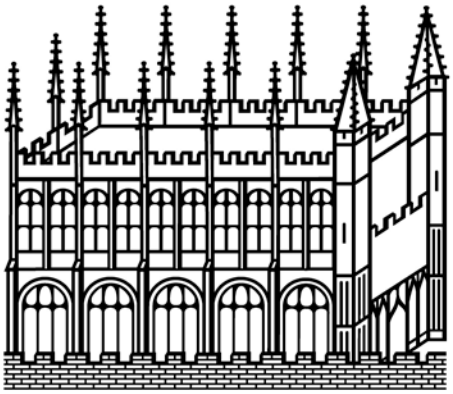

S. H. 1825.

Observations

ON A

RAIL-WAY FOR COMMON CARRIAGES,

Between Newcastle and Carlisle.

ALSO A REPORT

ON A NAVIGABLE CANAL,

From Newcastle to Hexham, &c. &c.

Price 3s. 6d.

Observations

ON

CANALS AND RAIL-WAYS,

ILLUSTRATIVE OF THE

AGRICULTURAL AND COMMERCIAL ADVANTAGES TO BE DERIVED FROM AN IRON RAIL-WAY,

Adapted to common Carriages,

BETWEEN

NEWCASTLE, HEXHAM, AND CARLISLE;

WITH

ESTIMATES OF THE PRESUMED EXPENSE, TONNAGE, AND REVENUE.

BY THE LATE WILLIAM THOMAS, ESQ.

ALSO, SECOND EDITION,

Report

OF

BARRODALL ROBERT DODD, ESQ.

CIVIL ENGINEER, &c.

ON

A PROPOSED NAVIGABLE CANAL,

Between Newcastle and Hexham;

WITH

APPENDIX,

CONTAINING REMARKS ON THE GREAT UTILITY OF A PROPOSED JUNCTION CANAL, OR RAIL-WAY,

Uniting Newcastle upon Tyne and Carlisle with Liverpool, Manchester, Hull, Derby, Sheffield, Birmingham, Bristol, and London.

Newcastle upon Tyne:

PRINTED BY G. ANGUS, SIDE, AND SOLD BY W. HEATON, SANDHILL, AND J. FINLAY, MOSLEY STREET; ALSO BY LONGMAN AND CO., LONDON; KAY, LIVERPOOL; CONSTABLE AND CO., EDINBURGH, &c. &c.

1825.

INTRODUCTION.

TO enable the public the more readily to comprehend the occasion of the following Reports, it may be necessary to premise that the important object of uniting the east and west seas, by way of Newcastle upon Tyne and the city of Carlisle, was first suggested by the late Mr. Dodd, the Civil Engineer, to whom this country is indebted for the origin of so many useful public works. It appears that Mr. Dodd, in the year 1795, had first the honor of calling the attention of the public to this desirable undertaking, by representing the great and manifold advantages which agriculture, manufactures, and commerce were enjoying from the adoption of navigable canals, in various parts of the British empire, in which the districts through which the proposed canal would run, could, from the richness of their mineral treasures and other favourable circumstances, abundantly participate.

As might be expected, the proposition was most favourably received. Meetings were held on the subject both at Carlisle and Newcastle; surveys, &c. were ordered; in consequence of which, Mr. Dodd reported at considerable length on the subject, recommending the south side of the Tyne as the preferable course for the canal to pursue in its approach to Carlisle: viz.—To commence at Stella, five miles above Newcastle, to which place the Tyne is navigable; then to pass to the south of Ryton, Prudhoe Castle, and the Riding to Hexham. An opposition to this useful measure soon arose, in consequence of Mr. Wm. Chapman projecting an opposition canal from Newcastle to Haydon Bridge, on the *north* side of the Tyne; the peculiar feature of which was, that it should be on one level between those places, a distance of thirty-one miles.

As this long level was more than 200 feet above the level of the Tyne, up which all goods would have to mount, either by carts or inclined planes, it would seem something like the prospect of a fine country from a a church steeple, very delightful when you reached the eminence, but rather awkward in getting up or down. By the original line on the south side, Hexham could be approached with a rise not exceeding 109 feet.

An application being made to Parliament in the year 1796, for an Act for the north side canal, this scheme was so strongly opposed, principally on the ground of expense, and comparative public inutility, as to be rejected by the House of Commons.*

The late Robert Whitworth, Esq., who was an eminent Engineer, on being called upon to state candidly which line he preferred:—In a letter dated 16th March, 1797, says,—"*The line upon the south side has very "much the advantage, both in point of tonnage and "expense, and safety in the execution.*"†

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* There is scarcely a canal, or any other public work in this country, but what was opposed by some noble, or other finally unavailing interest, when before parliament; for individual objections and prejudices must yield to the public good; yet, in this instance, the patriotism of the gentlemen who opposed this bill, cannot be called in question, as by their evidence they shewed that the north line was improperly chosen—that it would be difficult and most expensive in execution, and, when accomplished, could never afford the accommodation the public required; but that a canal less expensive, more useful, and consequently more profitable, could be executed on the south side of the Tyne; and, therefore, the mutilation of their lands, and other objections to its execution, was in a public point of view, quite unnecessary.—*Vide the Parliamentary Evidence on the Bill.*

† Mr Chapman appears by his *latter* writings to have abandoned the north line which he projected for a *canal*, and so late as June, 1824, recommends it, as the best line for a *rail-way*, "as it runs for 31 miles on a level, and is peculiarly advantageous for a rail-way, conveying articles both ways,

In 1802, subscription books were again opened to promote the north-side canal, from Newcastle to Haydon Bridge, but without success.

In the year 1805, the late Mr. Thomas, then of Denton Hall, Northumberland, conceiving by the construction of an iron rail-way from Newcastle to Hexham and Carlisle, adapted to common carriages, that many of the obstacles to the establishment of a navigable canal would be avoided, whilst the mode of conveyance, as compared with the existing means, would be greatly improved; Mr. Thomas drew up a report and estimate thereon, which was read to the Literary and Philosophical Society of Newcastle upon Tyne. As might be expected, from

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and preferable for many causes." Latterly he has veered round, and aiming at the popular side of the question, we now find him recommending the original *south line*, as proposed by Mr Dodd, as the proper course for a ship canal, or the projected rail-way, which line he for years denounced as unfit for such a purpose. Whilst he thus displays his eagerness to avail himself of the superior skill and sound judgment which operated in the choice of that line, we find him taking as much care not to hint to whom the public are indebted either for the idea of the canal, the rail-way, or that important matter the choice of line; as we, from a sense of justice, and what is due to departed merit, have to make it known. It is true these things did not originate with Mr Chapman, but then has he not displayed great local knowledge, and surveyed and estimated upon them in a manner that could only proceed from one "placed at the head of his profession?"

the acknowledged talents and intelligence of the Author, (allowance being made for the distance of time, and those improvements which experience and science have since suggested), the performance appears to evince judgment, accuracy, and impartiality; and, certainly, from Mr. Thomas's connexion with various lead mines, collieries, lime works, &c., few persons had better opportunities of acquiring the best information on the subject he discusses. This report would have appeared much sooner, but on search being made at the Library it could not be found; to the regret of many who remembered the communication, and whose honorable feelings made them desirous for its publication, as well from the nature of its contents as to inform the public to whom the honor of suggesting a *rail-road*, as the means of improving the communication between Newcastle and Carlisle, properly belongs. Fortunately a copy of the document in question was transmitted to an honorary member of the society, in London, from which source the present edition is printed. And at a period when the public attention is so particularly directed to the properties of rail-ways, when so many millions are proposed to be embarked in their extension, it is presumed the information contained in this early Essay will not prove unacceptable to the public;

for whilst the local advantages of the measure are clearly pointed out, the general arguments applicable to so many other places are deduced from facts well known and established in this neighbourhood, where the number of rail-ways, and their incidental machinery, is more extensive and varied than in any other part of the kingdom.

