

University of Oklahoma College of Law

## University of Oklahoma College of Law Digital Commons

---

American Indian and Alaskan Native Documents in the Congressional Serial Set: 1817-1899

---

5-12-1832

**Report from the Secretary of War, in compliance with a resolution of the Senate, relative to an examination with a view of connecting Lake Michigan with the Wabash River in Indiana.**

Follow this and additional works at: <https://digitalcommons.law.ou.edu/indianserialset>



Part of the [Indigenous, Indian, and Aboriginal Law Commons](#)

---

### Recommended Citation

S. Doc. No. 143, 22nd Cong., 1st Sess. (1832)

This Senate Document is brought to you for free and open access by University of Oklahoma College of Law Digital Commons. It has been accepted for inclusion in American Indian and Alaskan Native Documents in the Congressional Serial Set: 1817-1899 by an authorized administrator of University of Oklahoma College of Law Digital Commons. For more information, please contact [Law-LibraryDigitalCommons@ou.edu](mailto:Law-LibraryDigitalCommons@ou.edu).

**REPORT**  
FROM  
**THE SECRETARY OF WAR,**

IN COMPLIANCE

*With a resolution of the Senate, relative to an examination with a view of connecting Lake Michigan with the Wabash river, in Indiana.*

---

MAY 14, 1832.

Read, and ordered to be printed.

---

DEPARTMENT OF WAR, *May 12, 1832.*

SIR: In compliance with a resolution of the Senate, of the 23d ultimo, I have the honor to transmit the report of "the examinations made by Howard Stansbury, esq., United States' Civil Engineer, relative to the connection of Lake Michigan with the Wabash river, in the State of Indiana."

I have the honor to be,

Very respectfully,

Your obedient servant,

LEW. CASS.

To the PRESIDENT of the Senate of the United States.

---

TOPOGRAPHICAL BUREAU, *May 11, 1832.*

SIR: I have the honor to lay before you the report of Mr. Howard Stansbury, of the survey made by him in relation to a connection by means of a canal between Lake Michigan and the Wabash river, called for by a resolution of the Senate, dated the 23d day of last April.

As the report embodies a summary of the estimates of the probable cost of the work, the detailed tabular statements of the cost of each section are not appended to it, as these are voluminous, and the copying of them would have much delayed the submission of the report.

The drawing which accompanies the report, is that of the condensed general map, exhibiting the entire survey at one view.

With great respect,

I remain, sir,

Your obedient servant,

J. J. ABERT,

Lt. Col. T. Eng.

HON. LEWIS CASS, *Secretary of War.*

*Report on the Michigan and Wabash Canal.*

WASHINGTON, October 17, 1831.

SIR: I have the honor to transmit to the department a report of the operations of the party engaged under my direction, during the seasons of 1829 and 1830, in carrying into effect instructions from this department, dated April 23, 1829, and June 9, 1830, directing examinations to be made in the State of Indiana, having, for object, "to ascertain the practicability of uniting by a canal the waters of Lake Michigan with the Wabash river."

By the instructions issued by the Board of Internal Improvements, two routes were ordered to be examined and compared, which are therein described as follows, viz.

1. "The first would ascend the valley of the St. Joseph river (of the lake,) to leave it at a convenient point near to Kankakee river; then it would cross to this stream to descend its valley down to the mouth of Yellow river; thence up the same to a point from which a cross canal could be run to Tippecanoe river. From hence the route descends this stream, and then the Wabash, to the head of steamboat navigation.

2. "The other would ascend the valley of the St. Joseph river (of the lake,) up to one of its head branches; from thence to the fork formed by the St. Joseph and St. Mary's rivers; then from that point, through the valley of Little river, to the Wabash river, as far down as the head of steamboat navigation."

Both of these routes have been surveyed, and, accompanying this report, are the plans, profiles, and field notes, in duplicate; an estimate of the comparative expense of the two routes, together with a general map, upon a reduced scale, embracing the country through which lines have been run, with a view to the connection of the Wabash river with Lake Erie, as well as the particular connection which is the subject of this communication.

Before entering upon the examination of either of these routes with instruments, reconnoissances were made, and every opportunity of obtaining information as to the quantity of available water upon either summit, as well as respecting the general features and characteristics of the country, was eagerly embraced. But, although the contemplated connection was destined to be made between points comparatively well known, the intermediate country (upon the southern route especially, which is, for the most part, included within the Indian boundary lines) had never been explored. All accounts of it were, in consequence, so general, vague, and unsatisfactory, that little or no reliance could be placed upon them. With the exception of a comparatively small portion, none of the lands belonging to the Government had ever been surveyed, and hence no maps, having any pretensions to accuracy, were in existence. I have, however, to acknowledge my obligations to many gentlemen of that State for the kind interest they took in the successful prosecutions of the examinations. The information they communicated was of much use in guiding the operations of the party, and preventing a waste of time and labor in fruitless investigations; and the ready kindness which they displayed on all occasion, when opportunity was afforded for its exercise, demands my grateful remembrance.

With these difficulties before us, with little, if any other guide than the spirit level, and such data as were gradually developed by the progress of the surveys, and, indeed, from the nature of the examination itself, it was not to be expected, nor is it pretended, that the lines have, in every instance, been carried over ground the most suitable. No doubt is entertained

that when the lands shall have been surveyed and settled, and thus the particular features of the country, the bearing of the streams better known, and such other knowledge gained by this means, as is highly useful to the engineer, the distance upon both routes may be somewhat lessened. The operations which have been executed, were intended chiefly to ascertain the practicability of either or both modes of connecting these waters, and to collect data upon which to base an estimate of their relative superiority. The selection of the precise ground over which the canal should pass, with the location of the sites of the locks, dams, and other structures appertaining to a canal, belong more properly to the actual construction of the work, and must be the result of more particular and minute examination than could be given upon a preliminary survey. Endeavors, however, have been made to approximate as nearly to such a location as possible, where it could be effected without too great a sacrifice of time.

