Tendering—Contracts Nos. 60-63, B.C.

19883. In this matter it appears that the successful tenderer asked for a short extension of time: do you remember whether you were consulted upon the expediency of granting that; they got on one occasion some days, and a further extension of some days?—I have no recollection of anything of that kind. I think I took no part whatever in the negotiations that took place between the receiving of the tenders and my reporting on them and their final acceptance.

19884. Do you remember whether you took any part in the negotiations between the final acceptance of the tenders and the transfer of the rights of these parties to Onderdonk, and the contract with Onderdonk?—No part, so far as my memory serves me.

19885. Have you any personal knowledge of the way in which the transfer was brought about?—I have no personal knowledge.

19886. Is there anything in connection with this matter relating to this last section D that you think ought to be explained by you?—Nothing special.

Results favourable to the public.

19887. Have you considered whether the result of this asking for competition was one as favourable to the public interest as might be expected and under all the circumstances?—I have no reason to think it was in any way whatever unfavourable.

19888. Do you think that the prices were as low as might be expected for work in that country at that time?—I think they were.

19889. Have you given any consideration to the question of the expediency of putting so much work into the hands of one contractor or firm, instead of into the hands of four separate contractors or firms?—I have referred to that point, I think, in my letter dated 20th January, 1880, page 190. I said there, that

> "As the other three sections in British Columbia are already awarded to Mr. Onderdonk, and the one section intervenes between them, it would result in considerable avantages to have the whole in the hands of one contractor of sufficient strength to carry on the work, and from the letters furnished from the general manager of the Bank of Montreal and others of high standing, there would appear to be no doubt of Mr. Onderdonk's financial ability and experience."

Of great advantage to have the whole of a great work in the hands of one capable contractor.

19890. This opinion, however, as I understand it, touches only the last state of affairs, that is after Onderdonk had got the other three sections, and the question was whether he should get the fourth; but I intended to ask you the broader question, whether, when the work was in the hands of four contractors, it was advisable to amalgamate the whole and place them under one contractor?—I have stated in what I have just read you, it would result in considerable advantages to have the whole in the hands of one contractor.

19891. That is, as I understand it, after the other three sections had been acquired by Onderdonk?—I think I have reported on that point somewhere else, but I cannot see it at this moment.

19892. Without reference to what has been formally reported, what is your opinion now upon that subject?—I would rather refer to my opinions as they were given when I was an officer of the Government, than to furnish fresh opinions at this time.

19893. Would you have any objection to say this: whether you have seen any reason to change the opinions which you gave then?—I have no reason to change the opinion. I have seen no reason to change the opinion.

Tendering—Contracts Nos. 61-63, B.C.

19894. So that, as far as you remember the contents of the report, you are still of the same opinion?—Yes.

19895. I think you alluded to this subject at a former stage of your evidence when you were discussing the expediency of letting the work upon sections A and B, between Thunder Bay and Red River, contracts 41 and 42?—Yes.

Other things being equal it is best for public that one strong firm should have the whole of a large work.

19896. I understood you, then, to give this opinion on the subject: other things being equal, that you thought it would be as well for the interest of the public that one strong firm should have the work?—Yes; I think I did give an opinion of that kind.

19897. Have you any objections to say whether that is still your opinion upon the question in the abstract?—Oh, I think it, as stated here, resulted in considerable advantage; but I must say to you, that one is not in a frame of mind to give any deliberate opinion as I am now situated in the witness box, excited by the numerous questions asked me. When I give an opinion upon a question of such importance, I desire to give it deliberately.

19898. Then I understand you do not desire to be asked anything further on the subject now?—I do not object to give opinions on that or any other subject, but I cannot give a deliberate opinion on that or any other important subject situated as I am at this moment.

Work let at very low prices and given in each instance to the lowest tenderer.

19899. Is there any other matter connected with this work in British Columbia, either as a whole or any section of it, which you think ought be given to us by way of evidence from you?—I know of nothing. The work is extremely difficult. It seemed to me at the time to be let at very low prices, lower in fact than I thought it would be let for, and if I am not entirely wrong, I think in every instance it was placed under contract at the lowest price offered.

19900. That appears so from the report furnished us?—Except, perhaps, one irregular tender I had referred to to-day. One by Brown & Corbett; they offered to do it for a very little lower than somebody else—the lowest regular tender.

Bridge across Red River—Contract No. 64.

How the work was undertaken.

19901. The next contract in order is No. 64, with Ryan, Whitehead & Ruttan, for a temporary bridge across Red River: do you remember any special circumstance connected with that?—Yes; I remember something about it. Mr. Collingwood Schreiber was then at Winnipeg in the capacity of superintending engineer, I think; and on the 3rd of March I telegraphed him as follows:—

"If you think it advisable and practicable, while river is frozen, to construct temporary pile bridge at Winnipeg, you can invite tenders, giving a week's notice."

The object was to secure railway connection between one side of the river and the other, to facilitate intercourse between the Pembina Branch and the town of Winnipeg and the country west of Winnipeg. Mr. Schreiber replied to that telegram on the 4th, the following day:

"It is advisable, in the interest of speedy construction westward, to have a bridge, but what about its obstruction to navigation? If it is to be built the piles and timber must be delivered at once; but I do not consider it would be prudent to erect it until after the ice flows."

On the 6th of March, having received authority, I directed Mr. Schreiber to get out piles and timbers while the snow lasts, and on the 10th of March I requested Mr. Schreiber to make application to the corporation of Winnipeg to allow

Bridge across Red River—Contract No. 64.

a temporary fixed bridge to be erected; and that I considered it best to postpone erection until the ice moved, but that the materials should be obtained at once. According to the instructions referred to, tenders were received for the erection of the temporary bridge on the 10th of March, and I reported on the fact some time afterwards, on the 6th of April, the lowest tender having been accepted under the authority of the Minister by telegraphing in the meantime. The lowest tender was that of John Ryan, Charles Whitehead and H. N. Ruttan, $7,350. The work was undertaken and completed after I ceased to be Engineer-in-Chief.

Contract based on lowest tender.

19902. Then the contract appears to have been based upon the lowest tender: do you know whether up to the time that you ceased to have charge of the work it was progressing satisfactorily?—I heard nothing to the contrary up to the time I left.

19903. Is there anything special about the contract which you think it necessary to state?—Nothing at all that came under my knowledge.

Rolling Stock—Contract No. 65.

19904. The next contract in order is No. 65, with James Crossen, for some rolling stock?—The rolling stock referred to was advertised for on the 19th of February. Tenders were invited and received on the 1st of March. The tenders were opened on the 2nd of March by Messrs. Trudeau, Smellie and Braun. The contract appears to have been awarded to Crossen, of Cobourg, his tender being the lowest, for four first-class cars. There was an official car added to the contract afterwards. The information with regard to the official car will be found in the correspondence.

Contract given to lowest tenderer.

19905. Did the manner in which this contract was fulfilled come under your knowledge officially?—I do not think it did. I think that contract was filled after I left.

19906. Is there anything connected with the contract which you think it proper to mention?—No; there is nothing that I desire to say, or that I think attention should be drawn to.

Tendering—Contract No. 66.

19907. The next contract is No. 66, with Bowie & McNaughton, for the construction of a portion of the main line, the second 100 miles west of Red River: that, I understand, was submitted to public competition?—This work was advertised on the 1st and 11th of February, 1880. The reception of tenders was postponed by a second advertisement dated the 22nd of March, until Friday, the 9th of April. Specifications and memorandum of information and forms of tender and all necessary documents were prepared and printed, and furnished to intending contractors. Tenders were received. Tenders were opened on April 12th, in the presence of Mr. Trudeau, Mr. Schreiber and Mr. Braun, and on the 13th April I reported on them to the Minister. From this it appears that the lowest tender was one sent in by George Bowie and Mr. McNaughton, the amount being $438,914. A contract was entered into with these parties on the 3rd of May, but I have no personal knowledge of what has been done in the way of carrying out this contract.

Contract based on lowest tender.

19908. The contract appears to be based upon the lowest tender, according to your report at that time?—Yes.

19909. Is there anything further in connection with this contract which you can explain?—I do not think it is necessary to state that

Railway Location—Contract No. 66.

this second 100 miles section was located in a position that I did not think the best.

Location not what witness would approve.

19910. Who decided upon that location ?—The Government.

19911. Contrary to your recommendation ?—Contrary to my recommendation.

19912. In what respect did it differ from the line which you recommended ?—It went over ground that involved very severe gradients, unnecessary as I thought.

19913. Do you mean that a line with lower gradients could, in your opinion, have been obtained between the same termini ?—By a different route. However, my views were overruled, and the contract was let.

Witness believed a better line with lower gradients could have been obtained but his views were overruled.

19914. Was there any Governmental policy involved in the adoption of that line, or was it merely from engineering views different from yours ?—I dare say a question of policy had something to do with it.

19915. What was that Governmental policy ?—I am not prepared to say what their policy was. It was not very fully explained to me. I could not see it myself.

19916. Do you mean that you did not agree with the Government in their policy ?—I was not called upon to agree or disagree; I simply stated my views with regard to the advisability of building the line on that particular route.

19917. Of course we have no wish to enquire into the expediency of any policy which was adopted by the Government, but we wish to enquire into the engineering features of the transaction: do I understand you to say that the same result could have been obtained, in your opinion, by following a different route ?—Practically the same result could have been obtained on a better route.

The same result could have been obtained on a better route.

19918. Could you explain, generally, the main features of the difference between your opinion and the other engineering opinions which prevailed ?—I think my reports that are printed will partly explain it. At all events you will find my report on the subject at page 246 in the Canadian Pacific Railway Report for 1880; you will find a reference to it also at pages 23 and 24, in which I say:

Explains.

"In June last surveys were commenced to establish the route from the western boundary of the Province of Manitoba, and thence north-westerly towards the River Saskatchewan. A general reconnaissance of the district has been made, and two lines surveyed—one running west, and terminating four miles beyond Fort Ellice, on the Assineboine; the second, on leaving the Province of Manitoba, taking a north-westerly course to Bird Tail Creek; a third was projected to run from the common starting point to the confluence of the Little Saskatchewan and River Assineboine. This line gave promise of favourable gradients on a section which ultimately might be used for coal traffic; but the first had the advantage with respect to mileage on the other route. The Government held that it was more important to continue the line which followed the general course of settlement along the western slope of the Riding Mountain, especially as it proved to be twenty miles shorter than the southern route. The north-westerly route was therefore adopted by Order-in-Council dated 22nd January last, and tenders were invited for the second 100 miles section west of Red River."

That is the point that you refer to. The line that I favoured was the one leading from the western end of the Province of Manitoba to the Valley of the Assineboine, by the mouth of the Little Saskatchewan.

19919. Is that the one that you allude to as likely to be used for coal traffic ?—Yes.

Railway Construction—Contract No. 66.

19920. I suppose the work on this section was not much more than commenced at the time that you left the railway, and that therefore you are not able to say how the work was done on this second 100 miles?—I doubt if anything at all was done when I retired from the field.

Rolling Stock—Contract No. 67.

Simon Peters lowest tenderer for box cars.

19921. The next contract is No. 67, with the Moncton Car Co.: had you anything to do with that?—These cars which are contracted for, under contract No. 67, were advertised for at the same time as the passenger cars furnished under contract No. 65. For this particular kind of cars—that is to say box, and freight and platform cars—the prices of the Moncton Car Co. were the lowest but one. They offered to furnish the box cars at $690, and platform cars at $490. They were actually the lowest for the platform cars, but there was a lower tender for the box cars—that of Simon Peters, of Quebec.

19922. By how much was that lower for the box cars?—$5. But I think, on reference to the tender, you will find that Peters did not undertake to furnish the full number required, not more than half.

19923. He is reported to have offered to furnish only from fifteen to thirty instead of sixty?—Yes.

19924. Then I understand you to suggest that the offer of the Moncton Car Co. was the best in the public interest?—Here is a letter addressed to Simon Peters on the 3rd of March, by Mr. Braun, informing him that his tender for the box cars was the lowest—but it was not made on the proper printed form—and enquiring if he had seen the drawings and specifications, and if he was sure that the cars were to be delivered at Emerson, Manitoba. Mr. Peters was further asked to state if his tender was made on the conditions contained in the plans and specifications, to telegraph the fact at once and confirm the telegram by letter. He was also informed that a deposit of 5 per cent. would be required. On the 4th of March I see Mr. Peters telegraphed that he would proceed to Ottawa. On the 5th of March I find a letter from Mr. Peters, dated Ottawa, March 5th, stating that when he made up his mind to tender for the cars it was too late to procure copies of the specifications either from Ottawa or Moncton:

Peters withdraws.

"Believing that the said cars would be the same as those I had previously tendered for for the Intercolonial and Grand Trunk Railways, I tendered upon those plans and specifications. Upon examination of the plans and specifications for cars for the Pacific Railway, made by me this morning, I find that those cars are much more expensive to build than the ones I have estimated for. I beg, therefore, to withdraw my tender, with the hope that it will not be prejudicial to me in the minds of the Government."

Contract given to next lowest tenderer—the Moncton Car Co.

Mr. Peters' tender being withdrawn the Secretary was instructed to notify the parties in Moncton that their tender was accepted, and the contract was entered into, as I understood it.

19925. Did anything further come under your notice with respect to this contract which is necessary to be explained?—No further explanation is needed, I think. Nothing occurs to me as being necessary.

Contract No. 68.

19926. The next contract, No. 68, is with the Ontario Car Co., for two postal and baggage cars?—Two postal and baggage cars were advertised for at the same time as the cars last referred to. The lowest tender received was that of the Ontario Car Co., and the tender

Contract given to lowest tenderer—the Ontario Car Co.

of the Ontario Car Co. was accepted. The price was $3,115; the price of the next lowest tender was $3,303. The contract entered into was dated 8th of May. I ceased to be engineer before the end of May, and

Transportation of Rails—Contract No. 69.

the contract has, doubtless, been completed since. I know nothing of it of my own knowledge. The next contract was entered into after I left. I find in my letter-book a memorandum giving the required explanation of contract 69. It sets forth as follows:—

Explanation why competition not invited.

"With regard to the letter of Mr. Henry Beatty of the 13th instant, returned herewith, I have made enquiry and learned from the Hon. Mr. Pope, that he has no recollection of having asked a rate for 15,000 tons as claimed by Mr. Beatty. On September 30th, 1879, a letter was sent Mr. Beatty accepting his offer of $6 per ton, for the limited quantity of 4,000 tons, from Montreal to Fort William, the rate to include harbour dues at Montreal, canal tolls, insurance to the value of $25 per ton, and piling at the point of delivery. Late in the season 3,000 tons in addition to the 4,000 tons arrived in Montreal, and it was necessary to have them removed from the wharves and forwarded. Mr. Beatty was the only party available for this purpose, and he offered to take them to Emerson at the same rate as he had contracted to convey 11,000 tons for contractor John Ryan. This offer was informally accepted, and Mr. Beatty acted on the acceptance, but no payments have yet been made. As the sum is large, before certificates are issued, it would be necessary to have the understanding for the transportation of the 3,000 tons confirmed and approved."

What was done after that I do not know, but I have no doubt at all an Order-in-Council was passed and the payments made.

The arrangement desirable in the public interest.

19927. The arrangement made, as I understand you, was a desirable one for the Government to make?—I think it was quite a desirable one.

19928. The fact of no competition being invited was not material to the public interest in any way?—We got the rails carried at the same price that contractor John Ryan got his carried for, and it is natural to assume that John Ryan made the best bargain he could with the Transportation Co.

19929. Have you any reason to think that it could have been done cheaper than it was done?—I have no reason to think it could be done at any cheaper rate.

Contract No. 70.