In the year 1810, preparations were made for applying to parliament, for powers to complete the canal as far as Hexham, on the south side of the Tyne, under circumstances very flattering to the prospect of final success; but these were suspended in deference to the opinion of a late noble duke, and in the hope that time would produce a more public avowal of support.

In the year 1817, measures were renewed to promote a canal, and a subscription entered into for surveys; but a letter being received from the Duke of Northumberland, intimating his Grace's dissent to its passing through his lands, on either side of the river, the project was again laid aside.

Adverting to the scale of our existing inland navigations, and looking forward to a junction with them, we must confess we think a ship canal unnecessary, and, at the same time, as affording no adequate prospect of remuneration to the adventurers; nor of the remaining

propositions, a rail-way, or a barge canal, in the absence of reports, plans, and estimates, founded on actual surveys, made by able and skilful engineers, competent and willing to discuss the relative merits of canals and rail-ways, have we the means of offering a decided opinion; for these may shew a much nearer approximation in regard to expense than now appears, as well as the means of greatly increasing the speed of canal vessels where it is desirable, as in the case of passage boats. The enormous expense and delay incurred by the opposition to a rail-way, now before the House of Commons, would seem to render the advantages attributed to that species of road, beyond the accommodation canals afford, or can be made to yield, not quite so obvious to that House, as they have been represented out of it; but we refrain from any particular discussion, as it is not the object of these remarks to attempt any bias. The public are entitled to the fullest information; and we are happy to lay before them an Original Essay on the Rail-way, not before printed; also the most compendious Report on a Canal as far as Hexham, now out of print; and having made these contributions to the subjects in question, we trust, after the fullest investigation, that the measure best adapted to the public wants

will be selected; receive the support of the landed, the agricultural, the mining, and the commercial interests, and finally the sanction of the legislature; and, when completed, prove not only eminently useful and lucrative in itself, but the forerunner of many other improvements, which, in the spirit of our appendix, we are of opinion will follow.

Observations

ON

CANALS AND RAIL-WAYS.

IN a country where commerce occupies so much of the attention, and constitutes so great a portion of the comforts and conveniences of its inhabitants, every measure that has a probable tendency to give additional vigour and expedition to general intercourse, merits the peculiar support and countenance of the public. The means of facilitating the carriage of heavy articles through the country, in the least expensive way, has long and deservedly been considered an object of great national importance, of which the multiplied introduction of canals bears strong evidence; and certainly no object of commercial speculation has a higher claim to unqualified approbation, or which has, in various instances, so essentially answered the end proposed; yet there is

a variety of objects unfriendly to the establishment of canals, so generally as the state of the country demands; such as natural impediments, individual prejudices, or local derangement of pleasure grounds, or forest scenery, and, above all, the uncertainty of the expense which the execution may incur, and which the most judicious calculation is found unable to remove. There appears, therefore, a necessity for a middle line, embracing some of the advantages of a canal, divested of most of the objections above enumerated, and possessing so great a superiority over the present mode of conveyance upon the public roads, as to render a plan advantageous to the adventurer as well as the public. To delineate the general outlines of such a plan, shall be the object of those observations.

When the mode of conveyance, established by many individuals in this country, for the carriage of coals from the pits to the vessels on the river, is considered, it may readily be conjectured that the plan proposed has a reference to that kind of conveyance, where the power of one horse is equal to two tons and a half, exclusive of the weight of the carriage, which is somewhat more than one ton, and which he draws with ease about three miles an hour. Hence we find a facility of con-

veyance, considering the weight very superior indeed to that at present practised on the common roads, where the weight drawn, by a single horse, is seldom more than twelve hundred weight, exclusive of the carriage, and that at little more than two miles an hour. This principle is, therefore, considered perfectly applicable to the proposed plan, with some little variation, which the increased quantity of carriage, and the more permanent nature of the road, seem to point out. The disposition of the road is intended to be as nearly horizontal as the nature of the ground, over which it passes, will admit; but in no part to ascend, or descend, more rapidly than at the rate of about one inch and a quarter in each yard.

It is proposed that no horse shall convey less than two tons, exclusive of the carriage, which including this inequality in the road, he can easily do. Though this may occasion a more circuitous route for the article to be conveyed, yet the superior quantity carried with more ease and expedition, are considerations which must overbalance the inconvenience arising from an increased length of the road. By the road admitting of this inequality, some of the objections which attach to the line of a canal, where the preservation of a level is so essen-

tially necessary, may be avoided. Commencing the ascent, or descent, in any given situation, the line of the road may be so far diverted as to pass undisturbed those favored spots which the prejudices of individuals hold in estimation; or those great and almost insurmountable barriers which nature places in the way of a canal.

Instead of the common wood rail used in collieries, it is proposed to form this way of cast metal plates, applicable to the passage of the common carriage wheels, with a tread-way of five inches for each plate, and a ledge or margin three inches high, to prevent the carriage slipping off the road. Each plate to be about five-eighths of an inch thick, and four feet six inches long, to be laid at the joints on oak sleepers, and the middle of the plate to be supported by blocks of stone, twelve inches square, in which shall be cut a grove to receive the thickness of the plate, and an oak plug in the centre, to which all the plates are proposed to be nailed. Where the way crosses common roads, small concave plates are intended to be fixed, to admit carriages to pass over it without obstruction from the ledge of the plate, as well as to allow their going off, or coming on, to the way without inconvenience. By the adoption of metal plate ways, in preference to the common wood rail-way, a great part of

the friction of the latter will be avoided, the facility of conveyance increased, and the road rendered much more durable. In every half mile of the road, side-ways of about sixty or seventy yards long, are proposed to be laid to admit carriages passing each other. These side-ways are proposed to be placed in situations where it is found necessary to make a turn or bend in the road, in order to lessen the curve in the side-ways.

As the value of the principle article in the formation of this road, (namely, metal plates,) is so well known, little of the expense, except the making of cuts and batteries, is left to conjecture, and those have been so general in this country, through every situation of the most difficult access, that the expense of them can be easily and accurately ascertained. Here then another objection to forming of canals (the uncertainty of the expense), is in a great measure removed. The man of common understanding is enabled to form a competent judgment of the stake he risks, uninfluenced by any considerations but those of plain facts.

