, and one to which it is not easy to imagine exceptions, that every thing tending to establish substantial and permanent order in the affairs of a country; to increase the total mass of industry and opulence, is ultimately beneficial to every part of it. On the credit of this great truth, an acquiescence may safely be accorded, from every quarter, to all institutions and arrangements, which promise a confirmation of public order, and an augmentation of public resource."

Your committee believe, that navigable canals, connecting the Hudson with lake Erie and with lake Champlain, would, from the moment of their completion, make it cheaper for nearly all our western and northern citizens to find a market down these canals, than in and other direction; and they would certainly afford the safest possible transportation.

But, besides calling back to our own market a large amount of the productions of our own soil, which are now alienated from them, the construction of these canals would draw into our limits the trade of the western parts of Vermont, of a considerable region in Upper Canada, and of the northern half of all that portion of the United States, which lies west of the Allegany mountains. The future extent of this trade, it would be difficult to calculate. It must be immense. The country south of the great lakes alone, from which it will flow, includes as many acres as make up the

territory of some of the most powerful nations of Europe, and is the most fertile part of the globe. That country already contains near a million of souls, and is increasing with a rapidity of population known only on this side of the Atlantic.

The increase of the people of New-England, for the last twenty years, has been at the rate of six per cent. annually; and the surplus thousands of this increase are continually seeking new settlements in the west. A similar climate to that in which they have been bred—a luxuriant soil, and advantages for navigation, which are never lightly esteemed by a trading people, induce these thousands, for the most part, to take up their abode within two or three degrees of latitude south of the lakes. There they are joined by a numerous emigration from the middle and southern States, who, together with them, multiply and thrive in exact proportion to the means of subsistence, which their common industry produces. It is in our power to open to that country a cheaper, safer, and more expeditious road to our market towns, than they can possibly enjoy to any other. Shall it be done?

The expense of transportation from Buffalo to Montreal, is 30 dollars a ton; and the returning transportation is from $60 to $75 a ton. The passage of lake Ontario and the St. Lawrence, is shown to be dangerous, by the fact, that many vessels and lives are yearly lost upon them. And this passage, though at different times of very unequal duration, is on an average longer than one would be from Buffalo, through a canal and the Hudson, to New-York. The expense of transportation from New-York to Buffalo is about 100 dollars a ton, and the ordinary length of the passage is about 20 days. In the present state of things, to all the trade of the west, the evils attending the more tedious and expensive route to New-York, are not counterbalanced by the benefits of a superior capital and a more open port, which that city enjoys over Montreal. Make the western canal, and

it would once and for ever control that trade; for it would offer a transportation from Lake Erie to New-York, including the imposition of reasonable tolls, at a rate of from $10 to $12 a ton.

Those, whom business and curiosity have led to consider what is the amount of monies now actually paid for transportation by our citizens, will best understand how to appreciate the saving produced by so great a reduction of its price. It is believed by intelligent gentlemen, that the merchants of our state, living in Oneida and the counties west, pay annually, for transportation, not less than one million of dollars. And this belief is strengthened by what is known in relation to the sums paid, by the merchants of Pittsburgh, for waggonage, from Philadelphia and Baltimore, to that place. In the year 1815, the amount of this kind of disbursement, was found to be, in the month of July, $103,000, in the month of August, $112,000, and in the first fourteen days of September, $83,000. This saving, it must be confessed, would be of vast importance.

By making the northern canal, a saving would be ensured, of much less amount indeed, but, considering the cumbrous and heavy articles, which must always constitute the chief subjects of trade, from the neighbourhood of lake Champlain, and the difficulty of removing them upon the present roads, the expense of transportation would be reduced in almost as great a proportion.

In discussing the expediency of opening these canals, it should never be forgotten that the question is, whether we will, by taking measures completely within our power, and not burthensome, secure to our own country incalculable wealth, or will, by neglecting such measures, bestow that wealth, with all its advantages, upon a foreign nation.

To those of our citizens, who live on the great parallel roads, which traverse the state east and west, it is important to consider, not whether the canal, from

lake Erie to the Hudson, will be more travelled than either of those roads, but whether this travel shall pass through the heart of the state, giving additional activity to every species of profitable labour, by dispensing to it a golden reward, or whether it shall be diverted entirely beyond their reach, and pass down the waters of the St. Lawrence and the Mississippi. And they should remember, that whatever increases population, capital, and commerce, in their vicinity, enlarges the sum of materials out of which their individual fortunes are to grow. The same considerations will apply, with greater or less force, to every portion of our people.

It will not be denied, that the construction of these canals will induce the transportation into the state, of an immense amount of interior productions and of foreign goods. Will these come into the state, and depart from it, without leaving any traces of their having been among us? Or, will they swell the comforts of our country towns, and make our villages and cities exhibit, upon a larger scale, the improvements and the magnificence of a prosperous community?

From the foregoing observations, it will be perceived that your committee are of opinion that these canals would be beneficial to every section of the state. They would eventually make New-York the greatest commercial emporium in the world; and the greatness of the commerce of that city, would, in a variety of ways, promote the interests of the southern district. Every addition to its inhabitants, would add to its demand for all the numerous articles, which only its immediate neighbourhood can supply; and every augmentation of its wealth, would send out, in greater numbers, its rich citizens, to patronize the industry, and to cultivate, improve, and embellish the face of the earth, in the adjacent country. Experience shows, in all the rich cities of Europe, that as the means of communication with the interior are rendered easier, better, and more extensive, from those cities, the value of property has uni-

formly increased in their vicinity. It must necessarily result, from establishing great affluence in any place, that the ordinary channels of wealth, which are open nearest to that place, will first be filled.