19930. The next contract, No. 70, is with the North-West Transportation Co., represented by the same Mr. Beatty of whom you have been speaking, and is also for the transport of rails: will you say what you had to do with that contract?—I do not think I had anything to do with that. The tenders were received just before I left, and I do not see from the papers before me that I had anything at all to do with it, beyond probably preparing the advertisement and specification and the form of tender.

Bridges over eastern and western outlets of Lake of the Woods. Contract No. 71.

19931. I am not aware of any other contract in which you took any part: are you aware of any that has been omitted?—I think we have gone over all. Yes; there is one other. There is a contract entered into with the Toronto Bridge Co. By advertisement dated 1st of April, 1880, tenders were invited for furnishing and erecting iron bridge superstructures over the eastern and western outlets of the Lake of the Woods. Specifications and other particulars were prepared and printed and furnished for the use of intending contractors. Tenders were received, and on the 20th of May I reported on them to the Minister of Railways and Canals. My report is available. They were also invited to tender for other spans at the same time. The tender of the Toronto Bridge Co. I found to be decidedly the lowest, and I recommended the acceptance of the tender of the Toronto Bridge Co. for the two bridges at the outlet of the Lake of the Woods. The acceptance of the tender of the Toronto Bridge Co. involved an expenditure of $51,264.80. That seems to be all.

Toronto Bridge Co. the lowest tenderers, got the contract.

Railway Location—Contract No. 14.

HENRY CARRE's examination continued:

By the Chairman:—

19932. Did you locate the line as at present adopted on section 15, and the eastern portion of 14?—Not the eastern portion of 14.

19933. How far did your work extend easterly?—My location only extended to the west side of Cross Lake.

19934. You mean on that point of land then that extends into the lake?—Yes; at that station 1912.

19935. Is it upon that well known projection of land?—Yes; that was the end of my location. I then ran a trial line of my own afterwards to Red River.

19936. Which line was adopted first, that of 14 or 15: I mean had you to work so as to join with some line already located, or had you the whole field open to you so as to select any line you liked, and somebody else would afterwards join with your line?—I had the whole field from Rat Portage to Red River, following the general direction of Mr. Jarvis's line run in 1871-72—the winter.

Laid out two lines in neighbourhood of Cross Lake.

19937. Do you remember whether you laid out many lines about the neighbourhood of this crossing of Cross Lake?—I laid out two; that is all. The present one is the first one.

19938. Was the other one the alternative line of which Mr. Fleming speaks in his report: have you seen his report upon the advisability of selecting this line in preference to the other one?—I have just seen the report for the first time now.

19939. Is the alternative line, there spoken of by Mr. Fleming, the one to which you are now alluding when you speak of the other line—I mean the one not adopted?—Yes; that is the other line at that point.

19940. Did you make any other locations in order to see what was the best line to be obtained, excepting the one that was adopted, and this other line of which you speak?—Yes; I made another line along the south of Shoal Lake and Lake of the Woods.

19941. That is still further south than this other line of which you first spoke?—Yes.

19942. How much further south?—Some ten miles I should say.

Laid out a southerly line which did not touch Cross Lake at all.

19943. So far that it could not come into comparison in any way with these two routes in this locality—I mean the crossing of Cross Lake?—No; it did not touch that lake at all.

19944. Are you aware of any other projected locations but these two?—Mr. Jarvis ran a line a little to the north of these.

Jarvis ran a line a half a mile north of present crossing.

19945. A little to the north of what?—A little to the north of the present crossing; about half a mile to the north.

19946. Are you aware of any other locations than the one you speak of by Mr. Jarvis to the north of the present line, and that one you speak of ten miles south of the present line, except these two that are compared in Mr. Fleming's report?—No; there are no locations, but I ran a trial line to the north of Cross Lake altogether, called the Dalles line.

Railway Location—Contracts Nos. 14 and 15.

19947. Will you look now, at a map (Exhibit No. 100), and say whether you ran any of those other lines that are shown there besides these two that you speak of as being reported on by Mr. Fleming?—Well, there is only one line marked on that map which I have run.

19948. But there are several other lines: did you run any of these?—No; no others marked on that. I remember that Mr. Fleming proposed—sent up a sketch proposing——

19949. Although you did not actually run any of these lines was any suggestion made to you that any of them should be run that you find marked on this Exhibit No. 100?—Yes.

19950. How is that one marked on the exhibit?—No. 4, in red chalk.

19951. Now, what have you to say to that proposition?—It was referred to me in the office at Winnipeg by Mr. Rowan. I was asked what I thought of it, and I gave him from memory a profile of what I considered would be obtained if that line was adopted—a profile which would be obtained if that line was run. I handed it to Mr. Rowan and that was the last I heard of it.

One of the lines suggested would have made a much heavier crossing.

19952. Could you say now how the profile of that would compare with the line actually adopted as to the probable expense or feasibility, in fact?—It would have made the crossing—as far as I believe it would have made a much heavier crossing of the lake, because we would have had to keep a higher level—the cuttings on either side would have been greatly in excess of what we have at present.

Points out in map a line which he thinks would have been better than that adopted.

19953. Then it was not so desirable as the one adopted?—Not there; but I think I could point out—there is a line marked on that which I think would be more desirable.

19954. A line marked on this exhibit?—Yes.

19955. Have you ever seen this exhibit before?—No; but I know the country so well.

19956. Have you been questioned on this subject by us before?—No, never.

19957. Could you describe, so as to go down on the reporter's notes, the line that you think would be more desirable there than the one adopted, taking any means you think proper of identifying it either by numbers of the stations or otherwise?—I think No. 2 would have been better.

19958. Do you mean the red line here marked No. 2?—Yes. I have been told there was a line run through this valley on No. 2, and coming out to the easterly point of the promontory on which the line is now actually located.

OTTAWA, Friday, 22nd April, 1881.

HENRY CARRE's evidence continued:

By the Chairman:—

19959. When were you first connected with any work on sections 15 or 14?—In the spring of 1874.

19960. In what capacity?—Engineer in charge of a party.

Railway Location—Contracts Nos. 14 and 15.

19961. Surveying party ?—Locating party.

19962. That was before construction took place ?—Yes; three years before.

Instructed to run from Rat Portage to Red River.

19963. Over what part of the country had you charge ?—My instructions were to run a line from Rat Portage, crossing the eastern crossing of the Winnipeg River, eastern outlet, to Red River at or near a place called Sugar Point, following the general direction of a line run by Jarvis in 1871.

19964. Is that in the same general direction in which the line is now being built ?—The same general direction, yes; but a little to the south of Jarvis's line.

19965. Over what extent of country did you locate a line, then, on sections 14 and 15 ?—I located from Rat Portage to the west side of Cross Lake, and from that to the eastern boundary of the province I ran a trial line.

Though first instructed to go to Red River subsequently ordered to join in with Brunel.

19966. Would you describe to me what you mean by the work involved in a trial line, as distinguished from the work in locating a line ?—Before answering that I wish to say that I was instructed to join in with a line of Mr. Brunel's at this point, though my first instructions were to go to Red River.

19967. For the present, the location west of the province line will not affect the line we are considering, so that may be dispensed with; I remember what you said about that on a previous occasion. Will you describe, shortly, the difference between the work involved in locating a line, as you say you did, up to the west side of Cross Lake, and making a trial line, westerly from that ?—In locating the line between Rat Portage and Cross Lake, I had first to run a trial line before I could run the location line.

How a trial line is run.

19968. Well what is done in running a trial line ?—In running a trial line you run any number of lines in different directions, taking the angles or courses of those lines and chaining and levelling. Then when that work is completed, I would lay down the location line which would have to be run, putting in all the curves, stakes and everything, in exact position as the track would be laid or the grading would be done.

19969. In making what you call a trial line, is it done by instrumental examinations ?—I did it with instrumental work all through.

19970. The trial line ?—Yes; sometimes the trial line is run by compass measurement, compass bearings, sometimes astronomical bearings taken with a transit. In this case it was astronomical bearings taken with a transit.

Having run a trial line you proceed to locate by putting curves where there are angles.

19971. In making a trial line, do you follow a straight line through the country ?—Straight lines and angles.

19972. Then, afterwards, when you adopt a location, you put in curves where those angles are, and otherwise shorten the length—is that what you mean ?—Yes.

19973. I want to get upon the notes of evidence a description from you, so that persons not connected with your profession will understand the duties which you performed in this portion of the country ?

Railway Location—Contracts Nos. 11 and 15.

—As I say, between Rat Portage and Cross Lake I had both to run a trial line ahead of location, then back up and locate.

Difference between trial line and location.

19974. With the same party?—With the same party. If the trial line did not suit, I would have to try back again, so it was double work—double distance work. After passing Cross Lake I had nothing but trial lines, taking the best direction I could, going ahead and getting the direction, directing the transit men to keep on what course I wanted them to keep upon. In fact, a trial line is more like a ship tacking against a head-wind; it is back and forward, trying to steer clear of rocks, swamps, lakes, and every sort of obstruction. With the location of a line you know what is ahead of you, but you have to be more accurate and run all the curves, and put in all the stakes, so a true profile of the line can be had.

19975. In locating a line for a railway in the first instance, is it considered necessary that you should get the best possible line before adopting a location?—It is generally done. The best line is found, but you cannot know the best line, until the whole line is completed—until you have got the work finished and calculations made.

19976. Does it not happen that a line is sometimes run or a location adopted with the distinct understanding that it may be very much improved by subsequent investigation?—Certainly.

19977. Then is it necessary, in the first instance, to adopt what is considered the best line or only a line that is practicable?—Well, in that case I would understand you to mean the best route. If you take a line, you take a line that must be established, but you may take a route through a country—two routes—and adopt one as being generally the best, and then try and improve it as far as you can.

What witness means by a route.

19978. You make a distinction between a route and a line: now speaking of a general course as a route what would be the technical word to express an exact allignment?—What I mean by a route is following the general direction of a country—following water-sheds, crossing lakes at certain points that are the only points can be used.

A line the exact centre of road-bed.

19979. I understand now what route means?—But a line is the exact centre of the road-bed.

19980. Now you say what a line means; then is it necessary, in the first instance, to adopt what is considered the best line or only a line that is practicable?—It is usual to adopt the best line after all lines have been tried—all means have been tried to obtain that, to find what is the best line.

One must locate a line to be able to judge whether it is the best among rival locations.

19981. That is usual, in the first instance, in locating a line, is it?—In locating you cannot tell actually what is the best line until it is located. In fact you must locate to be able to judge.

19982. Then I repeat my question: is it necessary, in the first instance, to adopt what is considered the best line, or only a line that is practicable?—It is usual to adopt the best line, certainly.

19983. Do I understand that you refrain from locating any line until you have so thoroughly examined a country that you know which is the best line?—No.

Both lines must be located before one can say which is the better.

19984. Then it is not necessary to find out the best line before you locate at all?—You must locate both lines before you can tell which is the best.

Railway Location—Contracts Nos. 14 and 15.

19985. Well, that reasoning seems very plain to me, but it is not plain to you. I will repeat my question: is it necessary, in the first instance, to adopt what is considered to be the best line, or only a line that is practicable?—Where does the location come in? That is what is bothering me. There is something said about location in the question.

19986. In other words, do you refrain from locating any line until you have made such a thorough investigation that you can say which is the best line?—In some cases we do; in other cases we do not.

Not necessary in all cases to make a thorough investigation.

19987. Is it necessary to be done in all cases?—No; it is not necessary.

19988. Did you adopt the location of this line which you say was done as far as the west side of Cross Lake, without making such a thorough examination of the country as would enable you to say which would finally be the best line?—I did not adopt it myself.

19989. Adopt what?—I did not adopt the line.

19990. I mean adopted for the work of your party. I understand you were a locating party?—My instructions were to run a trial location line and to do so I had to locate.

19991. I understand you to say that you made not only a trial line but a location; as far as your party and as far as your duty went you exercised a judgment and located a line as far as the west side of Cross Lake?—Yes; a trial location line. You had better put it that way.

19992. Was the first investigation and examination you made without instruments, or was it with instruments?—Yes.

(1) First walked over line with axe men—exploratory.

19993. You say your party backed up and went through another process; what was the first process?—There were three processes. I walked over the line first with my axe men.

19994. What do you call that technically?—We picketed and chopped out the line.

19995. What would you call that?—It is a trial location or exploration: an exploratory line.

19996. What would you call that operation technically?—A rough exploratory line.

(2) Transit men went over and took all the angles; chain men chained it; levellers levelled it.

19997. What was your next course?—The next thing was the transit men went over that picketed line and took all the angles; the chain men followed and chained it; the leveller came afterwards and levelled it, and then it was plotted.

19998. What would you call that second operation?—That is a trial line: an instrumental trial line.

19999. You say you went through a third operation?—The third operation we went back and I ran in the curves: straightened up the angles and ran in the curves.

(3) Trial location.

20000. What would you call that?—That was the trial location.

20001. That was as far as you went then in establishing the line to the westerly side of Cross Lake?—Yes.

20002. Was that done and decided upon because you considered that was the best line that could be eventually got, or because it was a line

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good enough to be adopted for that occasion?—I did it because it was the only practicable line in that direction I could find; that is, in that direction or on that route.

His line the most practicable.

20003. Do you still think that was the only practicable line could be found in that direction?—On that route?

20004. On that route?—With the grades I was given.

20005. You say you are still of the same opinion?—I am still of the same opinion. There were some slight deviations that could have been made.

20006. If you are still of the same opinion, that disposes apparently of the whole question of a better line being found crossing Cross Lake?—Crossing Cross Lake?

20007. Crossing in that locality?—With those grades.

20008 So you are of the opinion there is no better line to be adopted?—In that direction?

20009. Going east and west in that direction?—I consider there is a better line east or west from Rat Portage.

20010. Where is it?—According to this south line I ran?

20011. Assuming that you were going to Cross Lake, is there a better line in your opinion now?—No; not with this grade. I could not get a better line—at least I do not know of a better line.

20012. I understood you, in your conversation yesterday, to say that from your knowledge of locating, and what you could see of the country now since it has been cleared, you are of the opinion there is a better line there?—That is west of Cross Lake; that is not what I was talking of. I am talking of east of Cross Lake now.

20013. Do you mean this better line must diverge from the established line at some points west of Cross Lake? You do not consider there is a better line which can be found, starting from a point east of Cross Lake and crossing Cross Lake?—Yes; that is always qualified with the instructions as to the grades I received to work on.

List of grades.

20014. What were those instructions?—A list of grades was given to me. Gradients between Red River and Lake Superior: ascending for tangent and one degree curve, ascending westerly 1 per 100 maximum; easterly, ·5 per 100. For a two degree curve, ·9 per 100 ascending westerly; and ·45 per 100 ascending easterly. Three degree curve, ·8 per 100 ascending westerly; ·40 per 100 ascending easterly. Four degree curve, ·7 per 100 ascending westerly; ·5 per 100 ascending easterly. And at the foot of these instructions there was a note:

"In making the trial location endeavour to get the above maximum grades. In some cases it will be sufficient to ascertain that it can be had without going over the ground again until the final location."

That note was put in in consequence of the question which I asked Mr. Fleming, as to whether I should back up and try another line through the country altogether, if we were unable to get those grades. Mr. Rowan asserted that they could be got, and as I knew that Mr. Jarvis had no idea of using those grades at the time he was making the survey, I thought it was rather doubtful that they could be got through such a rough country. I found out that this was the case

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afterwards by following up Mr. Jarvis's line, and finding old stations here and there and old bench-marks. I found that he was running to a different grade altogether, and that those grades were totally impossible and impracticable.

Found the above grades impossible on Jarvis's line.

20015. You mean the Fleming grades?—Yes; these grades that I have read were totally impracticable on the line run by Mr. Jarvis.

20016. Now, I understand you to say that you made what you call your trial location as far as the west side of Cross Lake?—Yes.