Several districts in this country where an easier mode of conveyance than by the public roads would be advantageous are attended with other objections to the adoption of canals; such, for instance, where seams of

coal have been wrought, and where others are still to work. The chasms formed in the strata where seams have been wrought, in many places even to the surface, will always render the security of canals in such situations, extremely doubtful, independent of the hazard to which a large portion of the property of individuals is exposed, from the great probability of the water of the canal oozing through the subjacent strata to the workings. A consideration of this importance will always raise very serious obstacles to the adoption of that mode of conveyance, however great the projected advantages to the public may be. Having thus slightly detailed the leading features of the proposed mode of conveyance, it seems necessary to give a summary of the probable expense and profits of a given distance, in order to prove that it has not originated in visionary speculation, but stands supported by strong claims to the public attention, arising from evident advantage to the adventurer, upon the best of all principles, that of general utility. A line of canal, lately proposed, having excited very general attention, and furnished the public with considerable information respecting the articles of carriage and the expense of forming the canal, a part of the same line is proposed to be taken to form the present

estimate, namely, from Newcastle to Hexham, as any erroneous principle of calculation may be the more easily detected, and a clearer, more decided, and satisfactory opinion formed of the advantages likely to result from the whole. It is proposed that it should commence at the Turnpike Road, above the West Gate, and to run along the line of the intended canal, except through those objectionable situations which the canal could not surmount, and which this way is expected to avoid by an alternate rise and fall.

First, as to the calculation of one mile of way.

	£	s.	d.
Two yards of metal plate way, for both sides of the road, of the description before mentioned, will weigh 96 lb. at 1½d. per lb.	0	12	0
As the neighbourhood of the line of the road is known to contain quantities of useful stone for the purposes of the way, and the western part amply supplied with wood for sleepers, those are calculated at - -	0	1	0
Finding nails and laying the way - -	0	0	3
Beating, filling, and making foot-ways -	0	0	3
Ballasting - - - - - -	0	0	6
	£0	14	0

1760 yards, at 14*s.* per yard - - -	1232	0	0
Two side-ways, to allow carriages to pass, 140 yards, at 15*s.* per yard - -	105	0	0
	£ 1337	0	0
Making cuts, batteries, bridges, &c.—gates—gate-houses—fencing both sides of the road—materials for cutting the road——Suppose - - - -	163	0	0
Total expense, per mile - -	£ 1500	0	0

The next object to be considered is, the extent of calculation to complete the way to a given point, productive of any considerable profits, in order to give a view of the expected advantages through the different progressive stations of the line, and how far the probable revenue, from those situations, will contribute to the further advancement of the road. This presents itself at Benwell Colliery, where the line passes very conveniently for the conveyance of coals to Newcastle; and there can be no doubt of the whole of the trade from thence being immediately brought upon the way. The distance is nearly two miles, which, at £1500 per mile, amounts to £3000.

The present price of those coals to the consumer is 7*s.* per fother; and supposing 12 fothers the quantity a single horse and man may lead in one day, upon the new way, the value is - - -				4	4 0
Present price of the above 12 fothers at the pit, at 4*s.* 6*d.* - -	2	14	0		
For leading those 12 fothers upon the new way, with a single horse and man, the allowance must be considered very ample at -	0	7	0		
				3	1 0
Saving upon 12 fothers - - -				£1	3 0

Allowing one half of the above saving to the road, or say one shilling per fother, and supposing sixty fothers to be led daily for 265 days, the annual revenue will amount to £795, which is nearly 27 ℘ cent. upon the capital laid out; for it is supposed that the expense of cleaning and supporting the way, with the charge of way-leave to the respective proprietors of the lands, for the liberty of passage, will be defrayed by the carriage of manure, and other articles that may probably pass along the road after its establishment. The general declivity of the greater part of Newcastle, from the Turnpike Road above the West Gate, will admit of a single horse drawing a double-horse cart, or a fother, from the plate-way into the town. And it is proposed

that carts shall be so constructed, that three (the number which one horse will be fully equal to draw upon the plated-way) may be linked together when drawn on the road. The first, or leading cart to be provided with a pair of shafts that may be removed, and attached to the others; so that, on the return of the empty cart to the plate-way, the shafts may be applied to the full one; and so on, until the whole loading is discharged.

Here we find, in the first step, so great a surplus of revenue above common interest, the risk being considered very unimportant, as to afford a large and immediate contribution towards the further progress of the way; and it is conjectured, with great probability, that every additional mile, in extending the road further to the west, will increase very considerably in the carriage of corn, &c. to market, and the return of manure from the town, as the way comes more into the neighbourhood of extensive occupiers, who, on account of the distance from Newcastle, will find it an object of consequence to avail themselves of so cheap and expeditious a conveyance.

I shall, however, fix the next station at Heddon on the Wall, where the line passes within three furlongs of the village. Here another very considerable article of commerce becomes a subject of calculation in the increase of the annual revenue, namely, that of lead; and it is supposed, on this and the preceding line of road, the whole of the upper part of the town of Newcastle

will be supplied with the greatest part, if not all, of its consumption of coals; for, in the former calculation of coals from Benwell, the quantity is only estimated at what it may be supposed that Colliery will find it convenient to work, independent of its sea-sale. The distance of this point from Newcastle, is 7 miles and a half.

As the expense of cuts, batteries, and bridges will be greater on the 5½ miles of road from Benwell to Heddon than from Newcastle to Benwell, an addition of £100 per mile is charged on that account; making the whole expense £1600 per mile, which, for 5½ miles, amounts to - - - - - - 8800 0 0

Expense of the road from Newcastle to Benwell - - - - - - 3000 0 0

Total expense of the road to Heddon on the Wall - - - - - £ 11,800 0 0

The quantity of coals to supply the consumption of the upper part of the town of Newcastle, is estimated, upon a moderate computation, at 32,000 tons annually; and supposing the average distance of those coals coming along the way to be four miles, at 3d. per ton per mile, the annual revenue will be - - - 1600 0 0

The quantity of lead to come upon the whole length of this line, may probably be 3000 tons annually, at 3d. per ton per mile, amounts to - - - - - 281 5 0

Supposing the amount of other carriage upon the way, as corn to market, &c. to be 2000 tons annually, which must be considered very low, at 3d. per ton per mile - - - - - - -	187	10	0
Probable annual revenue - - - £	2068	15	0

It is computed that back carriage, with the carriage of manure, &c. from Newcastle, will be fully equal to way-leaves, and the repairs and support of the road; so that the interest upon the capital laid out, to extend the road to Heddon on the Wall, will be little short of 18 ℘ cent., with a great saving in the price of conveying all the articles.

