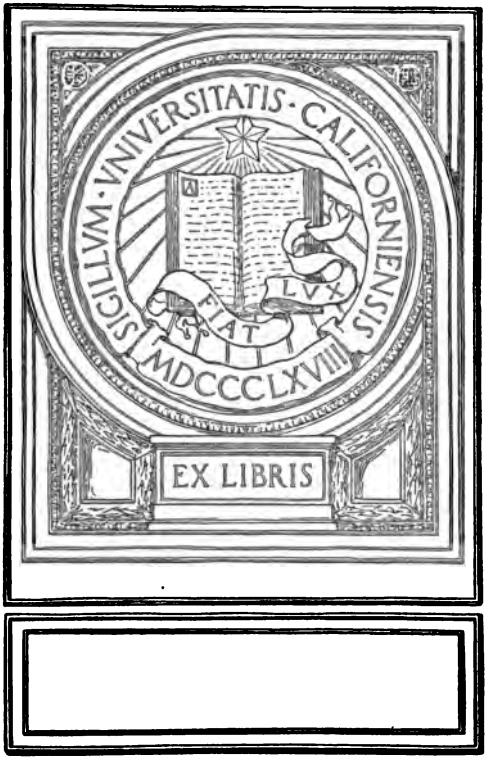
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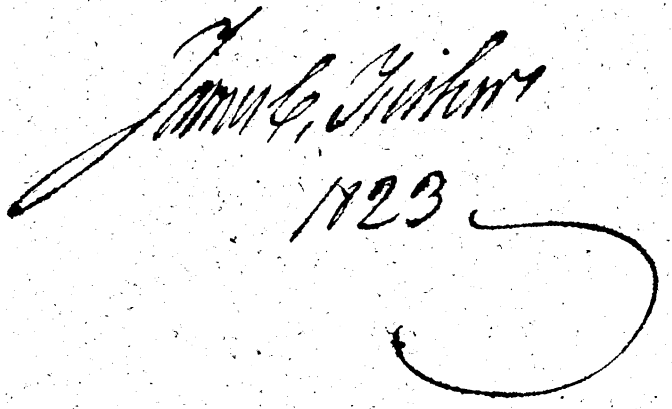
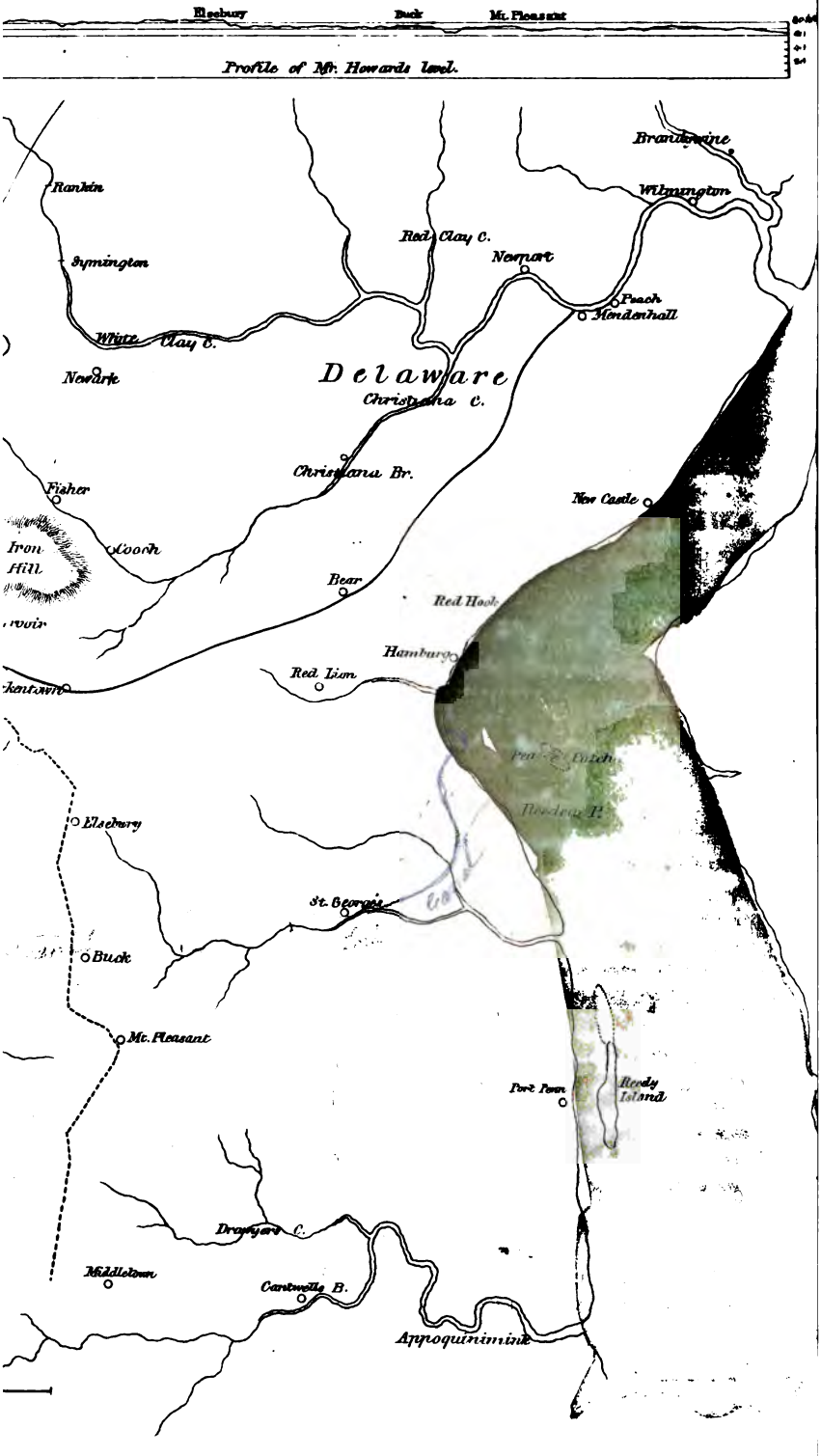



Elsebury
Buck
Mt. Pleasant
Profile of Mr. Howards Level.
Brandywine
Rankin
Wilmington
Red Clay C.
Symington
Newart
Peach
Hendenhall
White Clay C.
Newarke
Delaware
Christeana C.
Christiana Br.
Fisher
New Castle
Iron
Hill
Moore
Bear
Red Hook
Hamburg
Red Lion
Elsebury
St. Georges
Buck
Mt. Pleasant
Port Penn
Reedy
Island
Drawyers C.
Middletown
Cantwells B.
Appoquinimink

A

MEMOIR

ON THE

RISE, PROGRESS, AND PRESENT STATE

OF THE

CHESAPEAKE AND DELAWARE CANAL,

ACCOMPANIED

WITH ORIGINAL DOCUMENTS AND MAPS.

By JOSHUA GILPIN,

FELLOW OF THE AMERICAN PHILOSOPHICAL SOCIETY,

AND ONE OF THE DIRECTORS OF THE CANAL COMPANY.

WILMINGTON:

PRINTED BY ROBERT PORTER.

1821.

To the Citizens of Philadelphia:

AND PARTICULARLY THE COMMITTEES OF THE PHILOSOPHICAL SOCIETY AND OF THE CITY.

FELLOW CITIZENS,

It is with peculiar propriety I address to you the following papers, and claim for them your patronage. The work of which they treat is of acknowleged importance to the United States, and particularly to the city—it was originally begun, by its zeal and under its auspices, and a revival of that zeal at the present moment, offers the fairest prospect of raising it from its depressed state. In this situation, it cannot I think, but be acceptable to lay before you what information I possess upon the subject, and to make that information as general as possible; in this I have no motive, but the public good, and that of my native city, whose interests I have ever sought to promote in every situation in which I have been placed, and above all in the present work, by devoting to it a large portion of my time, and pursuing in common with my fellow-directors, a spirit of conciliation towards the citizens of the two adjoining States, whose interests are particularly united with those of Philadelphia—sensible, that as it is upon the area of their soil, under the protection of their laws, and in a great degree by their people, that this work must be executed, it is by these means that the ascendance which the city justly claims, in return for its capital and exertions, may be most effectually maintained.

If the information this little work conveys, shall in any degree tend to realize to our city the advantages of those institutions of which it treats, it will form my highest gratification.

I remain

With profound respect,

Your fellow-citizen,

JOSHUA GILPIN.

December 1, 1821.

REFERENCE TO THE MAPS.

To face the title—Map of the present designated route

Map, No. 1.	The route from Chester to Duck creek, by T. Gilpin, 1769. Appendix, Page	1
No. 2.	The route from Bohemia to Appoquinimink.	4
No. 3.	The route from Elk to Christiana.	5
No. 4.	General surveys of canals, roads, &ca. made by the Philosophical Society in 1770.	12

NOTE—These Maps are reduced from the originals—the upper black line of canal in the last one, is in lieu of the red line mentioned in the Appendix, page 14.

ERRATA.

Page 8	Line 15	read, 2 or 3 miles above Frenchtown.
	33	small inland streams.
9	34	part of the British.
11	11	much of, instead of generally speaking.
	23	six to seven feet burthen.
13	26	bight for bite.
14	27	two miles and a half.
28	35	immediately benefitted.
29	19	do. do.
30	35	finished.
42	15	40,000 tons.
	28	5 vessels.
		IN THE APPENDIX.
8	2	above the Pennsylvania line.
	12	Peter's creek.
21	26	Christiana road.
	36	and the intercourse.

A

MEMOIR,

&ca.

It has been correctly remarked, that the near approach of the waters of the Chesapeake and Delaware, must have suggested the idea of an artificial communication between them, at a very early period. It is probable, however, that little attention was paid to the subject before the year 1757, or 1760; as it was at that time, that canals commenced in England. Of what may have been done in the shape of surveys, estimates, or other effective documents, after that period, I know of none but those of my father Mr. Thomas Gilpin, who appears to have taken up the subject, about the year 1767, or 1768; and, with the assistance of some gentlemen in the neighbourhood, to have made many surveys and estimates, for a canal from Duck creek to the Head of Chester, which he then owned, and where he partially resided. Of these surveys I possess six, of nearly the same tenor; the whole of which were at length condensed in one survey and estimate, in the year 1769, presented by him to a committee of merchants, then formed in Philadelphia, for the improvement of the trade of the province; and to the American Philosophical Society, of which he was a member. This appears to be the first introduction of the subject to the attention of that body, and was soon after followed by another survey, and remarks upon the route from Bohemia river to Appoquinimink: both of these documents are now published.

As there was at that time no board established for public improvements of the kind, the Philosophical Society was the natural repository of all the ideas suggested by ingenious men on the subject. Accordingly, an examination of the plans proposed, and of the passes between the waters of the two bays, was taken up with great public spirit by that body, who appointed a very respectable committee in 1769. This committee however, appears to have confined its attention to the pass between Bohemia and Appoquinimink; which, tho short, presented considerable difficulties, and besides, was thought too low in the peninsula, for the advantage of the city of Philadelphia.

In January 1770, another committee was appointed, which proceeded to Christiana Bridge, and there divided: one party exploring the pass between Back creek, and Red Lion creek; and the other, that from Christiana Bridge to Elk; after which, their attention was directed to an object of equal importance, viz. that of exploring the ground thro Chester and Lancaster counties, to the lowest parts of Susquehanna, within Pennsylvania; in order to draw the produce brought down that river, by short communications to the waters of the Delaware, and the vicinity of the canal; and thus to open an easy and direct communication for it to Philadelphia.

The transactions of these committees were condensed into a report, which is published in the transactions of the Society, vol. 1. fol. 357. I find however, in the hand writing of Mr. Gilpin, who served on both the committees, a general explanation of his sentiments in a letter to Dr. Franklin, with whom he corresponded on the subject, and a journal of their proceedings, and the field notes of the surveys kept by himself, which contain a number of important remarks, as to the levels, and also several essays, extracts of letters, &ca. relative to the improvements, which seem then to have agitated the minds of the citizens of Philadelphia, very much as at present.

These papers of my Father, having been often asked for, I have thought it best thus to give them to the public; as they form, so far as I can trace it, the first link in the

history of the contemplated canal, and, with the papers of the Philosophical Society, all I believe, that was done upon the subject before the revolution. It will be seen that the papers generally, contain a great number of interesting facts, observations, estimates, &ca. very extraordinary for an age, in which, both the science and practice of canals, were yet in their infancy in England, and nearly unknown here. The whole can be considered as no more than the cursory, or preliminary surveys, of a number of ingenious men, preparatory to actual practical investigation. The three routes indeed, of the Head of Chester, Bohemia, and Elk, were examined with that practical accuracy, which, even at so early an age, fixed those characters of them that time and every observation since has tended to confirm. The route from Red Lion creek, to Back creek, was but very cursorily examined; as it was the depth of winter, when the severity of the season prevented a critical survey of it. The opinion and estimate of the committee therefore, appear to have been formed on that general feasibility of execution which presents itself here, as well as in so many places elsewhere.

One circumstance seems to have been taken as it appeared, without much examination, viz. the state of the waters, at the different extremities of the proposed canals. In the three points which were verified by surveys, and most particularly in the route from Elk to Christiana, which was then the great road of land carriage across the peninsula; the state of the different debouches was accurately fixed, by the existing water carriage. It is probable, that in other places, this was the less minutely attended to, from the nature of the canals proposed, as they were upon an extremely small scale. In these respects however, it will be seen, what important changes time has since effected, in filling up some waters, and the embankment, &ca. of others; which, with an entire difference in the size and construction of the canal now proposed, give a new feature to the surveys.

It will be worth remarking, however, how much in many instances, a close union exists between these sur-

veys and those which have been since made by the canal company, who, I must remark, never had these papers before them, (except the report of the society,) or very partially so, as it was not till since their labors were suspended, that I have been able to collect and arrange the principal part of those of my Father. Yet in the progress of the company's surveys, they were often carried over the same route, embraced the same general outline, and if I am not mistaken in my recollections, I was informed by Mr. Latrobe, that in more instances than one, his surveys verified their identical landmarks.

The importance that was attached to the investigations of the country and route extending to the Susquehanna, and drawing the produce from that river, merit particular attention. They form, as will be perceived, a very important part of the whole labors of the committee; certain it is, that they offer a communication to Philadelphia, which could be scarcely obtained in any other way, from a great part of Chester and Lancaster counties, and they form very feasible means of arresting the mass of produce which comes down the Susquehanna, and turning it to that capital. In what manner the ideas that were thus elicited, in this respect, have been since taken up by the company, and enlarged and applied to the routes designated by them, will hereafter appear.

With these remarks, I shall leave the papers and plates accompanying them, which are copies of the originals, to speak for themselves; sensible, that they will be appreciated as very valuable documents, and as proofs of the early care of those whom we may term our ancestors, to the improvement of Pennsylvania, and drawing the productions of its own and of the surrounding country, to its capital.

From this period, I can trace nothing on the subject till the passage of the acts which incorporated the present company These were slowly effected during the years 1799, 1800 and 1801. It was not, however, until the second Monday in May 1803, that a sufficient number of shares was subscribed to complete the organization of the

company. At that time a very large and respectable meeting of the Stockholders assembled at Wilmington, where they elected Mr. Tilghman, the present Chief Justice, Messieurs J. C. Fisher, George Fox, Joshua Gilpin, for Pennsylvania: Mr. Tatnall, Mr. Johns, the present Chief Justice of Delaware, and the late Mr. Bayard, for that State: and Mr. Chew, Mr. Gale, and Mr. Adlum for Maryland, as their president and directors.

The first object of this board was to obtain the most complete information of the whole area of the peninsula, where a canal appeared in any manner practicable. For this purpose they engaged the three best engineers within their reach, and in order to co-operate with them, they formed a committee of survey of six of their own body; viz. Mr. Tilghman, Mr. Gilpin, Mr. Tatnall, Mr. Johns, Mr. Gale, and Mr. Adlum; all of whom possessed an intimate knowledge of the country.

The first report of the directors, which is included among the papers presented herewith, contains so clear an explanation of the survey, up to the final decision on the route, that it would be nearly unnecessary to do more than refer the reader to the perusal of it; if it were not that there are many circumstances attending the execution of the survey in detail, which it is impossible for a report to comprise, and yet are highly satisfactory to be known.

The gentlemen chosen as engineers and surveyors, were not Mr. Latrobe alone, who enjoyed great reputation and was indeed the only engineer properly so called within the reach of the company, but Mr. Cornelius Howard, brother of col. Howard of Baltimore, and Mr. Thompson of Pennsylvania, a gentleman who was highly recommended to the directors from that State, and who proved eminently worthy of their confidence. To these were occasionally added, Mr. Blaney, who possessed great local knowledge of the country below New-Castle, on the Delaware, and others, whose information or aid was necessary to the fullest investigation of every circumstance.

On the 4th of July 1803, I accompanied Mr. Tilghman from the city to Wilmington, where most of the com-

mittee with the surveyors and engineers were collected, and formed the outline of a plan for proceeding together, in an investigation of the country, waters, and points of importance, in order to fix by personal observation, and the best general information to be obtained, the plan for the operations of the engineers in detail. Accordingly, we began with Frenchtown, the point which seemed in general opinion, the most proper for the western termination of the canal. Here were assembled on the 6th of July, most of the committee with Mr. Latrobe and Mr. Howard.

It is here proper to observe, that the termination of the canal fixed upon by the survey of 1770, was nearly opposite to Elkton point, which was then the head of a good navigation about 4 or 5 miles above Frenchtown. But in the course of the intermediate time, the Elk had become so much obstructed by shoals, that this navigation had very nearly ceased; and Frenchtown was universally considered, as the highest point at which it would be proper to attempt an entrance for the canal.

There is also a remark, with respect to the waters of the Chesapeake generally, proper to be introduced here, tho it applies less to the Elk than to the other streams. These streams almost uniformly present to the eye, fine sheets of water with steep banks of gravel, sand, or other alluvial substances: they also form on the map deep indentations into the peninsula, apparently of the utmost value for canal communications, which has always led to the idea, of these communications being much easier than is found to be the case in point of fact. In this respect therefore, they are extremely illusory, as they are no more than estuaries, or inlets of the tide water of the Chesapeake, supported by no inland streams; but immediately degenerating at the head of the tide, into rivulets of little use, either for natural or artificial navigation. Thus the head branches of Bohemia and Back creek are dammed up at the head of the tide, for mills, and no one of them is able to supply more than one mill of feeble powers. From the loose nature of their shores also, they have all,

since the settlement of the country, become so obstructed with shoals and sand-banks, either at their mouth, or within it, as to have very much lost their capacity for navigation, and to render it necessary, that canals formed into them, instead of debouching at their upper extremities, should traverse their whole extent; which again is rendered nearly impracticable along their banks, by their loose structure, and deep indentations; so that it is necessary for canal purposes, to resort to the table land or elevated ridges between the streams.

We found the Elk at Frenchtown more affected by these causes than we had imagined. The river itself, it is true, is of a character wholly different from any one in the peninsula, being one of those bold streams, which rising in the rocky and elevated ridges of Pennsylvania, brings down at all times, such a body of water, as to keep open a considerable channel thro the estuary into which it expands, and which at Frenchtown is half a mile wide. But the channel itself is a considerable distance from the shore, and would require an embankment to reach it: it is also narrow, and difficult to be navigated especially with particular winds. Such was the result of the information we obtained on the spot, and of our own observations; and tho the navigation may be considered as tolerable, if not good at present, (being frequented by the packets,) yet the state of the channel, and its probable deterioration in the course of time, suggested to us the propriety of a minute investigation of it by the engineers; and in the mean time to trace the shore of the Elk downwards, to find some point of entrance, of a decidedly bolder character.

This we proceeded upon, but found the eastern bank of the Elk so skirted by flats and sand banks, that our object was not attained till we reached Welch point, at the mouth of Back creek. Here it was that the British landed in 1777, and the boldness of the water close to the shore was unequivocal. The land also appeared extremely proper for the entrance locks, and the site of a good basin offered itself within the point in Back creek.

Hence we proceeded to investigate Back creek itself. This had always been of so inferior a character for navigation, that however short the distance from the head of it to Hamburgh, it never had been distinguished, as a pass of much importance between the two bays; but it had now become so obstructed, as to preclude the idea of its forming part, of a bold and efficient canal navigation. Leaving it however to be minutely investigated, we traced its northern bank, to see how far that was fit for a canal to be carried along it; and the result was that this appeared ineligible, from the roughness of the bank itself, and the many deep ravines which branched from it, and extended to considerable distances from the shore of the creek.

Hence we crossed to the south shore of Back creek, by passing the heads of Long creek, Broad creek, and all its other branches, which we found of the same character as the northern, that is, composed of a succession of high banks and intermediate indentations; so that the best chance for a canal in this quarter, seemed to be over the more level parts of Bohemia Manor. Here the customary route from New-Castle to Old Court-House point, upon the bold water of the Elk itself below Welch point, obviously suggested the idea of tracing a course from thence, to the nearest point on the Delaware, which was accordingly pointed out to the engineers; when we proceeded to examine Bohemia river. Here we were met by Mr. Basset and Mr. Bayard, who above all others were interested in having that river included in our plan. Yet it is due to the candor of those gentlemen, and particularly to Mr. Basset, whose long acquaintance with the spot, gave him the best knowledge of it, to say, that the most decisive information of the nature of the Bohemia was derived from him, by which it appeared, that both the mouth of the river, and a large part of its course, had become too much obstructed, for our purposes. This was the most southern point of our investigation, as the rivers beyond it appeared to be too low in the peninsula, for the object we had in view; we therefore turned from hence to explore the

waters of the Delaware, and crossed the country to Cantwell's Bridge, the head of the navigation on the Appoquinimink, nearly over the route formerly proposed for the canal from Bohemia. Here we were joined by a number of gentlemen of the country, who pointed out every thing worthy of notice in this pass, and gave us a correct chart of the Appoquinimink itself.

Having given the general character of the waters of the Chesapeake, it is proper to do the same with those of the Delaware, which are of a very different description. Generally speaking, the western shore of this river is composed of bodies of marsh extending several miles inland, obviously formed of the alluvion of its waters driven on its bank by easterly winds. Through these the small streams which, like those of Maryland, descend from the middle ground of the peninsula, wind in very narrow and devious courses, their channels being kept open by the action of the tide of the Delaware. Most of them however are small streams whose navigation has become worse and worse till they have been banked out. Appoquinimink itself is one of the best of them, and its navigation to the bridge is still kept open, though it admits vessels only of about five feet burthen, and its course winds for nine miles through marshes, while it is only four direct. It was said also, that in north west winds, the bar at its mouth, was sometimes nearly, if not quite bare. Such a creek therefore, it was obvious was unfit to form any part of the route of the canal.

As this was the shortest of all the passes between any important streams of the peninsula, it being by the survey, not six miles from the head of the tide in Appoquinimink to that in Bohemia, it displayed better than any other, the nature of those passes, and how little their apparent brevity was to be depended upon; since the length of a canal fit for any important purposes, here, as elsewhere, must extend, not from the head of one tide to the other only, but to the extremities or mouths of their respective streams; that is instead of six to nearly twenty miles, without deriving any aid from those streams themselves,

but on the contrary considerable embarrassments from the nature of their bank on one side and their winding marshy course on the other.

This pass however from its thus being the shortest, offered a fair opportunity of examining one plan which had gained considerable public attention, and indeed was pressed upon us, by the gentlemen of the neighborhood, here. This was no other, than that of a thorough-cut from one water to the other on the level of the tide, to which we gave most deliberate attention, and entered, with the engineers, into such calculations as might determine, at least with some probability, whether such an undertaking was practicable or not. It is to be observed that the middle ground here, though high, is little more so than to the northward, while it is shorter and no where more assisted by the ravines or indentations of the upper part of the streams, (if indeed they can afford any assistance) since those of Appoquinimink and Drawyer's creek very nearly approach those of Bohemia and Back creek. It was obvious however, that at least one mile of the middle ground must be cut through its full depth, and at least two and a half miles more, on each side, at a height not materially less, as the hills maintain much of their elevation to the heads of the tide. Mr. Latrobe has in one of his reports, given the calculation for cutting this single mile, which amounted to 880,000 dollars without any allowance for removing the earth, or any provision for what was to be done with it. This calculation is made for a canal obviously of less dimensions than would be proper, and at a less price than it is possible to execute it: taking it however on this scale, with the digging of the residue—the purchase of the land—the removal of the earth, (if indeed any place could be found to put it)—the embankment of the sides—and such works as would be obviously necessary to regulate the course of the water, it could not altogether amount to less than many millions of dollars, to say nothing of the innavigable state of the streams on both sides, the difficulty of keeping open such high banks of loose earth, and preventing their throwing continual obstructions in the

canal, or the streams at its end, or carrying masses of earth and sand into the Chesapeake or Delaware bay, the last of which is already sufficiently obstructed. In fact this idea of a thorough-cut seemed both to the committee and engineers one of those delusory projects which would not, in the present improved system of forming canals, gain the attention of any scientific engineer, or well informed body entrusted with important public interests. The committee left it therefore, to pursue more important objects.