These canals would promote the interests of the middle district, by furnishing it with gypsum, salt, iron, lumber, and fuel, in many places cheaper than they can be otherwise obtained; and by increasing the market for all its surplus productions.

They would speedily give a new and more prosperous aspect to the business of our northern counties, by opening, to a more profitable and growing demand, their extensive forests, abounding with all the usual kinds of lumber, and building timber, and their inexhaustible mines of iron ore; and by facilitating the transportation to and from their markets, in such a manner as to give an additional value to all their other exports, and a reduced price to all their imports.

To the western district, the importance of these canals is too well known, and too generally admitted, to need elucidation here.

It may be proper, in this place, to notice an objection sometimes made against making these canals, arising from the high price of labour in our country. The foundation of this objection will probably long remain. But can the objection itself have any weight? Is it not apparent, that if the price of labour is high among us, it applies as well to the prodigious annual expense, which would be saved in transportation, by the canals, as to the cost of their construction?

The consideration, which your committee have given to these great improvements, has impressed them with a conviction, that from the moment when the Legislature shall deliberately determine to undertake them, the real property of the state will rise in value, faster than the amount of disbursements necessary to their perfect completion. They ought certainly to be made.

But does good policy require, that they should be

immediately commenced? The benefits which they will insure, are, now extensively understood; and the evils which they will avert, are plain, palpable, and urgent. Every real objection to them must be of a local origin; and will time lessen such objections? Every year produces new concentrations of interest, on the borders of the northern waters, at mill sites, and in the centres of the counties, where villages spring up and grow into importance. Some of these places will be so situated as to think hereafter that the construction of these canals will be injurious to them; but if it shall be now known, that they will be constructed, these villages will take such a location in future, and with prospects much more promising, as to profit by all their advantages.

The land to be occupied by the canals would now cost nothing; and little expense would be incurred, in the purchase of water privileges from mills and other hydraulic establishments. But wait a very few years, and the enterprise of our countrymen will have appropriated every stream to objects, from which the expense of detaching them will be measured by their profit; and every mile of the country will contain obstructions to the route, from public or private edifices, from orchards, or from burying grounds. Your committee, therefore, decidedly believe that the best policy of this state requires the immediate commencement of these canals.

Having arrived to this conclusion, it is felt to be a cause of just exultation, that the interests of the state of New-York, demanding the execution of these projects are so entirely concurrent with those of several of our sister states, and of the union generally. The Legislature of Ohio, with a liberality and promptitude worthy of that enlightened body, have already expressed their zealous approbation of the canal from lake Erie to the Hudson, and pledge themselves to an effective co-operation in its construction. Additional aid may be expected from other states in the west.

And surely we may yet look for help from the government of the United States. As bonds of union, as military roads, as favouring the increase and collection of commercial revenue, as means of sustaining her Indian department, and as prolific parents of all kinds of national resource, the claims of these canals upon the general government must hereafter be allowed and fostered. That day which shall see them completed, will be a proud one for our country. If the Spaniard, who, from the top of the Andes, first discovered the Pacific, felt impelled by a natural impulse, to prostrate himself in thanksgiving to the Almighty, for the prospect with which he was indulged, what pious gratitude will become the American citizen, whenever, by the completion of these improvements, he shall be permitted from the political and moral elevation on which they will place him, to contemplate as wide an expanse, animated, adorned and illustrated, by every thing interesting and ennobling to man! Let it be the ambition of this state, now to commence them, and this prospect will soon be realized.

It remains for your committee to point out where they would recommend to have these canals begun; to designate the funds which they would appropriate to them at the present session; and to state the manner in which they think it expedient to provide for their eventual completion, and the discharge of all the expenses to be incurred in their prosecution.

Notwithstanding the perfect conviction of your committee, that these canals can be made without any serious inconvenience to the financial operations of the state, yet they admit that it is due to the counsels of prudence to bring the solidity of their conviction to the touchstone of experiment, before the whole system is undertaken.

Under these impressions, they recommend the adoption of immediate measures, for purchasing the interest of the Western Inland Lock Navigation Company, and for commencing and completing a canal navigation, between Rome and the Seneca river, and between

lake Champlain and the Hudson river, at a convenient point below Baker's falls.

If the middle section of the western canal is made before the rights of the Western Inland Lock Navigation Company are purchased, it may induce the latter, in consequence of the increased value of their property, to rise in their demands. And if the state, after a fair trial of the experiment, shall only complete the canals now proposed, and proceed no further in the whole work, yet these partial operations will open valuable and important communications, and be greatly beneficial to the community.

Your committee, being of opinion, that those designated objects can be accomplished in two or three years, and at an expense not exceeding one million and a half of dollars, recommend that a board of commissioners, to be denominated the Commissioners of the Fund for Internal Improvements, be constituted; that it consist of the comptroller, the secretary, the attorney-general, the surveyor-general, and the treasurer.

It is proposed to establish a fund, or income, to be appropriated expressly and exclusively to the making of these canals, and to be pledged for the payment of the interest and principal of such loans as it may become convenient to make, and which should be made exclusively upon the credit of such income, and not upon the general credit of the state; and that the comptroller be directed to open separate books, and to keep the accounts of those funds distinct from the other funds and accounts of the state; the whole to be under the control and management of the said commissioners of the fund, whose powers and duties shall, besides, embrace the following objects:—

1st. To borrow, on the credit of the fund above mentioned, a sum not exceeding a million and a half of dollars, with interest not exceeding six per cent. payable semi-annually, and the principal reimbursable in twenty years, or at any time before, in the option of the state.