No particular point presents itself from which much source of revenue is expected to arise, until the line passes the neighbourhood of the Lime Kilns at Corbridge, distant about nineteen miles from Newcastle, by the metal road; and here a very extensive field opens itself to the occupation of this mode of conveyance:—The Corbridge lime to Newcastle for building, and the intermediate country for manure;—the lead from the southern and western lead mills;—the carriers from Hexham and Carlisle;—and corn and grain from a great extent of country, both on the north and south sides of the river, will here be collected into one general store-house, and transported from hence on the road to

Newcastle. Though it may very reasonably be expected that the articles of carriage will increase with the advantages resulting from a greater facility of conveyance, yet, that no representation may be construed into a wish to deceive or mislead, the calculation of the propable revenue shall be drawn from the amount, as nearly as can be ascertained, of the present carriage, with an expectation of such an increase, in quantity, of lime from Corbridge to Newcastle, &c. as must inevitably happen after the establishment of the road.

Eleven miles and a half of road, from Heddon on the Wall to Corbridge, at £1600 per mile - - - -	18,400	0	0
Expense of the road from Newcastle to Heddon on the Wall - - -	11,800	0	0
Total expense of the road from Newcastle to Corbridge - - £	30,200	0	0

PROBABLE ANNUAL REVENUE.

The amount of coals to supply the consumption of Newcastle - - -	1600	0	0

It is computed that the greatest part of the lead from the mills to the south and west, will be brought down to this storehouse, and conveyed along the whole

line to Newcastle. This quantity is estimated at 9000 tons, which, at 3*d.* per ton per mile, amounts to - - -	2137	10	0
As the lead carriages return home, laden with a variety of articles, the back carriage may reasonably be computed at one third of the above sum - - -	712	10	0
The present amount of carriage, between Newcastle and Carlisle, is estimated, on respectable authority, at 10,000 tons annually, the greatest part of which will, in all probability, pass along this road from Corbridge; but say 8000 tons annually, at 3*d.* per ton per mile - -	1900	0	0
Lime from Corbridge to Newcastle, and the intermediate country, may be estimated at 12,000 tons annually; and to give additional encouragement to the use of this article, say 2*d.* per ton per mile, upon an average of 12 miles -	1200	0	0
Coals that may pass upon the road, to Hexham and Corbridge, from the collieries to the east, supposing 4000 tons annually, and the average 6 miles at 3*d.* per ton per mile - - - -	300	0	0
Bark, props, sleepers, corf-rods, and timber of all kinds, to Newcastle and the collieries on the line, supposing 5000			

tons annually, and the average distance 12 miles, at 3*d.* per ton per mile -	750	0	0
Wheat, barley, oats, turnips, and every other article to the weekly markets; suppose 5000 tons annually, and the average distance 10 miles - -	625	0	0

The calculation upon these last articles, is considered much below what will prove to be the real amount; for as the method of ascertaining the quantity is rather uncertain, it is thought preferable to take the lowest scale. The increase from this source of revenue, after the way is completed, will, no doubt, be very considerable, as it will induce the occupiers of large corn farms to send a much greater quantity to so good a market as Newcastle, when one horse will be enabled to draw from Corbridge, as much as generally employs six on the present road. This number the farmer, no doubt, finds it often too inconvenient to spare from the other necessary business of the farm, and therefore contents himself with less profit. The smaller occupiers, whose individual quantity is too inconsiderable for a single horse, will likewise, in all probability, find it expedient to join their stock, to avail themselves of so superior a market, which the present distance and expense of conveyance deprives them of.

Brought forward - - - -	£ 9225	0	0
Manure from Newcastle to the several farms in the neighbourhood of the line, suppose 4000 tons annually, and the			

average distance 6 miles, at 2*d.* per ton per mile - - - - - - -	200	0	0
Probable annual revenue - -	£ 9425	0	0

Having included in the above calculation, every probable source of revenue, it is necessary to state what may be the annual expense of supporting the way, way-leaves, &c., to form a more accurate judgment of the real advantages to the adventurer. Every mile of road is supposed to occupy four acres of ground, which, upon the whole distance from Newcastle to Corbridge, will amount to 76 acres. As several parts of the road must pass through land of an inferior quality, the estimate will, no doubt, be considered very full, at £30 per acre - - - - - - - - - 228 0 0

To clean the road, and to assist in the necessary repairs, one man is supposed to a mile, at 12*s.* per week, which, for 19 men, amounts to - - - -	592	16	0
Salary to a general inspector - - -	50	0	0
Toll gatherers, with materials and tools for the road - - - - -	129	4	0
	£ 1000	0	0

So that the net annual revenue appears to be £8425, which is upwards of 27 ℔ cent. on the capital laid out.

I shall now proceed with the calculation, as proposed,

to the nearest point of the canal to Hexham, which, from Corbridge, by the line of the road, is $3\frac{1}{4}$ miles, at £1600 per mile, amounts to - - - 5600 0 0

Expense of the road from Newcastle to Corbridge - - - - - 30,200 0 0

£ 35,800 0 0

In the calculation of the annual revenue from extending the road to this further distance, few additional articles are expected, except coals, to supply the greater part of Hexham, from the collieries to the east, which may nearly double the quantity calculated to pass upon the line to Corbridge, together with some increase in the articles of wheat, barley, &c. to market; so that the only difference will be the additional charge on the several articles conveyed, proportionate to the further increased length of the road. Though this may not produce quite so high a revenue as the line to Corbridge, yet the amount upon the whole will continue to appear extremely advantageous.

Hitherto the propositions for establishing this mode of conveyance, have been confined to the carriage of heavy articles only, as being more essentially useful; yet it is conceived that the plan may be extended to accommodate the more light and expeditious carriages, such as coaches, post-chaises, &c. Though the advantages to the adventurer may not be so great, yet, as a public

benefit, it merits consideration, particularly as the interest of the sum expended in the execution of the plan, will still continue very ample. To accomplish this end, it is proposed to form two complete ways, with side-ways to each; so that carriages passing from Newcastle to Hexham, shall not be interrupted by those from Hexham to Newcastle, each having distinct ways. Light carriages pursuing the same line of road as the heavy ones, will have little to impede their passage, except occasionally going on to the side-ways, when they happen to overtake any carriage of the latter description; but this is supposed to be of much less moment than the inconvenience of ascending hills in the common roads; and when the greater facility and safety of conveyance is considered, this becomes of still less importance. By this mode of conveyance, it is expected that the present coach which passes daily between Newcastle and Hexham with four horses, and takes four hours and a half, may with two horses travel the same distance in one hour less time. Post-chaises will likewise possess the same advantages. It will be necessary to change the state of the shafts attached to those carriages, for the purposes of the way, but this will produce but little inconvenience.

Should it be necessary to alter, in some degree, the construction of the present carriages, yet, as the friction on the common roads will, in a great measure, be removed, they may be formed of much lighter materials, which added to the greater duration, that consideration

will become an object of little moment. In calculating the expense of the line of the road to Hexham for heavy carriages, a view was had to the probability of carrying into execution a double way, and the estimate of cuts and batteries was made adequate to that expectation, as the additional expense would not be great, and also the value of the quantity of land for two roads.

The expense of this second way is, therefore, calculated at £1400 ℔ mile, which is considered very full.

22¼ miles amount to - - -	31,850	0	0
Expense of the first line to Hexham -	35,800	0	0
Total expense of the double way	£ 67,650	0	0

It will now be necessary to resume the calculation of the annual revenue on the whole line from Hexham, adding thereto such further income as may be supposed to arise from the accommodation of light carriages.