20017. Did it go beyond the bay which is now upon section 14, or did it end at the crown of the promontory?—It ended on the crown of the promontory.

20018. Before adopting that as the end of your trial location, did you make examinations of the country south of it, within a quarter of a mile or half-a-mile, to any great extent, to see if any other crossing could be made?—I did to a slight extent.

20019. To what extent: could you describe it?—I climbed over the hills as well as I could, and worked through the bush. It appears that I missed a valley which I have seen since I missed it. I was running then a trial line to see whether a line was practicable at all, and if I could get through the rocks, but I did not think it was worth while to waste the time on the locating of it until I knew whether I could possibly get through.

When locating missed a valley south of station 4000 on contract 14.

20020. You say you missed a valley that you discovered since?—Yes.

20021. Where is that valley: how far south of the present line?—South of station 4000 on contract 14.

Took for granted he had found best point for crossing Cross Lake.

20022. For the present I wish to confine your attention to the part of the country covered by 15. I understand you to say that you adopted the terminus of section 15 on your trial location at the crown of this promontory: I am asking now whether you investigated the question as to the possibility of getting a better line on 15, towards the west end of 15, or whether you took it for granted that that was the best point for the terminus?—I took it for granted that that was the best point I found for crossing Cross Lake. We did not know anything of 15 or 14 at the time. I had got out of the worst part of the rough, bad country. There was an open country then. The snow had fallen deep and the ground was frozen, and it was difficult and more expensive locating. I then determined, as I had a long distance to go, and the season was getting late, to rush through with the trial line on which I knew I could lay down a location line.

20023. How did it happen that you ended your location at that particular spot when your work was to cover all the country, not only there but westerly?—Because I knew I had not time, and I had received—I did receive—a very sharp letter from Mr. Rowan saying that I had spent too long over it, and asking for an explanation why I was so long getting through.

Chose Cross Lake as an objective point, merely because he had got across the lake on the first ice.

20024. Can you say whether at that time there was any intimation to you that that was to be an objective point or governing point on the crown of the promontory?—Certainly not. Nobody ever spoke to me on the subject. It was merely because I just got across that lake on the first ice that the men could travel on, and then I under-

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stood from my Indians that I could then get ahead a little faster, and I thought that the trial line would be sufficient to give all the information necessary at the time, and I thought that the line I had run was such a rough one that it was most likely there would be another trial made—another line tried.

20025. Then that location which you say you had made up to that time was, in your opinion, but a temporary one?—Certainly; it was a mere trial location. I did not back up to improve little spots here and there. I knew I could improve in certain spots. If I were making a final one I would have backed up. If a curve did not fit the ground or suit the ground exactly as I wanted it I would have turned back and run it over again; but in this case I kept on with the work if the line was at all practicable.

Tendering.

Before second advertisement another line was run to the south.

20026. Did it happen that there was a more thorough investigation, such as you say you expected would take place, before the line was finally adopted: did such an examination take place before this section 15 was advertised and competition invited for its construction?—Not before the first advertisement.

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20027. Was there a more thorough investigation before the second advertisement?—There was another line run.

20028. By whom?—By me.

20029. Where was that run?—It was run to the south.

20030. How far south?—It followed the first line, the line of 1874 I call it. It followed it for five miles.

20031. From Keewatin you mean?—From Keewatin, and then branched off to the south following the general course of the shore of Lake of the Woods, Crow Lake, and the north side of Shoal Lake.

20032. Our present object is to ascertain something about the possibility of a better line crossing Cross Lake, and when I ask about a most thorough investigation, I mean in that neighbourhood: was there a more thorough investigation such as you say you expected would take place before the final location of the line, and was it before the construction was offered to public competition?—No; not before it was offered—not before the first offer.

A more thorough investigation before the third call for tenders.

20033. Was it before the second?—No; but there was before the third.

20034. Who made it?—I made it.

20035. Where was it?—I re-located the line I ran in 1874.

20036. And in making that investigation for the purpose of final location, did you examine the country thoroughly on the east side of Cross Lake?—Yes, I examined it.

With grades could have found no better line than the one located.

20037. Did you find any portion of that country through which you think now a better line could have been obtained east of Cross Lake, provided that as good a line west of Cross Lake could have been obtained as was afterwards adopted; in other words, irrespective of the line west of Cross Lake, could you for that portion of the main line of the Pacific Railway, east of Cross Lake, have found a better line to locate than the one which was located?—No; not with these grades.

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20038. Then the question of a better line in that locality will depend, according to your opinion as you have now expressed it, upon the possibility of getting a better line west of Cross Lake than the one which was adopted?—I did intend at one time to run to the south of Hawk Lake, and I believe I could have got a line passing at the south end of Cross Lake, which might have been as good or better than the present one, but I could not find at the time a line on the west side of Cross Lake. I remember now I worked hard at that, and examined it in every phase.

20039. That does not lead to an answer to my question. Do you understand that we are trying to find out whether proper attention has been given to getting a good line in the locality of the crossing at Cross Lake? Our attention is now directed to that point, and, among other things, we want to see whether proper care has been taken by you and other persons to examine all that country before this line, which has been adopted, was utilized, and the money spent on it: do you understand?—Yes.

Line as located on 15 the best possible; but there was a better line than the one adopted on 14, and had this been decided on he could have swung 15 to meet it.

20040. Do you say that east of Cross Lake you examined the country so that you are satisfied that no better line could be got there, and that consequently the question of a better line across Cross Lake in that neighbourhood must depend upon the possibility of getting a better line west of it than the one that was adopted west of it: do you say that the question, in your opinion, turns upon that point now?—I say that the line as located to Cross Lake was the best line that could be adopted in the interest of contract 15, as a contract separate from 14; that had I known of a better line on contract 14—on the east end of contract 14—I might have varied the line on the western end of 15 slightly, so as to have met an alteration on contract 14, and made a connection with it. It was possible to swing the line and move the line on the west end of 15 so as to meet a line at the east end of 14, if it was a better one, and which I considered would be a better one. It has been proved, I think, to be a better one.

20041. Without at present asking your opinion as to whether there is a better one west of Cross Lake: do you understand that the question of a better line in that locality crossing Cross Lake depends upon a better line being found west of Cross Lake; in other words, that unless there is a better line west of Cross Lake than the one adopted there could have been no better one for the crossing of Cross Lake?—That is what I have said.

20042. That is not what you have said; it may be what you intended to say?—That is what I mean; that I could not have got a better one, and my reason for saying so is that on either side I had firm rock foundations for the structure—for the foundations of masonry structure had that been put in, and I had the shortest possible water stretch.

20043. When you say you had those desirable features, you mean you had them at the crossing which has been adopted?—Yes; and that is why I stick to that crossing.

20044. Now that the question of the better line there has been reduced to the question of a better line west of Cross Lake, are you aware of your own knowledge whether there is any better line west of Cross Lake than the one which has been adopted?—In tra-

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velling over the line last fall, I think, with Mr. Forrest, I pointed out a valley to him and I said: "Why, Forrest, we might have got a better line through that valley." He said: "I tried that line." "How did it turn out?" I said. He said: "Splendid." I said: "Did Mr. Thompson approve of it?" "Yes," he said "Mr. Thompson approved of it." I asked then why it was not adopted, and he said that Mr. Rowan would not adopt it, or had not adopted it, greatly to his disgust and Mr. Thompson's. That was the impression left on my mind. I afterwards have seen the plan here showing that line, and it is exactly as he described it.

Forrest had found a better line on contract 14.

20045. Who was Mr. Thompson?—Mr. Thompson was the engineer in charge of contract 14.

20046. Will you look at these plans marked 112 as exhibits, and say whether if these plans are proper plans of the location of this line and of the profile of it: whether it is a better line in the public interest than the one that has been adopted, as far as you can judge in a hurried examination of them?—I consider that the line marked on these plans you show me, and called trial location line A and coloured black, is a much superior line to the one which has been built. The profile of it is better, and I have been told by Mr. Forrest that the second heaviest cutting, or that cutting at station 3985, is all earth or principally earth. On the present line there were very heavy rock cuttings and bad intervening hollows, and a great deal of waste, but I think that black line could have been still further improved had I known of it. The crossing of Cross Lake was finally located by me in October—in the early part of October, 1877. I see by these plans that this line was made something about the same time, the date on the profile being November 13th, 1877; but I did not know of it until long afterwards. It was not reported to me, and I never was asked whether I could do anything towards assisting them—whether I could assist them by altering my line in the least to help to improve it.

Witness recognizes on map a much better line than that adopted but he did not know of it until after the crossing of Cross Lake had been finally located by him.

20047. I understand you still to say that the improvement of which this was capable was only upon a portion of the country west of Cross Lake?—That is all.

20048. On the profile of this trial location line A, do you see another profile: I mean a profile of another line?—Yes; on the same sheet as the profile of the line which has been built.

20049. Looking at these two profiles, are you able to form any comparison of the cost of the two lines: I mean only from the profiles and without the knowledge which the actual construction has since given you. Assuming that those two profiles were before you to judge from in November, 1877, before you found out by actual work the nature of the muskeg, for instance, or other localities on the line, would these profiles give you materials enough to judge of the relative merits of the two lines?—They do, with the description given me and my own knowledge—with the description given me by the gentleman who ran line A and my own knowledge of the country—original surface of the country—on the present line.

20050. That information, I understand, is simply the fact that the cuttings between stations 3835 and 3990 would be principally earth and not rock: is that the information that you mean?—That is one portion of the information.

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20051. What other matter does your information cover? Understand that I am asking you whether this paper gives you sufficient materials upon which to form anything like a comparison of the relative merits of these two lines; you say it does if you add to it the information that Mr. Forrest gave you, and you say, among other things, that he told you the heavy cuttings were earth: is there still any other information that you would require so as to be able to make a comparison of these lines?—I do not think there is any other information that I require. I know that myself of my own personal knowledge.

Forrest's line would have had less rock excavation and would have followed a better country.

20052. In what respect do you say that this trial location line of Mr. Forrest's is a better one to be adopted than the one which was adopted?—There is far less rock excavation on it—much less I should say—and it follows a better line of country. It is a few hundred feet longer, some 300 feet longer, I see by the chainage.

20053. Could you state what advantages the profile shows on this trial location line over the adopted line?—It shows less rock cutting.

20054. Is that all?—And less filling also.

20055. Do you mean that the natural surface of the ground is more level, and that there would not be so much cutting and filling either of earth or rock?—Not so many heavy voids to be filled, and that bay of Cross Lake, which has swallowed up a great quantity of earth, more than was expected, is less on it—smaller and easier to fill, shorter distance, and it would require less quantity.

Both cuttings and fillings less.

20056. Is there any other point in the comparison which the profile shows you to be in favour of the Forrest line?—Both cuttings and fillings. From the appearence of the plan, both cuttings and fillings are less in quantity.

Less rock but 400 feet longer.

20057. Is there anything further?—And I believe there is less rock on the Forrest line than on the other, from my own knowledge.

20058. Is there anything further that you can gather from the profile?—On the other side there is about 400 feet more in length—in distance.

20059. On the other side of the question?—Yes; on the other side of the question.

20060. Is there anything further that the profile will enable you to say by way of comparison?—No; I do not think so.

20061. Please look at the plan of location and see if it enables you to form any comparison of the relative merits of the Forrest line and the located line, as far as the allignment is concerned?—The one is just as good as the other. There is a little more of the four degree curvature on it, but there is a longer portion of it straight. There is also another point in favour of the Forrest line; there is a portion of it on an easier grade. It breaks the long heavy maximum grade from station 3984 to station 4022. It is on an easier grade than the present line.

20062. That comparison you make from the profile?—Yes.

20063. Now, looking at the plan of location, is there anything further which you could remark upon as to the relative merits of these two lines?—I consider one location as good as the other if it were not about 400 feet longer.

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20064. You are speaking now of the allignment only, not of the whole merits?—Of the allignment only.

Forrest's line crosses and re-crosses the stream oftener.

20065. Is there anything further that you could state by way of comparison between these two lines, either from your own knowledge or from what these maps show?—There is another point I observe here. There might be a little more stream diversion necessary.

20066. On which line?—On the Forrest line. It crosses and re-crosses the stream often.

20067. Is that a disadvantage?—It increases the work.

20068. It is a disadvantage?—It is a disadvantage; yes.

20069. Is there anything else that you could state by way of comparison?—No; I do not think of anything else.

No better line unless Forrest's be that.

20070. Then I understand the result of this examination by you of these plans and of your knowledge to be that there is no better line than the one adopted for the crossing of Cross Lake, unless this Forrest line is a better line?—None that I know of.

20071. It turns upon that question?—Yes. I may remark that I speak very positively, because I know Mr. Forrest well. I know what he is capable of, and we had a long conversation on the subject. If he were a man I had no confidence in, and I did not know, I would not speak so distinctly about it; but having been on my staff for a long time, I know thoroughly what he is, and he and I understand each other as far as talking over a matter of that kind. I understand how much reliance I can place on anything he says.

20072. We have gathered from you that this opinion which you have been giving is based entirely on what these profiles show and your own knowledge of the country, with a single exception, and that is that certain cuttings are of earth: is there anything else that your opinion is based on besides what this plan shows and your own knowledge and statement by Mr. Forrest about the material in those cuttings?—The information from Mr. Forrest is one item.

20073. I understand it to be one item, and I understand that you have mentioned this earth cutting to be the only matter, but I am asking you whether your opinion now, in favour of the Forrest line, is based on any other information from Mr. Forrest beyond that about the material in the cuttings?—No; that is the only information I base it on.

20074. When this work was contracted for it was in two sections, one known as 14 and the other as 15, was it not?—Yes; it was.

Contract No. 14 put under contract before contract No. 15.

20075. Which was first put under contract?—14 was first put under contract.

20076. After that was put under contract were you engineer upon 14?—No; I had nothing whatever to do with it.

20077. Was it part of your duty, then, after that was put under contract, to revise any location of the line on the ground covered by 14?—No; it was not my duty.

20078. Your duty as to 14 had ceased then at that time?—Yes; it had. The only thing I did was to advise Mr. Forrest when he was making the location, as Mr. Thompson had never seen the ground.

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He would consult me on different points, and I gave him my advice, not as a portion of my duty, but as I had connection with it, and understood the matter; he would advise with me instead of Mr. Thompson, who had never seen the ground.

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20079. After that period, I understand you were engaged as engineer upon section 15?—Yes; next year I was engaged in running another line for 15; that was in 1875. Contract 14 was let in the spring of 1875; work commenced on it; and during that summer I was running another line for 15.

20080. Then since that time you have been connected with 15 alone?—Yes; up to the time that I left the contract.

20081. I understand that your duty, as the engineer on 15, would require you to make such deviations as you thought advisable, which would be improving the line, as long as they were within the termini?—If I obtained permission to do so after the contract was let. I considered then, but I didn't consider it my duty to make alterations—in fact I was instructed not to do so without permission.

After contract was let, was restrained from making deviations unless with sanction of superior officer.

20082. Is that not over part of the line?—Yes.

20083. You were restrained from making deviations, except with the consent of some superior officer; is that what you mean?—Yes.

20084. That of your own accord you could not adopt what you considered a better line?—No.

20085. How were those instructions conveyed to you?—Verbally.

20086. By whom?—By Mr. Rowan.

20087. That line that you spoke of having surveyed in 1875 was not adopted, I believe, as the one to be constructed?—No; it was not.

20088. Then did you return to the present located line?—Yes; in the spring of 1876.

20089. In what character?—As engineer in charge of construction.

20090. From that time, I understand you to say, you might suggest deviations, but had not the power of making them without the approval of the superior officer?—What I said was after the contract was let; but at this time the contract was not let. I was placed in charge of it, and I then considered I had a right to make those improvements which I had seen were possible, when I was making the trial location, because my first line was only a trial line.