The next point of examination was Port Penn or the piers at Reedy Island, which if so low a route for the canal was ever thought adviseable, challenged attention from the boldness of water and security of the harbor they offered, and above all, from their being an out-port of Philadelphia itself. In traversing the country from the higher ground to Port Penn it appeared also, generally very eligible; the committee determined therefore that the engineers should explore every route which appeared practicable from this quarter to the Chesapeake, not only directly across Bohemia manor to Court-house point, but also to the heads of Back creek, with a view to ascertain both the elegibilty of these routes, and the general nature of the passes at the heads of St. George's creek, while the surveys they contemplated above, would give them an equal knowlege of the country at the head of Red Lion creek, and the whole western bank of what is termed the *bite* of New-Castle.

There were however two circumstances affecting this whole bank, which merited particular attention: the first arose from the notorious circumstance that from the piers of Reedy Island to those of New-Castle, there was no known good harbor or shelter, on the contrary the whole of this coast was extremely exposed, especially to the violence of easterly winds. The second, that it was subject to the formation of banks or flats; the basis of new marshes, in front of those already embanked. How far therefore a debouch or termination at once sufficiently bold in its nature, sufficiently sheltered, and not liable to future obstruction, could be obtained, was essentially ne-

cessary to be determined, in order to guide the views of the committee to this quarter. Accordingly the engineers were directed to explore the coast along this bite or bay, and to obtain actual soundings of its depth of water.

The situation of New-Castle itself was obvious to every one of the committee, as possessing all that could be desired for a termination of the canal, except its exposure, which could be remedied only by the construction of a basin, or artificial harbor—a work very practicable immediately below the town, though not to be effected without considerable time and expence.

Above New-Castle there could be no idea of a debouch for the canal but into Christiana creek—on which head it is to be observed, that the survey in 1770, fixed Christiana bridge as the termination of the upper canal, after the short course of about twelve miles from Elkton. But the same circumstances which had effected Elk river, had also operated in some degree upon Christiana; that is, the navigation to the bridge was still maintained, but was not sufficiently bold for the contemplated canal until it came below Newport, whence, the Christiana was not only known to be bold but to offer in the whole course to its mouth, a harbor already formed, particularly suited to vessels of any size which would probably navigate the canal. The committee and engineers therefore proceeded to explore a proper situation on its banks, which appeared attainable about a mile and a half above Wilmington; the practicability of this was however left to be confirmed by the surveys of the engineers, who were also directed to investigate the depth of water by actual soundings to the mouth of Christiana.

With respect to the waters of supply for the canal, it was obvious that there existed no resource in any one of the streams below Elk river, Christiana, and its two branches White-Clay and Red-Clay creeks, as these are the only ones which afford water of a sufficient elevation, or in a sufficient quantity. The Elk had been explored, as it will be seen, in 1770 and a feeder traced to it; so also were both Christiana and White-Clay creeks, to a certain ex-

tent. From the general knowledge of the committee, it appeared probable that all these streams could be brought to the canal, and that if the Elk was not sufficient, the whole together would prove abundantly so. To ascertain this with precision could only be effected by the actual practical operations of the engineers, but the committee thought it their duty to accompany them to the spot, and to form the best outline for proceeding in their power. Here they were joined by Mr. Cooch, who from his residence in the neighborhood, was enabled to give them very important local information of the country and waters. So far as a cursory view admitted, there appeared little doubt but that White-Clay creek afforded a large supply of water, of sufficient elevation to be brought to the canal, but the course it would be proper to adopt, was necessarily left to a practical survey. Of Christiana and Elk there could be little doubt from the former surveys. Leaving these objects therefore, to the investigation of the engineers, the committee explored the route formerly traced to the middle ground, so far as they could ascertain it from information; and from hence the country towards the Bear, and thence to New-Castle.

In this survey, which was conducted with great confidence between the committee and engineers, without any preconceived opinions, and with a sincere desire in both to leave no object uninvestigated, many important points were settled, and especially the manner of conducting the future surveys.

On the 25th of July, the board of Directors met, when the operations of the committee were approved of. Mr. Thompson was now added to the engineers, and they received their instructions to proceed, which will appear from the reports to be so comprehensive, as to embrace every position necessary to give the fullest knowlege of the country and waters. A great deal of the important part of the work was allotted to Mr. Howard and Mr. Thompson, but in the operations which were now commenced and pursued with great activity throughout the summer and autumn, the engineers assisted each other,

so that most of the important points were verified by more than one survey, and they were assisted also by different members of the committee, who possessed local information; some of whom were almost constantly with them, as well to give their superintendance to the work, as to satisfy their own doubts and to gain information themselves.

By a letter of Mr. Latrobe's of the 24th of November it appears that by that time, no less than thirty-two surveys had been made, comprehending a great number of the most important objects of the work. As however, it is less satisfactory to describe what was done in general terms, than in detail; I shall mention those which were effected.

1. A line from Frenchtown along the north side of the high land to Oliver Howell's at the foot of Gray's hill.
2. A line from Frenchtown along the south side of the ridge, falling in with the first line where it crosses the Frenchtown road.
3. Eight or nine lines to verify the levellings, and explore the ground, but not found eligible as lines of work.
4. A line from Oliver Howell's S. E. of the farm of —— Elsebury, thence following the slope of the ridge to the Bear—practicable but circuitous, no aqueducts nor tunnels.
5. A set of cross levels over the whole ridge, dividing the waters of Christiana from those of Delaware, the extreme points touching the heads of streams on each side.
6. A line in the straightest practicable mode, from Oliver Howell's to Aitkentown.
7. Three other lines—practicable but less eligible.
8. Four or five lines of levelling about Aitkentown, for the purpose of ascertaining the merits of the ground, *as to the choice of properties to purchase*, for the line of canal, there being a choice.
9. The straightest practicable line from Aitkentown to the Bear.
10. Several corrections and variations of this line.
11. A line to Christiana creek from near the Bear in the

straightest practicable direction. It strikes west of Mendenhall's landing, east of Nonsuch marsh, on a small island of fast land of Geo Gray, deceased.

12. Two attempts to carry a line more to the northward and westward; neither of them completed, the ridge being found very broad and too high by from 10 to 20 feet.

13. A line of levellings, not reduced to a *practicable* line, to Peach's fishery, by Mr. Howard.

14. A similar line to Mendenhall's also by Mr. Howard.

15. A line from a point near the Christiana road to New-Castle, being a branch of No. 11.

16. A line from the Bear to New-Castle, passing to the east of the Red Lion road—practicable and eligible.

17. Several others, *previously* attempted, the ground to New-Castle being very difficult for the last 3 miles and a good line not easily found.

18. A line to Red Hook; the shortest of them all.

19. An attempt at a line to Hamburgh—given up because the heads of Red Lion intercept the straight direction, and render that to Red Hook or even to New-Castle much more eligible.

20. A variety of cross levellings from Christiana to the Hamburg line.

21. A complete survey of Christiana creek, from the mouth to the bridge, with all its soundings, accurately taken and laid down, by Mr. Thompson.

22. Two cross levels over the ground between the Bear and Christiana bridge.

23. Two levellings along the road from Chistiana bridge to Cooch's mill.

24. Two levellings from Cooch's mill to the summit, near Oliver Howell's along the road.

25. One levelling along the foot of Iron hill, with cross levellings along all the vallies.

26. A line of levels from the summit, to the tide at Rudolph's mill at Elkton.

27. Three lines from different points on the Delaware at or near Port Penn.

28. A line to Court-house point on Elk river.
29. A survey of the ground from Port Penn to Wirts' landing on Back creek, for the purpose of finding the situation and ranges of the numerous ravines.
30. A survey of the dividing ground between Perch creek and Long creek.
31. A complete survey of Back creek and of its soundings by Mr. Thompson.
32. A great variety of verification and exploring attempts.

The committee now directed the accurate survey of the upper waters for the supply of the canal; but while the engineers were preparing to go upon it, the country and waters, particularly those of White-Clay creek, were very diligently explored again by Mr. Tatnal and Mr. Johns, in order to ascertain their elevation, probable quantity of water, and cost of purchasing them. The heights were ascertained by taking those of the mill-dams, and known falls between them, which gave them with tolerable accuracy and showed them to be sufficient—the water they considered as at least equal to Elk river, and they found that the purchases might be made at a fair value. Soon after this, the engineers went upon them, and by the end of December completed their surveys, when it appeared by their report—that White-Clay creek might be obtained, and brought to the canal, at an elevation of upwards of 80 feet by a feeder 11 miles in length, which though expensive and not eligible in the outset, offered a sure resource in the event of other means not being sufficient—that Christiana might be brought in the same manner as a resource, though with a less quantity of water—but that the Elk was, beyond all others, the source of supply proper at least to begin with; as it could be brought very much on the course traced in 1770 from Elk forge, at an elevation of 84 feet, by a feeder of about 5 $\frac{1}{2}$ miles, to the site of the canal upon the upper route. The quantity of water was estimated by Mr. Latrobe at 144 locks full per day—sufficient to pass 25 vessels each way. This feeder also offered all the important advantages that had

ever been contemplated from it—viz. a complete supply of stone and of lime for the canal—a very important revenue in bringing down lime for the supply of the peninsula, which is wholly destitute of it—and, the end of the feeder approaching within 38 miles of Lancaster, offered all those advantages for conveying the produce of Chester and Lancaster counties, which had formerly been contemplated.

This survey altogether, satisfactorily determined the most important points, on which the whole structure of the canal depended; as it proved that even if considerable allowances were made in the quantity of water, there was sufficient for as large a lockage as would take place upon it, for a great number of years—that this might be largely increased, by reservoirs in its neighborhood—and that there were ample resources for future times. It went therefore in a very great degree, to determine not only the size of the canal but its position; since wherever it was to be formed, it was from these sources, and these only, that it could be supplied.

In the course of the months of October and November 1803, and January 1804—particularly in the latter; both the board of Directors and the committee of Survey had several important sittings, to review the operations of the season, and to draw them towards a decision of the route—a large mass of surveys, and of information, had now been collected; however, to satisfy the doubts of the members, and to leave no points unaccomplished, they determined that the principal routes should be again gone over, and every dubious object re-explored. The surveys had now determined the business into two great features, which became known by the names of the Upper route—that is, from Frenchtown or Welch point, along the table land to Christiana, New-Castle, or the bite below it—and the Lower route, whether from Back creek, or old Court-house point to Port Penn, to Hamburgh, or any other position that could be found in the vicinity. Mr. Howard having left the survey in the autumn, these

were pursued by Mr. Latrobe and Mr. Thomson, with the best assistance that could be obtained.

Besides the more precise instructions as to completing the routes already contemplated, the surveyors were left at liberty to mark out any other that they should find upon their own judgment, and were instructed positively to do so—but their investigations were particularly directed to the lower route, especially from Back creek, and to the soundings of it—of Elk river—and of the shore along the bite of New-Castle; and as it appeared probable, that all these would be completed in time, notice was given to the board of Directors of the intention to determine the route, on the fourth Monday in April 1804.

One survey, which had been effected by Mr. Howard, is too important not to be noticed, that is a complete level of the elevation of the ridge between the Chesapeake and Delaware, beginning at its upper extremity at Oliver Howell's at the foot of Gray's hill, and extending down the ridge as far as the lowest branch of Bohemia or the most southern pass, in order to determine what was the lowest level at which the ridge could be passed in any direction, between the approaching branches of the various streams. By this survey it was found, that there was no depression in the ridge below 70 feet, until it came about a mile south of the Buck tavern, or about 8 miles below the present feeder, and on the route from Back creek or Old Court-house point to Port Penn. But this depression was to no more than 62 feet, or 12 feet below the summit level of the upper route; and in proceeding southward it soon rose again until it came below Middletown.

At the meeting of April 1804, all the surveys were completed, and laid before the board, with the reports of the engineers respecting them, and a mass of evidence upon every point that could be required. Indeed by this time the mind of every member of the board was made up upon the subject; and the inquietude expressed by the stockholders, after nearly twelve months spent in investigation, at a considerable expence, was such as to prove that the time was come for a decision, which was

accordingly made in favor of the upper route, from Welch point to Christiana.

The principles on which this route was adopted, are so clearly explained in the first report to the company, that it is scarcely necessary to do more than to refer to it. However as there are many collateral circumstances which may serve to explain these principles, it may be satisfactory to give some farther account of them.

It has been mentioned already how much light had been thrown upon the nature of those short passes across the peninsula; and that instead of being merely from the head of one tide to the other, a canal of sufficient efficiency, and to attain bold water at its extremtiies, must traverse the whole extent of the streams and of course become of considerable length.

It will have been seen also, that many of the routes were utterly impracticable for want of water of sufficient elevation; and that no route whatever could be supplied from any source but Elk, White-Clay creek, and Christiana at the upper extremity of the peninsula. These two circumstances alone, were in a great degree decisive as to the route of the canal—since every circumstance of convenience and indeed of necessity pointed out the propriety of keeping the canal, as near as possible, to its source of supply. What has been termed the lower route, and indeed the lowest that can be contemplated, viz. that from Back creek whether to Port Penn, St. George's, Red Lion, or any other point on the Delaware, was if not impracticable yet in every respect ineligible. It will be seen by the surveys and reports, that a canal carried from the head of Back creek, must be supplied by the upper waters thro a long extension of the feeder of 8 or 10 miles, which would have increased any expence that might otherwise be supposed to be saved. But the western end could not be supplied at all, except by a steam engine to pump water into it. In fact, as Back creek itself was totally ineligible for any part of a bold navigation, and its banks on both sides difficult if not impracticable to be traversed, it necessarily threw this route off from the val-

ley of the creek, upon the table land on either side. If upon the south side, on Bohemia manor or in fact upon the route from old Court house point to Port Penn, the western end of which could not as I have mentioned be supplied with water; and if on the north side, it threw it into the line of the upper route from Welch point. The only thing in favor of this route was, the depression of the ridge, which however, we have seen was only 12 feet, and was useless on the western end of the canal; but if it had been effective, was infinitely more than counterbalanced by other obstacles, viz. the actual length of the route, if made effectual from bay to bay; the very difficult nature of the ground at the heads of Back creek, St. George's, and the Red Lion; the extension of the feeder for at least 8 miles; and lastly, the nature of the coast of the Delaware, which at any place in the lower part of the bight of New-Castle, was too much obstructed and exposed, and altogether too low down the bay to be adopted, if a good superior position could be obtained.

On the contrary every circumstance which had been contemplated in forming this important work or that was elicited by the surveys seemed to point out the propriety, of bringing it as much as possible, up to the heads of the two bays. This was the best and most natural course, which the carriage of produce formerly took; as the route from Elk to Christiana bridge always was superior to every other, and gave the most extensive accommodation, to the eastern shore of Maryland, and indeed to the draft of the whole produce of the Chesapeake: It throws the different extremities, and particularly the eastern one, into the safe and sheltered part of the navigation of the Delaware, and above all, it admits of that very important feature, of an extended communication in Pennsylvania.

These may be considered as the economical advantages of this route: but the practical advantages are still superior. Taking the general course from Welch point or from Frenchtown, it is perhaps the most practicable ground in the peninsula; and probably as much so as ever was formed into a canal—for by rising from Welch

point to the table land, it may be effected without difficulty, and indeed, with such a choice of ground as infinitely to lighten the expense. If the eastern end were to terminate at New-Castle or Red Hook, it would perhaps be the shortest practicable route, but even at the utmost extension adopted, it is probably the most economical, for it is not by the length, but by the nature of the ground that the expence must be determined; as many miles over good, are often executed for what a short distance will cost over difficult ground. Some objection has been made to the elevation and number of locks, on which it is to be observed, that the peninsula cannot be passed much lower on any route—say, with not more than a difference of one and a half or two locks at each end, or three or at most four altogether. But for this difference that elevation is gained, which saves to the canal innumerable difficulties and expenses that would occur on a lower level. A lock is in itself by no means one of the most formidable articles of expense—those on this canal, (I mean the upper ones) are estimated at 5000 dollars; and would not I apprehend cost more; three or four locks therefore, would produce a saving of $15,000 or $20,000, which would be soon consumed in a piece of deep digging, or embankment, or aqueduct, or in fact any other difficult work, to which a lower level across the peninsula would be subject. The ideas which have arisen from too great a number of locks, might have been obviated in another way—Mr. Latrobe has designed them with the very moderate lift of 8 feet, in order to give them greater solidity, but he might with propriety, have made them of 10 or 12 feet, which would have reduced the number to 6 or 7 on each side: tho this would have been more a saving in appearance than in fact.

As for the supply of water, I believe it never has been questioned by any one who has seriously examined it with competent judgment; on the contrary, the more it has been viewed by practical people, the more certain does it appear that it will be sufficient for all contemplated purposes. As however this is the pivot upon which the canal

turns, for without a suffiicent supply of water there can be no canal at all, I may here be indulged in some particular observations upon the subject. If doubts have been raised, I rather think it has been not by those who have examined it, but by the supporters of other plans, to whom a failure in this point would be most favorable. I have heard it said that Mr. Latrobe has expressed his doubts upon the subject, which I question; at least it appears extraordinary to me, as in repeated examinations of the water with him, in his calculations and designs founded upon it, and in his reports to the board, I never heard any thing but an undiminished confidence in the quantity of water, expressed or intimated. The business however did not rest alone upon the calculations or opinion of Mr. Latrobe; to measure the quantity of running streams of water, may be supposed to be the business of mathematicians alone, the gross differences between whom both in theory and practice may be seen by perusing the article River, § 27. in Dobson's Encyclopedia. When however, streams of water are in part or altogether converted to mill purposes, their quantity and powers, become an intimate object of investigation to those who are concerned in them, and are generally as well understood by them, as by theoretical men. There were indeed several in the board competent to determine the quantity of water with sufficient accuracy. It is well known that on many canals locks of the size contemplated in the present one, are filled in from 3 to 5 minutes; Mr. Latrobe's calculation of 144 locks full in 24 hours allows 10 minutes, a quantity to which Elk river, taking what is used in the mills at Elk forge, and especially if the waste water be added, seems amply sufficient. It is to be observed however, that in the economical plans adopted in Europe, far less is made to answer, as streams of water instead of being turned directly into canals, are first collected in reservoirs or ponds into which the natural streams, flowing continually, while they are but partially drawn off, are immensely accumulated; this indeed may be seen in the use of common mill-dams. As to locks, it is to be remarked

that an acre of water 8 feet deep would contain 25 locks full—10 acres 250—and 100 acres 2500. Of such reservoirs, it will be seen provision was intended to be made in the outset, especially for one of 100 acres near the junction of the feeder and canal, and the upper level of the canal of 13 miles in length, formed itself a considerable one. Elk river therefore, with the resources of Christiana and White-clay creeks, to be used in the same way, left the supply of water probably as large as could be used by the number of vessels, which would ever pass through the locks in a day. Indeed, having examined the sources and modes of supplying a great number of the canals of Europe, I do not hesitate to consider the supply in this instance, what would be deemed a large one there, and such as is very seldom obtained. In the two great canals of Languedoc and of the Forth and Clyde, both of which I have examined, the sources of supply, considering their vast lockage bear no comparison to it; the canal of Languedoc is supplied by two brooks, the Sor and the Laudot, which I do not think collectively exceed the Elk—these are united together and collected into a vast reservoir in the mountains of St. Feriol or Montagne Noire, by an embankment which has been termed the most magnificent work of modern ages. Here by their constant operation, they form a reservoir containing 600 acres and 900,000 cubic toises of water, from which the supply of the canal is drawn thro three brass cocks of 9 inches diameter each. The canal itself being 180 miles in length, 75 English feet in breadth, and 7 in depth, with 103 locks and a descent on the side of the Garonne of 200 feet and 600 feet on that of the Mediterranean. The supply of the Forth and Clyde is still less than this, as it depends chiefly on mountain torrents, collected into two reservoirs, one of 50 and the other of 70 acres, yet it has to supply a canal of 56 feet wide, 8 feet deep, and 35 miles long, with a descent of 160 feet each way by 40 locks.

If then we consider the economical plans, which are thus adopted, in converting water to the supply of canals;

and the resources of Elk, Christiana, and White-clay creeks together, there cannot I think be any hesitation in the mind of a practical man, upon the subject, especially when we come to consider how vast a revenue will be paid, by far less than the full extent of the lockage of 50 vessels per day.

The considerations thus far apply, as it will be seen, to the main course of the upper route, on which it is to be observed the opinion of the board was decisive,—there was indeed no question, as to the eligibility of the course from Welch point to the Bear tavern; or diverging point, from which the canal might be carried to Christiana creek, New-Castle, or to Red Hook, about 3 or 4 miles below it—and upon which the opinions of the board were divided. There could have been no difference as to the course to Red Hook, had it not been for its exposed situation, and the shoals along that shore. With respect to New-Castle and Christiana, between which the difference of opinion principally arose, it will be seen, the cost was nearly the same, or less to New-Castle, if a harbor there be kept out of view. The actual point upon which the decision turned more than upon all others, was the want of a harbor at New-Castle, and its being ready provided in Christiana—this creek, indeed, from the contemplated entrance of the canal, may be considered in the same light as a river navigation; with the circumstance, that it affords a perfectly secure harbor; and is in fact, the first secure harbor above Reedy-Island: on the contrary the bold and beautiful situation of New-Castle occasioned the regret of every gentleman in the board, that there was a single obstacle to adopting it; but it was undeniable that a harbor must be formed there, which would have required considerable time, and expense, to have completed it. This expense also it is to be observed, was not contemplated in the estimate of the route to New-Castle, and when added makes it more than that to Christiana. I believe however I state the feelings of the gentlemen of the board correctly when I say, that every one felt happy that this part of the subject was

open to review; all agreed upon the necessity of proceeding without delay to execute the western end of the canal, to bring the waters to it, and to put at rest the question of the eastern debouch until it might be determined upon, under circumstances of more experience and opportunity.

On this subject it is necessary to remark, that of four or five routes that had been designed and hoped for, by the proprietors in their respective neighborhoods each had its advocates, and the board was sure to be left with considerable discontent from the disappointed quarters, let their decision have been what it would. This was indeed one of the most unpleasant and difficult parts of their duty; but their decision being founded upon the broad basis of public good, they hoped it would silence all party upon the subject. The few members of the board who could have had any local interest, were poised against each other, if even it could be supposed that men of reputation could be guided by views of this kind; and the decision actually rested with gentlemen of interests, totally remote from the neighborhood—viz. those of the city of Philadelphia —and of Maryland. Indeed if the names of the members of the board are now reviewed, it must silence every idea that they could act, either with partiality or without the fullest information.

There were it is true many circumstances of policy, which came into view in deciding this question; such as must ever have an influence on subjects of the kind. The size of the canal depended in the first instance, upon the quantity of water and nature of the ground; but next to these upon the traffic it was to accommodate. Neither the water nor ground admitted the passage of large sea vessels, but great pains were taken to collect an account of the size and draft of water of the craft, usually navigating the two bays. In Europe the greater number of canals are for inland navigation, by barges or vessels which, if they carry masts at all, are made to lower them, the canals being crossed by bridges, tunnels, &ca.—here it was obvious nothing of that kind could be attempted. The depth of water was fixed at 8 feet which was found

to accommodate the craft both of the Chesapeake and Delaware, and which is as deep as almost any canal in Europe, or as the water here admitted, or in fact as was reasonable and practicable.

The next object which presented itself; and that of primary importance, was the great use of the canal to the public, and the revenue to be derived from it to the stockholders. To give it the great feature of a national work, and to make it a link of that interior communication along the coasts of the United States, which has been often contemplated, was accomplished as far as possible, by the size and route of the canal, in the manner decided upon. To make it as useful as possible to the States and cities who designed it, was the next object, particularly to Philadelphia, where, it was well known, the support of the canal chiefly rested.—After these objects every circumstance of propriety pointed out, that the benefit of the States thro which it passed, should also be consulted, as it was not to be supposed that these States would furnish the ground, the waters and whole area of the canal, and sanction it with legislative aid, merely to pass thro them without some attention to their interests. The interest of Baltimore stood very much upon the same footing as that of Philadelphia; that is, it was at the other extremity of the canal, and of course had equally the advantage of it—but the interests of the eastern shore, which of all parts of Maryland had promoted this canal, with most zeal, dictated an opening to them of as many markets as could be furnished; and above all the old one which they had enjoyed, when the route from Elkton to Christiana was open to the numerous mills on their streams.