No directions, as to the dimensions of the canal, having accompanied the instructions of the board, it has not been thought proper to vary from the dimensions of the transverse section adopted in the estimate of a similar work to connect Lake Erie with the Wabash river, which are as follows, viz. 40 feet wide at the surface, 28 feet at bottom, 4 feet deep, with a tow path of 10 feet, and guard bank, 5 feet wide at the top; the tow-path and guard bank to be 2 feet above the surface of the water in the canal, with an in and out-slope of  $1\frac{1}{2}$  to 1. No modification of this size has been taken into view in the estimate, although it is believed that, in many instances, it may be proper to contract the width of the canal; yet the nature and extent of these departures from the general plan, must depend altogether upon the location of the line, and circumstances arising from it.

The great scarcity of stone along the greater part of both routes, precludes all idea of making use of that material, generally, in the construction of locks. So far as our researches for it have extended, little or no success has attended them. All locks, dams, aqueducts, and culverts, therefore, are estimated to be constructed of wood. Suitable timber, and of excellent quality, is to be found in abundance wherever it shall be needed. It may be a subject of after consideration, whether it would not be good policy to construct the locks along side the spot where they should ultimately be placed, in order that when they begin to decay, stone locks, the materials for which can then be transported at a comparatively trifling expense, may be constructed upon their proper sites without interrupting the navigation of the canal. It is deemed proper that the locks should not be less than 90 feet between the hollow quoins, and 12 feet wide in the clear. The expense of these wooden structures, it is believed, will not exceed one-third that of similar works of stone; and they will last, with little repairs, for eight or ten years.

It is believed that, in many instances, short, wooden trunks may be advantageously used to pass the canal over small streams, in preference to allowing heavy embankments to rest on wooden arches, which, beside their greater liability, from their situation, to decay, cannot be repaired, as the former may, without serious interruption to the navigation.

It may here be remarked that, in the preparation of the estimates, regard has been paid to the prices given for work, of a similar nature, upon the Ohio canals. In the prices of excavation and embankment, the cost of grubbing is included.

As has been before stated, two distinct and separate routes were directed

to be examined and compared, one by means of the St. Joseph river (of the lake,) the Kankakee and Tippecanoe rivers, the other by means of the tributaries of the St. Joseph (of the lake,) and the St. Joseph of the Maumee. The former will be designated in this report as the Kankakee and St. Joseph, or, more summarily "*the southern route,*" the latter as the Big and Little St. Joseph, or "*northern route.*"

The whole of the first of these routes, and the greater part of the summit section of the other, were examined during the season of 1829; that of 1830 was occupied in finishing the examinations upon the northern route, and in preparing plans and estimates as to the expense and relative merits of the two lines of communication.

#### SOUTHERN ROUTE.

The St. Joseph river (of the lake) takes its rise in the Territory of Michigan, and, after pursuing a southwesterly course for about fifty miles, enters the State of Indiana, when, suddenly turning to the north, it re-enters the Territory, and runs in a northwest direction, until it discharges its waters into the lake. The point at which it thus turns to the north, is termed the "Great" or "Southern Bend." Just below this bend is a small stream, which discharges itself into the river from a little lake or pond about two miles distant. This lake or pond is also the fountain head of the Kankakee or Theakike river, a very considerable branch of the Illinois. There is a portage at the bend, of about six miles from the St. Joseph to the Kankakee. Several experimental lines were run over this summit, and a base mark established, whence a line of levels was carried down the St. Joseph (of the lake,) by one division of the party, whilst the other pursued the examinations of the valley of the Kankakee, and the result has fully demonstrated the complete practicability of this connection.

This route is divided into three sections, viz.

*Northern section.* From the debouch of the canal into the St. Joseph (of the lake,) near its mouth, to base mark on the summit.

*Middle section.* From base mark, on the summit, to the Tippecanoe river.

*Southern section.* From the intersection of the line with the Tippecanoe, to its termination at the mouth of that river.

Before entering upon any farther description of this part of the surveys, it must here be observed that both the northern, and that part of the middle section lying between base mark and Yellow river, will have to depend for a supply of water upon the St. Joseph alone. Fortunately that stream is fully able to meet the demand. It yielded, on the 25th of July, 1829, 1395 cubic feet per second, and, as the water was at that time very low, its discharge may be considered as nearly its minimum. It has been stated, too, as a fact well established, that, whilst the waters discharging themselves into Lake Erie and the Ohio, or those running south and east, are much affected by the drought, insomuch as to become nearly dry during the summer, those running westwardly into Lake Michigan are remarkable for their uniform and constant discharge, being seldom if ever affected by the dry season, nor rising more than three or four feet at seasons where the others rise to great heights, overflowing the whole country through which they run.

There will have to be a feeder  $7\frac{1}{2}$  miles in length, together with a dam across the St. Joseph, 26 feet in height, to supply the summit. This dam will have to be built of the best materials, and in the very best manner, to

resist the great pressure of the current, and will add very considerably to the expense of this route. Should any doubt, however, be felt as to the ability of a work of that height to withstand such a pressure, the danger can be lessened by erecting the dam higher up the river, and thus diminishing the height; but the feeder must, in that case, be proportionably lengthened. It is believed that, by taking the water out at a lower level, the price of the work would be very materially enhanced, as the whole line from Base Mark to Yellow river, a distance of 38 miles, (and which will have to depend upon this stream for a supply,) is carried down without a lock; every foot, therefore, that the dam is lowered, will add that depth to the excavation for the whole of that distance. Assuming one and a half cubic feet of water per second per mile, as sufficient for the supply of a canal of this size, there will remain at the disposal of the canal for hydraulic purposes, more than twelve hundred feet per second, which, with the great increase of power gained by a fall of 26 feet, cannot fail to produce a considerable revenue, and thus lessen the ultimate cost of the dam.

The total cost of the dam and feeder, according to the estimate herewith submitted, amounts to \$ 121,367 14.

#### NORTHERN SECTION.

From base mark to debouch of the canal into the St. Joseph (of the lake.)

