



Green 1868.

The Bangor and Piscataquis Railroad, as located and now constructed, commences at a junction with the European and North American Railway, at Old Town, Maine, twelve and one half miles from the city of Bangor, and runs thence, northerly, across an arm of the Penobscot river, and between Birch and Dead streams, through the towns of Old Town, Alton and La Grange; the line then trends to the westward, passes through the southern portion of Orueville, crosses the Piscataquis river, and follows closely its northern bank, through the towns of Milo, Sebec and Dover, to the present terminus in Foxcroft. It is intended, at some future day, to prolong the road to Moosehead Lake, and possibly beyond to Canada.

The gauge is five feet six inches, (5'6") corresponding with that of the E. & N. A. Ry and the Maine Central Railroad, its connections.

The preliminary survey was made in the months of November and December, 1867, under the direction of Col. A. W. Wilder, Chief Engineer, and the estimate of cost was then prepared. The estimate for the total line was \$861,743.92, and the principal quantities computed were as follows, viz.:-

Length of Road,	40 miles.
Earth Excavation,	441,792 c. yds.
Rock " "	6,678 "
Embankment,	468,556 "
Bridge Masonry, 1st. Class,	2,836 "
" " 2 ^d "	1,562 "
Culvert " & Cattle Guards,	5,710 "
Rip Rap,	3,000 "
Truss Bridging,	1,310 linear ft.
Also, Fencing, Right of Way, Depot Buildings,	

Road Crossings, Ballasting, Superstructure, Engineering, &c.

The road was let to the contractors, under this estimate, on June 5, 1868; and, in the contract, they agreed to furnish materials, make and finish it, in the most substantial and workmanlike manner, for a first class railroad, from its terminus in connection with the European and North American Railway in Old Town, to its northern terminus in Foxcroft, excepting passenger and freight stations, engine houses, turntables, wood sheds, water tanks, pipes for supplying said tanks, road signs, right of way, and fencing, for the sum of seven hundred and eight thousand, seven hundred dollars (\$708,700.), the road to be completed on or before the last day of November, 1869.

The location survey was commenced in the latter part of June, 1868, and the contractors immediately commenced work. The survey was prosecuted under the direction

of Col. A. W. Wildes, Chief Engineer, and under the immediate supervision of Luther H. Eaton, Resident Engineer. The location adhered quite closely to the preliminary survey over the greater portion of the line, and the character of the work agreed nearly with that found on the previous survey. In some places the line was straightened, and the amount of work, for the whole line, was somewhat lessened. The location survey was concluded September 4, 1868.

The tract of country, occupied and passed through by the line, is of a character favorable to easy construction, the earthwork being, generally, very light. Few cuts exceed ten feet in depth, and these are of short extent.

Through the towns of La Grange and Alton there stretches a gravel formation of marked shape, called by the townspeople a "horseback", and said to be a moraine. While somewhat winding, its general direction is north, and on each side are extensive bogs.

The same formation is also found on the eastern side of the Penobscot river, higher up than on the western side. Prof. Agassiz, I have been informed, at one time felt sufficient interest in the matter to visit this section, and pronounced this ridge to have undoubtedly been formed from the debris of a glacier.

At a point in Allow the line passes through this horseback, by a cutting of twenty two feet at the deepest point, and its structure is there exposed to view. It consists of different, nearly parallel, layers of sand, gravel, small pebbles and larger stones, each distinct, the stones smooth and round, packed closely together, and, as seen in the cutting, sloping at an angle of about forty five degrees. The railroad, after passing through the horseback, follows closely its general course, for some miles, in order to avoid the bog which lies on the other hand. Gravel of good quality for ballast is obtained

from the ridge.

The curvature of the road is light; in thirty five consecutive miles no curve exceeds two degrees, radius 2865 ft., while many are lighter. There are a few curves of three and four degrees at each end of the line, one of eight degrees thirty minutes, and one of ten degrees at the junction with the E. & N. A. Ry., four hundred and fifty feet long. The longest tangent is two miles, with two more of nearly that length. The ruling gradient is one in one hundred.

