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*W. C. McMillan*

# REPORT

OF THE

## RAILWAY COMMISSIONERS,

OF THE

### PROVINCE OF NEW BRUNSWICK,

### FOR THE YEAR 1858.

WITH THE

REPORTS OF THE CHIEF ENGINEER; WM. PARKER, ESQ., C. E.;  
THE SUPERINTENDENT,

AND

*Forms of Contracts and Specifications.*

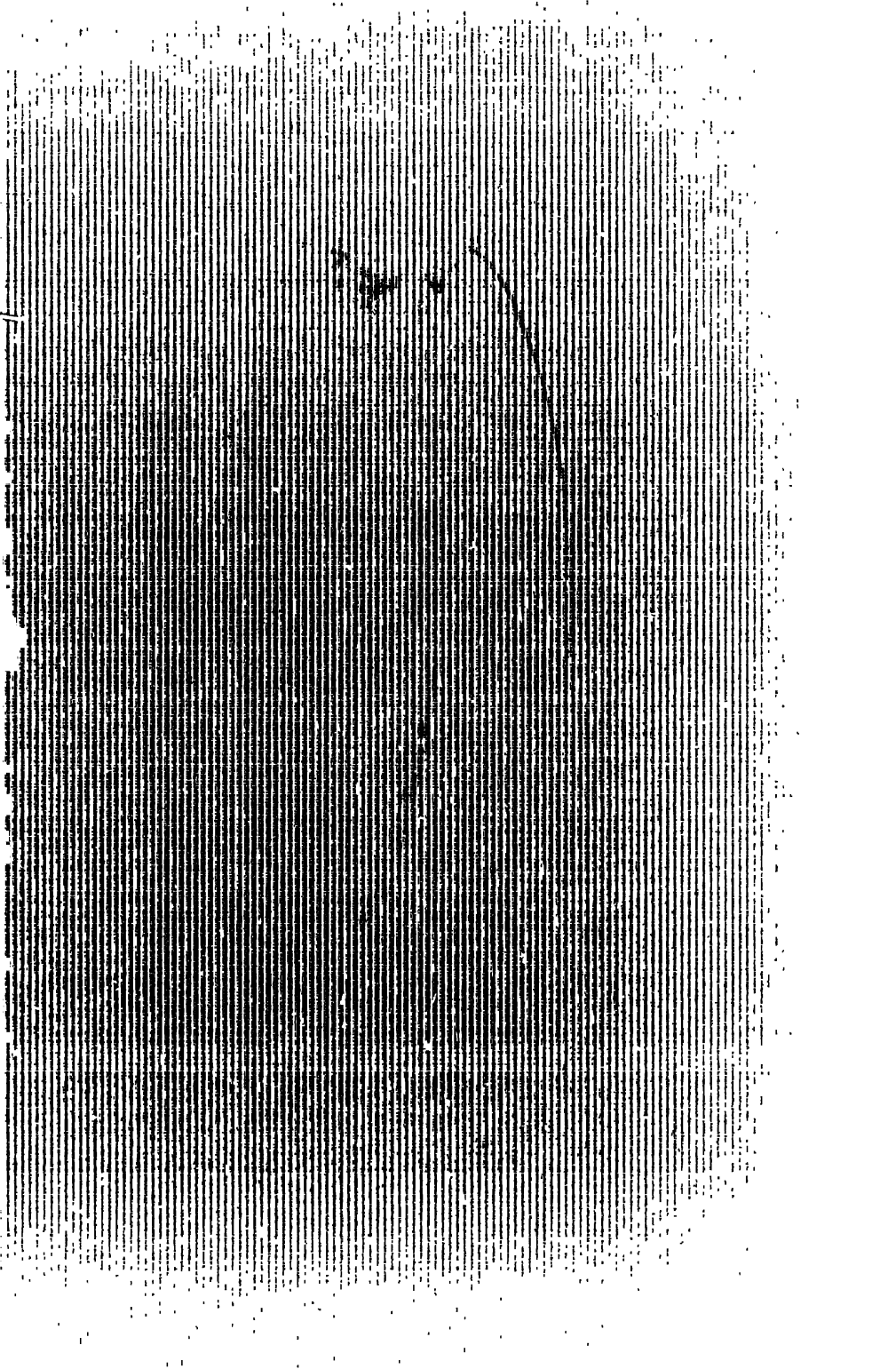
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SAINT JOHN, N. B.,

J. & A. McMILLAN, PRINTERS, 78, PRINCE WILLIAM STREET.

1859.



# REPORT

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## RAILWAY COMMISSIONERS,

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1858.



SAINT JOHN, N. B.,

J. & A. McMILLAN, PRINTERS, 78, PRINCE WILLIAM STREET.

1859.



**OFFICERS OF THE  
EUROPEAN AND NORTH AMERICAN RAILWAY.**

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**R. JARDINE,**  
*Chairman,* }  
**R. C. SCOVIL,** } **Commissioners.**  
**GEO. THOMAS,** }

**R. W. CROOKSHANK, Jr.,**  
**SECRETARY.**

**ALEX. L. LIGHT,**  
**CHIEF ENGINEER.**

**L. CARVELL,**  
**GEN'L SUP'T.**





**Railway Commissioners' Office,** }  
*Saint John, N. B., 2d Feb., 1859.* }

**To the Hon.**

**THE PROVINCIAL SECRETARY**

Sir,—

The Commissioners beg to submit for the information of His Excellency the Lieutenant Governor in Council, a Report on the state of the Railway Works under their charge.

Quarterly Accounts of all expenditures, liabilities, and receipts, have already been furnished to the Auditor General as the law directs.

The following Balance Sheet and Abstracts of Accounts, made up to the end of the financial year (31st Oct., 1858,) will show the expenditure and receipts from the commencement of operations under the Government, including the amount paid Messrs. Peto, Betts, Brassey & Jackson.

## Dr. CAPITAL ACCOUNT,

Engineering,	per Abstract	A.	£35407	15	2				
Permanent Way,	"	"	B.	193886	17	6			
Buildings,	"	"	C.	17874	13	5			
Rolling Stock & Machinery,	"	"	D.	42985	5	11			
Miscellaneous Stock,	"	"	E.	1563	9	2			
General Expenses,	"	"	F.	5851	8	3	297,469	9	5
<hr/>									
Expenditure on Sec's. Nos. 2 & 4									
St. John, and No. 3, Moncton, "	"	"	G.	58159	5	0			
Do. on Sundry unfinished Sect's. "	"	"	H.	143267	1	2			
Do. " other Contracts, "	"	"	I.	5696	1	9	207123	7	11
<hr/>									
Balances of unsettled Accounts,				102	15	9			
Cash,				154	2	9			
Traffic Department, (not received at this date,)				447	16	0			
General Stores on hand,				20395	5	5	21099	19	11
							<hr/>	<b>£525691 17 3</b>	

## REVENUE ACCOUNT TO

Locomotive Power,	per Abstract	K.	£4294	17	10				
Merchandise and Passenger Cars,	"	"	L.	1330	10	9			
Maintenance of Way and Buildings,	"	"	M.	327	13	9			
General Charges,	"	"	N.	1306	12	1	7259	14	5
<hr/>									
Balance,								747 19 4	

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**£8007 13 0**

## EUROPEAN AND NORTH AMERICAN

### General Balance Sheet to

Balance from Capital Account,	£747 19 4
<hr/>	
<i>Saint John, N. B.,</i> 30th October, 1858. }	

31st October, 1858.

Gr.

Treasury Department,		£517618	0	8
Baring Brothers, due them in Acct.,	£7109	1	0	
Bank of New-Brunswick (Overdrawn Account,	316	16	0	7335 17 0
				<hr/>
Balance,			747	10 4

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 £5256691 17 8
 

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31ST OCTOBER, 1858.

Traffic Receipts, St. John to date,		£2917	0	11
D. P. Myers, Sec. No. 2, St. John, (use of Trains, &c.,)	368	15	0	
Do. " " " (wages of Drivers, &c.,)	373	0	0	
Walker & Co., " 5 " " "	337	10	0	
J. Brookfield, " 4 " " "	296	0	0	1375 5 0

Traffic Receipts, Shediac and Moncton,		2476	19	7
Walker & Co., Shediac Wharf, (use of Engines, &c.,)	123	10	0	
Do. Section, No. 1, Shediac, "	361	10	8	
Wm. Stevens, " " 2, " "	198	11	0	
Walker & Co., " " 1 & 2, " "	124	0	0	
Permanent Way, " "	431	16	7	1238 8 3

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 £8007 13 9
 

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RAILWAY.

31st October, 1858.

Balance from Revenü Account,		£747	19	4
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**Abstract A.—Engineering.**

Salaries and Office Expenses, (of this paid by Jackson, £7000 0 0)	£14,900 16 4
Surveying, &c.,..... Do.	5000 0 0 11,835 10 0
Travelling Expenses and Incidentals, ... "	3208 8 10 6,179 19 7
Instruments and Drawing Material, ... "	25 0 0 508 15 0
Inspectors, .....	1,618 17 0
Miscellaneous, .....	370 16 0
	<u>£35,407 15 8</u>

**Abstract B.—Permanent Way.**

Labour by Contract or otherwise, .....	£101,178 19 1
Rails, Chairs, Ties, Signals, &c. &c., .....	57,023 10 1
Land Damage, .....	19,331 17 9
Miscellaneous, .....	16,352 10 7
	<u>£193,886 17 6</u>

**Abstract C.—Buildings.**

Shediac Station House, .....	£875 0 0	
Freight Shed, .....	404 1 8	
Engine, Car and Wood Shed, .....	563 7 8	
Machine, Blacksmiths and Carpenter Shop and Store House, .....	959 13 10	
Tank House and Privies .....	85 10 10	
Telegraph Office .....	53 2 7	2940 16 7
Ticket Office &c., St. John, .....		185 0 0
Advanced on Acct. of New Building; Pile driving, Plans, &c., Saint John, .....		723 12 9 3849 9 4
<hr/>		
Moncton Station House, .....	1554 4 11	
Freight Shed, &c., .....	318 18 3	
Car Shed, .....	220 3 3	
Wood Shed and Tank House, .....	234 6 0	
Freight Shed on Wharf, .....	274 6 0	2601 18 5
Kennebecasis Station House, .....	656 18 3	
Wood Shed; Tank House, including Water Pipes, &c. &c., .....	747 19 6	1404 17 9 4006 16 8
Way Station Platforms, &c., on line, .....		324 13 6
Shediac Wharf, .....		8086 2 8
Moncton, .....		559 16 6
Appleby's, .....		373 15 3 9019 14 5
Engineer's Office, Wetmore's Lake, .....		37 10 0
Engine House, Lawlor's Lake, .....		65 0 0
Stables, &c., .....		90 0 0
Range of Houses, .....		185 0 0
Blacksmith and Carpenter's Shop, .....		52 0 0
Range of Houses at Scadouc, .....		100 0 0
Shanty and Stable near Steven's, .....		35 0 0
Engine House and Wood Shed, Do. .....		109 10 0 674 0 0
		<u>£17874 13 6</u>

**Abstract D.—Rolling Stock and Machinery.**

Engines and Tenders, .....	£18226	1	7
Spare Gear, .....	1412	3	8
Tools and Implements, .....	1653	7	9
Snow Ploughs, .....	505	0	0
Stationary Engines, .....	570	13	0
Passenger Cars, including outfit, .....	5547	3	10
Freight Cars, .....	3213	13	11
Platform Cars, .....	4722	15	10
Ballast Cars, .....	6772	0	0
Miscellaneous, including Track Tools, .....	262	6	9
	<u>£22885</u>	<u>5</u>	<u>11</u>

**Abstract E.—Miscellaneous Stock.**

Furniture in General Offices, .....	£966	6	6
Furniture in Stations, .....	351	16	2
Horses and Carriages for Engineers and Police, .....	245	6	6
	<u>£1563</u>	<u>9</u>	<u>2</u>

**Abstract F.—General Expenses.**

Salaries and Office Expenses, Books and Stationary, Rents, &c., .....	£2915	11	4
Insurance, .....	164	19	0
Interest and Commission, .....	292	8	2
Postages, Printing and Telegraph Expenses, .....	632	11	1
Police Expenses, .....	1019	1	2
Miscellaneous, including Travelling Expenses, .....	826	17	6
	<u>£5851</u>	<u>8</u>	<u>3</u>

**Abstract G.—Section Contracts.**

Advanced to Contractor, D. P. Myers, Sec. No. 2, St. John, .....	£38598	11	10
Iron Bridge and other Materials, .....	2479	2	9
Advanced to Contractor, John Brookfield, No. 4, St. John, .....	15272	3	8
Sundry Materials, .....	353	9	7
Ballasting Sec. No. 3, Moncton, Walker & Co., .....	1455	17	2
	<u>£58159</u>	<u>5</u>	<u>0</u>



**Abstract L.—Merchandise and Passenger Cars.**

Wages to Conductors, Brakemen and Porters,	£803	8	5
Oil, Tallow and Waste,	125	11	9
Materials for Repairing Cars,	15	10	1
Wages for Repairing Cars.	32	15	1
Work not done by the Railway,	97	1	9
Small Stores,	6	19	3
Wages to Switchmen,	186	8	1
Miscellaneous,	62	16	3
	<b>£1330</b>	<b>10</b>	<b>9</b>

**Abstract M.—Maintenance of Way and Buildings.**

Inspectors, Plate-layers and Labourers Wages and Tools,	£314	4	5
Repairs to Stations, Buildings and Approaches,	13	8	1
Small Stores,	0	1	3
	<b>£327</b>	<b>13</b>	<b>9</b>

**Abstract N.—General Charges.**

Salaries to Officers and Clerks,	£746	16	10
Advertising, Printing and Stationery,	194	19	0
Insurance,	218	13	6
Damages to Men, Animals and Goods, &c.,	46	4	9
Miscellaneous,	99	18	0
	<b>£1306</b>	<b>12</b>	<b>1</b>

**European and North American Railway.**

STATEMENT SHEWING THE AMOUNT OF EXPENDITURE TO THE DIFFERENT PERIODS HEREINAFTER NAMED.

1856	July 6. Purchase of road and materials from Messrs. Peto, Betts, Brassey & Jackson £90,000 0 0 Stg. or £108000 0 0		
1857	April 1. Expenditure under superintendence of A. L. Light, Chief Engineer,	58452	11 11
	Aug. 15. Expenditure under first Board of Commissioners, W. H. Scovil, Chairman,	41344	11 7
1858	Oct. 31. Expenditure under present Board of Commissioners, R. Jardine, Chairman,	317292	15 0
	<b>Total,</b>	<b>£525089</b>	<b>18 6</b>

*Statement shewing the actual cost of the Railway, from Gilbert's Lane, St. John, to Kennebecasis Station.*

Labour of Grading, Masonry, Rock and Earth Excavation, &c., paid Myers, Brookfield and Walker & Co.,	£69565	14	1
Proportion of work done by Jackson & Co.,	2187	10	0
Rails, Chairs, Spikes, Girders, Frogs and Switches, Sleepers, &c.,	17971	0	5
Fencing,	2029	9	10
Levelling, Ridging, Siding, Sloping, Ditching, &c. &c.,	2842	13	6
Materials, Iron, Timber, Pile Shoes, &c. &c.,	6076	16	3
Proportion of Engineering Expenses,	6396	4	1
9 3-5 miles @ £10528 0s. 5d. per mile.	Total,	£101069	8 2

*Statement shewing the actual cost of the Railway from Moncton to Shediac.*

Labour of Grading, Masonry, Rock and Earth Excavation, &c., paid Walker & Co., Wm. Stevens and John Brookfield,	£58948	6	3
Proportion of work done by Jackson & Co.,	17812	10	0
Rails, Chairs, Spikes, Frogs and Switches, Sleepers, &c.,	35317	2	11
Iron Girders, Rails, &c. &c., for Seadouc Bridge,	3502	11	10
Sidings, Sloping, Soiling, Ditching, &c. &c.,	2562	3	11
Fencing,	2768	3	3
Materials, Iron, Timber, Pile Shoes, &c. &c.,	7730	6	4
Proportion of Engineering Expenses,	7483	15	10
20 4-5 miles @ £6513 0s. 6d. per mile.	Total.	£136094	19 4

*Statement shewing the actual Cost of Construction, Grading, Roadway, &c., of Station Grounds from Mill Street to Gilbert's Lane, St. John, to 30th April, 1857.*

Labour of Grading, Masonry, Pile Driving, &c., paid Walker, Brookfield & Myers,	£4191	18	8
Materials, Timber, Iron, Rails, Spikes, Pile Shoes, &c. &c.,	3733	19	7
	£7925	18	3



In the Appendix will be found,

Report by the Chief Engineer on the state of the works, with estimate of probable cost.

Reports by Wm. Parker, Esq., C. E.,

On the Railway Works.

On the Rolling Stock, and

On the Staff of Officers.

Report by the Superintendent with summary of Plant Stores and Materials purchased from Jackson & Co., and since acquired by the Province.

Report by the Superintendent, with traffic returns,

Statement of proposed Stations on the line.

Statement of amounts, claimed awarded and paid, for land damages.



It will be seen by the Chief Engineer's report that the probable cost of the Railway between Saint John and Shediac completed, including station buildings, wharves, rolling stock, land damages, and the £90,000 sterling, paid to Messrs Jackson & Co., will be £927,976 9 2 currency or £773,313 14 10 sterling, equal to £8,500 currency or £7,083 sterling per mile.

The Commissioners have every reason to believe that the final cost will not exceed this sum.

It will be observed from this Report that the railway will be of a very substantial character, capable of being run at high speed, and kept in repair at a minimum rate of cost. All the bridges over 40 feet span will be of iron, the rails of the best Staffordshire iron, and the width of embankments, slopes, ballasting, and drainage, such as to ensure permanence.

The following comparative estimate will show that this Railway, especially when the permanent character of its structure is considered, will, as regards cost and quality, compare favorably with any other on the continent.

Statement shewing the average cost per mile of the E. & N. A. Railway compared with that of Nova Scotia and the Railways of the State of New York.

## AVERAGE COST PER MILE.

Particulars.	Nova Scotia Railway, 928.10 miles, including 5.9.10 miles of Double Track and Sidings.	New York Railway, 2617 miles including 570 miles Double Track and Sidings.	E. & N. A. Railway, 109.18.100 miles, including 61.2 miles of Double Track and Sidings.
Grading, Masonry and Bridges, Superstructure, including Iron.	£5086 8 3	£3614 15 4	£4091 14 0
Station, Buildings and Fixtures.	2898 1 8	3299 5 0	2281 9 0
Locomotive Engines, and Cars.	435 2 2	557 7 6	224 10 0
Land, Land Damg's. and Fences.	1113 1 1	1521 6 6	786 16 0
Engineering and Salaries.	167 17 8	1106 15 0	493 10 0
Other items not included in above	356 11 11	409 10 0	253 12 0
	986 13 7	2189 5 0	367 19 0
	£11,043 16 4	£12,698 4 4	£8,499 10 2

It is stated in the Report for 1858 of the Grand Trunk Railway Company of Canada that the cost of that railway will be £10,000 sterling per mile.

The Great Western Railway, the next road in point of importance in Canada extending from the Niagara river to Windsor opposite Detroit, a distance of 228 miles through a much more level and easy country, with an alignment, gradients, road bed, superstructure and general finish certainly not superior to the proposed European and North American Railway, with wooden bridges which are being renewed with iron superstructures, has cost by the last reports upwards of £15,000 currency per mile.

The traffic returns show a profit over working expenses of £747 19 1.

When it is considered that to ensure safety and accommodation to the public, nearly as large a staff has to be employed for the short lengths now run as would suffice for a much greater distance, there is good reason to suppose that with the extension of the railway a more than corresponding increase in the profits may be expected, and the Commissioners feel satisfied that when Hampton and Sussex are reached, a considerable per centage on the cost of the road over working expenses will be realised.

The Books are now kept on the system in use by the Grand Trunk Railway of Canada. All accounts from the commencement of the railway operations have been brought up in the new set of books.

The Stations on the Line have been fixed at places which, from all the information in the possession of the Commissioners, will best serve the public and the requirements of the road.

There will be Ten Wood and Water Stations, and Eighteen Intermediate or Flag Stations.

Three Bridges will be required over the Kennebecasis River in connection with the Railway, at or near Millstream, the Finger Board, and the site of the former Toll Bridge.

It will be observed that the cost of land and grading for the Terminal Station at Saint John, amounts to a large sum. Under the Company the Station grounds were selected to the Eastward of the Marsh Bridge, as will be seen from the following extract from the Minutes of the Directors:—

“At a special meeting of the Directors of the European and North American Railway Company, held 15th Sept., 1853, at noon—present

R. Jardine, *President*;

Geo. Botsford ;  
D. J. McLaughlan ;  
S. L. Tilley ;  
W. J. Ritchie ;  
Hon. John Robertson ;

Hon. Mr. Chandler ;  
“ “ Hazen ;  
“ “ Wilmot ;  
“ “ Montgomery ;  
“ “ Gray ;  
“ “ Hayward.

Moved by Mr. Gray—seconded by Mr. Wilmot—

*Resolved*, That the Terminus at Saint John be on the Lands of Henry Gilbert, Esq., in the vicinity of the Marsh Bridge, and on the lands in Courtney Bay; and that Mr. Giles be requested to prepare a plan showing the quantity and position of land required in both places; and that an application be made to the Government for a grant of so much of the said lands at Courtney Bay as may be necessary for such purpose, and negotiations forthwith entered into to purchase the same from Mr. Gilbert, or otherwise obtain possession thereof agreeably to law.”

The Land selected by Mr. Giles, in accordance with this Resolution, was about Ten acres between the Marsh Road and the Creek, on which no grading would have been required, and no buildings or building lots interfered with.

Soon after the railway was transferred to the Government, it would appear that a different terminus was selected, as the railway track, after crossing the Creek at about a mile to the

---

Eastward of the Marsh bridge, was altered so as to pass in a straight line North of the Creek close to Gilbert's Island and through the valley and mill pond to a station at mill bridge.

This line avoided the level station grounds selected by the Company, and passed over a summit of twenty feet near the Valley Church, by an ascending grade of 70 feet per mile, and a descending grade to the station in the mill pond of 100 feet per mile.

The railway was constructed by the Government over this summit although it was then well known that no grade on any other portion of the road would exceed 45 feet to the mile and that consequently the railway could not be worked economically until this grade was reduced to the maximum.

On the 1st August, 1857, the Commissioners Messrs. W. H. Scovil, F. W. Hatheway and Joseph Myshral put upon record the track between Gilbert's Island and the mill bridge, and five acres in the mill pond and three acres at Gilbert's Lane for station grounds.

Immediately thereafter several of the persons whose land had been taken applied for damages, and the present Commissioners who took office on 15th August, having no power under the law to give up or re-convey lands so taken, had to pay for a considerable portion of it, and in such circumstances did not feel warranted in entertaining the question of a change of station grounds.

Finding that the price demanded for the five acres in the mill pond was £39,000; that to fill it up, and make this site suitable for a station would cost at least £10,000 more, and that a deep cutting would have to be made through the summit to bring it to the level necessary for station grounds, the Commissioners, after much consultation with the Chief Engineer and Mr. Parker, determined to place the passenger station on the track between Dorchester and Garden streets, to cut down the summit 9 feet so as to reduce the grade between the passenger station and the engine and car station at Gilbert's Lane to a grade of 45 feet to the mile; but even with this modification the cost of the station grounds is much greater than is desirable.

As a passenger station, engine house and car sheds had to be provided for the traffic consequent on opening the road to Hampton next summer, the Commissioners had to decide between erecting temporary buildings, and incurring a considerable expense in grading the track and station grounds

to the necessary level and erecting permanent buildings. The latter course was adopted, and on reflection the Commissioners do not see that they could with propriety have decided otherwise.

The Commissioners have not yet determined on a mode of communication with the tide waters of St. John.

There are three ways by which this can be obtained,

First, by placing the freight terminus at Courtney Bay, and constructing wharves and a wet dock on the flats there as was originally determined on by the Company, and eventually, if found necessary skirting the peninsula on which St. John is built and running round the head of the wharves from the breakwater to the Market wharf.

Second, by running from Mill street across the head of North Slip, Hare's Wharf, and Hon. John Robertson's wharf to the Market wharf.

Third, by extending the line of railway westwardly towards the Falls of the river St. John by the ends of Long and St. Helena wharves, and so forming a deep sea wharf from Mill street to Rankin's wharf.

Whichever of the three modes is determined on, it will we doubt not be found necessary in time to have a larger space for freight terminus than can be found between Gilbert's Lane and Mill Street, and land for this purpose can only be obtained in sufficient quantity and at a moderate price on the flats at Courtney Bay.

As there is some doubt whether the Commissioners have power under the law to take or construct wharves, or branch lines, further legislation will probably be required regarding this.

It would be also desirable to give power to the Commissioners to re-convey land taken and found not to be required.

The estimate of £30,000 for Land Damages is based on the present mode of appraisalment being continued. If the law is altered so as to meet the views of land owners, it is hard to say what the damages would amount to.

The only portion of the track on which no appraisements have been made, between Sussex and Salisbury, is mostly in wilderness.

In England the cost of land taken for railways averaged ten thousand pounds per mile, although it has since been ascertained that the increase of value to land through which

railways passed would have been an ample equivalent to landowners for all the land taken, and that it will be so to even a greater extent in this country there is no reason to doubt.

In any County of the Province, landowners generally would be willing, with a railway in prospect, to grant free right of way, in the belief that the benefits would compensate the damages, and in Kings and Westmorland Counties, nearly three fourths of the track, as originally laid out, was granted. Nothing has since occurred to lessen the beneficial effect of railways.

There are four level crossings of the main post road between Saint John and Shediac; at Sussex, Petitcodiac, Moncton, and Dorchester road. At all other crossings bridges are erected.

Although not provided for by law, level crossings have been made on every farm where practicable. In cases where bridges over or under the railway would have been necessary, the Commissioners have considered it more for the public interest to pay damages for want of access.

The Tariff has been a subject of much consideration to the Commissioners. In Nova Scotia the fare for first class passengers has been fixed at 2d currency per mile, in the United States it ranges from two to four cents, and in England is about 2d sterling.

It has been ascertained that the cost of carrying passengers in the United States is 2 7-12 cents per mile, and that the paying point is three cents per mile.

The Commissioners have determined on a rate of three cents per mile with the usual deductions for family and season tickets.

The Locomotive manufactured by Messrs. Fleming & Humbert last year has proved an efficient machine, equal in all respects to specification. A contract has been made with the same firm for two more locomotives to be delivered this season at United States prices.

Passenger, freight and platform cars have all been subjected to competition in this market, and are now being constructed at rather less than U. S. prices.

Wheels and Axles for passenger and freight cars have been procured from known makers in England and the United States. Some made here are now being proved under ballast cars.

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The Commissioners have purchased rails, chairs, and iron girders in England through Messrs. Baring Brothers. Instructions have been given to ask tenders for these materials from the first houses in the trade and to accept the lowest.

Tenders are also to be taken in Liverpool for freight as cargoes are ready.

All articles are manufactured under the supervision of an Inspector appointed by the Commissioners.

Full insurance is kept on all the railway property.

The Contracts have been made and the work apportioned, with a view to the expenditure of Two Hundred Thousand Pounds, sterling, per annum, as provided by law.

The Commissioners are of opinion that in the present state of the money market, and with labor and materials so low as they now are, it will be for the public interest to push the Works to completion as rapidly as can be done economically.

Respectfully submitted,

By Order of the Board,

**R. JARDINE, Chairman.**

**R. W. CROOKSHANK, Jr., Sec'y.**





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**APPENDIX.**

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**R E P O R T**  
ON THE  
**EUROPEAN & NORTH AMERICAN RAILWAY,**  
ITS  
PROGRESS, PROBABLE COST, &c.,

BY  
**ALEXANDER L. LIGHT,**  
CHIEF ENGINEER.

FEBRUARY, 1859.

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Engineer's Office, St. John, }

February 2nd 1859. }

To

ROBERT JARDINE, Esquire,

*Chairman of the Board of Railway Commissioners.*

Sir,—

I have the honor to submit the following Report on the  
European and North American Railway.

I am, Sir,

Your obedient Servant,

ALEX. L. LIGHT,

CIVIL ENGINEER.

## INTRODUCTORY REMARKS.

On reference to my Report, (made and submitted in March 1858,) upon the Works of the European and North American Railway, it will be found that the state of the Line and the prospects relative to the completion of the several "Sections" then contracted for, were as follow:—

The Division from Moncton to Shediac, including the Moncton Branch, with the exception of a small portion of the Ballasting, had been completed. This Division, twenty and one third miles in extent, had been opened for traffic.

The locations between Saint John and the Nine Mile House had been adjusted, and the Sections contracted for. The Grading, with the exception of a small portion near the Five Mile House, had been nearly completed. The Materials for all the Bridges required on this portion of the Line had been obtained.

Sections Five and Six, extending from the Nine Mile House to "Groom's Cove," near Hampton, a distance of eleven miles, had been put under Contract; but, although by the terms of the Contracts, it was required that these works should be completed in November, 1858; owing to peculiar circumstances, which the Contractors had not anticipated, there was but little probability of this portion of the Line being completed before July, 1859.

The Hammond River Viaduct had been contracted for; but it was not expected that the Contractors would fulfil their engagement to complete the work in October, 1858—the time specified for finishing it.

The location between Groom's Cove and Sussex Vale, and that between Pitfields' Corner and Moncton, had been completed; and Sections 7, 8 and 9, Hampton, and 4 and 5 Salisbury Districts comprised in the above, had been contracted for.

The terms on which the several Contracts had been taken, and the expectations entertained with regard to their probable fulfilment, within the time specified in the Contracts, were stated.

The Division between Sussex Vale and Salisbury (28 miles in length) had not been located; but it had been ascertained by preliminary examination and survey, that this would

prove the least expensive Section between Saint John and Shediac.

Of the whole Line from St. John to Shediac, one hundred and eight miles and three tenths ( $108\frac{3}{10}$ ;)—there had been opened for traffic twenty-three miles and a-half ( $23\frac{1}{2}$ ;)—there were under Contract fifty-seven miles;—and yet to be located, between twenty-seven and twenty-eight miles.

The advantage of selecting a course of Line, differing in some degree from that located by Messrs. Peto, Brassey, Betts and Jackson, were pointed out and referred to.

From this brief abstract from, and reference to my former Report, some general idea may be formed of the condition of the Line when that Report was made, and the prospects then entertained with regard to the progress of the works.

Attached to that Report was an estimate of the probable cost of the whole Line; and, it affords me some satisfaction to be able to state, there is no reason to anticipate that the general cost of the work will exceed the estimate then made.

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#### REPORT.—1859.

On its again becoming my duty to submit a Report upon the European and North American Railway, I have to say, that during the past summer the remaining Division between Sussex and Salisbury has been located, and the Sections composing it were let at very moderate rates, on the 8th of last October. Thus the portions of the Road, that are not completed, are all under Contract; and with two or three exceptions, I am happy to be enabled to state, are progressing favorably.

The whole distance from Mill Street, St. John, to Shediac Harbor ( $108\frac{3}{10}$  miles), has been divided into Twenty-One Sections, which were severally let out in pursuance of advertisements, inviting Sealed Proposals for the performance of the work.

I would here remark, that the Contracts for work of every description entered into subsequently to the 1st December, 1857, have been, (I think without exception), let to the lowest responsible bidder, who could procure the necessary securities required by law. It having been insisted upon that the Specifications in every instance should be strictly followed.

The Contracts under which these Works are being executed, (with some exceptions,) provide for the entire completion of the Railway; including grading, masonry, bridging and tracklaying, upon each Section, for a gross sum. The Contractors "maintaining" the works for a twelve-month after their final completion—the Government finding iron rails, spikes, chairs, and iron girders for bridges, and the Contractors furnishing all other materials of every description—provision being made for additions and deductions by a Schedule of fixed prices, by which the Contracting parties are bound, should any alterations in the Alignment become absolutely necessary, by which the quantities or nature of the work would be unavoidably altered.\*

Table A, No. 9, in the Appendix, exhibits at one view, the numbers of Sections; the names of Contractors; dates of letting; amount of Contracts; value of work done up to 31st December, 1858, and amount still remaining to be done. The continuation of this Table shows all other work of every description, that has been executed by Contract or otherwise, since the commencement of the work, including that already finished, Surveys made, and "plant" furnished by the former Contractors as well as work still to be done—not yet contracted for.

This Table, in fact, contains all *actual work* done and to be done, in reference to which, the *time* required to complete the Railway needs specially to be regarded. The balance of money in the final estimate, outside of the sum stated in this Table, is required for Superstructure, Iron Girders, Rolling Stock, (which can be easily purchased whenever required,) and for Land Damages and Contingencies, the former of which can be ascertained and adjusted at any time; and here I may observe that more than half of the three heaviest items, viz.; the Superstructure, Iron Girders, and Rolling Stock, are already delivered.

On examining this Table it will be seen, that the whole value of actual work to be executed, in the construction of the Railway, is £557,100 12 1d., of which £371,973 12 8d. was done up to the 31st December, leaving £185,126 19 5d., or about one third, still to be performed. A careful perusal of this Table will furnish the best criterion by which the progress of the work may be correctly ascertained.

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\*See blank form of Contract, Specification and Schedule, upon which Works have been let, at end of Report.

The quantity of Earth and Rock work on each of these Sections; the proportion done up to 31st December; the balance still remaining; the aggregate of the whole; and the value of the same at current prices, are stated in Table A., No. 10, by which it will appear that the whole Earth work amounts to 3,383,572 cubic yards, and the total Rock Work is 148,620 cubic yards; and that of the former 1,907,200 cubic yards, or nearly three-fifths; and of the latter 125,084 cubic yards, or five-sixths are already completed; or regarding the money value of these proportions of each at one shilling and three pence per cubic yard for earth, and five shillings and six pence for rock, and adding up the amounts thus obtained, it will be seen that three-fifths (in point of value) of the aggregate excavation is done.

### ESTIMATED COST.

The cost of the whole Line from Mill Street, St. John, to Shediac Harbor, including the Moncton Branch, stations, wharves, rolling stock and land damages, amounts to £927,976 currency or £773,313 sterling, or an average per mile, of £8500 currency, or £7083 sterling, as will be seen by referring to Table A No. 1, appended to this Report, which contains the final estimate, being a summary of the cost of the portions already completed—the work done by the former Contractors, previous to the Railway reverting to the Province—the “Superstructure” (in which term is included the sleepers, iron rails, chairs, and spikes, &c.)—the Sections, under Contract, as well as the stations and rolling stock; the cost of which are severally enumerated in separate tables, consecutively numbered, and attached to the final estimate of which they furnish the basis.

This estimate is grounded upon the actual cost of the Divisions from Moncton to Shediac, and from St. John to Salmon Brook, which are finished; and the several contracts, with but one exception, are finally closed and the accounts settled. The sums at which the unfinished Divisions have been taken by the several contractors, have been assumed, and as usual in Railway Estimates fifteen per cent on the whole now under construction, has been added for contingencies.

In the Estimate for the superstructure, the value of rails, chairs, spikes, &c. is based upon the cost of the latest importation made of these articles; whatever variation may arise in the price of iron from that stated, will of course vary the cost of the track.



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The sleepers are estimated, by taking as a standard, the average of the prices bid by the several contractors, which is a sufficient basis of estimate. The track-laying and ballasting are included in the section contracts.

The sidings are assumed at five per cent. of the whole length of superstructure; this will be sufficient for the purposes of traffic for some time; but as the business increases, they will require to be much enlarged.

The Rolling Stock estimate is the same as stated by Jackson & Co. in their specification; it will be sufficient for the business of the Road for one or two years; it is what, ordinarily would be called, a moderate equipment, as the quantity needed, depends entirely upon the business to be done, and it can be easily augmented as the traffic increases.