This section comprises that part of the canal which follows the valley of the St. Joseph, and is divided into three subdivisions.

*Subdivision 1st.* (Map sheets 1 and 2,) commences at base mark, and terminates at a small Indian village a short distance below the town of Niles.

Distance 11 miles—descent 16 feet—2 locks.

The soil upon this subdivision is a mixture of sand, clay, and gravel, and easy of excavation. Owing to its high level above the St. Joseph, some heavy embankments will be necessary to pass the canal over deep ravines and depressions. Some walling, also, will be required, and an aqueduct over the "river of the Fathers," which, however, will be short.

The expense of this subdivision, as estimated, is \$ 83,024 14.

*Subdivision 2d.* From the end of subdivision 1st to B. M. 20.

Distance 18 miles, 1,621 yards—descent 32 feet—4 locks.

From base mark, 29 miles, 1,621 yards—descent 48 feet—6 locks.—(Map sheet No. 2.)

This subdivision passes over ground, a considerable portion of which is side cutting, in many cases requiring protection walls to guard the embankments from injury from the shocks of ice and timber that descend in the spring. The winding course of the river on this subdivision increases the length of the canal very much; the distance on a direct line does not exceed six and a half miles, while the distance by the route pursued, is rather more than 15. Some doubts have been entertained whether it would not be proper to cross the river near bench mark 10, (map sheet No. 2,) and either recross it near bench mark 18, or continue the canal on the eastern side of the river to its termination. In either case, it is believed, the expense of construction would be materially diminished.

These circumstances have raised the cost of this subdivision considerably above that of the preceding one. The estimate of this subdivision amounts to \$ 224,191 62.

*Subdivision 3d.* From bench mark 20, to the debouch of the canal into the river.

Distance 12 miles, 1,034 yards—descent 79.87—10 locks.

From base mark, 42 miles, 895 yards—descent 127.87—16 locks.—(Map sheet No. 2.)

In order to avoid, as much as possible, heavy embankments and walling in the river, and exposing the canal to freshets, the line on the preceding subdivisions was kept up, thus enabling us to keep back from the bold shores and steep banks of the river. On this subdivision, however, the ground changes its character: extensive bottoms are generally found between the bluffs and the river, allowing a choice of ground; the line was accordingly carried down by proper reaches into the flats below, to its debouch into the river. Some steep side cutting occurs, which, however, can be avoided, by lessening the distance between the locks, and thus sooner attaining the level of the bottoms, as there is no object to be gained by preserving the high level formerly kept up.

The canal enters the river about three miles from its mouth; the water up to this point is never less than five feet in the most shallow part, and averages from 10 to 12, affording a large natural basin safe from the storms of the lakes. Vessels of 300 tons burthen have come up as high as the point of termination of the canal. A tow path of about three miles in length will be required to carry the canal entirely to the lake, should it be deemed necessary; but the cost of which has not been included in this estimate.

The department is already aware of the obstructions that exist at the mouth of the river, to its free entrance at all times; but, as it is understood that examinations have been ordered with a view to their removal, any remark upon the subject will be unnecessary.

The whole estimate for this subdivision amounts to \$ 173,659 42.

#### SUMMARY OF THE NORTHERN SECTION.

Subdivisions.	Distances.	Descent.	No. of Locks.	Estimates.
	miles yds.	Feet.		
First, - - -	11 0,000	16	2	\$ 83,024 14
Second, - - -	18 1,621	32	4	224,191 62
Third, - - -	12 1,034	79.87	10	173,659 42
	42 895	127.87	16	480,875 18

#### MIDDLE SECTION.

From base mark on the summit to the Tippecanoe.

This section is divided into two subdivisions; the first extending from base mark to Yellow river; and the second embracing the dividing ground between that river and the Tippecanoe.

*Subdivision 1st.* Length 37 miles, 1,110 yards—(Map sheets Nos. 1 and 3.)

This subdivision, as has been before stated, will have to depend for its supply of water upon the St. Joseph alone. After crossing the summit between the southern bend of the St. Joseph and the Kankakee, the line strikes

the valley of the latter, and, leaving it about half a mile to the right, gradually diverges from it, until it crosses Yellow river rather more than ten miles above their junction. It is carried for the most part along the foot of the bluff, skirting the wide prairie through which that stream runs, and from which it derives its name of the "Kankakee prairie." This prairie, lying at an elevation of not more than two or three feet above the level of the river, is very wet and swampy, even in the driest seasons, and abounds in springs. The Kankakee runs through it without forming any bank for itself, occupying merely a bed sufficient for its waters in the dry season, and, in the spring and fall, overflowing the whole country far and wide, and forming what is called "the Kankakee pond." The bluff above mentioned forms the eastern boundary of the valley, and is low and much broken.

The cutting for the first nine miles will be much greater than on any other part of this subdivision, averaging 8.6 feet the whole distance. The soil consists of wet and dry prairie, and the excavation is of the easiest kind. At the end of 12 miles, the line ceases to run in the prairie, exclusively, and begins to attain a slight elevation above it, being carried either on the side or the top of the small bluff that skirts it; continuing, however, to cross small spurs of wet prairie, which put into the bluff so far that it could not be carried around them without materially increasing its length.

The soil of these wet prairies, after penetrating the turf with which they are covered, is found to consist of quicksand and soft mud, in most instances of great fluidity and considerable depth. Embankments will be required to pass the canal over them, the earth for which, consisting of a mixture of sand, clay, and pretty coarse gravel, is generally convenient.

