Report of a Survey and Estimate for a Rail-road from Waterville to Bangor, Maine

Edward Appleton
PENOBSCOT & KENNEBEC RAILROAD.
REPORT

OF A

SURVEY AND ESTIMATE

FOR A

RAIL-ROAD

FROM

WATERVILLE TO BANGOR,

MAINE.

BY EDWARD APPLETON,
Engineer of the And. and Ken. R. R.

WATERVILLE:
E. MAXHAM, PRINTER....‘MAIL’ OFFICE.
1848.
To the President and Directors of the Androscoggin and Kennebec Railroad.

Gentlemen,—

During the past winter, according to your directions, and in compliance with the request of the inhabitants of Newport and the intervening towns, who contributed to the expense, a survey was made for an extension of your railroad from Waterville to Newport. Upon the completion of the survey to that town, the citizens of Bangor desired that it should be extended to that place, and it was accordingly done at their expense. We have now, therefore, a survey of a route for the entire distance from Waterville to Bangor, which can be adopted, if desired, by the company to be organized under the charter of the Penobscot and Kennebec Railroad.

Upon glancing at the map of the State, it is evident that a direct line from Waterville to Bangor must encounter many obstacles. Many streams appear to have their sources in this region, and the formidable hills in Dixmont and the neighboring towns are well known to travellers. But a little farther north, we observe the head waters of the Sowadabscook, (which empties into the Penobscot a little below Bangor,) approaching very near to the east branch of the Sebasticook, a tributary of the
Kennebec, emptying into it at Winslow, opposite Waterville. It would seem probable, from this inspection of the map, that by ascending the valley of one stream, and then crossing over into, and descending, the valley of the other, a very favorable line for a railroad might be obtained. It is this route, so well defined by nature, which we have followed in the present survey, and it proves to be a remarkably good one.

The whole distance from the Kennebec River at Waterville to the wharves at Bangor is 54 1-4 miles. Of this distance, four-fifths consists of straight lines. The remainder consists of curves, generally of 4000 or 5000 feet radius; but in no case will a shorter radius than 2000 feet be requisite. As to grades, the steepest inclination found necessary is 39.6 feet per mile. Out of the whole length, 14 3-4 miles are level; 4 1-2 miles, from 10 to 20 feet per mile; 7 1-4 miles, from 20 to 30 feet per mile; and the remainder from 31 feet to 39.6 per mile. The longest continuous ascent at the maximum rate of inclination is 3 miles, occurring in the ascent from tide water at Bangor to the high table land back of the city.

The most expensive portion of the route is at the western end, including, as it does, the bridge across the Kennebec River at Waterville. Four different lines for crossing the river have been examined; one at Rock Island, immediately above the Ticonic Bridge; one at the College Rips; a third at Bacon's Narrows, immediately above the Colleges; and the fourth at Kendall's Mills. Of these, the third is much the best. The river at this point, is contracted into a narrow channel, with rocky banks on each side. A bridge can be thrown across of a single span of 200 feet between abutments; thus avoiding the necessity of building a pier in the middle of the river, exposed to the full force of the freshets, and the ice and timber which they bring down. The ledge upon each side is above the ordinary height of the water, so that the foundations can be prepared with very little trouble. At no other place are these advanta-
ges found. I have made the following estimate of the cost of this bridge, viz:—

2082 yards of masonry, at $7 per yard, $14,574.00
280 yards " " at $3 per yard, 840.00
220 feet Truss Bridge, at $17.50 per foot, 3850.00

$19,264.00

The general level of the country on the east bank of the Kennebec River, is much higher than the western side; and the ascent to this level requires a considerable amount of excavation. In some places the ledge evidently rises very near to the surface; in others there are no signs of it. Upon the route selected, we are able to take advantage of the valley of a small brook in rising to the high land, and the line can be so adjusted to the sides of it as to avoid all ledge cutting, and also to diminish materially the amount of earth excavation indicated by the preliminary line now run.