A Repair shop has been erected, and suitably furnished at Shediac; but no buildings of this kind have been included in the estimate for St. John, as it is considered that the Repairs can be made at the several machine shops already established in the city, at a cheaper rate for some time to come;—this however is problematical.

The Estimate for the Stations, includes several buildings in addition to those contemplated by the original Contractors; more than half the principal portion of which is either already built or contracted for, and it is believed that the remainder can be finished for the amount stated in the estimate.

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I now proceed to review the progress of the several Divisions and Sections of the work in detail, in the order in which they were let and have been completed.

### MONCTON DIVISION.

First, the Division from Moncton Station to Point du Chene in Shediac Harbor, (19 42-100 miles) as well as the Moncton Branch—(88-100 of a mile) making a total of 20 3-10 miles, was let on the 1st of August, 1856, and opened for traffic on the 20th August, 1857. The earth works throughout the whole of this distance having consolidated during the winter of 1857-8, the work was thoroughly finished during

the past summer, and delivered over to the Commissioners, by the Engineer Department, with passenger and freight stations, engine houses, turn-tables, wharves and all necessary appliances complete.

This Division is in perfect "running order" and permanently finished with the exception of the eastern abutment of the Scadouc viaduct, and two wooden trestle bridges; these structures were erected by the former Contractors; the latter have become so "shakey" from indifferent timber having been used in their construction, and from the piles being imperfectly driven, that they are fast becoming unsafe. As these last temporary structures are erected over insignificant streams, I would recommend that stone culverts be put under them this winter, and the space occupied by the bridges be filled in with embankment in the ensuing spring.

The cost of this alteration will not exceed one thousand pounds; should an accident occur here, ten times that amount might not pay even the *pecuniary* damages which might accrue or be awarded.

The eastern abutment of the Scadouc viaduct above mentioned is not now filled in with earth. This was tried, but, owing to cracks immediately making their appearance in the masonry, it was found necessary to remove the earth as the abutment could not withstand the pressure. Trestles have therefore been erected inside, upon which the track has hitherto been sustained.

The cost of this Division, exclusive of the Moncton and Shediac wharves, Stations and Rolling Stock, has been £6,485 per mile, as will be seen by Table A, No. 3 in the appendix to this Report.

### ST JOHN DIVISION.

Secondly, the portion of Division No. 2 extending from Mill street, St. John, to Salmon Brook beyond the Kennebecasis station, comprising a distance of 9 6-10 miles—put under contract on the 10th of January, 1857 and opened for traffic on the 1st of June, 1858—has been completed.

The cost of this portion of the work, exclusive of Stations, Rolling Stock, and Land Damages, has been £10,809 per mile, as may be seen by referring to Table A, No. 2, annexed.\*

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\* It is worthy of remark that both Mr. Jackson and Mr. Giles (as I have been informed on reliable authority) have frequently stated it to be their opinion that this work would cost £10,000 Stg. per mile.

When the heavy nature of the work comprising this Division, the number of bridges for the purposes of the Railway, including the several crossings of the different public Roads (over and under the same), as well as the numerous and expensive level crossings of private roads that occur at nearly every division of property, when likewise the number of intermediate stations, and the superior character of the works generally, are taken into consideration (of which I do not hesitate to say that they will compare favorably with any of a similar character and extent executed elsewhere in America), everything, I say, being regarded—the cost will be satisfactorily accounted for.

Some of the causes why this Division has proved the most expensive portion of the whole Line, may be ascribed to the following facts:—

That here nearly half of the rock excavation on the whole Line had to be performed, and that of the very hardest description.

That there was an entire absence of any good natural ballast upon this part of the Division, this deficiency having to be remedied by the substitution of a costly foundation of broken stone, finished by a “top dressing” of very superior gravel ballast brought by tug boats and scows at an enhanced expense from the opposite shores of the Kennebecasis Bay.

That, along the shores of the Kennebecasis, it became necessary to protect the embankment from the action of the water and the effects of freshet, by means of stone walls, throughout their whole extent.

That the ground was of a soft and yielding nature at the four mile bridge, Robinson’s Meadow and Lawlor Lake.

The borings at these last mentioned places were taken before the work was commenced, discovering twenty five, forty and about one hundred feet of soft material, at the deepest points beneath the original surface of mud or water, (as the case might be), and these places there was no possible way of avoiding with propriety.

The difficulties were overcome as follows: first, at the 4 Mile Bridge the seat of the embankment was well drained, and then carefully covered with six feet of strong green brush. The slopes of the embankment were made very flat, and the first half of the embankment made up of the peat bog itself, placed on in layers; the top of the embankment and outside

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of slopes being completed with clay from the adjoining cuttings. This method had the double effect of combining extreme lightness with breadth of base, and distributing the superincumbent weight over more surface. I am glad to say, the work now referred to has been entirely successful, as the settlement of material has been trifling, indeed not much more than would naturally be produced by the consolidation of the particles of earth forming the mass.

Secondly, at the Robinson's Meadow in the vicinity of the Five Mile House, difficulties of a nature similar to those encountered at the Four Mile Bridge, presented themselves, only on a more extended scale, the bog being deeper and the embankment higher.

The unavoidable arrangement of the Grade Line at this point was such, that the rock cuttings on each side were entirely insufficient in quantity to make up the embankment; all that could be spared from the southern cliff was put into this Meadow. It was soon found that rock was an improper material to make up this embankment with, as from its great weight it broke through the crust, and sunk down to the bottom of the bog, throwing up the Marsh in ridges on either side. It was decided to reserve all the rock in the cutting North of the Meadow, to put into the Lawlor Lake, (where it was required and would be exceedingly valuable) and make up the deficiency in the Robinson Meadow Embankment from side cutting formed in layers, with material carted from the adjoining hills; by which means it was hoped that a portion of the settlement could be in some measure prevented.

But here another obstacle presented itself, as the hills turned out to be composed of rock with a thin layer of earth on the surface, and no sufficient side cutting could be obtained with a reasonable lead, though search by means of trial pits was made.

The nearest side cutting that could be obtained was at McCullough's Farm at the further side of the Lawlor Lake; but it was obvious, that to get there the Lake must be first filled; and as there was no probability of this being completed with the greatest exertion before June, 1858, and as the Robinson Meadow Embankment, from its requiring nearly the same quantity of material as the Lake, would take another season to complete, it was therefore decided that a tim-

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ber viaduct which would last some fifteen years, by means of which the earth could be conveyed to complete the embankment at some future day.

The embankment at Lawlor's Lake, with the heavy rock cuttings on either side of it, presented another serious obstacle; in fact, the most difficult point in the whole Line as eventually located.

On a revision of the Location being made, with a view if possible, to avoid the heavy work in this neighbourhood, it was ascertained by the borings, that it was necessary to descend 60 feet deeper, (to find solid bottom), than shewn on the original plans of survey made by former Contractors and upon which the works had been let. The whole depth being as already stated about 100 feet instead of 40 as shewn, of which about 40 was water and 60 feet of very light vegetable deposit. To counteract this, the original gradient through this portion of the work was lowered as much as possible.

After most of the rock cuttings on either side had been put into the Lake, there was still a deficiency, of about 90,000 cubic yards of material, (as nearly as could be ascertained by a careful series of cross sectional soundings made on so treacherous a bottom,) required to be supplied to complete the embankment. To provide for this, recourse was had to a borrow pit near Torryburn; and after a month's incessant labor, and some ten thousand yards had been put in, it was ascertained by another set of soundings instituted during the progress of the operations, that the works had progressed but little, as the earth had been dissolved and washed away by the action of the water; and it became evident that if this system was persisted in, the embankment, if completed in this manner, would require a much greater amount of material than was originally anticipated, and even as much perhaps, as would be requisite to fill up the greater portion of the Lake. Under all these circumstances, it was decided to take advantage of the ice, and construct a temporary pile bridge,—which was effected by splicing long spars of spruce; this bridge to be of sufficient width to contain three tracks: the centre track (in case of emergency) to be used for Passenger Traffic: the two side tracks to be used exclusively for "construction purposes," to accelerate the "tipping" of the earth, as by this means a whole train of cars could be tipped at once. While the bridge was in process of construction, two rows of side

piles were driven extending longitudinally, parallel to the Railway; the piles being placed at intervals of twenty feet, and driven until their tops were level with the surface of the ice; these rows were placed 75 feet from the centre of the bridge, and on each side of it; enclosing a space of 150 feet in width, or a little narrower than the seat of the proposed embankment. Between these side piles and extending under the temporary bridge, a flooring of timber and brush wood several feet in thickness, was laid all over the surface of the ice, which was sawn away and pressed under it. After the floor had been finished, hundreds of tons of stone were brought on by means of the temporary bridge, and carefully loaded all over the flooring equally, until the latter was sunk to the level of the surface of the water; then large "cribs" were built upon the floor, and on each side of the bridge, and bounded in with the floor, by placing long *untrimmed* trees in the alternate tiers, with the butts to the outside of the cribs and their tops overlapping in the centre space between. These side cribs were composed of alternate layers of timber, brushwood, and stone, until they were brought up nearly to the surface of the water, being held in position by the side piles during their settlement. On this floor, and between these side cribs, the tipping was commenced in the following manner;—waggon loads of rock were conveyed along the outer tracks of the bridge and cast as far *over* the outside, as the men were able to throw the stone; after this had been continued for some time, earth was tipped *through* the three tracks into the  $\nabla$  or centre space between the stone. This mode of operating succeeded admirably—the Lake was filled in a very short space of time—and the settlement since the completion of the work has been very trifling indeed. The cost of this work, including the expense of the flooring of timber and temporary bridge, was much less than it could possibly have been done for, by any other method than that adopted—while from the fact of the brush and timber being permanently under water, this portion of the work will be almost as durable as though the whole mass had been composed of stone.

### LAKEFIELD DIVISION.

SECTIONS FIVE AND SIX—from Salmon Brook to Groom's Cove near Hampton, eleven miles in length, forming the balance of the Second Division, are the next in order.

It is here necessary to remark, that on the first of these sec-

tions the most extensive departure from the original locations of the former Contractors was made; and the very serious difficulties, well known to exist in the neighborhood of Gondola Point, including the large viaduct through the deep water at Harris' Cove, were entirely avoided—difficulties of far greater magnitude than any that occur on the line elsewhere.

It was ascertained by a carefully revised series of preliminary surveys, that a more direct line by the way of the Lakefield Settlement, up the valley of the Salmon Brook, and thence downwards to Hammond River, coinciding there with the old line and crossing the river at the same point, could be selected at a reduced cost.

This alteration, without involving a steeper gradient than the maximum of 45 feet to the mile, as adopted upon this Railway, effected a saving of upwards of 400 degrees of curvature and nearly one and a half miles of distance.

In addition to these manifest advantages, the *direct* saving, including damages to land and buildings was estimated at £35,000. Besides this, however, there was a *prospective* and perpetual saving provided for by this important change, which is equivalent to a further sum of £32,216; this latter represents the capital which would accrue from the present and consolidated value of the yearly interest on the money (£19,070) which would have been required to build this unnecessary 1½ miles of Railway,—added to the yearly running expenses and wear and tear. These two sums therefore taken together, exhibit a total saving of £67,216 effected by this alteration.

The attainment of this great desideratum was hardly to be expected, as the line of country between these points had already been repeatedly explored without the object in view being accomplished.

For the purpose of obtaining an impartial opinion, where so many conflicting interests were at stake, the Commissioners in order to verify the estimate, concluded to open each line to the competition of experienced contractors; this resulted in offers being received to construct the line through the Lakefield settlement for sums varying from £30,000 to £50,000 less than the shore line by the Gondola Point.

The Tender of Messrs Walker & Co., which was accepted, was £30,917 less than their offer for the Gondola Point. This section was let to them in June, 1857, to be completed in

\* For a further explanation see note A in the Appendix.

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November, 1858. The terms of this contract with regard to the time of completion have not been fulfilled for reasons hereinafter explained.

This part of the Division is peculiarly situated, being about  $6\frac{3}{4}$  miles in length; the earth work is heavy, averaging nearly 60,000 cubic yards to the mile; the heaviest portion of it, situated at or near the summit, has to be conveyed by engine power, either way to embankments situated at, and near the foot of each incline.

By the terms of the contract it was stipulated to furnish a Locomotive Engine, and forty ballast Cars to the Contractors; these should have been in their hands as early as possible in the season, the Engine was not delivered before the latter end of October, 1857, and the Cars in the following December; so that on the heavy or governing points of the work, a good portion of the first season was virtually lost. The want of the Locomotive Engine, prevented the Contractor from "stripping" the earth off the principal rock cutting near Otty's, before the setting in of the frost—and for this reason, but little rock was excavated at this point, during the winter of 1857-8, when properly the whole of it should have been finished.

An additional Engine, and 45 extra Earth Waggons, were furnished to the Contractors in July, 1858, after the works at Lawlor's Lake had been completed; and these have been working steadily since that date.

A Steam Excavator was likewise procured at the suggestion of Mr. Parker, the Consulting Engineer; it has been kept at work near the summit up to this time; but, notwithstanding this assistance, the works still require a period of time;—including some months of summer to complete them; and these, in justice to the Contractor, should be allowed him in consideration of the delay caused by the want of the Locomotive and Cars.

It should also be borne in mind, that in such a confined working area as is here presented, only a limited number of men can be simultaneously employed. If the Contractor is allowed three months from the 1st of April next, this will afford a sufficient time to open the Road, if the work is *energetically* urged forward.

The Locomotive has already passed six times over the whole extent of the Line from St John to Hammond River during the past year.



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**SECTION 6**, which forms the eastern portion of this Division, extending from Hammond River to Groom's Cove, near Hampton, was let to the same parties (Messrs. Walker & Co.) to be completed at the same time with the above work. Upon this Section, the Government were to furnish no Plant of any kind; the works are not so backward as those on Section 5, but they are still far from being complete; a portion of the Grading and all the bridges are unfinished, although nearly half of the Grading is done and the Track laid upon it.

Some excuse should however be made for the contractors on this Section also, as the exact location of the eastern portion, including the heaviest embankment through Groom's Cove, could not be definitely decided upon, for some months after they took the Contract. The position of the line across this Cove was controlled by the fact of questions arising whether the Railway should pass through Hampton Village or the Ossekeag Valley, questions which the Commissioners were not in a position to decide, until the completion of the locations to Sussex in October, 1857, gave the preference to the route adopted.

From the limited time allowed in preparing the plans of construction for this Division from the absence of that knowledge that more definite surveys could alone supply, and from the fact that at this time the Engineering Staff was far from complete, some of Mr. Giles' general plans were (in order to save time) adopted, which, as well as others prepared under my own supervision, had in some cases to be modified to suit the altered circumstances.

At this time too, a system of letting the Contracts, different to that which had hitherto been adopted at Shediac, and from St. John to Kennebecasis Station, was decided upon for this Division; those Divisions having been let and tendered for upon a Schedule of prices only. By this latter mode of proceeding it was to a certain extent immaterial to the Contractor how much or how little work was to be executed, or what plan the Engineer decided to adopt; the former merely being paid by the cubic yard for any description of work at his Schedule price, this system giving the Engineer the advantage of preparing his plans as the works progressed, exactly suited to the nature of the case, or such as a further experience of the particular locality may have shown to be necessary and expedient to adopt.

It will be borne in mind, moreover, that these lettings embraced proposals for the Gondola Point Line, as well as for

that by the Lakefield Settlement, as the adoption of the latter, as already stated, was dependent upon the comparison of the tenders for each route.

The two lines, with the Hammond River Viaduct and Section 6, embraced an extent of some twenty miles in length, and included the very heaviest portions of the road : much care and time were obviously requisite for the preparation of the necessary drawings.

Even if the same system of letting had been adopted on these, as that on the former Sections, (which it was my expectation at the time would have been done), the addition of the Gondola Point Line was alone sufficient to have doubled the office work. But, it was not until a short time before the period appointed for receiving the tenders, that I was informed that the Government insisted upon the works being let upon "gross" sums for each Section and all it contained.

On this account, previously to the letting, it became necessary to prepare a distinct set of Contracts, Specifications, Schedules, Estimates and Plans of every description, necessary for each route; as likewise drawings in detail of every separate piece of work required in both.

For the proper carrying out of this arrangement, there was not sufficient time, nor were there means to prepare the plans required, even had there been time. No draughtsman had been appointed, although I had several times remonstrated on the impossibility of perfecting works of the magnitude here involved, with an insufficient standing staff.

However, the most that could be done under the circumstances, was done; but, after the location of a portion of the Grades and Alignment had been revised, some of the structures had to be modified; this caused some delay in getting the designs ready, and it was not until March, 1858, that all the drafts were finally arranged for this Section, though it is proper to state, that they generally were prepared as fast as they were required by the Contractor.

### HAMMOND RIVER VIADUCT.

The Hammond River Viaduct, situated midway between Sections 5 and 6, was let at the same time to Messrs. Small & Crosby, to be completed in October, 1858.

This is a massive structure, and the most extensive of the kind on the whole route, being composed of stone and iron,

or rather the most substantial Iron Girders of "Fairbairn's Patent," supported upon Piers and Abutments of dressed Granite, resting upon elaborately constructed pile foundations, which have been laid some 12 feet below the summer water level, and executed with the greatest care and regard to permanency, in order to withstand the rush of water that annually takes place, upon this very hazardous stream at the periodical breaking up of the ice.

The Contractors have had a good many difficulties to contend with, in the preparation of their artificial foundations, which have been somewhat more expensive than at first contemplated; they have therefore had to execute more work, than it was expected would be required, at the time when they entered into the contract.

The site of the Viaduct is peculiar; the line of Railway necessarily crossing the river at a point where the stream is divided by an island.

The Viaduct as originally designed by Jackson & Co. was composed of seven spans of 80 feet each, crossing a portion of both branches of the stream and the intervening island; necessitating the construction of two abutments and six piers.

As all the water passed through a span of 235 feet, half a mile above at the crossing of the post road, this number of piers, requiring very expensive foundations and great width of costly superstructure, appeared excessive; and at the letting of June, 1857, a different plan was prepared for three spans of one hundred feet each, supported on two Piers and two Abutments, to be erected over the Eastern or Main Channel, in which the borings taken, disclosed a hard bottom some 30 feet below the surface of the general depth of water during the summer; and drawings of the foundations were prepared accordingly. As soon after the letting, however, as an Engineer could be spared from the office, an elaborate Survey was made of the whole river, half a mile above and below the intended Bridge site, which fully demonstrated, that it was better to erect the proposed structure on the intervening island, and that a new water way should be made through the same, the original channels being filled up on either side with embankments.

This site was therefore adopted; thus dispensing with four Piers, including their costly foundations, besides 260 feet of unnecessary superstructure, and thereby enhancing the per-

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manent safety of the Railway, besides effecting a very considerable reduction of cost.

This arrangement, by placing the longitudinal centre line of the Bridge, at right angles to the general direction of the current, allowed the water to pass freely between the Piers, and gave the Contractor the *advantage* of working upon dry land during the period of construction.

This alteration, has also been of service, in reducing the cost of "unwatering" the coffer dams for the Piers and Abutments.

When the bearing Piles under the foundation came to be driven, it was found that the *specified* depth of eighteen feet, which was deemed at the time as the utmost they could have been made to penetrate into the gravelly *stratum*—was insufficient. From the fact of quick-sand unexpectedly presenting itself, it was necessary to drive the piles forty feet below the bottom of the dam, instead of the distance specified.

This, of course, caused an extra expense to the Contractor, in consequence of more pumping being required during the driving of the longer piles, as well as the expense of the additional length of pile.

The upper surfaces of the foundations, are laid at a depth of about twelve feet below the level of summer water; therefore the piles composing their support, extend to a depth of fifty-two feet below this level.

From the fact of all the Coffers Dams, being more or less underlaid with Gravel and Quicksand, the continued and simultaneous use of three of "Gwynn's Patent" Steam Pumps, has been required in each dam, during the greater portion of the time. These difficulties, I am happy to be enabled to state, are now entirely overcome.

In the Spring of 1858, after due deliberation, and after the Stream had been carefully watched through the previous winter, to observe the effects of the ice, it was decided, that it would be safer to raise the level of the Bridge three feet higher, to ensure it against damage from ice, in case of an extraordinarily high freshet. This was effected; by putting in three feet more masonry in the footing courses of the Piers and Abutments, without making any material change in the Plan or description of the work. This additional masonry was found to be necessary, and would have been inserted at first, if the same knowledge of the stream had existed at the time of letting, as was afterwards obtained by more extended observation.

As any elevation of the Bridge, necessitated a corresponding elevation of the embankment on either side, the quantity in the latter was thereby largely increased. It may be as well here to observe, that at the letting in June, 1857, it was an object to keep these embankments as low as possible to save expense, it being known that they could be easily raised afterwards—if required.

These alterations of detail, will now be paid for as extras, upon a just and fair Schedule of prices, instead of appearing, as they would have done at first, in the Contract

It may be as well here to state that I consider it better policy to pay afterwards as an *extra*, upon a fair Schedule of prices, (as is fully provided for in this Contract) for what is really required than to use so large a *margin* in the calculation of quantities (on work that may be to a certain extent problematical) for the sake of avoiding the popular outcry against extras, and thus run the risk of having to pay Contractors a price for work that they may never do; for it is well known that in “gross sum” Contracts (particularly with governments,) they generally manage to get an additional price for any extras that may arise; while on the other hand, no matter what the deductions may have been, they endeavour to get the full amount of the original price in the Contract.

The present condition of the Work may be stated as follows:

The Foundation of the Piers and Abutments are all laid; the two centre Piers are nearly completed; the Eastern Abutment is above the level of the water, and the Contractor is now laying the Masonry in the footing courses of the Western Abutment, which is being laid “dry,” to admit of the work being prosecuted during the winter.

Nearly the whole of the Granite for the completion of the Bridge, is delivered and dressed; and if ordinary exertion is used, to get the two Abutments during the present winter above the level of the usual spring freshet—so that the works may not be stopped during the recurrence of the same in June and July next; there will be no difficulty in finishing the Masonry by the beginning of August, 1859. The Iron Girders are all delivered and housed, awaiting the completion of the Masonry in the Piers, before a commencement is made towards erecting the former into position.

As the Girders can be raised upon a scaffolding before the

*Abutments* are completed, it follows that the whole Viaduct may be finished simultaneously with the Masonry, and the Railway carried over it about the first of August next. In case it should be desired to open at an earlier day, a temporary pile-bridge can easily be erected in the Spring, at a small expense.

This Viaduct though it has progressed slowly, so far as completed, is well done; and would be acknowledged by competent judges to be good work any where, and considering the low price at which this work was undertaken, the execution reflects credit on the Superintending partner, Mr. W. H. Crosby.

### SECTIONS 7, 8 AND 9.

Sections 7, 8 and 9, Hampton District, and 5 and 4, Salisbury, next in order, were let on the 15th of December, 1857, to Messrs. Blackie & Johnston,—Dillon P. Myers,—Thomas King & Co.,—Walker & Co., and McDonald & McBean—consecutively,—to be completed on the 1st November, 1859.

The two first, and the last of these Sections are well advanced; a reference to Table A, No. 9, in the Appendix, will show that if they proceed at the same rate during each portion of the allotted period, that they have hitherto, they will be completed within the time specified.

Sections, No. 9, Hampton, and No. 5, Salisbury District, are not nearly in so satisfactory a state, and redoubled exertions will be required upon these Sections, during the ensuing Summer, to complete them in accordance with the terms of the Contracts—otherwise the final opening of the Railway may be delayed.

During the past Summer, the location between Sussex and Salisbury, 28 miles in extent, has been completed. This division was divided into seven Sections of about four miles each; and the Grading, Masonry and Bridging, put under Contract on the 8th day of October last. The Track-laying and Ballasting, being reserved, to be let hereafter as a separate Contract.

This latter course was adopted, in consequence of it being found, that, where these items were included with the other work, the Contractors injured the Permanent Material (Rails, Chairs, Spikes and Sleepers,) by using them for their own temporary purpose, in the construction of their work; the damage thus caused, exceeded the additional cost of doing the work without such aid. The Iron Rails were frequently so

injured in removing a few trifling yards of earth, from neglect in not "packing" the sleepers, &c., as to render them unfit for Permanent Track.

These Contracts, which are for the last remaining portion of the Road to be let, are to be completed by the 1st of June, 1860. The "clearing" throughout this Division is completed, and the Grading as well as the delivery of stone for Bridges, materials for Fencing and Sleepers, &c., have been commenced upon all the Sections.

From the light nature of the Grading upon this Division, averaging under 24,000 cubic yards of earth to the mile, there is not the least doubt but that the Contractors will be enabled to finish their work within the time specified.

Should circumstances occur to render it an object of importance to open the whole Railway before the first of July, 1860, there would be no great difficulty in so doing; as by giving a small *bonus* to the several Contractors, the Earth work on all the Sections above referred to, could be completed by the 1st of October, 1859, instead of 1<sup>st</sup> June, 1860.

A portion of the ballast could in the meantime be carted on the several Sections; and as soon as the Railway is ready for the Cars, over the Hampton and Salisbury Divisions, so that the Rails can be delivered at Sussex and Salisbury respectively, the laying of the Track between these points may be immediately commenced, and successfully prosecuted to completion during the Winter of 1859-60; and sufficient ballast can be easily laid on during the Spring, to admit of the whole Road being certainly opened with safety by the 1st of July, 1860, or by the 1st June, if necessary.

From what has now been said, in reference to the completed and still progressive portions of the Road, its state of progress may be briefly summed up as follows:—

		Miles.
1st Division—	Moncton to Shediac, - - -	completed, 19.42
2d " "	—Saint John to Salmon Brook, -	completed, 9.60
" "	—Section 5 and 6,	
	including Hammond River Viaduct,	<i>3ths done,</i> 11.00
3d " "	—Hampton to Sussex,	<i>3 done,</i> 23.18
4th " "	—Moncton to head of Petitcodiac,	<i>2-5ths done,</i> 20.59
5th " "	—Sussex to head of Petitcodiac—located, let,	
	cleared, and work well begun,	24.51
Branch to wharves at Moncton,	- - -	completed, 0.86
<b>Total Miles</b>		<b>109.18</b>

It having been recommended that the locations, as completed by Messrs. Peto, Brassey, Betts and Jackson, should be revised. I now proceed to give the characteristics of both locations, as well as a description of the character of work proposed to have been built by that firm, as compared with that now in course of construction.

### CHARACTERISTICS OF THE ROAD AS ORIGINALLY LOCATED.

The Line, as originally located, commenced on the eastern side of the Marsh Creek, outside the bounds of the City of Saint John, and proceeded up the flat of the Marsh, crossing a bend of the Creek near the One Mile House, (so called) until it struck the rough and broken ground near the "Moose Path," here passing the present Post Road on the level, thence to beyond Torryburn, when the location followed the general contour of the shore of the Kennebecasis Bay, intersecting Davidson's Cove, and thence having passed over the points of land intervening between Davidson's Cove and Sandy Cove; it again met the Kennebecasis, afterwards pursuing with but little variation its sinuosities, until it reached Harris's Cove—one quarter of a mile East of Gondola Point.

From this place, still skirting the shore line to the head of Forrester's Cove, the Road would have passed over the intervening points of land to the Hammond River, and crossed the River by an Iron Girder Bridge, 560 feet in length. Proceeding from thence the line skirted the shores of Darling's Lake, crossing Groom's Cove, and was carried over to the head of the Ossekeag, and from thence following to the South side of the Kennebecasis River—the present Channel of that River being crossed on the interval near the mouth of the Passekeag Creek, thus rendering (if this location had been adopted) an expensive diversion of the river necessary.

Between this point and Sussex Vale, the line was intended to have been carried over the several brooks, requiring to be crossed, by means of wooden trestle bridges, varying from 30 to 180 feet in length.



From Sussex Vale, by this location, the Road would have crossed Trout Brook and Salmon River, by wooden and iron Girder Bridges, 600 feet, and 420 feet respectively in length; and passing through Upper Sussex and turning up the Valley of Stone's Brook, following the same until it struck the head waters of the Anagance. From hence the Line kept the Southern side of the Anagance—still holding an Easterly direction, and crossing that river a little below its confluence with the North River, at which place the name of the river becomes the Petitecodiac; from thence keeping the Petitecodiac to the South, the Line followed nearly the general bends of the Post Road to Moncton; crossing the brooks which fall from the Northward into the Petitecodiac, near their mouths by wooden trestle Bridges,—thus continuing till it reached the Station at Moncton.

From Moncton, the Line wound round the rear of the town, crossed Hall's Creek, and proceeded circuitously up the Valley of Harris' Mill Stream to its crossing—thence to Cook's Brook, passing over the summit 161.9 feet above high water spring tide level at Saint John Harbor—passing on through the Shediac Station to Cape Brule, a distance of 110 miles from the Marsh Bridge at Saint John.

### CHARACTERISTICS OF THE LINE AS AT PRESENT LOCATED.

The Line as at present located, begins at the Mill Pond Station, St. John, and takes an Easterly course, keeping on the Northern side of the Marsh Creek, until it crosses it, opposite the residence of Robert Jardine, Esquire, where it joins the Line previously located; this portion of the original location having been previously partially constructed. From the Three Mile House, the Line diverges from that first located, and taking a direct course passing fourteen feet *above* the level of the Post Road at the Four Mile Bridge and *under* the same at Lawlor's Lake, where it again intersects the old Line; from thence to the Nine Mile House, the new line does not differ materially from the old one. But from the Nine Mile House to Hammond River, it will be seen by reference to a former portion of this Report, that the new line deviates widely from that originally located, being also much shorter and in every way preferable. From Hammond River to Hendricks', the two lines vary but little. Leaving this point, a marked deviation is observable; the new line passes over

the summit near the corner of the Passakeag Road, winding round the large bend in the Kennebecasis, and again joining the former location at a distance of 27 miles from St. John. By this *detour* the heavy excavations which would otherwise have been required for the alteration of the Channel of the River, and the effects of the annual heavy freshets (often of a most disastrous nature) have been avoided.

From the point last named, to within a mile of the boundary between Kings and Westmorland Counties, the new line, pursuing the same general direction, differs in many essential points from that originally located. Curves of larger radii and tangents of greater length have been substituted. From hence to Moncton the whole location consists of only four very long tangents and four curves of large radii. A great saving in Curvature has been effected thereby, while the Gradients are not in any way heavier than those designed for the former road.

From Moncton to Shediac, the line having been partly constructed by Messrs. Jackson & Co., it became necessary to adopt the previous location; but here some changes were made, longer tangents being adopted in several places, thereby effecting a direct saving in the curvature and distance. From Shediac Station to Point du Chêne, the constructed line was followed for a short distance, but for the remainder a new line was located down to the present wharf.

The whole distance from Mill street, St. John, to Point du Chêne in Shediac harbor, is 108 3-10 miles or only eight per cent longer than a straight or "air" line, and it is also shorter than the original location by 2, 2-3 miles.

A Branch Line 98-100 of a mile in length has been constructed from the Station in Moncton to the public wharf in that place. As this line crosses the heads of the wharves in this town, Sidings and Loading Platforms have been provided for the accommodation of those using them. The public wharf has been entirely remodelled, repaired and furnished with a moveable loading and landing Slip. Additions have also been made to the bed, so that vessels may lay at low tide with safety. A commodious Freight house has also been fitted up with conveniences for loading and storing freights.

The maximum Gradients on either location, are at the rate of forty-five feet per mile.

Table B., No. 2, contains a summary, shewing the lengths of each description as designed for both lines. On the ori-

ginal location the *minimum* radius of curvature between St John and Shediac was 1584 feet,—the *maximum* was 5260 feet.

On the revised location, the minimum radius of curvature is 2865 feet between St. John and Moncton, and the *maximum* 12,278 feet. Between Moncton and Shediac the radii of the curves are the same as those of the original location. On the original location, the total amount of curvature between St. John and Shediac was 3901 degrees or 35 degrees per mile.

On the revised location to Point du Chene, the total amount of curvature is 2173 degrees or 20 degrees per mile.

On the original location the total amount of straight line was 70.9 miles, and of curved line 40.1 miles.

On the revised location, the total amount of straight line, is 79.7 miles, and of curved line 28.6 miles, making a gain of 8.7 miles of straight line, and a reduction of curvature expressed in length of 11.4 miles.

The whole amount of the ascents on the revised location from St. John to Shediac, is 1063 feet, and the amount of the descents, is 1075 feet.

The summit or highest point on the line, is twelve and a half miles from St. John, and has an elevation of 165 feet above the level of high water in St. John Harbour.

Table B. No. 2, exhibits the details of the gradients as designed for the new location—shewing their length,—total distance from St. John—rate per 100 feet—grade per mile, ascent and descent, and elevation above the tide water at Saint John.

Table B., No. 3, gives a summary of the curves and tangents as designed for both routes

Table B., No. 1, shews the lengths between the different locations.

From the foregoing remarks, it will appear that the advantages that have resulted from revising the locations previously made by Messrs. Peto, Brassey, Betts & Jackson are very decided, and may be stated in general terms as follow :—

Seventy-five curves have been dispensed with, and straight lines substituted; ten of them being dangerous “reversed” curves, and sixteen others, connected by short tangents of from twenty to ninety feet, between the points of “reversion”—that are scarcely less dangerous.

On the revised location, the shortest tangent line between

two curves in opposite directions is 400 feet; the minimum radius of curvature has been increased from 1584 to 2865 feet.

By these reductions of curvature and elongations of *radii*, the Railway will admit of very greatly increased speed with *safety*, and these improvements will also be the cause of a great permanent saving of wear and tear in the working of the road.

Sharp curves are always highly objectionable, particularly on passenger roads, from their "wear and tear" of Engines and Cars, and displacement of Rails, &c.; and the danger of running off the track, is very much increased thereby, especially at high velocities.

The actual saving in distance effected from St. John to the end of the wharf at Shediac, is *two and two thirds* miles, while at the high rate of speed that can and will be maintained upon this Railway, should its connection with proposed lines from East and West be effected, the absolute reduction of 1727 degrees of angular deflection, (technically termed "curvature,") equal to four and eight tenths entire circles, will be equivalent to a further reduction in the working expenses of the road, of *six miles*; or, in other words, the amount of curvature here stated, had it *remained* in the Line, would have entailed an expense in friction and loss of power, (exclusive of wear and tear) equivalent to that on six straight and level miles.\*

These two items therefore, I maintain, *virtually* make a permanent saving in the working expenses of the passenger traffic equivalent to a reduction of *eight and two thirds miles of distance*.

## CHARACTERISTICS OF CONSTRUCTION ON PRESENT ROAD.

The Railway is laid out as a single line of five feet six inches gauge; although the ample quantity of 100 feet in width of land taken, as well as the location of the centre line, likewise the Station Buildings, are arranged for a double Track, if required hereafter.

The Permanent Way consists of a single **T** rail, of the latest improved American pattern, 63lbs. to the yard, of Staffordshire hammered iron, fastened down at the rail joints only, (with cast chairs, of 24lbs. weight each, manufactured from "best

\* See Note B. at end of Report.

Welsh cold blast" iron,) to sleepers, of cedar, hachmatac or pine, nine feet in length, ten inches wide, and six inches deep, laid two feet four inches apart from centres, the largest being at the joints, and all bedded in clean ballast, twelve feet wide at the base of rail, and extending twenty inches in depth below the same level. The width of the Roadbed is not less than twenty feet, on embankments, and twenty-four feet in excavations at "formation level" which is two feet below rail height.

The side slopes are nowhere less than one and a half horizontal, to one perpendicular, though, where required, these have been reduced to one and three quarters, and two to one.

In construction, the road-bed has invariably been kept two or three feet above the general level of the ground whenever practicable, in order to ensure a good drainage and facilitate the removal of the snow, (a very necessary precaution in this climate;) when this could not be effected without incurring too much expense, and when material obtained from excavation of ordinary width, was insufficient to complete the adjoining embankment, the low and wet cuttings liable to be deluged with water, have been increased to thirty-five feet in width at formation level, and capacious ditches opened on either side; thereby forming as it were *embankments throughout the cuttings*—a desideratum very essential for the efficient working of railways in the severe winters in this climate.