The road-bed, when finished and at grade, was required to be fifteen feet wide in embankments, and twenty feet wide in earth and rock excavations, the ledges to be taken out to a slope of one fourth to one. The work was built to sub-grade, two feet below grade, unless the material was of a sandy or gravelly nature, when the formation approached more or less nearly to grade, ac-

according to the fitness of the earth excavated, for ballast. The ballast was required to be twelve feet wide at grade, giving one ^{half} foot shoulder at each end of the sleepers, and one and one half feet shoulder at subgrade. The line was cleared to a width of six rods, and all stumps were removed, (grubbed out,) where the cuts or fills were less than three feet deep to grade.

During the summer and fall of 1868, the work of grading was pushed rapidly on, and was continued, during the ensuing winter, in cuts deep enough to go below frost. The third class, or culvert, masonry was also in progress. The principal ledge cutting, near Old Town, containing twenty five hundred cubic yards, was commenced in November, 1868, and finished in April, 1869. The rock was slate, as were all the ledges encountered on the line, and was full of seams and water, which rendered it a difficult ledge to excavate. Dynamite and electricity were

here tried ^{in blasting} with good results. The ledges in Milo and Dover are stratified in thin sheets, and in that vicinity are many quarries which produce a good quality of roofing slate. This article of freight was largely counted on by the projectors of the road as a source of revenue.

The abutments and piers required, at the arm of the Penobscot river, for three bridges, were commenced as soon as the river was frozen strongly enough to bear teams, and were essentially completed in March, 1869. They were built of granite, laid dry, quarry faced, in courses of from eighteen inches to two feet rise, and were required to be first class masonry. Their average height was fourteen feet. The piers were put in through the ice, on a gravelly bottom, and the depth of water, during the winter season, varied from three to six feet. In two cases cribs of hemlock logs were used, where the water

was from six to ten feet deep, the timber not coming above low water mark. The bases were all enlarged two and one half feet on each end and side, and protected, where necessary, by rip-rap.

The abutments were of T form, having a bridge seat of twenty two by seven feet, with a batter of one inch to one foot on the face and ends, and of one and one half inches to one foot on the rear. The tail was built with perpendicular sides and end, was eight feet wide, and about sixteen or seventeen feet long, according to the height of the fill, it being designed that the foot of the earth slope should reach the middle of the end of the abutment. The tail was finished by a one foot course of coping, projecting one foot.

The piers were of rectangular plan, having the same sized bridge seats as the abutments, (excepting two piers, supporting a one hundred and eighty feet span, whose

thickness was increased to nine feet,) and battering one inch to one foot on three sides, and, on the up stream side, six inches to one foot.

The superstructure, Howe truss, was framed during the winter, and erected as fast as the masonry was completed, the last span going on in March. Common scaffolding was used for false bridging. The spans are as follows, viz.:—Beale's Rips bridge, two spans of one hundred twenty five feet each; Orsow Island bridge, two spans of one hundred fifty feet each; and Black Island bridge, two spans of one hundred feet each, one span of one hundred and eighty feet, and one span of one hundred and thirty one feet. They all carried the track on the lower chords. The spans were cambered from three to seven inches, varying with their length, and the top chords were continuous over the piers.

The smaller bridges, over

brooks, are eight in number, of spans from twelve to twenty five feet, and are either simple stringers or, for the longer spans, triangular trusses. The abutments are of second class masonry, and are, in some cases, of T form, and, in others, wing abutments, the wings making an angle of thirty degrees with the face, and having the same batter as mentioned before.

The bridge at the Piscataquis river, near Freeman's ferry, in Milo, was built during the summer of 1869; the superstructure is a Howe truss, single span of one hundred sixty feet, also a through bridge, and rests on abutments about twenty feet high. These abutments have curved wings, convex towards the stream, and subtending an angle of thirty five degrees. They are built of granite, laid dry, battering one inch to one foot on the face, seven feet wide on the bridge seat and ten feet wide on the foundation, all the stones,

with the exception of the top courses, having two feet rises, and the wings being stepped in accordance. These abutments are the best constructed masonry on the line. During the erection of the superstructure, much trouble, delay and expense was caused by two severe freshets, in quick succession, which, in the first instance, carried away the false bridging before the chords were on, and, in the second case, swept out a portion of the horses from one side, leaving the bottom chords, which had just been packed, in a dangerous position, unsupported for about sixty feet of their length. No damage was done them, however.