After reaching this high level, the surface of the country is generally very smooth. In some parts, to overcome long swells, we make use of the maximum rate of inclination; but there is neither excavation nor embankment, from Sebasticook to Newport, more than 20 feet in depth, and but a small quantity of that. The general direction of the line, on this part of the route, is north-east; and it is brought within about half a mile of all the villages it passes; viz., Sebasticook, Clinton, Burnham, Pittsfield, and Detroit. At each of these villages the water power is already brought into use; and between them there are many more sites on the Sebasticook, which will without doubt be soon occupied. At Clinton and Pittsfield, large quantities of lumber are annually manufactured, which would form an important item in the freight of the road. At Burnham and Detroit are large tanneries, and at Newport several kinds of manufacturing are carried on.
At Pittsfield, we cross the western branch of the Sebasticook, about a quarter of a mile below the mills, by a bridge 120 feet long. At this place, another route was spoken of, crossing the river about half a mile above the mills, at a place called the Douglas Ledges. This route would probably be somewhat longer than the one surveyed, but it would better accommodate the towns of Hartland and St. Albans lying farther north, and deserves a thorough examination prior to a final location. It would probably come almost as near Detroit as the present line, as it is necessary to approach Newport village nearly on the line now surveyed.

Newport is a village of some importance, at the southern extremity of a large pond, from which issues the eastern branch of the Sebasticook river. Thirteen miles north of Newport is Dexter, a large manufacturing town, to which, at the request of its inhabitants, a branch line from Newport was surveyed, and found to be feasible; and it is said by some, that the most practicable route to the Barnard Slate Quarries and the Katahdin Iron Works, is by way of Dexter and Dover; but this of course must be demonstrated, when the proper time arrives, by surveys.

Crossing the eastern branch of the Sebasticook at Newport village, by a bridge about 100 feet long, the line then curves to the south, passing near the south cove of the pond, and then passes over the summit between the waters of the Sebasticook and those of the Sowadabscook. This summit region, in the north-east corner of Etna, abounds in ledge; but we succeeded in obtaining a very good line through it, requiring no long planes of the maximum rate of inclination, and but a small amount of ledge cutting. Passing along the south-western shores of Carter's Pond, and Etna Pond, the line then enters the valley of the Sowadabscook, which it follows for some distance, crossing it three times by bridges, (not very costly ones, however,) and twice where the course of the stream can be
changed, and the expense of bridges thereby saved. The line passes near Etna village, near Emery's, Fuller's, and Chamberlain's Mills, on the Sowadabscook, and crossing the Carmel road a little north of that village, proceeds in nearly a direct line to Hermon Pond, crossing the Sowadabscook for the last time near its entrance into that Pond. The line then continues along the northern shore of Hermon Pond, and thence in a direct course to a point near the Steam Mill, on the road from Bangor to Carmel, at the outlet of the Great Bog. Hermon village is about a mile north of the line. From the Steam Mill above named, the line tends more to the south, approaching the Penobscot River in the northern part of Hampden; thence curving to the north, it enters the city of Bangor near Dennett's cove, with such a direction and grade, as to allow of the track being readily extended along all the wharves of the city, up to the mouth of the Kenduskeag.

The route from Newport to Bangor, requires more excavation and embankment, for the formation of the road-bed, than the equal distance from Sebasticook to Newport; but in comparison with other roads, the quantity is rather below the average. There are no expensive bridges on this section, and not a very large amount of masonry. The approach to the city of Bangor, is, I think, eminently favorable. It is all-important to a road connecting Bangor with the interior, that it should be able to reach the wharves at deep water, and thus discharge and receive freight at once, to and from the vessels. No other entrance into the city affords equal facilities. The valley of the Kenduskeag passes through the central part of the city, is of rapid descent and contracted width, and towards its mouth is lined with buildings and stores. And any road approaching from the north, must interfere with streets and buildings, and must cross the mouth of the Kenduskeag, before reaching the wharf accommodations at deep water, which are secured at once by the route we have surveyed.
The completion of this road in connection with the Andros-coggin and Kennebec, and the Atlantic and St. Lawrence Railroads, secures an unbroken line of railroad communication, extending through an interior country rich in agricultural resources, and having an inexhaustible amount of water power for manufacturing purposes, and terminating at either end at a seaport renowned for its enterprize and successful commerce; thereby affording an excellent market for the produce of the country, in whichever direction it may be carried. And the completion of the St. Lawrence Railroad to Montreal, will undoubtedly bring upon the line of road we have been considering, a vast additional amount of business, in the transportation of nearly all the supplies of flour, &c., for the State of Maine, from the rich fields of the Western States, in preference to the more tardy and circuitous route by water, hitherto employed.