On steep side hill cuttings also, where ice would be liable to be formed over the rails, the excavations on the double track side, have been enlarged to twenty feet from centre, or thirty-two feet in all, and a "catch water" drain ten feet in width and two feet in depth, below formation level, has been inserted between the side hill and the Railway; wherever the depth of embankments exceeded thirty-feet, the formation width has been increased to twenty-two feet, and the side slopes made two to one; and wherever the action of water had to be especially guarded against, "rip rap" or bank paving has been placed as a protection. The rock excavations, are not less than twenty-four feet in width, with side slopes of three inches to the foot.

The Masonry for the large and more important bridges, is the best "Ashlar" with "hammer dressed" beds, and rough or quarry faces, laid in hydraulic cement; while that of the smaller class bridges, is of good substantial punched rubble laid dry.

The superstructure of all bridges of spans above forty-feet is composed of wrought iron; all of these bridges have been so designed, as to ensure safety and stability, with proper regard to economy.

The patterns adopted, are of three kinds, viz. :—"Stephenson's, Fairbairn's, and Warren & Kennard's patents." Those that have hitherto been executed, may rank with the best of their respective kinds in other lands.

I may here remark, that latterly, all the iron rails and girders, have been prepared under the superintendence of Charles May, Esq., C. E., of No. 3, Great George Street, Westminster—and it is but an act of justice to that gentleman to observe, that he has executed this duty with ability and fidelity.

The superstructure of Bridges of Spans under forty feet, is of wood, composed of the best well selected St. John pine timber. Table B., No. 4, gives a statement of the quantity of iron and wooden bridging, that was to have been erected by the former Contractors, and also shows the greatly reduced quantity of bridging now being completed. A perusal of this Table will show, that although iron superstructure has been extended to the ten principal bridges, or to all spans of upwards of forty feet, while the original Specification only contemplated applying iron, to four Bridges of Spans of one hundred feet and upwards, yet the total quantity of Iron Bridges has been reduced, from eighteen hundred and twenty, to thirteen hundred and ten lineal feet. The wooden superstructure, has also been reduced, from four thousand and eighty-four, to two thousand three hundred and eighty-six feet, or nearly one-half. It is likewise worthy of remark, that nearly all the wooden bridging, was originally intended to have been composed of *trussle work*, with the earth slopes running directly through the posts—a method of all others, the least permanent. The wooden bridges now being constructed, are the best of their several kinds; the material and workmanship, in all, are to be of the best description, carefully planed and painted, and protected from the weather as much as possible, by a covering of asphaltum or zinc. They comprise twelve of woodwork alone, and twenty two, having a similar superstructure with the former, but with the addition of stone abutments,—the span between which (with a special view to permanency) has been contracted to the shortest length, consistent with the requisite space for the water:—this will account for a portion of this re-

duction. A further reduction of trestle bridging has been effected, by the substitution of arch and box culverts of stone, with embankments, wherever practicable; by which the consequent demand for repairs and liability to accident, has been greatly reduced.

\* Nearly all the main roads intersected by the Railway, have been crossed either over or under, by means of substantial bridges,—level crossings, (as originally intended,) being the exception rather than the rule.

The arch culverts on the Line, vary from 4 to 12 feet span; they are of the very best description of material and workmanship, and laid in hydraulic cement.

The box culverts are of different sizes, and are with a few exceptions, of a very good description of strong punched rubble masonry laid dry; no wooden culverts on the main-Line, covered by earth-work, have been permitted.

From Moncton to Point du Chene, the superstructure is composed of the **U** or bridge rails imported by Messrs Jackson & Co. As a previous and extended experience of this Rail on the St. Andrews and Quebec Railway, had confirmed me in the opinion that the single **T** or American pattern, was a superior form of rail for this climate, its adoption was recommended, for the residue of the line between Moncton and St. John, as already stated.\*

In crossing the several viaducts and bridges between St. John and Moncton, "Winslow's Compound," or continuous bearing Rail has been adopted. This dispenses with both joints and fishes &c., and thus adds largely to the safety of the Railway.

A pier, 1850 feet in length, has been built at the Shediac terminus at Point du Chene.—1000 feet of which, is thirty feet wide; and 770 feet, forty feet in width; at the end an **L** 80 × 150 has been placed. A single Track has been laid down and a carriage road constructed alongside the railway throughout its whole length; suitable mooring posts and rings have been provided, thus ensuring (as far as possible) safety to ships moored alongside the Pier. Loading Platforms have also been erected, and cranes have been procured to facilitate the shipment of freight or cargo.

In further explanation of the style on which the works are

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\* See latter part of Note C. on this subject.

being executed, I beg to refer to the form of Specification attached to the Contract at the end of this Report ; and I take this opportunity of stating, that a strict adherence to the terms of these Specifications, is invariably insisted upon.

In concluding these remarks upon the several constructions in this Railway, I beg to say, that the works generally are being built in a thorough and substantial manner, and with a due regard to the ultimate requirements and permanent efficiency of the Road, and at the same time with every attention to a proper economy.

As some test of the goodness and safety of the Road, it is worthy of remark, that since the two divisions from Moncton to Shediac, and from St. John to Kennebecasis have been opened, doing a considerable traffic, and at an average rate of speed of about 30 miles per hour, (while the train is in motion,) and extending over a period collectively of nearly two seasons, during which no accident, or failure of any kind has taken place, arising from imperfections in construction, or from any inherent defect in the way, works, or rolling stock.

And I believe I am justified in saying, that no Engine or Train has been thrown off the Main Line, through any of the above causes ; indeed, no accident of this kind has occurred, and this is the more remarkable, when is remembered, that both the above Divisions were opened for Traffic, before the Ballasting was completed, and while a considerable proportion of the work was in an unfinished state.

## ROLLING STOCK.

Table A, No. 8, shows a list of required quantity of Engines, Cars, Snow-ploughs and equipment generally designed for the Railway ; it will be sufficient to say that they are of the newest and most approved American pattern, and are, in my opinion, better adapted to the climate of this country and the traffic to be anticipated, than any other.

The experiment of building the Locomotives in this city (St. John,) has been entirely successful, and I have no doubt that the enterprising builders, Messrs. Fleming and Humbert, having perfected their arrangements, can make Engines equal to those imported from Boston.

The Passenger Cars on this Railway, are especially worthy of notice ; in point of interior capacity and general arrange-



ment, I do not hesitate to say, (although made in this city) that they are unsurpassed in America, and reflect much credit on Mr. James the Contractor, who has spared no pains in their completion.

As it is very desirable that all the Rolling Stock of a Railway, each of their respective kinds, be of uniform size and pattern so that they may be as much as possible duplicates of each other; and as there is now a large proportion of the stock required already on the road, prepared in accordance with well digested designs, I cannot conclude this notice without recommending that the original patterns be generally adhered to.

Exception has been taken to the wrought iron trucks under the Freight and Platform Cars as being liable to get out of adjustment; but, as this only happens in the event of Cars running off the rail, which very rarely occurs on this Railway, it is questionable whether the objection would not be overruled by the superior permanency of the iron truck.

#### OBSERVATIONS ON THE CONTRACT MADE WITH MESSRS. JACKSON & Co.

The superiority of the Road now being constructed, over that which would have been made under the original contracts with Messrs. Jackson & Co. having been assumed in this Report, it is proper to state succinctly and clearly, the grounds on which a comparison of the two lines, is presumed to be favourable to the former.

Such a comparison cannot be fairly made, without adopting some standard, by which the merits of both lines can be measured.

Assuming, therefore, that a road is in every point of view the best,—which is the shortest, the most level, durable—and, at the same time,—the cheapest which can be made—the following comparison may be instituted.

To facilitate this enquiry it is well to refer to, and thoroughly examine, the original specification (marked A) a copy of which is annexed.

It must be remembered, that it has been considered judicious to substitute work of a superior character to that specified and as exhibited on the drawings—and to add thereto.

From the character of the specification it will also be evident that extra work (not provided for therein) would have been imperatively required.

The points here briefly referred to, as particularly demanding attention, are more fully discussed in Note C. The additional, cost to that which would have been incurred, by strict adherence to the former contracts, was rendered necessary for the attainment of the following objects ;—

1st, additional cost of Iron for superstructure.

2nd, widening, straightening, and perfecting the grading.

3d, the substitution of arch culverts, covered by embankments, and permanent bridging—in place of trestle work (occasional) wooden culverts, or level crossings.

4th, the erection of five additional wood and water stations.

5th, grading depot grounds.

6th, the construction of Shediac, Moncton and Torryburn wharves.

7th, making 35 miles additional Fencing and liquidating land damages.

\* The proper value of these several additional items is as follows :—

Original contract price	£6,500 stg.	<i>per mile</i>	£7,800
Additional cost of Iron above that specified,		<i>at per mile</i>	240
Additional earth work for widening, straightening, and perfecting grading,		<i>at per mile</i>	633
Additional cost of permanent bridging in lieu of trestle work, wooden culverts, and level crossings,		<i>at per mile</i>	351
Additional wood and water stations,		<i>at per mile</i>	35
Additional depot grounds,		<i>at per mile</i>	138
Additional wharves,		<i>at per mile</i>	83
Additional fencing, -		<i>at per mile</i>	51
Land damages,		<i>at per mile</i>	277
Total cost of present road by original contract		<i>per mile</i>	£9,608
Present estimated cost		<i>per mile</i>	8,500
	Saving <i>per mile,</i>		£1,108

\* For a further explanation of this comparative estimate, I refer to Note C, where the causes of these items being charged, are enlarged upon ; and I also call attention to the significant quotations from the Report of Mr. Charles Hutton Gregory, and Mr. Walter Shanly on the Grand Trunk Railway.

From this it is evident, that it was only by the substitution of less perfect and permanent work, that the Road could have been built cheaper than it is now being constructed.

It may not be improper here to call attention to the comparative estimate, which has been furnished to you, of the average cost per mile of the Nova Scotian, New York, and European and North American Railways.\* It will therein be perceived that, in the items of Grading, Masonry and Bridging, the cost of this Road is large in proportion—this increase it must be remembered, is for work of an enduring and permanent character, (which governs the annual outlay for repairs)—while in rolling stock, buildings, engineering and contingencies, the proportion of this is small.

This Table is worthy of study and is very significant, affording, as it does, a true criterion by which the permanent character and economy of expenditure on the European and North American Railway, may be judged.

The system of allowing contractors to prepare their own specifications—select their engineers—design their locations—and superintend their own constructions—is one which renders them to a great degree irresponsible,—enabling them in fact, to make a Railway to suit their own pecuniary advantage, and is altogether incompatible with the true interests of a Provincial undertaking, especially one of the magnitude and importance here involved.

While investigating the comparative merits of the two mentioned methods of Railway construction, it has been my somewhat unenviable duty, to institute a comparison between the Line as first located, and the works as now being completed,—and I trust, that in so doing, I have not laid myself open to the charge of drawing invidious conclusions or of making contrasts further than was necessary to render the subject fully intelligible.

It is far from my intention, to convey the impression, that the contractors or engineers did not fulfil their several engagements, as *defined* and ascertained, by a strict construction of the terms of the original contract. On the contrary, I do not hesitate to say that these gentlemen fully executed the works as specified, which were, as far as completed, constructed in accordance with the contract. If just cause for complaint here exists, it is to be attributed to the want of

\* See page 14.

definiteness in the specifications, which admitted of such latitude of interpretation.

The line as at first located was such a one as a judicious engineer, whose special duty it was to study the pecuniary interest of his employers — without any regard to the subsequent cost of maintenance and running expenses — would have designed. It was, it is true, very curvilinear: but, — when it is taken into consideration, that it was to have been paid for *by the mile* and therefore rendering it a requisite object that the road should be made as long, and as easy to build as possible, — this should cause no great surprise; — in fact, it might have been *much less direct* than it was, and still have fulfilled all the requirements of the contract.

The present excellent location of the European and North American Railway, is mainly attributable to the numerous surveys and plans previously made of it by several eminent civil engineers.

The first survey was made by John Wilkinson, Esq., an exceedingly careful and scientific geodetic surveyor, whose accurate and very superior topographical plans have been of the most essential service — a survey subsequently prosecuted by Messrs. Beattie and Campbell, well known in the profession — afterwards by Frank Giles, Esq., assisted by a very competent staff, whose comprehensive profiles and plans were of the greatest value in selecting the present location, (these being subject to the approval of A. C. Morton, Esq., the consulting engineer). All the gentlemen above referred to, contributed to render the final survey and location, comparatively easy, and gave to their successor and the Province the benefits of all their previous labors and experience.

Before speaking of the Engineering Staff I must first beg to acknowledge the very valuable advice, and courteous consideration which I have invariably received from Mr. Parker, C. E., of Boston, who was employed by the Government to Inspect and Report upon the Works.

### ENGINEERING STAFF.

The staff has been organized upon the American system, which is considered the best adapted for the requirements of the construction of Public Works on this Continent wherever the general and promiscuous way of letting works

to men of all classes is entertained, without any special regard being had to their qualifications, and so long as the lowest tender for work must necessarily be accepted, such an organization of the staff will be imperatively requisite.

In England a different system is adopted; the Public Works are rarely let except to *bona fide* contractors, well known to have extensive experience and capital; such men have generally a thorough knowledge of their business, and keep in their employ a regular staff of Engineers. The works are generally, let to the contractors, after the locations and plans have been carefully arranged and decided upon, —they becoming responsible for the works; and executing them under the supervision of their own Engineers; the Company or the Government, as the case may be, merely employing a Chief Engineer and such a limited staff of Resident Engineers and Inspectors, as may be sufficient for the *general* supervision of the Works.

This, it is evident, could not be done in this country, as for the reasons already stated the contractors have not the experience as a general thing, nor have they the Engineers in their employ—and the result would be that if works were let to them under the English system the Engineering (if done at all) would be done very badly, while the construction generally would be “scamped.”

The English system has to a certain extent been tried in Nova Scotia, and I find from the very able Report of Mr. Laurie, the Civil Engineer appointed by the Government of that Province, to examine and report upon the Nova Scotia Railway, that the result has not been satisfactory.

Extract from Mr. Laurie's Report, page 41 :—

“It may be proper to state, that I consider the Engineer Department of the road as having been organized on too limited a scale, originating, no doubt, in the laudable desire of economy, but in this it is quite possible to go too far. The force employed has not been sufficient to give the requisite levels and stakes during the progress of the work, and we consequently find, at several places, the grading out of line, excavations and embankments too wide, and at others not wide enough, improper ballasting used, and other matters of detail imperfectly executed. Some of the bogs and lakes which have swallowed up such large quantities of material, could have been partially or wholly avoided, and no doubt would have been, had proper soundings been taken to determine their depths on the original surveys. The services of one or two well qualified assistant Engineers in addition to those who have been employed on the road, to have given a personal superintendence to the work, would have saved large expenditures at many points—expenditures which, although nominally borne by the contractors, have generally in the end to

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be made up to them in the shape of allowances or otherwise. The duties of Chief Engineer are such, in the office, as prevents his spending much of his time upon the line during the construction of a road."

With the above view, the Engineering Staff has been latterly organized upon as limited a scale as was compatible with thorough efficiency, and the work has been systematically carried on in the following manner. As soon as the surveys and locations had been completed, the plans and drawings prepared and the contracts let and signed—the Road was divided into eight separate Divisions—each averaging about 13 miles in length and placed under the charge of Division Engineers.

The duty of these Engineers, was to attend to the careful "setting out" of the numerous works and structures, to see that they were built of the best material, in a proper manner and in accordance with the specifications, to make to the Chief Engineer regular returns of all work done and material delivered on their respective Divisions, for each month then ending, so that the Contractors could receive monthly payments for the exact amount of work done:—In fact, to take sole and full charge of all the Works on their respective Divisions receiving orders from, and reporting weekly to the Chief Engineer, who by this means is kept constantly and correctly informed of everything transpiring on each Division of the Road.

A principal assistant Engineer, of matured experience, was also appointed, whose duty it was to take the general supervision of the whole of the works and act under and carry out the particular views and orders of the Chief Engineer and pass over the Work, as often as possible, consulting and advising with the several Division Engineers on the state of the works generally and on any particular difficulty that might at any time arise.

In the principal Office at St. John a Draughtsman and two Assistants, and also a Clerk have been appointed. The duty of the former was to prepare all maps, plans, and drawings of structures of every description, under the especial direction of the Chief Engineer and the Principal Assistant. This important service has been very onerous, from the fact of each Section being let separately for a "gross sum," necessitating the preparation of distinct sets of drawings in full detail for each Contract in duplicate; and it is but justice to say, that the execution of these latter reflects the greatest

credit upon the gentlemen to whom this service has been entrusted. In addition to his special duties as Clerk, Mr. Stone has made out all the Contractors monthly accounts as well as the pay lists and vouchers of the Engineering Department.

The following list shows the names and special duties of the Officers of the Staff; but it should be stated that some of the situations referred to are not at present occupied by their original holders:—

### LIST OF ENGINEERING STAFF.

R. W. Burrowes,	Principal Assistant Engineer.			
George Wightman,*	Locating Engineer,			St. John.
Thomas Ramsay,*	Assistant Locating Engineer.			
Endicott King,*	Resident Engineer,	St. John to Hampton.		
John Stone,	Chief Clerk,	Principal Office		St. John.
William Lunn,	Chief Draughtsman,	"	"	"
H. G. C. Ketchum,	Assistant Draughtsman,	"	"	"
John T. C. McKean,	"	"	"	"
Chas. F. Ely,	Engineer in charge of Division,			Moncton
F. P. Tuck,	Second Assistant,			"
W. J. Crossdale,	Engineer in charge of Division,			Salisbury.
Fredk. L. Dibblee,	Second Assistant,			"
W. S. Rowson,	Engineer in charge of Division,			Anagance.
C. F. Gregory,	Second Assistant,			"
H. F. Perley,	Engineer in charge of Division,			Sussex
William L. Hazen,	Second Assistant,			"
R. R. Thompson,	Engineer in charge of Division,			Norton.
E. R. Burpee,	Second Assistant,			"
W. H. Rankin,	Engineer in charge of Division,			Hampton.
G. F. Crookshank,	Second Assistant,			"
J. Ewd. Boyd,	Engineer in charge of Division,			Lakefield.
John H. Parks,	Second Assistant,			"
P. D. Cox,	Engineer in charge of Division,			St. John.
J. Mahood,	Second Assistant,			"

\*Left the Road

\*Left the Road.

\*Left the Road.

In justice to the whole Staff, I cannot allow this general notice of its various members to pass without gratefully acknowledging the ability, assiduity and faithfulness which have distinguished the entire corps. In this Report it would be out

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of place to particularize individual claims to regard ; nor would it be in accordance with my own feelings, to contrast the merits of the several Officers mentioned, who have each and all, manifested an untiring zeal for the success of the Road, and whose general conduct has been such as to entitle them to the warmest commendation ; it is indeed to their zeal, fidelity and ability, that the degree of success attained in the prosecution of the details of the work, to which I can refer with satisfaction, is in a great measure attributable.

Of every member of the Staff I can with sincerity say, that he has established a claim to a higher position than that which he now occupies.

As Heads of Departments, Messrs. Burrowes, Wightman and King, are obviously entitled to special attention. If the position, of these gentlemen in the Corps, did not even demand this notice, my own grateful sense of the valuable and ready assistance (which, whenever required,) they have afforded me, calls for my warmest acknowledgements.

As Principal Assistant Engineer—his superior general Engineering talents, practical knowledge of Mechanics, and a previous experience as Contractor as well as Engineer, have enabled Mr. Burrowes to afford me invaluable co-operation. To Mr. Wightman's skill as Locating Engineer, added to great experience and very superior judgment in selecting routes through a difficult and partly wilderness country—the superiority of the present location of the road, over that formerly adopted, is mainly attributable.

Mr. King's unremitting attention to the onerous duties, which devolved upon him, as Resident Engineer in charge of the very heavy Division between St. John and Hampton—together with his strict adherence to approved system, and thorough practical knowledge, rendered his services of great value.

As Resident Engineer on the Moncton and Shediac Division, Mr. H. F. Perley's indefatigable zeal during the completion of this portion of the road, entitle him to great credit. To Mr. Perley also, as well as to the reliable assistance of Mr. H. G. C. Ketchum, I am much indebted for the aid they have afforded me in collecting many particulars, and arranging a portion of the data, to be found in the tables which accompany this Report.



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In conclusion, I have to observe, that although this Report has exceeded the limits in which I had supposed it could be comprised, I trust it will not be regarded as unnecessarily prolix or minute. When the great interest is considered, which is justly attached to the European and North American Railway—an interest not confined to this Province:—when the powerful influence which the success of the road must have on the present fortunes, and in (its widest sense) the future welfare of our people:—when especially it is considered, that not hastily adopted or perhaps ill founded expectations, are entertained, that this road will ere long become the great thoroughfare of British North America—to form, it may not be presumptuous to hope, before many years elapse, the Eastern portion of a great highway from the Atlantic to the Pacific—all these momentous topics for consideration being regarded,—it is surely most desirable, that every *official* statement or report relative to the road, should be comprehensive and thorough.

I have the honor to be,

Sir, your obedient servant,

ALEX. L. LIGHT,

ENGINEER.

## NOTE A.

In further explanation of the amount *virtually* saved by the adoption of the shorter route through Lakefield, it is necessary that the data forming the basis of the calculations made in the body of the Report, should be more fully enlarged upon.

The cost of the original line from Salmon Brook to Hammond River, around Gondola Point, 8.12 miles in length, would have been *by the lowest tender* £106,794, or at the rate of £13,152 per mile, including superstructure, stations, rolling stock, and land damages.

The saving in distance, effected by adopting the line through Lakefield, was 1.45 miles, which at the before mentioned rate would amount to £19,070, the annual interest on which sum at six per cent. is £1144.

The annual wear and tear, and repairs, as well as the cost of running the trains, that would have arisen upon this unnecessary 1.45 miles of railway, will be ascertained by the following investigations:—

The expense for repairs of iron rails, after allowing for the value of the old material, has been found to be equal to the cost of an entire renewal once in every fourteen years—that for cross ties to a renewal once in eight years.

The annual cost of repairs per mile upon a substantially finished way and works may be stated as £100.

Thus we obtain for annual wear and tear and repairs the sum of £370 upon this distance saved.

Assuming four as the least number of trains that would daily have passed each way over this 1.45 miles of Railway, if it had been constructed, we have an aggregate saving per annum of 3500 miles of distance, effected by the adoption of the Lakefield route.

The cost of running a train may be stated at two shillings and nine pence per mile, including all incidental expenses, except wear and tear and repairs of Track; this makes a saving of £419 for this item.

In a word, assuming the cost of this 1.45 miles of railway to be as above £13,152 per mile, or £19,070 for the whole distance, the interest of which is £1144; the annual repairs as well as wear and tear of superstructure, to be £370, and the annual running expenses also £419; the *total* annual expense will then be £1933, which is the interest of £32,216 at 6 per cent., which sum might profitably have been expended in shortening the Railway 1.45 miles.

It so happened that the line through the Lakefield settlement, instead of requiring this sum to be expended upon it over and above the cost of the Gondola Point Line, was actually obtained for £31,500 less money than the longer line—adding together, therefore, the sum actually saved and the sum that might properly have been expended to obtain the shorter route; we have the sum of £63,716 as the *virtual* saving by the adoption of the line by Lakefield, which was in every way superior.

The following is an extract from a work by W. M. Gillespie, C. E., Professor of Civil Engineering, entitled "Roads and Railroads," wherein, as he himself expresses it, "the results of an engineering experience in all parts of the United States, &c., have been combined.

This extract, from such a well known and undoubted authority, so fully embodies my own views upon this important subject that I will make no apology for inserting it.

## "ECONOMY OF STRAIGHTNESS."

"From the great cost of the superstructure of a Railroad, and the continually increasing expense of keeping it in repair, it is highly desirable that it should be as straight, and consequently as short as possible.

"As the earthwork of a railroad costs almost nothing for repairs, while those of its perishable superstructure are very great and proportioned to its length, as is also the cost in fuel, wages, and wear and tear of the engines of running the road, it will often be advantageous to make large expenditures for the former element of cost, in order to lessen the length of the road, and consequently the annual expenditures for the latter.

"Suppose the total cost of a railroad to be \$30,000 per mile, the interest of which is \$1800; the annual repairs of the superstructure \$1000 per mile; and the expenses of engines also \$1000 per mile. The total annual expense will then be \$3800, which is the interest of \$63,000, which sum might profitably be expended to shorten the road one mile, or \$12 to shorten it one foot of length. If this single foot gained was the only result of a day's labor of a locating party, it would be a satisfactory equivalent for the expenses of such a day's work.

"On these grounds, a *short* route, which has the faults of steep grades and curves of small radius, may profitably receive an outlay of capital upon it, for the purpose of lessening these defects, equivalent to the cost of the difference of distance between it and a *longer* line, which has better grades and curves:

From these considerations it is also seen that a line ought not to diverge from the direct course between its extremities, and thus increase its distance, for the sake of the trade of a small town, for whose benefit the time and fare of all the passengers and freight on the whole line would thus be taxed. It would be preferable to make a branch track to the town."—See "*Roads and Railroads*"—page 270.

## NOTE B.

### REMARKS ON CURVES.

The theory of a perfect railway requires that it shall follow a right line on plan and be uniformly level from end to end.

These two conditions are made impracticable by the interposition of natural obstacles, such as hills, rivers, buildings &c., which must be avoided, or crossed, or passed within certain limits.

The principles regulating all lateral deviation are, *first*, that they can be made only in curves, angles being incompatible equally with the speed to be attained on Railways, and with the constantly parallel axes of the four or six wheeled machines impelled upon them; and *secondly* that as the perfect condition is a right line, so does comparative perfection consist in the minimum amount of deviation from it, that is, in the largest possible radius of curvature.

The Count De Pambour, in his work on Locomotive Engines, says "Curves in railways present inconveniences which are by so much the greater as their degree of curvature is greater.

These inconveniences are of three kinds: 1st when a wagon moves in a curve the wheel which follows the outer rail necessarily goes over more ground than that which follows the inner rail. Now, in wagons at present in use, the two wheels of the same pair are not independent of each other, but are fixed invariably on the axle which turns with them. Therefore the distance described by the one cannot be less than the distance described by the other, except the latter be drawn without turning over the difference between the two distances to be described. This is in consequence an additional resistance offered to the motion.

2nd The centrifugal force created in the passage of the curve, by virtue of the velocity of the motion, may urge the wagon outwards, so far as to produce a contact and consequently a friction of more or less energy of the flange of the wheel against the outer rail; and the resistance produced by this cause is much more injurious than the former one, because the friction takes place on the whole of the distance performed by the wheel, and not merely on the difference of the distances performed by the two wheels.

3rd Finally, the centrifugal force of the motion may be such as not only to press the flange of the outer wheel against the outer rail, but by pushing the wheel violently in a direction tangential to the curve, it may drive the flange of the wheel over the rail, and thus throw the train out of the rails."

The following tabular statement, compiled from the "Third Report of the officers of the Railway Department," in England, in 1813, exhibits the average velocities attained on five different railways — the great difference in which was mainly attributed to the difference in their curves only:—

	Average velocity attained.
Northern and Eastern,.....	36 miles per hour.
Great Western,.....	33 " " "
London and Birmingham,.....	27 " " "
Manchester and Leeds,.....	24 " " "
Birmingham and Gloucester,.....	23½ " " "

The "Northern and Eastern Railway," with the exception of one sharp curve where it joins the "Eastern Counties," line is very straight, occasionally extending for several miles in a perfectly straight direction.

The "London and Birmingham" — constructed through a difficult country — has moderate curves and gradients. The "Manchester and Leeds" Railway has curves generally of  $\frac{1}{2}$  of a mile radius, and some still less.

Thus it would appear that the sharper the curve, the greater the resistance offered to the impelling power, and consequently the greater expenditure of fuel in the Locomotive Engine to overcome that resistance; an increased amount of wear and tear to the rails and flanges; and it may be added, as the result of actual experience, entails an additional outlay for maintenance of nearly 25 per cent.

The following fact may also be deduced, namely — that reducing the curvature on a line of Railroad, not only *actually* shortens the distance to be travelled over, but *virtually* reduces that distance still further by enabling a much greater rate of speed to be attained, with safety and economy.

From this brief compiled history of the disadvantages of curves upon railways, I now proceed to analyze as nearly as possible (from such data as are extant upon the subject) the approximate value of the *virtual* saving made by the reduction of curvature upon this road.

It is much to be regretted that the experiments which have hitherto been made relative to the resistance caused by curvature at high rates of speed have not been conducted upon a more enlarged scale and in a more comprehensive manner; although sufficient is known to warrant very decided conclusions being made upon the subject.

From various experiments made upon Curves of different radii to ascertain the resistance due to curvature, it has been found that the resistance at the same speed is inversely in proportion to the radii, commencing with a curve of 6000 feet radius and *merely moving the load*, the ratio of increase of resistance, as the radii were reduced, shows that 200 feet radius is the Curvature upon which theoretically the resistance would be doubled, or upon which it would require double the power to draw a given load that would be required upon a level straight line.

A full circle of this latter radius would be about 1256 feet in length; it follows, therefore, that in passing round a full circle of this radius the consumption of power

which would be required will be twice that which would be necessary upon a level straight line of 1256 feet in length; or, in other words, the extra consumption of power required by the resistance due to the curve, would have drawn the load an additional distance of 1256 feet on a level straight line.

The resistance due to curvature being found, as before stated, to be precisely in inverse proportion to the radius, it follows that the total amount of resistance due to a full circle, or 360 degrees of Curvature, would be the same whatever the radius might be; and that the extra consumption of power, required to overcome that amount of Curvature, would be sufficient to draw the load 1256 feet of additional distance upon a level straight line.

It must, however, be understood that this result is deduced from experiments made upon a load *merely moving* at a very slow rate of speed.

No satisfactory experiments have yet been made in this country, to determine the resistance on a given curve due to high rates of velocity, but it cannot be doubted that the increased resistance upon a given curve, would be precisely in proportion to the speed.

In merely moving a load upon a level straight line, no resistance except friction is developed; this having been assumed in these experiments to be about 8 pounds per ton, and the power necessary to move the load on a curve of 200 feet radius, being double that amount, it follows that eight pounds per ton is the resistance due to that curvature when a load is merely moved.

In estimating therefore, the value of a road designed for moving heavy loads at a very low speed, that is to say, in reducing the length of such a road to its equivalent length of straight line, it would be a fair rate to add to the measured length, 1256 feet for every 360 degrees of curvature.

Applying this rule to the line under consideration, the saving of distance upon the new location, in consequence of the reduction of curvature would be about one mile and a quarter; but when taking into view the fact, that we are constructing a Railway for moving trains at a speed of from 20 to 60 miles per hour, the actual saving of distance that will be found upon a proper equation will be far greater.

The above deductions from the experiments of Mr. Latrobe the Chief Engineer of the Baltimore and Ohio Railway, which were made with great care, are perfectly reliable; they fully demonstrate the value of the resistance of curvature, when the load is *merely moved*; but no exact proportion has yet been accurately ascertained, of the value of the additional resistance, due to any increased rate of speed.

In the autumn of 1855, Mr. McCallum, the eminent superintendent of the New York and Erie railroad, instituted a careful series of experiments for the purpose of determining the relative power required upon the several divisions of the Road, for the transportation of *heavy freight*.

Previous to the date of these experiments—it had been customary to estimate the friction of cars with wheels of 30 inches and journals of 3 inches diameter at about 7 lbs. per ton, or 8 lbs per ton, for wheels of 33 inches—but the average of six experiments at a speed of ten miles per hour, conclusively shewed that the friction of the loaded cars did not exceed  $4\frac{1}{2}$  to 5 pounds per ton.

After a careful examination and comparison of the loads, moved upon the ruling grades and curves of various sections of the road, it was certainly ascertained that the friction of the cars was  $4\frac{1}{2}$  lbs. per ton (of 2,000 lbs.) The resistance of curves being  $\frac{1}{2}$  lb. per ton for a deflection of one degree of curvature per 100 feet, at the same rate of speed. Assuming the friction at 5 lbs per ton, the resistance upon the deflection of one degree of curvature per 100 feet, would be 10 per cent. additional; and as the resistance at the same speed is inversely in proportion to the radius as already stated, it follows, that a curve with a deflection of 10 degrees per 100 feet, or of 573 feet radius, would double the resistance: a full circle of this radius would be

about 3618 feet in circumference, therefore in passing round this curve the consumption of power, which would be required, would be doubled, or otherwise, the power requisite to carry the load around this curve, would have drawn it an additional distance of 3618 feet upon a straight and level line. By this it will be apparent that the reduction of every three hundred and sixty degrees of curvature, would be tantamount to a reduction of 3618 feet of distance.

In estimating therefore the value of a road, designed exclusively for freight, at a speed of ten miles per hour, that is to say—in reducing such a road as previously stated, to its equivalent length of straight line, it would be a fair rate to add to the measured length 3618 feet for every 360 degrees of curvature or *vice versa*; applying this rule to the line under consideration;—the saving of distance in consequence of the reduction of 17279 of curvature, would be about  $3\frac{1}{2}$  miles.

The only reliable experiments on the resistance of curvature at *high velocities* are those of that eminent Civil and Mechanical Engineer, Daniel Kinnear Clark, Esq. These trials were made in England, on one continuous run on varying gradients, and with various curves, of and under one mile radius.

Mr. Clark found that at a speed of forty-five miles per hour, on curves of one mile radius and under, the resistance was upwards of 20 per cent. more than on a straight line. As he does not state what proportion of the curves were less than a mile radius, the data are to a certain extent indefinite. It is well known that by the Statute Law of England, curves having a radius less than a mile, are the exception upon Railways; it would therefore not be improper to assume a mile as the radius upon which the resistance will be increased 20 per cent. at the above speed. This point being established, the following results will be a natural consequence.

It being borne in mind that the resistance increases in inverse proportion to the radius, it follows that a radius of one-fifth of a mile, or a deflection of five degrees and twenty-five minutes per hundred feet, would double the resistance. The periphery of a full circle of the latter radius, will be about 6635 feet, consequently, in passing round such a circle, the consumption of power required will be twice that which would be necessary on a level straight line of 6635 feet in length.

Applying this calculation and deduction, therefore to the line under consideration, and to the data previously given, we have a direct proportion as follows:—as the number of degrees in an entire circle, is to the number of degrees of curvature saved by the present location, so is the circumference of a curve of one-fifth of a mile radius, to the total virtual saving of distance (in consequence of the reduction of curvature) upon the new location, which saving has been ascertained to be 31,829 feet or a little more than six straight and level miles—adding this, therefore, to the direct saving of 2.66 miles before shown, we have altogether a saving equivalent to eight and two-thirds miles of distance.

Assuming these deductions and conclusions to be correct—(as it may safely be presumed they are)—being based upon the experiments of three of the most distinguished Engineers of the age. The question next arises—what expense might have profitably been incurred, to obtain this permanent virtual reduction of friction, and consequent diminution of running expenses?

Assume the direct saving of  $2\frac{2}{3}$  miles road, at a cost of £7,800 per mile (the original contract price,) the total will be £20,800, the interest of which is £1248; to this add, the annual saving of reduced running expenses over the whole  $8\frac{2}{3}$  miles, (*virtually* saved,) which (by using the same figures already explained in Note A. is found to be equal to that upon 21,000 miles of distance, and which at the rate of two shillings and nine pence per mile,) is £2987; this latter sum added to the interest upon the *actual* saving above mentioned, makes a total of £4135 which is the interest of £68,916 at 6 per cent, which sum I maintain might profitably have been expended in *virtually* shortening the Railway the above distance.