In the State of Delaware, little interest was felt for the canal, below the Christiana or New-Castle. If the canal passed at any lower route, no part of the State would be benefitted by it, but the few landholders on its borders. But very different circumstances took place in the district composing the upper part of New-Castle county, here the interests of the State of Delaware, the revenues of the canal, and the interests of Philadelphia united in a man-

ner that if not attended to, was in a great degree to desert the objects of the work altogether. It is well known that the area of country, from the Christiana northward to the Pennsylvania line, possesses a command of water power, superior to any of the same extent, in the United States; this has been already improved into a vast manufacturing district, and offers a wide scope for future improvement. It depends and always has done, for one of its greatest raw materials, viz. wheat, upon the Eastern shore, and waters of the Chesapeake, the route for which it must always wish to restore to its former direction, and to render it as cheap as possible. But if to this be added other raw materials, such as tobacco and cotton, and above all coal from the southern parts of Virginia, it offers a most important addition to the revenue of the canal.

That the State of Delaware should expect and ask these advantages, for its commercial metropolis, and the only district it possesses which can be benefitted by the canal, is natural and just; but in these the interests of Philadelphia and Delaware are most intimately combined; for the manufacturing district of Delaware tho divided from Pennsylvania by an ideal line, is more essentially connected with Philadelphia than any part of that State. What little commerce Wilmington once possessed, now centres in Philadelphia. All the agricultural and manufactured produce of the district, its flour, paper, powder, cotton, iron, tobacco, timber, in fact every article it either raises or makes, goes direct to Philadelphia, to the amount of nearly two millions annually; and all the supplies of the district with raw materials, and with European and West Indian articles, come from that city. In fact, Philadelphia does not possess in its own State or any where else, a district of the same extent, which is so certain a support to its commerce, and that these facts should not have been attended to, to a reasonable extent, by those who had its interests in charge, would have been a dereliction of their duty towards it; independent of which it is to be remarked, that the number of

stockholders in the Delaware State was nearly equal to those in Pennsylvania, that the mass of them was in this district, and claimed some attention to their interests upon the same principles, that the stockholders in Philadelphia naturally claimed it to theirs. These circumstances however, had but a partial influence upon the board, and never were urged to an extent that affected any other principle, or swayed the route of the canal, beyond what its great interests admitted. On the contrary, the decision rested principally, as I have observed, on other grounds.

There was indeed one circumstance of so important a nature as to become in a great degree imperious upon the board, viz. the unprotected state of the shores of the Delaware, on any point of which a single frigate might have obstructed all the uses of the canal, or destroyed its works. This circumstance has since altered, as I shall hereafter observe, but at that time it was itself alone sufficient to justify the decision of the board.

As the surveys drew towards a conclusion, and the principles and position of the canal to a determination, preparations were made to commence it, as soon as the route should be fixed. As the waters of Elk were requisite in every view of the subject, they were purchased; the route of the feeder was included in the surveys, and the lands upon it also obtained; with these, the necessary tools were procured, a number of workmen engaged, and the work commenced, on the 2nd of May, 1804.

With respect to the propriety of commencing with the feeder, the reasons have been fully set forth. It is however necessary to revive the attention of the public so far as to mention, that as not a single drop of water could be furnished to the canal before the feeder was completed; if the canal had been begun first, it must have remained useless and subject to injury, until the feeder was afterwards furnished. A large quantity of water also was necessary for the use of the canal, for puddling, &ca. while in operation; besides which great use could be made of the waters, in transporting earth, &ca. and as every part of the canal could be filled as soon as finished, it was

thereby preserved from injury, and brought into immediate use. It is to be observed also, that not a particle of stone was to be obtained for the canal itself, but from the upper part of the feeder; and that a large supply was actually obtainable in cutting it—the whole supply of lime also was to be drawn from Chester county in Pennsylvania by means of it. Every circumstance indeed determined the propriety, of beginning at the fountain head of supply, and drawing the waters into every part of the canal, as it was formed. Accordingly, the feeder was made of a size equally answerable for that purpose, and for a navigable canal, in which light it may be considered as the basis of a future one into Pennsylvania, on that plan which as it may be seen, had so much occupied the attention of the Philosophical society in 1770, and appeared to the board to demand their most serious attention. Indeed the manner in which their surveys and those of the society confirm each other, will appear striking, as the designs of the routes and feeders in each case are almost identified; the society having traced their level of 84 feet to the same dam of Elk forge, where the board commenced it, tho the plan of the old survey did not render it necessary to go altogether so high.

It is to be observed with regard to the plan of the canal, it was formed upon the best models which Europe presents: at present canal works may be considered as having attained such eminent perfection, as to give the utmost certainty to their execution and use. Before the admirable invention of locks, the attempts at canals in Europe, were little more than so many abortive projects. Most of the isthmuses, or narrow passes between the greater waters, had been from time to time attempted, —that of Suez, by the Egyptian kings—that of Corinth (only five miles in length) by a number, among whom were Julius Cæsar and three succeeding emperors—the junctions of the Rhone with the Moselle, and the Neckar with the Danube, were attempted by Lucius Verus, Marcus Aurelius, and afterwards by Charlemagne—and finally that pass, which has since been so successfully ex-

ecuted in modern times, from the Mediterranean to the Garonne. But all these attempts were in vain; nothing was executed beyond ditches of a broader capacity in level ground. The difficulties of removing large mounds of earth and other natural obstacles, mocked the power and resources of the ancients who, tho they have left us so many astonishing monuments of their grandeur in every other respect, failed in canals. Nothing indeed was done, until the simple and beautiful system of locks, a discovery of the 15th century, by raising canals, wherever water was found to supply them, above all interposing difficulties gave effect to their use, and diffused them throughout Europe. It is by this system, that works impracticable before have been executed with ease, and that so many astonishing designs have been perfected, in the course of which the old ideas of deep cuts, damming up rivers, &ca. have been exploded, and every part of the system reduced to such perfection, as to give a certainty of success in pursuing it. Not to have pursued it then, by following the correct models placed before them, or to have adopted plans which, however ingenious were untried, and might have failed in execution, was to subject this great work to a hazard that would have been an unpardonable dereliction of their duty. The two existing works I have named viz. the canal of Languedoc and that of the Forth and Clyde, the last in particular, being formed for sea vessels of a moderate size, in the same manner as this canal, furnished those models for its execution which were at once a guide to the engineers, and a security for their conduct to the board, insomuch as they had little more to do, than to apply and carry into effect existing works which had been stamped by the use, and admiration of mankind.

The canal of Languedoc is perhaps more magnificently than usefully wide—that of the Scotch canal, which is 56 feet by 8 feet deep, unites more economy with practical usefulness, since tho width is desirable, it is a point of importance not to extend it too far, as any waste in this respect, does not alone increase the expence at first, but that of the water ever afterwards. It is however desirable on

such a canal that vessels should be every where able to pass each other, and accordingly the present canal was designed to be 50 feet wide on the water line and 8 feet deep.

In the plan of the work therefore upon the upper route, it will be seen, that the canal of these dimensions, from its entrance at Welch point rises within one mile, by eight locks to the height of 68 feet, on which level it continues for seven miles, when it rises 6 feet more, and continues for thirteen miles, to the first descending lock on the Delaware side. On this level the whole country has one uniform soil, without impediment and is removed above those difficult and expensive works, which abound on a lower level; in particular the passage of the roads admits of being provided for in a manner peculiar to a canal of this kind, by taking the advantages of hollows, and passing the roads of the country thro archways underneath it, instead of the obstruction of drawbridges, a mode now universally practised wherever it can be done on the greater canals of Europe.

In designing these operations, and indeed the whole course of the surveys and plan of the canal, the board had continued reason to remark, the illusory nature of the best plans which could be formed by superficial views, taken in walking or riding over the country; how often even the levels and surveys alone were but of partial use, and how absolutely requisite it was to have the knowledge and judgment of a practical engineer, to design at every step, the various species of work so as to unite all their objects together.

From the period when the feeder was begun in 1804, two objects occupied the attention of the board, viz. the prosecution of the work, and providing funds for it. Accordingly, it was pursued with unremitting activity thro the years 1804 and 1805, when a total failure of the funds compelled the board to discontinue it. During this period a great portion of the most difficult part of the feeder had been completed, besides the outfit and arrangement of the workmen; and a degree of experience in conducting the

works was obtained, of the highest benefit, when they should come to be conducted on a larger scale.

If funds had been supplied in a manner commensurate with the operations of the board, there is no doubt that this great work would have been completed ere this, and the public would not now have to lament its failure, or to contemplate its revival. The causes of the failure of funds, were simple and obvious; they did not arise either from want of confidence in the work, or in the conduct of it; neither of these were ever experienced by the board, but it arose from the great demand for money and the numerous banks, insurance companies, and other institutions, which were commenced about that time, and offered such immediate remuneration for the sums invested in them, as overpowered the competition of one, which, however certain in the end, it required time to effect. The deficiencies of the stockholders in not paying up their instalments, were at first partial, and the board hoped to counteract them by mild remonstrances, but, notwithstanding these, they became more and more extensive, and at last general. Suits were instituted in some instances to try the powers of the board in this respect, bu they were resisted—it was vain to contend against the general deficiency, or to retain workmen and pursue operations, requiring a continual advance of money, upon the uncertain success of law-suits or further payments—the works therefore were discontinued; the most economical disposition made of their tools and other perishable property, to pay the workmen as far as they would go; and the works left in the best situation they would admit.

Thus circumstanced, there remained no resource but to apply to the legislatures of Pennsylvania, Delaware and Maryland, and to Congress for aid. This has been done at every session since, in which there appeared to be any hope of success. Petitions of the most explanatory and forcible nature, accompanied by statements, calculations, maps and every thing which could throw light upon the subject, have been constantly furnished—in particular the legislature of Pennsylvania, was attended during one

session, by a committee of the board, who laid before them that statement of facts and observations which is given herewith, in order more particularly to point out the benefit of this canal to the State of Pennsylvania, as a conveyance of its produce from the Susquehanna to its metropolis.

The issue of all these applications may be comprised in a very few words, viz. that except resolutions of the States of Pennsylvania and Maryland to subscribe to a certain number of shares when the United States and State of Delaware should do the same, which are thus far ineffectual, for want of their co-operation, nothing has been done; there has been no aid obtained whatever, and there now seems to be little prospect of it. For some years it is true, and particularly under the very active exertions of the late Mr. Bayard, there appeared to be strong grounds for belief, that Congress would in some way or other, patronize or support the work; since then however, and especially of late years, the business seems to have been more and more involved in uncertainty. Very formidable doubts have been raised on the score of unconstitutionality. This work has been made the parent or co-partner of other designs, that seem to have become more splendid, as the hope of assistance diminished, and which either might never be executed, or at least not in such a time or manner as might relieve the suffering interests of Philadelphia; and lastly, ideas which have been diffused in Congress, of the improper choice of the route, have given argument to those who were unfriendly or indifferent to the measure, and palsied the efforts of its friends. "Of what use," it has been said, "is it, to give "assistance to a work, about which, those who are con- "cerned in it, disagree among themselves."

In this situation without the command of a shilling, or any support whatever; the board of directors have had no part to act but to keep alive the constitutional existence of the company, and to wait for some moment, when the interests of the public might be manifested in its favor. Of late it has appeared to them, that while there was no

efficient support to their measures, it only served to engender opposition and party opinion for them to move in the business, and this has been the real cause of their silence. So long as the works were in operation, and the board had any thing to communicate they were ample in their communications, as their reports will show; these they had the gratification to perceive and know at the time, were received with satisfaction by the public, but so long a period has occurred during which they have had nothing to publish but their abortive attempts to obtain public aid, that what was satisfactorily made known before has been forgotten, and many crude ideas engendered, till at length a period seems to have arrived in which the zeal of the public has manifested itself in such a manner, as to revive the hope that they may receive sufficient support to proceed.

From the review of what has been done in this important work in the past, we naturally turn to the more useful consideration, of what is to be done in the future. In the outset of this, there seems to be no fact more probable, than that if ever this important work is to be revived and perfected, in the manner that the suffering interests of the city of Philadelphia require, it must be done by the enterprise and capital of its citizens, with the aid of those parts of the States of Delaware and Maryland, which must always feel a deep interest in it; from being the theatre on which it is to be executed, and from the immediate benefit they must derive from it. The most important step in the prosecution of any measure for the purpose, is to proceed with unanimity—that unanimity which has been the main source of success, in the undertakings of the States around us—and to insure this, the most correct proceeding is to examine with cool deliberation, what has been done, and to ascertain how much easier and surer a foundation for success exists, in reviving and carrying that into effect, than by exhausting the time and attention of the public, in desultory experiments, or controversies.

It is to be observed in the outset, that there now ex-

ist acts of incorporation, in all the three States which are immediately interested in this work—these were obtained with great difficulty, at a time when the enthusiasm in favor of the canal, was at its height. In one State the act, after laying before the legislature for two sessions, was passed in the third by a casting vote. The hope of obtaining any other acts, should these be lost or infringed upon, is little; and indeed the differences of opinion which have arisen forbid it. Under this act there exist a company, a large number of stockholders, and a president and directors, who are the legal and constitutional organs for prosecuting this work; the respect due to this board, as a regular institution, is not only a common one, due to every body of the kind, but the support of it, is a matter of interest to every stockholder, and well wisher of the canal; what the conduct of that board has been, will be seen from the review that has been here given; and I trust it will appear, that under the circumstances in which they have been placed, none could have acted with more correctness; when, as I have observed before, the names of the gentlemen, by whom the plan of this work was first fixed are reviewed, I believe, it will silence every idea of their acting either interestedly or prematurely—and the present board will, I trust, receive the same degree of confidence, when the depressing circumstances under which they have acted for some years past are known.

The zeal which has been lately manifested in the citizens of Philadelphia to revive this work, is it will be observed, the first favorable circumstance that has occurred since the operations on the canal began; and is such as the board of directors would have always hailed, as the surest guarantee of their success, and always hoped they should at some period receive: such as it is, it can not be too highly appreciated, nor the respectable gentlemen who compose the committee that has been formed on the subject: there can be no wish but to give them information, and to act with their assistance. It is certain however that instead of wasting the time and patience of the

public, in the discussion of plans which may be offered, even by ingenious and well meaning men, but which the more they are indulged will divide the public opinion —if the work be resumed where it was left, a recommencement of active operations may be actually carried into effect, in the time that would be otherwise lost in deliberation. Indeed, such preparations might be made this winter, as would admit it the moment, the season opens in the spring.

It is obvious that if the present board had the means of recommencing the work, or whenever they should possess it, one of their first objects would be, a revisal of their former proceedings, in which every attention would be given to the general sentiments of the stockholders, and to every reasonable plan which has been elicited; while this would be done under all the advantages arising from former information, and with that just discernment between plans founded on local views or ingenious theory, and those of real practicability and public benefit; a discernment for the exercise of which it is, that the directors of this or any work are chosen, and which constitutes the most essential part of their duty; it is obvious that new engineers must be appointed, since the death of Mr. Latrobe has of course put an end to the idea of employing him, even had it been contemplated. With new engineers a decent conformity to their opinions would follow of course—of the necessity of the feeder there can be no doubt, and that might be recommenced and carried on, while every other point was investigated; particularly the line of the canal and the debouches, especially the eastern one upon which the chief difference of opinion seems to rest. On this head I have already mentioned, that no party exists in the present board: their object was to get the more important part of the work done, and this question would have been settled by them without disturbing the public mind. Since the suspension of the work, the erection of a bridge at Wilmington has thrown impediments in the navigation of that creek, or at least all the disadvantages of a drawbridge, and the works erected

on the Pea-Patch it is presumed, will defend the entrance of the river, and tho it is does not follow from hence, that it would be more proper to place the debouch of the canal where it might become the scene of military operations, nor do away the natural disadvantages of the shore, or so low a situation on the Delaware; yet these united circumstances now give a considerable preponderance to the situations on the Delaware generally, and especially that at New-Castle, where there is decided bold water without the impediments existing below, and the dangers of exposure may be overcome by a mole or embankment, at less expense than in any other situation without the Christiana. Here also the peaceable traffic of the canal, is equally defended by the works of the Pea-Patch below, and rendered more secure by its distance from the actual scene of operation.

Whether however the debouch be in the Christiana, at New-Castle, or at any point below it, is a matter of less moment to the citizens of Philadelphia, than that it be begun and executed in a useful and economical manner. While the work remains at rest, the public will continue to be agitated by local interests and plans, all sanguine in their objects, and all obtaining some advocates, as the board of directors experienced before; while the business at last must be settled by the judgment and authority of some delegation, and never more properly than by the legal organ of the stockholders, uniting the knowledge of what has already been done, with a disposition to pursue anew every necessary investigation, and determine it with unbiassed integrity.

That the stockholders and public may have the best information to proceed upon, I shall now give a statistical explanation of the state of the company; premising, that this is principally drawn from a letter which I wrote in 1808, to Mr. Gallatin, formed, at that time, from the papers of the company, and a comparison of opinions with Mr. Latrobe; since which, I have reviewed it so far, that I believe it is as accurate as the nature of the subject admits.

First—The state of the company's accounts, is as follows:

There has been received from the stockholders about $103,000

And expended altogether, 122,000

Leaving the company in debt, 19,000

This debt, which may be taken at the round sum of 20,000 dollars, includes all that the company owes, except for lands and water-rights not yet taken into possesion, which of course must be considered as a new expenditure, and enter into the estimate of what the canal will now cost. It is to be observed however, that at least $20,000 has already been paid for those lands and water-rights, which may in some degree be balanced against what they owe.

The expenditure includes all the surveys; the *materiel* or outfit for the work; the whole of the contingent expenses, and the works on the feeder.

Second—The capital of the company, is as follows; The amount of the original subscription was 1792 shares at $200 a share, $358,400

Of which there has been received, 103,000

Leaving 255,400

Yet due from the stockholders, subject no doubt to some allowances for bankruptcies, intestate estates, &ca. tho this allowance must be contingent upon the spirit with which the work is revived, and the consequent demand for shares, which will of course occasion a greater or less desire to pay the arrearages. It is probable however that under all circumstances, the capital of the company may be rated at $ 200,000

Third—The estimate of the future expenditure may I believe be taken, with as much correctness at it is possible to attain, as follows:

To pay the debts of the company, $20,000

To complete the purchase of the water-rights on Elk river, and land on the feeder,	$40,000
To complete the whole work on the feeder,	30,000
To purchase the land on the course of the main canal 4,200 acres at $12, say	50,000
To complete the whole extent of the canal, fit for operation, except the locks, $20,000 per mile, on the longest route, say 22 miles,	440,000
To complete 18 locks averaged at $10,000, each,	180,000
For contingent expenses	10,000
	$770,000

Should the route go into the Delaware some allowance must be made for an artificial harbor, tho the calculation of $20,000 per mile, on 20 miles of the upper route at least, is so liberal considering the nature of the ground, that it will probably admit of paying for a harbor, especially at New-Castle, where it will cost less than at any other place. It may however, for the sake of round numbers, be proper to estimate the total future expenses, at $800,000

From which if we deduct the present capital, 200,000

There will remain of new capital to be provided, 600,000

Fourth—The revenue and probable reimbursement of capital, or interest, is a subject of course, of no small importance: on this, as information was required by Mr. Gallatin in 1808, I took every pains to investigate the subject, and shall give the result. In the outset however, it may be necessary to state, the net revenue that will be wanted. If to the $103,000 already expended there be added $800,000 the work will cost, say $900,000, the interest of which will be $54,000

Annual repairs,	10,000
Attendance on the locks, clerks, &ca.	6,000
	$70,000

The tolls on a route of this distance would, in England, average 2 ½, *d.* sterling per ton per mile or 55 *d.* for 22 miles; but taking it at $1 per ton, it would require the passage per annum of 70,000 tons, to pay the above revenue; or 240 tons; or 5 vessels of 50 tons each per day for 300 days in the year.

The probability of obtaining this depends upon calculations of two different kinds—1. The existing traffic —2. The new traffic, which may be expected—The first of these seems to afford some probable data, and accordingly I endeavored to obtain the best information I could of the produce carried across at the different portages, and the cost of it; by which I found it, as near as a subject naturally so vague in itself admits, as follows.

The amount of goods	Tons 400,000
The carriage of it	$80,000

It must be obvious however, that the exisiting land carriage by bad roads, can give but a very partial view of the revenue to be derived thro an unlimited intercourse by water, and that the great expectation of revenue must be founded upon the new traffic to be created, of which, tho no idea approaching to accuracy can be formed, very reasonable conjectures, that it will be very great, may be made from the following circumstances. It is probable that the craft occupied in the two bays of Chesapeake and Delaware amount at least to 1200 vessels or 40,000 tons, out of which we may presume, that many more than 7 vessels will pass per day. Indeed if 50 vessels of 50 tons should be engaged in the trade and each pass 30 times thro the canal in the course of a year, they would carry more than the requisite tonnage, say, 75,000 tons.

The probability of this employment may be conjectured from the following considerations,

First—the great interchange of merchandize between Philadelphia and Baltimore, and the other towns on the Chesapeake.

Second—The attraction of all those heavy articles, the productions of either bay to its head, and thence across

the canal. And here we may observe, that it is these upon which the revenues of all canals in Europe are founded, more than upon the passage of merchandize, as their great quantity and great bulk or weight, gives a vast revenue. If coals alone be attracted from Virginia to the manufactures on Brandywine and Christiana, it will give a new feature to them, by introducing those of iron, and afford a large revenue--if to Philadelphia, so as to be sold cheaper than foreign coal, it would be still greater. Independent of this, on the one hand, are the lime of Pennsylvania thro the feeder, to all parts of the peninsula below, the produce of the Susquehanna to be brought round, and the wheat, Indian corn, tobacco, cotton &ca. of the southern States, and on the other all those articles with which Philadelphia supplies the southern States; without taking into account what may be expected from an extension of intercourse to New York, at one end, and the southern States at the other, by canals of which the present one will probably be the parent.

In contemplating the resources of the board, we must mention the very ample powers to raise money, to an unlimited extent, as there is no particular sum to which the capital is circumscribed. Under these powers, the board felt great confidence in their original proceedings, for tho the subscription was not sufficient for the whole work, it appeared amply so to complete the western end and feeder, upon which there would have been an immediate traffic; as the produce of the Chesapeake would then have been brought to within a few miles of Christiana bridge, and other landings on that creek, which would have given the company an active property whereon to raise loans, or would have so far inspirited the stockholders, that new subscriptions could be obtained, or the powers of the company to raise money resorted to. But the defection began so early, as to deprive the board of every resource, it being obviously useless to ask for loans without an estate to mortgage, or new subscriptions when the old were unpaid. There was then no hope but in public aid, the failure of

which left the board without the least appearance of support, till the present moment.

In order to judge of the interest taken in the present work, and where the subscribers to it exist, it is worth while to take a view of the original subscriptions, which are as follows ;

	Shares.		Subscribers.
In Penn. chiefly Philadelphia,		824 by	429
In Delaware, Wilmington,	351		166
New-Castle,	126		14
Cantwell's Bridge,	125		35
Pencader	24		10
Port Penn,	35		12
Middletown,	30		4
Duck Creek	11		2
Concord	10		4
	——	712	
In Maryland, Elkton	69		11
Head of Sassafras,	85		17
Chestertown,	45		19
Easton	57		7
	——	256	
		1792	730

It will thus be seen, that less than one half of the subscriptions are in Philadelphia, and that Delaware has subscribed nearly as much as Pennsylvania. But in the payments the case stands differently, for of the sum received,

Pennsylvania has paid about	$73,400
Maryland about	18,300
Delaware about	11,300

So that of the deficiencies of the calls heretofore, there is due—

From Pennsylvania,	$9,100
From Maryland,	7,300
From Delaware	59,900
Making a deficiency of	76,300

As this deficiency took place, after the decision of the route and commencement of the canal, of course it had no effect upon them, altho it must go now to abate the claims, which the deficient stockholders might otherwise have for their interest. It has been inquired of the board, whether the deficient shares have been declared to be forfeited, a measure which sound policy has heretofore rejected—in the fallen fortunes of the company, the deficient stockholders would willingly have received this as a relief from future demands, but amid their limited resources the board did not choose to deprive themselves of the hope of receiving the arrearages in one way or other, besides which it was dubious, if a general forfeiture was declared, whether a sufficient attendance of the general meetings could have been obtained, to keep up the board. What therefore would now be proper, if new subscriptions are obtained, would heretofore have been useless at least.