Owing to the impracticability of approaching the Kankakee, from the swampy nature of the prairie, no accurate estimate could be formed of its fall; but judging from that of Yellow river, in the neighborhood of where the line crosses that stream, it must be considerable. But of this fall, whatever it be, the line of canal does not partake, because, instead of pursuing the course of the Kankakee, which runs in a southwesterly direction, it follows the foot of the bluff, which, diverging from it, turns to the south, and skirting the head of the valley only, extends across, without dropping the level at which it diverged, till it reaches the stream of Yellow river. Owing to this circumstance, the canal, for the whole length of this subdivision, can be constructed on a single level. From the great length of this level, it is proper that a fall of from one to two inches per mile should be given to the bottom of the canal to prevent stagnation, and to facilitate the passage of the water that is introduced into it from one end only. This would throw the surface of Yellow river somewhat above the level of the canal; but as all the available water of this stream will have to be taken for the supply of the canal over the summit between itself and the Tippecanoe, all that is not appropriated to this object can be passed either through the canal or under it, by a large culvert. From our previous ignorance of these circumstances, which were thus developed during the progress of the examinations, no allowance for this fall has been made, but an estimate for crossing Yellow river, by an aqueduct, accompanies this report.

The whole estimated cost of this subdivision is \$357,002 06.

*Subdivision 2d.* From Yellow river to Tippecanoe—length 9 miles 1,140 yards. From base mark—length 47 miles 490 yards. (Map, sheet No. 4.)

This subdivision comprises the summit between these streams. Several experimental and random lines were run over this ground with the view of ascertaining the shortest and least expensive route. Some vague informa-



tion had been given us of a large lake upon this summit, called by the Indians (within whose boundary lines the whole of this and the succeeding, as well as the greater part of the preceding subdivision are included) Mek-sin-kuk-keek, and which it was stated would be amply sufficient for the supply of all water that might be needed. Examinations were accordingly made to ascertain the position of this lake, and the practicability and fitness of a connection by means of it, and lines were run from Yellow river to it, and thence to the Tippecanoe. It was found that, although the connection was practicable, yet the lake lay nearly ten miles to the left of the direct course of the desired communication, and the cutting that would be required between it and Yellow river, a distance of five and a half miles, would be very great, averaging 18 feet, and, in some instances, rising as high as 44 feet. This route was therefore abandoned, and another, more direct, was sought for. By following the general course of the line, it was found that another lake lay immediately in our way, which, although not so large as the former, was, nevertheless, fully capable, together with the Yellow river and the surplus water supplied by subdivision 1st, to feed the canal over this summit. The ground over which the canal will have to pass, by this route, is not so high as on the other, in consequence of which a thorough cut can be made through it, thus forming a single level from the Kankakee summit to the Tippecanoe; whereas by the Mek-sin-kuk-keek route, in addition to the deep cutting, four locks of eight feet each will be required.

This route is termed the "*Devil Lake Route*," from the name of the lake on its summit, and is the route adopted. The line runs through wet and dry prairie and high white oak barren land, the soil of the former consisting principally of sand, and that of the latter of a mixture of sand, clay, and gravel.

This subdivision will be supplied by a short feeder from Yellow river, by the surplus water of subdivision 1st, and by a short cut from Devil lake. The surface of this lake lies rather more than five feet above the bottom of the canal, and was found to contain 7,313,883 square yards, affording a natural reservoir, furnishing the very large amount of 12,189,721 cubic yards of available water. Yellow river was estimated to discharge 12 cubic feet per second, but it will hardly yield that quantity during the dry season. The supply derived from these several sources will be abundantly sufficient to feed the canal until it reaches the Tippecanoe. No estimate has been made for these feeders, but the omission will not affect the general truth, inasmuch as a saving of equivalent amount will, it is thought, be produced by the improvements in the location of the line.

## SUMMARY OF THE 2D SUBDIVISION.

Route.	Distances.	Descent.	No. of Locks.	Estimate.
	<i>miles yds.</i>			
Mek-sin-kuk-keek, -	23 578	32	4	\$317,285 72
Devil lake, -	9 1,140	none.	none.	193,134 45
	13 1,198	32	4	\$124,151 27

Difference in favor of the Devil lake route.

## SUMMARY OF THE MIDDLE SECTION.

Length, 47 miles 490 yards—estimate \$550,136 51.

The southern section commences at the intersection of the line with Tippecanoe river. From this point the canal follows the right bank of the stream to where the Motimonon falls into it; here it crosses, and is then carried down the left bank to the junction of the Tippecanoe with the Wabash.

This section will have to depend for its supply upon the Tippecanoe, which yielded at a short distance below, where the line strikes its valley, two hundred and seventy feet of water per second, which quantity may be considered about its medium discharge.

*Subdivision 1st.* From the southern end of the middle section to the Motimonon—

Distance,	-	-	36 miles 1,318 yards,	dscent 64 feet,	8 locks.
From base mark,	-	84	" 48	" 64	" " "

This subdivision continues throughout its whole length, on the right bank of the river; the soil is principally sand, occasionally intermixed with clay and gravel, and the excavation will be of the easiest kind. Some paving and walling will be required along steep bluffs, to protect the canal from injury by the freshets, which, in this river, rise very high. A dam must be erected across the Tippecanoe at the beginning of this subdivision, which will give water sufficient to feed the canal all the way to the Motimonon. The estimate for this subdivision amounts to \$271,198 12.

Upon reaching the Motimonon river, which discharges itself into the Tippecanoe from the west, it was thought best to cross this latter stream by a dam, and to carry the canal down its left bank.

This course is believed to present several advantages. It would have required a long aqueduct and a heavy embankment to take the canal over the Motimonon; the right bank of the Tippecanoe presented no facilities for the construction of the work, which did not equally exist upon the left bank; added to which, was the consideration that, at its termination, the canal, if carried down the left bank, would discharge itself into a basin to be formed for the Erie and Wabash canal, a work which is to debouch at the same point; whereas, had the right bank been followed, the expense of an aqueduct to connect the canals, or of a separate basin, would have been required, as well as a dam lower down, to feed the canal to its mouth. According to the course adopted, we cross the Tippecanoe by a dam which will be sufficient to feed the canal the whole length, and avoid the construction of an aqueduct over the Motimonon, and either a basin or an aqueduct across the Tippecanoe at the end.