2d To pay over, from time to time, such monies as shall be required for the execution of the powers committed to them, by the commissioners constituted by the act to provide for the improvement of the internal navigation of this state.

3d. To purchase the interest of the Western Inland Lock Navigation Company.

4th. The said commissioners of the fund shall, as soon as the said purchase, or the whole, or any part of the said works is completed, have power to establish and receive reasonable tolls, and to take all the necessary measures for that purpose.

5th. The annual application of dollars of the monies arising from the auction duties, of the duties arising from salt as herein after mentioned, and the whole of the monies, which the state may derive from the sale of unappropriated lands, shall be pledged for the payment of the said debt and the interest thereof, and shall be received and applied by the said commissioners of the fund for internal improvements; and they shall have power to apply any unappropriated monies in the treasury to make good any deficiency or failure in the receipts of the said fund, or to borrow on the faith of the state any monies that may be necessary, to be reimbursed from the said funds, when the same shall be received.

6th. The said commissioners of the fund shall at the opening of the next cession of the legislature, report a plan of finance for the execution of the whole of the said canals, and also of a sinking fund for the extinguishment of the debt.

Your committee have proposed this plan for the following reasons :—

1st. In a free government, where the people compose the sovereign authority, it is chimerical to contemplate the execution of a stupendous plan of internal navigation, without the adoption of a wise and econo-

mical system, which will conciliate the affections and secure the favourable opinion of those, who are the source of all legitimate power. To attempt to raise by taxation the whole sum, as it will be required, will impose a burthen on the people, which would be destructive of the project.

2d. The annual revenue of the state is now upwards of 924,000 dollars, and its ordinary expenses about 547,000 dollars, leaving a surplus of near 400,000 dollars applicable to extraordinary demands on the treasury, and to the extinguishment of the state debt. The auction duties for the last year amounted to about 160,000 dollars. From this fund the sum of dollars may be therefore appropriated annually to the payment of interest as before stated, without interfering with any other claims, and without any inconvenience to the treasury.—It will be also recollected, that the direct tax of the United States, which last year drew from our treasury $365,620 38, has ceased to operate.

3d. The appropriations before mentioned from the duties on auctions and salt, and the partial avails of the sale of public lands, will be at least equivalent to an immediate grant of one and a half million of dollars. On a supposition, that the western canal will cost five, and the northern canal one million of dollars, the commissioners of the fund for internal improvements, will, besides devising a sinking fund, have only to recommend a plan for raising 270,000 dollars annually, being the interest of four and a half millions. For this purpose the following among many other sources may be indicated. And it must be explicitly understood, that as only an annual revenue of $90,000, will be required until the canal from Rome to the Seneca river, and from lake Champlain to the Hudson river below Baker's falls, are finished, it will not be necessary, to use the funds now designated, until the happening of those events; and that some of them will be, of course, in a state of rapid accumulation.

1st. A tax to be laid upon all salt manufactured in the western district, at the rate of nine cents per bushel, upon that which is made at private works, and at the rate of twelve and a half cents per bushel, upon that which is made at the public works.

2d. The duties on sales at auction, after deducting $26,000 for the hospital, $15,000 for the support of foreign poor in the city of New-York, $500 for the Orphan Asylum Society, and $500 for the economical school.

3d. A tax to be laid upon the valuations of real and personal property, in the counties, cities, or towns, which will be particularly benefitted, by the construction of these canals, of from one-third to three-fourths of a mill upon a dollar. And the places to which this tax should apply, and the proportion of its application to each, your committee think should be as follows:

New-York, at 1-2 a mill, on last year's valuation, amounting to		$41,037
Albany and Watervliet, at 3-4 mill, on do. do.		4,776
The towns of Waterford, Stillwater, Saratoga, Northumberland, and Moreau in the county of Saratoga,	at 1-2 do. on do. do.	1,762
All the towns of Washington county, except Cambridge, Jackson, and Whitecreek,	at 1-2 do. on do. do.	2,672
The county of Essex,	at 3-4 do. on do. do.	706
of Clinton,	at 3-4 do. on do. do.	1,135
of Montgomery,	at 1-3 do. on do. do.	2,593
of Herkimer,	at 1-2 do. on do. do.	1,914
of Oneida,	at 3-4 do. on do. do.	7,098
of Madison,	at 3-4 do. on do. do.	3,408
of Onondaga,	at 3-4 do. on do. do.	2,869
of Cayuga,	at 3-4 do. on do. do.	3,647
of Seneca,	at 3-4 do. on do. do.	3,066
of Ontario,	at 3-4 do. on do. do.	11,203
of Genesee,	at 3-4 do. on do. do.	5,834
of Niagara,	at 3-4 do. on do. do.	2,373
of Chautauque,	at 3-4 do. on do. do.	647

The city of Troy,	at 1-2 do. on	do.	do.	800
The village of Lansingburgh,	at 1-2 do. on	do.	do.	180

4th. A tax upon all steam boat passengers, of one cent per mile each for any distance not exceeding an hundred miles, and not exceeding one dollar for a passage between Albany and New-York.

5th. Lotteries after the sums now granted upon them are raised, and which will probably require ten years.

6th. All unappropriated lands.

7th. Contributions from other states, on condition that they shall make use of the canals, for the same tolls, as may be required from the people of this state.

8th. Contributions from the government of the United States, on condition, that for all their purposes they shall use the canals for the same tolls, as may be required from the people of this state.