It would be for the board if convened, to adopt the measures proper to be taken, for the re-organization of the work. But as the public are alive to the subject, it may be satisfactory to point out a plan, on which it may be done, with great simplicity. The debts of the company are, as it will be seen, of no great amount; the importance of the work, and the probability of its paying an interest to the subscribers, great—if therefore new subscriptions could be obtained to the amount of $500,000 or $600,000, it would require 5000 shares, the instalments on which first required should be $100 per share, or the same that has already been required of the old stockholders, who should be called upon at the same time to pay up their subscriptions, or forfeit their shares, and thus the old and new subscribers would be consolidated on the same footing. If these subscriptions are obtained, there seems to be no reasonable cause of delay in recommencing and

pushing on the works in the ensuing year. Those on the feeder are in a state to be immediately resumed; the substantial part of them is little injured, and a moderate expense will reinstate the whole. Besides which they will afford, as they have done heretofore, an opportunity for organizing the workmen and materials upon a small scale, preparatory to their being engaged on a greater one If indeed the feeder was not essential to the main canal, in every position in which it could be contemplated, it would be a work of incalculable advantage itself for drawing the produce of Pennsylvania to Christiana bridge, or other landings on that creek, and the distance to execute it for this purpose would be but a few miles.

I have already spoken of the probable revenue of the canal—but as this is a matter of primary importance to the subscribers, it may not be improper to enlarge upon it. I have mentioned that 5 vessels or 250 tons per day, would probably pay the full interest and expenses, at a rate of toll under what is admitted by the acts, and which is altogether a very reasonable one in itself. It is almost unnecessary to add that 10 vessels or 500 tons would of course double the revenue to 12 per cent. and if any thing near the number of vessels which can pass through in a day, actually do so, the revenue will, as it will be seen, be enormous. There is however another object, which tho of inferior importance, is not to be lost sight of. The mode of forming this canal, that is by its width, and by passing the roads under it, will admit the passage of steam-boats, a thing which is impracticable on almost every canal in Europe, owing at once to the necessary height of the chimnies in those boats, and the obstruction of bridges and tunnels on the canals, as well as the wear and tear of the banks where they are not very wide. These circumstances are so important, that Mr. Fulton assured me in 1809 they were the reasons which prevented him from attempting to introduce his steam-boats, on the canals of England There is another circumstance from which revenue may be derived: viz. a turnpike road on the bank of the canal. This will be in a great degree es-

sential to continue the traffic, at those times in which the canal is obstructed by ice, but it will be a most convenient and lucrative accommodation to the public at all times, for it is to be observed, that the bank of the canal is perfectly level throughout the whole extent, except just at the declivities of the locks—that it is at all times completely drained, and the carriage of materials by the canal itself, will admit such a choice of them as to make it of the most perfect construction. Upon most of the canals of Europe, their winding course and their interference with established turnpikes have limited this use; most of the canals, from the expence of land, and other motives of economy have limited the road on their banks to a mere towing-path on one side, but the modern ones have extended them to each side. Here it is obvious, that one of these may be made a perfectly fine road of 20 to 30 feet wide, without interfering with the purposes of the canal. The acts of the company do not it is true, at present contemplate a turnpike, and there is now one from New-Castle to French-town, but the superb convenience of one of about 20 miles from New-Castle to Welch point, on the banks of the canal, would undoubtedly render it an easy matter of compromise with the present company, or obtain it from the public.

In the revival of the work, the sentiment of the public seems to look forward to the employment of Mr. Strickland, upon which there can be but one sentiment, as it must be a subject of general satisfaction, to know that we possess a native citizen, who has given such proofs of his taste and skill, and who is now preparing himself for this particular species of work, by an examination of the canals abroad. In England it is usual for the resident or chief engineer, in points of difficulty to call to his assistance other professional gentlemen of known skill, and should this be necessary the public have a resource in Mr. Oakes, who has given great satisfaction in the works on the Schuylkill, and no doubt there are other gentlemen of known skill and talents, to be obtained if requisite. These however, and all other matters of detail, form the

proper employment of the directors, who can have no desire but to gratify the wishes and expectations of the stockholders and the public.

Of the present board of directors, who have been elected to serve until June 1823, I shall only remark that several of them have now served from the commencement of the work, during which their attention will, I trust, sufficiently appear from the remarks I have made. Most of them are men of independent fortunes, and all of them of independent characters, whose services have been tried on many occasions. In the course of this work, their duty has often been arduous, at a distance from home, and in a country not remarkable for its healthiness. As the post is not one of emolument, there could be no motive to undertake it, but that public spirit which they cannot now be presumed to feel less than others; the age and the inclination of some, will no doubt afford openings for other citizens, who possess an equal zeal; but some of them, on whose personal attention the conduct of the work, its accounts, lands, water-rights, &ca. have devolved are indispensible, at least for some time, to the prosecution of the work, and instruction of a future board; besides which, I have no idea that either the stockholders or the public, would wish to omit that confidence in their future services, which is the best reward for those that are past.

Having thus expressed my sentiments freely, I have only to apologize to the public, why I have undertaken to address them on the subject, and whence my title to do so is derived. Amid the zeal manifested on this occasion, I have perceived a very considerable want of information, which the subscribers have a right to ask from those who possess it, and to which the public are no less entitled. Some time must elapse before they can receive it from the regular meeting of the directors, during which I have thought it would conciliate the public sentiment, to give what I believe to be a correct statement of facts. Of my opportunities for obtaining these, I wish to speak with modesty, but as it is on a knowledge of them that confidence in my opinions and information must rest, I think

it correct to state, that having imbibed an interest in this work from the labors of my father, and a local knowlege of the country almost from my infancy, I availed myself of seven years residence in Europe, to obtain correct practical information of works of this kind, by visiting most of the existing canals, and collecting such a mass of documents as is not often done, even by professional men. A large part of my investigations were pursued in concert with the late Col. Tatham and Mr. Fulton, particularly with the last, both in England and on the continent. With this assistance, I entered the board at its commencement, and have served now eighteen years, during which I have devoted to it a large portion of my time, and I believe my fellow directors will do me the justice to say, have sustained no unimportant part of its weight. A second residence in Europe, has brought down my information nearly to the present period, and confirmed that zeal which I have ever felt, to assist in conferring upon my country the incalculable benefit of works of this kind; nor do I believe the public will fail to appreciate and encourage in its citizens, that attention to the great works of political economy, which renders travel truly useful to our country.

One object in forming this memoir, has been to preserve a number of valuable papers which have already accumulated. In examining works of the kind, it is a constant subject of regret, how much their history is obscured, for want of an early attention to record documents, often very valuable, which intrusted to single copies are soon scattered and lost. Having had the part allotted to me, of drawing up the official papers of the board, I felt more than usual anxiety to preserve them, and formed them some years ago into a little volume which I deposited in the Philadelphia Library, but the copies which have been preserved of them are too few for circulation, at a time, when the perusal of them would give great information to the public. I have therefore placed them in the Appendix, together with a number of others of the

most importance and value; many more indeed might be added, and especially the whole of the letters and reports, of which I have been compelled to limit myself to extracts, in order not to swell the present work into too expensive a form.

While upon this subject, I have received the work lately published upon the New York canal, in which my ideas upon this head have been anticipated, by the splendid production printed under the direction of the New York Association. Of the many objects, in which it is the part of this great work to lead the way, the design of publishing their papers is not the least useful, and I apprehend the public will not be displeased to see the example followed, in this instance tho upon a more limited scale. Perhaps also, it may in some degree contribute to promote that enthusiasm for our work, which the New York publication must every where produce, for its own. It must indeed be a subject of universal admiration, that a canal of such extent has been undertaken, and in a great degree perfected in a country that thirty years ago was a wilderness, and the authors of it will receive, as they justly merit, the unqualified admiration of the present age and of posterity. That it will stimulate other designs, and above all the present one, there can be no question—and as the publication before us, will naturally lead to a minute examination of the causes which have led to success in the work of which it treats, we cannot but be forcibly struck with two in particular—first, the early and decisive adoption of the system of lock navigation, after the European plan; and secondly, that the gentlemen who designed it, lost no time in beginning and pushing on its execution, in which they have been supported by the public, for if this work had ever had the misfortune to be suspended, it is probable it would, like others, have occasioned speculations which would have loaded its revival with difficulty.

APPENDIX.

Papers of the late Mr. Thomas Gilpin.

ROUTE I.

From the Head of Chester to Duck creek, near Smyrna.

DRAFT, REMARKS AND ESTIMATE.

The distance from the tide in Chester river to the tide in Duck creek, is about 12 miles.

The whole length of the canal as per draft—14 miles.

The height of the middle ground above the tide—38 feet.

The waters of Chester river and Duck creek are sufficient to supply a canal and locks 22 feet higher than the tide.

The length of the middle ground, which is higher than the surface of the water in the canal by 11 feet at the highest part, and which gradually descends each way is in the whole, 4 1-4 miles.

The land the whole distance, is of a convenient height to support the sides of the canal from tide to tide.

The soil is chiefly clay and loam free from stones, the wells across vary in depth from 8 to 12 feet.

I would propose at first, that an attempt be made for an inland navigation only for flat bottomed boats, at a much less expense than a lock navigation, and when the utility and advantages of such a communication are fully experienced, it may be enlarged to a complete canal for shallops with locks, &ca. without any considerable loss of the first expense.

A calculation of the expense of cutting a canal, agreeably to the above proposals.

Digging 14 miles, 4480 rod, the whole length of the canal 16 1-2 feet wide and 4 feet deep, is 40 cubic yards in each rod at 4 1-2*d.* per yard or 15*s.* per rod	*L* 3360
Digging the middle ground, 4 1-2 miles or 1360 rod, to be dug on an average 8 feet deeper, will cost more proportionably on account of the depth—say 37*s.* 6*d.* pr. rod.	2250
Digging ten places in the canal, for boats to pass each other	100
Expense of securing the two ends of the canal, and making them convenient to load and unload.	200
Expense of three tumbling dams on the branches of Chester river and Duck creek, to carry off superfluous water.	140
Building two large draw-bridges for the public roads.	300
Building two smaller ditto.	100
Building a commodious warehouse at each end of the canal and cranes, &ca.	600
Cost of tools, wheelbarrows, &ca.	100
Liquors.	100
Expenses of temporary houses, tents, kitchen furniture, &ca.	300
	L 8050

A calculation for the additional charges of altering the above canal into a lock navigation.

Widening the canal from 16 1-2 to 30 feet, and from 4 to 7 feet deep, makes 113 cubic yards to each rod—digging as it will be so much deeper than before, will cost at least 60*s.* per rod.	*L* 13440
Digging 4 1-4 miles, the deepest part of the canal, will cost 40*s.* per rod extra, for 1360 rod.	2720
	L 16160

Amount brought forward.		L16160
Expenses of building a lock 100 feet in length, 15 feet wide, inside walls 35 feet high, sides 6 feet and ends 10 feet thick, is 2860 perch of stone, at 4s.	L 572	
Digging, mason work, and lime.	572	
Six lock gates, and casing the inside with plank.	300	
Iron work.	200	
	L 1644	
Ditto for another lock.	1644	
		3288
Tools, &ca.		100
Temporary houses, tents, kitchen furniture, &ca.		500
Liquors.		200
		L 20248

Chester river lays nearly opposite Baltimore, the most central and thriving place in Maryland: It is not inconvenient to Annapolis and Patuxent river; and convenient to Baltimore county, in which are several rivers running a considerable distance into the country.

Out of Chester river to the south, there is a pass through or between Kent Island and the Main, to Wye river, where a vessel of five feet water may pass and save 50 miles passage round.

Wye river runs into the middle of a great wheat country, and out of it there is water into Miles and Third Haven rivers, which head near Talbot Court-house, and within six miles of the middle of Choptank river; all of which command a circuit of nearly 60 miles without going into Chesapeake bay, none of which is so convenient to any carrying place to the Delaware.

All which is submitted to the consideration of the American Society held at Philadelphia, for promoting useful knowledge, and the Committee of Merchants, by

THOMAS GILPIN.

Philadelphia, June 15th, 1769.

ROUTE II.

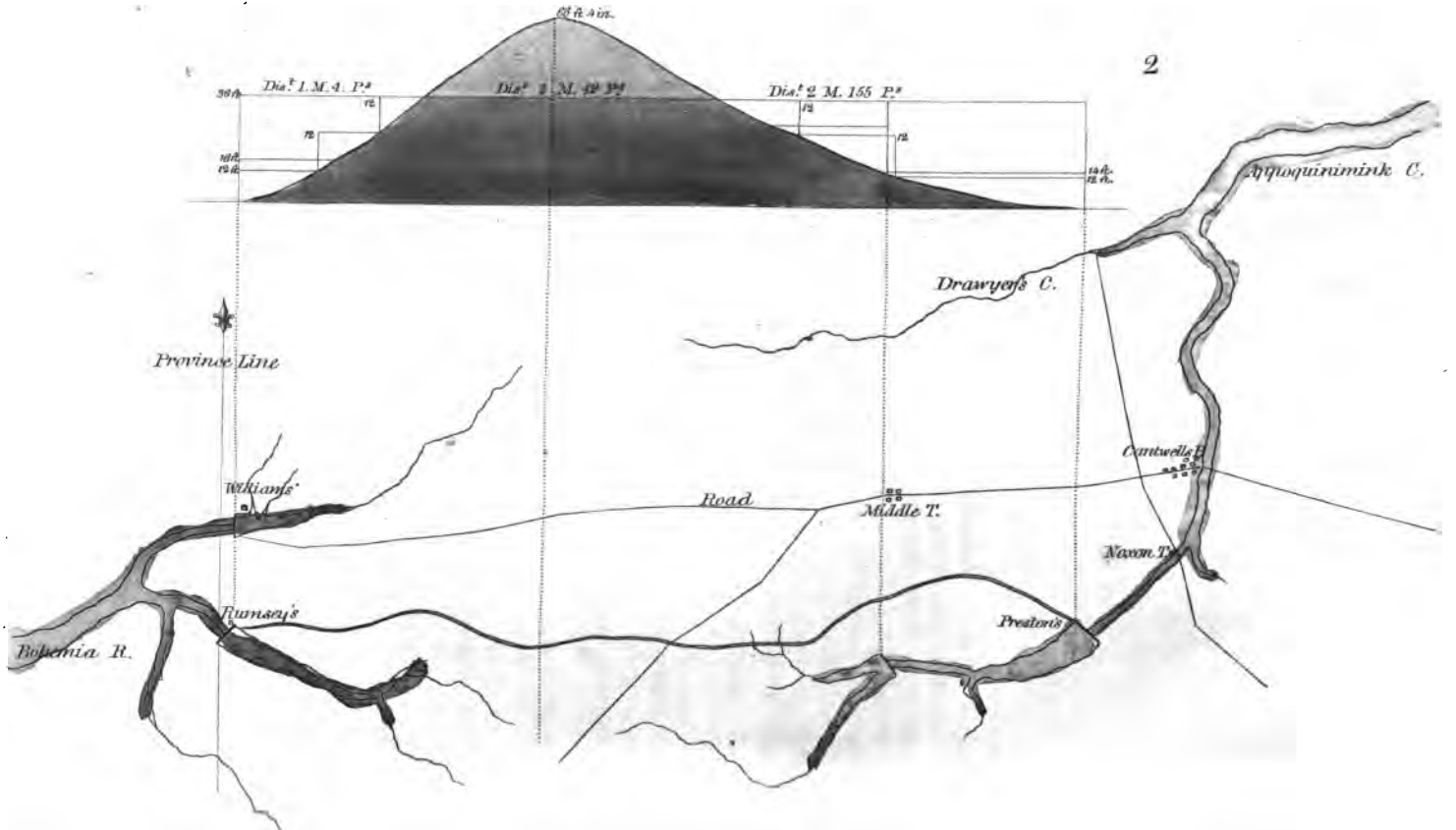
From the Head of Bohemia, to Appoquinimink creek, near Cantwell's bridge.

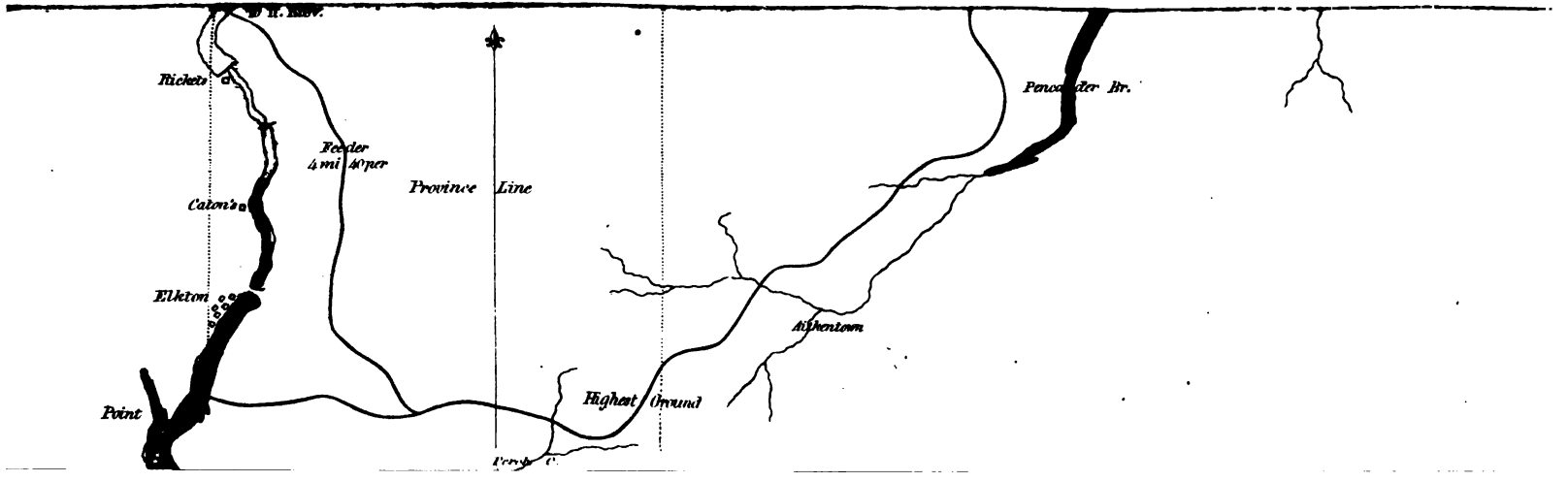
DRAFT AND REMARKS.

From Bohemia to Appoquinimink as the route runs, is about seven miles, and from tide to tide not quite six; the road is very good and the carriage cheap; it lies high up Chesapeake bay; a little difference between Philadelphia and Baltimore markets will command the trade across, and there is no place of export on Chesapeake bay very near; the land is high, and the waters small even at thirty feet height. If a canal is dug I would propose an inland canal, for a barge of 1000 bushels, which would in part answer in case of altering it to a lock navigation, only in this, that as it is too high for one lock, the same course would not do all the way.

A comparison between Bohemia and Chester rivers.

Bohemia is convenient to the western shore, Baltimore county in particular, and the inhabitants of Cecil county; out of Chester there is a thoroughfare into Wye, Miles, and Third Haven rivers of about 60 miles, without going into the bay, for produce now carried to Queen's-town, Chester-town, George-town, and Baltimore; but was there a canal to Duck creek, a small difference in the prices would encourage it to go to Philadelphia.


2
Province Line
Williams'
Road
Middle T.
Bohemia R.
Rumsey's
Drawyers C.
Appoquinimink C.
Cantwell's B.
Navon T.
Preston's


Rickets
Feeder
4 mi 40 per
Province Line
Caton's
Elkton
Point
Highest Ground
Penn Cedar Br.
Allentown

ROUTE III.

From Elkton to Christiana.

DRAFT, REMARKS, AND ESTIMATE,

Made for the Philosophical Society.

A computation of the cost of a navigation for barges, from Christiana to the head of Elk.

Distance 12 miles 10 rods, by the courses of the canal, at 18 feet wide and 6 deep is 253550 cubic yards of earth to be thrown out, which at 6*d.* per. yard is	*L* 6338 15
Two miles of the middle ground will require to be 15 feet in depth and 30 feet wide on an average, more than the other which is 17600 cubic yards at 12*d.*	880
Making a dam across Christiana to vent superfluous water and to carry the canal over it.	300
Making 4 small dams over some small vallies, to save digging further round and to give places for boats to pass, say *L*100 each.	400
Digging 4 points of small hills or banks to save digging round, &c. *L*100 each	400
Expense of tools, liquors, small houses for workmen to sleep, work, &c. say	500
Securing the ends of the canal, *L*500 each end.	1000
Building a warehouse at each end.	2000
Digging a channel from the ends to the natural navigation of Christiana and Elk.	400
	*L*12218 15

Additional cost to alter the barge into a lock navigation.

To add 4 locks at each end.	8000
To widen and deepen the canal to 30 feet wide and 8 feet deep, will amount to 506,880 cubic yards of earth to be removed at 12*d.*	25344
Tools, liquors, &c.	2000
To a fund for raising *L*180 per annum to pay the wear and tear, care of the locks &c.	3000
To purchasing two Mills the water of which will be wanted to supply the canal.	5000
	*L*43344
	*L*55562 15
The difference is *L*43344 the interest of which is	*L*2600 12
The carriage may be done by a barge navigation for 1*d.* per bushel or 3*d.* per barrel, at which suppose 300,000 bushels at 1*d.* 1250, and 100,000 barrels, at 3*d.* 1250, are per annum	2500
As the interest of the difference in cost between a barge and lock navigation may be supposed to pay the freight by barges, we conceive that method most adviseable more especially as it may at a future time be altered (without any considerable loss of the first expense) to that of locks.	

Signed,

THOMAS GILPIN, JOHN STAPLER,
JOEL BAILEY, LEVI HOLLINGSWORTH.

NOTES

Of the Tour and inspection of the Committee of the Philosophical Society.

1770, Jan. 22.—Set out about 3 o'clock on the canal business—got to Withey's at 8 o'clock at night.

23d,—At 10 left there—at 3 left Marshall's, reached Christiana bridge at 6 in the evening. The tangent point bears West from New Port about 6 miles. On the hill at Beeston's Philadelphia and Chester, bear N. 36 E. Wilmington is S. 50 W. 2 ½ miles, the temporary line crosses about 1½ miles south of Wilmington and intersects Delaware at Christiana mouth: 11 miles by water from Delaware to Christiana bridge, it is 11 miles also from the angle of the lines to Wilmington, and the line runs a little north of New Port.

24—Bad weather—got some things in order at the Inn (January's) took the height of the house from the tide, 40 feet to a mark in the window.

25.—Bad weather, Samuel Rhodes, Doct. Ewing, —— Henderson, —— Sideford, went to the Red Lion to view across from the bight of New Castle to Broad creek. In the forenoon, Stapler, Bailey, Hollingsworth, Brown, and Gilpin got some staffs made, and levelled from the point at Reed's, to the Meeting house.

26—This day began at an appletree near the Presbyterian Meeting house at Christiana bridge, and ran along the road to Fisher's Mill, then to Thomas Cooch's, where we remained for the night.

27.—Ran from Cooch's Mill to the head of Elk.

28.—Sunday.

29.—Ran from Elk to Baldwin's Mill.

30.—Went from Elk to Susquehanna.

31.—Went from David Price's to Fulton's ferry, the Bald Fryar falls are just above the ferry, the falls 8 feet in about 20 rods, the current lies on the East side, it is about 2 miles to Amos's falls, below that not so bad, and still farther below it is smooth; the best channel is on the West side; there is no fall of any consequence be-

tween this and Peach bottom, which is about 1 ¼ miles below the Pennsylvania line, the water often rises from ten to twenty feet high on the falls, at which time a flat may go up. William Porter has a good place at the mouth of Peters' creek, at this are the Peach bottom falls which are very small. He says the Bear Island falls are about six miles up and are worse than these, but that two men came over all the falls last summer in two canoes and brought their wives, children, and goods safe; the canoes were tub canoes lashed together. Porter tells us he will let ground on good terms for a warehouse.

We went up Porter's creek which is very gradual and good for a road across to Octorara, over which may be had a pretty good road, and from thence to Elk a very good one, at Elk there is tolerably good crossing, and good ground from thence to the corner of the province.

February 1. Went from Hains' to Christiana bridge, and thence home.

Note. The ground from Peters' creek will admit of a good road to Octorara, which is about 8 miles. From thence to Elk is about 19, from Elk to the corner about 3, and a good road may be made.