After crossing over to the left bank, an experimental line was run to ascertain the practicability of uniting the present line with the line run for the Erie and Wabash canal. It was thought that, if this should be practicable, the additional expense per mile in the construction would be more than counterbalanced by the difference in the length of the lines. The experimental line was accordingly carried up the valley of a small run, with the view of ascertaining the height of the dividing ridge between the Tippecanoe and Wabash rivers and their distance apart; but it was found that the distance was much greater, and the cutting much deeper, than had been anticipated, amounting to thirty-nine feet, with a prospect of further rise. This route was therefore abandoned, and the line carried down to its termination at the mouth of the Tippecanoe, forming the second subdivision.

*Subdivision 2d.* From the Motimonon to the debouch of the canal into the Wabash at the mouth of the Tippecanoe.

Length, - - - 30 miles 1,533 yards, descent 107 feet, 13 locks.

From base mark, - 114 " 1,581 " " 171 " 21 "

The soil on this subdivision does not differ materially from that of the preceding one, consisting generally of sand, clay, and gravel. The bluffs of the river are steep, and, in many instances, very high, and approach so near the water as to occasion the necessity of a large quantity of walling and paving, to protect the canal from the action of the stream. These circumstances, together with the great number of locks that will be required, enhance the cost of the subdivision very considerably.

As has been stated, the dam by which we cross the Tippecanoe will be sufficient to supply this portion of the canal.

The estimate for this subdivision amounts to \$472,327 99.

#### SUMMARY OF SOUTHERN SECTION.

Subdivision.	Distances.	Descent.	No. of Locks.	Estimate.
First, - - -	36.1318	64	8	\$271,198 12
Second, - - -	30.1533	107	13	472,327 99
	67.1091	171	21	\$743,526 11

#### SUMMARY OF SOUTHERN ROUTE.

Section.	Distances.	Ascent and descent.	No. of Locks.	Estimate.
Kankakee Feeder, -	7.1707	-	-	\$121,367 14
Northern Section, -	42.0895	127	16	480,875 18
Middle Section, -	47.0490	-	-	550,136 51
Southern Section, -	67.1091	171	21	743,526 11
	157.716	298	37	\$1,895,904 88

#### NORTHERN ROUTE.

Having thus endeavored to give a general description of one of the routes ordered to be examined, it now remains that some account should be given of the result of our labors upon the other.

From the same absence of all sources of accurate information, similar difficulties presented themselves upon this as were experienced upon the southern route. Some time was occupied in exploring the country and ascertaining its shape and topography, and the most favorable point at which a suitable connection could be formed between the St. Joseph of Lake Michigan and the St. Joseph of the Maumee, the second mode of communication designated by the board.

It was found that Pigeon river, a considerable branch of the St. Joseph (of the lake) derived its source from a cluster of lakes, in one of which Fish creek, a stream discharging itself into the St. Joseph of the Maumee, also took its rise. Experimental lines were run over the summit dividing these lakes, the result of which was a determination to prosecute the surveys with a view to the connection by means these two streams. A series of levellings was accordingly commenced at the head of Pigeon lake, (one of the cluster referred to,) and the source of Pigeon river, and carried over the summit dividing that lake from another, called Camp lake, whence issues a small stream, which discharges itself into Little Fish lake, another of the group, and the spring head of Fish creek. From Fish lake the line descends the valley of this last mentioned stream, until it strikes that of the St. Joseph of the Maumee, which river it follows to the termination.

Returning to the summit, and proceeding west, the line follows the valley of Pigeon river to its junction with the St. Joseph of the lake, when it is carried down this stream nearly to its mouth.

With this general sketch of the mode of communication, we will proceed to examine the line in detail, observing that this route is divided into three sections, viz.

*Eastern Section.* From six miles above fort Wayne to a little below the junction of the St. Joseph of the Maumee with Fish creek.

*Middle Section.* From the mouth of Fish creek to Deer lake, on Pigeon river.

*Western Section.* From Deer lake to the debouch of the canal into the St. Joseph of the lake.

#### MIDDLE SECTION.

The survey of that part of this section which was made in 1829, was entrusted to Mr. George Smith, the principal assistant of the party, from whose report to me in regard to it, the following extract is given:

“A line was commenced at Pigeon lake, assuming a base line four feet below its surface, and carried over the summit between that lake and Camp lake, a distance of one and three-eighth miles, with deep cutting, the average depth of which will be fifteen feet. On reaching Camp lake, a lock of nine feet was dropped, which brought the base line four feet below its surface. The line was then carried on from the lower end of the lake, with the same base, down the east side of the summit, to Little Fish lake, (a distance of one and a half miles,) with a descent of 59 feet, by seven locks reaching that lake with a base four feet below its surface. The line was then carried down the valley of Fish creek to bench mark 2, where it was taken up by yourself, and prosecuted until you were stopped by the inclemency of the weather.”

“The line down the western side of the summit commences at the lower end of Pigeon lake, with a base four feet below its surface. Proceeding down the valley of Pigeon river, that stream was discovered to pass through the lower end of Long lake, whose surface was 3.72 below the base line, making it 7.72 below Pigeon lake. The base was accordingly lowered eight feet, making the lake's surface  $\times 4.28$ . With this arrangement, the lake was intended to be taken in as a feeder, and thus obviate the necessity of crossing the river by an aqueduct; an ordinate was also run from the main line, showing the facility with which Pigeon lake and Long lake could be connected.”

“The line was then carried on from Long lake, crossing the outlet from Fire lake, and continues in the valley of the river until it reaches the next lake below, around which it passes, and reaches the bank of the river a little above Hogback lake, at the outlet of which bench mark V. is established at the end of  $9\frac{1}{4}$  miles. The channel of Pigeon river from Long lake to Hogback lake is very deep and the valley narrow, with the exception of the space between Hogback and the lake immediately above it, where the valley widens over a wet prairie of considerable extent. The river at the outlet of Hogback lake has the appearance of being raised by freshets two feet.”