Railway Location.

20091. Is this what you mean: that while you were engineer in charge of the survey of the country you might make deviations without any superior authority consenting to them?—Yes; that is it.

20092. But after you became engineer on construction you could not do so?—After the contract was let I did not consider I could do so.

Thompson was working on 14, and witness had no right to interfere with him.

20093. While you were engineer of the surveys, did you consider that you had any right to endeavour to get a better line which would extend beyond the meridian of this end of 15?—No, I had no right; because Mr. Thompson had parties in the field locating contract 14, and they might come out at any point on Cross Lake—might find a better line than I had ever found before, and as soon as they found that I would then try to work and connect with them; but I had no right

Railway Location—Contract No. 15

to go in and say: "I don't consider you can find this line; I will go in and try and find it,"—until they had failed.

20094. You mean on their territory?—Yes; I had plenty of other work to do.

20095. I am not speaking of your disposition to do it or not to do it, I am speaking of your authority what you considered to be your authority, on the subject?—I had no right to trespass on the other man, no more than he had the right to come in on me. If he had chosen to do it, I would have been very glad to have him help me, and I suppose he would have been glad to have me help him, but we did not interfere with each other.

20096. Do you mean to convey this idea to us: that, because the terminus had been temporarily fixed at what you say was the crown of the promontory of Cross Lake, that it would not have been proper for you, by new surveys over the line you had adopted as a trial location, to investigate whether a better line could have been adopted, if such better line took in any portion of the country west of that terminus?—It would have been proper to have asked about it, and have investigated it.

20097. Asked whom?—Asked any party who was working there.

20098. A party where?—On contract 14.

Knew he had the best line which could be got on 15.

20099. You do not understand that I am asking you whether you consider it would have been proper for you to have investigated the territory within which No. 15 lay, so as to say whether a better line could have been found which, by joining some line, possibly a new line on section 14, would have been, as a whole, an improvement?—I knew I had done all that, and I knew I had the best as far as I could find out at that time.

20100. I am asking you whether you consider you had the authority to find out whether it was the best if further investigation was necessary to find it out?—I did not consider it was my business to enquire; there were other men employed at that work, and were working at it.

20101. But they were doing it on 14?—That was 14. I could not do better on 15.

20102. I am asking you whether you had the authority to do it if you could have done better?—In 1876 I had.

20103. Then if you did not make any investigation it was not for want of authority to do it, but because you considered you had made sufficient investigation?—Yes.

20104. You did not refrain because you considered you had no authority?—No.

20105. Did you ever refrain from making an investigation up to the meridian, up to the end of 15, because you considered you had no authority to make it?—No.

20106. Although it might go farther west than the terminus adopted for 15, you considered yourself at liberty to come down half way on Cross Lake, for instance, if that would make a better line on 14 and 15 together?—Certainly I did.

Railway Location—Contract No. 15.

If he had known of a better line on 14, could have changed line on 15 to meet it.

20107. Because yesterday in our conversation you led us to understand that you refrained somewhat from making as full an investigation as could have been made for fear you would trespass on some person's rights on 14?—If I had known of anything better on 14 I might have changed the line on 15 to meet it.

20108. But it is possible for a man to make an investigation without knowing what is ahead of him; you seem to think it was necessary that you should know there was a better line to the west of Cross Lake before you made further examinations on the east?—Certainly it was necessary.

20109. Then did you refrain from making further examinations either for the want of that knowledge or for the want of requisite authority?—No, there was no want of authority; there was no other place that I could cross than that, to get a better line. After you crossed there then, I say now that I believe it could be improved.

Repeats that up to end of 15 as located, nothing could be better.

20110. For the present I am not asking you about anything west of Cross Lake?—Then I say that up to the end of 15, as it is located now, I could not have done better.

20111. You consider you got the best location on 15?—Yes.

20112. No matter how good a one could have been got on 14, you could not have got any better on 15?—You mix it up with 14; I cannot understand it. If I knew there was a better line to be made on 14 I might get as good a line to connect with it for 15.

20113. If you had had the charge over both 14 and 15 as the engineer responsible for the whole matter, would you have made any further investigation on the east side of Cross Lake than you have made?—Yes, I would.

20114. Then why were you restricted in consequence of having only the charge of 15?—Because I was ignorant of there being any better line to be found at the time, and I considered I had no right to go on—I had no authority to.

20115. Then I understand you to say this: that because the authority happened to be divided between two persons, one person on section 14 and one person on section 15, the country has been examined to a smaller extent than it would if one person had had charge over both?—I say that it has been examined sufficiently.

20116. I will repeat my question: if you had had the charge over both 14 and 15 as the engineer responsible for the whole matter, would you have made any further investigation on the east side of Cross Lake than you have made? I understand you to say that the country has not been so fully examined as it would have been, because you say you would have made further examinations, and that that omission to examine it as fully as it would have been has happened because two separate persons were in charge of these two separate sections: is that what you mean?—I cannot say so, because I know that the examination which I think I would have made if I had full charge of both sections, has been made—was made.

20117. By whom?—By Mr. Forrest.

20118. On the east side of Cross Lake?—On the east side.

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20119. When did you examine it on the east side of Cross Lake?—In running that line A.

20120. I thought that was west of Cross Lake?—West of Cross Lake I mean.

20121. *To Reporter:*—Repeat my question.

20122. *Reporter:*—If you had had the charge over both 14 and 15 as the engineer responsible for the whole matter, would you have made any further investigation on the east side of Cross Lake than you have made?

Had he charge of the two sections he would not have made any further investigation for a better line east of Cross Lake.

By the Chairman:—

20123. Now, remember that is the east side of Cross Lake?—I beg pardon, I misunderstood the question. I would not have made any further examination east of Cross Lake than I had made, even if I had been in charge of both sections.

But there could have been a better line; 15 could have been slightly diverted and the eastern end of 14 could have been improved.

20124. I wish to ask you whether, from your knowledge now and the information gained from any source whatever, you think a better line could be got crossing Cross Lake than the one now adopted, and irrespective of the question whether it would come upon 15 or 14 or part upon one and part upon the other?—I believe that it could, as I have stated; there could have been a better line.

20125. Is that the west one: the Forrest line?—The line on 15 could have been altered slightly to allow of as good a crossing of Cross Lake—that is as good in the interest of contract 15—as the present line, but which would have improved the eastern end of 14.

20126. Would that crossing have been further south than the present crossing?—It would not have been 100 feet off it at one end.

20127. Would it have been further south?—No; it would have been a little to the north. I have sketched it on the plan. It would have given a little better swing to the line, and would not have injured 15 in the least.

20128. Is that improvement which you speak of in effect a continuation of the line suggested by Mr. Forrest, or nearly that same line?—It is a slight improvement on the present location on the west end of contract 15, and also a slight improvement on the eastern end of contract 14 as proposed by Mr. Forrest on that line A.

20129. If you had had charge of both 15 and 14, would it have been within your authority to make that improvement which you now say could be made?—I consider so.

20130. Would the probability or possibility of it have engaged your attention?—Certainly.

Had he been in charge of 14 and 15 he would have made the change.

20131. Then if you had been in charge of both 15 and 14, would you have made any further examination east of Cross Lake, or of any portion of the line east of the terminus of 15 than you made?—No; I would not have made any more examination, because I knew it sufficiently.

20132. Would you have made any change?—Certainly I would have made a change; without any doubt I would have adopted that line.

20133. Would that be any better line in the public interest?—I believe it would.

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20134. Then do you say that the public interest has suffered because one person had not charge of both sections?—I say that it has suffered because that alteration was not made. Whose fault it is, is another question.

20135. I understand you to say that you would have investigated the probability of that improvement if you had charge of both sections?—I would.

The public interest has suffered because one man had not charge of the two sections.

20136. Then has the public interest suffered because some one man—either yourself or some other person—had not charge of both sections?—Because some one man did not do that work?

20137. I understand you to say that if one man whom you name (Mr. Carre) had had charge, it would have been done?—Yes.

20138. Then has the public interest suffered because some one man had not the charge?—I should say so.

20139. Why do you say now, after all this questioning, that you did not make that investigation and suggest that improvement?—Because I did not know of it until too late.

20140. What was it that you did not know of?—I did not know that there could be an improvement made.

20141. Do you mean on the west side of Cross Lake?—On the west side of Cross Lake.

20142. Then I understand you to say that the suggested improvement on the west side of Cross Lake is what leads you to think that this improvement might be made from the western terminus of section 15 easterly?—Yes.

20143. And that that improvement even, which you have last mentioned, depends entirely upon the question whether the Forrest line is an available line, or a better line than the adopted one?—Yes.

Question of possible improvement in section 15 narrowed down to the adoption of the line run by Forrest on 14.

20144. So that the whole question of improvement comes to be narrowed down at last to the question of the Forrest line?—Yes.

20145. How would this deviation to the north from the west end of section 15 affect the cost of the filling of that portion of Cross Lake?—Of the main lake?

20146. The main lake?—You do not mean the bay?

The change would have made very little difference in the fill at Cross Lake.

20147. No; that could not possibly be easterly from the west end of 15, because it is westerly from the west end of 15?—The alteration that I propose would make very little alteration in it. The east shore of Cross Lake is nearly at right angles with the line, and a short deviation to one side or the other would make a very slight increase in the quantity of filling. It might increase a little the excavation on the main line below the western end of 15, but any increase that would be caused by that would be saved greatly in the filling of the bay.

20148. I think you said you had some memorandum in a diary as to the feasibility of this terminus, in connection with any work that might be done upon section 14: will you read the note in your diary?—I will:

"October 10th, 1877, Wednesday—Walked over line to Ingolf; saw gang of Mr. Sifton's men burning on the line. Cannot see any improvement can be made in location of that portion [that is, of the line] can join in with any location on 14 [that is, contract 14] which may be made to present crossing of Cross Lake."

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I read this to show that I had thought over the matter of a slight change being made in the last portion of the location, of the easterly end of contract 14.

20149. Have you seen the printed memorandum by Mr. Fleming addressed to the Minister of Railways and Canals, speaking of these two lines, the one adopted and another one to the south of it, which he calls No. 1 and No. 2?—Yes; I saw it yesterday.

Line No. 2 run by Watters.

20150. Do you know who ran the line which he describes as No. 2?—One of my assistants, Mr. Louis Watters, who was drowned.

20151. Was he under your control at that time?—He was under my control, and I gave him the general course and directions.

20152. That is a line which takes in part of 14 and a considerable part of 15?—Yes, it is.

20153. So that, at all events, one other line covering portions of both these sections and the one adopted have been subjected to comparison?—Yes.

Rowan pointed out to him a third line and asked his opinion.

20154. Have you any knowledge of another line being called to your attention through the suggestion of Mr. Fleming—I mean one which started somewhere about station 1860, on 15, and deviating in a direction to a point on the east side of Cross Lake and then westerly to strike a portion of section 14?—I remember that Mr. Rowan placed in my hand a tracing of a portion of my location with a line as you describe it traced on it by Mr. Fleming, and asking for my opinion as to the feasibility of that line.

20155. Did you give him any opinion on the subject?—As well as I remember, it was two years since I had seen the country. I made an approximate profile of what I considered would be the effect of the change.

Not a better line than the one adopted.

20156. Was it considered to be a better line than the one which was adopted?—I do not think so.

20157. Was it in your opinion a better line?—It was not.

20158. Then that was another alternative line which had been considered, taking in also a portion of 14 and a portion of 15?—It was.

20159. Are you aware of any other line embracing portions of both 14 and 15 which were compared with the one now adopted?—At Cross Lake?

There was yet another line to the south of Cross Lake.

20160. At Cross Lake or anywhere else, as long as it comprised portions of 14 and 15?—None at Cross Lake that I know of. There was another one much to the south that I have spoken of before.

20161. How far south of Cross Lake crossing was that line that you now allude to? I suppose you mean your location of 1875?—Yes; my south line: about ten or twelve miles.

20162. I understand that you did not locate that line the whole way to the westerly limit of it?—It was located to what was then known as the end of location on contract 15.

20163. About what place?—About three or four miles to the east of Bog River.

20164. And what is the westerly end?—There was another line tried to a point near Brokenhead.

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20165. And did you locate the whole of this 1875 line?—No; I had nothing to do with that line ending at Brokenhead. That was a trial line run by Mr. Forrest and Mr. Armstrong.

Sixty-four miles the length of line run by witness.

20166. As to the one which you ran yourself can you say now the whole length of it?—About sixty-four miles I see marked here, or seventy miles—seventy miles from Rat Portage is marked here. I cannot remember, the profile is in the office. I also ran a line from the Dalles to the north, ending about the same point as the line of 1875, that is at the end of location on contract 15.

20167. How much of section 15, as now located, is common to that and this line which you now speak of?—280 chains—280 or 290 chains.

20168. That is at the easterly end of section 15?—Yes; from Rat Portage westerly.

20169. How much longer is this southerly location than the one actually adopted?—To the end of location?

Southerly line about five and a-half miles longer than the one adopted.

20170. Between the two nearest common points?—I think five and a-half miles was the difference as well as I can remember. It is marked six miles: five and a-half miles, I think, according to the chainage.

20171. Would you describe, generally, the country through which this southerly location passed?—For the first five miles it was identical with the present line. After that it passed, up to the twenty-fifth mile, through a very broken country—as broken, in fact, as any portion of the present location; but, in my opinion, a more favourable country for the construction of a road.

But more favourable being more accessible, better for roads and for rock work.

20172. In what respect more favourable?—In one respect as it was more accessible for the contractor to bring in supplies; and had a contractor been estimating for that section, I would have told him that he could plant his supplies on the line at almost every three miles within the whole distance with about an average of half a mile to a mile of land haul from the waters of Shoal Lake and Lake of the Woods; that he would have a better country to make roads through; that the rock was more favourable for working, and that the quantities as given I considered would be more accurately obtained—could be more closely given and estimated from the information that we had.

20173. Was that from some peculiarity of the country that you could calculate more closely?—Yes; that there was less steep hill-sides; that there was also less of those bottomless water stretches. I think there were thirteen on the line first adopted, and on the south line there were only six.

Did not know when the survey was made that the water stretches on section 15 was "so bottomless" as they proved, but knew that they were pretty bad, and therefore preferred the south line.

20174. Was it known as early as the time you made that survey that there were bottomless water stretches on the line of 15?—We did not know that they were so bottomless, but I knew they were pretty bad, looking at the holes to fill. I had no means of sounding.

20175. At that time your comparison could not have been based in any way on the bottomless character of the water stretches that you describe?—Yes, I think so.

20176. I thought you said you were not aware of that?—Yes; because I knew it was more expensive to make an embankment in water than on dry land. It would require protection work of some kind, and also that the quantities, as I calculated them, were less. That was another feature in favour, I considered, of the south line.

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20177. Less on the whole line or per mile?—Less on the whole line—that is on an equivalent distance.

20178. Do you mean the same mileage?—On a greater mileage on the south line they were less than on the straightest line. They were less on a distance which would leave contract 14 the same length as at present.

20179. So that if you added the excess of distance, which you call five and a-half or six miles, altogether to the eastern end of your new survey, still the mileage covered by that would cost less or would require less quantities to be executed than on the northen line?—It would.

South line would have cost less.

20180. You have been describing the character of the country on the eastern portion of this location: will you please continue now the description of the country on the westerly portion of this location of 1875?—From about the forty-second mile, the point at which I finished estimating for a comparison between two lines, to its junction with the contract 14 location, the ground was broken by a number of hillocks of rock. The line that was run was a perfectly straight one for a long distance, over twenty miles, and it crossed a great number of little islands of rock in the level country. These could have been avoided by swinging the line—curving the line to pass round them. It was not a very favourable country. It was not a very difficult one, nor was it a favourable country; not so favourable as the one that was afterwards tried as far as Brokenhead, as far as I have been informed of it.