The old road from Peach Bottom to Christiana is about 30 miles; from the corner stone to Christianna is about 8 miles.

Jan. 25, 1770. Memorandum of a level taken from a bend in Christiana creek a little above Mrs. Read's Inn at Christiana to Elk river: viz. from the said bend to the top of a point of a hill at a hickory tree 60 feet above high water mark distance 25 perches—thence S. 68 W. 44 perches, height 60 feet—thence S 56 W. 20 perches, height 60 feet to an apple tree, the whole height of the hill here is about 80 feet, from the point to the meeting house.

From hence are given the field notes of the said level of 60 feet carried westward, as is seen by the map, in which, beside the courses and distances, the only items are as follows:

At 698 perches—left the Nottingham road.

894 On the middle ground between White-clay and Christiana creek.

1038 $\frac{3}{4}$ from the beginning of this course, and 40 perches from S. Bradford's barn, lies the head of a swamp which is 6 ft. 8 in. higher than the level—or 66 ft. 8 in. above high water.

1908 To Andrew Fisher's mill—the water in the dam is 5 ft. 3 in above the level, or 65 ft. 3 in. above high water.

2104 To the end of the Baptist meeting house.

2172 A point of Iron Hill; Christiana creek about 20 perches off, a gradual descent.

2369 T. Cooch's house—his dam is 18 feet below the level—he has 12 feet fall at his mill—the land to the left is level and good to dig.

2829 John Aitken's (Aitkentown)—the water is 28 ft. 3 in. lower than the level or 31 ft. 9 in. above high water.

2938 The middle ground—68 ft. 7 in. above high water in Christiana creek—Perch creek to the south.

3070 A white oak, where a former level was taken—73 ft. 6 in. above high water—but each way it falls 7 ft. 6 in. within 10 rods.

3850 Descent by various courses to the head of Elk 71 ft. 2 in.

MEMORANDUM.—The land about one mile S. W. by S. from the point comes down in a ridge round to a point 40 feet high where there is 8 feet water, and at the distance of $\frac{1}{4}$ of a mile from the shore, the land is about 60 feet high; from the middle ground it falls off towards the south and Perch creek runs about W. S. W. its mouth being about S. S. W. at the distance of 2 $\frac{1}{2}$ miles. The land is high enough on either side, but to go below will lead a great way round. On the upper side there are

many places, between that above or first mentioned and Perch creek, to empty into Elk at the height of 40 to 60 feet. To go from the middle ground, on the south side of Christiana, the canal will indeed be the straightest, but the land near the tide of Christiana is too low without first descending by locks; and if the canal is to be supplied by Christiana, the water must be brought into it by a side cut or feeder, which must extend from within a mile of the middle ground to the Baptist meeting-house.

The falls on Elk are as follows;

Jacobs mill	5 feet
Between Jacobs, and Joseph Gilpin,	13
Gilpin's to Ricketts	8
Ricketts' dam	11
Between Ricketts, and the Forge	33
The Forge dam	17
	87

Whole elevation to the top of the Forge dam is 87 feet.

The water of Elk may be very well taken from either of the above to the canal.

The falls on Christiana are as follows:

The tide rises to Patterson's	
Patterson's dam,	13 feet
Between Patterson and Cooch,	14
Cooch's dam,	12
Between Cooch and Fisher,	8
Andrew Fisher's dam,	18
	65

It is good ground for a canal from Christiana bridge to Fisher's dam—and from Fisher's dam to the middle ground.

The land on Elk at the upper landing belonging to Alexander Scott, may easily be had; next to him Jacob's heirs, next Tobias Rudolph, and next Benjamin

Thomas whose land lies on each side of the line. And on the lower side of Perch creek the land belongs to Benjamin Miller and that family.

Susquehanna to Philadelphia.

Some brief observations offered to the intended meeting, to consider of the best mode of saving the trade of this province, which is going from its metropolis to Baltimore.

The cause of this deviation, is the less expense to go to Baltimore; the country most in danger is the south part of Cumberland, York and Chester counties: the means of preserving this trade and indeed that of every other part likely to be affected, is to make the expense of the farmer and trader cheap and easy, and for that purpose to fix on a route which may be most cheaply and easily improved: such a mode there certainly is, in fact a natural water conveyance exists almost in a direct course for 40 miles of the distance, a better one than which can scarcely be desired. By this and a land carriage for the remaining distance, the places in danger may be reduced to an equal carriage and expence to that from Lancaster and Wright's Ferry. Hanover is 40 miles over the Susquehanna in York County; this improvement as it runs along the southern bounds of the province must secure all to the northward from going further south. The expense of this route, were it well improved, would be as small from Hanover to the city, as to Baltimore; or, should it not be quite so cheap, the influence, connections and despatch of this city will be equal to 10 per cent. on the carriage, which will continue if the trade is preserved.

The objection to this route has been, that it must pass by Wilmington. I hope this may be well conisdered. Wilmington is a place that exports little of what goes to it, the rest is brought to Philadelphia, and it is seldom that any produce has been stopped in coming by, and never at a less price than if it came here. Wilmington does not ship off one fourth of the produce of that country, or of what goes to it: besides it is a child of Philadelphia, it

gains its supplies from the city of all European and other foreign articles, except a little West Indian produce, and even its import from the Islands is generally sent here to sell on commission. This therefore cannot be a place to be dreaded, or a cause why we should go round at the additional expense of 50 per cent. carriage, to avoid coming thro it, and risque the loss of our trade from an imaginary danger. If the trade of this city be preserved its ascendency will keep down others, but if we trifle with the trade by indulging our fears it will fall. The public roads in this province are a great object of consideration, and are shamefully neglected. Let then the most beneficial route be adopted and first completed, as the trade is declining for want of a remedy.

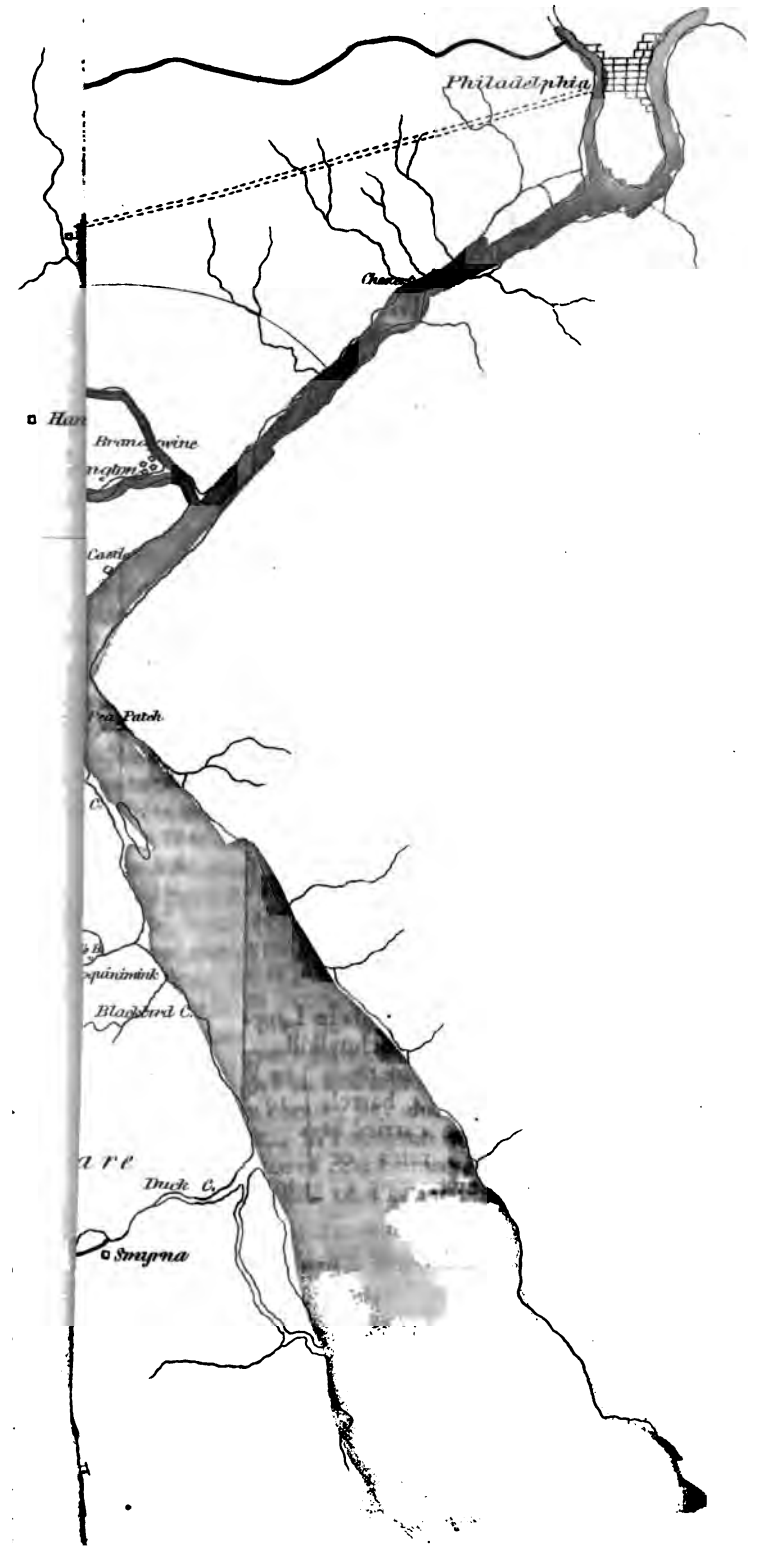
Copy of a printed paper of Thomas Gilpin's, dated Jan. 20, 1772;

On improving the carriage from the western counties of Pennsylvania, to Philadelphia, referring to a map printed at the same time and inserted in the American Philosophical Transactions, vol. 1st.

REMARKS

The common rates of land carriage for a loaded waggon are nearly about 12 *d.* per mile, a load is on good roads 14 barrels or 3000 wt. on middling, 12 barrels or 2500 wt.—on bad less. This is allowed for four horses double or five single, to travel on a journey ; short carriages may take more.

From Philadelphia to Lancaster is 62 miles, worth			£3 2
Ferriage over Schuylkill			5
If the roads are made good, 14 barrels may be carried at these rates or 3000cwt.	to Wright's	12	12
	to York	13	13
		87 Phi. to York	4 12
	to Hanover	18	18
			£5 10


Philadelphia
Brandywine
Smyrna

The freight from Philadelphia to Christiana bridge and Newport is *6d.* per barrel, which, for the above load, is equal to 7 miles miles land carriage, at which rate it may be fixed, as it can be and is done at that rate, therefore

From Phila. to Christiana,	7 miles	*L*	7
Susquehanna,	32	1	12
York	30	1	10
	69 Philad. to York	3	9
From Susquehanna to Hanover is 10 miles farther than to York, which adds 10*s.*			10
		£3	19

Hanover is in the part of the country where the trade is most in danger; and the carriage of goods or produce from that part can be brought to this city for 79*s.* which is less than by way of Lancaster, 31*s.* per load of 14 barrels or 3000 wt. and as the Susquehanna river will accommodate all the western and northern inhabitants of this province, and enable them to make use of the same channel—this seems to be the most natural, and immediately worthy of notice for presevering the trade: for even the town of Lancaster and all the mills around, find their advantage in making use of this way to convey their heavy goods from thence to Philadelphia, which will appear by the following estimate of the expense of land carriage, viz.

From Lancaster to Philadelphia	62 miles	£3	2
From Lancaster to Newport	42	2	2
From Newport to Philadel. equal to	7		7
By way of Christiana	49	2	9
Saved per load of 14 bbls. or 3000 wt. and ferriage over Schuylkill	13*s.* 5*s.*		
In favor of coming by Christiana	18*s.*		

This is so considerable that no turnpike can turn the carriage from this natural channel, which itself will be equally improvable in the same way.

If a canal or entire water communication at once from the Susquehanna to Philadelphia, can be accomplished it is almost needless to say that it will excel every other mode, as the proportion to land carriage is found on the best experiments, to be such as to save near $\frac{4}{5}$ths. but say $\frac{2}{3}$ds and this mode will sooner pay the expense of improvement with the interest, than any other.

The red line from the Susquehanna to the Schuylkill on map 4, is nearly where a route may be obtained, and perhaps by the necessary meanders may be 100 miles which may be done for about 40*s*. per rod on an average, which is three times what some part of it may cost, this is—£64,000. But as the making a canal will require considerable time, and the present cause calls for immediate remedy, perhaps it may be thought best to adopt the following plan.

To make use of the natural route already done for about 45 miles on the direct way, and only add to the natural advantage of that, (the Christiana) the expense of a good road which will ever be useful, and a free ferry over the Susquehanna, which will so lessen the carriage from the parts in danger as to leave but 9*s*. per waggon load in favor of going to Baltimore, which the superiority of Philadelphia market will greatly overbalance. As to the idea of a turnpike road from York by Lancaster, was it ever so good, the distance to go all the way by land is so great, that the difference can not be less than 32*s*. in favor of the Baltimore over the Philadelphia market: there seems therefore but little hope of remedy, except by taking advantages of what nature has done, which will reduce the difference to about 9*s*. per waggon load, as mentioned; and by which the inhabitants of Lancaster itself now save 18*s*. in every waggon load of produce conveyed to this city.

Philadelphia, January 20, 1772.

EXTRACT

Of a letter from Thomas Gilpin to Dr. Franklin on the subject of the projected improvements of Pennsylvania by canals, roads, &c.

1769. October 10th.—I now communicate a few of the outlines of the proceedings of the Committee, appointed to view the ground and investigate the practicability of a canal. between the tide waters of the Chesapeake and Delaware bays.

It is found that from Duck creek on the Delaware, to the Head of Chester river on the Chesapeake, the distance is about 12 miles, the extreme elevation 33 feet, the water high and the ground easy to dig.

From Appoquinimink creek on the Delaware, to the Head of Bohemia on the Chesapeake is 5 miles; the extreme height 66 feet, the streams small and they lie low, the ground easy to dig.

From the head of Christiana on the Delaware to Perch creek a branch of Elk river is about 12 miles; the ground has not yet been viewed by the committee, but they are appointed soon to go upon it.

The first of the above communications is too low down the Chesapeake and Delaware; the second is deep for digging and is very scant of water to supply locks; the third appears the best of all, as by a side canal or feeder, the water may be brought from the higher parts of Elk river, at the distance of six or seven miles to support the locks, as high as the extreme elevation of the middle ground, and as Elk river lies at the extremity of the Chesapeake, it renders it most convenient to every part of that bay.

It is said the inhabitants of Maryland will be averse to this canal, as it may lessen the profits of the carriage across the peninsula and prevent the growth of the towns; but in this I apprehend they are mistaken, and would doubtless be convinced of their error by many persons who understand the subject well, for it is evident that their trade at present is divided among so many small ports, that it is rendered weak for want of great leading mar-

kets; but, if this canal were open, boats would ply across and afford an option of a market in either bay, which would attract all produce to the head of the Chesapeake, and of course into Maryland itself, where its own ports if of sufficient importance, would have the first offer, and a second would occur by the opportunity of proceeding onward, but at all events, the certainty of one or the other and the choice of both markets, would unquestionably attract all produce to that quarter, instead of going round by sea as a great part of it now does; thus the western trade as well as that of all the waters of the Chesapeake, would be drawn to one great centre at its head and a depot formed for the sale of their own produce, and supplying them with every foreign article by the easy navigation of the Chesapeake, and by the ease also with which supplies might be obtained from the two markets of Baltimore and Philadelphia; I think that these undoubted objects which would open for the landed or agricultural interest, would give a decided preference to that of being confined to the markets of their own bay, and ensure their assent to the canal.

As to the Susquehanna, as it has been found navigable for boats of four and five tons nearly to its sources, which extend over a great part of Pennsylvania, and as the navigation may doubtless be improved by a canal, to its mouth, this would draw the produce of Pennsylvania to that quarter, and afford the double advantage of a market there, or proceeding to Philadelphia at a saving of 50 per cent. on carriage even from Lancaster, and the same saving in goods going backward, as they might be sent from Philadelphia to the Chesapeake and thence to the westward, at a considerable diminution of expence.

A great deal more might be said on the subject, but I know of no one who can perceive or appreciate the advantages I have pointed out, better than Doct. Franklin, to whom I submit these remarks, for him to correct and use them as he may think most beneficial to our country.

Barnet, who owns a furnace and forge on Octorara, a branch of Susquehanna, has in the driest part of this sum-

mer, when the water was remarkably low, gone with boats backward and forward from his works down the Susquehanna to the tide, and intends as I am informed, to pursue this navigation. This circumstance still further magnifies the importance of the navigation of the Susquehanna and the necessity of the canal.

Extracts, Letters, Reports, &c. of Mr. Latrobe.

1803, August 14. Extract of a Letter.

When I wrote to you on the 4th August, I had ascertained the levels of much of the practicable ground near Frenchtown. I had discovered that there are only two practicable tracts from thence to New Castle, one to the northward, the other round the south end of the hill which abutts upon Perch creek. The northern course is so evidently the best, that it will no doubt meet with unanimous preference. Since then I have proceeded to the summit of the ridge and beyond it towards Cooch's mill.

Before, I however mention to you the result of my operations, I must premise that all my levels have been proved beyond the possibility of doubt, by repeated levelling upon different courses; and having with great labor and perseverance, established several points of levels, I have invariably run every day's work up to one other or of these, and have never rested until I have produced perfect coincidence, at least within 6 inches. What I shall therefore now give to you as the result of my operations, may I think, be well depended upon.

1. The tide in Elk river varies with the winds more than with the Moon, and differs from 3 ft. 6 to 2 ft. be-

tween high and low water; I have assumed the mean tide at 2 ft. 6.

2. The high land near Frenchtown, rises in no instance above 82 feet above common high water.

3. The lowest pass from Frenchtown on to the summit, is over a very narrow ridge, the only practicable spot upon which, is 72 ft. 2 in. above high water, from thence there is a long straight stretch of level to be had about 70 feet above high water, near which the canal may be twisted about so as to go over 72 feet.

4. From the end of this level to the summit level at Oliver Howell's in a straight line occurs no material obstruction excepting a narrow ridge from Gray's hill, rising to 78 feet 6 inches near Mr Rudolph's farm house, and two vallies to Perch creek, sinking to 64 feet above high water.

5. The summit level at Howell's is without doubt 76.9 above the highest tides in Frenchtown, and 78.6 above the majority of high waters, such as I observed during a fortnight's occasional residence there.

6. Under all these considerations, I have thought that the best summit level that can be had, and in the course of which the fewest disadvantages are to be encountered, is that of 76 feet of elevation above high water. In $\frac{9}{10}$ths. of the length of this range, there will be 4 feet 6 inches of bank to be made on each side, and if the canal be 42 feet wide on the surface of the water, the excavation will as nearly as possible, make a handsome embankment and road on each side. I have therefore made a compleat set of sections of all my courses, and a map on a large scale from Frenchtown to the summit level at Howell's. On this map I have noted in more than one hundred places, all of which are important as to the decision on the location of the canal, the exact elevation of the spot above high water, and I have laid down the line which in my judgement is the best, placing the locks in the points most evidently convenient—showing the necessary alterations of roads, &c.

I propose the distribution of the locks to be as follows:

	feet.	inches.
Summit elevation above high water,	76	90
Difference of high and low water,	2	8
	78	8
One tide lock to the basin in the marsh so as to raise the water over the present surface of the marsh, digging down only 2 feet 6 inches, which is necessary to get earth for embankments.	9	00
At the head of the basin, 3 locks, 9 ft. lift	27	00
At the north end of Mr. Henderson's line about half a mile distant from the basin, 3 locks,	26	8
Near the Elkton road, 2 locks, 8 feet lift	16	00
	78	8

Of the southern course which is otherwise not a bad one, I will say nothing, as it is half a mile longer; one or other of the two must however prevail, for it is impossible to arrive at Howell's, excepting over the narrow ridge I have mentioned, if Frenchtown be the west head of the navigation.

Having arrived at Howell's, and spent a day with Mr. Howard in re-examining the elevation of the summit level, which we agreed to set down as above stated, having differed only 6 inches in all our operations. I requested him to level the course of the Elk. He concluded this operation yesterday, and found the head of the upper forge to be 84 feet above the tide.

October 21.—Extracts of a Report.

1. General view of the land between the bays.

It will be easy to comprehend the present state of the land between the two bays, if we suppose the whole peninsula to have been once a plain, composed of soft alluvial soil, extending from the foot of the Granite hills to the ocean, gently inclining from the northwest to the southeast.

In the course of many centuries the water falling upon the surface, and discharging itself into either bay, as accident or some unknown cause has directed, would wash this plain into vallies. Between these the ridges would naturally retain the level and inclination of the original plain, while the vallies would become deeper and wider, as the water collecting within them from the heavens, and from the springs starting from their sides, accumulated. Soon after the commencement of the surveys, these conjectures proved so exactly coincident with the fact, as to be of great service in choosing the ground over which to carry the level. For in running along the ridges, higher ground was invariably to be found to the northwest, and lower by running more to the eastward of south.

The ridges which divide all the waters of the peninsula have one common point of union on the southeastern slope of Gray's hill, to the northwest of the house of Oliver Howell, and within the Maryland line.

The soil across the peninsula is loamy, often abounding in sand near the surface, but generally mixed with a very large proportion of clay, at a few feet in depth, and is every where very fit for the purpose of holding water.

——2. Of the general principles on which the lines of canal directed to be explored can be effected.

Although no observations on the idea of making a thorough-cut, as it has been called, from bay to bay, thro which the tide should flow, have been now required by the committee, I feel it my duty to make one remark on this scheme, in deference to the opinion of those who think it practicable.

The lowest place above Middletown at which the ridge can be crossed is 62 feet above tide, and if the cut be made 8 feet below the tide, it must be 70 feet deep. If on each side of the ridge the best advantage be taken of natural depression, one mile at least across the ridge must be cut to this depth. If the canal be only 30 feet wide at the water line, and the towing path, or guard bench be only 10 feet on each side, the cut will be 50 feet wide at the water line. The banks will not stand at a less pre-

portion than at 5 feet of base on each side to 4 feet in height on the surface of the earth, the cut will be 205 feet wide, and 70 feet deep, and each yard in length will contain nearly 1000 cubic yards. To dig a mile therefore will require the removal of one million seven hundred and sixty thousand yards of solid earth. Although it is impossible to estimate the expense of such an enormous undertaking, it is fair to suppose that it would cost not less than 50 cents per yard. Thus one mile would more than exhaust the whole capital of the company. And what is to be done with the earth, or with the springs rushing from the sides of the opening and caving them in? —The canal is to be navigated by vessels which cannot strike their masts. Its bridges must therefore, be either draw-bridges or turning-bridges. All bridges interrupt the navigation by masted vessels, but draw-bridges and turning-bridges interrupt the intercourse both by land and water. They are besides a constant source of expence in repairs, and often require to be rebuilt. While under repair they stop all passage by land entirely. Four roads of the first importance to the peninsula, must necessarily cross the line of the canal—1st from Elkton—2d, from Aitkentown—3d, from Christiana bridge; and 4th from Wilmington, Newport and New-Castle, southward.

By an accurate observation taken at the Bear, where the Christiana crosses to the Red Lion, one carriage passed every ten minutes on an average, making in 12 hours, 72 carriages. The interruption arising to the navigation even from this number, which will probably annually increase, can be easily imagined—much greater numbers pass to the southward from Newport, New-Castle and Wilmington. But if the line of canal be so laid, that the necessary land-drains shall fall into situations in which they may be made not less than from 12 to 15 feet high, and from 15 to 20 feet wide, the roads may be made to pass under the canal, and the winter course both by land and water, will be free from interruption. Such a culvert will not cost more than a bridge over a large navigation, and will save the expence of a bridge. It might be call-

ed an aqueduct, if this appellation did not habitually involve the idea of great expense.

The lines of canal exhibited upon the map afford aqueducts of this kind to all the great roads, and to some of those of less importance.

——The survey and level between Back creek and Port Penn, has been begun and carried forward to the summit level, and a survey of Back creek has also been taken with great care by Mr. Thompson, and the whole of the land laid down between the two points. The difficulties attending the navigation of Back creek as well as the want of time, have induced me to suspend the prosecution of this level, until your further pleasure shall be known.

NOTE. This report contains also, the surveys from Frenchtown to Red Hook, New-Castle, and Christiana, which were afterwards given more in detail.

1804, Jan. 21.—Extracts of Report.

THE WHITE-CLAY CREEK FEEDER.