9th. Donations of money and lands from individuals. John Grieg, Esq. has already contributed to this fund, by executing a deed to the people of this state, for three thousand acres of land lying in the county of Steuben; and the agent of the Holland Land Company has given satisfactory assurances, that he will execute a deed of 100,632 acres of land, lying in the county of Cattaraugus, for the same purpose.

10th. As soon as the canals, or any important section of them are completed, a great revenue will accrue to the state, which will speedily extinguish the whole debt, and repay to all the places, which shall have been taxed on the valuation of their real and personal estates, the sums from them respectively levied. This revenue will arise in two ways:

1st. From the artificial mill sites, and the infinite variety of hydraulic uses to which the surplus waters may be applied. These privileges ought never to be sold in perpetuity, but leased and kept under the control of the state, so that no individual can gain an in-

terest in them, that may become prejudicial to the public. And,

2d. From the imposition of light tolls or transit duties, on vessels and cargoes descending the canals, to be increased on those ascending.

Your committee deem it proper, before they conclude, to present to the consideration of the Legislature, a proposition for the construction and completion of the western canal, which has been made to the president of the canal commissioners, by J. Rutsen Van Rensselaer, Esq. as follows:

SIR,

Desirous of aiding by every means in my power the improvement of the internal navigation of this state, I take the liberty of submitting to your consideration the following propositions, to be disposed of as you may deem proper.

1st. I will form a company, who shall give security in the sum of one million of dollars to be approved by the comptroller, that the whole canal from Erie to Hudson shall be completed, on the plan contemplated by the report of the commissioners, except only, that the aqueducts shall be formed of durable materials, probably cast iron, as in my opinion wood should not be used in any exposed situation. I will then contract to perform the whole work, for ten millions of dollars, five hundred thousand of which shall, on good security, be advanced by the state, to be accounted for by the company, on the completion of the canal, and shall form a part of the last expenditure; and on each subsequent advance, by the state, similar security shall be given, that the amount shall be applied to the object, and a proper proportion of the distance be completed, until the whole is finished.

2dly. I will complete the work, on like advances and security, for the sum of seven millions and an half of dollars, together with the tolls, which may be collected

from the time one-fourth of the canal shall be completed to the expiration of twenty years after the whole is finished, the toll not to exceed two cents per mile per ton. Or,

3dly. I will, on the like advances, furnish the like security, and finish the whole, for five millions of dollars, together with the tolls, at the rate specified in the former proposition, for the period therein specified, and for one half that sum for ever thereafter: should the legislature exact a toll, after the twenty years, at the rate of five dollars per ton, for the whole distance, the company shall pay, and the canal be pledged as security, three per centum per annum, on the whole advance, or refund to the state two millions and an half of dollars, at convenient periods, with interest, at six per cent.

In the commencement of an undertaking of this importance, the Legislature should be governed by a spirit of great liberality; sectional interests should not be indulged, and no objection should be raised to the imposition of a general tax to meet a portion of the expense. If the Legislature will consent to borrow the five millions of dollars, funds may very easily be provided to meet the payment of the interest, and to redeem the principal at no great distance of time.

I am, sir, with perfect respect,

Your most obedient servant,

J. RUTSEN VAN RENSSELAER.

Claverack, 11th March, 1817.

To the acceptance of either of these propositions, your committee are entirely opposed, being persuaded, for a variety of important considerations, that the state should retain the perfect control of this canal, in every period of its construction and future regulation.

For the reasons and in conformity with the principles herein specified, your committee have prepared a bill on the subjects submitted to them, which they now ask leave to present.

WILLIAM D. FORD, *Chairman.*

In Assembly, *April* 3, 1817.

Communication from the Canal Commissioners.

The canal commissioners have the honour to report to the honourable the Assembly, in obedience to their resolution of to day:—

That they are not required or authorized by law to hold any communications with the western inland lock navigation company respecting the purchase of their interests, and that, of course, they did not institute any inquiry on that subject. It appears however from an official report of the former commissioners, who were duly authorized, dated March 1812, that the company asked $190,000 for the shares held by them, exclusive of three hundred and fifty shares held by the state. And the present commissioners coincide in the opinion with the former board, that the price then asked is unreasonably high.

The commissioners have obtained cessions of the land to be occupied by the Erie canal, from fifty-six persons, through whose farms the line passes, west of the Seneca river; and Schoharie creek, a considerable number of cessions, from persons living within those limits; but as the deeds of cession, except those which relate to lands west of the Seneca river, are not here, and as these deeds do not, in general, express the length of line conveyed by those who have executed them respectively, neither the precise number of these deeds, nor the exact extent of the lands which they cover, can at present be ascertained.

Though the commissioners, at an early day, procured blank forms of cessions to be printed (some of which were delivered to the engineers on the different sections of the canals) and have found more than nine-tenths of those to whom they were offered for subscription, willing to make a donation to the state of that strip of their land, which would be required for the canal, it has not