Many little islands of rock could have been avoided by swinging the line.

20181. As to that westerly portion of your 1875 location, was it upon the whole as favourable a country as the equivalent length upon the present section 14?—I may say that I never myself travelled that, because I was then engaged upon the Dalles line trial locations, and the location was finished by Mr. Fellowes, one of my assistants. From the profile I should say as good a line could have been obtained upon the westerly portion of the south line location as upon the present line.

Judging by profile as good a line could have been obtained on the south line as on the present contract 14.

20182. Have you seen the profile of that westerly portion of what is called your 1875 location?—Yes, I have. It is some years since I have seen it.

20183. Where did you see it?—I saw it in the office here, in Ottawa, after it was made up. I assisted in making it up.

20184. Was there a profile made of the line which you located from Keewatin westward to the neighbourhood of Falcon Lake?—Yes.

20185. Then a profile has been made of the whole of that 1875 location?—Certainly; it is in the office. I saw it in 1879.

Witness's line of 1875, would have given an engineer data to compare that line with the northern one which was adopted.

20186. Would that profile give an engineer data sufficient to make a comparison between the availability of that line and the northern one which was adopted?—It would give him the same information—equivalent information to the line with which it was compared.

20187. Are you aware of the result of any comparison of those two locations?—I am.

20188. By whom?—Comparison by whom? By myself.

20189. Did you, yourself, compare the result of these particulars upon the two different locations?—I made the quantities out for forty-two miles of the south line, against thirty-six miles and three-quarters of the north line, and also with the same description of grades, and

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also with grades raised on both lines. I made a comparison, comparative quantities, got the original schedules which I made out at the time and submitted to Mr. Rowan.

20190. Have you had the means before you of forming an engineering opinion upon the comparative merits of these two locations—I mean for construction merely irrespective of the operating in future?—Yes; I have.

Trial location of 1874, data as to quantities on located line, but with a two feet lower grade than was decided on ultimately.

20191. What was the result of your comparison?—The first calculations were made by Mr. Frank Moberly and his party. The quantities were taken out by scaling from a copy of my profile of 1874. These calculations were made, and I was instructed to put them in schedule form, and the result was, as the bill of works gave at the time: 600,000 cubic yards of rock, at $2.75, would be $1,650,000; loose rock was estimated at 40,000 cubic yards, which, at Mr. Whitehead's rate, would be $70,000; earth estimated at 900,000 yards, at 37 cts., $333,000—total, $2,053,000 for a distance of thirty-six miles and three-quarters; rate per mile is $55,864.

20192. Is that upon your 1875 location?—That is the 1874 location.

20193. That is the adopted line?—That is the adopted line nearly. There have been some little alterations made since.

20194. I was asking you a little while ago what you found on this location of yours of 1875: you appear to have been giving the quantities of the existing line?—I thought you were asking me what comparison I had made between the two quantities.

20195. Are you stating now, what you have stated as a portion of the comparison?—Yes; that was the first estimate.

20196. Proceed.—After this tenders were called on that bill of works, but none were accepted.——

20197. Then these were the quantities which were estimated at the time of the first advertisement?—Yes.

20198. Was that at a higher or lower grade than the present one?—It was about two feet lower grade.

20199. Then the cuttings would be greater?—The cuttings would be greater; yes.

20200. Then the data you have so far given concern the present location of section 15, but at a lower grade than was finally adopted?—That is right.

1875 location.

20201. Well, proceed.—In the spring of 1875 it was determined to try for a better line, and I was instructed to proceed to make another trial.——

Southern line, 42 5-100 miles; northern 36 75-100.

20202. Is that the trial of which you have been speaking, and which is called your 1875 location?—Yes; with the same sort of grades, that is, grades to equalize cuts and fills as I have laid them down on the line of 1875, which was $42\frac{5}{100}$ miles in length.

Quantities on located line of 1875.

Difference in total cost in favour of southern line $172,986.

20203. That is, against the $36\frac{75}{100}$ of the present location?—Yes. The quantities I returned were: rock, 445,261 cubic yards, estimated at $2.75, the same rate, is $1,224,467; earth, 960,936 yards, at 37 cts., $355,546, leaving out cents—total, $1,580,014; the rate per mile is $37,574, showing a difference in total cost of building forty-two miles of the

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south line against thirty-six miles and three-quarters of the present line of $472,986, and in the rate per mile of $18,290. The grades in both cases were intended to balance cuts and fills, and in this latter case the centre heights were calculated accurately from the level and grade book instead of being scaled from the profile. I was then instructed to raise the grades on the line of 1874 an average of four feet throughout——

20204. That line of 1874 is the present line?—Yes: an average of four feet throughout the whole distance, which I did; and calculating from centre heights, as in the last case, returned the quantities as follows: rock, 369,390 cubic yards, at the same rate, is $1,015,822; the earth I returned at 1,979,506 cubic yards, at the same rate, $732,418—total, $1,748,240; rate per mile, $47,571, showing a difference in favour of the south line in total cost, of $168,266, and of $10,000 in the rate per mile.——

Comparison made on the basis of solid embankments.

20205. Now was that comparison made between these lines upon the condition that the voids should be left and not filled with trestle or embankment?—No; that is for solid embankments in both cases. There was no talk of trestle work then.

20206. Then that was not on the terms of the second advertisement for section 15?—No; these were my returns that I made myself.

20207. These were made for the purpose of comparison, and not as they were submitted to the public?—Yes.

Another comparison on the southern line ran from Brokenhead and made only 40 4-100 miles long gave a difference of $239,716 in favour of southern line.

20208. In order to ascertain the relative merits of the two lines?—Yes. This I considered was scarcely fair by the south line, as the present route had the grades raised and the quantities diminished greatly, so I made another estimate of the south line, raising the grades on it only an average of two feet instead of four, as on the present route, and having calculated the quantities in the same manner as the last case, but for a shorter distance, I obtained the following. It was made a shorter distance, because it was then intended to try and run for Brokenhead, and we calculated what the distance would be, and it would make contract 15 shorter, so we only calculated for $40\frac{4}{100}$ miles. I returned the quantities as: rock, 356,558 cubic yards, calculated at the same rate as before, $980,534; earth, 1,427,000 cubic yards, equals $527,990—total, $1,508,524; rate per mile, $37,675, making the difference in favour of the south line still greater, being $239,716 in the total cost of building forty miles of the south line, against thirty-six and three-quarters of the present route.——

20209. Were the cuts and fills equalized in this last comparison?—They were raised two feet.

20210. Would that leave voids?—On the south line it was raised two feet, on the north line four feet.

20211. Would the effect of thus raising the grades be to leave voids unfilled?—No; that was a calculation for solid bank throughout.

20212. That would have given a solid bank?—That was the calculation.

20213. Would this first calculation you speak of, when the grades were raised, have given a solid embankment on the two lines?—Yes; that was the calculation.

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20214. Then, if the comparison was made upon a condition of solid embankments in both cases, why add another height to this lower line in order to make a different comparison: what was the object of adding two feet to the lower line for the purposes of comparison, if you had already, in your second comparison, obtained a line that was efficient with full embankments?—I thought I might gain a little more than I did.

20215. Gain a little more in what?—Make it a little cheaper, that the line might be built a little cheaper than with the first grades put in—two feet less cutting.

20216. Would that have accomplished the object of having solid embankments on the southern line?—Yes.

Still further comparison made.

20217. Have you made a still further comparison between these two routes?—Yes.

20218. Explain upon what foundation?—The item of loose rock does not appear in any of the above calculations. As it was necessary to have a price for this class of work a nominal amount was put in the bill of works.

20219. What bill of works?—The bill of works presented. I have not given you the bill of works yet, but I will; and as it was considered I had over-estimated the quantity of solid rock in cuttings, it was decided to deduct this nominal sum of loose rock from my solid rock quantities. Bills of works were therefore made up from calculations Nos. 3 and 4 above mentioned, quantities put in for clearing, close cutting, grubbing, &c., &c., and moneyed out at the average price obtained from all the tenders received from the first bill of works ——

Quantities in original bill of works he gives from memory.

20220. Tenders received for what section?—Section 15. That is 600,000 yards of rock. The original bill of works made out for this time (winters of 1875-76) I deposited with the Engineer-in-Chief, May, 1879. and can be obtained by the Commissioners. Some notes of these calculations were also deposited at the same time. I can, therefore, give the quantities only as near as possible from memory, as these papers were refused when claimed by me, and I give the quantities as I remember they were calculated—rock, 340,000 cubic yards, at $2.40, equals $816,000; ——

Estimate of cost of present line over section 15, $1,540,150.

20221. On which line was that?—That is on the present route, thirty-six miles and three-quarters long: loose rock, 30,000 cubic yards, at $1.05, $31,500; earth, 1,979,000 cubic yards, at 35 cts., $692,650—total, $1,540,150; rate per mile, $41,909.——

20222. That is your estimate of the cost of the present line over section 15?—Yes.

20223. Is that for solid embankments?—That is what I gave at the time as well as I can remember: that is for solid embankments. I should like very much to see the other three which I deposited with Mr. Smellie. There is one of them (Exhibit No. 295) headed by Mr. Rowan in Mr. Rowan's handwriting.

20224. Do I understand you to say that the estimate of which you are now speaking was an estimate based upon quantities with the prices averaged upon the tenders made for that work, and with a view of making solid embankments all through?—Yes.

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20225. No trestle work and no voids?—No rough trestle work and no voids.

20226. When was that estimate made?—That was made in the spring of 1876. This estimate made in spring of 1876.

20227. Now, I understand that to be your estimate in the spring of 1876 of this work which you have described, and for the whole of section 15?—Yes.

20228. Solid embankments?—Yes.

20229. In round numbers $1,500,000?—Yes.

20230. Proceed.—On the south line the quantities in a similar bill of works were calculated as: rock, 311,600 cubic yards, at $2. 0, equal to $747,840; loose rock, 45,900 cubic yards, at $1.05, $47,250; earth, 1,427,600 cubic yards, at 35 cts., $499,450—total, $1,294,540; rate per mile (that line was 40 1/100 miles in length) $32,331, being a difference in favour of the south line of $245,610 in the total cost, and $9,578 in the rate per mile in these three items only.—— $245,610 in favour of south line.

20231. Then I understand you to say that, according to your calculations at that time, the southerly line, although more than three and a-quarter miles longer than the northerly line, would cost upon these items alone, in round numbers, $250,000 less than the northern line: is that the conclusion you come to?—Yes.

20232. Have you any further particulars of a comparison between these lines?—Yes. I would wish to explain some evidence that I gave before a Committee of the Senate in May, 1879. I was then asked to state from memory what the result of the calculations was. I then stated the amount to be $360,000, which was the sum spoken of at the time the calculation was made. I also stated that there was against the southern route, the cost of building and equipping of three and a-half miles of line and the maintenance of it. I also mentioned that were this line adopted, a large sum of money expended on contract 14 would be lost, that is on works between Brokenhead and what was called the end of location, I think that was the place. I stated these things because that $360,000, as I considered it, was to build nearly the same length of line on both routes from Rat Portage westward, and therefore I gave the items that were against it. My impression now is that the sum of $360,000 was roughly arrived at in this way, as the difference in cost of building thirty-six miles and three-quarters of the present route against the same distance on the south line. The real difference, according to these figures which I have given, is: the cost of building thirty-six miles and three-quarters of the present route, at $41,909 per mile, $1,540,150; the cost of thirty-six miles and three-quarters on the south line, at $32,331 per mile, is $1,163,916, and the difference is $376,234, and that was called, in talking over the matter, $360,000. There was almost a difference of $10,000 per mile between the two routes. There were thirty-six miles at $10,000 a mile talked of, and that was put at $360,000, and that was the way it came. Explains evidence given before Committee of the Senate in May, 1879. Had stated that the difference would be $360,000 in favour of southerly line, the real difference $376,234, but this was on a mile to mile comparison, and would therefore be reduced by the longer distance to $245,610.

20233. This difference of $360,000 would be reduced, as I understand it, because you only gave mile for mile, when, in fact, it took more miles on the southerly line to reach the meridian on the end of 15?—Yes.

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20234. And that reduces this difference from the amount you now name, $360,000, to the sum of $245,000?—Yes; but if you take the $245,600, that is the calculated difference in the cost of construction of the two lines, this is the difference in cost, minus three and a-half miles. I might here state that in reading up this matter I find there is a great difference of opinion among engineers as to what the actual cost of running and maintaining a mile of road for all time to come is worth. It has been stated by one man that it is as much as four hundred and odd thousand dollars—it was worth that to save one mile in distance where the traffic was very heavy. If it was worth that to do it we could build a straight line over almost anything.

20235. In comparing these lines, or rather the probable cost of them, did you take into account the cost of ballast, ties and rails?—No; oh, no; there was nothing.

Cost of ballast, ties and rails on three and a-half miles to be added.

20236. Is that to be added to the cost of this three and a-half miles of road?—Yes; that is to be added.

20237. That would diminish the difference you now describe as $245,000?—Certainly.

20238. What difference would that make in the cost of ballasting, ties and rails for three and a-half miles?—I have not made the estimate. I would not like to say it without knowing the cost of rails.

20239. In order to make a comparison merely in the cost of construction, the cost of these items would have to be deducted from that $245,000?—Oh, yes.

20240. Then, in addition to that cost of construction, for the purpose of comparing the expediency of adopting one of these two lines in preference to the other, you would have to set against the south line whatever the amount of operating and maintaining three and a-half miles for all time would cost?—Yes.

Would have crossed fewer water-stretches on southerly line.

20241. Did you state that you would have to cross more water stretches on the southerly line or fewer, as far as you remember now?—I stated we would have crossed fewer.

20242. Do you remember whether there was any great difference in masonry in these two lines?—I made no calculations for masonry. There was no masonry intended that was not common to both lines.

20243. You think the expense of masonry would be about equal on the two lines?—Yes; according to the bill of works of Mr. Whitehead. If it was let on the same bill of works as Mr. Whitehead's, I wish to correct the cost of the thirty-six and three-quarter miles of the south line at $32,331. It is $1,188,168. The difference is $351,982 instead of the figures I gave you. I did not calculate the three-quarters of a mile.

SMELLIE.

W. B. SMELLIE's examination continued:

By the Chairman:—

$12,750 cost per mile for ballasting, ties, rolling stock, &c., at Cross Lake.

20244. Could you state, in round numbers, the cost per mile for the ballasting, ties, rails, track-laying, rolling stock and everything connected with the construction and equipment in the neighbourhood of the Cross Lake locality?—I estimate $12,750.

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20245. That is per mile?—Per mile.

20246. At what price have you put the rails?—$77.

20247. That was the cost of those got about that time?—Yes.

20248. Could you state the probable cost per mile of operating with such a business as might be calculated on with tolerable certainty in that locality?—Not at the present moment.

20249. Is there no well understood rule about that?—I do not happen to remember.

HENRY CARRE'S examination continued: CARRE.

By the Chairman:—

When above comparison made the present line had not been adopted.

20250. Had the present line of 15 been adopted as a final location at the time that you made this comparison and submitted these views to the Department?—It had not.

20251. How do you explain the fact of your getting the prices from some set of tenders then?—Mr. Rowan had a copy of all the tenders, all the prices in his letter-book, and from these he struck an average for every item.

20252. What prices had he: you say he had the prices in his letter-book?—The prices received for the first tenders asked in the first bill of works.

20253. Do you mean at the first advertisement for section 15?—For section 15, dated some time in the winter of 1874–75—the spring of 1875.

These views submitted to Department in winter of 1875-76. $68,000 had been expended at that time on section 14, which would have been lost had the southerly line been adopted.