In my first report to you of Oct. 21, 1803, I endeavored to describe the general surface of that part of the peninsula over which it is practicable to conduct canals, uniting the waters of the two bays. From this description, especially from an inspection of the map, it is very evident that the surface over which lines of canal may be conducted is entirely separated from the country which must supply them with water by two deep vallies and water courses, excepting in one point—at the foot of Gray's hill, near Oliver Howell's. Now, as the smaller but numerous branches of Christiana creek, which rise between Gray's hill and Iron hill, as well as the principal branch which runs under the eastern declivity of Iron hill and Chesnut hill, lie between the valley of White-clay creek and the summit at Oliver Howell's, and as the valley of Christiana is every where broad and considerably depressed below the proper level, from the foot of Iron and Gray's hills, as far as Christiana bridge—only two modes exist of bringing the waters of White-clay creek

to the ground of the upper canal; and from thence to any more distant line which might be adopted.

The first is to lead them into the valley of Christiana creek above Cooch's mill, to carry them over the creek, and thence under the foot of Iron hill, over the smaller runs to the foot of Gray's hill. The second to conduct them along White-clay valley, over Ogle's run valley to near Christiana bridge, where an aqueduct of large dimensions and great length would convey them across the creek, and to the canal near the Bear. The latter project, notwithstanding its evident expensiveness, might have been thought worthy of consideration, could the feeder be shortened by its adoption. But this not being in any great degree the case, I have confined myself to the first method.

Under your first instruction (in July 1803) I had already levelled and explored the ground under Iron hill, and between Iron and Gray's hill in a variety of directions as far as Cooch's mill-pond. I had also carried the level to the tide at Christiana bridge. The three roads—1. from Cooch's to Christiana bridge—2. from Christiana to Newark, and 3 from Newark to Cooch's, enclose all the ground, and run over the highest points of the ridge, which separates the Christiana valley from that of White-clay creek, and over which the White-clay creek can be led. I therefore carefully levelled along these roads and marked the useful points—by which means I also obtained an accurate verification of my whole work; this connected with the tide at Christiana bridge, and the summit at Howell's. In speaking of the *summit* level, I mean a point 74 feet above the tide of Chesapeake at Frenchtown, or about 71.6 above the tide at Christiana bridge.

I found the centre of the street at Newark, to be 116 ft. above the tide, or 42 above the summit. It is therefore necessary to lead the White-clay feeder along the valley of the creek, until a point low enough to permit it to cross over, should be found; and in this first place to determine the best elevation for the level of the feeding canal. This elevation, I have fixed at 80 feet above the tide at

Christiana bridge or 8 feet 6 inches above the summit of the canal.

The distances along this feeder are as follows :

	m.	f.
From Rankin's dam, to Symington's	2	0
Thence to where it crosses the Newark road	2	2
Thence to the aqueduct over Christiana creek	3	1
Thence to the post road, foot of Iron hill	1	0
Thence to the reservoir at Tweeds'	1	7
Thence to the main canal	1	2
miles	11	4

From the reservoir to the main canal, the feeder should have the dimensions of the canal itself.

CHRISTIANA CREEK.

On the project of carrying Christiana creek to the canal, I cannot lay before you such detailed information, as I have done on White-clay creek. Neither the weather nor my health permittted me to carry my work higher than the mill-pond of Mr. Fisher. This pond is 23 feet 6 inches higher than Cooch's or 1 ft. 6 in above the summit, an elevation which is insufficient for any purpose: and as I found that Mr. Fisher pens his water as high as the fork of the creek, the task of exploring both prongs with the means of uniting and conveying them under the foot of Chesnut and Iron hills cannot be attempted. But this much is certain, that considering the smallness of the stream, and the difficulty of the ground, the same quantity of water could be obtained at a much less expense from Elk river. I will however proceed with this work, if required, as soon as the season, and my health will permit.

ELK FEEDER.

My first operation on this feeder, was to ascertain the level of the upper forge pond above the tide. Mr. Howard had informed me that he made it about 84 feet. I found it 84ft. 7 in. $\frac{3}{10}$. so that this level may be confidently relied upon. In pursuing my course up to the forge from the tide at Rudolph's mill I explored with the as-

sistance of Mr. Thompson, the whole country over which the feeder might probably be carried.

The forge pond is in a narrow part of Elk valley, the west side of which is rocky, and intersected with vallies. The east offers an easy course for the feeder. The present mill-race would indeed suffice until more important parts of the work were executed. If the feeder be, however carried along the east side, an aqueduct will be necessary where the bridge is now built; but it may consist of one arch, and will be a work of moderate expence; after crossing the creek, the feeder will enter a meadow, and proceed under an abrupt bank, towards the lower forge, where crossing a sloping valley, it reaches a bluff of rocky cliff—the only part of the work in which any difficulty presents itself, and the stone which will be quarried in this place, will probably be worth the expence as building stone. This bluff continues as far as M'Causland's mill dam, where the feeder leaves the bank of the creek, and never again approaches it. Nothing worthy of remark occurs in the progress of the work, until it approaches the road from Elkton, towards Lancaster on the N.W. side of Bell hill; on exploring this part of the line, I found it would be best to cut through Bell hill. A valley extending up its N.W. sides gives a good opportunity of saving much digging, and at the distance of 160 perches, the average digging through which will be 18 feet, the levels again struck on the opposite side. Another valley must then be followed, and a rocky spur of Sandy hill cut through, 68 perches in length, and average 15 feet deep.

This brings the feeder to the front of Cachots' house, from which it may proceed on a good level as far as the north side of the ridge at Richard Updegrove's. The deepest digging through this ridge is 15 feet, 18 perches in length, thence the extraordinary depth, gradually vanishes to nothing in 85 perches, from which points the natural level continues to the site of the reservoir, near Robinson's smith shop.

The distances along this feeder, which I propose of the dimensions mentioned for that of Whiteclay, are as follows :—

	M.	F.	Ch.
From the upper forge dam to the aqueduct,	0	2	5
From the aqueduct to M'Causland's dam,	0	5	0
From M'Causland's dam to Cachot's where the feeder enters Cow Run valley,	1	7	0
From Cachot's to the canal at the old School House, near Oliver Howell's,	2	6	0
Miles	5	4	5

This feeder will have 9 culverts not exceeding 4 feet diameter.

To estimate the quantity of water which any of these three creeks discharge with any degree of accuracy, is not practicable.

The differences of opinion, which in all cases of large streams, have existed between the most eminent men of science, are well known to the Board, and exhibited themselves particularly in the case of the Forth and Clyde navigation. The bad construction of the mills, and the unlevel edge of the dams deprived me in the present instances even of the usual means of a reasonable guess. The best opportunity which I possessed, was however at Elk forge.

The length of the dam over which the water flowed is 102 feet, after one day's rain, $\frac{3}{4}$ of an inch at an average ran over this dam, which was said to be the usual quantity discharged on Sunday, when the works stood still in a dry time. The water moved near the edge of the dam, at the rate of 4 feet in length in a second, making 91,000 cubic feet in one hour.

If the locks on the canal be 16 feet wide and 100 feet long, with 8 feet lift, each boat in passing will consume 12,800 cubic feet of water, or in going through the whole canal from bay to bay 25,600, with every usual allowance therefore for waste, the Elk yields water sufficient to pass 3 boats in one hour, or 72 in one day. But I think that a

much larger quantity of water is supplied by this stream in common seasons.

The severity of the season forbade my compleating the soundings off the Hook. I having ascertained them as far as colonel Grantham's landing. I have also compleated the surveys of the lower route, on which I am ready to report fully, and wait your instructions.

Memorandum of the opinion of Mr. Vicars, April 16.

Mr. Vickars called on me this morning, and informed me he had been to Elk forge and viewed the route of the feeders, which he highly approved of, as also the position for taking the water out of the Elk as proposed by Mr. Latrobe—that the river appears likely to furnish an ample supply of water for the canal—that stone for aqueducts, culverts and other rough work may be had on the line of the canal, and in the vicinity of the forge; that stone of a quality proper for hewing does not yet appear, but must be sought for.

April 23.—Extract of a Report.

——Agreeably to your instructions, *I have now compleated my survey of the lower route from Back creek to Port Penn*, by going over all the ground formerly explored, and levelling every part of the difficult ground from Bohemia to Back creek. 2. I have compleated the survey and soundings of Elk river. 3. Have explored, surveyed and laid out a course for the canal from the upper line to Welch point. 4. Have taken the soundings of the Delaware, off Red Hook, and 5. I have also made estimates of all the proposed routes of canal, with my written opinion on the best route for the feeders, and canal, with the advantages and disadvantages attending each route &c.

I beg now to report upon each of these articles in the order in which I have placed them.

I. The lower route from Back creek to Port Penn.

In my former operations on this route, as will appear by reference to my reports, I had ascertained, that the levels of

the land from the road commonly called the Buck road to Port Penn, offered no obstacles to the easy construction of a canal from thence to Port Penn; and that the whole of this level of 62 feet above the tide could be supplied without difficulty, with water by a feeder, brought from the upper country along the ridge which divides the waters of the Chesapeake from those of the Delaware,—notwithstanding the depression of this ridge, which exists for one mile and a half between the waters of Back creek and of St. George's, a depression fully ascertained formerly by Mr. Howard, and now verified by myself to be correct. I had also ascertained the practicability of a canal upon the same level with that on the eastern side of the Buck road, from Back creek, at the mouth of Hog creek, or old Court-House point, to the vicinity of Bohemia church: but had also discovered that the land lying between the Buck road, on the east, the head of Herring creek in the vicinity of Bohemia church on the west, Back creek on the north, and Bohemia river on the south, had a general elevation of from 65 to 80 feet above the tide, and that, without an enormous expence in aqueducts, along the south side of Back creek, and of embankments over its numerous branches; or of deep cutting through the level elevated ground, the same level with the feeder, and with the east and west parts of the canal, could not be preserved.

In order to complete this survey, in that part which alone offered any difficulty, and to ascertain in how far my former levellings might be correctly performed, I took my departure from high water mark at Sluyter's mill near Bohemia river, and traversed all the ridges which lie between the branches of Bohemia and Back creek, on the lines laid down in the general map of this elevated tract of ground. The result of these operations, has been a perfect confirmation of all my former levellings; the greatest difference being only 7 inches, a quantity of itself of no practical importance, and which may be accounted to the difference of the assumed high water marks at old Court House point, and at Sluyter's mill.

These facts oblige me to suggest once more as the most economical mode of executing this part of the work, the employment of a steam engine to throw up the water to the summit level, and this is the mode contemplated in my estimate.

II. Surveys and soundings of Elk river.

In laying down the map of Elk river, I have adhered to Mr. Thompson's very accurate survey as to the east shore, and laid down the prominent points on the western side by intersections from upper and lower Welch points, old Court-House point, Pierce's point, Locust point and Frenchtown. The places of the soundings were ascertained by the bearings of prominent points from on board the packet during the soundings. The soundings themselves were taken on board the packet while beating down against a strong southwesterly wind, the edge of the channel being touched at each tack.

By the chart of Elk river, herewith laid before you, it will appear, that from the proposed mouth of the French town canal there is very good water, i. e. from 14 to 17 feet as far down as Plumb point—that the channel below Plumb point becomes much wider, and shallows, to 10 feet 6 inches at low water but that at Welch point and a little above there is from 20 to 30 feet of water in a bold broad channel, and 12 feet within 100 feet from the shore at Welch point.

III. Line from Welch point to join the upper route.

The most favorable range of ground which I have yet seen on the peninsula for the economical construction of a canal, in proportion to its length, is from Welch point to the ridge near the land of William Pennington, and Solomon Underwood, two miles S. W. of Aitkentown. It is interrupted neither by high ground nor by deep vallies; but continues, after rising in one mile and a half to the summit of 70 feet, for nearly seven miles along a ridge generally of the level of 67 to 70 feet above the tide.

IV. The soundings off Red Hook.

The soundings were extended below Red Hook as far as Aldridge point, nearly opposite to the mansion house at Hamburgh, where it was supposed that deep water was to be found close to the shore, and continued to col. Grantham's avenue. It is now ascertained that the flats upon which there is only 4 feet 6 inches water at low tide extend 1000 feet from the shore in most places, and although 10 feet at low water is to be found nearer to the shore off the south point of Red Hook than elsewhere, it is there at the distance of 750 feet.

V. ESTIMATES.

The estimates herewith submitted are:

1. Of the line from French town to Christiana creek, 17 miles 7 furlongs 1 chain.	$522,340
2. From French town to New-Castle, 17 miles 6 furlongs 4 chains,	476,691
3. From Back creek to Port Penn, 17 miles 1 furlong 4 chains,	493,585
4. From old Court House point to Port Penn, 20 miles 5 furlongs 8 chains,	564,585
5. From Welch point to Christiana 21 miles 3 furlongs 1 chain,	534,725
6. From Welch point to New-Castle 21 miles 2 furlongs 3 chains,	489,085

In making these estimates, I have had the advantage of a detailed and intimate knowledge of the ground and of the levels, and have therefore, I hope, been able to fix such a value upon the cutting and embanking, as will cover the labor, and all the utensils found to contractors by the company. But in respect to the side works in masonry, without knowing whence the stone can be procured and the nature of that which will be employed, I have trod upon less safe ground. Presuming, however, on the actual expense of similar works, especially of the Schuylkill basin at Philadelphia, for that of the tide locks, and upon the best estimates I could make for the other works, I hope I am as correct as the nature of the case will admit.

It will however, readily occur to the committee that in the execution of so extensive a work, upon which the weather has such a powerful effect as to the economy and expedition with which it may be executed, absolute correctness cannot be obtained. And to the uncertainty of the expense in the present case, the competition of many other public works, raising the price, and increasing the scarcity of labor, added to the unhealthiness of the country, will contribute not a little. And I confidently hope, that the committee, fully aware of the delicate situation of an engineer, who suffers in his reputation with the public more by his failure in the estimate, than he can perhaps ever gain by the most compleat success and importance of his work,—will receive those now submitted with the proper indulgence.

In giving my opinion of the merits of the different routes, I will begin with the lines from Port Penn to old Court House point, and from the same place to Back creek. Both these I conceive to be ineligible for the following reasons :—

1. Because they are at their Delaware mouth so low in the bay, as to occasion very great uncertainty as to the arrival of vessels in Philadelphia, in unfavourable winds or tides.

2. Because the Delaware bay is unfavorable to the safety of small boats, many of which would come down the feeder and proceed to Philadelphia without discharging their cargoes, if the navigation of the Delaware commenced in a narrower part of the river.

3. Because the canal from old Court House point to Port Penn, is the most lengthy and expensive of those proposed.

4. Because that from Back creek is subjected to the evil of the shoal, uncertain, and narrow channel of the creek, the navigation of which is almost entirely suspended in a westerly wind.

5. Because the mode by which the summit level of both these canals must be supplied is ineligible.

6. Because of the increased expense of the feeder.

2. From Welch point to the ridge, compared with the line from French town, to the ridge, where both meet.

If the additional expense of about $13,000 be put out of the consideration, there can be no doubt that the preference must be given to the former line.

1. Because a vessel will arrive sooner from Welch point to the ridge, than from Welch point to French town, and thence to the ridge.

2. Because a vessel can sail down the Elk and into the bay against a southwesterly wind, which would render the departure from French town difficult, and perhaps impossible.

3. Because the depth of water at Welch point is more likely to be permanent than at French town.

I do not consider the securer harbor at French town in the river, as a circumstance of importance. Against S. W. winds there is a good harbor for craft north of old Court House point, and against west and N. W. winds under Old Field point. Besides I believe that in any wind if not a very unusual storm, a vessel may warp into the canal and lie safe in the basin on the marsh.

3. Along the upper route.

From the ridge to the Bear there is only one good line of Canal, which ends south of the Bear tavern near the house of Mr. More.

4. From the Bear to Christiana creek compared with the line to New-Castle.

In favor of Christiana against New-Castle are the following arguments: —

1. The utility of the work to all the banks of Christiana creek, above and below its mouth, comprising a much larger activity of capital and greater extent of productive industry, than is perhaps found within the reach of the New-Castle mouth of the work. By this I principally mean to allude to the capital fixed and employed, —of the town of Wilmington.

2. A safe harbor in stormy weather for craft along the river Christiana.

3. The practicability of getting to the mouth of Christiana when the tide and wind are unfavorable in the Delaware, often, when it would be impossible to reach New-Castle.

4. Greater safety in southeasterly storms for vessels which have left the canal, or mean to enter it.

5. Greater safety from an enemy.

In favor of New-Castle against Christiana.

1. Bolder water, and a wider space to work a vessel in contrary winds, either to or from the mouth of the canal.

2. The practicability of going up Christiana and Brandywine creeks in one tide at all times.

3. The easy access to the trade of all the lower parts of the Jerseys.

4. The probability of deep water at the mouth of the work for an indefinite time, whereas most of our tide rivers are gradually becoming shoaler.

The evidences on which the facts contained in these opposite arguments, may be believed or rejected, are to be obtained from the testimony of those who have known the two situations best, for a great length of time, and come not within my professional duty.

NOTE. As this report was in a great degree, the basis of the decision of the board, and contains the estimates of the several routes, it is necessary to say something upon that subject. These estimates were those of the actual cost of making the canal, and did not include the following—1. The purchase of the land—2. The fencing along the sides of the canal.—3. The lock-keepers' houses —4. Building a permanent office and stores.—5. Cranes and wharves at certain stations.—6. An aqueduct on one of the branches of Mill-creek, at the passage of the New-Castle and Red Lion road.—7. Ditto for the Newport road at Reed's hollow.—8. Expences of surveys, salaries, &ca.—And 9. the cost of a harbor at New-Castle.

These of course would raise the whole expense, and

vary it on different lines in a manner that could not be well determined, until the route was in some degree fixed.

Estimates are always asked for, and are still in their nature uncertain—in making up the report for Mr. Gallatin, I was extremely solicitous to give a complete view of the sum total, including every thing. It was labored therefore by Mr. Latrobe and myself with all the attention in our power, without design either to diminish or exaggerate it, and with the assistance we had then derived from the actual operations on the feeder. I believe therefore the estimate I have given, to be as correct a medium between those who are disposed to consider all estimates as still to be added to, and those who form plans for diminishing them, as can be made. It is in my opinion the most correct and manly mode, to apprize the public, that in whatever manner and upon whatever route the canal is made, it will be a work of considerable expense, and probably not much above or below the estimate I have given.

June 2.—Report.

Note. As the following report condenses the matter of all the preceding ones, I have thought it best to insert it at length.

Agreeably to your resolution of the 24th of April, I have the honor to lay before you maps and profiles of the lines of canal from French town and Welch point, to the meeting of these two canals, from this point to the vicinity of the Bear, and from thence to Christiana creek near Mendenhall's, and also to New-Castle, with estimates of these several sections.

A former resolution of the committee of survey, required of me a general report on the whole business committed to me, for the purpose of its being laid before you at your present meeting: with this resolution, I now beg leave to comply.

At the first meeting of the board of Directors for the transaction of business in June 1803, Mr. Howard and myself were appointed to explore all the ground over which it was judged to be most likely to find a good line of canal

between the waters of the Chesapeake and Delaware. The arrangements previous to our undertaking this duty, delayed the commencement of operations till the middle of July; when the gentlemen of the committee of survey rode over the several proposed lines, and pointed out the leading objects of examination.

The instructions of the committee were confined in the first instance to the examination of the ground between several principal points on each bay, and of the feeder. They were from time to time extended to all the following lines.

Chesapeak.	Delaware.
1. Back creek at or near Wertz's landing	Port Penn.
2 Back creek at the nearest convenient point below Wertz's.	Port Penn.
3. Old Court House point, the south cape of Back creek	Port Penn.
4. Welch point - - -	New-Castle.
5. Welch point - - -	Christiana bridge.
6 & 7. Any convenient point at which there might be deep water between Locust point and Welch point	to New-Castle. and Christiana creek.
8. French town - -	Vicinity of New-Castle, particularly Red Hook.
9. French town - -	New-Castle,
10. French town - -	Christiana creek.

When these instructions were given, several other routes had been under consideration by the board and were the subject of conversation with the engineers, although they are not mentioned in any formal communication. As it is the object of this report to bring into view the whole of the proceedings with the reasons on which they have been founded; and public attention having been frequently directed to these lines, it appears necessary not

entirely to omit mention of them. They are principally the following :

Chesapeake.	Delaware.
1. Head of Chester.	Duck Creek.
2. Sassafras.	Appoquinimink.
3. Sassafras,	Drawyer's creek.
4. Bohemia,	Appoquinimink.
5. Bohemia,	Drawyer's.
6. Sassafras or Bohemia,	Silver run.

The first of these lines was deemed to open into the bays, too far from Philadelphia and from the mouth of Susquehanna to be eligible. Against all the rest there was independently of every other, one general objection, the bars of the mouth of Appoquinimink and Drawyer's and Bohemia.

The excessive expense, and uncertain result of what has been called the thorough-cut, precluded the adoption of that plan.

In the operations intrusted to the engineers, the following leading principles were understood to be for their general government.

1. The canal to be carried into water at each end, of 8 feet depth at low water, at least.

2. The canal itself to be 8 feet deep below the surface of the water.

3. The canal to be fed either by Elk river, Christiana creek, White-clay creek, or by all these streams.

The business of exploring the ground was begun at the tide at French town. The surveys formerly made at the expense of the American Philosophical Society for the same purpose had already pointed out the practicability of several lines of canal, but on principles which the experience of European engineers, during the time since elapsed, has exploded or corrected. The first leading fact which it was necessary to ascertain, was the level of the ridge, which divides the waters of the bays of Chesapeake and Delaware, and much time was spent by Mr.

Howard and myself in levelling up from the tide and back again, and in performing every operation necessary to correctness. We finally agreed to fix the heighth of a point on the lowest pass of a ridge on the upper line near Oliver Howell's at 76 feet 9.5 inches above the high water of Chesapeake at common tides, and from thence to determine all other levels of the summit southward.

In the course of the operations to ascertain this level, it was proved that any line of canal, commencing at French town must necessarily pass near a remarkable maple in front of the house of Oliver Howell, because the vallies of Perch creek on one side, and the high ridges from Gray's hill on the other, allow no other course.

It then became requisite to know how high it would be necessary to proceed up the river Elk, Christiana, or White-clay to secure a supply of water for a summit level of about 76 feet, whether the supply could be brought to the canal on that level, or whether it would be better to lower the summit by deep cutting. Accordingly Mr. Howard levelled up to the upper forge on Elk, and found the elevation of the water of the dam to be 84 feet, and that of the lower to be 70 feet above the tide of Chesapeake. It appeared therefore necessary to obtain the water of the upper forge. In examining the ground towards Christiana creek, I found it difficult and uneven, and ascertained that Fisher's mill dam would not be sufficiently elevated for a supply. Above Fisher's the creek branches out, and its water cannot be easily collected. White-clay creek being afterwards also explored, I found that nothing short of Rankin's dam above Newark had sufficient elevation, that very uncommon difficulties presented themselves in the construction of this feeder; and that independently of local difficulties, the feeder would be more than double the length of a feeder from Elk creek.

It being thus known that the canal could certainly be supplied with water from the upper forge dam on Elk river, if carried on a summit level of 76 feet, Mr. Howard proceeded to determined the elevation of the range of the highest land between the two bays, so as to intersect

by this line of levels all the routes between the two bays, which it was proposed to explore.

He found that in proceeding from Howell's along the ridge in southeast direction, the ridge increased in elevation, till he approached the heads of the waters of Back creek, running into Elk river, and of St. George's discharging themselves into Delaware.

From this point southward, he found a depression of the ridge extending for above a mile; the lowest point being only 62 feet above the tide in Chesapeake. The ridge from this point southward, became again elevated. All these facts were afterwards verified by levels taken in my subsequent operations.

Mr. Howard afterwards ascertained the respective levels of the ridges which separate the waters of Christiana creek and Delaware, and sounded the river Elk at French town, making a survey of the shore and of Perch creek.

The general elevation of the highest land, being accurately determined, the surveys and levellings were now directed to the actual determination of the lines of canal. And in order to ascertain the best situations on the waters of the two bays, at which to enter the tide water. Mr. John Thompson of Springfield, Pennsylvania, was employed to make surveys, and to take all the soundings of Christiana creek, and Back creek from their mouths to the end of tide navigation, and to survey the east shore of Elk river from Locust point to Welch point. This task he executed with great skill and fidelity. In the necessary land surveys, his assistance and that of Mr. Daniel Blaney of Port Penn, was also very useful.