The charge of this survey was entrusted to Mr. A. W. Wildes, who has conducted it with much skill and ability; and to his valuable assistance in the preparation of the plan and estimates, I am also highly indebted.

The land damages upon this line must be very small. For a great part of the distance, it lies just back of the cleared lands of the farmers, and in passing through villages it interferes with very few buildings or house-lots. Indeed, in many places we were assured that the land would be freely given.

The estimates subjoined are based upon the line actually run, without making any deductions for the improvements of which the line is evidently capable. I am confident that a locating survey will considerably reduce the present estimate. As the proposed road from Belfast to Waterville will probably follow the same line for the first six or eight miles east of Waterville, this portion of the road might be built by either company and the use of it hired by the other.

The road-bed is to be 15 feet wide at top on embankments, and 25 feet wide at grade in the cuts, with the usual slopes of
1. The quantity of rock allowed for in the estimates is considered to be ample. The earth formations on the line surveyed are generally clay or clayey gravel. The embankments considerably exceed the excavations, enabling us to lay the road-bed high above the surface; and as so large a share of the earthwork will be borrowed, the price will probably be less. No road, in a country so subject to the action of frost as this is, can be kept in good order without a copious dressing of sand or gravel. We find some reservoirs of this material, though not so frequently as would be desirable. It will be necessary to put on this dressing with an engine and cars after the track is laid, and for this purpose I have made an allowance of $1000 per mile.

The estimate for superstructure is for either an H or a bridge rail, weighing about 63 lbs. per yard, or 100 tons per mile; to be laid on cedar sleepers 8 feet long and 6 inches thick, placed about 2 1/2 feet apart from centre to centre. The rails to be secured at the ends by cast iron clasp chairs, weighing about 24 lbs. each. The price of rails is very variable, and if estimated at the current price now, it would be no standard three months hence. I shall at this time estimate them at $60 per ton, which, though higher than the present price, is certainly not above the average.

In regard to the running furniture of the road, I have made an estimate sufficient for a large business. For a few years at the commencement, a smaller amount will suffice, but the business of the road will rapidly increase, and after the connection with Montreal is completed, the stock of engines and cars must be very much enlarged.

The foregoing report, and the following estimates, are respectfully submitted by

Your obedient servant,
EDWARD APPLETON.

WATERVILLE, May 1st, 1848.
## ESTIMATES

*Estimate from Waterville to Sebasticook, 3 miles.*

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge across the Kennebec</td>
<td>$19,264.00</td>
</tr>
<tr>
<td>165,000 yards of earth, at 18 cents</td>
<td>$29,700.00</td>
</tr>
<tr>
<td>759 yards of culvert masonry, at 2 dolls</td>
<td>$1,518.00</td>
</tr>
<tr>
<td>300 yards bridge masonry, at 3 dolls</td>
<td>$900.00</td>
</tr>
<tr>
<td>1 Road Bridge</td>
<td>$200.00</td>
</tr>
<tr>
<td>24 acres clearing, at 15 dolls</td>
<td>$360.00</td>
</tr>
<tr>
<td>100 rods grubbing, at 1 doll</td>
<td>$100.00</td>
</tr>
<tr>
<td>3 miles gravelling, with engine, at $1000 a mile</td>
<td>$3,000.00</td>
</tr>
</tbody>
</table>