The actual cost of this reduction has been £34,458, which may be seen as follows: The additional cost of grading as stated in the report, was £633 per mile; of this item, — one half was due to widening embankments and perfecting grading generally, which would have been required on any line, — the other half, chargeable to shortening and straightening, was equal to £34,458 as above stated.

Thus, it will be seen, that the clear gain effected by the shortening and straightening alone, (exclusive of wear and tear of superstructure, already stated to be twenty-five per cent.,) without taking into account the increased safety insured thereby, amounts to the sum of £34,458.

### NOTE C.

In arriving at the conclusion which I have, with regard to the extra sums that must be added to the original contract price of £7800 per mile to bring the road, as designed by former Contractors to the same standard of excellence as the Railway now building, as stated in the estimate in the body of the Report, the following data have been employed:—

1st. Those obtained by a careful examination of the several very explicit plans, profiles and estimates for the route originally intended to have been pursued, which were left by the former Contractors, and transferred to me by order of the Government.

Secondly, Those furnished by an intimate knowledge of the character of the works executed between Moncton and Shediac, on this line, as well as by a close inspection of all the works in Canada completed by the same firm.

Thirdly, The final cost of the latter, and the remarks of the several Engineers who have reported thereon—in addition to those afforded by a careful study of the Specification (marked A. appended to this Report) which confirmed the opinion adopted in reference to this subject, and which I now proceed to analyze.

1st. The Contract, of which this Specification forms a part, defines that should the first cost of iron in England exceed £6 per ton, the additional cost should be regarded as an extra. The iron used upon this railway has cost £8 per ton sterling, making a difference on the required quantity (at the rate of 100 tons per mile) equal to £240 currency.

Secondly, The embankments are required by the Specifications to be 16 feet wide at formation level, with slopes of one and a half horizontal to one perpendicular; this has been found insufficient, and they have been increased to 20 feet in width, and the slopes in many instances on high embankments have been increased to two to one; this added to the additional quantity required in straightening the line, increased the earthwork by 1,300,000 cubic yards. The Rock work has been reduced from 194,000 to 125,000 cubic yards, by the change from the Gondola Point to the Wakefield route. By equating these differences of quantities at their respective values, it is found that here £633 per mile has to be charged to the original contract.

The next item is the extra expense occasioned by the substitution of permanent bridging in lieu of trestle work, wooden culverts, and level crossings; here, the specifications stated "that bridges under the Railway, of 100 feet span and upwards, to be constructed of iron, and under that span, of timber or stone, or both, at the discretion of the Contractors, &c." On reference being had to the Plans it was found that there were four bridges marked "iron" of an aggregate length of 1800 feet over Scadou, Salmon, Trout and Hammond Rivers, twenty-two marked "wood"

As these bridges were all designed with spans less than 100 feet—and as there was no necessity for making more than the specified width of iron, it would have been in excess of contract if they had been so completed.

It is impossible to say of what character of work these bridges might have ultimately been; though in this comparison it has been assumed that they would be completed with iron.

There were bridges designated in the plans as “wooden viaducts” of an aggregate length of 4084 feet. If those bridges built between Shediac and Moncton by the former Contractors, and which were specified in a similar way upon the Plan, may be taken as a criterion of the character of work in which the remainder would have been completed, the price stated of £5 per lineal foot would be considered as ample compensation for the construction of the whole.

The actual cost (by contract), of completing the permanent bridging between St. John and Moncton, exclusive of the three Iron bridges common to both lines, is £58,497; deducting £20,420 as the value of the trestle work above stated, there is a balance of £39,077, or £351 per mile to be added to the original contract.

It will be seen by comparing Table A, No. 6 with the list of Stations in Specification A, before mentioned, that there have been added to the latter, five wood and water stations—amounting in the aggregate to the sum of £3750—equal to £35 per mile.

Grading of Depot grounds, is an extra, and is the same as charged in Table A, No. 1, £14,982 which is equal to £138 per mile.

The additional wharves (at Shediac, Moncton, and Torryburn) are the same as charged in Table A, No. 1, and equal in the aggregate cost to £9022 or £83 per mile. These wharves were not included in the original Specification.

The fencing was only to be “where required, of post and rail.” As a considerable portion of the original location was through a wilderness country, it is considered that for at least one third of the whole distance, the fencing would have been entirely dispensed with. On the present location the fencing is constructed on both sides of the line (of a very permanent character) for the entire length; therefore the charge of £5,600 for a distance of 35 miles (or at the rate of five shillings per rod), equal to £51 per mile on the aggregate distance, is deemed a just one.

The Land Damages, it will be seen by reference to the Specification were not taken into account; the proper liquidation of this item is estimated in Table A, No. 1 to be £30,000, equivalent to the sum of £277 per mile.

All these items taken together, make up the sum of £1808—which, added to the original contract price of £6,500 sterling, or £7,800 currency, makes an increase (as previously shown in tabular form) over and above our present estimated cost equivalent to £1108 per mile.

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As the selection of the best form of Rail is a matter of paramount importance, I beg leave in confirmation of my previously expressed opinion, to refer to the following quotations from the Report of Mr. Charles Hutton Gregory, (the eminent Civil Engineer sent out from England by the Grand Trunk Railway Company) “upon the construction of the Railway, the character of the Works, and the quality of the Rolling Stock supplied under the Contracts” of that Railway.

#### PERMANENT WAY.

“The description of Permanent Way specified and executed on your Railway was, I understand, settled after a consideration of the forms and details found to be most successful on the lines of the Northern States.



"The action of the severe frosts and rapid thaws distorts the whole structure of the road to such an extent that the English system of continuous bearing, or cast iron chairs with fittings, were alike inadmissible; and it was necessary to adopt a form of great simplicity.

"The Rail of 63 lbs. per yard, which is either of the form called the Bridge rail, or that called the single T rail, rests directly on sleepers, 2 feet 6 inches apart, and is secured to them by spikes. The joints are supported on a wrought iron chair, weighing, in some cases, 8 lbs, and in some cases 12 lbs, the former being the prevailing weight.

"Simplicity is no doubt thus attained; and from all the inquiries I made, I am led to the conclusion that the arrangement adopted is the one approved by most of the local Engineers; and an identical arrangement has been adopted by eminent English Engineers on the Haddiscoe and Halesworth Railway, in England, on the Altona and Kiel, on the Royal Danish Railway, and, I believe, on other lines on the Continent.

"These circumstances undoubtedly justified the adoption of such a system in the Specifications. This road is certainly superior to the road laid with light cast-iron chairs, so common in the Northern States; and where it is fully ballasted and well maintained with good material it runs well; but from a study of those parts of your line where it has been most severely tried, I have concluded that present experience might lead you to the adoption, in future works, of the single T rail with fished joints, or with Adam's Bracket Chair of wrought iron, either of which, I believe, would make a more perfect road; but it is right to add that even the first and best known of these was not generally accepted as an improvement when your road was designed. Meanwhile, on the existing portions of your system, I believe that a sensible improvement might be effected by putting in large-sized Sleepers at the joints, and arranging the spaces between the Sleepers so as to be least next the joint sleepers.

"The crossings of your permanent way are of good construction, and the simple shifting rail adopted for Switches is, in my opinion, the best suited for this climate."  
—See Report (page 34) *Grand Trunk Railway, 1857.*

"The Earthworks appear to have been properly executed; but the contract width of 15 feet was found to be insufficient for the embankments, which were subsequently increased, and the additional work allowed for in the final settlement."—See same Report, page 25.

"Many of the culverts have been made with timber tops to facilitate the clearing of them, and I do not consider this variation from the Specification to be objectionable, while the saving to the Contractors, where any exists, would be inconsiderable."—See same Report—page 26.

"It is also noteworthy that the permanent character of the important Bridges on the Grand Trunk Railway proper, will in the course of years be productive of great saving, from the absence of those losses by decay, or fire, or flood, which as you know to your cost are too prevalent elsewhere, both in Canada and the United States."—See same Report—page 37.

Extract from Report of W. Shanly, Esq., Chief Engineer of the Grand Trunk Railway.—See page 11—Report, December 1858.

"East of the St. Lawrence the whole line to Portland, having been originally constructed without that view to permanency, which characterizes it between Toronto and Montreal, and between Richmond and Quebec, the outlay called for in the renewal of wooden bridges, the reconstruction of imperfect masonry, and the ballasting of the permanent way, &c., has necessarily been very large, and must continue

to be large for some years to come. The Wooden Bridges are the main source of expense. There were originally upwards of 9000 feet in length of this perishable description of structure between Longueuil and Portland. Renewals in iron have, to a certain extent, taken place already—the most important being that of the Bridge over the river Richelieu where 900 feet in length, of tubular girder, have been substituted for the original wooden bridge, which was far advanced in decay. A good many other bridges, also, which were no longer safe, have been renewed in wood, and the work of reconstruction is still going forward, and the road gradually assuming in other respects, as well as in the bridge work, a stable and permanent character.

“The largest proportion of the expenditure is due to the American section of the Line—149 miles—from Island Pond to Portland, where the outlay chargeable to capital for the past year amounts to £438 10s. 2d. per mile.”

N. B.—I may state that the approved portion of this superstructure—as well as the improvements recommended, (with the exception of the “Adams bracket chair”) were adopted on this railway as early as the winter of 1856-7.

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**TABLES REFERRED TO**  
**IN**  
**THE FOREGOING REPORT.**

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## TABLE A.—NO. 1.

APPROXIMATE ESTIMATE OF THE COST OF THE EUROPEAN AND NORTH AMERICAN  
RAILWAY FROM MILL STREET, ST. JOHN, TO SHEDIAC HARBOR—INCLUDING  
STATIONS, ROLLING STOCK, AND LAND DAMAGES.

Grading, Masonry, Bridging, Fencing, laying Track and Ballasting, First Division, from St. John to Salmoti Brook, as per Table, No. 2,	£ 86,784 5 8
Grading, Masonry, Bridging, Fencing, laying Track and Ballasting from Salmon Brook to Sussex Vale as per table No. 9,	£160,921 4 3
Fencing, as per table No. 9,	2,400 0 0
Grading, Masonry, Bridging and Fencing, from Sussex to Salisbury, as per Table No. 9,	58,796 3 4
Clearing, as per Table, No. 9,	1,500 0 0
Track laying and ballasting,	19,000 0 0
Grading, Masonry, Bridging, Fencing, laying Track and Ballasting from Salisbury to Moncton,	55,059 7 9
Clearing, as per Table No. 9,	1,850 16 5
Grading, Masonry, Bridging, Fencing, laying Track and Ballasting, from Moncton and Shediac, as per Table No. 3,	92,531 15 4
Grading and preparing Depot Grounds, Stations, as per Table No. 6,	14,982 17 8
Plant and Surveys by Jackson & Co, see Table No. 7,	24,515 14 1
Appleby's wharf as per Table No. 9,	29,735 17 1
Moncton, do. as per Table No. 9,	373 15 3
Shediac, do. as per Table No. 9,	498 12 7
Total amount of Contract Work, as per Table No. 9,	8,150 2 8
Contingencies, &c., 15 per cent on £339,026 3s. 6d. (being am't of work under construction),	£557,100 12 1
109.18 miles superstructure at £1653 per mile,	50,853 18 2
5 per cent. for sidings,	180,474 10 9
Iron Girders for Bridges	9,023 14 6
Rolling Stock, as per Table No. 8,	20,000 0 0
Land Damages,	80,523 13 8
	30,000 0 0
Currency,	£927,976 9 2
Sterling,	£773,313 14 10

Total distance including Moncton Branch equal to 109.18 miles, making cost per mile £8,500 currency., or £7,083 sterling.

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**TABLE A.—NO. 2.**

**COST OF FIRST DIVISION FROM MILL STREET, ST. JOHN, TO SALMON BROOK, A DISTANCE OF 9.60 MILES—EXCLUSIVE OF STATIONS, ROLLING STOCK AND LAND DAMAGES.**

**SECTION.**

No. 1. Charles Walker, Dillon P. Myers & J. Brookfield,	£4,191 18 8	
No. 2. Dillon P. Myers,	39,799 2 8	
No. 3. Walker Rankin & Walker,	9,694 18 7	
No. 4. John Brookfield,	17,524 4 9	71,210 4 8
Miscellaneous account,	6,476 0 0	
Iron and Girders,	700 0 0	
Fencing,	2,029 0 0	
Levelling and Ridging,	120 0 0	
Proportion of Engineering,	4,061 11 0	
Work done by Jackson & Co.,	2,187 10 0	15,574 1 0
		<u>86,784 5 8</u>
9.60 Miles of superstructure at £1,653 per mile,	15,868 16 0	
Sidings on ditto	1,114 0 0	
		16,982 16 0
		<u>£103,767 1 8</u>

Equal to £10,809 per mile.

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**TABLE A.—NO. 3.**

**COST OF LINE FROM MONCTON TO POINT DU CHÊNE, SHEDIAC, INCLUDING THE MONCTON BRANCH—20.30 MILES IN ALL—EXCLUSIVE OF STATIONS, ROLLING STOCK AND LAND DAMAGES.**

John Brookfield, Section No. 3,	£ 16,181 11 8	
William Stevens, Section No. 2,	16,354 7 8	
Walker Rankin & Walker, Section No. 1,	27,178 4 1	59,714 3 5
Work done by Jackson & Co.,	17,812 10 0	
Fencing Moncton to Point du Chêne,	2,768 3 3	
Proportion of Engineering,	4,506 13 4	
Miscellaneous acct, including Maintenance,	7,730 5 4	32,817 11 11
		<u>£92,531 15 4</u>
20.30 miles of superstructure at £1,653 per mile,	33,555 18 0	
Sidings, sloping and soiling,	2,562 0 0	
Iron Girders for Scadouc Viaduct, (charged in Table No. 7.	3,000 0 0	39,117 18 0
		<u>£131,649 13 4</u>

Equal to £6,485 per mile.

TABLE A.—NO. 4.

APPROXIMATE ESTIMATE OF ONE MILE OF SUPERSTRUCTURE AND BALLAST.		
98 tons Iron Rails (63 lbs. to the yard) @	£12 10 0	£1,225 0 0
2 " Iron Rails additional for waste @	£12 10 0	25 0 0
<u>100 "</u>	Total,	£1,250 0 0
5 tons 8 cwt. Cast Iron Chairs (of 24lbs. each) @	£10 0 0 per ton,	54 0 0
12 " Cast Iron Chairs, additional for waste, @ £10 0 0		6 0 0
<u>6 tons,</u>	Total,	60 0 0
2½ tons Spikes @ £21 0 0		52 10 0
2,400 Sleepers, @ 2s. 1d.		250 0 0
Proportion of permanent points and crossings,		40 10 0
Total for Track,		£1,653 0 0
4,350 Cubic yards of ballast,		500 0 0
N. B. Tracklaying included in Contracts.		

TABLE A.—No. 5.

APPROXIMATE ESTIMATE OF THE ACTUAL VALUE (AT CURRENT PRICES) OF WORK DONE BY JACKSON & CO. BETWEEN SHEDIAC, BEND AND ST. JOHN, AS NEARLY AS CAN BE ASCERTAINED FROM MEASUREMENTS TAKEN ON RECEPTION OF THE WORK.

BEND AND SHEDIAC DISTRICT.		
Clearing.		£570 0 0
Workmanship on Scadouc Bridge,		6000 0 0
125,800 Cubic yards Earth Excavation, @ 1s 3d.		7862 10 0
1500 Cubic yards Masonry, @ 20s,		1500 0 0
180 Lineal feet Wooden Bridging @ 80s		720 0 0
2900 Tons Iron Distributed @ 8s.		1160 0 0
		£17,912 10 0
SAINT JOHN DISTRICT.		
18,750 Cubic yards Earth Excavation, @ 1s.		937 10 0
4,000 Cubic yards Rock Excavation, @ 8s 3d.		1250 0 0
		2,187 10 0
Total Amount		£20,000 0 0

TABLE A.—No. 6.

## ABSTRACT OF STATIONS.

No. 1 "Saint John"	Class No. 1.				
Passenger station(wooden) including shed,		£1,526	0	0	
Car House, 45 x 335,		1,331	0	0	
Engine House, (brick) 175ft. diameter,		2,941	5	0	
Wood shed	30 x 100	256	0	0	
Freight House	50 x 150	1,000	0	0	7,054 5 0
No. 2 "Kennebecasis"	Class No. 2				
Passenger station	50 x 28 platform &c.	655	0	0	
Tank House, Woodshed, Privies &c.		586	1	10	1,241 1 10
No. 3 "Nauwigewauk" Flag Station and Plat-	Class No. 4				
form, &c.					150 0 0
No. 4 "Ossekeag"	Class No. 2				
including Passenger Station, Freight					
House, Tank and Woodshed,					1,455 0 0
No. 5 "Passekeag" Flag Station and platform	Class No. 4,				
					150 0 0
No. 6 "Norton" Passenger Station, F <sup>t</sup> House,	Class No. 3,				
Tank and Woodshed,					970 0 0
No. 7 "Apohaqui" Flag Station and Platform,	Class No. 4,				
					150 0 0
No. 8 "Sussex"	Class No. 2				
Passenger Station	50 x 28	1,675	13	6	
Tank House	18 x 18	111	5	0	
Woodshed	100 x 30	303	10	0	
Freight House	70 x 45	553	0	0	
Engine House	70 x 60 (3 pits)	1,468	0	1	
Turntable	45ft. diameter	466	10	0	4,572 18 7
No. 9 "Plumweseep" Flag Station and plat-	Class No. 4				
form, Class No. 4					150 0 0
No. 10 "Penobscuis" Flag Station and platform,	Class No. 4,				
					150 0 0
No. 11 "Anagance" Passenger Station, &c.	Class No. 3				
					970 0 0
No. 12 "Portage" Flag Station and platform,	Class No. 4,				
					150 0 0
No. 13 "Peticodiac"	Class No. 3				
					970 0 0
No. 14 "Salisbury"	Class No. 2				
					1,342 1 10
No. 15 "Boundary Creek" Flag Station and	Class No. 4,				
Platform,					150 0 0
No. 16 "Moncton" Station and Turntable,	Class No. 2,				
Class					1,558 7 8
Woodshed required,		256	0	0	
Freight shed on wharf,		274	6	0	530 6 0
No. 17 "Shediac" Station and Turntable,	Class No. 2,				
		1,947	13	5	
Woodshed Required,		256	0	0	
Freight House on wharf at Point du Chêno		600	0	0	2,803 13 5
					<u>£24,515 14 1</u>

TABLE A.—No. 7.

STATEMENT SHEWING WHY THE SUM OF £29,735 17s. 1d. IS INCLUDED IN ESTIMATE NO. 1 ATTACHED, AND HOW THE WHOLE AMOUNT OF £90,000 STERLING IS ACCOUNTED FOR.

Amount paid Jackson & Co., for Surveys, Work, Iron, Rails and Permanent Material delivered, and Plant furnished £90,000 sterling, equivalent to			£108,000	0	0
Rails, chairs, spikes, sleepers in St. John, Bend & Shediac, delivered by Jackson & Co., and included in estimate of superstructure,	£46,888	2	11		
Stationary Engine, and Fixings for Shediac Sta., included in estimate of Rolling Stock,	762	0	0		
Permanent wheels for Carriages, included in estimate of Rolling Stock,	224	0	0		
Locomotive Engines "Hercules" and "Sampson," included in estimate of Rolling Stock,	5,390	0	0		
Iron Girders for Scadouc Viaduct, included in estimate from Moncton to Shediac,	3,000	0	0		
Probable value of Plant remaining after completion of the Railway,	2,000	0	0	58,264	2 11
Actual value of work done by Jackson & Co., as shewn in Table A, No. 5,				20,000	0 0
Balance charged in Estimate A, No. 1,				29,735	17 1
				£108,000	0 0

TABLE A.—No. 8.

APPROXIMATE ESTIMATE OF ROLLING STOCK AND MACHINERY.

8 Locomotives, "St. John,"	£1575	16	0		
"Kennebecasis,"	1700	0	0		
"Peticodiac,"	2350	0	0		
"Anagance,"	2731	6	2		
"Loostauk,"	2325	0	0		
"Scadouc,"	2350	0	0		
"Hercules,"	2695	0	0		
"Sampson,"	2695	0	0		
Engines on Road—Total cost,				£18,422	2 2
8 more ditto—required, @ £2500	0	0		20,000	0 0
12 First Class Passenger Cars, "	650	0	0	7,800	0 0
4 Second Class, " "	404	5	0	1,617	0 0
4 Express and Baggage Cars,	375	0	0	1,500	0 0
80 Covered Box Freight Cars,	170	0	0	13,600	0 0
120 Platform Cars,	145	0	0	17,400	0 0
40 Ballast Cars,				2,350	0 0
20 Hand Cars,	20	0	0	400	0 0
4 Snow Ploughs,	252	10	0	1,010	0 0
Shediac Sta'y Engine, &c., Planer, Lathc, Small Tools, Pump, Hoisting Gear, Shop Fixtures, &c.,				1,814	11 6
Total value of Rolling Stock,				£85,913	13 8
2 Locomotives charged in amt. pd. Jackson & Co.,				5,390	0 0
Balance as charged in Table A, No. 1,				£80,523	13 8



TABLE A.—No. 9.

No of Section.	Names of Contractors.	Time of Letting.	Amount of Contract.	Total Amount of Contract Referred to in previous Tables.	Value of Work done under Contract to 31st December, 1858.	Amount of Contract remaining still to be done.
No. 1	J. Brookfield, C. Walker and D. P. Myers.	Nov. 10, 1856	4,191 18 8		4,191 18 8	
" 2	Dillon P. Myers,	Jan. 10, 1857	39,799 2 8		39,799 2 8	
" 3	Walker & Co.,	" "	9,694 18 7		9,694 18 7	
" 4	John Brookfield,	" "	17,524 4 9	£71,210 4 8	17,524 4 9	
" 5	Walker & Co.,	June 30, 1857	40,872 12 4		30,410 4 5	10,462 7 11
Hammond Riv. Via.						
No. 6	Small & Crosby,	" "	11,950 0 0		9,889 2 7	2,060 17 5
" 7	Walker & Co.,	" "	20,946 16 9		12,559 14 1	8,387 2 8
" 8	Johnston & Blackie,	Dec 15, 1857	32,457 19 9		18,465 10 6	13,992 9 3
" 9	Dillon P. Myers,	" "	28,949 15 5		15,798 17 10	13,150 17 7
" 10	Thomas King,	" "	25,744 0 0	£160,921 4 3	9,118 3 4	16,625 16 8
" 11	Beckwith Foster & Co.	Oct 8, 1858	11,743 10 1		559 15 0	11,183 15 1
" 12	John Brookfield,	" "	6,581 4 4		1514 12 0	5,066 12 4
" 13	John Brookfield,	" "	6,619 19 7		1058 17 4	5,561 2 3
" 14	Dillon P. Myers,	" "	6,948 5 6		767 11 0	6,180 14 6
" 15	William Stevens,	" "	7,491 17 5		741 5 2	6,750 12 3
" 16	W. H. T. Sumner,	" "	7,496 0 0		310 2 4	7,185 17 8
" 5	Beckwith Foster & Co.,	" "	11,915 6 5	£58,796 3 4	881 16 4	11,033 10 1
" 4	Walker & Co.,	Dec. 15, 1857	25,172 17 9		8875 15 5	16,297 2 4
" 3	Mc Donald & McBean,	" "	29,886 10 0	£55,059 7 9	21,144 13 7	8,741 16 5
" 2	John Brookfield,	Aug. 1, 1856	16,181 11 8		16,181 11 8	
" 1	William Stevens,	" "	16,354 7 8		16,354 7 8	
	Walker & Co.,	" "	27,178 4 1	59,714 3 5	27,178 4 1	
			Amt's. carried over, £405,701 3 5		263,020 9 0	142,680 14 5

TABLE A.—No. 9.—CONTINUED.

Contract Work	Names of Contractors.	Amount of Contract.	Value of Work done under Contract to Dec. 31, '58	Amount of Contract still to be done.
	{Total amounts brought forward,	£405,701	263,020	142,680
Passenger Station, St. John,	John Brookfield,	1,526	0	0
Car Shed,	John Brookfield,	1,331	0	0
Engine House,	W. H. Crosby,	2,941	5	0
Kennebecasis Station,	Alfred Harris,	1,241	1	10
Hampton Station,	Johnston & Blackie,	1,455	0	0
Sussex Station,	Thomas King,	3,995	3	7
Salisbury Station,	McKay & Butcher,	1,342	1	10
Moncton Station,	John Brookfield,	1,556	7	5
Freight Shed, Moncton,	McKay,	274	6	0
Shediac Station,	Walker & Co.,	1,947	13	5
Appleby's Wharf,	Samuel Mayes,	373	15	3
Moncton Wharf,	Constantine & Stevens,	498	12	7
Shediac Wharf,	Fitzgerald & Walker & Co.,	8,150	2	8
Derpôt Grounds,	J. Brookfield and D. P. Myers,	14,982	17	8
Leveling and Ridging,	Donovan,	129	0	0
Fencing St. John to Kennebecasis Station,	C. W. Allin,	2,029	0	0
Fencing Sections 5 and 6,	Morton & Earl,	2,409	0	0
Fencing Moncton to Shediac,		2,768	3	3
Clearing Sussex to Salisbury,	Freeze, Price &c.,	1,500	0	0
Clearing Salisbury to Moncton,	W. H. T. Sumner,	1,850	16	5
	Amounts carried over,	£457,984	10	4
		298,763	5	11
		159,221	4	5

TABLE A.—No. 9.—CONCLUDED.

	Amount of Contract	Value of Work done under Contract to 31st Dec., 1888.	Amount of Work still to be done
[Total amounts brought forward.]	457,984 10 4	298,763 5 11	159,221 4 5
Work at St. John by Jackson & Co.,	2,187 10 0	2,187 10 0	0 0 0
Do., Sialiac "	17,812 10 0	17,812 10 0	0 0 0
Plant and Surveys "	29,735 17 1	29,735 17 1	0 0 0
Amount of Stations not Contracted for,	6,905 15 0		6,905 15 0
Miscellaneous, Accounts,	14,206 5 4	14,206 5 4	0 0 0
Engineering, &c.,	8,568 4 4	8,568 4 4	0 0 0
Track-laying and Ballasting, Sussex } to Salisbury, not Contracted for, }	19,000 0 0		19,000 0 0
Iron Girders,	700 0 0	700 0 0	0 0 0
Total,	£557,100 12 1	£371,973 12 8	185,126 19 5

BRITISH RAILWAY BOARD REPORT

TABLE A.—No. 10.—EARTH AND ROCK WORK.

Sections and Divisions.	Names of Contractors.	Work on Contract.		Work done under Contract.		Work still to be done.	
		Cubic yards Earth.	Cubic yards Rock.	Cubic yards Earth.	Cubic yards Rock.	Cubic yards Earth.	Cubic yards Rock.
Section No 1, St. John,	Walker, Brookfield and Myers,	23,046	14,102	23,046	14,102		
" " 2, "	Dillon P. Myers,	142,193	44,507	142,193	44,507		
" " 3, "	Walker Rankin & Walker,	51,303	4,509	51,303	4,509		
" " 4, "	John Brookfield,	80,450	5,182	80,450	5,182		
" " 5, "	Walker & Co.,	431,399	17,921	263,481	13,830	167,918	4,091
Hammond River Viaduct,	Small & Crosby,	6,483		5,894		589	
Section No 6, "	Walker & Co.,	205,170	4,400	139,490	2,359	65,680	2,041
" " 7, Hampton,	Johnston & Blackie,	296,851	9,240	185,307	5,422	111,544	3,818
" " 8, "	Dillon P. Myers,	310,654	2,000	163,824	1,458	146,830	542
" " 9, "	Thomas King,	229,563	5,000	96,535	2,977	133,028	2,023
" " 10, Sussex,	Beckwith Foster & Co.,	89,262		5,208		84,054	
" " 11, "	John Brookfield,	63,187		26,497		36,690	
" " 12, "	John Brookfield,	74,914		11,158		63,756	
" " 13, "	Dillon P. Myers,	102,828		13,226		89,602	
" " 14, "	William Stevens,	73,653		8,000		65,653	
" " 15, "	W. H. T. Sumner,	83,322	2,035		392	81,754	1,643
" " 16, Salisbury,	Beckwith Foster & Co.,	104,104		2,012		102,092	
" " 5, "	Walker & Co.,	253,604		66,006	7,492	187,598	3,608
" " 4, "	Walker & Co.,	302,742		176,247	208	126,495	92
" " 3, Moncton,	McDonald & McBean,	78,084		8,500			
" " 2, "	John Brookfield,	87,707		87,707			
" " 1, Shediac,	William Stevens,	112,007		112,007			
" " 1, 2, 3, Shediac,	Walker & Co.,	125,800		125,800			
" " 1, & 2, St. John,	Jackson & Co.,	18,750		18,750			
Branch Line, Moncton,	William Stevens,	6,496		6,496			
Depot Grounds	John Brookfield,	30,000	10,000	16,911	4,272	13,089	5,728
Total		3,383,572	148,620	1,907,300	125,034	1,476,372	23,586
Earth at average price of 1s 3d per Cubic yard		£211,473 5		£119,300 0		£92,273 5	
Rock " " " 5s 6d, " "		40,870 10		34,384 7		6,486 3	
Total,		£252,343 15		£153,584 7		£98,759 8	

TABLE B—No. 1.

Statement showing the difference between the original locations from Saint John to Cape Brule, and the revised Location from Saint John to Point Du Chene.

## ORIGINAL LOCATION TO CAPE BRULE.

From Mill Pond Station to Zero St. John	.878
“ St. John to Moncton - - -	89.975
“ Moncton to Cape Brule - - -	19.850
Add for Wharf at Cape Brule - - -	.350
Total Distance	<u>111.053 Miles.</u>

## REVISED LOCATION TO POINT DU CHENE.

From Mill Pond Station to Zero St. John	.878
“ Zero St. John to Moncton - - -	88.085
“ Moncton to Point Du Chene - - -	19,075
Add for Wharf at Point Du Chene - - -	.350
Total Distance	<u>108.388 Miles.</u>

Distance per original location from St. John to Moncton - - -	89.975
“ “ “ Revised do. - - -	88.085
“ Saved by Revised location - - -	<u>1.890 Miles.</u>

Distance per original location from Moncton to Cape Brule - - -	19.850
“ Revised do “ “ - - -	19.057
Saved by Revised location - - -	<u>.775 Miles.</u>

Total Saving by Revised location from St. John to Point du Chene over original do. to Cape Brule - - -	2.665 Miles.
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TABLE B.—No. 2.

Table of Curves and Tangents, as originally located on the European and North American Railway, between St. John and Shediac.—Beginning at Mill Pond Station.

SAINT JOHN TO MONCTON.					MONCTON TO SHEDIAC.				
No. of Curves.	Length of Curves of same Radii Miles	Radii ft.	Deflection °	Total Deflection.	No. of Curves.	Length of Curve of same Radii Miles	Radii ft.	Deflection °	Total Deflection.
9	2.183	1584	427.30		2	.442	1584	85.00	
4	.750	1848	120.30		4	1.217	1980	167.00	
4	.670	2112	93.00		1	.154	2244	22.00	
1	.330	2376	41.00		6	1.979	2640	226.30	
42	11.250	2640	1300.00		1	.146	3630	12.00	
6	1.500	2904	153.00		2	.095	3960	7.00	
6	1.375	3168	97.30		2	.572	4752	36.30	
1	.115	3300	19.00		5	1.992	5280	112.30	
1	.470	3636	44.00						
26	6.649	3960	454.30		23	6.597			668.30
1	.758	4158	58.00					13.253 Tangents.	
29	7.471	5280	424.30					.350 Wharf at Cape Brule.	
130	33.521			3232.30		20.200 Miles.			
	57.332 Tangents.								
	90.853 Miles.								
From Mill Pond Station St. John, to Moncton,						90.853			
“ Moncton to end of Wharf, Cape Brule,						20.200			
						111.053 Miles.			
Total No. of Curves from St. John to Shediac, 153=	3901.00								
Amount of Curvature per Mile,						35.11			

TABLE B. No. 2.—CONTINUED.

Table of Curves and Tangents on the revised location of the European and North American Railway between St. John and Shediac.—Beginning at Mill Pond Station.

SAINT JOHN TO MONCTON.					MONCTON TO SHEDIAC.				
No. of Curves.	Length of Curves of same Radii	Radii ft.	Deflection	Total Deflection.	No. of Curves.	Length of Curve of same Radii	Radii ft.	Deflection	Total Deflection.
24	6.689	2865	714.38		2	.442	1584	85.00	
1	.228	3016	22.46		2	.756	1980	96.00	
2	.593	3243	55.23		5	1.507	2640	173.30	
1	.868	3263	81.15		1	.146	3630	12.00	
2	.621	3438	54.39		2	.095	3960	7.00	
6	1.670	3822	132.48		2	.572	4752	36.30	
1	.845	4033	63.22		4	2.136	5280	116.00	
1	.650	4912	39.59						
1	.816	5542	44.32		18	5.654			526.00
15	5.940	5730	313.57			13.421 Tangents.			
1	.614	5807	31.36			.350 Wharf Point du Chene.			
4	2.256	11.460	63.00						
1	1.214	12.278	29.54			19.425 Miles.			
60	23.004			1647.49					
	65.959 Tangents:								
	88 963 Miles.								

From Mill Pond Station to Moncton, 88,963 Miles  
 " Moncton to end of Wharf Point du Chene, 19,425  
 108,388 Miles.

Total No. of Curves St. John to Shediac, 78=2173.49  
 Amount of Curvature per Mile, 20.08

## SAVING EFFECTED BY REVISED LOCATION.

Number of Curves - - - - - 75=1727.11  
 Amount of Curvature per Mile, - - - - - 15.03

## TABLE B.—No. 3.

TABLE OF GRADIENTS ON REVISED LOCATION FROM ST. JOHN TO SHELDIAK.

Dist. from Saint John. M. dec.	Lgth. of Grade. M. dec.	Inclination of Grade. per 100ft	Grade per mile.	Ascent of Grade. ft.	Descent of Grade. ft.	Elev. above High wtr., app. tides, St. John.	Locality
	.000					5.25	
.253	.253	.727	38.38	9.75		15.00	
.385	.132	Level.				15.00	Stat., Garden Street.
.689	.304	.812	42.87		13.00	2.00	
3.538	2.849	Level.				2.00	Marsh.
4.098	560.	.44	23.23	13.00		15.00	
4.334	.236	Level.				15.00	
5.378	1.044	.853	45.00	47.00		62.00	Lawlor's Lake.
5.544	.166	Level.				62.00	
7.054	1.510	.69	36.43		55.00	7.00	Torryburn.
7.886	.832	Level.				7.00	
8.075	.189	.40	21.12	4.00		11.00	
8.264	.189	.40	21.12		4.00	7.00	Nine mile.
8.453	.189	Level.				7.00	Station.
8.832	.379	.15	7.92	3.00		10.00	
9.245	.413	.25	13.20	5.44		15.44	
12.582	3.837	.853	45.00	150.32		165.76	Summit.
12.616	.034	Level.				165.76	
15.996	3.380	.85	44.88		151.76	14.00	
16.276	.280	Level.				14.00	Hammond River.
16.901	.625	-15	7.92		6.00	8.00	
17.166	.265	Level.				8.00	
17.431	.265	.57	30.00	8.00		16.00	
17.506	.075	Level.				16.00	
17.771	.265	.57	30.00		8.00	8.00	
17.865	.094	Level.				8.00	Darling's, Mill-strm.
18.149	.284	.40	21.12	6.00		14.00	
19.058	.909	Level.				14.00	
19.172	.114	.50	26.40	3.00		17.00	
19.211	.039	Level.				17.00	
19.438	.227	.57	30.00		6.84	10.16	Matthews' Ferry.
19.476	.038	Level.				10.16	
19.817	.341	.85	44.88	15.30		25.46	
19.855	.038	Level.				25.46	
20.265	.410	.76	40.12		16.46	9.00	Groom's Cove.
20.441	.176	Level.				9.00	
20.744	.303	.52	27.45	8.30		17.30	
22.715	1.971	.05	2.64		5.35	12.05	Hampton Station.
23.435	.720	.45	23.76	17.10		29.15	
23.510	.075	Level.				29.15	
23.983	.473	.25	13.20		6.25	22.90	
25.119	1.136	.65	34.62	39.00		61.90	
25.175	.056	Level.				61.90	
26.482	1.307	.716	37.80		49.40	12.50	Passekeag.