The amount of coals to supply the consumption of Newcastle - - -	1600	0	0
Lead from the mills, south and west of Hexham, 9000 tons, at 3*d.* per ton per mile; say 5*s.* 8*d.* per ton upon the whole	2550	0	0
Bark for the lead carts, one-third of the above	850	0	0
The carriage of articles between Newcastle, Hexham, and Carlisle, 8000 tons, at 5*s.* 8*d.* per ton - - - - -	2266	13	4
Lime from Corbridge to Newcastle, &c. as			

in the former calculation - -	1200	0	0
Coals, to supply Hexham and Corbridge, from the collieries, to the east—Suppose 8000 tons annually, and average distance 9 miles, at 3*d.* per ton per mile -	900	0	0
Bark props, sleepers, &c. as in the former calulation - - - - - -	750	0	0
Wheat, barley, potatoes, &c. 5000 tons, and supposing the average distance 12 miles, as some of the more western farmers will find it more convenient to send their corn to Hexham than Corbridge - -	750	0	0
Manure from Newcastle, as in the former estimate - - - - - -	200	0	0
The calculation of the profits arising from the lighter carriages, must be admitted with caution, as there appears no certain ground on which to form the estimate; yet, considering the advantages that may arise to country people, in bringing their different articles to market, in covered carts or waggons, from Hexham, Corbridge, Bywell, &c., together with the passage of coaches, post-chaises, and riding horses (as, no doubt, many on horseback will prefer this level road to the present uneven one), the amount of the whole it is presumed will not be less than	2000	0	0

Probable annual revenue - - £ 13,066 13 4

Taking from this annual revenue a sum sufficient for the charge of attending the way in repairs, &c., it is expected there will remain a net revenue of £11,000, which is something more than 16 ℘ cent. upon the whole sum expended. To this should be added a consideration for the amount of the revenue, arising from the several stations in the progress of the line, which will tend much to diminish the capital to be expended in the execution of the whole.

The present charge of conveying lead from Hexham, is 1*s.* per pig, or 13*s.* 4*d.* per ton; as one horse will, upon the new way, draw two tons, 2*s.* 6*d.* per ton is supposed fully sufficient for conveying that quantity from Hexham to Newcastle, taking into consideration the advantage of back carriage, so that the saving upon this article will be 5*s.* 2*d.* per ton.

The present charge of the carriage of goods from Hexham, is 3*d.* per stone, or £2. per ton; allowing the most ample profits to the carrier, the saving upon those articles will be full one-half. Though the advantages arising from this mode of conveyance, are in many points inferior to that on canals; yet, in some instances, the preference evidently leans to the metal road, and in none more than in the article of loading and unloading of goods, which on canals must be much more frequent than on this way. The conveniences from this circumstance are too obvious to require to be enumerated.

In a climate where the winters are frequently long and severe, and consequently navigation much obstructed, conveyance of goods upon canals will often meet with impediments which cannot arise upon the metal road. By this certain mode of conveyance, the merchant and manufacturer will avoid those disappointments which must frequently happen from the effect of long continued frosts on canals.

It may be said that the line of road to Hexham is particularly favourable for the adoption of such a mode of conveyance, and few instances will be found equally eligible; yet, if the plan can in any one instance prove to be advantageous to the public, the object of those observations is in a great measure answered.

Report

OF

MR. B. R. DODD, CIVIL ENGINEER,

ON THE PROPOSED CANAL NAVIGATION BETWEEN NEWCASTLE AND HEXHAM.

To the Nobility and Gentry, Landholders, the Proprietors of Mines and Royalties, the Shareholders, and others commercially interested therein.

My Lords and Gentlemen,

Of the many public works which British enterprize and exertion have accomplished at private expense, the numerous navigable canals the last fifty years have given birth to, may, from the immense advantages they have rendered to the agricultural and commercial interests of the country, justly rank amongst the most useful and valuable of all improvements. In the districts where they have been adopted, the happy results are to be witnessed in the increased fertilization and value of the lands they have passed, and in the population, wealth, and prosperity, before unknown, of the towns and villages they have united, substituting for a burthensome land carriage, a conveyance by water of unequalled convenience, cheapness, and certainty: new markets have been opened, whereby the abundance of one place has supplied the deficiency of another; the ponderous ores of lead, iron, &c. before useless, have been wrought, and with abundance

of coals, furnished by the same means unprecedentedly cheap, materially contributed to the comfort of the poor, and to the establishment and present flourishing state of manufactures. And it is pleasing to find, that not only have they produced important national benefits, but, in general, ample and increasing returns to the individuals their proprietors. Such has been found the utility of canals, that a laudable desire to reap their advantages has already occasioned the completion of more than three thousand four hundred miles, and the legislature is annually granting new acts for others. It is, however, to be regretted, that as yet no useful works of this nature are to be found in the most northern counties of England, notwithstanding all that can make canals eminently useful or profitable, as exhaustless treasures of coal, lead, lime, iron, and other heavy articles, are there to be found in unrivalled abundance, only wanting the accommodation of canals to render them valuable to their owners and useful to society.

To enable an extensive district of country thus situated, to participate in the benefits of inland navigation enjoyed by so many other counties, a navigable canal has been proposed between Newcastle and Hexham, to eventually open an inland water communication between the east and west seas, and thence, by way of the city of Carlisle, to Solway Frith, or Maryport.

On the first part of this undertaking, and that more immediately required, viz. between Newcastle and Hex-

ham, agreeably to your request, I have the honour to report, from the surveys I have undertaken, and a due consideration of other circumstances, the following as the most eligible route for the same to pursue. The canal to commence at Stella, to which place the Tyne is navigable for all such boats as will use the canal, then to pass to the westward by Ryton, Crawcrook, Prudhoe, Eltringham, Michley, Stocksfield, Broomley, Broomhaugh, Riding, and Dilston, to Hexham, where many of the south and south-west roads from the lead mines terminating, previous to joining the eastern road to Newcastle, a capacious basin should be formed on the western side, for the particular convenience of the town, and the accomdation of the present and great increase of trade the canal will occasion. The villages on the north of the Tyne, as Newburn, Wylam, Ovingham, Bywell and Styford, may readily communicate with the canal by crossing the different fords, and by means of the bridge at Corbridge. Although I have recommended the canal to commence at Stella, I must observe that a cut of about half a mile, in a line from its entrance, across the Haugh to Lemington, seems very desirable, as it would save a circuitous passage of near two miles round the same; and were the canal brought still nearer to Newcastle, it would increase both the utility and revenue of the concern. This may be effected according to the line laid down on the general plan, either to Dunstan Staiths, or the Redheugh, at both which places there is ample

space for a basin, wharfs, warehouses, &c.; but some deep cutting or quaying off a part of the river for a short distance, will be requisite on account of the rise of the ground at Stella and Bladon. The same thing may be accomplished by cutting a new passage for the river across Lemington Haugh, then filling up the old bed, and continuing the canal as before proposed to Redheugh. According to this plan, *the navigation would be materially benefited by the tide flowing much higher up the river than at present,* and the canal, by passing the Staiths at Stella, as near as the Tyne now does, would afford them the same accommodation.