$55,042.00

*Estimate from Sebasticook through Newport, 26 miles.*

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>361,000 yards of earth, at 20 cents</td>
<td>$72,200.00</td>
</tr>
<tr>
<td>4,000 yards of ledge, at 1 doll</td>
<td>$4,000.00</td>
</tr>
<tr>
<td>2,100 yards of Culvert Masonry, at 2 dolls</td>
<td>$4,200.00</td>
</tr>
<tr>
<td>3,100 yards of Bridge Masonry, at 3 dolls</td>
<td>$9,300.00</td>
</tr>
<tr>
<td>Bridge across West Branch Sebasticook, at Pittsfield</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>“ East “ at Newport</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>3 Road Bridges, at 200 dolls</td>
<td>$600.00</td>
</tr>
<tr>
<td>3 Brook Bridges, at 100 dolls</td>
<td>$300.00</td>
</tr>
<tr>
<td>246 acres clearing, at 15 dolls</td>
<td>$3,690.00</td>
</tr>
<tr>
<td>36 acres grubbing, at 160 dolls</td>
<td>$5,760.00</td>
</tr>
<tr>
<td>26 miles gravelling with engine, at $1000 a mile</td>
<td>$26,000.00</td>
</tr>
</tbody>
</table>

$129,550.00
Estimate from Newport to Bangor, 25 1-4 miles.

454,000 yards of earth, at 25 cents, .................................................. $118,500.00
23,000 yards of ledge, at 1 dollar, .................................................... 23,000.00
3,050 yards of Culvert Masonry, at 2 dolls. ...................................... 6,100.00
1,750 yards of Bridge Masonry, at 3 dolls. ........................................ 5,250.00
1 Brook Bridge, ................................................................. 100.00
1 Road Bridge, ................................................................. 200.00
3 Bridges across Sowadabscook River, ............................................. 2,700.00
140 acres clearing, at 15 dolls. .................................................... 2,100.00
16 acres grubbing at 160 dolls. ..................................................... 2,560.00

$155,510.00

Estimate of One Mile of Superstructure.

2,100 Sleepers, ot 25 cents each, .................................................... $525.00
600 Chairs, 24 lbs. each, at 3 cents per pound, .................................. 432.00
4,500 lbs. Spikes, at 4 1-2 cents per pound, ..................................... 202.50
100 tons of Rails, at 60 dolls. ...................................................... 6,000.00
Laying track and distributing materials, ........................................... 350.00

$7,509.50

To provide a sufficient length of Side Tracks and Turn Outs, 60 miles of superstructure will be necessary, ..................................................... $450,570.00

Buildings, and other Fixtures.

2 Turn Tables, at 800 dolls. ......................................................... $1,600.00
2 Engine Houses, at 1,500 dolls. .................................................... 3,000.00
1 Passenger Station, at 3,000 dolls, 1 at 1,500 dolls. ......................... 4,500.00
8 " " at 500 dolls. ................................................................. 4,000.00
1 Freight House, at 1,500 dolls, 1 at 1,000 dolls. .............................. 2,500.00

$15,600.00
Fencing will be required at present on less than half the distance — say 25 miles — at 75 cents per rod, or 480 dollars per mile, $12,000.00

Recapitulation.

Waterville to Sebasticook, grading, masonry and bridging, $55,042.00
Sebasticook to Newport, do. do. do. 129,550.00
Newport to Bangor, do. do. do. 155,510.00
60 miles of Superstructure, 450,570.00
Buildings, &c. 15,500.00
Fencing and land damages, say, 20,000.00

$826,272.00

Add 10 per cent. for superintendence and contingencies, $908,899.20

Equal to 16,756 dollars per mile, on 54 1-4 miles.
Grading, masonry, and bridging, alone, will be equal to 6,269.00 dollars per mile.

Estimate of Running Furniture.

5 Engines, at 7000 dollars each, $35,000.00
6 Passenger Cars, at 1,800 dollars each, 10,800.00
3 Baggage Cars, at 500 dollars each, 1,500.00
30 Freight Cars, at 300 dollars, 9,000.00
30 " at 500 dollars, 15,000.00
3 Snow Ploughs, at 500 dollars, 1,500.00
12 Hand Bars, at 75 dollars, 900.00

$73,700.00