TABLE B.—No. 3.—CONTINUED.

Dist. from Saint John M. dec.	Lgth. of Grade. M. dec.	Inclination of Grade. per 100ft	Grade per mile.	Ascent of Grade. ft.	Descent of Grade. ft.	Elev. above High wtr. app. tides, St. John.	Locality.
27.362	.880	Level				12.50	
27.694	.332	.57	30.00	10.00		22.50	
27.959	.265	.25	13.20	3.50		26.00	
28.850	.891	.28	14.70		13.16	12.84	
28.944	.094	Level				12.84	
29.835	.891	.25	13.20	11.75		24.59	Moose horn Brook.
30.877	1.042	Level				24.59	
31.824	.947	.05	2.64		2.50	22.09	
31.892	.068	Level				22.09	
33.074	1.182	.40	21.10	24.86		46.95	
33.112	.038	Level				46.95	Stark's Brook.
33.510	.398	.85	44.88		17.85	29.10	
33.863	.353	Level				29.10	
34.381	.518	.49	25.80	13.32		42.42	
34.419	.038	Level				42.42	
34.742	.323	.60	31.60		10.20	32.22	
35.409	.667	Level				32.22	Drummond's Brook.
36.503	1.094	.29	15.30	16.06		48.28	
36.873	.370	.40	21.12		7.80	40.48	
38.086	1.213	Level				40.48	Sproul's Ferry.
39.010	.924	.48	25.34	23.44		63.92	
39.080	.070	Level				63.92	
39.894	.814	.44	21.64		17.63	46.29	Musquash Brook.
40.936	1.042	Level				46.29	
41.163	.227	.52	27.45	6.24		52.53	
42.507	1.344	.10	5.28		7.10	45.43	
43.570	1.063	.18	9.50	10.10		55.53	Sussex Station.
43.814	.244	Level				55.53	
43.947	.133	.21	11.08	1.47		57.00	
44.761	.814	.0544	2.87	2.34		59.34	
45.102	.341	.44	23.64	7.99		67.33	
45.139	.037	Level				67.33	
45.925	.786	.36	19.00		15.33	52.00	Salmon River.
46.579	.654	Level				52.00	
46.957	.378	.186	9.82	2.00		54.00	
47.525	.568	Level				54.00	
48.869	1.344	.073	3.84	5.16		59.16	Wallace's Road.
49.437	.568	.600	31.70	18.00		77.16	
49.569	.132	Level				77.16	
50.213	.644	.2038	10.76		6.93	70.23	
51.237	1.024	.19	10.00	10.26		80.49	Salmon River.
52.013	.776	.22	11.60	9.08		89.57	
52.525	.512	Level				89.57	
53.301	.776	.60	31.70	24.43		114.00	Stone's Brook, or Pe nobsquis.
53.585	.284	Level				114.00	
55.232	1.647	.46	24.28	40.00		154.00	
55.470	.238	Level				154.00	
56.586	1.116	.56	29.66		33.00	121.00	
59.271	2.685	.0141	.75		2.00	119.00	Anagance River.
60.271	1.000	.75	39.60	39.75		158.75	

TABLE B.—No. 3.—CONTINUED.

Dist. from Saint John. M dec.	Lgth. of Grade. M. dec.	Inclination of Grade. per 100ft	Grade per mile.	Ascent of Grade. ft.	Descent of Grade. ft.	Elev. above High wtr. spg. tides, St. John.	Locality.
60.335	.064	Level				158.75	
61.410	1.075	.4923	26.00		27.95	130.80	
61.447	.037	Level				130.80	} Leek's Brook, or Por- tage.
61.882	.435	.391	20.50	9.00		139.80	
61.958	.076	Level				139.80	
62.545	.587	.516	27.40		16.00	123.80	
62.602	.057	Level				123.80	Hayward's Mill Brook,
63.114	.512	.518	27.40	14.00		137.80	
63.189	.075	Level				137.80	
64.344	1.155	.77	40.70		47.00	90.80	
67.033	2.689	.0352	1.84		5.00	85.80	Steves' Brook.
67.980	.947	.40	21.12	20.00		105.80	
68.055	.075	Level				105.80	
68.567	.512	.296	15.60		8.00	97.80	
69.331	.764	.77	40.70		31.00	66.80	Peticodiac River.
71.987	2.656	Level				66.80	
72.529	.542	.675	38.00	19.35		86.15	
74.421	1.892	.12	6.33		12.03	74.12	
74.934	.513	Level				74.12	
75.447	.513	.73	38.54	19.68		93.80	
75.560	.113	Level				93.80	
76.033	.473	.20	10.56		5.00	88.80	
76.108	.075	Level				88.80	Salisbury Station.
76.539	.431	.20	10.56	4.60		93.40	
76.633	.094	Level				93.40	Wortman's Creek.
77.011	.378	.20	10.56		4.00	89.40	
77.087	.076	Level				89.40	
77.352	.265	.20	10.56	2.80		93.20	
77.409	.057	Level				93.20	
77.636	.227	.20	10.56		2.40	89.80	
77.693	.057	Level				89.80	
78.016	.323	.20	10.56	3.40		93.20	
78.187	.171	Level				93.20	
79.420	1.233	.513	27.00		33.40	59.80	
79.974	.554	Level				59.80	Nixon's Brook.
81.029	1.055	.70	36.50		39.00	20.80	
81.120	.091	Level				20.80	Steves' Lake.
82.840	1.720	.83	43.98	75.42		96.22	
83.340	.500	.061	3.20	1.58		97.80	
83.378	.038	Level				97.80	
83.643	.265	.28	14.70		3.92	93.88	
83.700	.057	Level				93.88	
83.908	.208	.14	7.40	1.55		95.43	Chartres' Brook.
83.946	.038	Level				95.43	
84.361	.435	.25	13.20		5.75	89.68	
84.419	.038	Level				89.68	
85.129	.710	.11	5.80	4.12		93.80	
85.583	.454	.46	24.29		11.00	82.80	
86.152	.569	.833	43.98		25.00	57.80	Horsman's Creek.
86.195	.043	Level				57.80	

TABLE B.—No. 3.—CONTINUED.

Dist. from Saint John. M. dec.	Lgth. of Grade. M. dec.	Inclination of Grade. per 100ft	Grade per mile.	Ascent of Grade. ft.	Descent of Grade. ft.	Elev. above High wtr, spg. tides, St. John.	Locality.
86.422	.227	.80	42.24	9.00		66.80	
86.811	.389	Level				66.80	
87.700	.889	.833	43.98		39.00	27.80	
87.769	.069	Level				27.80	Post Road, Milner's.
88.110	.341	.833	43.98	15.00		42.80	
88.280	.170	Level				42.80	
88.667	.387	.833	43.98		17.00	25.80	
88.799	.132	Level				25.80	Jonathan's Creek.
88.963	.164	.80	42.24	6.92		32.72	Zero, Moncton.
89.063	.100	.80	42.24	4.02		36.74	
89.463	.400	Level				36.74	Station Moncton.
89.738	.275	.80	42.24	11.76		48.50	
89.850	.112	Level				48.50	
90.350	.500	.833	43.98		22.40	26.10	
90.531	.181	Level				26.10	Hall's Creek.
90.702	.171	.636	33.58	6.38		32.48	
90.849	.147	.861	44.90		6.68	25.80	
90.924	.075	Level				25.80	Chandler's Marsh Via.
91.699	.775	.833	43.98	34.21		60.01	
91.764	.065	Level				60.01	
91.942	.178	.833	43.98		7.97	52.04	
92.162	.220	Level				52.04	
93.271	1.109	.71	37.48	41.06		93.10	Harris, Mill Str.
93.446	.175	Level				93.10	
93.833	.387	.80	42.24	16.05		109.15	
94.033	.200	.636	33.58	5.95		115.10	
94.183	.150	.833	43.98	6.60		121.70	
94.258	.075	Level				121.70	
94.533	.275	.833	43.98	12.10		133.80	
94.595	.062	Level				133.80	
94.770	.175	.33	17.42		2.94	130.86	
95.082	.312	.833	43.98		13.75	117.11	
95.182	.100	.15	7.92		.80	116.31	Cook's Brook.
95.297	.115	.363	19.16	2.16		118.47	
95.619	.322	.863	45.56	14.82		133.29	
95.894	.275	Level				133.29	
96.081	.187	.275	14.52	2.73		136.02	
96.143	.062	.50	26.40		1.65	134.37	
96.693	.550	.13	6.86	3.96		138.33	
97.230	.537	.81	42.76	23.27		161.60	
97.280	.050	.11	5.80	.30		161.90	Summit.
98.155	.875	.833	43.98		38.50	123.40	
98.205	.050	Level				123.40	
98.555	.350	.833	43.98	15.40		138.80	Hemlock Hill.
99.217	.662	.833	43.98		29.00	109.80	
99.642	.425	Level				109.80	
99.879	.237	.31	16.36	4.00		113.80	
100.154	.275	.833	43.98	12.00		125.80	
100.289	.135	Level				125.80	

TABLE B.—No. 3.—CONTINUED.

Dist. from Saint John. M. dec.	Length of Grade M. dec.	Inclination of Grade. per 100ft.	Grade per mile.	Ascent of Grade. ft.	Descent of Grade. ft.	Elev. above of High wtr. spg. tides, St. John.	Locality.
100.476	.187	.79	41.71		8.00	117.80	
100.798	.322	.33	17.42		5.50	112.30	
101.235	.437	Level				112.30	
101.458	.223	.79	41.71		8.50	103.80	
101.745	.287	Level				103.80	
102.180	.435	.69	36.43		16.00	87.80	Post Road to } Dorchester. }
102.305	.125	Level				87.80	
102.542	.237	.833	43.98	10.00		97.80	
102.592	.050	Level				97.80	
102.717	.125	.45	23.76		3.00	94.80	
103.057	.340	.833	43.98		15.00	79.80	
103.234	.177	Level				79.80	
104.552	1.318	.833	43.98		58.00	21.80	Girder Bridge, } Scadouc River. }
104.702	.150	Level				21.80	
105.327	.625	.64	33.79	20.00		41.80	
105.389	.062	.188	9.92	1.00		42.80	
105.641	.252	.68	35.90		9.00	33.80	
106.144	.503	Level				33.80	Shediac Station.
106.644	.500	.60	31.68		17.00	16.80	
106.769	.125	Level				16.80	
107.382	.612	.60	31.68		19.00	-2.20	
107.925	.543	Level				-2.20	
108,038	.113	.70	39.60		4.50	-6.70	
108.388	.350	Level				-6.70	Wharf Pt. du Chene. Shediac Harbor.
Total of ascents and descents				1063.15	1075.10		

N. B. It will be observed that the Level of Rails on Shediac wharf is 6.70 below high water at St. John, and the level of high tide at the latter place is 10.70 feet above that at Shediac Harbor.

## ABSTRACT OF GRADIENTS.

Description.	No.	Length. Miles.	Total Length.
Level.	86	25.496	
10 ft. per mile and under.	20	19.345	
20 ft. " " " "	24	10.701	
30 ft. " " " "	30	16.803	
45 ft. " " " "	56	36.043	

108.388 Miles.

TABLE B.—No. 3.—CONCLUDED.

Abstract of Gradients originally designed for the European and North American Railway, between St. John and Cape Brule, Shediac, (beginning at Zero St. John.)

DESCRIPTION	NO.	LENGTH MILES.	TOTAL LENGTH.
Level	65	29.655	
10 ft. per mile and under	19	13.000	
20 ft.       "       "	32	12.646	
30 ft.       "       "	29	12.164	
45 ft.       "       "	99	42.360	
Add Mill Pond Station to Zero		.878	
" for Wharf Cape Brule		.350	

111.053 Miles.

TABLE B—No. 4.

Statement showing the length of Iron and Wooden Bridging originally designed for the European and North American Railway, from St. John to Shediac.

	Lin. ft. Iron.	Lin. ft. Wood.
Saint John to Sussex Vale	560	2192
Sussex Vale to Shediac	1260	1892
Total Amount	1820	4084 lin. ft.

Statement showing the length of Iron and Wooden Bridging as now being constructed upon the European and North American Railway, from St. John to Shediac.

	IRON. LIN. FT.	WOOD. LIN. FT.
Saint John to Sussex Vale	510	1343
Sussex Vale to Shediac	800	1043
	<u>1.310</u>	<u>2.386 lin. ft.</u>

# REPORTS

OF

W. PARKER, ESQ., C. E.

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(Copy)

*Secretary's Office, Fredericton, 7th May 1858.*

SIR,—By direction of His Excellency the Lieut. Governor, I am to request you to examine and report on the construction and general character of the E. & N. A. Railway in this Province, and on the location of that part of the Line now under contract.

I am also to request you to afford to the Commissioners of that Railway and to the Chief Engineer the benefit of your advice on any matter connected therewith which they may refer to you.

I have, &c.,

(Signed) S. L. TILLEY.

W. M. PARKER, Esq., C. E., St. John.

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(Copy)

*Boston, Massachusetts, July 5th, 1858.*

HON. S. L. TILLEY,

*Provincial Secretary, Fredericton, New Brunswick.*

SIR:—

In accordance with your letter to me, dated May, 7th ult., I have “examined the construction and general character of the E. & N. American Railway in this (your) Province, and the location of that part of the line now under contract,” and have the honor to report as follows:

## FIRST AS TO THE LOCATION.

The Railway on leaving St. John runs in the direction of Lawlor's Lake, rendered famous for the difficulty which has attached its filling up for the transit, but which has now happily been overcome, and thence proceeds in the same course until it enters the valley of the Kennebecasis River, at the distance of six or seven miles from the City. It then pursues the said valley on its southerly side all the way to Sussex Vale or its vicinity excepting two diversions therefrom, made to avoid sinuosities or to secure better ground for the Line to occupy.

These diversions are—the first, from “Henderson's Cove,” near the Nine Mile House, and the mouth of Salmon Creek to a point nearly opposite the mouth of Hammond River, which is crossed on the way. The second, from near Groom's Cove, two miles West of Hampton over a dividing ridge, to Patticake Creek, in order to secure a favorable crossing of the intervale lands of that stream, which are exceedingly wide nearer its mouth, and would have there exposed a Railway embankment over them to frequent damage, and even risk of destruction.

By the first of these diversions a saving both of distance and cost is secured. By the second a saving of cost and improved alignment and gradients are obtained at a small sacrifice of distance.

From Sussex Vale the line as projected leaves the immediate valley of the Kennebecasis river for one of its tributaries, which it follows to near its source, and thence across the dividing ridge of land, there very lightly defined to the valley of the Petitcodiac.

Pursuing this last named valley to the “Bend” at Moncton, the line avoids the sidelong ground near the river, indented as it is, by deep creeks of soft and treacherous bottom, and keeps a higher level and more direct course over the more even back grounds, thereby securing greater regularity of gradients, and saving both distance and cost.

From Moncton to Shediac as from Saint John to the “Nine Mile House” the line is completed and in use, its location being generally favorable and judicious.

Twenty-eight miles are yet to be placed under Contract, but the line is determined and well nigh definitely marked out; this portion extends from Sussex Vale into the valley of the Peticodiac, and is over very favourable ground.

The location of that part of the line now under Contract is judiciously made and admits of little or no amendment. It extends from Kennebecasis Station near the "Nine Mile House" to Sussex Vale, and from a few miles West of Salisbury to Moncton, an aggregate distance of about fifty-one miles.

Where the line traverses the sidelong ground of the Kennebecasis Valley, which it does for a distance of about thirty-five miles, it might be supposed at first sight that by a free use of curves, accompanied by some undulation of gradient, much saving might have been realized of the cost, as set forth in the estimate of the Engineer and in the Contracts; but it has so happened that the level at which the exposure to freshet has determined the grade line, finds the hill side full of projecting knolls or head lands, and deep gulfs or cross valleys, with wide and flat intervales, which preclude much of the benefit that a tortuous line would have otherwise secured; and after a careful examination I am of the opinion that the line is located along that part of the route as economically, with slight exceptions, (if any) as it could well have been done.

The greatest rise or fall per mile in the whole line will be forty-five feet.

The most severe curvature will have a radius of nearly three thousand feet.

#### SECONDLY—THE CONSTRUCTION.

The construction, so far as it has proceeded is of good character, and the specifications and contracts look to its continuance.

The width of the road bed at subgrade or formation level has been assumed at twenty feet in embankment, and not less than twenty-four feet in excavation, with slopes varying from one and a half to two feet horizontal for every foot vertical, according to the nature of the earth to be sustained. These dimensions and slopes I regard as liberal, and think that they may be reduced in some instances without hazard to the character or permanency of the work—the qualities of the prevailing earth will, however, require much caution in doing so.

The Masonry consists of abutments and piers for bridges, walls and arches or other covering for culverts—these are of a high quality, well adapted for durability, and generally very creditable to those concerned.



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It is not improbable indeed that it may be found safe in some of the works yet to be built, to lower the standard of quality or substitute a different class of masonry, and thereby reduce somewhat the cost. This, however, must be confined to the less conspicuous and lighter works which are only important as a matter of expense in their number and aggregate amount.

The superstructures of three of the bridges on the line—one of them erected some time ago over the Scadouc Creek, near Shediac, by the former Contractors—one over the Post Road near Saint John, and the bridge over Hammond River, are—or are to be—of the Iron Girder class made of Boiler Iron—a form of structure which, though somewhat expensive, is preferred by many Engineers to all others for its simplicity, for its permanent adjustment, and for its great strength when well proportioned. Permanency, including proof against fire, seems to have been thought especially called for in the localities above named.

All other bridge superstructures are—or are to be—of wood, and in some cases in which the exposure did not forbid, even the abutments and piers are provided for, of the same; but in all instances they are well planned for substance and durability, so far as compatible with the material used.

The buildings thus far erected seem to be judicious and appropriate, and as far as I have been able to learn, will meet the probable wants of the several localities.

The Track or Railway proper is of an excellent character and will compare favorably with the best railways in the United States.

Care has thus far been taken both in the formation of the road bed, and in the supply of "ballast," to secure good and rapid drainage, obviously so important in your climate; the Sleepers or Cross Ties are good and substantial, and the Railway Bars which are of the T pattern, prevalent in this country, are of approved proportion and quality, the latter indeed is much better than usual, offering a reasonable warrant of economy in the future repairs of the line.

I hope, Sir, that the above statements and remarks are sufficiently comprehensive and explicit to satisfy His Excellency the Lieutenant Governor, yourself, and the members of the Government with whom you are associated. I am glad that I can offer so favorable a Report on the subject, and I trust that the delay of it to this time may not have caused disappointment to any one.

On entering upon the duty assigned me, much of my time was first demanded by the second portion of your letter, viz., in advising with the Commissioners and Chief Engineer upon matters of detail, requiring immediate decision and then held in suspense; and I was desirous to make careful personal examination of the line, as well as of all other matters, before I should venture to express an opinion. This I have done, traversing much of the line on foot for that purpose.

It would have been extraordinary if nothing open to criticism, modification, or improvement had been found; but I take pleasure in saying that comparatively little has appeared; that little has been and will be the subject of conference, with the Commissioners and Chief Engineer, to which the close of your letter invites me, with a view to restraining the cost of the line, as much as consists with securing a good practical Railway.

I am, &c., (Signed)

WM PARKER, *Civil Engineer.*

*St. John, N. B., June 26, 1858.*

*ROBERT JARDINE, Esquire,*

*Chairman of the Railway Commissioners of New Brunswick:*

SIR,

Yours of the 25th inst., asking my opinion as to the policy proper to be followed in procuring Rolling Stock for the Railway, and upon the proper rates for passenger fares, is before me.

It must be apparent that the greatest care in selecting Rolling Stock with reference to safety is of the utmost importance, and that nothing in the way of trial of new makers should be attempted without extreme caution. This is especially true of Wheels and Axles, and I recommend that for Passenger Cars wholly, and for Freight Cars mainly, you resort only to those makers of wheels and axles, whose work has been proved and stands in the front rank for excellence, giving at the same time such encouragement to home enterprise as may be derived from orders of these articles for use on your ballast or gravel cars, and a few of your freight cars, until by continued and successful trial they shall be found *certainly* worthy of more extended use. Axles may, I think, be had best with

reference to cost and quality combined, from England ; wheels (being of cast Iron) from the United States, where they are (of cast Iron) almost exclusively used.

In selecting makers of Locomotives a like course should be pursued, adhering to *one pattern* for each *class* of machines without deviation, that their repair and maintenance may be simplified and cheapened. There is little difference in essential properties among the several forms of Locomotives now made ; but a *uniformity* of pattern has been found, whenever adhered to, connected with marked economy of repairs.

Those machines which you have already procured are of good quality and established repute ; and I would adhere to the same makers, while they continue to do as well, at moderate prices, encouraging at the same time your home mechanics, by occasional orders, made proportionately more frequent as their results shall be satisfactory—always, however, without variety of pattern.

*Cars*, whether for passengers, freight, or other uses, stand in a somewhat different position than wheels and axles, being subject to the foregoing remarks. The frames and bodies of cars are bulky, and subject to heavy charges for their transportation from abroad, while their manufacture does not call for any great degree of *experience* superadded to mechanical skill and faithfulness.

Materials for their construction are abundant in this Province ; so, I believe, is good mechanical labor ; and I see no unavoidable hazard, in preferring home artizans in this department at like prices. Looking, therefore, first to quality and to proper seasoning of lumber, and under a rigid inspection, I recommend that your Cars be made at home, allowing reasonable competition if it shall arise—the wheels and axles having been procured, as before stated.

Rates of fare for passenger travel have been extensively experimented on in the United States, and with the exception of a few densely populated lines, and for *very long* travel it is believed now that three cents per mile is the lowest rate expedient. Commutation for families, resident near the City, and for occasional excursion trains may be judiciously adopted at a reduction of not exceeding one half.

I am your obed't servant,

WM. PARKER,

*Civil Engineer.*

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(Copy)

Boston, Dec. 2d, 1858.

HON. S. L. TILLEY,

Provincial Secretary, Fredericton, N. B.

SIR:—

When last in St. John with the opportunity to confer with the Chief Engineer and Commissioner, upon the list of "Staff," submitted to me in yours of August 31st, it was apparent that much of that list had been changed in consequence of the completion of the location and laying out of the Railway, from Sussex to Salisbury, preparatory to its being offered for contract; and I therefore deemed it proper to obtain a revised list, presenting the "Staff," as at present organized.

Such a list has recently been received and accompanies this communication.

In carefully considering it as requested by you, I do not perceive that any material reduction could be made with due regard to the public service. The organization in both departments appear simple and well ordered, and the rates of compensation as low as could be expected to procure the services of persons well qualified for the several duties.

(Signed)

WM. PARKER,

*Civil Engineer.*

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EUROPEAN AND NORTH AMERICAN RAILWAY.

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REPORTS

OF THE

GENERAL SUPERINTENDENT.

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THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 354: QUANTUM MECHANICS

# EUROPEAN AND NORTH AMERICAN RAILWAY.

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*Saint John, N. B., 4th March, 1858.*

SIR—

Having been furnished on the 12th day of November last with an inventory of the plant and stores, made by Messrs. Peto, Betts, Jackson and Brassey, the 31st December, 1854, which was supposed on hand, when their right to the same was conveyed to the Province; and having been directed to take a particular account of all plant, stores or stock, now on hand, as well of that then received, as of that which has since been received by the European and North American Railway; and after comparing the same ascertain the deficiency, if any.

I have now, therefore, to report from the information of the Board of Commissioners, that in compliance with such instructions I have carefully taken an inventory of all the stores, Plant, or other property belonging to the "European and North American Railway," on the line or elsewhere, and having made the same up, find as follows:—

	Old.		New.	
Office Furniture	£150	16 0	£180	19 6
Engineering Stock	120	0 0	347	3 5
General Stores	2406	18 1	730	14 7
Rolling Stock	5217	0 0	18,343	2 0
Earth Wagons	4967	0 0		
Buildings and Stations	2025	10 0	3033	10 9
Permanent Way Stock	9775	9 3	18,603	13 3
Miscellaneous Stock	2526	8 7	2151	1 4
Station Furniture, &c.			56	1 3

Making the value of the Old Stock and Stores now on hand, at their prices £27,189 1 11—and the value of the stock acquired, since the line was handed over to the Province, £43,446 6 1, as per stock account herewith submitted.

With reference to the balance of the Plant, Stores, &c., delivered by Messrs. Peto, Betts, & Co., to the Province, I have to remark that £42,683 15 8d. has been used in the construction, found worthless, or disposed of for the benefit of the road, as will appear by a statement herewith submitted, (No. 1) with explanations therein, by Alex. L. Light, Esq., the Chief Engineer in charge of the works. That stores were sold Messrs. Walker, Rankin and Walker, John Brookfield, and William Stevens, Esqrs., Contractors as per copies of accounts herewith submitted—Nos. 1, 2 and 3, respectively as follows—viz.:

Walker, Rankin & Walker	-	-	£553	11	9
William Stevens	-	-	328	5	8
John Brookfield	-	-	259	0	0

That sales by auction was made at Moncton, on the 15th day of December last, to the extent of £103 12 6d., and that Plant and Stores to the value of £2685 10 2d. have been found to be deficient, as per Account Sales No. 4, and statement No. 5, also submitted.

The small prices of the chief part of the articles sold at Moncton on the day referred to, was caused by their being chiefly worn out and of little value.

I may say that, during my stay of two months between Shediac and Moncton, during which time my attention, so far as was consistent with my other duties, was directed to this subject, I have been quite unable to obtain any clue to the articles represented as deficient in statement No. 5, accompanying this Report.

I am sir, your obedient servant,

(Signed)

L. CARVELL,

*Gen. Superintendent.*

R. JARDINE, Esq.,  
*Chairman Railway Commissioners.* }



## STATEMENT No. 5.

(REFERRED TO IN FOREGOING REPORT.)

## EUROPEAN &amp; NORTH AMERICAN RAILWAY.

Statement of *Plant and Stores* found to be *deficient* upon taking an inventory of the *Materials* surrendered to the Province by *Messrs. Peto, Betts, Jackson and Brassey*, and not accounted for.

16 Chairs,.....	@ 4s. 6d.	£3	2	0
3 Drawing Tables,.....	60s.	9	0	0
2 Cupboards for Stationery,.....	45s.	4	10	0
1 Wash Stand,.....		1	1	0
3 Rulers,.....	1s. 6d.	0	4	6
1 Axe,.....		0	6	0
1 Iron Safe,.....		20	0	0
1 Set of Drawers and Cupboard,.....		4	10	0
2 Japaned Candlesticks,.....		0	3	0
1 Office Clock,.....		3	10	0
6 Lamps with Shades,.....		1	10	6
2 Chairs,.....	6s. 3d.	0	12	6
1 Bed and Bldg.—W. A. Rose's house,.....		12	0	0
1 Dobbin-Cart,.....		10	0	0
98 Navy Barrows,.....		85	15	0
57 2x6 Wagon Wheels 5x6 guage,.....		128	5	0
31 New Wrought Iron Axles,.....	37s. 6d.	58	2	6
200 Large and Small Wagon Pedestals,.....		76	13	9
41 Sets of New Iron Work,.....	205s.	420	5	0
6 Horse Sleds,.....	£8	48	0	0
2 Bob Sleds,.....	£3	6	0	0
6 Road Wagons,.....	£13	78	0	0
27 Box Horses,.....	2s. 6d.	3	5	0
1 40 feet Pile Engine,.....		20	0	0
1 Rammer Chain,..... 1cwt. 3qrs. 9lbs.	30s.	2	14	10
2 Iron Monkeys, 17 & 18,.....	17s. 6d.	30	12	6
2 Bolts and 2 Keys for 'dos,.... 1cwt. 2qrs.		3	12	6
2 New Girder Ropes,..... 3qrs. 12lbs.	55s.	2	7	1
18 Earth Wagons,.....	£33	594	0	0
3 Single Horse Carts,.....	£13	39	0	0
39 Tons Temporary Rails,.....	£8 10s	331	10	0
13 Temporary Frogs,.....	40s.	26	0	0
550 Temporary Sleepers,.....	6d.	13	15	0
3 1½ yds. Earth Wagons,.....	£15	45	0	0
1 Pile Engine,.....		17	10	0
50 Corn Sacks,.....	2s. 6d.	6	5	0
1 Scotch Cart,.....		5	0	0
4 ½ Bushel Measures,.....	10s.	2	0	0
13 Pails,.....	1s. 3d.	0	16	3
6 Shovels,.....	3s. 6d.	1	1	0
10 Hay Forks,.....	4s.	2	0	0

Amount carried forward, £2117 19 5

		Amount bro't forward, £2117 19 5	
9	Setts Bells,.....	@ 4s.	1 16 0
10	Lanthorns,.....	3s. 6d.	2 16 0
30	Curry Combs,.....	1s.	1 10 0
30	Hair Brushes,.....	4s.	6 0 0
5	Horse Brushes,.....		0 5 0
20	Mane Combs,.....	6d.	0 10 0
9	Head Stall Halters,.....	5s.	2 5 0
1	Sett Double Harness,.....		5 0 0
11	Setts Harness,.....	100s.	55 0 0
4	Setts Trace Harness,.....	40s.	8 0 0
10	Nose Bags,.....	5s.	2 10 0
31	Horse Cloths,.....	10s.	15 10 0
10	Cart Saddles,.....	10s. 6d.	5 5 0
2	old Brushes,.....	1s.	0 2 0
5	Corn Seives,.....	4s.	1 0 0
2	Whips,.....	4s.	0 8 0
1	Double Open Sleigh,.....		25 0 0
1	Single Sleigh,.....		7 10 0
7	Harness Straps,.....		0 3 6
14	Breachings,.....	15s.	10 10 0
7	Padlocks,.....	1s. 3d.	0 8 9
6	Pair Reins,.....	7s.	2 2 0
21	Circingles,.....	5s.	5 5 0
6	Horse Cords,.....	1s.	0 6 0
2	Small Measures,.....	2s.	0 4 0
1	“ “ .....		0 1 6
6	Crooper Pads,.....	6d.	0 3 0
2000	Sp'l feet Spruce for Wagons,.....	95s.	9 10 0
1	Pair Bellows,.....		2 10 0
1	Back Iron,.....		0 15 0
1	Vice,.....		3 0 0
1	Vice,.....		1 18 6
3	Setts Taps and Dies,.....		6 15 0
1	Guage for Taps,.....		0 1 6
1	Shifting Key,.....		0 2 6
6	Guages for Bolts,.....	1s. 3d.	0 7 6
7	Fire Irons,.....		3 10 0
1	Portable Forge,.....		10 10 0
3	Hall Stoves,.....	62s. 6d.	9 7 6
2	Sheet Iron Stoves,.....	50s.	5 0 0
21	16 inch Flat Files,.....	45s.	3 18 9
48	14 “ half round Files,.....	34s. 6d.	6 18 0
39	16 “ “ “ .....	48s.	7 16 0
32	14 “ Flat “ .....	34s.	4 10 8
18	16 “ “ “ .....	45s.	3 7 6
40	9 “ Cross Cut Saw “ .....	16s. 6d.	3 6 0
36	6 “ “ “ “ .....	7s. 6d.	1 2 6
9	17 “ Flat “ “ .....	27s.	1 0 3
12	15 “ “ “ “ .....	22s.	1 2 0
8	“ “ half round “ .....	24s.	0 18 0
8	14 “ Hand Rasps,.....	32s.	1 4 0
17	cwt. Cast Steel.....	76s.	59 12 0

Amount carried forward, £2125 13 4

Amount bro't forward, £2425 13 4		
1 " Tallow,.....	10d.	4 13 4
57cwt. 3qrs. 9lbs. Chain,.....	27s. 6d.	79 10 4
9 10 inch Dobbin Cart Knees.....	2s. 6d.	1 2 6
29 pair Boxes for Dobbins,.....	4s.	5 16 0
5 Carpenters' Adzes,.....	8s.	2 0 0
4 Hand Saws,.....	7s.	1 8 0
5 Cross Cut Saws,.....	18s.	4 10 0
1 Pit Saw,.....		1 15 0
2 cwt. Rope and Tar Cord,.....		4 10 0
1 Iron Snatch Block,.....		0 12 0
2 " Sheave " .....	12s.	1 4 0
3 2 " Iron " .....	25s.	3 15 0
2 2 " " " .....	25s.	2 10 0
2 1 " " " .....	20s.	2 0 0
3 Iron Shears,.....	2s. 6d.	0 7 6
3 Seam Shoes, .....	10s.	1 10 0
24 Horse Shoe Knives,.....	1s. 6d.	1 16 0
28 Horse Brushes,.....	4s. 7d.	6 8 4
4 Brass Barrel Taps,.....	1s. 6d.	0 6 0
6 Watchmen's Lamps,.....	7s. 6d.	2 5 0
136 lbs. Mould Candles,.....	1s.	6 16 0
108 " Dip " .....	9d.	4 1 0
2 Plate Layers Adzes,.....	12s. 6d.	1 5 0
9 Rim Locks,.....	5s. 6d.	2 9 6
10 Iron Cupboard Locks,.....	1s. 6d.	0 15 0
30 Pinch Boxes,.....	10s.	15 0 0
33 Shovels,.....	4s.	6 12 0
18 Grafting Tools,.....	5s.	4 10 0
39½ gross Screws,.....	7s. 6d.	14 16 3
2 " Brass Screws,.....	6s. 6d.	0 13 0
5 Crib Wheels,.....	20s.	5 0 0
2 Post Screw Tackles,.....	19s. 6d.	1 19 0
4 pair Lewesis, .....	10s.	2 0 0
10 Hand Saw Files,.....	1s.	0 10 0
73 5 inch " " .....	7½d.	2 5 0
3 Ladders,.....	20s.	3 0 0
3 Wood Pumps,.....	15s.	2 5 0
3 Tarpaulins,.....		15 0 0
1 Painted Tool Box.....		0 10 6
24cwt. 2qrs. 10lbs. Wagon Iron—old.....		42 0 0
<u>£2685 10 2</u>		

(Signed)

L. CARVELL,

Gen. Superintendent.

Saint John, N. B., }  
 1st Feb. 1858. }

# EUROPEAN & NORTH AMERICAN RAILWAY.

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**General Superintendent's Office,**

*Shediac, 1st December, 1858.*

SIR,—As the period has arrived for closing the Railway Accounts for the year, it becomes my duty to render you a statement of the proceedings of this Department, since my appointment to office, and to furnish you with the Accounts and Tables required to show the nature and extent of the operations on each working division of the Road since it was opened for traffic.

In submitting this my first Annual Report I may remark, that when called upon to assume the duties of this office they were entirely new to me; and consequently, all the energies I possessed were necessarily taxed to overcome the difficulties of my position, in addition to which a large amount of work, which, even to a person well versed in Railway matters would be discouraging, was rendered necessary in consequence of the disorderly condition in which things were found, and the entire absence of system in the commencement. I found that no attention, whatever, had been paid to the proper arrangement and delivery of the stores, that they were scattered far and wide, and all privileged alike to assist themselves to whatever they thought their necessities required; that a very irregular and by no means correct account was kept with the Contractors and others; and that no separate account had been kept of the expenses connected with the working department of the Railway, nor any record of the employment of the Locomotives, while everything was, to all appearance, in the greatest possible confusion. Under these circumstances it is obvious that my duties were rendered difficult and unsatisfactory; and the possibility of giving you a complete and minute statistical report from the beginning is hence quite out of the question.