An ample supply of water, so essential to a canal where the trade will be great, and where, to prevent the inconvenience, delay, and expense attendant on shifting goods, locks are indispensible, may be obtained even from the Tyne itself; and during the driest seasons, from the copious and constantly running streams of Dilston or Devil's Water, Dipton, Stocksfield, Stanley, and other Burns, independent of the produce of innumerable springs descending from the sides of all the hills.

It appearing there is a rise of 104 feet from low water in the tide-way at Stella, as many feet of lockage, or twelve locks of eight feet eight inches' rise each, will be requisite to ascend and descend the same. Their situations are represented on the plan, and nature having provided excellent stone and timber nearly on the spot where seven of the locks will be placed, the cost of building them will be much diminished.

In regard to the dimensions of the locks required, I am of opinion they should be 70 feet in length, and 15 feet in width; as I apprehend this canal will not only be extended to the western sea, and, if the nature of the country permits, to Kendal, but at no great distance, by means of canals now in the course of survey, be united to those of Yorkshire, thus forming a cheap, certain, and uninterrupted inland communication with Liverpool, Manchester, Birmingham, the Metropolis, and most parts of the kingdom;—extensions that will not only greatly add to the value of this concern, but afford numerous and important facilities to trade and commerce. Locks of the above description will admit *two* of the small long boats, such as are used on the Staffordshire canals, usually sixty-five feet in length, and seven in width; or *one* of the large boats used on the Lincolnshire, Lancashire, and Yorkshire canals, of the same length, but fourteen feet in width. On the latter canals, vessels with keel bottoms are frequently used, which are much in the habit of navigating in the tide-way of rivers more rapid than the Tyne, as the Mersey and the Humber, the Ayre and Calder, the Severn and the Thames, also of making voyages coastways, and to the Continent during peaceable times; and as they are so well calculated to pass from one canal to another, and from sea to sea, or to enter the canals of Scotland or Ireland, and the canal under consideration, from the heavy produce that will be conveyed upon it, being likely to become, as

it were, an high road for the tonnage of many others, should be *proportioned to admit the vessels in general use*, for such reasons I shall estimate the same on the capacious scale of 46 feet width at top bank, and 6 feet deep, with slopes as two to three, which will leave 43 feet width at top water level, and 5 feet depth of water.

As keels are, in general, 19 feet 6 inches in width, and 47 feet in length, it is true locks of more width than I have recommended would be necessary to accommodate them; but as coal vessels, *sufficiently strong and capacious*, may be built within the dimensions I have allowed, it seems more proper they should be built suitable for the canal, than that unnecessary expense should be incurred to suit the canal to them.

It is among the favourable circumstances attending this canal, that the supply of water is so ample, and the number of locks fewer than most canals in the kingdom. On the Birmingham and Fazeley canal, at Farmer's Bridge, thirteen locks occur together, and I have seldom witnessed a boat occupy more than three and a half to four minutes in passing each lock. On this canal the trade, particularly in coals, is exceedingly great, and notwithstanding the water for its supply is pumped by steam engines, it pays the proprietors remarkably well.

The length of the navigation from Newcastle Bridge to Lemington is 4 miles, 40 chains.—Cut across the Haugh, 40 chains, 30 links.—Crossing the river to the canal entrance, 3 chains.—Canal from Stella to the pro-

posed basin at Hexham, 16¾ miles. Total length of the river's navigation, 4 miles, 43 chains. Ditto of canal navigation, 17 miles, 20 chains, 30 links. Total, 21 miles, 63 chains, and 30 links.

The greatest part of this line is through a country rich in the extreme, with coal and other heavy articles of tonnage, and admits of many useful collateral branches, by rendering navigable a part of the Team, the Darwent, Stocksfield Burn, Dipton, and Dilston Water, which would shorten the road, or lead to a number of collieries, would introduce lime so much wanted in their neighbourhood, and obtain lead and agricultural produce in return, as well as tonnage from vast quantities of free stone, flag stone, grindstone, and iron stone, abounding in their direction. These will no doubt take place at a future day, but at present I have not calculated on their cost, or the additional revenue they would produce. In the annexed estimate I have pointed out the particulars of the expense of completing the canal, in a substantial, workmanlike manner, according to the dimensions before specified. The best materials and most liberal prices are allowed throughout, such as I can obtain respectable persons, with proper security, to perform the work at, the whole including £15 per cent. on the estimate, or £13,800 for contingencies and unforeseens, amounts to £105,800.

As Mickley Fell is richly stored with coal, having several seams of an excellent quality rising one above another nearly to its summit, some of which are now work-

ed in grooves, the canal, by passing close along its bottom, will be ready to receive the tonnage from these rich sources, and by drainage and furnishing manures, as lime, dung, ashes, &c. at a cheap rate, as well as the means of conveying the produce to the markets of Newcastle and Hexham at one-third the present cost, render the land more fertile and more valuable, and the execution of the canal very desirable to all who may be interested in the proposed inclosure of that extensive common; indeed, all who are possessed of mines or land will be able to appreciate the benefit the canal will prove to their estates, and may look forward to those improvements and that increase in value canals invariably bestow.

The canal will afford an opportunity for the establishment of market and passage boats between Hexham and Newcastle, which, in other concerns, have been attended with much profit and public convenience. The packets will be divided into different apartments, with corresponding prices. Tea, coffee, wines, &c. will be provided for the accommodation of the company, as usual on the Bridgewater, the Chester, the Ellesmere, the Forth, and Clyde canals, the price not more than half the fare by land, and totally free from the dust, heat, and fatigue incident thereto.

The commissioners of Greenwich Hospital are materially interested in the success of this measure, as their estates at Whittonstall, adjoining the route of the navigation, contain immense beds of coal, only requiring the

aid of this canal to be advantageously wrought and sent to market. The timber from their woods, and lead from their mines, in the west, may be cheaply conveyed to Newcastle or Shields by the same means—considerations of much importance, as they would greatly increase the revenues dedicated to the relief and maintenance of our brave, but disabled seamen.

Equally useful will the canal prove to the estates and valuable subterraneous property of his Grace the Duke of Northumberland, at Prudhoe domain, &c. consisting of extensive fields of most excellent coal, which, on its completion, might be wrought and cheaply conveyed, in the same vessels as navigate the canal, to the shipping at Shields; and the more reasonable this indispensible article of life is to be obtained, the greater will the demand for it prove. Could coals be delivered at a lower price, it would induce the consumers to use them more plentifully, and on more occasions: besides, fresh manufactories would be established, and new markets opened, as the quality and cheapness of the article would encourage the expense of sending it to more remote parts of the country, which the dearness and increasing scarcity of other fuel render so desirable.