yet been in their power to secure a large portion of the canal lines. Much of the land lying in the western part of the state is owned by persons who do not reside there. The agent of the Holland land company has offered to convey to the state a strip of land for the canal, through their possessions, not exceeding four rods in width, on condition that the state shall make a good harbour for lake vessels at the mouth of Buffalo creek, a condition which the commissioners think entirely inadmissible. Other agents did not feel themselves authorized to make the donations desired, without consulting their principals. This they engaged to do, and at the same time expressed decided expectations of receiving favourable answers, but had not received those answers at the date of the last communications between them and the commissioners. In some cases the owners of the land, though usually resident there, were absent from home, and it has hitherto been inconvenient to make application to them. Besides, in exploring the route of the canal, in a country but partially cleared, it was impossible for the engineer, in first running it over, to determine in many places, where the canal line would pass. After advancing some distance in a doubtful course, difficulties would be met with, which made it expedient to go back upon the line to some point, whence a more eligible course might be pursued. In such cases, cessions on the route first explored would be useless; and a few of the deeds actually obtained are of this description. And although the line of canal presents but few obstructions, and is in general extremely favourable, yet it cannot be doubted but that the more minute and extensive examination of resident engineers, to whose superintendance the execution of the work ought to be intrusted, will point out many partial deviations from this line, which may be made with great advantage and economy. Hence it seemed the less important to obtain deeds of cession, on a first survey, even if the more general, and as was

judged more pressing duties of the commissioners and engineers, had allowed the necessary time. And it was thought, in reference to all those parts of the route of both canals, which should not be immediately undertaken, that the inducements to give the lands to be occupied by the canals, would rather be increased than diminished, making the eventual success of the whole projects to depend, as well upon the encouragement offered by those who are most interested therein, as upon the success of those parts actually to be commenced.

It is not to be denied that a few individuals, whose lands will be crossed by canals, have refused to make a donation of any part of those lands to the state. A provision by the Legislature, therefore, seems to be required, for taking the necessary possession of lands so withheld. Whether this provision extend to a few cases more or less, appears not to be very material, as if it is equitable, it will doubtless involve no public expense, except in cases where it interferes with expensive existing improvements.

The commissioners, from the best information which they have been able to obtain, entertain no doubt but that the necessary lands on the whole route of the canals may, with a few exceptions, be procured gratuitously.

All which is respectively submitted,

DE WITT CLINTON,
MYRON HOLLEY,
SAMUEL YOUNG.

Albany, April 1, 1817.

To the Honourable the House of Assembly.

In compliance with a resolution of the honourable the Assembly, we have the honour of enclosing a statement of the Comptroller. This communication would have been made before, but the accounts, as far as they were ascertained, were agreeably to the directions of the law exhibited to him; and with every attention, on his part as well as ours, it was not until to-

day that it has been in our power to render this statement.

The expenses of the commissioners include the expenses of travelling, at various periods—of their visit to the Middlesex canal—of their superintendance of the whole route of both canals, of their meetings at various times, and are brought up to their first meeting during the present session of the Legislature. They consist of the following sums, viz.—

Expenses of commissioners meeting 17th May, 1816, in New-York, including the expense of going there, of stay there, of two commissioners with two engineers going to view the Middlesex canal, stay there, and return home,	$515
Expenses of commissioners in meeting at Utica on the 15th July, while there, while exploring the route of the western canal, and returning home,	1080 12
Expenses of the commissioners in exploring the northern canal and directing operations thereon,	679 19
Expenses of commissioners in meeting at Albany in November last, and returning home,	193 86
The whole of these items amount to	$2463 17

Considering that upwards of 313 miles on the western canal, besides that part of the route south of the mountain ridge and west of Genesee river, and more than 60 miles on the northern canal, have been explored, surveyed and levelled; that the routes of the canals have been actually laid out; that perspicuous maps and profiles have been made; and that full reports have been presented, it is believed that no operation so extensive, so complicated and so important, has ever been performed with more economy of expenditure.

A sum not exceeding $4000 will be required, in addition to that part of the appropriation which is unexpended, to complete the payment of the engineers for their

services; to defray the expenses of printing, engraving and stationary; to pay the expenses of the meeting of commissioners, and their attendance on their duties during the present session of the Legislature; to satisfy some demands not yet presented, and also to make a reasonable compensation to the secretary and treasurer of the board, whose time, since the first meeting in May, has been almost exclusively engrossed in discharging those trusts, and in attending to their general duties as commissioners.

All which is respectfully submitted.

DE WITT CLINTON,
MYRON HOLLEY,
SAMUEL YOUNG.

Albany, 2*d April*, 1817.

STATE OF NEW-YORK, }
COMPTROLLER'S OFFICE. }

I certify, that from accounts and vouchers rendered by the commissioners appointed in and by the act, entitled "an act to provide for the improvement of the internal navigation of this state," passed 17th April, 1816, it appears they have paid and expended the following sums, viz.

To William Peacok, engineer, and Andrew A Ellicott, surveyor, for their services and for expense of hands, &c. &c. in exploring, levelling, &c. on the western section of the Erie canal,	$1563 42
To James Geddes, engineer, for do. do. do. do.	3233 17
To Benjamin Wright, on account of his services and expenses in exploring, levelling, &c. the middle section of the Erie canal,	2000
To Charles C. Broadhead, for his services and expenses in exploring and levelling a portion of the eastern section of the Erie canal,	2097 70
	$8894 29

Amount of expenses brought forward	$8894 29
For exploring and levelling a route for the northern canal,	5237 83
For expenses of the commissioners,	2468 17
For printing and other incidental expenses,	339
Making an aggregate of	$ 16990 29

ARCH'D M'INTYRE, *Comptroller.*

Albany, April 2, 1817.

AN ACT to provide for the improvement of the internal navigation of this State.

PASSED APRIL 17, 1816.