From bench mark V. the line was carried down to the end of  $14\frac{1}{4}$  miles, where the river passes through another lake, about the size of the two last above, where it become necessary to cross the stream twice. At the distance of  $21\frac{3}{8}$  miles, the line crosses a stream which, forming a junction with Pigeon river, increases its discharge very considerably.

“The line was terminated on account of the advanced stage of the season, on the banks of Deer lake, a distance from the summit of thirty miles and sixty-three chains.”

“From Hogback lake, the ground over which the line passes, is highly favorable, generally a barren sandy soil, with the exception of a small proportion of prairie.”

“I am of opinion, that, to effect the most judicious location, the line should follow the right bank of Pigeon river. At the time the survey was commenced, no important information could be gained in relation to the valley of the river, farther than was developed as the work progressed.”

“At first view, the resources of water for the supply of the summit level, agreeably to the discharge of the streams that have been gauged, would, in all probability, appear insufficient to remove such an impression, the following plan is respectfully suggested:

“It will be observed, that Hogback lake is not quite three-fourths of a foot lower than Long lake, and 8.42 below Pigeon lake. It will, therefore, be seen, that, by erecting a dam across Pigeon river at the outlet of Hogback lake, the backwater would be on a level with Pigeon lake, the small lake at the Hogback would be 1.46 above that level; the large lake northeast of it would be  $4-1.46$ , and Wood lake would be  $24\frac{1}{2}$  feet above the same level.”

“The following streams were gauged by a dam:

“Fish creek at outlet of the lake, 1.14 feet per second

“Do do near BM II. 1.48 do do

“Pigeon river above Long lake 1.26 do do

“Do do at the 2d crossing 16.14 do do.”

From the above remarks of Mr. Smith, it will be seen that it is not contemplated by him to construct a canal from Pigeon lake to Hogback lake, but to form a slack water navigation for that distance; and the reservoir formed by the dam at Hogback lake, he deems to be sufficient to feed, each way from the summit, until the waters of the St. Joseph (of the Maumee) can be commanded on the one hand, and those of Pigeon river on the other, at a point lower down, where, from a variety of sources, it has received supplies sufficient to enable it to feed without difficulty.

A personal and more careful examination, however, in the spring following, resulted in strong doubts as to the fact that the reservoir thus filled, would be sufficient to feed the series of locks on the Eastern side of the summit, from Pigeon lake to Little Fish lake, which, being so close together, would make heavy drafts upon its resources.

Fortunately, however, this fundamental question can, by a cheap and easy experiment, be speedily determined. But, in order to understand this, some preliminary explanations are necessary.

The country around the summit level, abounds in small lakes, from an half to two miles in length, either connected together in chains, or separate and alone, without any apparent inlet or outlet. They consist of the purest spring water, are full of the finest fish, and are of immense depth (in one of them, the bottom, as I have been informed, was sought in vain with a line of 250 yards.) The soil of the surrounding country is a mixture of sand, clay, and gravel, indicating a bed of elay. Their supply from beneath being constant, they do not appear to be affected by the drought of summer, but where there are outlets, these are considerably swollen by the melting of the snows and ice on their banks, in the spring.

The experiment, then, will consist in ascertaining whether the waters of one of these lakes cannot be availed of as auxiliary to the reservoir proposed by Mr. Smith.

Pleasant lake, (map, sheet No. 1, northern route,) lies about half a mile south of Pigeon lake, and has, evidently, no communication with it, or with Long lake, to which it is still more contiguous, (being 4.94 above the former, and 8.76 above the latter.) It has, in fact, no apparent inlet or outlet. By a careful survey, its surface was found to contain 99.272 square yards, which multiplied by 4.94, (its height above Pigeon lake,) will give us 163.467.24 cubic yards of available water. Now, we know that in wells and reservoirs which receive their supply from subterraneous sources, the water rises until the upward pressure is counterbalanced by that of the atmosphere, and by the weight of the superincumbent water. Suppose, then, a drain to be cut from Pleasant lake, (which can be done at a very trifling expense) three feet wide, and extending only two feet below the surface of the water, the discharge from it, supposing the supply to be constant, will not be short of 28 cubic feet per second; and, should such a drain be opened, the only question will be, whether the supply from below will be sufficient to replace the water thus taken away from above, without suffering the lake materially to diminish? This can be ascertained by experiment alone. Should such prove to be the case, it is believed that this quantity, added to the supply furnished by the proposed reservoir, will be sufficient for the supply of this summit. But should our expectations from this source not be realized, it will then be proper to make some farther examinations north of the summit, whence it is believed, water may be obtained from the head sources of Crooked creek and of Cold Water, in sufficient quantity.

I now proceed to a description of the route in detail.

#### EASTERN PORTION.

This part of the middle section extends from the head of Pigeon lake to the dam on the little St. Joseph, below the mouth of Fish creek.

Distance 19 miles 28 yards—descent 138.39—by 17 locks.

Deep cutting occurs in the first part of this subdivision, over the summit between Pigeon lake and Camp lake, varying from 12 to 22 feet for three-fourths of a mile. The line enters the lake by a lock nine feet lift. This lake forms a splendid natural basin, being nearly circular, and rather more than one-fourth of a mile in diameter.

From Camp lake, the ground descends very rapidly to Little Fish lake, a distance of one and a half miles, with a fall of fifty-nine feet, by seven

locks. By a little altering, the location of this part of the line, an improvement may be made in the location of these locks, the ground admitting of their being distributed at proper intervals between the lakes.

It is proposed, in order to prevent waste of the water drawn from the summit level by the series of locks above mentioned, to erect a dam across the outlet of Little Fish lake, nine feet high, thus forming a large reservoir, for which the make of the ground seems admirably adapted. By a careful survey, it was ascertained that this lake contained 373,452 square yards, which will give, by means of the dam of nine feet, at least 1,120,000 cubic yards of water for the supply of the canal as far as the Little St. Joseph.

The outlet of this lake was gauged in August, 1830, when its discharge was found to be much greater than in the year preceding, and amounted to 18.64 cubic feet per second, while the discharge into it on the same day from three small spring branches, amounted only to 4.04. The supply, therefore, accruing from subterranean sources was 13.70 cubic feet.