20254. Do you say that at the time you submitted these views some work had been done on section 14?—Yes. Those were submitted in the winter of 1875-76—that comparison was made then.

20255. Do you remember about the amount that was understood to have been then expended on section 14?—I overheard Mr. Rowan talking to Mr. Thompson on the subject, and to the best of my recollection it was some $68,000 had been expended in clearing and work between Brokenhead River and the end of location.

20256. That would have been lost if this southern route had been adopted finally?—Yes, it would.

20257. Then that sum has also to be taken from the difference of $245,000?—It has.

20258. I understood you to say the whole length of the line would have been increased by some five and a-half miles if the location which you made in 1875 was adopted?—Yes.

20259. Then taking $12,750 per mile, the amount which Mr. Smellie gives as an estimate, and multiplying that by five and a-half, we get at the actual outlay in construction for this increased distance?—Yes; but it was intended then to run a line which would be only three and a-quarter miles longer, and these estimates were made on that calculation of distances—comparative distances.

20260. Is there any person who can tell us now as to the comparative merits of that extended line which you say would only have increased the distance by three miles and a-half as against the equivalent distance on the present located distance of section 14?—Yes.

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20261. Who is that person?—Mr. Forrest ran half of the line and Mr. Armstrong met him.

20262. Are you prepared, as a matter of evidence now, to say whether that was as cheap a line as the present section 14?—I am not, from my own personal knowledge.

20263. Then, according to the data we now have before us, we must assume the line was that which would increase the distance five miles and a-half. That is the only evidence we have, and that is why I take the length at five miles and a-half: the result of this gives $138,125, to be taken from your difference of $245,610?—Yes; if I am right about that $68,000.

$100,000 net sum in round numbers in favour of southern line, which however, would be five and a-half miles longer.

20264. That leaves, in round numbers, $100,000 in favour of your southern route, and against that has to be put the cost of running for all time to come five and a-half miles of road: is not that the general result of the comparison as far as the evidence now before us goes?—Yes; that is it.

20265. So that unless it is wise to run five and a-half miles of road for all time to come rather than spend $100,000, then the selection of the present line is the best; is that the result of your calculation?—No; I will not go that far, because I say it was found impossible to build the line by the grades on which these calculations were made on the present route. They had to be lowered two feet.

20266. But I am speaking of the judgment at that time?—Yes; according to those calculations that is it.

20267. Those calculations were all that any one had before them at that time to lead to that judgment?—Yes.

20268. Then the judgment at that time was this: that the country had either to run five and a-half miles of road for all time to come, or to spend an additional $107,000?—If you stick to the five and a-half miles of course it kills it; but we knew it was possible to bring it down to three and a-quarter miles, and the calculation, $245,610, is made on the calculation as forty miles compared with thirty-six miles and three-quarters. There is another point I wish to bring out if there is a comparison with the other route.

Julius Muskeg would have been avoided by adopting the south line.

20269. Proceed.—I say had forty miles on the present route, which would have taken in one and a-half miles of costly work on 14, west of Cross-Lake, been estimated against forty-three and a-half miles on the south line, or had the total distance on the present route between Rat Portage and Red River been estimated against the total distance between the same point by the south line it would have been much fairer, but would have shown a much greater difference in the cost of construction. The Julius Muskeg would also have been avoided by adopting the south line. That mile and a-half of expensive line, and the Julius Muskeg, as far as I understand, had no equivalent by adopting the south line.——

20270. I understand you to suggest that the judgment made by the Engineering Department in 1876, was not a good judgment?—That the comparison was not a fair one.

20271. Do you mean to say that at that time they could form a judgment based on the result of the Julius Muskeg filling, or the filling

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of the bay of Cross Lake, or on other items which you mention now as being so objectionable in the present location?—No.

20272. Then how could they form a judgment on it if they had not these data?—They had a portion before them; they had the soundings taken in the Julius Muskeg, and they had also the approximate profile of that mile and a-half of expensive work.

20273. Do you mean the approximate profile of that expensive portion of 14 gave them any adequate idea of the cost as it turned out in execution?—It turned out a great deal more, but it gave them a good idea of what it was supposed to be—as good an idea as any other portion of the line. The last ten miles of the south line was easy work. The last five miles, I may say, was almost as easy as any portion of 14, but here was a mile and a-half left out of that calculation altogether at the rate of $41,909 per mile, for a mile and a-half of difference, which ought to be added on the total cost instead of the average cost of 14.

20274. Do I understand you to suggest that a portion of section 14 westerly from Cross Lake would cost a good deal more than the same distance on your southerly route?—I believe it would. I know it would.

20275. How much more?—According to these calculations about $30,000 a mile, I should say—that is, $45,000 for the mile and a-half

20276. That is the additional expense as I understand it?—Yes.

The above $107,000 in favour of southerly line should be increased by $45,000.

20277. So that this difference of $107,000 ought to be increased by $45,000, in your opinion, to make a fair comparison?—It would.

20278. That would give the difference in favour of the southern line at $152,000; and the question then presented to the Department was, as I gather from your evidence, whether it would be better to spend an additional $152,000 or to work five and a-half miles more for all time?—That was the question at the time.

20279. And you think their judgment was wrong?—I am not prepared to say. At the time I stated more distinctly that I considered those estimates made on the north line—the present route—were not correct, and could not be expected to be correct on account of the roughness of the ground; but that those on the south line were far more accurate, and had the grades on the south line been raised four feet it would have made a wonderful difference in that estimate; had they been raised a similar height to the others, I think it would have made a great difference. The comparisons were not made in the same way from the same data. I wish more particularly to show that I was perfectly correct and honest in the statement I made before the Senate Committee, as it was called in question, and I was blamed for giving inaccurate evidence. I have been told that the Minister was not satisfied with my evidence in some case or other, and I want to find out what that evidence was so that I can correct it.

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Witness says he is not responsible for the actual quantities as the grades were altered.

20280. There is another matter upon which I understand you wish to explain your views more fully—that is to say, the estimates of the quantities submitted to public competition of section 15, and to explain how it was that those quantities differ so much from the quantities as executed finally: could you state, shortly, your views upon that matter?—I can. I first of all wish to say that in my opinion I am not responsible for the actual quantities, as the grades were altered mate-

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rially in the meantime, between the time of letting and after the contract was let. I have been accused of making errors in my calculations to the amount of $763,000, being the discrepancy between Mr. Whitehead's bill of works for quantities for earth, rock and loose rock.

20281. You mean the line that he got at the time he tendered for section 15? —At the time he tendered for section 15, and the estimate which I made in January 1879.

Explains discrepancies as to earth, rock and loose rock.

20282. What was that estimate in 1879—I mean of what works?—Of those three items: earth, rock and loose rock.

20283. On the same section?—Yes; on the same section.

20284. And were they of the works then executed or to be executed, or both?—Partly executed, and partly to be executed.

20285. You mean of the total work which would be accomplished when the work was finished?—All the cost to complete the work when it was finished.

20286. The cost from the beginning?—Yes; from the beginning. I was to show how that discrepancy occurred. I have given, I think, the evidence all in different forms at different times, but I do not think it was ever moneyed out so as to make it plain. I may as well state how it came about—how the quantities in the bill of works were first of all estimated. In the summer of 1876, before the location was finished, I was asked—that is before the re-location was finished—I was asked for a new estimate of the quantities on contract 15. I was asked whether I had reduced the rock cutting in any way.——

20287. Was that between the first and the last advertisement for tenders?—Yes; that was in July or August of 1876, while the re-location was being made. The bill of works dated April 18th, 1876, was made out from my calculations. No. 3 gives the quantities as 320,000 cubic yards of rock, 30,000 cubic yards of loose rock, and 80,000 cubic yards of earth. My estimate above mentioned was for 369,390 cubic yards of rock. This amount was reduced to 320,000 yards as in the bill of works.——

20288. Why was it reduced to 320,000 in the bill of works?—The 30,000 cubic yards was deducted for loose rock, and some 19,390 yards were thrown out altogether.

The whole of the quantities estimated by witness were not put in the published bill of works.

20289. By you?—No; they were left out in making out the bill of works.

20290. Do you mean that the whole quantities which you estimated were not mentioned in the published bill of works?—They were not.

20291. Will that account for the disappearance of the 19,390 cubic yards?—Yes. In the summer of 1876, before the re-location of the line or the cross-sections were completed, I was asked by the district engineer to assist in making up the bill of works,——

On information given by witness bill of works dated August 1st, 1876, made out by Rowan.

20292. Who was he?—Mr. Rowan: with trestle work to fill up large gaps for which material could not be obtained from the cuttings. No time was given for calculations, and the only question asked was: "Have you reduced the rock work?" By applying a tracing of the new line as far as located to the old profile, I showed him that great reductions had been made in the quantity of rock at several points, which I roughly estimated at 20,000 cubic yards. On this information,

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the bill of works dated August 1st, 1876, was made out, Mr. Rowan calculating the quantities of timber in trestle work from some plans he had made. The items were rock, 300,000; loose rock, 30,000; earth, 80,000 cubic yards, no alteration being made in the quantities of loose rock and earth.——

Rock, 300,000; loose rock, 30,000; earth, 80,000 cubic yards.

20293. Then this estimate still omitted the 19,000 yards of rock which you had formerly mentioned as part of the expected work?— It is a new estimate altogether, and that 19,000 yards I suppose, was cast out.

Rowan's estimate omitted 19,000 yards of rock.

20294. I understand you to say it was cast out in this way: that Mr. Rowan first of all took it out upon his own responsibility from your estimates, and that he afterwards reduced that amount by 20,000, yards because you said the profile showed that that amount would not probably be required, so that the original deficiency still continues in this new estimate without any fault of yours: is that what you mean?— I forgot about that 19,000 yards at the time, and so I suppose I am responsible for it—for that error. I said 20,000 was the difference, and 320,000 yards of rock having been considered the original quantity, or the quantity in the last bill of works, I knew I had reduced about 20,000 yards by the line I had located up to that time, and therefore I gave it as 300,000 yards.

20295. Proceed.—The earth quantity given in this as well as in the former bill of works, that is Whitehead's bill of works, being only that calculated as coming from cuttings, no provision being made for earth to fill voids too shallow for trestle work, or for the grading of long low banks which had to be made either from borrow-pits or side ditches.——

Earth: Bill of works did not include fillings for shallow voids and grading for long low banks.

20296. Why did it not include that earth as well as the earth from the cuttings: if you were asked to make out a bill of works why did you not put in the earth from borrow-pits as well as from the line cuttings?—In the last bill of works, that is in the one of 1876 (of April, 1876) the intention was merely to take out the excavations—the cuttings—and make as much bank as possible from these.

20297. Then do you say that your instructions were only to mention so much earth as you supposed would come from line cuttings?—That is as I understood it at the time.

Understood his instructions were to mention only the earth that would come from line cuttings.

20298. And is that the reason that you kept it down to the 80,000 yards?—That is the reason it was kept down in April, 1876. I received no instructions to make any calculations for any other in the one of August—the following August.

20299. Then you repeated your calculations of the April estimate because you had no fresh instructions upon that subject?—Yes; I did not really know how the work was going to be done. Mr. Rowan had it all in his own hands and he asked me the questions and told me what to do, and I did it.

20300. Did he ask you them in writing?—No; he did not. Working in an office together a man does not write a question and hand it to you to answer. You are asked to do a thing and it is done, and nobody ever thinks it will be contradicted, or denied, or anything.

20301. Then you say now that, as far as this earth item is concerned, you never had instructions to estimate more than that which would

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come from the line cuttings?—No; I had not. The location and cross-sections being finished a plan and profile showing the changes made and also the cross-sections of the whole line, was forwarded during the winter of 1876-77 to the head office in Ottawa, in order that the grades might be finally adopted and sanctioned. On the cross-section sheets I showed the advantage of making some slight alterations in allignment.——

No cross-sections that he could use on which to base his estimate of quantities Astonished therefore when told that not a stake was to be moved.

20302. I understand that these quantities which you have named so far were arrived at only from the centre line, the profile line, without cross-sections?—There were no cross-sections in existence at the time that I could use. As the contract was then let I wished for permission to make these alterations, and fully expected it, but was astonished on being told that not a stake was to be moved.——

20303. Who told you that?—Mr. Rowan.

20304. Verbally?—Verbally, on the line.

20305. On what part of the line?—Walking over the line. He has referred to it in different instances since. I think he told Mr. Smellie so; I think I heard him. I counted on being allowed to do this—that is, to make those alterations—and thus make a reduction in the work when I was making the estimate for the bill of works. I knew that it was possible by slight alterations, after the work was thoroughly cross-sectioned and cleared, it was quite easy and quite possible to make a number of changes so as to reduce the work materially, and on that I felt more certain in reducing the quantity down to 300,000 yards.——

The 300,000 yards of rock returned by witness as the probable result of prospective alterations—this a new explanation.

20306. That is a new explanation: do you say now that you returned this 300,000 yards as the probable result of the work when these alterations were to be allowed, which you say you expected, and which were not permitted?—There was only one-half of the road located at the time. I had made great reductions on that half, and I expected to make more, and did make more, on the remainder, and in making a hasty calculation of that, I said to myself: "Well. I know two or three places where I can knock out a lot of work," and I thought I was safe enough in reducing it 20,000, and I know I was, and I know I reduced it a great deal more than that. On the 9th of March, 1877, I mailed the last of the cross-sections to Ottawa, and received from time to time the revised grades on short portions of the line; but it was on the 29th of June before the final grades were received.——

20307. How were they received?—First of all they were received by telegraph, and afterwards by letter.

20308. By letter from Mr. Rowan to you after the telegraph from head-quarters to him: is that what you mean?—I don't know how he got them.

20309. To whom was the first by telegraph: to Mr. Rowan?—No; to me. I received them first by telegraph, and afterwards by written direction. I think I have it here, a copy received from Ottawa, dated June 21st, 1877, statement of grades. (Exhibit No. 296.) After completing these grades I found that on the average they were some two feet lower than those which I had sent down, and from those on which the bill of works was calculated. In every case where work had been laid out by the old grades, or work done by the contractor, he had to take up bottoms and lower dumps, &c. As I have been taxed with the difference in quantities between the original bill of works and the estimate made by me in January, 1879, after this lowering of the grades was decided

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on, I therefore beg leave to ask, was no calculation made of the effect of lowering the grades to this extent when they in Ottawa had everything in their possession necessary, except test-pits, for obtaining accurate quantities, while the estimate made by me was calculated without this information, that is, without cross-sections. I contend then, that the final determining of the grades determined the quantities irrespective of any calculations made by me; that it was possible to arrive at something like accurate quantities before the final settlement of the grades, and if it was deemed of such importance that the quantities in the bill of works should not be exceeded, then a calculation of some kind ought to have been made, in my opinion.——

Contends that the determining the grades determined the quantities irrespective of any calculation made by him.

20310. Made by whom?—By those who arranged the grades—determined the grades.

20311. Who were they?—Mr. Smellie signed the list of grades, I think. In February, 1878, I was asked for an estimate to complete the contract, and for the first time, calculated total quantities from the cross-sections, the result being, rock 526,646; loose rock, 30,000 (put in at the same amount); and earth, 1,657,000. This was to complete the grading with solid earth banks. I was also asked for an estimate to complete with earth banks, and protection walls across all water stretches, with earth banks over heavy land fills where material could be obtained from local borrow-pits without extra haul, and then for trestle work to fill all voids for which material could not be obtained from cuttings or borrow-pits. In order that everything could be made as clear as possible, I sent a schedule giving the quantities in every cut and fill on the contract, and a statement of the comparative cost of completing the heavy land voids, either with earth or trestle work. I will put in a copy of the schedule of quantities that I sent down at that time. I have not got it with me now, but I will put it in to-morrow morning. I put in a written estimate of the comparative cost of earth work and trestle work on section 15. (Exhibit No. 297.) That is a copy of what I sent to Mr. Rowan at this time. I sent this estimate in this shape, so that everything might be laid before the district engineer as plainly as possible, at the same time calling his attention to the fact that the superstructure alone was so expensive in the plans for trestle work sent by him, that it would in all cases be cheaper to build solid earth bank where the fill did not exceed eighteen feet, than to put in the superstructure alone without the bents to support it.——

Estimate of quantities in 1878: rock, 526,646; loose rock, 30,000; earth, 1,657,000.