It would be very uninteresting and unnecessary to describe the great variety of levels which were unavoidably taken in order to discover the lines of canal which have from time to time, been laid before you as practicable or eligible. Their whole length taken together, exceeds three hundred miles. For although the top of the country is plain, and preserves nearly the same level, it is intersected by so many water courses and broad ravines, and so much abounds in

intricate swamps, that great difficulties occurred in finding the most eligible levels. The very great choice of ground even increased the necessary extent of examination. It was also proper to go over every line more than once, in order to verify former levellings and ensure the necessary accuracy.

I will now recapitulate the leading objects of all operations performed by me, under the direction of the committee of survey, beginning with the most southern lines, and proceeding northward.

The first line of levels carried over the ground between Port Penn and Back creek, had for its object a canal from Port Penn to Wertz's landing, or its vicinity on Back creek. It was soon found that no good line of canal could be obtained in this direction, on account of the numerous and deep ravines of St. George's, as well as of Back creek which intersect it; for this reason and in order to shorten the difficult navigation of the creek it was given up, and a lower point on Back creek, the mouth of Hog creek, was chosen as the point to which to carry the work. This line was connected with another, leading into the deep water of Elk river, at old Court House point. Both these lines were found very practicable, but the elevation of part of the ground of Bohemia manor is so much greater than of the depressed part of the ridge over which the feeder must be brought, that a steam engine seemed the best and least expensive method of supplying the summit level of the canal This great elevation of the ground was unexpected, and more than usual pains and time have been expended to examine every part of the neck between Back creek and Bohemia river; the fact is however fully verified.

By the range of levels which had been taken along the next ridge, it had been discovered, that there were only two modes by which a canal north of Back creek could pass it without an enormous expense in deep cutting. The one to cut through it, near Oliver Howell's, at or near the place above mentioned; the other to follow from Oliver Howell's the ridge in its southeast course for above

two miles, as far as F. Ellsbury's spring, which is the most distant head of St. George's, to cut through it at that point, to keep on the southern side of another ridge, which divides the waters of Christiana creek from those of St. George's and Red Lion, and to pursue its direction to the northeast nearly as far as the Bear tavern, where the lines to Christiana creek, to New-Castle, or to Red-hook separate. The latter of these routes was first explored, and many collateral lines were run towards the Delaware between the ravines of St. George's and the Red Lion, as well as towards Christiana. The result of these operations was, that it would be better to cut through the great ridge near Oliver Howell's than to follow this circuitous track, which though it offered no obstructions to the work by any deep cutting or embankments, would be more expensive from its length than the direct course across the head waters of the South branch of Christiana between Oliver Howell's and the Bear.

It then became my principal duty to explore carefully this part of the ground before entering on either of the ends of the work. In the course of this examination, it was found that the general depression of the ground among the ravines of Christiana creek, would permit the summit level to be fixed at 74 feet above the tide in Chesapeake; and all my subsequent operations were calculated to this elevation of the summit.

The only places between Oliver Howell's and the Bear, which present any difficulty, are a valley and brook, west of Aikentown, Belltown brook in its broad valley, and a brook and valley on the land of Kinsey Johns, esq. All these waters have spread branches to the southward, below the junction of which the line of canal must necessarily be carried. Aqueducts in all these places, and at Belltown brook a considerable embankment are required, under these aqueducts however, the public roads may pass, and thus the expense of bridges will be saved.

Having carried the levellings as far as the Bear tavern, the shortest distance by which the Delaware could be reached, appeared to lead to Hamburg, a distance of only

two miles in a straight line. But in levelling the ground for a canal, I found that the straight line, which would nearly follow the road, was intersected by two broad depressions leading towards Red Lion. To avoid these, it was necessary to keep to the north east, by which means a line to Redhook became much shorter, and passed over much better ground, and the land close to the river affords every advantage which could be desired at the termination of the work, and must certainly have been chosen in preference to any point of discharge, had the water in the Delaware been of a sufficient depth within a moderate distance from the shore; but a broad flat, beginning a little below New-Castle, extends a great distance into the river, and passes in front of Red hook, Hamburg and of all the landings from thence almost as far as Reeden point.

To discover good lines of canal to New-Castle and to Christiana creek, required a very long and attentive examination of the ground. In going to New-Castle, the branches of Mill creek, spreading chiefly to the northwest, opposed great difficulties on that side of the creek, the best line was found on the southeast side: there the ground over which the canal must be carried is remarkably level and straight as far as Mill creek marsh. This marsh must be crossed by an embankment, which will be more or less expensive according to the course of the canal after crossing. It will be 24 feet high and 400 yds. long, if a circuitous route be taken through hollows and lands of small value, and only 14 feet high, if carried through very valuable private improvements.

The ground towards Christiana creek is of a very different nature, a high ridge lies between Mill creek and Christiana creek, under which the numerous branches of Mill creek have their rise, and in the south of which, is situated the Bear tavern. The ridge cannot be advantageously crossed but at one place, on land of Nicholas Vandyke, esq. The depressions caused by the waters of Mill creek, prevent a straight course of the canal, but the levels are otherwise not unfavourable. The crossing place at Mr. Vandyke's is also very short, and the deep cutting

of no great importance. The greatest difficulties occur on the other side of the ridge in the valley of Christiana creek, they arise from the deep ravines on the lands of Enos, Read, and George Gray, deceased, and of many lines which may be followed to reach the creek none are entirely free from them. It will, however, appear by the map and sections, that by winding the line of the canal into the vallies, or by a few short embankments they may be easily overcome and a very excellent canal be made into the deep water of the creek near Mendenhall's.

I have only to remark further on the lines to New-Castle and Christiana, that in both instances the mouth of the canal will be admirably placed upon the tide navigation, and that the works in each instance will be nearly the same expense.

In the fisrt operations of the engineers, the ground about French town was well explored; of two practicable lines to reach the summit, that tending to the north from the mouth of the canal, was found far the most eligible, and least expensive. But both of them have their difficulties, and that which is proposed for adoption, has three aqueducts of moderate size within the first mile.

One of the last lines of levelling which have been performed, is that from Welsh point to join the upper line at the ridge, the length of this line exceeds that from French town, by more than three miles. But in other respects, it has none of the difficulties of the former in its whole course of near eight miles. It passes over level ground easily dug, and requires not even a culvert in the whole distance; nor will it materially exceed the line from French town in expense.

The board after very minute investigation on the subject of the feeders, and after laborious examination of the different grounds by the engineer, having purchased the waters of the Elk for the supply of the canal, I shall omit a particular description of what has been done on Christiana and White-Clay creeks.

The Elk rises in the hilly country, and in order to bring it by the best route to the summit, three ridges

must be cut through, one at Bell hill, another on the land of Mr. Cachot, and the last on land of Richard Updegrove, being a connecting ridge of Gray's hill with Sandy hill. Compared with similar works which have been executed in Europe or even with the cut through the Sand hills near Philadelphia, these cuttings are trifling: the deepest of them, Bell hill does not exceed 23 feet.

The actual work on the feeder commenced at Elk forge on the 2nd of May. The weather has since then, been so unfavourable as to have retarded the digging work very considerably. Great progress, however, is already made in the first half mile. In the commencement of every great work, there are many inconveniencies to overcome. The want of tools and of accommodations were at first seriously felt. At present we are better supplied with utensils, and more are daily procured; temporary and portable houses have also been erected so as to remove that difficulty of accommodation in a very great degree.

The operations carried on under your directions in the field commenced in July 1803, and were pursued without intermission during the months of August, September, October, November and December—they were again taken in March and April 1804. The country minutely explored, is of about 18 miles average breadth, between the waters of the two bays, and 12 miles average width.

The time thus expended, has furnished minute information upon all that is practicable in the way of inland navigation throughout the upper part of this Peninsula; so that independently of the means of deciding on the line of the present work, the utility of the survey will reach to every future attempt to extend its benefits by lateral canals, and save a very heavy expense in future surveys of the ground.

1805. May 30.—Extract of Report.

It is now about one year since the work on the feeder commenced; for altho the first sod was cut on the 2d of May 1804, the extreme wetness of the season, and the incomplete state of the arrangements for working, prevented any material progress before the beginning of June.

During this period, the work on the whole feeder has been carried on with the utmost vigor, which the state of your funds would permit; and as far as the lands could be procured, every part of the work is in progress, and by far the greatest part of it is finished.

The work begins on the east side of big Elk creek, with the abutment of the aqueduct, intended to convey the water of the forge race into the feeder. The foundation of this abutment is laid on the solid rock, 5 feet below the level of the water in the creek.

From thence the work is finished as far as Bell hill, a distance of one mile, four furlongs, ten chains, (forty perches.) This distance includes all the rocky ground to be encountered in the whole course of the feeder and of the main canal. The water is admitted from the runs which cross the canal into the whole extent, excepting at the first rocky hill, which is useful as a quarry, and from which the stone may be transported by water to the works either above or below it.

Bell hill is at present the only very heavy part of the work which is to be surmounted: from the south side, the work has been carried forward nearly as far as the road fromElk to Fisher s mill, and on the north a large excavation has also been made, and cut down to the level of the towing path.

The canal is compleat half across the valley south of Bell hill. The adjoining land of J. J. Cachot not being in possession of the company, the work stops at this point, and commences again on the south side of Catchot's land. From thence to the post road, the feeder is entirely finished, excepting in two places: the first at a deep valley, where a culvert must be built over a branch of Cow-run: the second opposite to Thos. Cunningham's house, where a small culvert is also necessary.

The post road is not yet cut thro, but preparations for the bridge are made, and on the south side of the road the earth is taken down to towing path level, and the ramps of the road on to the bridge are in part made.

A considerable portion of the work south of the post

road is finished as far as the foot of the ridge which divides the waters of the Chesapeake and Susquehanna.

The whole of this ridge is cut through, and in the highest part of the depth of 8 feet. A large portion of the rest is lowered to the depth of the towing path.

On the south side of the ridge the feeder will be finished in the course of a few days, from its foot to the road from New-Castle to French town, and on the south side of the road, there remains only 2 feet 4 chains, 27 links in an incomplete state.

The exact distances, and length of those parts of the work which are above described are as follows :

				M.	F.	C.	L.
Sec. 1, 2, 3, 4, 5, 6, 7, and part of 8, completely finished and navigable				1	5.	0	0
Of the residue of section 8.							
	Ch.						
Finished to towing path level	7	0					
Unbroken	6	65					
Finished to towing path level	2						
Completely finished				0	1	4	0
Sec. 9. Including Cachot's land							
	Fur.						
Unfinished	6	1	68				
Sec. 10, 11 & 12 finished excepting two culverts and a small piece.				0	5	0	72
Sec. 13 and 14, finished				0	0	1	00
Finished to towing path level	1	5					
Cut down 8 feet	1	3	10				
Sec. 15, 16, 17, and 18, finished				1	3	9	35
Sec. 12, partly finished							
Miles	1	5	1 10	3	7	5	07
				1	5	1	10
				m5	f4	c6	l17

The whole of the cutting, and embanking has been executed by contract, at a price which in most cases would have been sufficiently high, but which taking the stubborn nature of the soil into consideration must be generally considered as extremely low. The contractors have performed their duty with fidelity, and the work which has been executed may vie with almost any similar work in America or Europe in this respect.—And I am confident that the committee will be of opinion, that whatever the expense may have been, it has not been uselessly laid out, and that the instances in which any considerable saving could have been effected are not numerous. The course of the feeder is confined by nature to a few lines, which offer only a choice of difficulties, with the detail of which it is not necessary to swell this report. They are now nearly overcome, and even the digging thro Bell hill has made great and successful progress. On the rest of the line no work of any great importance, and nothing difficult remains.

The feeder, without which the main canal could not exist, has cost more in proportion to its magnitude, than can be expended on the latter. After passing the lock on the feeder, the soil changes to a sandy loam which soon becomes water tight. In 5 miles and a half, the feeder has required four very expensive, and ten less expensive culverts. From the feeder westward there is not on the main canal any masonry for eight miles to Welch point excepting the locks, and the abutments of the bridges; nor any cutting deeper than 12 feet.

Nov. 11. Extract of a Report.

Since your last meeting the works on the canal have proceeded with the limited number of hands, as directed by the resolution of the board of Directors. The progress made is as great as could be expected; the hill at the post road has been cut through by John Grimes, and brought to the level of the towing path, and at Bell hill, the excavation has been very considerable.

It would have been very desirable, could it have been accomplished on the limited scale of operations to which

the work was confined,—to have expended as much labor upon that which has been finished, as to have prevented injury by the washings of the rains. I beg leave to submit to your attention, the propriety of taking this project into consideration before the winter sets in. The injury already suffered is no where of any great importance, excepting in the cutting of Hugh Sands, near the Aitkentown road, where the loose nature of the soil has occasioned a considerable wash.——

Extracts from Minutes furnished by Mr. Latrobe, to reply to queries proposed by Mr. Gallatin in 1807.

The distance near to 22 miles to Christiana creek.—The canal rises from Welch point on the Chesapeake, in one mile to the height (above the tide) of 68 feet, the next seven miles are level to the ridge, dividing the waters of the two bays, the canal then rises 6 feet and continues for 13 miles on the level of 74 feet above the tide to the first lock on the Delaware side. The mean tides of the two bays are on the same level, but the tide in the Delaware rises from 6 to 7 feet, and at Welch point from 2 to 3 feet only, so that the high and low waters of the bays differ in their levels 2 feet in opposite directions: it is generally half flood in the Delaware when it is low water in the Chesapeake, but the Chesapeake tide is much influenced by the wind.

Locks.—8 Locks in 3 tiers at Welch point, one lock at the summit; and 9 locks in 4 tiers at Christiana creek, —dimensions, 80 feet long, 18 feet wide, 8 feet water—contents 11.520 cubic feet of water—construction, hewn stone laid in tarras.

Supply.—Elk river, supply measured 144 locks full nearly per day, of 24 hours, but from the decayed state of the dam much was wasted, and it may be estimated that 25 boats might pass thro in one day, eastward, and the same number westward.

There are in the canal, no particular difficulties to be encountered. The whole country has one uniform soil, loom, more or less sandy; but the ground over which the

feeder is carried, is difficult; the difficulties are however surmounted.

It is believed that the execution is perfect as far as it has gone; on the plan there can be no doubt, excepting as to its termination at Christiana or New-Castle; the question respects only the last five miles of the canal on the Delaware side, and tho quieted at present by a decision of the board in favor of Christiana, is still open to revision.

Note—The above Minutes seem to be decisive upon one point, viz. as to a supposed difference in the general level of the waters of the Chesapeake and Delaware, the idea of which had generally prevailed since the surveys of 1770.

The Reports of the Directors of the Chesapeake and Delaware Canal Company.

First Report, June 4th, 1805.

The President and Directors of the Chesapeake and Delaware Canal Company, in obedience to the Act of incorporation, and in pursuance of the duty arising from the trust committed to them, respectfully submit to the Stockholders of the company now convened at their annual meeting, the following report of their proceedings since their appointment.

Immediately after the organization of the company, and the election of the board—the board itself, sensible of the importance of the duty assigned to them, and how much depended on a prompt establishment of such system as might give economy and vigor to their measures, entered into those regulations for their own government, and the conduct of the work, which they deemed best calculated to establish harmony among themselves; and a proper cooperation in all who engaged in it.

The first great object which appeared necessary to form the basis of decision on the situation and mode of constructing the canal, was, to obtain a correct general knowledge of the country between the two bays, of the water from whence the supply for the canal could be obtained, of the streams which in various places seem to interlock with each other, and afford means of opening communications between them, of those positions which on each side might form the respective mouths or terminations of the canal itself, and to cause accurate surveys to be made of all such places as should appear practicable, or proper for the purpose. These it was necessary to accomplish, to enable them to decide upon the most eligible route, at once with justice to the various local and general interests engaged in, or affected by the work, to the duty they owe to their constituents, and above all to the great public advantage which was to be expected from the undertaking.

In effecting these objects it was their first concern to trust as little as possible to their own judgment or knowledge, or to the uncertain information to be obtained by cursory inspection, or to the vague and often interested opinions of those, who, however, qualified by residence to acquire a knowledge of the country, sufficient for common purposes, could possess little of the accuracy necessary on the present occasion. Without however rejecting information of this kind, but on the contrary availing themselves of it under every circumstance in which there was reason to hope it could be useful, it became the object of the Board early to engage in their service persons of the best capacity and reputation for public works of the kind in the United States. Accordingly Mr. Benjamin H. Latrobe, Mr. Cornelius Howard of Maryland, and Mr. John Thompson of Pennsylvania, all of them men of high reputation as engineers or surveyors, were engaged to take the necessary levels and surveys of the country, and of the routes appearing suitable for the canal.

In order to form a just outline of the work, and to fix a plan of proceeding for the engineers under that su-

perintendance which was enjoined on the Board by the trust reposed in them, a Committee of their body was appointed, who, with the engineers proceeded to a general examination of the sources of supply, the situations on each bay, the respective passes supposed to be practicable, and of the nature of the country itself. From this investigation much important information was obtained, and a system of proceeding established for the more minute operations of the engineers. It also enabled the Board to direct their attention to every point from whence utility and satisfaction could result to the public, to curtail the expence and time which would have been consumed *in* desultory and useless experiments, and so far to accelerate the business of the surveys, (sufficiently tedious even when confined to the most necessary objects) as to commence the execution of the work with the promptness and economy due to the expectations of the public.

In the course of this survey, and of the enquiries which attend it, many important general principles were established, to the satisfaction of the Board as well as of the engineers. Among the first of them, was that of the general nature or kind of the canal itself. Upon this subject they were aware, that several different plans had been offered to the public, before and at the time of their appointment, to which they thought it their duty to pay a just attention; and to carry with them the ideas which had been suggested, in order to apply them to the country and situations which they explored. One of the most prominent of these plans was that of effecting the canal by a deep cut or channel on the level of the tide from one bay to the other, so as to connect the two waters upon one level. As this had gained considerable public attention, they thought proper, not only to investigate its general principles, but to apply them to the positions which had been pointed out as most proper to admit of them. In examining the general principle, it appeared to them no other, than the revival of those ideas of artificial navigation which had existed previous to the invention of locks, and the execution of which had been found to present so many diffi-

culties as to baffle a variety of attempts both in the ancient and modern world. In applying the principle to those places which were most favorable from the near approach of the respective tides, such a work appeared at once, if not wholly impracticable, at least beyond the reach of the funds of the present company, or of any which seemed likely to be formed for the purpose: to say nothing of the nature of such a canal when formed, of the operation of the two opposite tides, or of the doubts how far these operations might ever be subjected to the regulations of art. From the investigation of the subject therefore it appeared obviously to result, that no alternative remained to the Board, but to adopt that kind of canal which should pass over the peninsula at a practical level with a lockage at each end, in the usual manner of those navigations which have been carried into such complete effect in Europe and in America, reserving the adoption of a larger or smaller canal to the time when a minuter investigation of the sources of supply should furnish the grounds on which to form a decision.

Another principle seemed also to be established, that although many plausible plans and inventions might be offered which had not heretofore been the subjects of actual and successful experiment, it became the Board, as intrusted with the interest of their constituents, and with a great portion of public confidence, not to put the issue of the present important work to hazard, by adopting any plans, whose success was dubious. But without being the slaves of precedent, or too minutely adhering to old habits, they resolved to adopt those which have already so admirably and extensively succeeded, as at once to afford the best models for the present work, and to insure its success by imitating them.

In exploring the various waters of the peninsula which seemed likely to afford a supply for the canal, it became at once obvious that this could be obtained from no other sources than from the waters of White-clay, Christiana, or Elk creeks; as all the streams below these were found to take their rise far below the level necessary for the canal,

and also to be so scanty in their nature, as to afford no hope of supply. From hence the result was obvious, that the more southward the position of the canal, the greater would be the distance for furnishing it with water.

It also appeared that the navigation of nearly all the rivers and creeks on each bay was subject to difficulties for a considerable extent below their respective heads of tide, that positions for the mouths of the canal, on either bay became more distant from each other as the line of the canal was carried to the southward, as well as more exposed to rougher navigation, especially below the line from Back creek to Port Penn, that the highest navigable position on the waters of Chesapake, approaching nearest to those on the Delaware was at French town on Elk river opposite to Hamburg, Red Hook, New-Castle and Christiana creek on the Delaware; the Board therefore, leaving the investigation of any route below that from Back creek to Port Penn as affording no hope of utility, adopted from their preliminary survey, a plan for obtaining the accurate and detailed surveys of their engineers on all the proposed routes northward of that line.

In order to carry this plan into effect, and to leave no necessary point of examination incomplete, a committee of survey was formed to assist the engineers, by frequently accompanying them; and the Board itself also held frequent meetings in order that the progress of the work might be known to them, and every measure taken which could conduce to its speedy and successful termination.

The operations pointed out to the engineers were as follow:

1st To survey and ascertain the lower route from Port Penn on the Delaware to Back creek, with an extension of the line to old Court-House point on Elk river.

2d. To survey and ascertain the routes from French town to New-Castle, Christiana creek, Red Hook, and other positions on the Delaware.

3d. To survey and ascertain the elevation and probable quantity of water of White-clay creek, Christiana, and Elk respectively, and the course by which feeders and a

reservoir might be formed to conduct these waters to the canal.

4th. To survey, sound, and estimate by actual measurement the courses and depths of Christiana creek, of Elk river, and Back creek, and their respective channels, and also of the river Delaware at New Castle and opposite to Red Hook and its vicinity.

These operations with several of a less important nature which were from time to time thought necessary for the general investigation of the subject, were pursued with unremitting industry through the late summer. But the season being considerably advanced before the appointment of the board, it was found impossible to complete them before the winter put a close to all operations of the field, and its length and rigor prevented their recommencement till unusually late in the present spring. However reluctant therefore the board have been to delay the important measures of a decision on the route—of the commencement of the work, and of giving the result of their labours to the public eye, they have been compelled to it by circumstances beyond their controul, and by their desire to effect their surveys in such a manner as should render them, not a vague, but an accurate guide to themselves and their successors: and they trust that their constituents will feel with themselves, that this delay is in a great measure compensated by the accurate and copious information which it has produced.

Without entering into the detail of these operations which would be too tedious for the present purpose, it will be sufficient to mention their general result and the measures which have been founded upon them.

1. By the survey of the waters of Elk, Christiana, and White-clay creeks, and of the course of the feeder and reservoir, it was ascertained, that the supply to be derived from Christiana creek was at all times small, and in summer very scanty indeed; but that a copious supply could be obtained from White-clay creek and Elk river. Either of these streams were, as far as could be ascertained, sufficient for an extensive navigation upon the canal, with

the advantage of adding the other whenever an increase of business should require it.

In tracing the line for the feeders from their respective streams at a sufficient elevation, to reservoirs in the vicinity of the canal, it was found that both could be conducted over practicable ground, but that the waters of Elk could be brought from the upper forge on that river at the elevation of 84 feet, by a route considerably shorter and less expensive than those of White-clay creek.

By the survey of the feeders several important general principles were also established.

1. That as the supply for the canal on any of the proposed routes must be drawn from White-clay or Elk creek, and along the same course from the reservoir, wherever might be the line of the canal, both the feeders and reservoir might be begun without delay.

2. As it was ascertained that a copious supply of water might be obtained, the size of the canal was established: the only doubt being removed, whether it ought to be so ample in its construction as to convey those vessels which were usually employed in the navigation of the two bays, or be made a mere barge-navigation of moderate dimensions, to which it must have been confined had the source of supply been smaller.

3. That as a canal so ample in its construction could be formed, it became of the utmost importance to place the termination or embouchure on each bay in such situations as should afford a bold and open access, beyond the hazard or delay arising from shallow water, exposure to winds, or any of those obstructions which might lessen its utility, by impeding the most free and uninterrupted approach to it.

II. By the survey of the lower route, from Port Penn to Old Courthouse point and Back creek, and of the creek itself as connected with it, it was ascertained,

1. That from Port Penn to the head of Back creek the ground was highly practicable, but that from thence no eligible route could be obtained either to Old Courthouse point, or to Back creek at such a level as could be

supplied by any known feeder, or in any other manner than by a steam engine, or other artificial work. It appeared particularly from the survey of Back creek, that its mouth was so much obstructed, and its channel so narrow, as to render the creek itself in no degree proper for forming any part of the proposed navigation.

2. The situation of Port Penn also appeared by no means more favourable than those higher up the Delaware.

III. By the survey of the route from French town to the waters of Delaware, the general practicability of that route was established with such certainty, as to confirm the most sanguine hopes that had been entertained of the probability, and indeed the ease of forming a canal from the two bays adequate to the most important purposes. Indeed, in considering the survey of this route, it seems rather to present a choice of places, all practicable in their kind, than to oppose any material obstacles whatsoever.