From the number of ravines which will discharge water into this lake, and the sloping of the ground, generally toward it, no doubt is entertained that the reservoir thus formed would be filled up in the winter during the interruption of the navigation. A case came under our own observation, where a dam having been erected across the outlet of a lake similar in its characteristics, the water rose to the level of the top of the dam, and afforded a very good mill seat.

From Fish lake, the line follows the valley of Fish creek, through heavily timbered land, with generally rich alluvial soil, to a short distance below its junction with the Little St. Joseph. The great number of locks upon this portion of the canal, together with the deep cutting over the summit, swells the estimate considerably, raising it to \$187,545 86.

#### WESTERN PORTION.

This portion of the middle section extends from the head of Pigeon lake to Deer lake, and contains two subdivisions.

*Subdivision 1.* (Map sheet 1, "northern route.") From Pigeon lake to bend mark 5, at Hogback lake.

Distance, 9 miles 623 yards.

Although the line on this subdivision was originally run with a view to the construction of a canal its distance, yet the result of the examination was such as to convince us that a slack-water navigation formed in the manner described before, was preferable, and presents, in fact, the only mode by which the summit level can be supplied. Should this course be adopted, the lock heretofore dropped within this subdivision, must be thrown further down, and is accordingly included within the second subdivision. The summit level thus extended, reaches from Camp lake, on the eastern, to Hogback lake on the western side of the summit, a distance of 10 miles 1,145 yards. It was determined, therefore, to adopt the distance of the line thus originally run for the canal, as the length of a tow-path and tow-path bridge, which will, in that case, be necessary. A slight reference to the map of this part of the survey, will show, that the length of this tow-path may be considerably shortened, whilst, at the same time, it can be made to pass along the margin of five lakes, affording the convenience of so many natural basins. This tow-path and bridge can, it is believed, be constructed for less than \$4,000 per mile. Timber of an excellent quality is to be had in the greatest abundance conveniently to the line.

The whole estimate cost of this subdivision amounts to \$47,041 75.

*Subdivision 2.* From Hogback lake to the dam across Pigeon river below Deer lake.

Distance, - 25 miles 70 yards—descent, 118.57 feet—15 locks.

From Pigeon lake, 34 " 698 "

The ground upon this subdivision is generally favorable, and the excavation easy. A considerable quantity of embankment occurs, which, however, may be avoided by a different location of the locks. Two aqueducts across Pigeon river will be required, but they are short. From the great fall in the ground, an unusual number of locks will be required, averaging about one to every 1½ miles. On reaching Deer lake, the canal passes through it by a tow-path bridge 181 yards long, by which means the necessity of twice crossing Pigeon river, is avoided. This subdivision terminates a short distance below, and, according to the estimate herewith submitted, will cost \$245,479 71.

#### SUMMARY OF MIDDLE SECTION.

Portion.	Distances.		Descent.	No. of locks.	Estimate.
	miles.	yds.			
Eastern portion	19	28	138.39	17	\$187,545 86
Western portion	34	693	118.57	15	292,521 46
	53	721	256.96	32	\$480,067 32

#### WESTERN SECTION.

*From Deer Lake to the termination of the line near the mouth of the St. Joseph (of the lake,) map, sheet No. 3, "northern route."*

This section will be supplied with water, first, by a dam at its commencement across Pigeon river, and by a dam across the St. Joseph of the lake, on the second division.

*Subdivision 1.* From the dam across Pigeon river, below Deer lake, to the crossing of the Little Elkhart. (Map, sheet No. 3.)

Distance, - 22 miles 1,179 yards—descent, 80 feet—10 locks.

From Pigeon Lake, 57 " 112 " " 198.57 " 25 "

This subdivision runs, for the most part, through high white oak barrens, with some prairie, and a fine, sandy soil, occasionally intermixed with gravel and clay. It follows the valley of Pigeon river until its discharge into the St. Joseph, when it descends the latter stream to the Little Elkhart, which it crosses by an aqueduct 193 yards in length. The cost of the subdivision will be enhanced by some pretty heavy embankments which occur over wide depressions, and one across the bottom of the Little Elkhart. This subdivision is to be fed from Pigeon river, by a dam seven feet high, and three hundred and seventy feet long at the top.

The estimated cost amounts to \$194,088 17.

*Subdivision 2.* From the crossing of the Little Elkhart to the head of the feeder for the supply of the Kankakee summit, on the southern route—

Length, - 19 miles 875 yards—descent, 48.31—6 locks.

From Pigeon lake, 76 " 987 " " 246.88—31 "



This subdivision will be very expensive. For the first three miles, the line runs through elevated table land, that, for the most part, extends quite up to the river, presenting high wash banks. The cutting, for this distance, will be tolerably deep, averaging  $7\frac{1}{2}$  feet. The excavation, however, is of the easiest kind. Long and high embankments will also be required across the valleys of the Big Elkhart river, and those of Ba-ba-go and Twine creeks; together with an aqueduct over each of these streams. These, however, will be short. Some steep side cutting will be necessary; and, in some cases, paving, and a good deal of walling will be requisite to support the canal under high and steep bluffs. These circumstances will greatly enhance the cost of this part of the work.

The first five miles of this subdivision will be supplied from the feeder of subdivision 1; after which, it was at first contemplated to procure a supply from the St. Joseph by a dam eight feet high, and 563 feet long. It is believed, however, that the Elkhart river will be preferable for this purpose, as its discharge will be sufficient, and the expense of converting it into a feeder will not be so great.

This subdivision is connected with the head of the feeder for the Kankakee summit, by a lock 9.51 feet. That feeder, together with the whole northern section of the southern route, constituting a continued line of levels from this point to the debouch of the canal into the St. Joseph, they are adopted as the remainder of this section, and their expense must, of course, be added as a part of the estimate for the northern route. Should this latter route be the adopted mode of connecting Lake Michigan with the Wabash, another dam will have to be erected across the St. Joseph, at some point lower down, in order to feed the canal to its termination.