It is worthy of remark, that of the coals sent from the Tyne to the Wear, at least one-fourth go up rivers and navigable canals to the interior of the country: thus the coal and coasting trades are encouraged by canals, and on them youth are taught the first nautical rudiments, as

the use of the oar, to sail and direct the helm, so training them for the boisterous seas.

I now proceed to notice the numerous and ample sources of revenue, which the *superior convenience, certainty, and cheapness* of the canal carriage, will render it greatly to the interest of the proprietors to avail themselves of. While some public works have been undertaken without due attention to this subject, it is far more satisfactory to lay before the subscribers, from authentic information received of the present carriage, &c. the grounds upon which a prospect of success and liberal remuneration are formed.

The annual average export of Wylam Colliery is 15,000 Newcastle chaldrons of 53 cwt. each, or 39,750 tons, passing 4 miles down the canal, at 3*d.* per ton per mile - - -	1987	10	0
Crawcrook Colliery, when at work, exports near the same quantity - -	1987	10	0
Coal for the use of Newcastle and some neighbouring manufactories, 25,000 tons, passing 7 miles on the canal, at 3*d.* per ton per mile - - - - -	2187	10	0
Coal for the use of Hexham and its vicinity, 3000 tons, passing 8 miles, at 3*d.* per ton	300	0	0
Coal for the inhabitants of Corbridge and its vicinity, and for lime burning, &c. 3000 tons, passing 8 miles, at 3*d.* per ton	300	0	0
Lead passing from Hexham, or places short			

of that, towards Newcastle, 10,000 tons, averaging 17 miles, at 5*d.* per ton per mile	3541	13	4
The present consumption of lime in and near Newcastle amounts to more than 5000 tons per annum, which at 1½*d.* per ton for 13 miles - - - -	406	5	0
Increased demand for the preceding article for manure, which from the cheapness of water carriage, may be expected 5000 tons, 13 miles, at 1½*d.* per ton per mile	406	5	0
Timber for ship-building, 2000 tons, 12 miles, at 4*d.* per ton per mile - -	400	0	0
Corf rods, 1000 tons, 10 miles, at 4*d.* per ton per mile - - - - -	166	13	4
Rail-sleepers, prop wood, &c. for the use of the collieries, and glass crate wood, 5000 tons, 10 miles, at 4*d.* per ton per mile	833	6	8
Grey slate, free stone, and grindstone, with flag stones, 6000 tons, 8 miles, at 2*d.* per ton per mile - - - - -	400	0	0
Goods of various descriptions passing to Hexham, Carlisle, and other parts to the eastward and westward, as grocery goods, wines and spirits, iron, deals and timber, hemp, flax, skins and hides, cheese, candles, soap, hops, tar, oil, grease, dry saltery articles, and manufactured goods in general, 11,649 tons, passing 17 miles on			

the canal, at 6*d.* per ton per mile -	4950	16	6
Articles of the above description that may be left short at sundry places, 2000 tons, 7 miles at 6*d.* per ton per mile - -	350	0	0
Articles from the eastward and westward, as wheat, barley, oats, peas, beans, hay, straw, butter, bacon, hams, paper, linen, cotton, cattle, and vegetables of all kinds, 6000 tons, 17 miles on the canal, at 6*d.* per ton per mile - - - - -	2550	0	0
To return manure from Newcastle, or that which may be brought by the light colliers as ballast, 6000 tons, 10 miles, at 2*d.* per ton per mile - - - -	500	0	0
Revenue from market and passage boats	600	0	0
Ditto for wharfage and warehouse room at Corbridge and Hexham - - -	400	0	0
	£ 22,267	9	10

From which it appears the total revenue will be £22,267 9*s.* 10*d.* per annum—a sum adequate to pay £20 per cent. on 1058 shares, and amply sufficient to warrant a much greater expenditure than the estimate, were it necessary. It is to be observed, that in the above account, few of the items are conjectural or *future*, being mostly the amount of the *present carriage by land;* but it is impossible to contemplate the immense mines

on the line of the canal—the exhaustion of the pits below bridge—the formation of collateral cuts—*the connexion with other canals*—the enclosure of wastes and commons—agricultural improvements, and the extension and consequent increase of commerce, without anticipating, at no distant period, such a revenue as will render the shares of this concern as valuable as those of any similar work this country can boast of.

Hitherto I have considered the canal as extended to Hexham only, and therefore but slightly noticed the great advantages that will result from its final destination or junction with the west sea: but we cannot anticipate such an event, without feeling a conviction of its vast utility; and as friends of our country, desiring the consummation of a plan that will open a direct and cheap communication with Liverpool by sea, and by means of the different canals with the interior of the country and the Metropolis, without exposing trade to the difficulties, the delays, and the expenses of the present system. The intended extension will not only benefit the country it passes through, by supplying coal, and all the necessaries of life, at a cheaper rate, but manure for the improvement of the soil, and the best and cheapest means of conveying the increased product to different markets. It will also enable merchants to trade directly with Ireland, and other ports, which they are now prevented doing with any advantage, from the length and uncertainty of the passage by sea, and the heavy expense

of the carriage by land.* Thus new markets would be opened, the revenue of the canal increased, and the blessings which Hull and Liverpool enjoy from their docks and canals, be experienced by Carlisle, Hexham, and Newcastle, in the establishment of manufactories, and the promotion of their trade, commerce, and prosperity.

I am, my Lords and Gentlemen,

With great respect,

Your devoted humble servant,

BARRODALL ROBERT DODD.

Newcastle upon Tyne,
22d October, 1810.

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* Goods are now conveyed to Newcastle and northern parts from Liverpool, 1st. by the canals to Hull, and thence by coasters to Newcastle, distance about 272 miles: 2d. by a most circuitous passage of 400 miles, by the Forth and Clyde canal, and east coast to Newcastle, exposed to all the difficulties of foul winds, tides, and storms; 3d. from Liverpool to Sandefield, near 110 miles by sea, and from thence 64 miles by land carriage to Newcastle.

Remarks

ON THE GREAT UTILITY

OF

A PROPOSED JUNCTION CANAL, OR RAIL-WAY,

Uniting Newcastle upon Tyne and Carlisle with Liverpool, Manchester, Hull, Derby, Sheffield, Birmingham, Bristol, London, and intermediate Places.

IN most parts of England, and in various parts of Scotland and Ireland, we find canals spreading in every direction, diffusing in their course conveniences and blessings innumerable; but on the borders of Durham, Northumberland, and Cumberland, they all stop short, as though *nature*, not the *indifference* of the inhabitants, forbade the further progress of these indications of superior civilization, public spirit, and national improvement. As latterly a pleasing and very considerable degree of emulation towards the improvement of the country, has been excited throughout Great Britain and Ireland, in which the above counties have largely participated, we may trust, that this reproach will soon be wiped away, and that various improvements, of which the northern part of England appear susceptible, will, ere long, be carried into effect; in which hope, these remarks,

extracted from a letter on the subject by Mr B. R. Dodd, the Civil Engineer, of Newcastle upon Tyne, are now offered to public attention.