I. *Be it enacted by the People of the State of New-York represented in Senate and Assembly*, That Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Joseph Ellicott, and Myron Holley, be, and they are hereby appointed commmissioners, to consider, devise and adopt such measures as may or shall be requisite, to facilitate and effect the communication, by means of canals and locks, between the navigable waters of Hudson's river and lake Erie, and the said navigable waters and lake Champlain; and in case of the resignation or death of any of the said commissioners, the vacancy thereby occasioned, shall be supplied by the Legislature, in the manner in which senators of the United States, from this state, are directed to be chosen.

II. *And be it further enacted*, That the said commissioners shall choose one of their number, to be president of their board, and shall appoint a fit person for their secretary, who shall be allowed and paid such salary as the said commissioners shall deem proper and reasonable: And the president of the said board of commissioners, shall have power to call a meeting of the same whenever, in his opinion, the public interests require it; and the said board may adjourn from time to time, to meet at any time and place they may deem most conducive to the public good: *And further*, the said commissioners shall have power to employ such and so many agents, engineers, surveyors, draftsmen, and other persons, as in their opinion may be necessary to enable

them to fulfil and discharge the duties imposed upon them by this act, and to allow and pay the said agents, engineers, surveyors, draftsmen, and other persons, for their respective services, such sum or sums as may be adequate and reasonable.

III. *And be it further enacted*, That it shall be the duty of the said commissioners, as soon as may be after the passing of this act, to cause those parts of the territory of this state which may lie upon or contiguous to the probable courses and ranges of the said canals, to be explored and examined for the purpose of fixing and determining the most eligible and proper routes for the same, and to cause all necessary surveys and levels to be taken, and accurate maps, field books and drafts thereof to be made, and further to adopt and recommend proper plans for the construction and formation of the said canals, and of the locks, dams, embankments, tunnels and aqueducts which may be necessary for the completion of the same, and to cause all necessary plans, drafts and models thereof, to be executed under their direction.

IV. *And be it further enacted*, That the said commissioners or a majority of them, shall be, and they are hereby authorized and required to make application in behalf of this state, to the government of the United States, and of such states and territories as may be benefited by the said canals or either of them, to the proprietors of lands through or near which the said canals or either of them may or may be proposed to pass, to all bodies politic and corporate, public or private, and all citizens or inhabitants of this or any other of the United States, for cessions, grants or donations of land or money, for the purpose of aiding in the construction or completing of both or either of the said canals, according to the discretion of the several grantors or donors, and to take to the people of this state, such grants and conveyances as may be proper and competent to vest a good and sufficient title in the said people to the lands so to be ceded or granted as aforesaid, and for the

purposes above mentioned, it shall be the duty of the said commissioners to open books of subscription in such and so many places as they may think necessary and expedient, and under such rules and regulations as they may from time to time establish; *And further*, it shall be their duty to ascertain whether to any and to what amount, and upon what terms loans of money may or can be procured on the credit of this state, for the purposes aforesaid.

V. *And be it further enacted*, That it shall be the duty of the said commissioners to make, or cause to be made, with as much accuracy and minuteness as may be, calculations and estimates of the sum or sums of money which may or will be necessary for completing each of the said canals, according to the plan or plans which may be adopted and recommended by them, for the construction or formation of the same, and to cause the said calculations and estimates, and all surveys, maps, field books, plans, drafts and models authorized and directed by this act, or so many thereof as may be completed, together with a plain and comprehensive report of all their proceedings under and by virtue of this act, to be presented to the Legislature of this state within twenty days after the commencement of the next regular annual session thereof.

VI. *And be it further enacted*, That the treasurer shall, on the warrant of the comptroller, pay to the order of a majority of the said commissioners, out of any monies in the treasury not otherwise appropriated, any sum or sums not exceeding twenty thousand dollars, and for which the said commissioners shall account to the comptroller of this state.

VII. *And be it further enacted*, That the act entitled "an act to provide for the improvement of the internal navigation of this state," passed the 8th day of April, 1811, and the act, entitled "an act further to provide for the improvement of the internal navigation of this state," passed June 19th, 1812, be and the same are hereby repealed.

An Act, respecting Navigable communications between the Great Western and Northern Lakes and the Atlantic Ocean.

PASSED APRIL 15, 1817.

WHEREAS, navigable communications between Lakes Erie and Champlain and the Atlantic Ocean, by means of Canals connected with the Hudson River, will promote agriculture, manufactures, and commerce, mitigate the calamities of war, and enhance the blessings of peace, consolidate the union, advance the prosperity and elevate the character of the United States. And whereas, it is the incumbent duty of the people of this State to avail themselves of the means which the Almighty has placed in their hands for the production of such signal, extensive, and lasting benefits to the human race. Now, therefore, in full confidence that the Congress of the United States, and the States equally interested with this State, in the commencement, prosecution, and completion of those important works, will contribute their full proportion of the expense, and, in order that adequate funds may be provided, and properly arranged and managed for the prosecution and completion of all the navigable communications contemplated by this Act:

Be it enacted by the people of the State of New-York, represented in Senate and Assembly, That there shall be constituted a fund to be denominated the Canal Fund, which shall consist of such appropriations, grants, and donations, as may be made for that purpose by the Legislature of this State, by the Congress of the United States, by individual States, and by corporations, companies, and individuals, which fund shall be superintended and managed by a board of Commissioners, to be denominated, "The Commissioners of the Canal Fund," consisting of the Lieutenant Governor, the Comptroller, the Attorney General, the Surveyor General, Secretary

and Treasurer, a majority of whom with the Comptroller, shall be a quorum for the transaction of business, and that it shall be the duty of the said board, to receive, arrange, and manage to the best advantage, all things belonging to the said fund; to borrow from time to time, monies on the credit of the people of this State, at a rate of interest not exceeding six per centum per annum, and not exceeding in any one year, a sum, which together with the net income of the said fund, shall amount to four hundred thousand dollars, for which monies so to be borrowed, the Comptroller shall issue transferable certificates of stock, payable at such time or times, as may be determined by the said board out of the said fund, to pay to the Canal Commissioners hereafter mentioned, the monies so to be borrowed, and the income of the said fund, reserving at all times sufficient to pay the interest of all monies that shall have been borrowed by the said board: to recommend from time to time to the Legislature, the adoption of such measures as may be thought proper by the said board for the improvement of the said fund, and to report to the Legislature at the opening of every session thereof, the state of the said fund; and that the Comptroller and Treasurer shall open separate books, and keep the accounts of the said fund, distinct from the other funds of the State.