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My first step was, in conformity with your instructions, to proceed along the line of Railway and take a complete inventory of the stock and stores on hand, and to endeavor to trace the whereabouts of the stores and plant acquired by the Province from Messrs. Peto, Betts, Jackson and Brassay, as well as that which had since the transfer, been acquired by the Board of Commissioners, and to place those articles in charge of competent and responsible persons, accompanied with particular instructions relating thereto. After performing this duty at Shediac, and after carefully checking the traffic receipts and attending to other duties, until the Trains on this Division had been stopped for the season, I left for St. John and performed the same duty there; and the result of that enquiry I was enabled to present to you, in the shape of a Special Report, on the 4th day of March last.

My next step was to proceed to make arrangements for having a proper and efficient *system* of doing the business of this department, inaugurated; but this was rendered almost impossible by the loose manner in which the general accounts were being kept; I foresaw that the whole thing must be *upset*. This was a work of time and delicacy, and although much has been accomplished, and indeed by far the largest part overcome, still, as the line proceeds to completion much remains to do. I found, as in almost all such cases, officers, who, like myself were inexperienced, had each acquired certain habits and systems of their own, and were each unwilling to substitute another. I had had a glance into the different systems of Railway accounts in the United States and the Canadas, and felt satisfied on mature reflection that nothing short of a complete abolition of the system, and the substitution of a modification of the Canadian Railway classification was required, before any proper and uniform system throughout the entire Railway management could be effected. The Board approved, as you are aware, of this course; a competent and efficient Accountant was procured; the change has been effected, and I am persuaded that the statements which will now, no doubt, shortly be presented by the Accountant, (based upon this classification) for your consideration, will be entirely satisfactory to the Board, and to the Country.

I allude to this because it was a necessary preliminary step to be taken before any effectual remedy could be applied to the defects in this Department of the Railway; and now that it has been accomplished, I anticipate very little difficulty in the future, and hope to be enabled from time to time to pre-

sent you with full and particular information on all matters connected with the operating portion of the Line, as occasion may require.

It will not be necessary in this Report to allude particularly to the different projects I have under consideration, for the better government of the staff under my control, and the more economical working of the Line; but I may say that a proper and efficient *system*, together with the employment of competent and faithful officers to carry the same into effect, are at the foundation of all economy and good management, and will be productive of the best results.

The staff of this Department, on the whole line, may be briefly stated as follows:—

- I General Superintendent;
- 1 Div'n. Superintendent;
- 4 Station Masters;
- 2 Freight Agents;
- 2 Conductors,
- 3 Brakemen;
- 4 Switchmen;
- 1 Locomotive Foreman and Driver;
- 6 Drivers;
- 6 Firemen;
- 1 Blacksmith;
- 1 Car Repairer;
- 5 Watchmen;
- 1 Track Master;
- 16 Trackmen.

The Trackmaster's services have since been dispensed with, and so soon as the Shediac and Moncton Trains are taken off—two Station Masters, two Freight Agents, one Conductor, one Brakeman, two Switchmen, one Watchman, and the sixteen Trackmen will be relieved for the winter, and the remainder of the hands on this Division consisting of—

- 1 Locomotive Foreman and Driver;
- 1 Driver;
- 1 Fireman;
- 1 Blacksmith;
- 1 Carpenter and Car Repairer—

will be profitably employed for the Winter, in repairing the Engines and Cars, and in making the Hand Cars which will be required for the whole Line.

The Receipts and Expenditure; the number of Passengers; Mileage of Engines, and Traffic generally on each Division of the Line, will be best shown on reference to the following Accounts—Abstracts and Statements:—

### SAINT JOHN DIVISION.

#### Railway Board in Account with the Traffic Department.

Date.	Particulars.	Amounts.
1858.	—Dr.—	
Oct. 31,	To D. P. Myers.—This amount received from him, being proportion for carrying labourers,	£275 0 0
	This amount received from D. P. Myers, proportion for repairing ballast wagons, charged Revenue Account,	93 15 0
	Driver and Fireman's Time, running "St. John," at Lawlor's Lake, 197 days, @ 20s., including sundry repairs,	197 0 0
	43½ days use of "Peticodiac," every thing found, @ 80s.,	176 0 0
		<u>741 15 0</u>
"	Walker & Co.—Driver and Fireman's Time, running "St. John," from 1st July to 31st Oct., at Wetmore's Lake, 123 days, (including extra time and sundry repairs.) @ 20s.,	123 0 0
	Driver and Fireman's Time, running "Kennebecasis," from 9th Feb. to 31st including extra time, 264 days, @ 16s. 3d.	214 10 0
		<u>337 10 0</u>
"	John Brookfield.—46 days use of "Peticodiac" and Cars, from 30th June to 31st Aug., @ 80s.,	184 0 0
	21 days use of "Loostank," from 20th Sept., to 31st Oct., @ 80s.,	84 0 0
	7 days use of "Anagance," from 21st to 28th Sept., @ 80s.,	28 0 0
		<u>296 0 0</u>
"	Allison & Washburn.—Carriage on Sleepers,	17 3 10
"	Receipts.—This amount received since the opening to date, per Abstract, A.	2899 17 1
		<u>£4292 5 1</u>
1858.	Cr.	
Oct. 31,	By Locomotive Power.—Per Abstract C.,	£2527 6 9
"	Merchandise & Pasgr. Cars, " D.,	728 4 0
"	General charges. " E.,	494 6 3
	Balance at Debit of R. W. Board,	542 8 11
		<u>£4292 5 12</u>
	To Balance,	542 8 11

E. O. E.

Shediac, 31st October, 1858

**Abstract A.****TRAFFIC RECEIPTS.**—From opening of the Line to 30th, Oct., 1858.

Date.	Where Received.	Passengers.	Freight.	Sundries.	Totals.
1858					
Feb'y 1	Between St. John and Moose Path,	£ 680 0 6			680 0 0
June 1	“ “ “	200 10 2			200 10 2
Oct. 30	Between St. John and Kennebecasis,	1941 14 5	77 12 0		2019 6 5
	Totals,	£2822 5 1	77 12 0		2899 17 1

The following statement will show the number of Passengers carried since the opening, say—

Between St. John and Moose Path—			
From 20th July, '57, to 1st February, '58,	-	27,201	
“ 1st February, '58, to 1st June, '58,	- -	8,020	
			35,221
Between St. John and Kennebecasis—			
Since 1st June, '58, with up trains,	- - -	19,461	
“ “ “ with down “	- - -	16,496	
			35,957
30th Oct., 1858.	Total.....		71,178

Two children, (over 4 years and under 12 years) counted as one passenger.

Statement showing name, capacity, and cost of each Locomotive on this District of the Railway.

NAME.	SIZE OF CYL'D'S	DIAMETER OF DRIV. WH'L'S.	CAPTY OF TENDER.	MAKERS.	COST ON LINE.	WHEN PLACED ON LINE.
St. John	12 x 20	4 feet	1200 gls	Portland Co. Loc Works,	£1575 16 0	24th Dec 1858
Kennebecasis	12 x 20	4 “	800 “	Boston Loc. Works,	1700 0 0	15th Dec. “
Potcodiac	14 x 22	5 “	1500 “	“ “	2350 0 0	1st Jan 1858.
Anagance	15 x 22	5½ “	1700 “	“ “	2731 6 2	30th June, “
Loostauk	14 x 22	5½ “	1600 “	Fleming & Humbert,	2325 0 0	1st Aug “

List of Rolling Stock on this Division, (except the Engine and Tenders) with the collective value of each description.

3 First class Passenger Cars, .....	£2,295 17 8
2 Second “ “ “ .....	808 11 0
6 Freight Cars, .....	1,288 13 11
16 Platform, .....	2,112 15 10
40 Ballast Cars, .....	2,350 0 0
131 Earth Wagons, .....	4,323 0 0
3 Hand Cars, .....	63 10 0
1 Snow Plough, .....	252 10 0



The following Abstract of Locomotive Returns will show the performances of Engines, &c., &c., from the dates given.—SAINT JOHN DIVISION.

1858 Time Re. date from.	Name of Engine.	Hours in Steam.	CONSUMPTION OF			MILEAGE OF CARS BY THESE ENGINES.				Total Car Mileage	AVG. No. Mts. to 1 lb. Tallow.	AVG. No. Miles to 1 lb. Waste.	AVG. No. of Cars to 1 Mile run.							
			Wood Cords	Oil in Gals.	Tallow in Lbs.	Waste in Lbs.	1st. Cl.	2d. Cl.	Freight.					Platfm.	Ballast.					
Jan. 1.	Peticline	3,350½	13,324	326	192½	298	1	298	6,906	390	7,761	15,461	15,415	45,933	69.3	13,324	44.71	3.44		
June 30.	Ansangne	1,236	5,876	193½	65	116½	105	105	6,661	3,578	4,521	1,154	—	15,914	90.4	59.33	55.96	2.70		
Sep. 1.	Loostauk	450½	2,186	60½	26	50	46	46	1,530	900	72	2,526	4,506	9,534	84.	48.72	47.52	4.36		
		5,037	21,386	580½	283½	449	167½	449	15,097	4,868	12,354	19,141	19,921	71,381	4.24	36.86	75.5	129 15	47.63	3.33
April 5.	St. John*	2,066	8,428						6,398	84,951				91,349	4.					10.84
May 14.	Kennebec*	2,176	4,759						—	56,693				56,693	2.15					11.91
		4,242	13,187						6,398	141,644				148,042	3.1					11.22

\*These Locomotives are employed in service of Contractors who find fuel, oil and waste.

The following Abstract of Locomotive Returns will show the Performances of Engines, &c., &c., from the dates given.—SHELDON AND MONTON DIVISION.

1858. Time Re. date from	Name of Engue.	Hours in Steam.	Miles Run	CONSUMPTION OF				MILEAGE OF CARS BY THESE ENGINES.						Total Car Mileage	AVG. No. Miles to 1 lb. Waste.	AVG. No. of Cars to 1 Mile run.			
				Wood Cords	Oil in Gals.	Tallow in Lbs.	Waste in Lbs.	1st. Cl.	2d. Cl.	Freight	Platfm.	Ballast.	AVG. No. of Wood.				AVG. No. of Gal. Oil.	AVG. No. of Miles to 1 lb. Tallow	
April 19.	Hercules.	582	2,526	64	39½	2	101	1,117	1,117	560	13,115	13,115	15,909	4.34	39.4	64.35	1263	25.	6.25
May 4.	Sampson.	882½	3,053½	150	55½	4	197	1,760	1,760	1,020	6,179	6,179	10,739	3.46	20.3	55.00	763.37	15.5	3.51
April 19	Scadoun.	1,860½	11,818	301	133½	18½	232	12,000	11,800	5,880	5,129	5,129	34,809	6.35	39.2	88.3	638.81	46.89	2.94
		3,325½	17,397½	515	228½	24½	550	14,877	14,697	7,460	24,423	24,423	61,457	5.23	33.78	76.14	710.	31.63	3.53

**SHEDIAC AND MONCTON DIVISION.***Railway Board in Account with the Traffic Department.*

Date.	Particulars.	Amounts.
—1858.—	DR.	
Oct. 30,	To Walker & Co.—This amount received for wages of Fireman and Driver, while constructing Sect. 1,	£361 10 8
"	This amount received for wages of Firemen and Drivers, Shediac Wharf,	122 10 0
"	This amount for Robert Atkinson, (Station Master at Shediac,) services inspecting Shediac Wharf,	40 0 0
"	William Stevens.—This amount received for wages of Firemen and Drivers, while constructing Section 2,	198 11 0
"	Permanent Way, No. 2.—This amount charged for time of William Steadman, (Station Master at Moncton,) inspecting Sleepers,	50 0 0
"	Permanent Way, No. 4.—This amount charged for time of Driver, Fireman and Cleaner and use of Engines "Sampson" and "Hercules," taking down Sleepers from 4th May to 5th Aug., 1858,	275 0 0
"	Walker & Co.—Time of Driver and Fireman, and Watchman, and use of Engine and Cars, from 29th March to 3rd May, ballasting at Moncton,	124 0 0
Oct. 31,	Permanent Way, No. 4.—Proportion of depreciation in value of Machinery used in construction on Sections 1 and 2, Shediac Wharf, and charged in Locomotive Power Acct., No. 11.,	66 16 7
"	Receipts.—This amount being Traffic Receipts, from opening to date per Abstract B.,	2476 19 7
		<u>£3715 7 10</u>
1858.	—CR.—	
Oct. 31	By Locomotive Power.—Per Abstract F.,	1767 11 1
"	" Merchandize & Passengers. " G.,	602 6 9
"	" Maintenance of Way and Buildings, Per Abstract H.,	327 13 9
"	" General Charges.— " I.,	812 5 10
"	" Balance at the Debit of Railway Board,	205 10 5
		<u>£3715 7 10</u>

To Balance,

205 10 5

E. O. N.

Shediac, October 31st, 1858.

**Abstract B.**

TRAFFIC RECEIPTS.—From opening of the Line to 30th Oct., 1858.

Date. 1858.	Passengers	Freight	W'ifage & Storage.	Totals.
Jan. 1.....	451 19 11	333 3 0		785 2 11
Oct. 30.....	804 19 7½	872 7 5½	14 9 7	1691 16 8
Totals,	1256 19 6½	1205 10 5½	14 9 7	2476 19 7

The following statement will show the number of passengers carried since the opening.

From 20th, Aug., '57 to 1st January, '58 (latter inclusive.)	
Going East,.....	1959.
“ West,.....	2829—4,788.
From 19th April to 21st December '58 (both inclusive.):	
Going East,.....	4007
“ West.....	4582
Shediac and Point-du Chené.....	1426—10,015.
30th October, 1858.	Total,.....14,803.

Statement showing the name, capacity, and cost of each Locomotive on this District of the Railway.

Name.	Size of Cylinder	Diamr. of D. W.	Cap'ty of Tr.	Maker.	Cost on Line.	Date when placed on Line.
Hercules	17 × 20	5 feet	1,700	Boston Lo. Works	£2,600 0 0	
Sampson	17 × 20	5 feet	1,700	Boston Lo. Works	2,600 0 0	
Scadouc	14 × 22	5 feet	1,500	Boston Lo. Works	2,350 0 0	1st. Jan. 1858.

\* These two Engines were imported by Messrs. Peto, Betts, Jackson and Brassey and I am not enabled to say when they were first received.

List of Rolling Stock on this Division, (except the Engine and Tenders) with the collective value of each description.

2 First Class Passenger Cars,.....	£1,520 0 0
2 Second “ “.....	877 0 0
11 Freight Cars,.....	1,925 0 0
16 Platform “.....	2,610 0 0
3 Trucks,.....	99 0 0
5 Hand Cars,.....	92 10 0
1 Snow Plough,.....	252 10 0

The following statement will show the character and quantity of the principal Freight which passed East and West over this District of Railway from 19th April to 30th Oct., inst.

GOING EASTWARD.

GOING WESTWARD.

4,247 Brls. Flour,	87.10	115,360 Bds Oatmeal,
119 Hhds. Molasses,		14,461 Bush. Oats,
32 Brls. "	14.80	1,285 " Potatoes,
21 Hhds. Sugar,	13.10	110 " Plums,
78 Brls. "	5.00	928 " Barley,
164 " Pork,		712 Brls. Herring,
413 Chests Tea,	1.00	249 " Pork,
221 Boxes Tobacco,		864 " Oysters,
7,190 Bds Dry Fish,	7.12	148 Brls and } Eggs.
152 Boxes Candles,	100.00	65 Boxes }
314 Boxes Soap,		15 Boxes Lobsters,
341 Casks Lime,	43.40	445 Packages Butter,
132,430 Bds Bar Iron,	500.00	22 " Lard,
20,707 Bds Castings,		44 Bags salt,
99 Brls. Oil,	10.00	12,544 Bds Dried Fish,
740 Kegs and Bags Nails,	1.00	77 Hhds. and } Salmon.
87 Bags Salt,	11.00	667 Boxes }
13,250 Bricks,	65.00	58 Dead Hogs,
32 Tons Coals,		700 Tons Stone,
21 Stoves,	2.00	89 " Coals,
134 Ploughs,	12.00	72,730 sup. ft. Lumber,
16 Vehicles,	16.00	6,750 Bricks,
105 Casks }		18 Horses,
69 Brls. } Liquors,	2.00	14 Wagons,
67 Kegs. }		
37 Cases }		

370  
 1633  
 469  
 317  
 350  
 11 05  
 380  
 100  
 90  
 222  
 60  
 300  
 20  
 340  
 500

178  
 146  
 473.10  
 8096 10  
 148

138  
 40  
 148

## ST. JOHN DIVISION.

**Abstract C.—Locomotive Power.**

Salaries and Wages, connected with running the Locomotives,.....	£1145	14	5
Firewood,.....	616	18	11
Oil, Tallow, and Waste,.....	183	6	8
Materials for repairing Engines and Tenders,.....	1	1	3
Work not done by the Railway,.....	179	16	1
Repairs to Tools and Implements,.....	1	9	5
Water,.....	68	18	1
Small Stores,.....	9	15	0
Watchmen,.....	253	5	5
Miscellaneous,.....	67	-1	4
	<u>£2527</u>	<u>6</u>	<u>9</u>

**Abstract D.—Merchandise and Passenger Cars.**

Wages to Conductors, Brakemen, and Porters,.....	£463	17	5
Oil, Tallow, and Waste,.....	102	19	3
Materials for repairing Cars,.....	14	0	1
Wages for repairing Cars,.....	1	4	0
Work not done by the Railway,.....	84	18	6
Small Stores,.....	2	15	10
Wages for Switchmen,.....	51	1	1
Miscellaneous,.....	7	7	10
	<u>£728</u>	<u>4</u>	<u>0</u>

**Abstract E.—General Charges.**

Salaries to Officers and Clerks,.....	£171	9	0
Advertising, Printing and Stationery,.....	124	3	9
Insurance,.....	160	13	6
Miscellaneous,.....	38	0	0
	<u>£494</u>	<u>6</u>	<u>3</u>

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**SHEDIAC AND MONCTON DIVISION.**
**Abstract F.—Locomotive Power.**

Salaries and Wages connected with running the Locomotives,.....	£832	8	2
Firewood,.....	451	13	5
Oil, Tallow, and Waste,.....	140	14	4
Materials for repairing Engines and Tenders,.....	40	18	6
Wages for repairing Engines and Tenders,.....	48	16	1
Work not done by the Railway,.....	42	6	0
Repairs to Tools, &c.,.....		2	8
Small Stores,.....	10	18	1
Watchmen and Miscellaneous,.....	199	13	10
	<u>£1767</u>	<u>11</u>	<u>1</u>

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**Abstract G.—Merchandize and Passenger Cars.**

Wages to Conductors, Brakemen and Porters,.....	£339	11	0
Oil, Tallow and Waste,.....	22	12	6
Materials for Repairing Cars,.....	1	10	0
Wages for Repairing Cars,.....	31	11	1
Work not done by the Railway,.....	12	3	3
Small Stores,.....	4	3	5
Wages to Switchmen,.....	135	7	1
Miscellaneous,.....	55	8	5
	<u>£602</u>	<u>6</u>	<u>9</u>

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**Abstract H.—Maintenance of Way and Buildings.**

Inspectors, Plate Layers and Labourers Wages, &c.,.....	£314	4	5
Repairs to Stations, Buildings, and Approaches,.....	13	9	4
	<u>£327</u>	<u>13</u>	<u>9</u>

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**Abstract J.—General Charges.**

Salaries to Officers and Clerks,.....	£575	7	10
Advertising, Printing, and Stationery,.....	70	15	3
Insurance,.....	58	0	0
Miscellaneous,.....	108	2	9
	<u>£812</u>	<u>5</u>	<u>10</u>

The casualties, I am happy to say, have been few. It is worthy of remark that but one, of a fatal character, has occurred in connection with the Traffic Trains, since the opening of the line on the Shediac and Moncton Division on the 20th Aug., 1887; or on the St. John Division, since the 20th July of the same year; and this present year they have been entirely free from anything of the kind.

The following is a statement of each accident, with the cause of the same, and the date, as far as can be ascertained, when they severally occurred.

Name.	Occupation	Train.	In whose employ.	Nature of Accident.	Date.	Cause	Place.
Wm. Wilson,	Brakeman	Ballast	Walker & Co.	Killed,	Aug., '57,	Carelessness in Coupling Cars,	Shediac.
Pat. Connolly,	Do.	Pas'gr.	Railway,	Do.	Oct., '57,	Carelessness in Coupling Cars,	Moncton.
Thos. Brown,	Do.	Ballast	Walker & Co.	Do.	Apr. 20, '58,	Jumped off Locomotive, after being uncoupled in front of approaching Cars and falling, was unable to recover before cars went over him.	
Thos. Pierce,	Policeman	Pas'gr.	Police Magistrate,	Leg bk'n	Jun. 11, '58,	Slipped in attempt to get on Engine when in Motion.	Shediac.
Thos. Hains,	Labourer,	Ballast	John Brookfield,	Killed	Nov. 1, '58	Cars being thrown from the Track in consequence of small House being placed thereon without instructions, by the Track Foreman.	Ken'bcas.
John Brown,	Do.	Do.	Do.	Killed			

The following will show the Receipts on Shediac and Moncton District for Passengers, Freight, Wharfage and Storage, for the corresponding months of September, October, November, in

Character of Receipts.	1857.			1858.		
	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.
Passengers, .....	151 4 4½	91 16 10½	72 15 4½	116 6 10½	88 18 6	81 18 10½
Freight, .....	43 5 1½	82 2 1	154 7 1½	106 2 2	170 18 9	224 12 8
Storage and Wharfage, .....	.....	.....	.....	2 17 2	4 6 10	8 16 10
Totals, .....	\$194 9 6	173 18 11½	227 2 6	225 6 2½	264 4 1	315 8 4½
						\$804 18 9

It will be observed on reference to the foregoing statements that in the trade on the Shediac and Moncton Division there has been a very considerable increase.

I have no doubt, whatever, as the facilities are afforded, a large and increasing trade will be carried on via this line, with the Northern districts of New Brunswick, the Northern side of the Restigouche, Gaspe, and the Island of Prince Edward, and, when the whole line is completed, with the Canadas.

The placing good and sufficient steam communication on the route between Point Duchene and Dalhousie, touching at the intermediate ports of Buctouche, Richibucto, Miramichi and Bathurst, is of the utmost importance to the trade via this Line, and cannot fail to add materially to the making it a paying operation.

Since the settlements of the Fishery question, and the introduction of the Reciprocity Treaty, the trade of the Northern districts of New Brunswick, with the United States, has increased with extraordinary rapidity; and it only remains now, that this trade, which has been carried on in the face of delays and risks, via Cape Breton and the Gut of Canso, should be brought up the Bay of Fundy and over this line, and so on to its destination.

The facilities which a large and commodious Store and Freight House, on the wharf at Point du Chene, would afford to fishermen in the Gulf, is worthy of the most careful consideration. It would, I believe, be one means of inducing them to send the produce of their labors over this line to market. I do not, however, anticipate that much can be effected in this way until the completion of the Line to the City, which will render the difficult and hazardous navigation of the upper Bay of Fundy and the Peticodiac River unnecessary.

I am, Sir, your very obedient Servant,

L. CARVELL,

R. JARDINE, Esquire,  
*Chairman Railway Board, St. John, N. B.* }



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**EUROPEAN & NORTH AMERICAN RAILWAY.**

ST. JOHN, N. B., 31st Jan., 1859.

SIR,—

In conformity with your directions, I now beg to hand you statement of amount collected in Cars, by Conductor, between St: John and Moose Path, to 1st February, 1858. Statement showing daily passenger receipts in Cars, by Conductor, to 1st June, 1858. Statement showing daily passenger receipts in Cars and at each Station, between St. John and Kennebecasis, from 1st June to 30th Oct. last, with amount received for Freight since the opening of the line on this division. Also—a statement showing the amount of receipts for passengers, freight, &c., during the season just closed, on the Shediac and Moncton Division.

I am, Sir, your ob't. Servant,

L. CARVELL,

R. JARDINE, Esquire.

*Chairman Railway Board, St. John.* }

## TRAFFIC RECEIPTS

*In Cars by "Conductor" between Saint John and Moose Path,  
from 1st February to 1st June, 1858.*

Date.	Amount.	Date.	Amount.	Date.	Amount.
Feb'y. 1,	£1 11 7	March 15,	2 1	April 26,	1 2
2,	17 1	16,	3 4 6	27,	1 8 3
3,	1 14 9	17,	2 5	28,	1 2
4,	3	18,	1 15 10	29,	1 9 6
5,	1 13 9½	19,	2 6 4	30,	1 19
6,	1 4 6	20,	3 10		<u>142 12 10</u>
8,	1 8 6½	22,	1 17 6	May. 1,	1 8 6
9,	1 10 5½	23,	3 4 2	3,	1 19 8
10,	16 6	24,	2 13 4	4,	1 17 2
11,	14 7	25,	3 5 10	5,	2 9
12,	12 6	26,	2 8 6	6,	1 13
13,	15	27,	2 4	7,	1 1 2
15,	1	29,	2 4 10	8,	2 8
16,	1 3 9	30,	2 6 2	10,	1 17
17,	1 2 6	31,	2 14 6	11,	3 15
18,	1 8			12,	17 4
19,	1 10		£58 5 2½	13,	2 7 8
20,	2 5 1	April. 1,	1 19 10	14,	3 4 6
22,	1 5 6	3,	2 6	15,	3 4
23,	1 5 6	5,	2 3 2	17,	2 17 6
24,	1 2 6	6,	1 16	18,	3 6
25,	1	7,	1 1 10	19,	2 12 2
26,	2 3	8,	1 16 6	20,	2 12 6
27,	2 9 3	9,	1 10 10	21,	1 19 6
	<u>£33 13 10½</u>	10,	1 2	22,	2 3 10
March. 1,	1 10	12,	1 15 4	24,	1 4 10
2,	1 1	13,	1 13 2	25,	2 13 4
3,	2 7 1	14,	1 3 2	26,	3 7 8
4,	1 5 6½	15,	1 13 2	27,	4 5 4
5,	1 8	16,	1 17 6	28,	2 1 10
6,	1 14 8	17,	3 1 2	29,	3 6
8,	2 2 3	19,	2 7 6	31,	2 18 10
9,	18	20,	2 6	June. 1,	2 14 3
10,	2 2 6	21,	1 3 4		<u>£65 18 3</u>
11,	3 0 2	22,	1 11 6	Total. . . .	<u>£200 10 2</u>
12,	1 10	23,	1 15 10		
13,	1 10	24,	1 15 2		

## STATEMENT

Showing Daily Passenger Traffic Receipts between Saint John and  
Kennebecasis, from 1st June to 30th October, 1858.

Date.	Am't received at Saint John.	Am't received at Kennebecasis.	Am't received in Cars.	Total Daily Receipts.
June. 1,	33 16 6			33 16 6
2,	8 16 10	1 12 8	3 11 6	14 1 0
3,	9 8 9	2 5 6	2 8 2	14 2 5
4,	5 17 0½	12 9	1 3 2	7 12 11½
5,	7 11 2"	3 8 2	1 4 8	12 4 0"
7,	8 16 2	1 14 4	1 7 0	11 17 6
8,	6 3 10½	1 16 2	1 9 2	9 9 2½
9,	9 19 "	1 18 2	1 12 6	13 9 8"
10,	2 5 3	18 8	18 2	4 2 1
11,	5 10 10½	1 8 4	1 4 4	8 3 6½
12,	5 4 9"	2 0 0	1 6 2	8 10 11"
14,	3 13 3"	1 14 2	1 0 10	6 8 3"
15,	4 5 7"	1 17 3	19 6	7 2 4"
16,	4 15 2	2 0 0	1 4 10	8 0 0
17,	7 16 1½	2 19 9	1 17 6	12 13 4½
18,	4 1 8"	2 16 3	19 4	8 3 8"
19,	18 5 10"	5 11 4	8 6	24 5 8"
21,	8 9 9	4 15 10	1 5 10	14 11 5
22,	8 5 3	5 0 10	1 17 10	15 3 11
23,	8 3 9½	3 1 6	2 4 4	13 9 7½
24,	4 7 0	3 5 5	1 3 10	8 16 3
25,	7 3 0½	1 12 5	1 19 8	10 15 1½
26,	10 8 11	4 18 10	7 10	15 15 7
28,	3 8 10	2 16 3	1 12 4	7 17 5
29,	9 0 0	3 1 7	1 7 4	13 8 11
30,	5 19 11	2 8 2	1 1 10	9 9 11
	<u>£212 1 0½</u>	<u>65 14 4</u>	<u>35 16 2</u>	<u>313 11 6½</u>
July. 1,	14 11 ½	2 1 6	5 6	16 18 0½
2,	5 11 7½	3 4 5	1 10 4	10 6 4"
3,	14 2 1½	6 4 0	1 6 6	21 12 7"
5,	7 12 3	2 17 8	1 10 0	11 19 11
6,	10 3 9	3 4 0	1 6 2	14 13 11
7,	6 18 1½	2 9 1	1 2 0	10 9 2½
8,	29 2 3"	3 8 8	3 12 2	35 15 1"
9,	9 6 1	2 17 0	1 5 10	13 8 11
10,	5 4 10	3 16 7	1 12 6	10 13 11
12,	3 7 7	3 12 4	2 4 4	8 13 3
13,	5 7 3	1 10 5	1 7 4	8 5 0
14,	4 16 11	1 18 6	2 6 6	9 1 11
15,	10 18 0	2 18 8	3 7 6	17 4 2
16,	4 19 4½	2 18 0	2 5 8	10 3 0½
17,	6 5 0"	5 0 1	2 12 8	13 17 9"
19,	13 9 8"	7 15 10	4 17 6	26 3 0"
20,	26 17 7½	5 14 5	3 14 2	36 6 2"
21,	30 5 6"	4 7 9	2 13 10	37 7 1"
22,	21 0 1"	3 13 11	4 18 6	29 12 6"
	<u>Amt. car'd for'd, £229 12 3½</u>	<u>89 4 10</u>	<u>43 15 0</u>	<u>342 12 1½</u>

Date.	Am't received at Saint John.	Am't received at Kennebecasis.	Am't received in Cars.	Total Daily Receipts.
Amts. bro't for'd, £229 12 3½		69 4 10	43 15 0	342 12 1½
July 23,	6 5 1½	1 9 9	2 4 10	9 19 8½
24,	5 15 7"	5 6 1	2 11 2	13 12 10"
26,	8 2 3"	3 12 0	3 5 4	14 19 7"
27,	4 3 5"	2 6 9	1 18 8	8 8 10"
28,	4 11 8"	3 3 6	2 2 8	9 17 10"
29,	26 7 5"	2 6 10	4 5 4	32 19 7"
30,	6 6 9	3 6 1	1 15 6	11 8 4"
31.	8 1 3	3 7 0	2 17 6	14 5 9"
	<u>£299 5 11½</u>	<u>94 2 10</u>	<u>64 16 0</u>	<u>458 4 9½</u>
Aug. 2,	6 9 10	2 11 6	2 3 8	11 5 0
3,	5 10 11	2 15 0	1 15 6	10 1 5
4,	5 16 7	2 13 9	2 10 3	11 0 7
5,	5 15 7	1 16 0	1 18 0	9 9 7
-6,	7 19 4½	2 14 3	2 17 6	13 11 1½
7,	4 15 4"	2 18 10	2 -6 0	10 0 2"
9,	8 3 6"	3 2 9	2 6 6	13 12 9"
10,	12 8 5	3 0 0	1 7 6	16 15 11
11,	9 1 5	2 12 3	2 1 6	13 15 2
12,	7 4 10½	2 15 6	1 15 6	11 15 10½
13,	18 16 11	1 6 6	2 18 6	23 1 11
14,	6 1 4	2 16 2	2 1 6	10 19
16,	5 10 1½	3 2 3	3 2 6	11 14 10½
17,	13 6 8	2 16 6	3 17 0	20 0 2
18,	2 12 8½	4 14 6	2 9 0	9 16 2½
19,	10 12 0	3 17 6	3 12 6	18 2 0
20,	28 2 2	3 16 6	3 15 0	35 13 8
21,	6 13 0	9 13 0	2 6 0	18 12 0
23,	7 6 10½	5 13 0	5 4 0	18 3 10½
24,	15 17 2	2 13 6	4 6 6	22 17 2
25,	39 9 7	3 10 4	2 12 6	45 12 5
26,	30 11 2½	2 5 8	4 13 0	37 9 10½
27,	5 17 6"	2 7 9	3 0 6	11 5 9"
28,	8 18 7	3 13 3	2 4 6	14 16 4
30,	8 18 1½	4 1 6	2 2 0	15 1 7½
31.	7 10 7½	3 15 4	3 1 0	14 6 11"
	<u>£289 10 6½</u>	<u>87 3 1</u>	<u>72 7 11</u>	<u>449 1 6½</u>
Sept. 1,	49 5 6	5 8 0	27 1 0	81 14 6
2,	12 12 7	1 16 0	4 13 6	19 2 1
3,	2 19 3½	2 6 6	1 9 0	6 14 9½
4,	2 17 0"	4 13 6	1 16 6	9 7 0"
6,	5 6 2"	3 16 6	2 8 9	11 11 5"
7,	10 11 1"	3 1 9	3 5 6	16 18 4"
8,	22 5 7	2 12 0	2 1 0	26 18 7
9,	13 17 4½	2 0 10	3 14 0	19 12 2½
10,	12 16 11½	2 14 8	1 4 9	16 16 4"
11,	2 5 6½	2 4 4	1 17 6	6 7 4"
13,	4 3 11	2 12 0	2 0 0	8 15 11
14,	13 3 10	3 19 0	3 7 9	20 10 7
15,	31 7 3	2 6 6	3 0 6	36 14 3
Amts. cr'd for'd, £183 12 2½		39 11 7	57 19 9	281 3 6½

Date.	Am't received at Saint John.	Am't received at Kennobecasis.	Am't received in Cars.	Total Daily Receipts.
Amts. bro't for'd, £183 12 2½		39 11 7	57 19 9	281 3 6½
Sept. 16,	7 14 7½	2 16 6	2 6 0	12 17 1½
17,	13 9 9½	3 8 3	1 7 6	18 5 6½
18,	5 9 0½	10 6 7	3 10 0	19 5 7½
20,	10 7 3	4 13 8	3 14 3	18 15 2
21,	13 0 0½	4 15 0	3 4 9	20 19 9½
22,	35 4 4½	4 8 10	3 2 0	42 15 2½
23,	11 14 10½	3 3 10	3 6 6	18 5 2½
24,	3 9 10	3 7 1	1 8 0	8 4 11
25,	8 4 3½	5 0 9	2 17 6	16 2 6½
27,	4 4 5	3 0 3	1 16 0	9 0 8
28,	7 15 3	2 11 1	2 15 6	13 1 10
29,	3 1 8½	1 14 6	1 14 0	6 10 2½
30,	8 17 2	3 6 0	2 1 0	14 4 2
	<u>£316 4 10½</u>	<u>92 3 11</u>	<u>91 2 9</u>	<u>499 11 6½</u>

Oct. 1,	2 2 7	3 19 0	19 6	7 1 1
2,	3 0 11	6 6 11	1 5 0	10 12 10
4,	5 7 4½	2 10 1	3 0 9	10 18 2½
5,	7 4 3½	2 16 0	1 10 0	11 10 3½
6,	4 6 9	2 5 0	1 9 0	8 0 9
7,	4 17 1½	1 14 10	3 0 6	9 12 5½
8,	1 5 3	1 14 6	14 0	3 13 9
9,	18 4	2 13 6	2 0 6	5 12 4
11,	2 15 11½	3 0 Q	2 11 6	8 7 5½
12,	2 19 11	2 4 6	1 8 6	6 12 11
13,	3 16 5½	2 14 5	1 5 6	7 16 4½
14,	1 16 5	1 12 0	1 2 6	4 10 11
15,	3 4 1	2 2 0	6 6	5 12 7
16,	2 11 10	3 11 9	17 0	7 0 7
18,	4 3 7½	2 18 6	1 4 0	8 6 1½
19,	3 11 11½	6 6 0	2 4 0	12 1 11½
20,	8 7 9½	4 8 9	1 10 0	14 6 6½
21,	9 13 2	5 14 0	16 0	16 3 2
22,	3 0 10	3 1 3	10 0	6 12 1
23,	4 5 0	6 13 5	16 3	11 14 8
25,	4 0 4½	3 8 0	1 5 0	8 13 4½
26,	6 9 1	2 14 3	7 6	8 10 10
27,	4 7 11	3 2 9	8 9	7 19 5
28,	3 18 6½	1 13 5	17 6	6 9 5½
29,	3 15 8	2 4 6	10 0	6 10 2
30,	2 2 6	3 18 2	14 0	6 14 8
	<u>£103 3 9</u>	<u>85 7 6</u>	<u>32 13 9</u>	<u>221 5 0</u>

## RECAPITULATION.

June.	£212 1 ½	65 14 4	35 16 2	313 11 6½
July.	299 5 11½	94 2 10	64 16 0	458 4 9½
Aug.	289 10 6½	87 3 1	72 7 11	449 1 6½
Sept.	316 4 10½	92 3 11	91 2 9	498 11 6½
Oct.	103 3 9	85 7 6	32 13 9	221 5 0
	<u>£1220 6 2</u>	<u>424 11 8</u>	<u>296 16 7</u>	<u>1941 14 5</u>

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**SUMMARY.**

RECEIPTS to 1st Febr'y, 1858, - - - -	£680 0 6
“ “ 1st June, “ - - - -	200 10 2
“ “ 30th Oct., “ - - - -	1941 14 5
“ “ For Freight, “ - - - -	77 12 0
<b>Total of Abstract A., in former Report,</b> - -	<b>£2899 17 1</b>

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*Statement showing the Traffic receipts on the Shediac and Moncton district for Passengers, Freight, Wharfage and Storage, from 19th April to 25th Dec., 1858.*

Passenger Traffic, - - - -	£911 5 9
Freight, - - - -	1166 0 8
Wharfage and Storage. - - - -	37 18 2
<b>Total</b>	<b>£2115 4 7</b>

**L. CARVELL.**

## Statement of Land Damage Claims.

CLAIMANT.	AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP.	WHEN PAID.
Charles Hazen,	£1745 0 0	0 0	800 0 0	Jul. 26 '58
W. R. M. Burtis,	3200 0 0	0 0	800 0 0	Dec. 4 '57
William Wright,	7500 0 0	3000 0 0	0 0	June 24 "
	4000 0 0	2870 0 0	0 0	Sep. 22 "
Dean' McLauchlan,	400 0 0	40 0 0	0 0	June 7 "
Bridget Lowell	30 0 0	0 0	10 0 0	Aug. 31 "
Peter Corinnack,	2282 10 0	500 0 0	200 0 0	Jul. 19 "
D. Ramsay,	0 0 0	0 0	25 0 0	Jul. 26 "
W. R. M. Burtis,	0 0 0	10 0 0	0 0	June 23 "
Penelugon & Whiting,	0 0 0	225 0 0	0 0	May 31 "
	0 0 0	75 0 0	0 0	April. 17 "
Lawrence Cullinan,	0 0 0	7 10 0	0 0	Mar. 5 "
Dr. Geo. P. Peters,	0 0 0	161 0 0	0 0	Oct. 19 "
John Dooley,	0 0 0	135 18 0	0 0	Dec. 4 "
Thomas Trafion,	904 0 7	425 0 0	100 0 0	Oct. 10 "
Estate H. S. Peters,	0 0 0	0 0 0	100 0 0	May 1 "
Stephen Wiggins,	0 0 0	147 0 0	0 0	Nov. 5 "
Robert McLean,	0 0 0	0 0 0	100 0 0	Dec. 4 "
Edward B. Peters,	0 0 0	118 0 0	0 0	Oct. 5 "
Charles Merritt,	0 0 0	70 0 0	0 0	Dec. 17 "
George Merritt,	0 0 0	61 0 0	0 0	Aug. 4 "
Thomas Parks,	0 0 0	71 0 0	0 0	Oct. 29 "
H. B. Smith,	0 0 0	174 0 0	0 0	" 12 "
Henry Walsh,	0 0 0	0 0 0	103 0 0	Dec. 4 "
Dr. M. H. Peters,	0 0 0	28 0 0	0 0	Oct. 8 "
F. Fitzpatrick,	0 0 0	10 0 0	0 0	Jan. 14 '58
Chas. Drury,	0 0 0	330 0 0	150 0 0	Aug. 18 "
George Young,	0 0 0	0 0 0	25 0 0	" 20 "
Estate of H. Hennigar,	100 0 0	0 0	0 0	April 15 "
	£9458 8 0	2313 0 0	0 0	

Forward..