20312. Do you mean that the superstructure of the trestling designed at that time by the Department, was of a very expensive character?—I think so.

Superstructures designed by Department very expensive; earth work, 37 cts. a yard; superstructure, $9.83 a foot.

20313. Was it more expensive than that which is now in use on the line?—Vastly more expensive. The earth work in that statement was calculated at 37 cts. a yard; the superstructure cost $9.83 a foot.

20314. Do you mean over the whole line?—Those were the plans for all heights of structure.

20315. Do you mean that it averaged that over the whole line?—Yes.

20316. Wherever the trestles were used?—Yes.

By Mr. Keefer:—

20317. That is for superstructure alone?—Yes; the schedule that I sent gave also the cost of the bent for every height. I called

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his attention to this fact, expecting that at least a cheaper style of trestle work would be adopted for low fills—shallow fills. By reference to this statement he could have seen that out of the twenty-six voids calculated only twelve could be filled with trestle work at a less cost than with earth, while in the remaining fourteen voids the trestle work would cost just double the price of solid earth banks at 37 cts. a yard. Mr. Marcus Smith, acting Engineer-in-Chief, walked over the whole contract with me in September, 1878—Mr. Rowan having returned to Winnipeg a day or so before he arrived—and to him the question of loose rock estimates was referred; as he walked along the line places were pointed out, and the proportion of stones and boulders to earth discussed, in presence of the contractor's agent and engineer. After Mr. Smith's return to Winnipeg,

A new definition of loose rock given witness.

I was sent written instructions to increase all previous estimates of loose rock, and a new definition of loose rock was given me, which will be found printed on page 113, Evidence taken before the Public Accounts Committee, May, 1879. I pointed out several deviations in the line to avoid heavy water stretches and steep side hill fills, which I told Mr. Smith I would have made had I not received instructions from Mr. Rowan in no case to increase the rock excavation a yard. Instructions were given, and these deviations were made in the fall and winter following. In January, 1879, I was called on for another estimate of cost of completion, and returned the quantities as: rock, 516,226 cubic yards; loose rock, 69,945 cubic yards, in earth cuttings, as computed in accordance with Mr. Smith's instructions; loose rock, 25,811 cubic yards, being solid rock outside slopes returned at loose rock prices; earth, 1,720,714 cubic yards, to form solid banks throughout. I purposely divided the loose rock quantities into two classes as above and in making up the approximate estimate increased the first class to agree with the new definition. The second I kept separate, as it never was intended to pay for this work, and as the specification distinctly states that it shall not be paid for, no calculation was made for it. Rock-borrowing was also ordered by Mr. Smith at several points, and the estimated quantities of this work, together with the increased quantities of solid rock, caused by deviations referred to above, are included in the total quantities of solid rock excavation. On the other hand, many of the cuttings had turned out less rock than calculated in 1878. These are all the calculations made by me up to May, 1879, when the examinations were made before the Committee of the Senate and the Committee of Public Accounts. A number of estimates were put in by the district engineer which are printed in the published accounts of the proceedings, and are, with the exception of that on page 109 of the Senate Report, compiled by him from the estimates made and given by him in this statement. That on page 109 is a copy of mine made in January 1879. A comparison was made between the quantities given of rock, loose rock, and earth in the bill of works, on which Whitehead took the contract and those given in the estimates of January, 1879, and the difference was found to be $763,025. I will now show how the principal portion of this large sum may be accounted for. By a calculation which I had made by my assistants, the lowering of the grades, after the contract was let, increased the rock excavation, 113,203 cubic yards, at $2.75, $311,308; changes in line and rock-borrowing amounted to 60,000 cubic yards, at $2.75, $165,000. This was brought about by the rock. Borrowing was made to assist in forming the protection walls which had been

In January, 1879, called on to supply another estimate of quantities.

Lowering grades after contract was let increased the rock excavation, 113,203 cubic yards at $2.75, $311,308, and changes in line and rock-borrowing, 60,000 cubic yards, at $2.75, $165,000.

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decided upon, or was supposed to have been decided upon at the time Mr. Smith passed over the line.——

By the Chairman:—

20318. Do you mean that was some work that could not have been estimated by you in the original bill of works?—Yes; it was never intended, and therefore I would never have estimated for it.

In consequence of Smith's instructions the increase in loose rock 25,811 cubic yards, at $1.75.

20319. It was the result of a change adopted after the contract was let?—Adopted after the contract was let. In loose rock the increase due to solid rock outside slopes, returned at loose rock prices in accordance with instructions received from the district engineer, 25,811 cubic yards, at $1.75, $45,169. That is the amount as I returned it in this estimate of January, 1879. The solid rock outside of slopes was ordered to be returned at loose rock prices by Mr. Marcus Smith, and that also was never intended in the specification made by me, and I was instructed to deduct it by Mr. Fleming and only pay it at earth prices, so I now deduct it or use it to show it was an item I never ought to have been charged with.——

Thus an error of $45,000 apparently in his estimates, for which he was in no way responsible.

20320. Charged with having estimated you mean?—Charged with having estimated. That amount, $45,000, was charged to me as an error in my estimates.

20321. I understand you to say it could have formed no part of your estimate?—No.

20322. Because it arose from what took place after the contract was let?—Certainly.

Item due to changes in definitions given by Smith, $48,961.

20323. Proceed.—There is another item: loose rock and cuttings, due to changes in definitions given by Mr. Smith. At the time I was making the estimate I said it would increase it some 40 per cent. I think that was a very low estimate indeed taking the two definitions, 40 per cent. on 69,945 cubic yards, is 27,978 cubic yards, equal to $48,961 at the contract price.——

20324. Should you not charge yourself against that item with the quantity represented by it against the earth embankment?—Yes; I should. No, no. I beg your pardon. I should charge myself with 25,811 cubic yards at 37 cts. a yard.

Increase in earth in consequence of lowering grades 144,138 cubic yards at 37 cts. $53,332.

20325. It took the place of some earth which you ought to have estimated at the beginning?—No, it is returned at earth prices instead of at loose rock prices, as I estimated it, but in no case ought I to do that, because it was never intended that that item should be in it at all, either paid as earth or any other class. Then there was an increase in earth due to lowering the grades, 144,138 cubic yards, at 37 cts., $53,332—total, $623,770. I give myself credit for that earth due to lowering grades, because in the two estimates which are compared together, there is only the earth estimated, which we supposed would be found in excavation in the cuttings.——

20326. This excavation was of a greater depth?—Yes.

20327. And turned out more earth to that extent?—Yes; turned out more earth. The total of solid rock given in the estimate of 1879 was purposely kept some 12,000 or 13,000 cubic yards in excess of what we expected, in order that there might be no more underestimating of quantities; and through fear that some heavy cuts, still to come out, might overrun our expectations and turn out more rock than we

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expected, we wished to be safe. That our expectations were fully realized, I think will be proved when the final estimate is received. I have not seen what the final estimate of rock on the contract is, but I think it will be a good deal under 500,000 yards. I only asked for 12,000 or 13,000, which I put on to make myself safe. I think I can then fairly claim a still further reduction of 12,000 yards of solid rock, equal to $33,000, making the total amount accounted for, $656,770, and leaving a balance of $106,255, or a little over 6½ per cent. increase on Whitehead's bulk sum—I am not sure, but I think about 6½ per cent. That the amount of solid rock due to a lowering of the grade of two feet is not excessive, may be proved from the calculations already given. The first calculation with grades to balance cuts and fills was 640,000 cubic yards of rock. I am only taking the rock quantities now; I know very well the loose rock was deducted from the quantities I returned then. The second calculation on the same line with grades raised four feet was 369,390 cubic yards. The difference is 270,610 cubic yards. The grades were again lowered on the same line some two feet, and the difference claimed now is 113,203 cubic yards, not half the amount of the four foot change. Of course the second foot, if it had been again lowered two feet, it would have been a larger sum than I claim. The second two feet would have made a larger difference. Again, the calculations made for south line, the rock excavation, is given as estimate No. 2, 445,261 cubic yards; No. 4, 356,558 cubic yards; total difference, 88,703 cubic yards. The amount of increase due to changes of line and rock-borrowing is, I am certain, below the mark, but can be easily verified. Solid rock outside of slopes returned at loose rock price, has been deducted by order of Mr. Fleming and paid for only as earth. The loose rock in cuttings was increased by Mr. Marcus Smith's definition, and again decreased by Mr. Fleming's instructions to measure in exact accordance with the specification. I deduct earth in cuttings because in both bills of works the amount of earth only in excavation is estimated. I would also draw attention to the fact that Mr, Rowan gives the same bill of timber for trestle work in his estimate given on page 126 with the increased quantities of excavation as that given in Mr. Whitehead's bill of work, so that according to him it would appear that he considered the lowering of the grades merely increased the cost of the work, without giving any more material to form banks or reducing the quantity of trestle work to complete the grading, $1. I compared the two bills of works then as follows:—

Claims that he accounts for $656,770 leaving a balance of $106,255.

Table of witness's and Rowan's estimate.

	Bill of Works.		Mr. Rowan's Estimate.	
		$		$
Rock	300,000	825,000	516,226	1,419,621
Loose rock	30,000	52,500	95,756	167,563
Earth	80,000	29,600	224,138	82,939
Trestle work		380,700		380,700
Extra haul				18,000
Wages				2,500
Items common to both		306,285		300,784
		1,594,085		2,372,099
				1,594,085
Total difference				778,014

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There is another item that I want to call attention to. There is nothing in the bill of works for extra haul; that is $18,000 in the estimate made by Mr. Rowan. There is nothing in the bill of works on which Mr. Whitehead took the contract for wages, and in the other there is $2,500. It makes a total accounted for of $677,270, and the balance unaccounted for is only $100,744. Now, I say, that taking it at a low estimate, the enormous increase in the quantities is worth 8 per cent. on the cost, and would decrease the cost of the trestle work some 8 per cent., and if I am allowed that the whole discrepancy is reduced $70,288, or about 4 or 5 per cent. on Mr. Whitehead's bulk sum. Mr. Fleming in his evidence before the Committee of the Senate, states distinctly that the quantities given in the bill of works were never intended or supposed to be perfectly accurate. The data on which I had to work has been admitted on all sides to have been very inadequate for making either of the calculations between which the comparison has been made. The country was the roughest and most difficult that it has ever been attempted to build a line through in the Dominion at that time. I ask, then, is 5 or 6 per cent. a very large discrepancy taking all things into consideration. I am prepared to verify my statements and make any further explanations necessary.

Points out that in bill of works are neither extra haul nor wages, and contends that only $100,744 is unaccounted for, and that the increase in the quantities reduces this sum to $70,288.

20328. You speak of the superstructure of the trestle work as originally described by the Department as being worth some $9.83 per foot run?—Yes.

20329. How much per mile would that superstructure cost—the trestle work?—That would be $52,180 per mile.

Trestle work such as originally described by Department worth $52,180 per mile.

20330. That would be say $52,000 per mile for the superstructure alone?—Yes.

20331. About how many miles was it designed to cover with trestle work?—The first estimate was for some sixteen miles, I think—no, eight miles—sixteen miles of lineal feet of 15 x 12 timber.

20332. Have you any means of stating now the mileage of the trestle work?—I can tell it on the estimate that I made myself. I make it about 1,550 feet in length, what I estimated for after lowering the grades.

20333. Is that the whole length of trestle work intended to be built originally by Mr. Whitehead?—No; estimated by me. The total cost, according to this, of the trestle work, is $206,955.

20334. A quarter of a mile of trestle work could not cost that?—Yes; but there is foundation and bents.

20335. Do you mean that a quarter of a mile of trestle work was all that you thought would be necessary at the time you made this calculation?—That is all, because at this calculation the water stretches were thrown out.

Calculated only a quarter of a mile of trestle work.

20336. Can you tell me how much was estimated for trestle work when the contract was given to Mr. Whitehead?—I could not from anything I have now got. I think myself it was about four miles, but I would not like to say.

When work given to Whitehead thought there would be about four miles of trestle.

20337. Did you notice that the original design of the work, and of the filling, was impracticable? Mr. Whitehead has mentioned to us at Winnipeg that, from the way it was designed, it was impossible to do

Railway Construction—Contract No. 15.

the work as was originally intended: now you were on the spot as engineer of construction, can you say how that was?—It was quite possible, if he could find the timber to build it in accordance with the specification.

20338. Well, irrespective of the timber, was there any difficulty about making the rock bases that were required according to the directions of you or your superior officer?—It would have been difficult for him to have formed the full rock bases from actual line cuttings.

20339. Originally it was not intended to put a rock base for the earth embankment?—It was not.

20340. As the contract was let, all that was designed was a rock base wide enough to support a trestle structure?—That was all.

In consequence of change from trestle to earth embankment a much larger amount of rock required for bases.

20341. Was that portion of the work changed in its character so as to make it necessary to provide a much larger amount of rock for bases?—It was.

20342. How was it changed; by what order?—By Mr. Rowan's orders.

20343. In writing?—I have not got it exactly in writing, but I have got references to it and telegraphs of my own to him and of his to me, and in calculations he has made and in letters which I have written to him to show him that this was intended at the time.

20344. Was it a positive direction, or one contingent on some event likely to happen?—It was a general direction for all cases.

20345. That all the water stretches were to have rock bases wide enough to support earth embankments?—Yes; except where it was found that the rock bases would require as much rock as would make a full solid rock embankment. Then I was to make the solid rock embankment to grade.

20346. The same amount of rock that would be necessary for a base for an earth embankment was required in all these fillings, either in the shape of bases for that purpose or in the shape of an embankment itself?—It was.

20347. Coupled with that change in the character of the work, was there any direction as to where the rock should be taken from or should be retained in case it should be wanted?—The instructions were these: in no case shall rock from cuttings be used to make up land voids until the water stretches bases are fully completed to three feet above water, and wide enough to receive an earth top with a three feet berm.

Changes in quantities would delay the contractor seriously.

20348. How would the carrying out of those instructions affect the prosecution of the work by the contractor? Would it hasten it or delay it, or make it more difficult?—The changes in the quantities would delay the contractor seriously.

20349. Why?—Either delay him or cause him a very large amount of extra expense—put him to an immense deal of extra expense upon it, because he would have either to take out the cuttings all from one end and wait until a cutting was out before he could commence the next one, in which case he would lose a great deal of time, for he would have to commence all the cuts at the same time, making tote roads and haul the material over the intervening hills and through the hollows. A horse would not be able to haul anything like the load in that way

Railway Construction—Contract No. 15.

that he would be able to haul in a dump. That would be another cause of increasing the cost.

20350. Was there any complaint by the contractor against these instructions?—Yes; I notified Mr. Rowan that the contractor had demanded a return of all the rock that was put into water stretches over and above the quantity sufficient to form a base to carry trestle works, as he intended to put in a claim for extras for that amount.

20351. Do you mean in consequence of the work?—Yes.

20352. How was that difficulty obviated at last?—I wrote to the district engineer, Mr. Rowan, and suggested that instead of using such an immense quantity of rock as was necessary to make the full rock bank, we should make a rock tip or protection wall at the toe of the slope on either side. I calculated that the amount of rock as a general rule necessary to make those two tips would be equal to the amount necessary to make the base for trestle work. On this recommendation or proposal of mine being laid before Mr. Marcus Smith it was adopted.