The open culverts were built with straight walls, and the box culverts had wings at right angles to their axes. Culverts generally had openings of three feet by three feet, with walls three feet thick; four feet by five feet culverts had

walls four feet thick. The covering stones, in the first instance, were one foot thick, and, in the second, eighteen inches, lapping on the walls, at each side, at least one foot. Cattle guards had four feet openings and walls three feet thick. They, as well as the open culverts, were built to within one and one half feet of grade, allowing for a three inch wall plate, a twelve inch by twelve inch stringer, and a three inch hard wood tie, grade being the face of the tie. All culverts, and also cattle guards where a flow of water might be expected, were paved, with paving one foot thick, extending under both walls, and protected at each end by a curbstone. The culvert masonry was either of granite or slate stone, whichever was the more readily procured. Where ^{one} ~~a~~ four feet by five or six feet culvert would not carry the water, two were put in, side by side. There were no arched culverts

on the line.

One large culvert, to admit back water, in case of freshets, to a portion of a bend of the Penobscot river cut off by an embankment, was built of slate stone from the ledge excavation near by. It had an opening seven feet wide, ten feet high, walls five feet thick, with wings, and overhanging at the top one and one half feet on each side, thus reducing the clear span of the covering stone to four feet. The opening was large, partly to admit of the running of logs through it. The foundation was mud, and the walls and opening were underlaid with large flat stones. The culvert has been built a year, and shows no signs of settling.

The second class bridges are also paved and curbed in a similar manner to the culverts, and are faced with granite.

The company agreed with the contractors to supply the latter with rails at seventy eight dollars per ton, and, by personal care and stipulations as to materials, piling and inspection, they secured a first rate article of Welsh rails, furnished by the Guest and Rhymney Works, through Messrs. Dabney, Morgan & Co., of New York. They are of I section, three and one half inches high, and weigh fifty six pounds to the yard. The joints are made with fish plates, two bolts to each rail. The contractors commenced laying iron June 4, 1869, at Old Town, and proceeded, with some interruptions and delays, to the northern terminus which they reached November 26, 1869.

The ballast was almost entirely hauled by trains, commencing with two trains in June and latterly three being at work, although one of them was occupied a portion of the time in hauling iron. Ballasting was continued until

the expiration of the contract.

The sleepers are generally of cedar and hackmatack, with a few of brown ash, are nine feet long, six inches thick, six inches face, and are laid ten in twenty four feet. The rails are in twenty one and twenty four feet lengths.

Embankments lying along the bank of the river are protected from washing by a coating of rip-rap.

My connection with the B. & P. R. R. began July 21, 1868, when I joined the locating party as leveller, and ran levels over five miles of the line, commencing at Old Town, and, from La Grange, twenty miles to Foxcroft; also, over eight miles of trial line. On completion of location, September 4, 1868, I was put in charge of the upper section, from the Piscataquis bridge to Foxcroft, thirteen miles. While here I re-located two and one half miles of the line.

December 7, 1868, the company discharged one of the three assistants, and, transferring me to Bangor, put me in charge of the first division, Old Town to La Grange, twenty miles. During the laying of the iron, I had charge of the same, as also of the grades and the ballasting, until the iron had reached the seventeenth mile; I set grades for twenty eight miles, and attended to the ballasting until the close. I left the road December 11, 1869. Having had a good opportunity for becoming acquainted with the details of the greater part, if not the whole, of the line, I might perhaps have gone further into particulars, but I have not now access to the plans and other sources of data.

The road was opened to the public in the early part of December, and was taken off the contractors' hands. The first twenty miles are nearly ballasted and completed, the next ten have less

ballast under the iron, and the last ten have none at all. The company propose to complete the road next season.

Respectfully submitted,
Chas. Greene.

Bangor and Piscataquis
Railroad.

Chas. C. Green