The whole estimated expense of this subdivision, according to the accompanying documents, amounts to \$223,679 57.

#### SUMMARY OF THE WESTERN SECTION.

Subdivision.	Distance.	Descent.	No. of locks.	Estimate.
First -	22.1179	80.	10	\$194,088 17
Second -	19.875	48.31	6	223,679 57
(Kankakee feeder) Third -	7.1707	-	-	121,367 14
Northern route of } Fourth -	11.0000	16.	2	83,024 14
the Southern } Fifth -	18.1621	32.	4	224,191 62
section. } Sixth -	12.1034	79.87	10	173,659 42
Total -	92.1136	256.18	32	\$1,020,010 06

#### EASTERN SECTION.

This section comprehends that part of the canal carried down the valley of the St. Joseph (of the Maumee,) and extends from a short distance below the mouth of Fish creek to six miles above Fort Wayne. It is divided into two subdivisions.

*Subdivision 1.* From a short distance below the mouth of Fish creek to bench mark 23. (Map, sheet No. 2, "northern route.")

Distance, - 14 miles 1,210 yards; descent 16 feet; 2 locks.

From Pigeon lake, 33 " 1,238 " " 154 " 19 "

This subdivision commences with a dam across the St. Joseph, eight feet in height, and one hundred and fifty-four feet long. The line runs through rich alluvial land, requiring very heavy grubbing. Side-cutting and walling will be necessary, as well as a considerable quantity of paving to protect the embankments from injury by the freshets.

The estimate for this subdivision amounts to \$174,072 60.

*Subdivision 2.* From bench mark 23 to the termination of the canal about six miles above Fort Wayne.

Length, - 16 miles 1,585 yards; descent, 24 feet; 3 locks.

From Pigeon lake, 50 " 1,063 " " 178 " 22 "

This subdivision does not differ materially in its character from the preceding, except that it will require four aqueducts to pass the canal over deep ravines, and one to cross Cedar creek. This stream can also be used as a feeder.

The line terminates at the head of the feeder, for the contemplated canal to connect Lake Erie with the Wabash river, as run under the direction of commissioners appointed by the State of Indiana.

The estimate for this subdivision is \$186,318 09.

#### SUMMARY OF EASTERN SECTION.

Subdivisions.	Distances.	Descent.	Locks.	Estimate.
First - - -	14.1210	16	2	\$174,072 60
Second - - -	16.1585	24	3	186,315 09
	31.1035	40	5	\$360,390 69

#### SUMMARY OF NORTHERN ROUTE.

Section.	Distances.	Descent.	Locks.	Estimate.
Eastern - - -	31.1035	40.	5	\$360,390 69
Middle - - -	53.721	256.96	32	480,067 32
Western - - -	92.1136	256.18	32	1,020,010 06
	177.1132	553.14	69	\$1,860,468 07

According to the above estimates, it will be perceived that a small difference exists in favor of the "northern route;" but, it must be remembered that the estimate does not include the whole length of that route as ordered by the original instructions in relation to this communication.

It is an estimate of that portion of it only which extends from the mouth of the St. Joseph (of the lake) to Fort Wayne, and it proceeds on the assumption that the residue of the route, viz. from Fort Wayne to the mouth of the Tippecanoe, will be constructed as a part of a different work, viz the Erie and Wabash canal. Should that work not be constructed, the cost of 106 miles more of canal, amounting, according to the estimate of commissioners appointed for that purpose, by the State of Indiana, to \$922,000, will have to be added, which will cause the total expense of the northern very considerably to exceed that of the southern route, thus removing the solitary ground of preference which can be urged in favor of the former.

But, leaving this advantage untouched, and taking it for granted that the remaining 106 miles will be constructed out of other funds, there still remain considerations, which, it is believed, will more than counterbalance this trifling difference in the original cost of the canal.

The southern route is shorter by more than twenty miles. It has less lockage by 262 feet. It will require but 36 instead of 69 locks, thereby occasioning a great saving of time in the transportation of all articles of trade; and, lastly, and principally, it enjoys the paramount advantage of commanding an unfailing and ample supply of water on the summit.

For these reasons, the preference has, without hesitation, been given to the southern route.

In closing this report, I should do injustice to my own feelings, were I to omit to mention the important services rendered by the assistants, who have been engaged upon the several parts of this survey.

To Philip R. Van Wyck, esq., U. S. assistant civil engineer, was committed the task of carrying the entire line of levels down the valleys of the St. Joseph and Tippecanoe rivers, in which service he was assisted by Mr. Charles Mortimer.

The diligent and faithful manner in which this part of the survey was executed, is such as to reflect upon Mr. Van Wyck the highest credit.

The levellings down the valley of the Kankakee, and over the summit of the northern route, were executed by Mr. George Smith; and, from that summit down the valleys of both the St. Joseph's rivers, by Mr. Erskine Stansbury, aided by Mr. Randolph Coyle.

The prosecution of this extensive survey, by subjecting to minute inspection a very interesting portion of our country, has tended entirely to confirm the view in which the examination had its origin. It has conducted the brigade through a region abounding in every natural advantage, fertile in soil, presenting great facilities of communication, and lying immediately adjunct, on one side, to a stream which will soon be rendered navigable throughout its length, and covered with the bustle of an active trade; and, on the other, to a great arm of our Mediterranean waters, stretching itself into the very heart of a rich and, soon to be, a populous country; and furnishing, for the naval defence of our internal frontier, a safe and convenient harbor, easily fortified, and affording every possible advantage for a naval depot. The means of uniting the two, have now been sufficiently developed to render it certain that that valuable improvement may be effect-

ed at a small comparative expenditure of money and labor; and a path has been fully opened for the enterprise of a young, but rapidly advancing State. All which is respectfully submitted.

HOWARD STANSBURY,  
*U. S. Assistant Civil Engineer.*

Lt. Col. JOHN J. ABERT,  
*Topo. Eng'rs. U. S. A.*