And be it further enacted, That the Commissioners appointed by the Act, entitled "An Act to provide for the improvement of the Internal Navigation of this State," passed April 17, 1816, shall continue to possess the powers thereby conferred, and be denominated the Canal Commissioners, and they are hereby authorised and empowered in behalf of this State, and on the credit of the fund herein pledged, to commence making the said Canals, by opening communications by Canals and Locks between the Mohawk and Seneca Rivers, and between Lake Champlain and the Hudson River; to receive from time to time from the Commissioners of the Canal fund, such monies as may be necessary for and applicable to the ob-

jects hereby contemplated; to cause the same to be expended in the most prudent and economical manner in all such works as may be proper to make the said Canals, and on completing any part or parts of the works or Canals contemplated by this Act, to establish reasonable tolls, and adopt all measures necessary for the collection and payment thereof to the Commmissioners of the Canal fund: that a majority of the said Commissioners shall be a board for the transaction of business, each of whom shall take an oath, well and faithfully to execute the duties of his office, and shall report to the Legislature at each session thereof, the state of the said works and expenditures, and recommend such measures as they may think adviseable for the accomplishment of the objects intended by this Act. And in case of any vacancy in the office of Commissioner, during the recess of the Legislature, the person administering the government, may appoint a person to fill such vacancy, until the Legislature shall act in the premises.

And be it further enacted, That it shall and may be lawful for the said canal commissioners, and each of them by themselves, and by any and every superintendant, agent, and engineer, employed by them, to enter upon, and take possession of and use all and singular any lands, waters, and streams, necessary for the prosecution of the improvements intended by this Act. And to make all such canals, feeders, dykes, locks, dams, and other works and devices, as they may think proper for making said improvements, doing nevertheless no unnecessary damage. And that in case any lands, waters, or streams taken and appropriated for any of the purposes aforesaid, shall not be given or granted to the people of this State, it shall be the duty of the canal commissioners from time to time, and as often as they think reasonable and proper, to cause applications to be made to the Justices of the Supreme Court, or any two of them, for the appointment of appraisers, and the said Justices shall thereupon by writing, appoint not less than three, nor

more than five discreet disinterested persons as appraisers, who shall, before they enter upon the duties of their appointment, severally take and subscribe an oath or affirmation, before some person authorised to administer oaths faithfully and impartially, to perform the trust and duties required of them by this Act. Which oath or affirmation shall be filed with the Secretary of the canal commissioners; and it shall be the duty of the said appraisers or a majority of them, to make a just and equitable estimate and appraisal of the loss and damage, if any over and above the benefit and advantage to the respective owners and proprietors or parties interested in the premises so required for the purposes aforesaid, by and in consequence of making and constructing any of the works aforesaid; and the said appraisers, or a majority of them, shall make regular entries of their determination and appraisal, with an apt and sufficient description of the several premises appropriated for the purposes aforesaid, in a book or books to be provided and kept by the canal commissioners, and certify and sign their names to such entries and appraisal, and in like manner certify their determination as to those several premises, which will suffer no damages, or will be benefitted more than injured by or in consequence of the works aforesaid. And the canal commissioners shall pay the damages so to be assessed and appraised, and the fee simple of the premises so appropriated, shall be vested in the people of this state.

And be it further enacted, That whenever in the opinion of the canal commissioners, it shall be for the interest of this State, for the prosecution of the works contemplated by this Act, that all the interest and title (if any) in law and equity of the western inland lock navigation company should be vested in the people of this State, it shall be lawful for the said canal commissioners to pass a resolution to that effect; and it shall then be lawful for the president of the canal commissioners, to cause a copy of such resolution, with a notice

signed by himself and the secretary of the said commissioners, to be delivered to the president or other known officer of the said company, notifying the president and directors of the said company, that an application will be made to the Justices of the Supreme Court, at a term thereof, to be held not less than thirty days from the time of giving such notice for the appointment of appraisers, to estimate the damages to be sustained by the said company, by investing in the people of this State, all the lands, waters, canals, locks, feeders, and appurtenances thereto acquired, used and claimed by the said company, under its act of incorporation, and the several acts amending the same; and it shall be the duty of the Justices aforesaid, at the term mentioned in the said notice, and on proof of the service thereof, to appoint by writing under the seal of the said Court, and the hands of at least three of the said Justices, not less than three nor more than five disinterested persons, being citizens of the United States, to estimate and appraise the damages aforesaid; and it shall be the duty of the said appraisers, or a majority of them, to estimate and appraise the damages aforesaid, and severally to certify the same, under oath before an officer authorised to take the acknowledgment of deeds, to be a just, equitable, and impartial appraisal to the best of their judgment and belief, and shall thereupon deliver the same to one of the canal commissioners, who shall report the same to the said Court; and if the said Court shall be of opinion, that the said damages have been fairly and equitably assessed, the said Justices or any three of them, may cerrtify the same on the said report, and the amount of the said damages, and the expenses of the said appraisal shall be audited by the Comptroller, and paid on his warrant by the Treasurer, out of the canal fund. And the people of this State shall thereupon be invested with, and the said canal commissioners may cause to be used all the lands, waters, streams, canals, locks, feeders, and appurtenances aforesaid, for the purposes intended by this Act.