As before observed, it was the original and valuable suggestion of the late Mr. Dodd, to effect a junction of the east and west seas, by a canal across the narrowest part of the island, to commence in the Tyne, and pass by way of Hexham and Carlisle, to Solway Firth, or Maryport; but the writer begs to repeat an opinion, that, in addition to this, and to afford the accommodation which trade and commerce requires, a junction should be effected with some of the southern canals, by a branch from near Hexham, carried as near as may be in a S. W. direction, to the Lancaster canal at Kendal; or in a southern direction to the Leeds and Liverpool canal, north of Skipton; or possibly in a S. E. course to Ripon, in Yorkshire. The precise and most eligible route must depend on the features of the country, the supply of water, and other circumstances to be determined by actual survey; but until the contrary is shewn, we may presume that, by some of the expedients to which the Civil Engineer could resort, and the vast importance of the subject would justify, the proposed junction could be effected with facility and advantage.

The distance to be paid for, whether by canal, or railway, is, from Newcastle to Solway Firth, 76 miles. From Solway Firth, vessels would have to coast to Liverpool, a distance of about 110 miles, exposed to

much uncertainty from contrary winds, tides, and storms.* This, by the proposed line, they would entirely avoid; which would, at the same time, *unite the great trading towns and ports of Lancaster, Liverpool, Manchester, Sheffield, Birmingham, Hull, Bristol, and London,* and by means of canals *already completed,* form a cheap and uninterrupted communication with the *interior,* and all the principle *manufacturing towns and sea-ports in the kingdom;* so that a vessel of 40 tons and upwards passing from London, Manchester, or Liverpool, *inland,* to Newcastle or Carlisle, and without *breaking bulk,* would become a gratifying and common scene.

On this proposition, an intelligent merchant of Newcastle has remarked, "that the most extensive advantages both to our foreign and domestic trades may be expected to accrue from it; and an immense carriage is sure to be derived, as the hardware from Birmingham and Sheffield, the pottery ware from Staffordshire, the cheese from Derbyshire, Warwickshire, and Cheshire, the Stourbridge clay for our glass-houses, and many other most important articles of consumption here, would un-

* The ascertained distance of the proposed canal, or rail-way, from Newcastle to Hexham, is 21¾ miles; and the distances taken in a right line, are, from Hexham to Kendal, about 48 miles; Hexham ditto to the nearest point of the Leeds and Liverpool canal, north of Skipton, 61 miles; and from Hexham to Ripon about 54 miles. In the absence of surveys, or correct data, to each of these distances may be added from 5 to 10 miles for circuity in obtaining eligible route and levels.

doubtedly embrace this line of conveyance, from the great advantage of their being brought forward in the same craft from the places of their original shipment. In return, the greatest part of our manufactures and native produce, which are now shipped for Hull and Gainsbro', and unshipped there for the inland counties, would be taken direct to their destination. Our foreign trade would also unquestionably be greatly benefited and enlarged. Extremely well situated for the trade of the Baltic and Continent, our port would become a depot of all their produce for the supply of the *interior*. Ships would prefer discharging at this before other ports on the east coast, from the certainty of always obtaining a loading here, either foreign or coastwise. The trade to Liverpool, to ports on the west coast, and to Ireland, from which we are at present nearly excluded by the circuitous passage, would then be open to us.

Although in the foregoing remarks, a *canal* has been considered as the medium of conveyance, yet much of the reasoning will apply to the advantages resulting from a *rail-road*, should, from a survey, the mountainous nature of part of the country, the expense, or other causes, render that the most eligible mode of conveyance. The happy result of this contemplated measure would not only prove highly advantageous to the country it would pass through, and the canals, &c. it connected with, but would increase the utility, and enlarge the profit of the proposed Newcastle and Carlisle rail-way, or canal,

(whichever may be carried into effect,) as well as obtain the certain support and influence of numerous companies and individuals, whose navigable canals and rivers, or projected rail-roads, stretch from Kendal and Ripon to the Thames at London, branching off in their course to every manufacturing town and sea-port of any consequence throughout the kingdom; but it were impossible to detail all the apparent advantages of the proposed measure at this time, we shall, therefore, conclude with the observations of another gentleman, well qualified, from the nature of his commercial transactions, to offer an opinion on this subject; who observes:—

"The lead trade to Liverpool, both manufactured and "in bars, would be greatly augmented. The carriage "from the mines, and freight by way of the Pentland "Firth, very often excluding the article from the Liver-"pool market, which would take off an immense quantity "if a canal passed from Hexham into Westmoreland. "The West India and North and South American pro-"duce would then come at an easy expense, with a cer-"tainty as to time, to Newcastle; and as sugars, rums, "coffees, tobacco, &c. can often be bought at Liverpool "much cheaper than in London, our merchants would "be able to get their supplies from thence when the "markets suited; whereas, at present, they are com-"pelled to buy in London, the passage, either north or "south about from Liverpool, being so long and cir-"cuitous. For the same reason we are almost excluded

" from the produce of the whole of South America, coast " of Africa, and the Mediterranean. Liverpool, being " the principal entrepot from those places, the ships dis- " charge their cargoes there; and the expense and un- " certainty of a marine conveyance round here, prevent " our obtaining them, which would be removed by the " rail-road, or canal, as the case may be. These are " but a few of the innumerable advantages to be de- " rived from such communication; indeed, I conceive it " scarcely possible to make any calculation of the im- " mense traffic, which such facility of conveyance would " open out."

Summary

OF THE EXPENSE OF FORMING A

BARGE CANAL, A SHIP CANAL, AND A RAIL-ROAD,

Between Newcastle upon Tyne and Carlisle,

ACCORDING TO VARIOUS ESTIMATES WHICH HAVE BEEN MADE.

BARGE, OR BOAT CANAL.

The estimate of Mr. B. R. Dodd of the proposed canal on the south of the Tyne, from Stella to Hexham, 16¾ miles, is £105,800;—say £6,300 per mile. From the proposed basin at the Redheugh to the canal basin at Carlisle, the distance is 64½ miles,* forming the approximate sum of £406,350; or commencing at Stella, 5 miles from Newcastle, (to which place the Tyne is navigable,) the cost of the barge canal would be £374,850

SHIP CANAL.

Mr. Chapman's approximate estimate for a ship canal, from the Redheugh to the basin at Carlisle, is £888,017. To this calculation Mr. Josias Jessop, who was employed

* Five miles less if vessels enter at Stella.

to examine the line and revise Mr. Chapman's estimate, made material corrections. First, he found it necessary to *deduct* £58,500, overrated for the masonry of the locks; and, second, to *add* £259,480, which sum at least, he observes, would be required for puddling one-half the canal, *without which process it would not hold water.* These important alterations make an addition to the estimate of £200,980. The total expense of the ship canal would therefore be - - £ 1,088,997

RAIL-ROAD.

Mr. Chapman's approximate estimate of a rail-way from Newcastle to Carlisle, distance as before, is £252,488. To this Mr. Jessop added £40,000 for improving the foundation of the rail-road, and on account of the rise in the price of iron: thus making the total expense of the projected rail-road - - - - £ 292,488

FINIS.

G. ANGUS, PRINTER.