In the deliberations on this route, the first important feature was that of the mouth or position on Elk river. After a survey of the port of French town it seemed to result, that although the navigation of Elk river, to and from the landing, or its vicinity, was at present highly practicable, yet from the narrowness of the channel, and the existence of a shoal below French town, the navigation of the river especially during the prevalence of south-westerly winds was liable to delay, and not of that unquestionably bold nature, which the board were desirous to procure. Added to this, it was to be feared, that from the loose soil of the shores of the river, the slowness of its tide, and its being deprived of much of its head water by the operation of the canal, any disadvantage under which it now labored might justly be supposed to increase, and perhaps others accumulate in the progression of years to which it may be confidently hoped the utility of the present work will extend.—The ground also for some distance although practicable for the canal, was found to be of a nature which would render it difficult and expensive. For these united reasons, the board entered into more minute surveys, and soundings of the shores and

channels of Elk river, in order to find a more advantageous position. None however offered nearer than Welch point, at the mouth of Back creek, where there is a bold and open point projecting at once into a depth of water, sufficient for vessels of almost any size, at any time of tide, or with any wind.

In order to verify the circumstances, which appeared so highly in favor of adopting Welch point as the mouth of the canal, the engineer was directed to make an accurate survey of it and of the route from thence towards New-Castle and Christiana creek. The result of this survey was, that the point itself proved to be in the highest degree favorable to the constant approach of vessels of almost every description at all times, with a sufficient harbour and situations proper for erecting the necessary locks and basin at the mouth of the canal, without extraordinary expence. In tracing the route of the canal from thence northward, until it joins that from French town, the ground over which it runs appears not only highly eligible in itself, but so far superior to the route from French town, that although the length of the canal is extended three and an half miles, a considerable part of the extra expence will be saved by the superiority of the ground, and the difference which it is supposed will not exceed 13,000 dollars, appears fully compensated by attaining a position on the Elk which will in all probability secure forever to the canal the desirable object of a bold and unembarrassed approach.

From either French town or Welch point, the canal, rising by a succession of 9 locks, to the elevation of 74 feet above the tide, attains the summit level, at which it is conducted across the Peninsula. At the distance of five and an half miles from French town, and nine from Welch point, the two routes unite, and continue on the same level across to the vicinity of the Bear tavern. Of this part of the route it is only necessary to remark that the general direction of the canal is confined by nature to the course adopted, it being prevented from any material deviation to the northward, or southward, either by

grounds which are too high, or by streams, ravines, or other formidable difficulties: and though the country possesses some irregularity in its general levels, it is in the main highly favorable to the purpose.

The canal thus conducted to the vicinity of the Bear tavern, arrives at a point from which the route becomes different, according as it enters the Delaware either at Red Hook, Hamburg, New-Castle, or into Christiana creek.

From the survey of the country from the Bear to Hamburg and Red Hook it appeared, that though both these lines were practicable, that to Red Hook was far the most eligible both as to distance and the nature of the ground.

It became however necessary to establish one general principle respecting these positions, by which they both appeared ineligible. For by surveying and sounding the river Delaware opposite to them it was found that the whole of the cove or bay extending from New-Castle almost to Reeden point was at once so shallow to a considerable distance from the shore, and so subject to the danger and changes occasioned by the violence of winds and tides as to be in every part an improper position for the entrance of the canal.

The route from the Bear to New-Castle, which was the next in distance was found to extend over very favorable ground until within 2 miles of the town, where it appeared that an embankment of considerable extent and expence would be wanted over Mill-creek, and the marsh on its sides.

In surveying the port of New-Castle as a position for the mouth of the canal, its bold and accessible situation was unquestionable, but it appeared to be more subject to exposure than was to be wished, and although improved by the piers lately erected there, it was to be feared that the nature of the port was better adapted to the security and navigation of large vessels, than to the shelter and constant communication of those of a moderate and small kind; which it must be supposed will be chiefly employed in the traffic on the canal.

The route from the Bear to a position on Christiana creek near Mendenhall's ferry, appeared in extent near one mile longer than the shortest of two proposed routes from the Bear to New-Castle, and the ground over which it extends, was subject to some obstacles and irregularities of surface especially as it approached Christiana creek. None of these however were either impracticable or formidable, and the position for the termination of the canal on the creek, seemed at once to accomplish the object of a bold navigation, accessible at all times, and from the rapid tide and quantity of water likely forever to remain so, and that of a safe, commodious and extensive harbor, furnished by the Christiana itself, particularly suited to those vessels which would most probably navigate the canal, and sufficiently accessible to others.

In deliberating upon the two routes to New-Castle and Christiana, which in point of eligibility so nearly approached each other, the Board thought it perfectly within the general object of this and similar undertakings, to consider how far the interests of the Stockholders might be promoted by adopting such a position for the canal, as would probably most increase its traffic, and accommodate the greatest proportion of the interests of the Stockholders, under circumstances subservient to the greater interests of the public. While therefore, the position on Christiana creek appeared perfectly accessible to the navigation of Delaware, and to establish as completely the intercourse from bay to bay, the Board could not but entertain an opinion that the important trade of the town of Wilmington, and the manufactures which were extensively conducted on Brandywine, White-clay creek, and other waters of Christiana claimed an attention to their interests, which would in all probability be richly repaid by their increase, and with them, the product of the canal.

In the prosecution of these surveys, a variety of collateral objects were necessarily pursued in subservience to, and as a confirmation of the general result of the work. Among these was a line of level along the ridge of the Peninsula for some distance southward. But as the detail

of these and many other operations are less the province of the Board than of the engineer, by whose talents and scientific knowledge they were accomplished, they do not enter into the present report.

Upon the close of the surveys, which has been heretofore observed, were protracted by the unavoidable circumstance of an inclement season, and an anxious desire to leave no necessary information unattained, the Board finally came to the resolution of fixing the route of the canal from Welch point on Elk river to Christiana creek, near Mendenhall's landing.

Of this resolution, which the Board are sensible had been for some time demanded by the public anxiety, and on which they are equally sensible that the opinions of many will be divided, they have only this remark to offer; that being the result of an indefatigable attention to the subject in all its bearings, of a research so extended as to leave no point of information unaccomplished, and of an unremitting deference and moderation among the members of the Board itself; they have no hope that any decision on a subject of such importance could ever be obtained under more favorable circumstances; and they trust that it will give satisfaction to every candid and liberal mind.

During the progress of the surveys necessary for fixing the general route of the canal, upon its being ascertained that the waters of Elk and White-clay creek must be resorted to, for supplying it wherever its position might be, and that the most economical mode of beginning the execution of the work would be by conducting the feeders from their source to the reservoir, in order that water might be supplied to every part of the canal as soon as it was executed, and stone, lime, and other materials procured for the works at much less expense than in any other way; purchases of the water rights on Elk creek and much of the land for the feeders were effected, and on the second of May, (the anniversary of the organization of the company,) the first sod of the canal of the feeder was cut near Elk forge, and a commencement made

in the execution of the work. Since then, contracts have been made for digging, and other measures taken to prosecute the work with such activity as affords a confidence that the whole of the feeder will be accomplished during the present year.

To this detail of the proceedings of the Board in their survey may be added, the result which is proved by every circumstance which has occurred to them, that in the ease of obtaining an ample supply of water, in the unobstructed nature of the ground, in the excellent position for its terminations, in the shortness of the work itself, and in every other circumstance requisite for forming a canal of the best construction and upon the best principles, the route now marked out, is beyond any that has occurred in the history of canal navigation, and seems to be one of those important passes left by nature as an invitation to human art, to establish a monument of patriotism and industry.

From the estimates which have been made by the engineer of the cost of the route adopted, it appears that the work contemplated in its full extent and upon a scale adequate to the greatness of the object, will amount to 560,000 dollars, including the purchase of the water rights, but exclusive of the land. When however, they contemplate how increasingly important the completion of the canal must become as its progress advances, they have no doubt but that the sums necessary will be furnished under the power vested in the Board, from the completion of the remaining shares, and from the support of the Stockholders and the public at large.

Since the establishment of the Board additional subscriptions to the amount of about 160 shares have been received, leaving about 500 yet to be subscribed for to complete the original amount of the subscription of 2,500 shares, mentioned in the acts of incorporation.

The sums of money which the Board have received from the Stockholders will be sufficiently explained and stated by the account furnished: upon which they have only to remark that thus far the payments required by the

Stockholders have been proportioned only to the moderate expenditure of the surveys and the limited progress of the work, and that this expenditure has been regulated by the most strict and methodical economy.

Having thus compleated every necessary preliminary and laid the foundation of a public work, whose utility has never been too highly appreciated, the Board has only to commit it to their successors, under the fullest conviction, that if supported by the zeal with which it was undertaken, by the public spirit which is due to its importance, and by the exertion of those places to which it promises the most immediate benefit, its execution will be neither difficult nor its success dubious, but that while it will ever claim for the age and people by whom it was begun, the credit due to those undertakings which almost beyond all others increase the agriculture, manufactures, commerce, and general prosperity of a country; it will afford advantages perhaps beyond the power of any, now to estimate, to the Stockholders, to the lands in its vicinity, to the neighboring States, and to the Union in general.

Signed by order of the Board, by

JOSEPH TATNALL, President.

Second Report, June 3d, 1805.

The President and Directors of the Chesapeake and Delaware Canal Company offer to the Stockholders now convened at their annual Meeting, the following Report of their proceedings during the late year:

Referring to the Report presented last year, it will appear, that the survey of the different routes for the canal being completed, and its position determined, a commencement had been made of the feeder, or canal of supply.

Since that period, the work has been prosecuted with unremitted attention, and the following objects have been effected.

Of the whole extent of the feeder, whose length from its commencement at Elk forge to its junction with the main canal, is five miles, forty six chains and seventeen

links, there has been fully compleated fit for the purpose of navigation, three miles, seventy five chains and seven links (nearly four miles); of the residue, forty chains and sixty seven links are in various stages of progress, so as to be at least half finished, and one mile, two chains and forty three links is as yet not begun, consisting chiefly of pieces intervening between the parts already finished.

This unfinished work, and the completion of the aqueduct over Elk river, of bridges over three public roads, of one lock and waste weir near the intended reservoir, with sundry culverts and small pieces of masonry, comprises all the operations necessary for compleating the whole of the feeder.

These, it is presumed, may be accomplished during the present year, so as to leave the work of the main canal the sole object of the ensuing one.

The cost of all the operations upon the feeder, as exhibited in the general account of the Board now presented, amounts to $59,189.40 of monies actually paid, and an estimated balance of $17,878.76 on accounts due from the Board, but which could not be adjusted previous to this period; in this expenditure however, is included a large quantity of stone and other materials for the future progress of the works, and the houses and tools necessary for the operations upon the main canal.

The time necessary for completing the feeder and its expence have been extended solely by the nature of the ground over which it was necessary to form it.—This ground laying chiefly on the east bank of the Elk river, or between Iron hill, Gray's hill and other high grounds at the head of the peninsula, presented many difficulties; particularly a considerable extent of hard rocky bank only to be overcome by blasting with gunpowder, several projecting points of the surrounding hills necessary to be cut through at a considerable depth, and of a soil uncommonly difficult; and numerous ravines, pieces of low ground, swamps, springs and streams of water, all which required embankments, drains, culverts and other works of considerable labor; these difficulties, more tedious however,

than formidable, or insurmountable in their nature, which could not to any extent be either foreseen, or subjected to calculation—which were absolutely necessary to be overcome, and could be overcome alone by time, perseverance and expence, comprize the sole causes for the protraction of the work, and the objects for which the expenditure of the company's money has been made.

In reviewing these operations, the Board has the satisfaction to reflect, that a great quantity of work has been done, comprizing that proportion of the great undertaking in which they are engaged, at once the most essential in its kind, and the most difficult in its execution. That the works which have been executed, have been done in a manner which will bear the strictest scrutiny or comparison with others of the kind either in America or Europe, and that the general structure of the feeder is such as to unite the purposes of supplying the canal and of forming a barge navigation thereto, upon the smallest practicable scale, and at the easiest expence.

In looking forward to the future progress of the work, the Board have also satisfaction in observing, that not only has a body of workmen been formed and reduced into system, various preparations, such as houses, tools, &c. made, and an example of perseverance and labor given, but much of the difficulty occurring in the whole undertaking has been overcome, since, at the termination of the feeder, a change of country takes place, which leaves the course of the main canal throughout, free from nearly all the obstructions heretofore encountered, and its expence probably not more, if as much per mile, as the feeder has already cost.

In reviewing the system which the board has adopted for conducting the works, they feel a conviction that its general plan is fully calculated to carry on the undertaking with as much expedition and as compleat a controul over the workmen and expenditure, as any they can adopt—they feel sensible however, that in the outset of a work which was in a great degree new to all the Board, in a country very thin in its population, where workmen were

to be collected from a distance, accommodations to be provided for them, and their operations to be brought into regulation, the details of that system could not at once be so perfect as they have since become, under the experience gained by the Board, or as that experience may still make them in the hands of their successors.

The general account now presented, will shew to the Stockholders the sums which have been received by the Board from the payments already required, and will also exhibit to them the amount of the deficiencies yet outstanding.

Upon these deficiencies, the Board have to observe, that as the whole of the undertaking, and the security upon which the Board themselves acted, was the faith of the original subscribers, it was with surprize that they found any persons among so respectable a body of subscribers, who could hesitate at complying with engagements so solemnly made, and upon which such important objects depended; finding however, that while a large proportion, of the Stockholders honorably fulfilled their engagements, others delayed them, and some altogether refused, the Board found it necessary to take the opinion of counsel respecting measures to be pursued in an event at once so unexpected, and so injurious to their interests; accordingly the opinions of two eminent lawyers in Philadelphia, two in Delaware and three in Maryland, including the Attorney General, were taken, all of which declared, that the original subscriptions for stock in the company were recoverable by the direct and usual process of law in all those States.

In this situation the Board had no alternative but either at once to abandon the interests of the Stockholders who had honorably fulfilled their engagements, and suffer the great public work that had been entrusted to them to tumble into ruin; or to avail themselves of the powers which had been given them by law; accordingly, however painful the alternative, yet conceiving it their duty, they directed suits to be brought against the delinquents in all the three States, in consequence of which, nearly all

the subscriptions in Philadelphia and Maryland have been settled, but a large number remain due in the State of Delaware. The Board however, cannot but entertain a hope that in all the three States, but particularly in the one most interested in this important work, where its progress ought to incite the greatest interest, and its future perfection the liveliest hope, the sentiments of public spirit and a patriotism directed to an object so extensively useful may prevent the injury arising to themselves and the company in delaying their payments by a speedy compliance with them.

Except this circumtsance, no others have occurred to the Board, to depress or lessen the hope of perfecting the works, or the expectations of benefit to be derived from them.—In their progress thus far, every thing has appeared to confirm the practicability of their execution: many of the most important difficulties have been overcome.—The probability of income to be derived both from the feeder and the main canal has been confirmed, with the additional circumstance, that as the State of New Jersey is now engaged in opening the communication from the Delaware to the Rariton, this canal will at the time of its completion, enjoy not only the benefit to be derived from the trade of the two bays, but of extending that trade from the Southern to the Eastern States, and thus completing one great link in the communication through the United States.

The Board are sensible of the gratification which many of the Stockholders might derive from an estimate of the whole cost of the future work, but they are the more confirmed at once of the difficulties of making such an estimate, and of the injury which often arises from it, as affording too much ground to those who are disposed to despond, or who may entertain views inimical to the work, by deviations or the failure of calculations in their nature peculiarly liable to error: —All therefore that they can mention, or that they conceive it their duty to mention is, that this important work appears to them highly practicable under the same measures they have adopted—that the monies already subscribed appear sufficient to secure the

execution of the work, especially with the aid which they are authorized by law to obtain.

For the satisfaction of the Stockholders on this head however, the Board will remark, that as every part of the main canal, when executed, will produce a lessening of land carriage and thereby secure its use, and as the present subscriptions of the company will in all probability finish one end of the canal and thereby produce a carriage and revenue upon it, so much will be perfected as to make it the interest of the company to secure its future execution.

If the canal be executed from Elk river to the Bear tavern, the land carriage to Christiana bridge will be reduced from thirteen to two miles; and from the traffic already existing by this conveyance, a revenue upon the part so executed, and upon the funds then expended, will be derived, perhaps as great in proportion as upon the whole work when compleated, so that there is no doubt but this product will insure the desire and means of the Stockholders to effect its completion.

There are other circumstances which aid the expectation that with a due exertion at present, the work will proceed to a completion. The board are not only authorized to obtain further monies upon subscription, loan or otherwise, and these means will be placed in their power by a vigorous prosecution of the work, but there is every reason to expect that the governments of the several States bordering upon the canal, and that of the United States itself, will support a work promising such great public advantage.

In order to avail themselves of this aid, and of that confidence which public support adds to a work of this kind, applications were made by the board to the legislatures of Delaware and Pennsylvania, in both of which, resolutions were passed for subscribing to the canal, and though the acts for that purpose were not compleated during the late sessions, owing to the great quantity of previous business before the several houses, yet there is every reason to believe they will be passed in the ensuing

sessions, and that the legislature of Maryland will adopt the same measures.

In order however, to receive this aid, and indeed to entitle the company to it, it is necessary that the works should proceed with unremitting exertion through the present summer, that all idea of despondence should be laid aside, and that the Stockholders should give that support to the undertaking, which can alone enable the future direction to carry it into effect.

If ever this work, thus favorably begun, and so considerably effected, should suffer injury or delay, this reflection will justly arise, that it is neither from the impracticability of its execution, from the greatness of its importance, nor from a want of zeal and perseverance in those to whom it has thus far been intrusted, but from a despondence without cause, from a versatility to abandon an enterprize just as it is begun, and from that want of public spirit and fortitude, without which no public work whatever can succeed.

Having thus exerted themselves in the performance of their duty during the period for which they were elected, and given to the Stockholders and to their successors the best information as to the past and prospects of the future which is in their power to bestow, the Board have only to resign into the hands of those Stockholders, and to the direction they may appoint, the future fate of this important work, with every hope for its success.

Signed by order of the Board

JOSEPH TATNALL, President.

Wilmington, June 3, 1805.

Third Report, June 2, 1806.

The President and Directors of the Chesapeake and Delaware Canal Company, now beg leave to offer their third annual Report to the Stockholders.

By the Report of last year, the Stockholders will perceive, that the operations of the company had been directed thus far, to complete the feeder or canal of supply,

of which there then remained about one mile unfinished, and that it was the expectation of the Board that the same might be completed during the late year, and the main canal itself began in the course of the present one.

But the exertions of the Board in this respect have been wholly disappointed by the delinquency of the subscribers; this delinquency was stated in the last report; a hope however prevailed that a sense of public duty in supporting a work of such general and acknowleged utility, or at least a regard for private honor and good faith in performing engagements solemnly contracted, would have produced the payment of those arrearages, upon which the progress of the work depended. But unfortunately, so far from these hopes being realized, the failure of payments among the remaining subscribers became so general as to leave no alternative but the prosecution of suits against the deficient parties, and suspension of the work until legal justice should furnish the funds which the defection of individuals had retained.

In justice however to those Stockholders who have honorably fulfilled their engagements, it is incumbent on the Board to mention, that but a small proportion of delinquencies exist in the city of Philadelphia or in the State of Maryland, that a respectable number of the Stockholders in Delaware have also paid, and that the deficiencies chiefly exist in that State and in the vicinity of the canal, where above all others they should have been least expected.

To assign any other cause is at once obviously unnecessary and impossible, for from this alone has the suspension of the work arisen; since the payment of the arrearages now due would have completed the feeder, enabled the Board with propriety to draw forth the residue of the company's funds, and left the execution of the canal no further a subject of doubt or despondence.

In order that no means should be left untried, which it was in the power of the Board to attempt—applications were made during the late winter to Congress and to the respective Legislatures of Pennsylvania and Maryland, im-

pressing on them the importance of the canal as a great national work, interesting, more than any which could be contemplated, to those States, and to the Union at large, and praying that as such the company should receive their patronage and support.

These applications were all favorably received and the importance of them recognized both by Congress and the State Legislatures, in their respective acts and reports.

The House of Representatives of the United States after fully admitting the importance of the canal as a national work, especially as a means of defence during any hostile act, plead the pressure of demands on the public funds, for withholding a present grant of money—In the Senate a resolution was introduced for granting a considerable quantity of land in the Western Territory.

In the Ligislature of Maryland a resolution was reported by a committee of the house of Delegates for authorising the Treasurer to subscribe for one hundred shares, and a bill was reported by order of the house of Representatives of Pennsylvania for a like subscription to an undefined number—after this recognition of the principles and importance of the work, and a reception so highly favorable and flattering to the hopes of the company as to leave little doubt of success at a future session, it was with regret the Board perceived that from the pressure of other business, the several resolutions and acts were unhappily postponed for the present, so that none of them were carried into an effect so compleat as to render any immediate aid for continuing the work.

Thus the want of public support which appeared the only resource on the failure of payment in the subscribers has confirmed the present suspension of the canal: With what concern the Board view this event, the public can estimate; without arrogating to themselves any merit beyond the fair execution of their duty, they feel it no more than an act of justice to remark, that partaking of the general zeal which was manifested at the first institution of the company, they entered upon the execution of the trust committed to them and have perse-

vered in an arduous attention to it through a course of three years, under a firm reliance on the punctual payment of the subscriptions as the work should require them, and on a continuance of that zeal and public support under whose auspices they began and which was essential to animate and encourage them through all its progress, their regret therefore is in a high degree accumulated from finding themselves deprived of means to proceed, and the works suspended in their hands, not by a failure of their own attention, but of that support on which they were taught to rely.

That the regret which the Board experience will be participated by every patriotic mind who originally felt the importance of uniting the two Bays of Chesapeake and Delaware by an uninterrupted navigation, or who now feels that importance confirmed by the ease of executing it, is a subject of some consolation and affords the hope that the lassitude or negligence of the public mind to an object at once so new, so useful and interesting, for which so much concern has been professed and so little realised, will soon be succeeded by that just attention to their interests which a large proportion of the United States and particularly the country contiguous to the canal ought to feel.

In addition to this hope there remains numerous circumstances to excite the confidence and animate the expectations and exertions of the public: the opinions of many of the most able lawyers in the union are decisive that the payments now in arrear will be recovered by law, and the Board have a well founded reliance on the justice of the courts to realize their opinion perhaps in the course of the present year.

These arrearages will enable the board to resume their operations, to compleat the feeder, and to prepare themselves for a commencement of the main canal itself, the execution of which may be deemed secure from the residue of the subscriptions yet uncalled for, and from that aid which Congress and the State legislatures have given so much reason to expect; but if even this aid

should fail and the existing subscriptions be insufficient to execute the work upon the great and important line which has been marked out, the opening of the navigation may yet be executed from French town to Christiana bridge, by a canal of little more than half the length originally intended, and upon dimensions considerably smaller, but adequate to accommodate the trade of the two bays.

By the execution of the works thus far, and the extensive view produced from those researches which have been made, the general utility and operation of the canal has been so confirmed, as in the opinion of the board must impress the public mind too forcibly not to induce the citizens of the several towns and States, who will partake of its immediate benefits, to exert themselves in promoting its execution—no fact appears more clear than that the opening of the canal, by drawing the whole immense produce of the Chesapeake and its waters to the head of that bay and across to the Delaware will restore to the city of Philadelphia the trade of Maryland, Virginia and North-Carolina which now goes direct to New-York, will afford an inexhaustible supply of produce for the manufactories of Delaware, will benefit the port of Baltimore by bringing all the produce to the upper part of the Chesapeake, instead of going from it by sea; and in respect to the United States generally, will compleat the chief link in that great inland communication between the eastern and southern States so much preferable at all times to a coasting navigation, and so absolutely essential in time of war. To the conviction of these considerations and to their operation upon the public mind, the board must now commit the future interests of the company with this reflection, that the preservation of the work from ruin, and the prosecution of it after it has thus far succeeded, will not only be more easy than to resume it hereafter and save the sum it has cost before it is wholly wasted—but will prove to the world that there exists in the country, not a disposition to form splendid designs and abandon them without cause, or consideration for those whom they may injure, but the just and solid information, industry and in-

tegrity which after beginning works whose utility and greatness are ascertained, perseveres in compleating them, insures their advantages to the country, and animates it to go on with similar undertakings by the force of successful example.

Signed by order of the board,

JOSEPH TATNALL, President.

Wilmington, June 2, 1806.