And be it further enacted, That for the purposes contemplated by this Act, and for the payment of the interest, and final redemption of the principal of the sums to be borrowed by virtue hereof, there shall be and hereby are appropriated and pledged, a duty or tax, of twelve and a half cents per bushel, upon all salt to be manufactured in the western district of this State: a tax of one dollar upon each steam-boat passenger, for each and every trip or voyage, such passenger may be conveyed upon the Hudson River, on board of any steamboat over one hundred miles; and half that sum for any distance less than one hundred miles and over thirty miles; the proceeds of all lotteries which shall be drawn in this State, after the sums now granted upon them shall be paid; all the net proceeds of this State, from the western inland lock navigation company: and all the net proceeds of the said canals and each part thereof when made: all grants and donations made or to be made for the purpose of making the said canals: all the duties upon sales at auction, after deducting thereout twenty-three thousand and five hundred dollars, annually appropriated to the hospital, the economical school, and the orphan asylum society, and ten thousand dollars hereby appropriated annually for the support of foreign poor in the city of New-York.

And be it further enacted, That from, and after the first Tuesday of August next, there shall be paid and collected in the manner now directed by law, upon all salt to be manufactured in the county of Onondaga, a duty of twelve and a half cents per bushel instead of the present duties, and the like tax or duty of twelve and a half cents per bushel, upon all other salt to be manufactured in the western district of this state, which shall be collected by the superintendant of the salt springs, until otherwise directed by the legislature: and for that purpose he shall have a responsible deputy residing at each place where salt is, or may be manufactured, with the like powers, and subject to the like duties

as his present deputies: and that all the provisions, forfeitures, penalties, and restrictions contained in the laws relative to the duties upon Onondaga salt, so far as the same may be applicable, shall be in force for the purposes of enforcing the payment and collection of the tax or duties imposed on salt, hereby levied and imposed: and further, that the said superintendant, instead of a yearly report to the legislature, shall make a yearly report to the commissioners of the canal fund, and pay into the treasury of this state, on the first Tuesday of February, May, August, and November, in each year, all the monies collected by him during the quarter preceding each of those days, deducting in addition to what by law is now allowed to be deducted, five per cent. of the duties collected at all other salt works, not situated in the county of Onondaga, and two per cent. of the duties upon Onondaga salt, as a compensation for the collecting and paying over the same.

And be it further enacted, That it shall be the duty of the said canal commissioners, to raise the sum of two hundred and fifty thousand dollars, to be appropriated towards the making and compleiteing of the said canals, from the Mohawk River to the Seneca River, and from Lake Champlain to Hudson's River, by causing to be assessed and levied in such manner as the said commissioners may determine and direct the said sum of two hundred and fifty thousand dollars upon the lands and real estate, lying along the route of the said canals, and within twenty-five miles of the same, on each side thereof: which sum so to be assessed and levied, shall be assessed on the said lands and real estate adjacent to the said several canals, in such proportion for each as the said commissioners shall determine. And the said commissioners shall have power to make such rules and regulations, and adopt such measures for the assessing, levying, and collecting of the sum or sums of money, either by sale of the said lands or otherwise, as they shall deem meet, and the said assessment shall

be made on said lands, according to the benefit which they shall be considered by the said commissioners, as deriving from the making of the said canals, respectively: *Provided*, That such rules, regulations, and measures, shall, before they are carried into effect, be sanctioned and approved by the chancellor and judges of the Supreme Court, or a majority of them: *And provided further*, That the company or individual subject to such tax, shall subscribe any money or other property towards the completion of the said canals, the amount of such donation or voluntary subscriptions, shall, if the same is less than the amount of the tax, be deducted therefrom, and if more, he or they shall be entirely discharged from the said tax.

And be it further enacted, That from, and after the first day of May next, the aforesaid tax upon steam boat passengers, shall be demanded, taken, and received, by each captain or master of every steam boat, navigating the Hudson River; and, that during each month thereafter, in which such boat shall be employed for the conveyance of passengers, it shall be the duty of such captain or master, to cause to be delivered to the comptroller of this state, a return or account sworn to, before some officer authorised to administer oaths, stating the name of the boat, the number of trips made by such boat during such month, and the whole number of passengers conveyed on board such boat, at each of the said trips, over one hundred miles, and the number conveyed less than one hundred miles, and over thirty miles, and pay into the treasury of this state, the amount of such tax collected during the time mentioned in the said return, deducting three per cent. thereof, as a compensation for making such return, and collecting and paying over the said tax: *And further*, That in case of any neglect or refusal, in making such return, or collecting and paying over the tax as directed in and by this section, the captain or master so neglecting, shall forfeit and pay the sum of five hundred dollars, beside the amount of the

tax so directed to be collected and paid over, to be recovered in an action of debt in the name of the people of this state, and for the use of the aforesaid fund.

State of New-York,
Secretary's Office.

I certify the preceding to be a true copy of an original act of the legislature of this state, on file in this office.

ARCHIBALD CAMPBELL,
Deputy Secretary.

April 15, 1817.