Statement of Land Damage Claims—Continued.

CLAIMANT.	AMT. OF CLAIM.	AWD. BY GOV.	AWD. BY APP.	WHEN PAID
		\$458 8 0	2313 0 0	J'ne 14 '58
Hon. R. L. Hazen,	Land and Damage,	150 0 0		" 16 "
Hon. W Botsford,	do.	140 0 0		Jul. 20 "
John McSweeney,	do. to Marble quarry.	3678 0 0	250 0 0	June 7 "
Geo. N. Robinson	do.		450 0 0	" 10 "
and Sisters,	do.		43 10 0	" 10 "
Mrs. S. E. Quinton,	do.		43 10 0	
Mrs. C. G. Stockford,	do.	30 0 0		Sep. 13 "
Israel Hoyt,	do.	163 10 0		Jan. 14 "
Henry McCullough,	do.	68 15 0		Jul. 26 "
Benj. Appleby,	Digging Trial Pits, &c.	1300 0 0	425 0 0	Feb. 26 "
	Land and Damage and			
	Land for Wharf,	35 0 0		June 3 "
Neill Bradley,	Land and Damage,	175 0 0	25 0 0	Aug. 5 "
J. Ferguson,	do.	450 0 0	3 0 0	Jan. 14 "
C. C. Stewart,	do.	525 0 0	No Damage	
J. A. Scribner,	do.		10 0 0	Jul. 2 "
	do.		25 0 0	Sep. 29 "
LeBaron Drury,	do.		80 9 4	
John Henderson,	do.	100 0 0	5 0 0	June 8 "
James Henderson,	do.	100 0 0	7 0 0	Nov. 7 "
James Duplex,	do.	150 0 0	25 0 0	June 11 "
Mrs. Anthony Dobbin,	do.	150 0 0	30 0 0	" 9 "
J. Henderson, Jr.,	do.	200 0 0	40 0 0	" 11 "
Abel Doughty,	do.	100 0 0	20 0 0	July 2 "
	Damage to Crop,		2 0 0	Nov. 7 "
James Rafferty,	Land and Damage,	150 0 0	10 0 0	April 2 "
F. McRory,	do.	840 0 0	80 0 0	July 20 "
P. O. Kane,	Damage to Crop,	42 15 0	5 0 0	Aug. 21 "
W. Waynes,	Building House for Abel Doughty,	107 10 0		Nov. 7 '57
			\$ 9367 17 4	3790 0 0

Forward.



## Statement of Land Damage Claims—Continued.

CLAIMANT.		AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP.	WHEN PAID
	Brought Forward..		9367 17 4	3790 0 0	
M. Morrison,	Land and Damage,	200 0 0	6 0 0	45 0 0	Aug. 4 '58
Allan Oity,	do.	40 0 0	10 0 0	20 0 0	Apr. 9 "
D. Sweeney,	Digging Trial Holes.			5 0 0	Aug. 20 "
D. Porter,	Land and Damage				June 16 "
	do.				" 17 "
	do.		3 4 0		Oct. 31 "
Thomas Purvis,	Moving Barn,		30 0 0		Sept. 10 "
James Keatér,	Land and Damage		1 0 0		Oct. 31 '57
	do.		8 0 0		Jan. 14 '58
Estate John Pollok,	do.			75 0 0	June 10 "
Lewis Burns,	do.	334 0 0		50 0 0	Oct. 28 "
Sarah Frances,	do.	50 0 0		10 0 0	Aug. 25 "
Harvey Siderquist,	do.	5 0 0	5 0 0		Sept. 18 "
J. Ruland,	Moving Barn,		12 10 0		Oct. 21 "
W. H. Baxter,	Land and Damage,	1100 0 0		200 0 0	Aug. 18 "
Nelson Arnold,	Station Grounds at Sussex,		72 0 0		May 6 "
Abner Jones,	Land and Damage,		5 0 0		Sept. 2 '57
	do.			60 0 0	July 20 '58
John Reed,	do.	250 0 0		125 0 0	" 20 "
Moses Jones,	do.	250 0 0		60 0 0	Oct. 9 "
R. Mühler,	do.	1055 0 0		460 0 0	July 20 "
	do.			25 0 0	Sept. 29 "
Jas. Dünüop,	Removing Barn,	210 0 0		20 0 0	Aug. 29 "
John Jones,	Land and Damage,			20 0 0	July 20 "
Caleb Beck,	do.		60 0 0		Oct. 31 "
Alex. Wright,	Station Grounds at Salisbury,		35 0 0		" 16 "
A. Wooten,	Land and Damage,		7 10 0		Dec. 4 '57
R. S. Bush,	do.		4 0 0		April 17 "
	Forward..		£ 9652 1 4	4940 0 0	

## Statement of Land Damage Claims.—Continued.

CLAIMANT.	AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP.	WHEN PAID
Oliver Jones, . . . . .	Station Grounds,	9652 1 4	4940 0 0	J'ne 30 '57
Isa. Bourke, . . . . .	Land and Damage,	618 0 0	5 0 0	Sep. 29 '58
Robt. Hamilton, . . . . .	do.	20 0 0		Dec. 29 '57
Jos. Votore, . . . . .	do.	10 0 0		Nov. 17 "
Frank Votore, . . . . .	do.	7 10 0		Feb. 16 '58
Simon Porrier, . . . . .	do.	35 0 0		Nov. 9 '57
Peter White, . . . . .	do.	13 10 0		Sept. 4 "
T. Robicheau, . . . . .	do.	45 0 0		Mar. 31 "
D. Govang, . . . . .	do.	130 0 0		Dec. 29 "
Robert Atkinson, . . . . .	do.	12 10 0		Sept. 16 "
Peter Porrier, . . . . .	do.	15 0 0		Nov. 17 "
Placide White, . . . . .	do.	8 0 0		Nov. 6 "
F. & J. Arseno, . . . . .	do.	10 0 0		Nov. 6 "
Peter, John & Alexander Votore, . . . . .	do.	15 10 0		Nov. 6 "
Robert C. Atkinson, . . . . .	do.	50 0 0		Dec. 4 "
George Bareman, . . . . .	do.		4 0 0	July 20 "
H. S. Armour, . . . . .	do.	9 0 0		Feb. 16 "
Joseph Billevous, . . . . .	do.		70 0 0	Sep. — "
Peter Billevous, . . . . .	Removing Buildings,	25 0 0		Nov. 9 "
R. S. Burke, . . . . .	Land and Damage,	3 0 0		Nov. 13 "
Thad Arseno, . . . . .	do.	10 0 0		Nov. 16 "
Robert Atkinson, . . . . .	do.	38 0 0		June 11 "
Hugh Boyd, . . . . .	do.	5 0 0		Dec. 29 "
James Boyd, . . . . .	do.	5 10 0		Dec. 29 "
Adam Boyd, . . . . .	do.	10 0 0		Dec. 29 "
W. Stack, . . . . .	do.	5 10 0		Dec. 26 "
James Mills, . . . . .	do.	8 10 0		Dec. 29 "
D. & P. Mills, . . . . .	do.	10 0 0		Feb. 16 '58
				Dec. 29 '57.
		£ 10771 11	4 5019 0 0	

Forward.

## Statement of Land Damage Claims.—Continued.

CLAIMANT.	Brought Forward..	AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP.	WHEN PAID
John Harris, . . . . .	Land and Damage,	10,771 11 4	15 0 0	5019 0 0	Jan.30 '57
Edmund Harris, . . . . .	do.	15 0 0	15 0 0		
Jno. A. Humphrey, . . . . .	do.	160 0 0	160 0 0		Oct.16 '57
John Humphrey, . . . . .	do.	75 0 0	75 0 0		Oct.29 "
E. B. Chandler, . . . . .	Land and Damage,	300 0 0	90 0 0		Oct.16 "
James Robertson, . . . . .	do.	15,00 0 0	275 0 0		
Jacob Gesner, . . . . .	do.	300 0 0	80 0 0	50 0 0	Sept. —
Bliss Botsford, . . . . .	do.		3 0 0		Oct.16 '57
G. Allingham, . . . . .	do.		100 0 0		July 26 "
William Steadman, . . . . .	do.		17 10 0		Nov. 3 "
Captain Cooper, . . . . .	do.		5 0 0		Oct. 27 "
Ambrose White, . . . . .	Land for Ballast Pit.		20 0 0		Nov. 9 "
P. Schureman, . . . . .	Land and Damage,		25 0 0		Dec.29 '58
W. J. Weldon, . . . . .	do.	23 0 0		5 0 0	Dec.29 "
A. Simpson, . . . . .	Removing Store at Wharf,		47 10 0		Oct.31 "
Thos. Trueman, . . . . .	do.		30 0 0		Oct.26 '57
Jno. Trices, . . . . .	Removing Store and House,		40 0 0		Oct.26 "
L. C. Gallagher, . . . . .	Removing House,		3 0 0		Oct.26 "
George Adams, . . . . .	Land and Damage,		300 0 0		Oct.26 "
S. Constantine, per E. B. Chandler,	Removing Buildings,		27 10 0		Oct.23 "
James Dunlop, . . . . .	do.		5 0 0		Nov. 9 "
Jno. Grady, . . . . .	Land and Damage,		32 10 0		Nov.17 "
I. S. Sayre, . . . . .	do.		5 0 0		Dec. 4 "
James Brown, . . . . .	Removing Buildings,		8 0 0		Dec. 4 "
Charles Tidd, . . . . .	Land and Damage,		20 0 0		Dec. 4 "
Thomas Tidd, . . . . .	do.		67 10 0		Ap'l17 '58
R. Kirwan, . . . . .	do.		50 0 0		May 10 "
A. Ferrigo, . . . . .	do.				May 10 "
		£ 12,228 1 4	5074 0 0		

Forward..

Statement of Land Damage Claims.—Continued.

CLAIMANT	AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP. WHEN PAID	
		12228 1 4	5074 0 0	
		25 0 0		May 10 '58
		10 0 0		May 31 "
		25 0 0		
		25 0 0		
		35 0 0		
	125 0 0		50 0 0	July 28 "
			77 10 0	
	1000 0 0		6 0 0	Sep. — "
			65 0 0	Aug. 5 "
		141 5 0		Oct. 31 '58
	60 0 0	17 10 0		
		4 0 0		Nov. 9 "
		5 0 0		Nov. 17 "
		30 0 0		May 31 "
			60 0 0	Sep. 29 "
	350 0 0		No Damage	
	50 0 0		do	
	150 0 0		do	
	750 0 0		do	
	250 0 0		do	
	100 0 0		do	
	30 0 0		do	
	450 0 0		do	
	300 0 0		do	
	200 0 0		do	
	200 0 0		do	
	12 10 0		do	
		£ 12605 16 4	5332 10 0	

Brought Forward.

Land and Damage,

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

Land purchased from Mrs. Ferguson, adjoining the Wharf,

For Wharf,

Removing Barn,

Land and Damage,

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

Lawlor's Lake,

"

"

Forward.

Damage extinguished by Benefits.

Damages extinguished by Benefits,

Statement of Land Damage Claims.—Continued.

CLAIMANT.	Land and Damage,	Brought Forward.	AMT. OF CLAIM.	AWD. BY COM.	AWD. BY APP.
George Roberts,	do.		300 0 0		5,332 10 0
E-t. D. Warren,	do.		100 0 0		No damage.
Jno. Palmer,	do.		200 0 0		do
Jno. K. Campbell,	do.		300 0 0		do
Thos. Purvis,	do.		151 0 0		do
Jno. Daniel,	do.		150 0 0		do
Thos. Fraser,	do.		100 0 0		do
Jas. Siderquist,	do.		200 0 0		do
M. H. Fowler,	do.		100 0 0		do
W. Crawford,	do.		200 0 0		do
Rev. W. W. Walker,	do.		150 0 0		do
W. Raymond,	do.		30 0 0		do
Jacob Yeomans,	do.		50 0 0		do
Robert Kee,	do.		150 0 0		do
J. D. McManus,	do.		150 0 0		do
Robert Otty,	do.		150 0 0		do
J. & C. Ketchum,	do.		250 0 0		do
C. J. Hendricks,	do.		300 0 0		do
George Brown,	do.		75 0 0		do
J. A. McManus,	do.		75 5 0		do
Edward Bartoo,	do.				do
H. Secord,	do.		155 0 0		do
Charles Secord,	do.		125 0 0		do
Reuben Sproule,	do.		125 0 0		do
V. H. Secord,	do.		100 0 0		do
A. B. Sproule,	do.		1.5 0 0		do
R. Burgess,	do.		50 0 0		do
Malcolm Wilnot,	do.		100 0 0		do
		Forward..	12,605 16 4		5,332 10 0

£25 per acre,

## Statement of Land Damage Claims.—Concluded.

CLAIMANT.	Land and Damage.	Brought forward.	AWD. BY COM.		AWD. BY APP.	
			12,605 16 4	5,332 10 0	No damage.	0
Alex. Robinson, . . . . .		50 0 0				
W. Horsman, . . . . .	do.	25 0 0				
W. Robinson, . . . . .	do.	50 0 0				
Alfred Frites, . . . . .	do.	30 0 0				
Malcolm Somers, . . . . .	do.	300 0 0				
Andrew Somers, . . . . .	do.	125 0 0				
E. Steeves, . . . . .	do.	90 0 0				
D. & H. Steeves, . . . . .	do.	90 0 0				
Gabriel Steeves, . . . . .	do.	15 0 0				
Israël Wilson, . . . . .	do.	15 0 0				
Bamford Wilson, . . . . .	do.	70 0 0				
Reuben Wilson, . . . . .	do.					
Robert Weldon, . . . . .	do.					
John Wilmot, . . . . .	do.					
George Wortman, . . . . .	do.	25 0 0				
W. H. Wortman, . . . . .	do.	30 0 0				
Martin Wortman, . . . . .	do.	30 0 0				
Frederick Wortman, . . . . .	do.	20 0 0				
W. Crandall, . . . . .	do.	150 0 0				
Edward Allison, . . . . .	do.	500 0 0				
Glebe Land, . . . . .	do.	750 0 0				
Total..£			12,605 16 4	5,332 10 0		
Amount paid prior to appointment of Commissioners, . . . . .				14 14 6		
Amount paid by Commissioners, . . . . .				12605 16 4		
Award of Appraisers, . . . . .				5332 10 0		17953 0 10
Appraisers Account, . . . . .						1080 16 10
Law Charges, fees of Record, &c. &c. . . . .						298 0 1
Amount of Debit of Permanent Way, No 3, as per Balance.						£19,331 17 9

## STATIONS ON THE LINE.

Miles from St. John	Miles from Principal Station	Miles from Station	STATIONS.
		0	St. John.
		1	Cemetery.
		2	Moose Path.
		1	Robinson's.
		2	Tory burn.
		1	Appleby's.
9	9	2	Kennebecasis.
		3	Quispansiss (or Lakefield.)
		5	Nauwigewauk (or Hammond River.)
		4	Quispam (or Groom's Cove.)
23	14	2	Ossekeag (near Hampton Ferry.)
		5	Pasekeag.
31	8	3	Norton (near Baxter's.)
		7	Apohaqui (near Millstream.)
44	13	6	Sussex.
		3	Plunweseeep (near Snider's.)
		4	Penobsquis (near Roache's.)
56	12	5	Portage (near McLeod's.)
		4	Anagance (near Leake's.)
66	10	6	Petitcodiac.
76	10	10	Salisbury.
		2	Boundary Creek (near Nixon's.)
		4	Mountain.
89	13	7	Moacton.
		2	Humphrey's Mill.
		4	Cook's Brook.
		7	Dorchester Road.
106	17	4	Shediac.
		2	Point du Chene.
		108	

CERTIFIED COPY OF  
**JACKSON & Co.'s SPECIFICATION A.,**  
 FOR BUILDING A  
**SINGLE TRACK RAILWAY,**  
 From Saint John to Shediac.

EUROPEAN & NORTH AMERICAN RAILWAY.

<i>Saint John to Shediac,</i>	- - - 107 Miles
<i>The Bend to Nova Scotia,</i>	- - - 37
<i>Total</i>	- - - 144 " <i>Single Track.</i>

— SINGLE TRACK. —

Rails.	<i>Permanent Way Rails</i> 63 lbs. to the Lineal yard.
Chairs.	<i>Wrought Iron Chairs</i> at the Joints each 12 lbs. weight.
Pins.	<i>Wrought Iron Pins</i> , Hackmatack or other suitable wood ties 8 $\frac{1}{2}$ to 9 feet long.
Ballast.	<i>Ballast</i> , 2 $\frac{1}{2}$ Cubic yards for every Lineal yard.
Fencing.	<i>Fencing</i> , where required, Post and Rail.
Earthwork.	<i>Earthwork</i> , Excavations 24 feet in width with slopes on ordinary Cuttings of 1 $\frac{1}{2}$ to 1 and in Rock $\frac{1}{4}$ to 1.
Embankments.	<i>Embankments</i> 15 feet in width at formation level, with slopes of 1 $\frac{1}{2}$ to 1.
Grades.	<i>Grades</i> , Maximum Grade not to exceed 45 feet per mile.
Curves.	<i>Curves</i> , Minimum Radius on Main Line 1500 feet.
Bridges.	<i>Bridges</i> , under the Railway of 100 feet span and upwards to be constructed of Iron, under that span of Stone or Timber, or both, at the discretion of the Contractors, secured with Iron bolts and fastenings;—over the Railway to be constructed of Stone or Brick.



*Culverts*, to be constructed of Stone or Timber, or both, depending upon the nature of the Foundations, as may be most expedient as approved by the Consulting Engineer.

Culverts.

*Crossings*, for farm and other roads on the Line of the Railway to be constructed in the usual way, and a Notice Board erected at all the public road crossings.

Crossings.

*Road Stations*, to be provided at or near (1) Nine Mile House, (2) Hammond River, (3) Hampton, (4) Finger Board, (5) Sussex Vale, (6) Head of Petitiocodiac River, (7) Pittfield's and two intermediate between the Bend and Nova Scotia boundary, with 300 yards siding at each, and also at the Bend, Shediac and Nova Scotia boundary, with a length of siding not exceeding half a mile at each.

Stations.

#### ROLLING STOCK AS FOLLOWS :—

10 <sup>+</sup> Passenger Engines,	20 Horse Boxes.
5 Goods do.	15 Ballast Wagons,
14 First Class Cars,	20 Hand Cars,
6 Second Class Cars,	4 Snow Ploughs,
50 Goods Wagons,	3 42 Engine Turn-tables
for St. John, Sussex Vale, and Boundary,	
50 Box Cars for Dry Goods,	
50 Timber Wagons,	20 15 Turn-tables,
20 Cattle Cars.	

*The Road Stations*, To be constructed of Wood, Brick or Stone, as the Contractors may find convenient, and to consist of a House with two upper and two lower rooms for the Station Master, with Out buildings and other conveniences together with a Ladies' Reception Room, Booking Office and open Shed for General Passengers, complete with Urinal and Water Closets; also a Platform for loading and unloading Cattle, Carriages, &c., &c., and at Sussex Vale, the Bend, Shediac, and Nova Scotia Boundary, Merchandize Sheds to be erected with Cranes and every necessary appliance, also Water Tanks and Woodsheds at Hampton, Sussex Vale, Pittfield's, the Bend, Shediac, and the frontier.

*The Terminal Stations* at Saint John to consist of a Carriage Shed roofed over for Passengers, with Platforms, Booking offices, Porters offices, Waiting

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rooms, Luggage rooms, Store rooms, Urinal and Water closets, Superintendent's residence complete, Board room, Secretary's office, Clerk's, do., Telegraph do., Refreshment room, and all requisite conveniences, Covered Goods Shed with Platforms, Cranes and Appliances, Cattle and Carriage Platforms with one mile of sidings to be built of Brick, with Slate or Zinc Roof; an estimate of such buildings in both Wood and Brick to be first made, and should the estimate in Brick exceed the estimate in Wood then the excess or difference to be equally divided and borne by the Contractor and Company.

Signed,

R. JARDINE, *President.*

W. JACKSON,

I certify the foregoing to be a true copy of the Specification or Shedule A. attached to the original agreement.

Signed,

ROBT. D. WILMOT.

[Form of Contract, Specification and Schedule upon which the Railway Works have been let by the Government.]

## NEW BRUNSWICK RAILWAYS, 1859.

### EUROPEAN & NORTH AMERICAN RAILWAY.

#### CONTRACT, SECTION NO.

Articles of Agreement made and entered into this  
day of \_\_\_\_\_ in the Year of Our Lord, One  
Thousand Eight Hundred and \_\_\_\_\_ and made in pur-  
suance of the Act of Assembly of the Province of New Brun-  
swick to authorize the Construction of Railways in the said  
Province, in duplicate between  
of the first part, and Her Majesty, Queen VICTORIA, represented  
herein by *Robert Jardine*, Chairman of the Board of Railway  
Commissioners of the Province of New Brunswick, appointed  
under Act of Assembly 19 Victoria, Cap. 15, of the second  
part:

WITNESSETH that the said part \_\_\_\_\_ of the first part, for and  
in consideration of the payments to them in hand, well and  
truly made, as hereinafter set forth by the said part \_\_\_\_\_ of the  
second part, do hereby for \_\_\_\_\_ Heirs, Executors,  
Administrators and Assigns, covenant, promise, and agree to  
and with Her said Majesty, Queen VICTORIA, Her Heirs and  
Successors, represented herein as aforesaid, to construct, build,  
complete and finish in a good, substantial and workmanlike  
manner, under the superintendence of the Chief Engineer  
appointed under the said Act, and in every respect to the  
satisfaction of the said Board of Commissioners and the said  
Chief Engineer for the time being, all the work contained in  
Section No. \_\_\_\_\_ on the \_\_\_\_\_ Division of the Euro-  
pean and North American Railway, commencing at a Station  
numbered \_\_\_\_\_ and extending to a Station num-  
bered \_\_\_\_\_ being a distance of \_\_\_\_\_  
miles \_\_\_\_\_ yards, more or less according to the Spe-  
cifications and plans hereunto annexed and referred to, and  
to provide all necessary plant and materials therefor of the  
very best description, and to do all said work, and to provide

all said plant and material, subject to the inspection, supervision, approval, and rejection of the said Chief Engineer, and upon the terms and conditions hereinafter specified.

The whole to be completed and finished, and in every respect ready for use, on or before the \_\_\_\_\_ day of \_\_\_\_\_ One Thousand Eight Hundred and \_\_\_\_\_ and to be conducted and carried out upon the terms, conditions and stipulations hereinafter specified, and which terms, conditions, stipulations, specifications and plans, are to be considered in every respect as part and parcel of this Contract.

IN CONSIDERATION WHEREOF, Her said Majesty, Queen VICTORIA, represented as aforesaid, doth promise and agree to pay to the part \_\_\_\_\_ of the first part, the lump sum of \_\_\_\_\_ pounds, \_\_\_\_\_ shillings and \_\_\_\_\_ pence, of the lawful currency of New Brunswick, the said sum to be paid the part \_\_\_\_\_ of the first part, by monthly instalments, as the work proceeds, according to the rates and prices in the tender and Schedule herewith attached:

## CONDITIONS.

### Materials.

*Firstly.* That the part \_\_\_\_\_ of the first part shall receive and use in the work herein contracted for, such Timber, Iron, Stone, Cement or Lime, and other materials as shall be furnished by the said Commissioners, and allow therefore such sum or sums of money as the Engineer may deem equitable: provided the same is not included in Schedule of prices attached to this Contract, and that the amount thereof shall be deducted from the amount of work done under this Contract.

Work to be done according to Specification.

*Secondly.* The constructing and finishing of said work is to be done in all respects according to the directions and instructions contained in, which may be implied from, or are incidental to the specifications hereunto annexed, and any plan or plans referred to in the said annexed specifications, which specifications and plan or plans therein referred to are hereby mutually agreed and declared to be incorporated in, and form a part of this Contract.

### Payments.

*Thirdly.* The payments of the prices herein beforementioned shall be made monthly by the said Commissioners upon certificate being received by

them from the Chief Engineer and approved of, that the work for or on account of which such payments shall be claimed has been duly and faithfully executed, such certificate to be given by the Chief Engineer within ten days after he shall have received an Estimate from his Assistant Engineer or officer in charge of the work, specifying the amount of work done during the month then ending.

But that nevertheless it shall be lawful for Her said Majesty to withhold from the part <sup>Retained money</sup> of the first part, and retain Ten per cent. out of the amount of the estimates, until the perfect completion of the work to the satisfaction of the said Commissioners: which Ten per cent. so withheld and retained shall be paid with the last instalment, after the Engineer or officer in charge shall have delivered to the Chief Engineer his final estimate of the work performed and materials furnished in virtue of these presents, with detailed measurements, weights, &c., and upon approved certificate by the said Chief Engineer of the work having been fully completed and finished: PROVIDED, that in forming his final estimate the Engineer or other officer shall not be bound or governed by the preceding monthly estimates which shall be taken and considered merely as approximate. PROVIDED ALWAYS, AND IT IS FURTHER AGREED, That Her said Majesty from time to time by the said Commissioners, during the progress of the work, may pay to the part of the first part the whole, or any portion of the Ten per cent. so withheld and retained.

*Fourthly.* That the work hereby contracted for, <sup>Work not to obstruct adjoining Contracts.</sup> to be done by the part of the first part, shall as far as may be required by the said Engineer, be prosecuted so as to facilitate and not to incommode or obstruct the prosecution of Contracts for adjoining, or contiguous works.

*Fifthly.* That this Contract shall in every respect be prosecuted in such order and at such places in the work and at such times and seasons as the Chief Engineer shall direct. <sup>Work to be prosecuted as the Engineer directs.</sup>

*Sixthly.* That if by report of the Engineer, or Superintendent employed by the Commissioners in that behalf, it shall appear that the establishment <sup>Chief Engineer may take work from Con-</sup>

tractor and re-  
let the same.

and rate of progress at and in the said work are not such as to insure the completion of the same within the time herein prescribed, or if part of the first part shall persist in any course violating the provisions of this Contract, Her said Majesty shall have the power at her discretion, by order of the said Board of Commissioners, without previous notice or protest and without process or suit at Law, either to take the work or any part thereof out of the hands of the part of the first part, and to relet the same to any Contractor or Contractors without its being previously advertised, or to employ additional workmen and provide materials, tools, and other necessary things at the expense of the part of the first part. And the part of the first part, in either case, shall be liable for all damages and extra costs and expenditure which may be incurred by reason thereof, and shall, in either of such cases, likewise forfeit all monies then due under the conditions and stipulations, or any, or either of them herein contained.

Failure in Con-  
tract.

*Seventhly.* That in case of failure in the Contract, the part of the first part shall thereby forfeit all right and claim to the said Ten per cent., or any part thereof remaining unpaid, as well as to any monies whatever due on this Contract.

All work and  
materials to be  
inspected.

*Eighthly.* That all work of every description may be inspected during construction, either by the Chief Engineer or such officer as he from time to time may appoint to superintend the same, and should any work be disapproved of, it shall immediately be removed or taken down and replaced by such as shall be satisfactory to the Engineer or the officer in charge. And no further estimate shall be made upon the same section so long as any work shall remain imperfect; and any omission to disapprove of any work at the time of a monthly estimate being made, shall not be construed to be acceptance of any defective work; likewise any material disapproved of shall not be used in the work, and if not removed by the part of the first part when directed by the Chief Engineer, or person in charge, then the rejected materials shall be removed by the aforesaid Chief Engineer, or person in charge, to such place as he may deem proper, at the cost and charge,

and at the risk of the part of the first part. And it is hereby expressly declared and agreed by and between the parties hereto that all materials, of every nature and description, and the property therein, which from time to time may be procured and furnished by the said part of the first part, to be used in and about the construction of the said works hereby contracted for, so soon as the same shall be inspected, approved of and marked by the Chief Engineer, or his officer for the time being in charge of and superintending the said works, shall absolutely vest in Her Majesty, the Queen, and the same may be included in the estimate of the Engineer or officer in charge, all which materials so inspected, approved of and marked shall not thereafter in any way be liable or subject to the debts, contracts or engagements or otherwise affected by any act of the said part of the first part to the prejudice of the said part of the second part. But it is distinctly understood and agreed that the inspection and approval of materials shall not in any way subject Her said Majesty to pay for the said materials, or any portion thereof unless employed or used in the said works, nor prevent the rejection afterwards of any portion thereof which may turn out to be unsound or unfit to be used in the work; nor shall such inspection be considered as any waiver of objection to the work on account of the unsoundness or imperfection of the materials used.

*Ninthly.* That, in the opinion of the Engineer, should any overseer, mechanic or workman, employed on or about the work, give any just cause of complaint, the part of the first part, shall immediately upon the application of the Chief Engineer or person in charge, dismiss such person or persons forthwith from the works, and he shall not be employed again thereon without the consent of the Chief Engineer; and should the part of the first part continue to employ such overseer, mechanic or workman, the part of the first part shall forfeit to Her said Majesty, Her Heirs and Successors, the sum of five pounds current money aforesaid, for each and every day during which such overseer, mechanic or workman shall be employed on the works after

Contractor to  
dismiss Work-  
men, &c,

such application as aforesaid; and all the sums so forfeited shall be deducted from and out of the amount which the part of the first part may be entitled to receive from her said Majesty at the commencement of the month next ensuing such forfeit, or at a later period as Her said Majesty may deem proper.

Engineer to determine quantities, interpret Specifications, &c.

*Tenthly.* That to prevent all disputes, it is hereby mutually agreed that the Chief Engineer for the time being, shall in all cases determine the amount or quantity of the several kinds of work which are to be paid for under this Contract, and the amount of compensation at Contract prices which are to be paid therefor, and also that the said Engineer shall in all cases decide as to the construction to be put upon any part of the Plans or Specifications, or any other question which can or may arise relating to the execution of this Contract, and his measurements and decisions shall in all cases be conclusive and binding between all parties, subject, however, to the final approval of the said Commissioners.

Contractor bound to make alterations or changes in position or details of work if required by the Chief Engineer.

*Eleventhly.* That if any change or alteration, either in the position or details of any part of the work shall be required by the said Chief Engineer during the progress thereof, the part of the first part is hereby bound to make such alterations or change, and if alteration or change shall entail extra expense on the said part of the first part, either in labour or materials, the same shall be allowed the said part of the first part; or should it be saving to the said part of the first part, either in labour or materials, the same shall be deducted from the amount of this Contract; in either case the amount is to be determined by the estimate made by the Engineer or officer in charge. But no such change or alteration, whatever may be the extent or quality thereof, or whatever time the same may be required to be made, pending the said Contract, shall in anywise have the effect of suspending, superseding, annulling, or rescinding this Contract, which shall continue to subsist, notwithstanding such change or alteration; and every such change or alteration shall be performed and made by the said part of the first part, under and subject to the



condions, stipulations, and covenants herein expressed, as if such change or alteration had been expressed and specified in the terms of this Contract, and should the said part of the first part be required by Her Majesty, represented as aforesaid, to do any work, or furnish any materials for which there is not any price specified in this Contract, the same shall be paid for at the estimated prices of the Engineer, subject to the approval of the said Commissioners; but no change or alteration as aforesaid whatever, and no extra work whatever shall be done without the written authority of the Engineer in charge, given prior to the execution of such work, nor will any allowance or payment whatever be made for the same in case it should be done without such authority. All bills for extra work, when ordered by the Engineer, must be returned monthly, or within one week from any time that may be called for by him; failing so to do, payment of them shall be discretionary with the said Commissioners.

*Twelfthly.* That the part of the first part will not by or agents, give or sell any ardent spirits to workmen, or any other person on or near the said work; or allow any to be brought on the work by labourers or other persons. Ardent Spirits.

*Thirteenthly.* That the part of the first part shall not in any way dispose of, or sub-let, or re-let any portion of the work embraced in this Contract: but the whole shall be done by labourers under immediate superintendence, with the exception of procuring materials. Work not to be Sub-let.

*Fourteenthly.* That any notice or other paper connected with these presents which may be required or desired on behalf of Her said Majesty to be served on the part of the first part, may be addressed to the part of the first part at residence, or usual place of business, or at the place where the work hereby contracted for is carried on, and left at the Post Office in Serving Notices. and any paper so addressed and left at the Post Office shall to all intents and purposes be considered legally served,

*Fifteenthly.* That should the part of the first part not complete the work herein contracted for at Non-completion.

of Work within  
time specified.

the period agreed upon as above mentioned, the said part of the first part shall be liable for and shall cause to be paid to the part of the second part, all salaries of wages which shall become due to the person or persons superintending the work on behalf of the said Chief Engineer, from the above named period for completion until the same shall be completed and received.

In case the  
Chief Engineer  
permits Con-  
tractor to pro-  
ceed with work  
if not completed  
within time spe-  
cified.

*Sixteenthly.* That in case it shall happen that the said part of the first part shall not fully complete the work herein agreed for within the time herein before specified, the said Commissioners may, if they shall think fit, permit the said Contractor to proceed with and complete the said work as if such time had not elapsed; and that in such case, such permission shall not be deemed to be a waiver in any respect of any forfeiture or liability for damages or expenses otherwise incurred by said Contractor in consequence of such failure to complete this Contract within such time, or incurred by him under any of the stipulations or provisions contained in this Contract, or in the annexed specifications; but this present Contract and every such forfeiture and liability so incurred, shall still continue in full force against such Contractor as if such permission had not been granted; and the said work shall in such case be performed, completed and paid for, in every respect according to the terms, stipulations and conditions contained in this Contract, and in the Specifications annexed, subject to the same forfeitures, liabilities and deductions, as are herein mentioned, which had been incurred by virtue hereof before such permission, and subject also to such forfeitures and liabilities, and the deduction of all such costs and expenses as shall or may, by the decision of the Chief Engineer, have been incurred after such permission, by reason of the non-completion, of such work within the time herein before specified for its completion, or by reason of the breach by such Contractor of any of the stipulations contained in this Contract, or in the annexed Specifications.

Discharged  
men.

*Seventeenthly.* That the part of the first part shall not hire any men that may be in the employ of, or have been discharged for misconduct from

any other section of the work, unless by consent of the parties who discharged them. It is likewise distinctly understood that the Contractors themselves will make such arrangements as shall establish a uniform rate of wages throughout the works, and that such arrangements shall not be departed from except by a majority of the other Contractors.

*Eighteenthly.* That the said part of the first part shall pay all labourers in employ monthly; and in case of failure of the part of the first part so to do, the said Commissioners shall have full right and authority to retain in their hands, for the payment of the workmen employed by the said part of the first part, on any work hereby contracted for, such an amount of any monthly estimate as the said Engineer may report to be requisite for that purpose. And the said Commissioners may adopt such measures for the disbursement of such retained money as they may consider the most judicious for the interest of all parties concerned.

Laborers to be paid monthly.

*Nineteenthly.* It is hereby also expressly conditioned and understood that the Governor in Council may suspend the progress of the said Works hereby agreed for, or any part thereof, according to the provisions of Act of Assembly, 19 Victoria, Cap 15, entitled, "An Act to authorize the construction of Railways in this Province." And in case the execution of this Contract shall be suspended as aforesaid at any time, and for any cause, no claim for prospective profits on work not done shall be made or allowed; but such an allowance for actual expenses incurred as the said Commissioners, upon the report by the said Chief Engineer, may deem fair and reasonable, which amount, when settled by the said Commissioners, shall be conclusive upon all parties; but the part of the first part shall have the right to complete the work when the part of the second part shall order it to be resumed.

Suspend on of Work.

In Witness Whereof,

# EUROPEAN AND NORTH AMERICAN RAILWAY.

## SPECIFICATION FOR WORKS.

General description of Work.

THIS Specification comprehends all works and every operation necessary for the formation of the Line of Railway, as a Single Line of Way from Station shewn on the Drawing, No. on the General plan to Station also shewn on the Drawing, No. on the Plan (with the exception of Tracklaying and Ballasting the Permanent way, which is not included in the present Contract.) and includes all diversions of Roads and Streams, and the completion of all Bridges and Masonry, and the maintenance all the works, exclusive of Permanent Way for twelve calendar months, after the Works have been finally delivered over and accepted.

Drawings.

The accompanying Drawings referred to in this Specification and in accordance with which the Works are to be executed, are in number, as hereafter particularized; and they are strictly to be attended to in the execution of the Works, with the particulars and description thereon, as well as such explanatory or detailed Drawings as may be furnished by the Engineer during the progress of the Work.

Conditions of Tender.

The Works included in this Specification are to be undertaken for a lump sum of money, the details and prices of which, based upon the quantities given on the Plans, to be stated in the Schedule; and it is distinctly to be understood that each item is to be monied out at a fair and reasonable rate, and the prices for additions and deductions and extra work, is also to be filled up; failing in either of these particulars the Tender will not be recognized. Should any alteration, addition, variation, or diminution, be made to, in, or from said Works, or should other Works be substituted for those shewn or specified by order of the Engineer, then such altered,

additional, varied, diminished, or substituted Work, to be measured by the Engineer and to be valued by him at the prices quoted in the Schedule annexed to the Tender; or if there be no prices applicable in the said Schedule, then the price to be fixed by the Engineer; and in all such cases the amount or value thereof to be added to, or deducted from the lump sum tendered, as the case may be.

The Engineer will set out the work and carefully stake out the centre line and half widths upon the ground at every fifty feet, and mark the cuts and fills, upon the stakes, after which the Contractor must be responsible for the correctness of the alignment and gradients, as no allowance will be made for errors by reason of the Works being out of line or level, and the whole must be delivered over finished and complete, in accordance with the Plans and Sections.

Entire changes in the location of the Railway, with a view of perfecting an alignment of the same, together with variations in the grade line, may be made by the Engineer, and no extra allowance beyond the additional measurement (if any) shall be claimed therefor.

The length of any Section may be increased or diminished by the Engineer if he consider the same necessary or expedient for the benefit of the Work.

The quantities marked upon the Section, whether of Excavation or Embankment, are deduced from cross section measurement taken upon the ground, which has been tested with numerous pits: also an allowance of ten per cent. is made upon the actual cubic measurement of the embankment for shrinkage. The Masonry also has been carefully calculated, and is in the opinion of the Engineer correct. These quantities are guaranteed to be correct, but should any considerable excess or deficiency arise, a corresponding addition or deduction will be made.

The various Works are to be executed according to the accompanying Drawings. These drawings are supposed to be correct, but the Contractor must satisfy himself on this point by taking and testing the levels, or by any other means, as no allowance

whatever will be made on the ground of any mistake.

Engineer to interpret Specifications and Drawings

If in any case it should happen that the dimensions written or described on the Drawing do not correspond with measurements taken by the scales, the Engineer in all such cases is to be the sole judge which of the two is correct, and to be taken, and the work is to be executed according to his decision.

Clearing.

The ground occupied by, and set apart for the Railway, is to be cleared for a distance of fifty feet each side of the Centre Line, of all buildings, timber, fences, stumps, bushes, logs, brush and other vegetable matter, which are to be removed to such places as the Engineer may direct; the buildings, crops and fences, to remain the property of the Commissioners; the loose brush, rotten logs, and other materials liable to catch fire, for a further distance of ten feet, or sixty feet each side of the Centre Line, are likewise to be brought out to it and burned, and in no case will they be allowed to be cast back on the adjacent land.

Grubbing.

The trees, stumps and bushes, to be cut close to the surface of the ground, removed, and piled upon the Centre Line, and the whole burned, or otherwise got rid of as the Engineer shall direct. No grading of any kind shall be commenced upon a Section until the clearing is finished to the satisfaction of the Engineer.

Where Embankments are less than two feet in height, all stumps, large roots, and other vegetable matter, must be thoroughly grubbed out and burned as specified above.

Loose Earth.

All vegetable or loose earth, which may be unsuitable for Embankments, must be removed, and no stumps, logs, or other perishable material, shall be placed in the Embankments. Should peat or any other materials be found in any of the Excavations, which the Engineer may deem unfit to be used in Embankments, it must be carried to spoil, and any deficiency which may thereby be occasioned must be provided for by the Contractor at his own cost.

Work to be executed according to longitudinal Section.

In Excavating the cuttings and forming the Embankments, the Contractor must strictly adhere to the depths and heights figured (or drawn) on the

longitudinal Section, and form the slopes and width of Road-bed in accordance with dimensions marked upon the Section, unless where otherwise ordered by the Engineer.

In carrying on the Embankments due allowance must be made for Settlement, and sufficient width at all times maintained, that no additions to the side of any Embankment shall at any time have to be made, and when by reason of side-lying ground the Embankment may have a tendency to slip, proper Benchings shall be cut according to the directions of the Engineer to receive the Embankment.

The road generally will be graded for a single Track, excepting at Stations, Turnouts, and similar places, which shall be graded wider, if required by the Engineer. The width of the Line, generally, at formation through all cuttings, is to be thirty-two feet, and on all Embankments twenty feet in the clear, when finished and delivered over, as shewn in the Cross Sections. On sidelong and sloping ground, the cuts in all cases will be excavated thirty-two feet in width on formation, twenty feet from Centre on the upper, and twelve feet from centre on the lower side. Where the Embankments are in Excess, the Excavations will be taken out thirty-five feet in width at formation level, if required by the Engineer. The Centre of the formation will in all cases be raised six inches higher than the sides, and the whole finished and ditched in accordance with the respective Cross Sections for Cuttings and Embankments, as shewn in Drawing, No.                      Figures                      at the end of this

Specification.

Such variations in the width of Excavations and Embankments, Slopes and dimensions of the Side Drains to be made as the Engineer shall from time to time direct.

All Earth excavated from Road-bed is to be carried into Embankment, unless otherwise directed by the Engineer, the surplus material to widen the embankments regularly, or form Double Track Embankment; and where there may be a deficiency of material, the Excavations will either be regularly widened all through, or an even and regular ditch

Settlement

Single Track.

Variations in the width of Cuttings and Banks.

Excavations

of sufficient capacity to furnish the deficiency of earth required will be staked out by the Engineer and excavated by the Contractor upon one or both sides of the Railway. No borrowing pits of any kind will be allowed, unless especially ordered by the Engineer in writing.

**Surplus Earth.** The Surplus Earth from Excavations not carried into Embankment, shall be deposited in a regular manner upon one or both sides of the Excavation, with regular slopes, as the Engineer shall direct, and so arranged as to convey the drainage or falling water from the Railway, leaving a space or berm of not less than six feet in width between the same and the outside line of the slopes of the Excavations, as shewn in Drawing, No.

As soon as part of an Embankment has been tipped, the Contractor shall trim and form such portions of the same as shall be directed by the Engineer, in order to enable him to judge of the proper allowance necessary for settlement and other causes.

**Crossings.** All Embankments and Excavations required for Road and Farm Crossings, and Bridges, shall be completed by the Contractor.

**Side Cuttings.** In case the Engineer shall determine to obtain any earth from Side Cuttings, the Contractor must execute such side cuttings wherever directed, and in such form and to such depth and extent as the Engineer shall determine, and shall dispose of the earth as directed by the Engineer.

**Drainage.** The bottoms of the Cuttings to be trimmed truly to the form shewn on the Cross Sections, for the purpose of draining the water from the surface into the side drains and ditches to be formed at the bottom of all Cuttings and Embankments, and along the tops of slopes in Cuttings of not less dimensions than shewn in the Drawings, and as much larger as the Engineer shall direct.

The Contractor is to keep all the Cuttings free from water, and to construct all such water courses and drains as may be necessary to preserve the slopes from injury by the action of water during the progress of the work or during the time of maintenance.

The description above given, as to the Cuttings



and Embankments, shall equally apply, as to manner of work, to all cases of Bridges, Approaches, Diversion of Roads and Occupation Roads, or to any other purpose of a similar character, and to every other matter and thing as above specified, or that shall in the opinion of the Engineer be needful for the proper execution of the Work.

In carrying the Embankment over any Bridge or Culvert which is to be covered thereby, care must be taken, by the use of a temporary bridge or staging, to have the Embankment brought up equally on both sides of such Bridge or Culvert, and carefully punned in layers not exceeding six inches in thickness, so that the weight of the earth may be brought equally upon each side thereof at the same time; and should any injury or derangement arise to any Bridge or Culvert, the Contractor will be required to make good the damage, or rebuild it at his own expense to the satisfaction of the Engineer.

Temporary  
Bridges, &c.,  
where required.

Before the Road is considered finished the Embankments and Excavations must be neatly Trimmed, and the whole surface made to conform accurately to the given widths and slopes and plane of graduation.

Trimming.

It is distinctly stated that no Permanent Materials will be allowed to be used in carrying on the Works, but that the Contractor is to provide at his own cost all requisite Plant and materials, including temporary Rails, Bridges, Coffers Dams, Crossings, Roads, Water Courses and Drains for keeping up communications and drainage during the progress of the Work.

Contractor to  
provide all temporary work.

The Contractor is to take upon himself all risks and contingencies whatever, that may arise in respect of the Works. He is to replace and make good at his own cost any work which may fail from whatever cause, whether from bad workmanship or materials, or from slips, slides, or freshets.

Risks and Contingencies.

The Blasting of all Rocks during the progress of the Work shall be entirely at the risk of the Contractor, and all damages occasioned thereby, or any injury done by him or his workmen to the crops, fences, buildings, or other property of the adjoining

Blasting.

land owners or occupants, in any way whatever, shall be paid for by him.

Roads not to be obstructed.

Public or private Roads which intersect the Line of Railway shall not be obstructed by Excavation or otherwise, until direction shall be given by the Engineer for completing the Road across the same, and convenient passing places or crossings shall be kept open for the accommodation of all having occasion to use them during the progress of the Work.

Public, or occupation Roads across the Railway, shall be not less than twenty feet in width. Between the Rails, and over the side ditches of the Railway, they shall be planked with merchantable Spruce Deals, not less than fifteen feet long and three inches thick, which shall be well spiked to the cross sleepers.

Two Cattle Guards, five feet in width and three feet in depth, and two open Culverts, two feet in width, to pass the water along the Railway ditches, composed of Dry Rubble Masonry, shall be inserted at every such Crossing.

The Approaches, if sunk, shall be built in accordance with Drawings, No.      The width of the Road bed, (if sunk,) shall be twenty feet in the clear, with a ditch on each side, six feet wide at the top one foot six inches wide at the bottom, and one foot six inches deep. If raised, it shall be twenty-four feet wide on the top. In either case, the Cross Section of the Road must be raised or barrelled in the middle ten inches, and the longitudinal slope or grade is not to exceed one foot vertical to twenty feet horizontal; also the side slopes of the Cuttings and Embankments are not to be less than one and a half to one.

Road Divisions

All Road Divisions will be located hereafter by the Engineer, and they shall be evenly graded with no longitudinal slope exceeding one in twenty.

The Road-bed, in such Divisions, shall be graded twenty feet wide on the surface between the ditches, and barrelled in the centre ten inches; the ditches on each side shall be not less than six feet wide upon the surface, one foot six inches deep, and one foot six inches wide on the bottom, and so arranged as to draw all the water off the Road and

discharge it through the Culverts, which shall be inserted at proper intervals under the Roadway.

When the diversion is of considerable length and runs parallel to the Railway, the same number and description of Culverts shall be in the diversion as are in the Railway between the same common points, and they shall be inserted at such levels as will completely dry the ditches. When from the nature of the ground it is necessary to go into Cuttings or Embankments to preserve the inclination, the side slopes shall be made not less than one and a half to one, and neatly dressed.

After the grading has sufficiently settled, the surface of the Road shall be covered over for a width of twelve feet in the centre with twelve inches of clean gravel or broken stone, in cubes of not more than two inches square, and the whole shall be neatly finished in accordance with Drawing, No.

The Works are to be carried on under the direction of the Chief Engineer, and such resident and Assistant Engineers and Inspectors as he may appoint, and they are to be executed in all respects to his entire satisfaction; and his decision on all questions relating to the Works, or to the construction and meaning of this Specification, or of the accompanying Drawings, or of any Drawings that may be furnished at any time to the Contractor, is to be final and binding on all parties.

As a check to the monthly estimates, it is distinctly understood and agreed, that the Contractor is required to return to the Engineer, at the end of every month, true Bills of the total quantity of work done, and materials furnished by him up to that time, before any payment will be made. These Bills shall include all extra work, labour and materials, (if any,) done and furnished up to the date of the estimate; failing so to do, payment of extras shall be discretionary with the Commissioners.

For the simplification of the monthly measurements, it is understood that the various kinds of Excavation will be classified under two heads, viz. :—Earth, and Solid Rock, and paid for as such. Earth, comprising all material of every kind except Solid Rock. Solid Rock, comprising all Rock in

Works to be carried on under Engineer or such others as he may appoint.

Contractor to return Bills of Work done, &c.

Description of Work.

places which requires blasting, and all detached stones or isolated masses measuring more than five cubic yards.

Every description of material required to be raised and removed in forming the Road bed, is to be estimated as Excavation, and the quantity ascertained by measuring, either in Excavation or Embankment as the Engineer may determine, making such allowance in measuring Embankments for shrinkage as he may deem proper:

### EXCAVATION FOR FOUNDATIONS.

Excavation for Foundations.

The Excavations for Foundations of all Bridges, Culverts, Walls, or other Masonry, shall be made of such a depth and of such dimensions as the nature of the ground will require, the Engineer to decide in this respect without reference to the Drawings; but whatever the depth may be, no extra allowance will be made in that respect, and no work shall be commenced in any such Excavations, until the Engineer shall have inspected and approved of the same. The Excavations, during the progress of the work, to be kept entirely free from water by pumping or otherwise, and the earth arising from such excavation to be placed in the Embankment, or other part of the Work, as the Engineer may direct; and in case no such depository can be found, the Contractor to remove the same from the Work entirely. When the erection, whatever it may be, is completed, the Foundations are to be filled in and punned round and about the Masonry, and the top smoothly levelled and made good to the satisfaction of the Engineer;

### MASONRY.

Masonry.

The Masonry will be classified under eight heads, viz: Ashlar Masonry, first class laid in Cement, Dry Rubble Masonry in Abutments, Rubble Masonry in Cement, Rubble masonry in Lime, Ashlar Masonry in Arches, Rubble Masonry in Arches, Dry Rubble Masonry in Culverts, and Rip Rap or Bank Paving,

All Masonry will be estimated and paid for in the monthly estimates, by the yard of twenty seven cubic feet.

## ASHLAR MASONRY.

Ashlar Ma-  
sonry.

Ashlar Masonry, first class, to be laid in the best quality of approved fresh Newark, or Rosendale cement, and clean sharp sand, mixed in such proportions as the Engineer shall direct.

All the stones to be used in this class of Masonry must be of the best ledge or split stone, of large and suitable size and of good quality, and well adapted for substantial and durable structures, and in all respects such as the Engineer shall approve. Each stone must be dressed fair on the beds throughout, the joints to be dressed square back from the face not less than nine inches, and to have chisel drafts up the arrises. To be laid in courses at least twelve inches in thickness, and so that there shall be one Header to every Stretcher, and so arranged with each other and with the backing as to make a good bond throughout.

The Headers must have at least two and a half times as much bed as face, measuring from the face towards the interior, and not less than two feet long on the face. The Stretchers must have a breadth on the bed at least once and a half the height of the course, and not less than eighteen inches, and they shall in no case be more than six feet in length, and the joints must overlap at least nine inches, the beds must be rectangular, being as long on back as face, as no trapezoidal shaped stones will be allowed.

Great care must be taken to have all the beds dressed to accurate planes; the face work quarry dressed and brought to the required lines. No pinning of any kind shall be permitted in setting any part of the work. Each stone shall be set in a full bed of mortar, and beaten solid; each course must be well and carefully grouted; all the strings and copings to be chisel dressed on the face. The filling in between the Ashlar and Bond stones of Piers, and backing of Abutments, shall be of large flat bedded stones, and no stone to be less than six inches thick, nor more than two thicknesses of stone to make the height of the course. The beds to be punched off so as to have a good bearing on the stone below, and in all cases the stones to be laid on their broadest beds,

and they must bond at least six inches with the Ashlar work and with each other. If any levelling is necessary upon the upper bed it shall be done before the next course is laid upon it. And each course of backing shall be cut down level with the face work. At least two thirds of the upper bed shall be of full thickness of course, so as to give the next stone a firm bearing upon it, And no levellers or spalls shall be allowed under a stone that will raise it from its bed. There are to be Headers in the backing midway between those of the face. When the walls are not more than three feet thick, the bond shall be in one stone three feet long, so as to pass through the wall to back and front. When the walls are of greater thickness than three feet, as in Peirs or Abutments of Bridges, the Header shall be not less than three feet in length, and put in alternately in the front and back of the wall. The course above to have large stones crossing the joints of the bond stones, so as to give effectual bond. When the work is finished it is to be neatly pointed at a proper season of the year.

### RUBBLE MASONRY IN BRIDGE ABUTMENTS.

Rubble Masonry in Bridge Abutments.

Rubble Masonry in Abutments to be of large flat bedded stones of good size, not less than one foot rise, and containing at least six cubic feet, the bed being at least twice the rise. The whole shall be laid in horizontal beds in irregular courses, free from pinnars, the beds being punched so as to insure an equal bearing throughout. The joints not to exceed three quarters of an inch; the vertical joints to be squared from the face nine inches, and the horizontal joints to overlap one foot. The Header shall be not less than three feet in length, and laid alternately in back and front of the wall. The coping and steps to the wings to be of stone split to dimension with squared joints and edges, and carefully bedded. Great care must be taken to effect the best bond, and make the closest and neatest work.

### ARCH MASONRY.

Arch Masonry.

Arch Masonry, whether in Ashlar or Rubble, shall include Arches only. The Ashlar Arch Stones

must be of the full depth or thickness of the Arch, and worked on the radial joints to three eighths of an inch; they must be not less than two feet in length, and must break joints not less than nine inches. They must be of good, sound durable stone, and laid in a full bed of mortar, of the best fresh Newark or Rosendale Cement.

In Rubble Arches, the stone must be of the full depth or thickness of the Arch, and rough hammered to fit the radial joints without the introduction of pinners. No stone to be less than one foot long, and they must all bond or break joints with each other at least six inches, and be laid in a full bed of Hydraulic Cement. The joints whether of Ashlar or of Rubble must be brought in line with the radius of the curve of the Arch.

### ARCH CULVERTS.

The Culverts will be built upon the site that shall Arch Culverts. be set out by the Engineer in charge of the work, and exactly in accordance with the lines and dimensions of the accompanying Working Drawings, No. All the stone used in the Culverts to be good and sound Free or other stone, that shall be approved of by the Engineer.

### FOUNDATIONS.

The ground to be excavated to the depth and of sufficient width to allow of the Masonry being put to its full dimensions, as shewn upon the Drawing. Foundations.

The Footing Courses shall be of large, flat bedded stone, hammer scabbled, the upper beds rough punched, and laid solid, at the depths shewn upon the Plan. No stone shall be less than six inches in thickness, nor of less area of bed than nine superficial feet. The rest of the Foundation Walls to the underside of the Invert, shall be of good, sound, flat bedded Rubble, not less than four inches in thickness and three feet area on the bed, to be laid dry. Footing Course.

### INVERT.

The Invert to be of Ashlar, laid in Cement, one foot deep, and neatly punched on the beds and joints, and pitched off square on the top and bottom, the joints not to exceed three eighths of an inch, Invert.

each stone to be dressed to the proper radius, set in a full bed of Hydraulic Cement and well grouted. No stone to be less than two feet long, and to break joints nine inches.

### SKEWBACK.

Skewback.

The Skewbacks to be of dressed Ashlar, of the form and dimensions shewn upon the Drawings, and no stone to be less than two feet in length.

### ABUTMENT WALLS.

Abutment Walls.

The Abutment Walls to be block in course, neatly hammer dressed, no stone to be less than seven inches in thickness and eighteen inches in length, and to have three times as much bed as rise, measuring from the face toward the interior of the work. The beds to be carefully dressed throughout, the joints not to exceed three eighths of an inch. The joints must be dressed back square at least nine inches from the face, and must overlap nine inches.

### BOND STONES.

Bond Stones.

Through bond stones not less than twelve inches thick, eighteen inches wide, and not less than three feet long, are to be put in every superficial yard of face.

### BACKING OF ABUTMENTS.

Backing of Abutments.

The Backing of the Abutments to consist of large flat, bedded stone, not less than three feet area on the bed. The greatest care must be taken to affect the the best bond with the face work, and to make the closest and neatest work. The whole must be laid solid in lime mortar and brought up to a level with every course of the face work.

### ARCH STONES.

Arch Stones.

The Arch stones to be of Ashlar, of the full depth of bed, as shewn upon the Drawing, and no stone shall be less than two feet in length and nine inches thick on the soffit. The thickest course to be laid at the springing of the Arch and gradually decrease to the crown. The key stone to be twelve inches thick on the soffit. The beds of each stone to be fair dressed to the proper radius, and the end joints squared to full depth of bed. The faces to be pitched off to a line and roughed punched; all the



stones to break joint at least twelve inches; and no joint shall be more than one quarter inch. No pinning of any kind will be allowed in setting. Each stone to be set in a full bed of Cement and beaten solid. The vaussours or ring stones of the Arch to be neatly pitched off, and to have a two inch arris draft around the edge of the extrados and intrados, and along the joints.

### WING AND END WALLS.

The Masonry of the Wing and End Walls to be of the same character as specified for the abutments: they will be built exactly as shewn upon the Drawing. The stones in this work must be not less than eighteen inches long, and one half of them must extend completely through the walls.

### COPING.

The Coping to Wings and Entrance to be the full thickness of the walls, projecting three inches over the face, and to be in stones not less than three feet long, neatly pointed and pitched to a line.

All the face work to the thickness of two feet to be laid in Cement, and the remainder of the Masonry, in good Lime Mortar, grouted solid at every one foot in height.

### PUNNING.

The Earth to be carefully punned in layers of not more than six inches at a time to ten feet in height above the crown of the Arch, and descending each side on a slope, of not less than one and a half to one to the surface, each side to be carried up simultaneously.

### BRIDGES.

Small Bridges under the Railway shall not exceed spans of thirty feet, they shall be built in accordance with Drawings, Nos. The Pilasters and Quoins shall be hammer-dressed rough Ashlar, with chisel-drafts up the arrises. The face of abutments and wing walls shall be best coursed Rubble, the courses to correspond with the Ashlar in the Quoins and Pilasters. The whole to be faced in Cement to a depth not less than two feet, and the backing laid with Lime Mortar well grouted. The coping on the Road Bridges to be tooled Ashlar.

Wing and End Walls.

Coping.

Face Work.

Punning.

Bridges.

Bridges over  
Railway

The Bridges over the Railway shall be built generally in accordance with the Drawings, Nos. . . . upon two piers placed upon the outside of the ditch. They shall be of snecked Ashlar laid in Cement.

Footing  
Courses.

All footing Courses shall be of large flat bedded stones, hammer-scabbled; the upper beds to be well jointed and laid solid at the depths shewn upon the Plan. No stone shall be of less dimensions than nine superficial feet (unless they are closers) and of the thickness shewn upon the Drawings.

### CULVERT MASONRY.

Culvert Ma-  
sonry

Culvert Masonry will include all Cattle Passes, open Culverts, and Box Culverts, with their walls, covering, coping and paving; also all bank sustaining walls, and will all be built in accordance with the respective Drawings, Nos. The stones will not be less than four inches thick, and three feet area on the bed. They will be rough punched or scabbled on the beds throughout.

Box Culverts.

Square or box Culverts will be of Dry Rubble Masonry, they will be from two to four feet span, and from three to four feet high, the thickness of walls varying according to circumstances. The stones of which they are built must be strong, durable and well-shaped, and laid in such a manner as to form a perfect bond throughout. One third of the stones shall be of sufficient length to extend completely through the walls where they do not exceed three feet, where the walls exceed three feet the headers shall be not less than three feet in length, and put in alternately in the front and back of the wall. The top courses shall be composed entirely of bond stones, extending throughout the walls, and not less than six inches in thickness. The covering shall be of large flat stones, nine to fifteen inches in thickness, as the Engineer shall direct; they shall be fitted so closely together as to prevent the earth of the embankment from running through into the Culvert. The quoins of all walls shall be not less than three feet long and nine inches thick, and of her laid up plumb or stepped regularly back to suit the proposed batter. The foundations shall be paved with flat stones in

a similar manner to that described above for Arch Culverts. The end walls will be of rough hammer dressed Masonry, with regular coping of two and a half feet wide, not less than six inches thick, projecting three inches over the general face of the wall and laid in a full bed of Cement mortar. Culverts of the above description are to be built, if required with one or more openings with a pier wall or walls between them. After the Work is accepted the earth is to be carefully punned in layers of not more than six inches at a time, to a height of three feet above and around the top and sides of the Culvert as shewn on the Drawing, No.

### RIP RAP.

Under the head of Rip Rap will be included the bottom ballasting of the Embankments; the underpinning in Culvert foundations as well as the aprons of Culverts; likewise the coating of the sides of the Embankments with loose stones and brush to protect them from washing, and such coatings shall be placed two feet in thickness, (measuring at right angles to the line of slope) along the slopes of all Embankments that are below extreme high freshet level.

Rip Rap or  
Bank Paving.

### CEMENT AND LIME MORTAR.

Cement shall be of the best quality of Fresh Newark, or Rosendale Cement, in papered barrels, and approved of the Engineer, and shall be mixed with an equal measure of clean sharp approved sand, or in such other proportions as the Engineer may determine, and only prepared as required for immediate use.

Cement and  
Lime Mortar.

Lime Mortar shall consist of the best lime in the Province, to be approved of by the Engineer, and mixed with clean sharp approved sand, in the proportion of two measures of sand and one of lime, or in such other proportions as the Engineer may determine. It shall be well mixed and thoroughly ground in a mortar mill that will be furnished by the Government, and tempered with a proper quantity of water, and only made as required for use.

Mortar in all cases to be prepared under the immediate direction of the Inspector, by labourers

employed by the Contractor ; or the Inspector may employ other men to mix it and charge their wages to the Contractor, which amount shall be deducted from the monthly estimates.

None but competent Masons to be employed in laying walls of any kind.

The prices per yard for Masonry shall include the cost of all Coffers Dams, the pumping and bailing of water found in the pits, both before and after the foundations are prepared ; (furnishing artificial foundations will be extra, except when they are delineated upon the Plans ;) also the scaffolding, centering for arches, and the preparation of all roads that may be required in order to transport the stones and other materials to the Work.

All the materials that are to be used in Culverts and Bridges must be examined and approved of by the Engineer, or such person as he may appoint, and those considered unsuitable must be immediately removed to such distance as may be deemed necessary, in order to prevent them from being used in the Work.

No Masonry shall be commenced without orders from the Engineer, or before the foundation has been inspected, or covered up before being inspected and approved. The Contractor will be required to have an approved Derrick on the Work before he will be allowed to commence Masonry of any kind.

The proportions and dimensions of the several parts of the Culverts and Bridge Abutments will be represented on the Plans.

No Masonry shall be laid in Mortar, unless by special direction, between the first day of November and the first day of April.

### TIMBER AND WORKMANSHIP IN BRIDGES AND VIADUCTS.

Timber and  
Workmanship  
in Bridges and  
Viaducts

All Bridges and Viaducts shall be built exactly as shewn on the respective Drawings. The timber work in Viaducts and Road Bridges, over and under the Railway, shall be of the best Saint John White Pine, with the exception of the Centre Stringers under the Rails, which shall be of the best Southern or Savannah Pine, and of sufficient lengths

to extend over two spans so as to break joint. All the timber shall be free from sap, heart shakes, bad knots, or any unsoundness whatsoever.

It shall be all neatly planed exactly to the dimensions shewn on the different plans, and the workmanship throughout must be of the best description of carpentry, good, sound, firm, and well bolted, and such as shall be approved of by the Engineer. It must be painted with three coats of oil paint of an approved colour.

The upper surfaces of all the Viaducts and Bridges under the Railway shall be covered with Warren's improved Fire and Waterproof Roofing.

### WROUGHT IRON WORK.

All wrought Iron, in plates, bolts, nuts, straps, <sup>Wrought Iron Works.</sup> cramps, bars, keys or wedges, or made use of in any other form or manner whatsoever, in any of the Bridges or other Works, is to be of the best Pembroke Iron or such other description of Iron as shall in the Engineer's opinion, be of equal quality. The greatest care must be taken in any welds that may be required, to ensure perfect soundness, and all other workmanship, whether forging or fitting up, must be of first rate quality.

The heads of all bolts must be forged in one with the bolts, and must be as thick as the bolt is in diameter, all nuts must also be of the same thickness as the bolt is in diameter, and the thread both of nuts and bolts must be well and deeply cut, and must be of such quality as the Engineer shall approve.

### SLEEPERS.

Sleepers will be furnished by the Contractor, they shall be of Hacmatac, Pine, Hemlock, or Cedar, the respective prices of which to be stated in the Schedule. They must be exactly nine feet long and six inches thick, and smoothly and evenly hewed to a uniform thickness with two parallel faces, which shall not be less than eight inches wide upon the narrowest part.

The Hacmatac and Pine may be sawed out of large timber, but the Hemlock and Cedar Sleepers must be hewed out of green straight thrifty timber, just large enough to make one Sleeper. The whole

Sleepers.



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No Grading is to be commenced or farm fence taken down between the first of May and the first of November, until the permanent fence on both sides of the Railway has been erected. When Grading has been commenced the previous winter, the permanent Fencing must be completed before the first of May. The Contractor will be held responsible for all damage sustained from want of Fencing, or from injuries done to crops by labourers in their employment.

The whole of the above specified Works to be executed in a substantial, faithful, and workmanlike manner, and to the entire satisfaction of the Chief Engineer, and subject to the constant supervision and inspection of such persons as he may appoint to superintend the same, and to be delivered over finished and ready for use on or before the first day of June, Eighteen hundred and sixty.

ALEXANDER L. LIGHT.

*Chief Engineer.*









<i>Quantities.</i>	<i>DESCRIPTION.</i>	<i>Prices.</i>	<i>Amt.</i>
		£. s. d.	£. s. d.
"	Ballast for every additional half-mile lead, beyond } the extent of the Contract, - - - }	" " "	.....
"	Upholding Line for 12 mos. after the acceptance } of the work, - - - - - }	at per mile.	.....

WITNESS hand , this day of One Thousand Eight  
Hundred and Fifty Eight.

Names of Sureties who are willing to become personally bound for the due fulfilment of this Contract.

*Names of }  
Sureties, }*

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J. & A. M' MILLAN, PRINTERS, PRINCE WM. STREET, ST. JOHN, N. B.

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