After some disputes work progressed on condition of no more rock being required for water stretches than would have been necessary with trestle.

20353. Then the work progressed from that time upon the condition of no more rock being required for these stretches than was originally contemplated for the trestle base?—About that. In some cases it would be less, in some cases it would be more, but it would average that.

20354. Was there any muskeg work on your section 15?—A little.

20355. Had you any special instructions as to the mode of measuring or certifying to work done in muskeg locality?—No special instructions.

20356. What is this muskeg material?—In some places it is nothing but the old Irish peat—turf. It would make splendid fire. In other places it is so soft that it is more like pease soup in consistency.

20357. Have you seen any excavation going on, on your own or any other section, in this material?—I have.

20358. What section?—Both on my own and on contract 14.

20359. Would you describe what you saw in connection with the work of removing it?—I saw on my own that after the ditches were taken out the bottom rose slightly, so that we had to cut a water table again to let the water pass, and that a heavy percentage ought to have been allowed in calculating to make a certain amount of embankment.

20360. You mean to say that a cubic yard of this excavated will not make a cubic yard in the embankment?—No; it will not.

20361. And that in order to provide for the quantity required for an embankment a heavy percentage ought to be added to the amount excavated?—Yes; in other places I saw where a rock dump was made across a piece of muskeg; the whole surface of the muskeg sank with the weight of the dump, and that there was clear water right through the dump—that is, that the bottom of the rock dump sank far below the original surface or level of the muskeg. On contract 14, I have seen the men taking it out with a broad axe in large pieces over a cubic foot in size and pitching it on to the barrow with a prong fork instead of a shovel. I have seen a man wheeling a barrow full of this stuff out of the ditch placing it in a dump, and when he was running up the board, the plank on which he was wheeling, the top of the load was higher than his head. It had no consistency, it was mere sponge.

Muskeg like Irish peat; like a sponge, no consistency.

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20362. Had it any substantial weight?—Well, it had the water in it and it made the greatest portion of it. It was frozen the time I am speaking of. I have been told by the assistant there that some of those ditches were taken out three different times, and there are some of them now that are on the level of the muskeg. You would not know there had been a ditch dug there except that the grass is all gone and there is nothing but a black streak.

The lighter the bank which can be put on muskeg the better.

20363. Was it good material for an embankment?—No; it was not. If there was enough of it it would make a good embankment. In some cases I consider it is better, as in the Julius Muskeg, where it is 19 feet deep. The lighter the bank you can put upon it with consistency to carry the ballast, the better it is, and as far as I have been told on the Northern Pacific, they made banks across these sort of places, and they worked and held first rate when the trains were running. A new engineer came along and he thought he was going to do wonders, and raised the grade and put on two or three feet of earth, and broke the bank and the whole thing went down; and they had to leave it altogether—nothing but fresh water.

20364. This latter part of your evidence, I suppose, is not within your own knowledge?—No; it is not. I give it as my opinion and from what I have heard—the experience of others, and what I consider to be correct.

30365. Is there any other matter connected with this section or your experience in the affairs of the Pacific Railway, that you think proper to give by way of further evidence?—I think so; I think there are other matters.

20366. What are they?—I do not remember just now; I do not remember anything just now.

OTTAWA, Saturday, 23rd April, 1881.

SMELLIE.

W. B. SMELLIE's examination continued:

Railway Location—Contracts Nos. 14 and 15.

By the Chairman:—

20367. I understand that you have some communication which you wish to make to the Commission?—I have, Sir.

20368. What is it?—A letter that I received from Mr. Fleming in reference to the evidence that was taken yesterday. Mr. Fleming informs me that he addresses the letter to me in the absence of the Chief Engineer.

20369. Are you the chief officer of the Engineering Department in the absence of the Chief Engineer—inside service?—I am.

20370. Read it please?—I will.

"OTTAWA, April 22nd, 1881.

Letter from Fleming respecting Carre's evidence, which, in the opinion of the writer challenged the judgment of the Department.

"DEAR SIR,—I feel it due to the Department of Railways and Canals to notice the evidence which Mr. Carre has just given before the Royal Commission. Some years ago I had formed a favourable opinion of Mr. Carre, as a locating engineer; he had considerable experience on the Intercolonial Railway. He was familiar with my system of operation on difficult ground and had, under my direction, carried out in a very satisfactory manner one of the most difficult location surveys on the Intercolonial. Mr. Carre was selected to locate section 15. Two lines were surveyed. A comparison was made. Estimates of the relative cost were prepared, and all the

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information acquired by Mr. Carre was gone over by Mr. Rowan, and I had, or believed I had, the benefit of every particle of information in Mr. Carre's possession. Mr. Carre has now come forward and voluntarily produced elaborate calculations and arguments to prove that the line selected and constructed on the information formerly furnished, is a mistake, and that the selection is a very injudicious one. I need not say to you, that the selection of the lines was made with a strict regard to the public interest, and the Department was governed by the data supplied by Messrs. Rowan and Carre, and laid before the Minister by me, as Engineer-in-Chief. I am not now an officer of the Government, and I am not in possession of the documents which would meet the statement made by Mr. Carre; but as Mr. Carre has challenged the judgment of the Department and its officers, it appears to me necessary that you should send for Mr. Rowan, that is to say, if the Royal Commission attach any weight to the evidence of Mr. Carre. I deeply regret the course taken by Mr. Carre. If his calculations just given to the Commission, are recently made, they are too late to effect any good purpose. If they were made long ago, before construction commenced, and he was sincere in the belief of their accuracy, it was his bounden duty to have submitted them to the head of the Department; and I feel strongly that the relations between Mr. Carre and myself rendered it imperative on his part personally to submit them to myself.

" I am yours, &c.,
" SANDFORD FLEMING.

" W. B. SMELLIE, Esq.,
" Canadian Pacific Railway."

20371. Were you present when Mr. Carre was giving the evidence to which Mr. Fleming alludes?—The greater part of the time.

20372. How have you always understood Mr. Carre to have been employed in the location of the line up there—I mean over what section?—Since I became connected with the railway Mr. Carre has been almost entirely on construction.

20373. What construction?—Section 15.

20374. During his evidence did he describe his duties, so far as stating the section over which he had charge: you say you were present while he gave his evidence?—So far as construction was concerned his duties were confined to section 15.

20375. And before construction?—And before construction his surveys extended from Rat Portage to Red River.

Carre made trial location and subsequent revision.

20376. Did you understand from his evidence that so far as that portion of the line is concerned, which is west of Cross Lake, he only made a trial location?—Oh, yes; he made a trial location and made the subsequent revision as well.

20377. On section 14?—No; on section 15.

20378. I am speaking now of west of Cross Lake. I confine my question to the portion west of Cross Lake: I ask whether, during his evidence, he did not plainly indicate that west of Cross Lake he had undertaken no more than a trial location?—Certainly.

20379. That was the substance of his evidence?—That was the substance of his evidence.

20380. Did he also, during his evidence, indicate that as far as section 15 was concerned he had as yet found no better line than the one located?—He said that most positively.

20381. Then what part of his evidence is it that Mr. Fleming complains of, for the reason he had withheld information from the Department which he ought to have communicated?—The knowledge which he now possesses relative to a line in the neighbourhood of Cross Lake.

20382. West or east of it?—Just in its neighbourhood.

Railway Location—Contracts Nos. 14 and 15.

20383. Has he said that in his evidence: has he not plainly said that the whole question of a better line depended on the possibility of a better line west of Cross Lake on section 14?—Yes; but Mr. Carre has also explained that a better line west of Cross Lake would necessitate the alteration of a short portion on section 15.

20384. But did not that alteration all turn upon the feasibility of a better line west of Cross Lake being first discovered?—Yes; altogether mostly.

Unless Carre shows that there was a better line west of Cross Lake, no point in Fleming's letter.

20385. Then, unless Mr. Carre now shows there was all the time within his knowledge a better line west of Cross Lake there is no point in this letter, is there?—I think there is not.

20386. You think there is not any point?—No.

20387. I will endeavour to make my meaning more plain to you: Mr. Fleming now complains that Mr. Carre has withheld, until this period of investigation, some information which, on account of Mr. Carre's official relation to the Department, he ought to have communicated to Mr. Fleming long ago?—Yes.

20388. Now there is no point in that, as I understand you to say, unless Mr. Carre has withheld some information either relating to the construction of section 15 or relating to some knowledge which he had during the trial location of section 14, because those are the two offices and charges which he undertook to fulfil at that period of the service?—Mr. Fleming, in my view of the letter—I have not read it very often, but he seems to understand, and I understood from Mr. Carre that Mr. Carre now gives to the Commission information, and states that there is a better line than the one now adopted.

20389. Where does he say that better line is?—At Cross Lake.

20390. But on which section?—Well, you cannot separate the sections.

20391. Does he not say that everything connected with this section about a better line turns upon the question of the Forrest line being a better one than the one on section 14?—Yes; I think he does.

20392. Then does it not follow as a certain sequence, that if that was not known to him during his official connection with the Department he withheld nothing he ought to have communicated?—I think if he did not know it during his official connection with the railway he could not have communicated it.

Carre had said that the line he considered better had come to his knowledge long after the period of location.

20393. Does he not say, in his evidence, that it was long after the period of location of section 14 that it came to his knowledge?—He said that it came to his knowledge before he left the service of the Government.

20394. Was that while he was locating engineer that it came to his knowledge?—Yes; locating engineer. I do not know what you mean by locating engineer.

20395. I understood you divided his services into two periods, the first when he was appointed to locate, or survey, or examine the section?—In 1874?

20396. And afterwards he became engineer of construction on section 15 alone?—Yes.

Railway Location—Contracts Nos. 14 and 15.

20397. The suggestion, as I take it, in this letter is that he has had some knowledge of a better line which turns out to be the Forrest line on section 14, and that he has withheld that information until now when it may damage some person's reputation, because it imputes negligence and want of care in surveying the country?—That is what is indicated in that letter.

20398. Do you say now that he gave evidence at any time which appears to show that he withheld information of this Forrest line at a time when it was his duty to communicate it?—I think it was his duty to communicate it at any time that he discovered it.

Witness thinks it was not Carre's duty at the time he heard of Forrest's line to communicate it to the Department.

20399. Do you think, while he was engineer on construction of section 15, if he had been told that the persons in charge of section 14—Mr. Forrest for instance, who was a subordinate to Mr. Rowan—was of the opinion that he had discovered a better line, and Mr. Rowan or his superior officers had rejected it, it was still the duty of Mr. Carre, who was constructing engineer on section 15, to communicate that fact to the Department?—I do not.

20400. Well, is not that in substance what he said yesterday in his evidence?—It is.

20401. Then do you see that he has been guilty of any breach of duty by withholding information?—Mr. Carre, as an officer of the Government, has given to the Commission information regarding the location of section 14 as an officer of the Government. That letter seems to convey that if Mr. Carre had any information in his possession, while in the service of the Government, that ought to have been conveyed to the Chief Engineer.

20402. Is that your opinion?—I think if I had been in the position of Mr. Carre, and I had known there was a better line there, even if it was off my section, I would have communicated it to some person to come to the knowledge of the Chief Engineer.

20403. Would you have considered it your duty, although informed by the person who knew of the better line that he had communicated it to a superior officer and he had rejected it?—No.

20404. Is not that the state of affairs that Mr. Carre describes—when he discovered it he was told in the same breath that the superior officer had rejected it?—Yes.

20405. Then, do you see, according to your knowledge of the practice and etiquette of the staff, that he has been guilty of any negligence in not communicating it?—No; I do not think he has.

20406. Do you understand that this letter alludes to the Cross Lake crossing or not, after what has been said, or that it relates to a comparison between the 1875 survey, the Carre survey, which was a deviation from a point near Keewatin?—I understand this to be the existing line.

20407. At Cross Lake?—At Cross Lake.

20408. But Mr. Fleming does not complain of his withholding information respecting the line surveyed in 1875?—He does not, not to my knowledge.

Entered Department in 1876.

20409. When did you enter the Department?—In 1876—I mean on the Canadian Pacific Railway.

Railway Location—Contracts Nos. 14 and 15.

20410. Was it at that time you had first any knowledge of the plans and profiles connected with the Pacific Railway?—Yes; the first time.

20411. Do you remember whether any plans or profiles connected with this line near Cross Lake have come under your own notice?—Nothing but what is before the Commission.

20412. Have you not had occasion at any time to supervise calculations or plans sent in by Mr. Rowan to the office?—Yes; generally anything of that kind always came under my observation.

Never saw the line (A) known as Forrest's line until yesterday.

20413. Do you remember whether those plans which were before us yesterday—I mean the plans of the line west of Cross Lake—were more closely examined into than they appeared to have been from the evidence?—I never saw that line that Mr. Carre calls A, to my knowledge, before yesterday.

20414. That is identical with the Forrest line?—Yes; I never saw it before yesterday.

20415. Could you say whether any of the particulars respecting that other survey of 1875—the more southern line, some ten miles south of Cross Lake crossing—has come under your knowledge in the Department?—No; it never was dealt with in my time.

20416. Have you found any records connected with it, although it was not dealt with: for instance, have you come across any plans, calculations, profiles or locations of that particular line?—No; nothing. I never had occasion to refer to it in any way, the line having been definitely settled at the time when I first became connected with the Department.

Cannot say whether plans of the 1875 survey of Carre are in office or not.

20417. Are you aware that there are, among the records of your Department, either plans, locations or profiles of that southerly line—the 1875 survey by Mr. Carre?—I dare say there may be.

20418. Are you aware that there are?—I am not aware; I could not state.

Witness understands Fleming to complain of Carre withholding information regarding the Forrest line which information Carre did not receive until long after the construction of section 15, or long after the possibility of adopting the Forrest line.

20419. It is quite possible that this letter of Mr. Fleming's may allude to a comparison made by Mr. Carre of that southerly (1875) survey with the present located line, and not with a line so immediately in the neighbourhood as you allude to, namely, the Forrest line: can you say whether, in any conversation with Mr. Fleming, you have been led to understand which of these two comparisons it is he complains of—I mean as now being made on data which ought to have been furnished to the Department long ago?—So far as I understand, Mr. Fleming does not complain of any information concerning that southerly line having been withheld at the time the route was finally concluded. He had all the information that Mr. Carre had, or any one else.

20420. Then it is with regard to the other line more immediately in the neighbourhood of the crossing?—I understand that to be so.

20421. Is it from conversation with Mr. Fleming, or from this letter, that you understand it?—Yes; from the letter and from the conversation I had with Mr. Fleming here, yesterday.

20422. Could you say what impression you got from Mr. Carre's evidence, as to the time when he was first made aware of this Forrest line which he considers to be a better line than the one adopted?—I understood it to be a very short time before Mr. Carre left the service.

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20423. That was really, then, long after the construction of 15 had commenced?—Oh, yes.

20424. Was it not long after the construction of section 14?—Yes. It may have been long after the construction commenced.

20425. Was it not long after the possibility of adopting the Forrest line that he was made aware of the existence of it?—Yes, it was. I understood it to be so.

Carre withholding information at the time he received the information in question could do no wrong.

20426. Then his withholding information obtained at that time could do no wrong to any other person, even assuming it had not been communicated by Mr. Forrest or by any person else?—It could not better anything.

20427. Did you notice, during the progress of Mr. Carre's evidence, that he volunteered statements without questions being asked on the subject?—I did not hear the beginning of Mr. Carre's evidence yesterday after recess.

20428. Mr. Carre, who is present, seems to think that this is an insinuation against him, as if he were showing some animus in the matter; when Mr. Fleming speaks of his volunteering information, that is hardly correct: I ask you whether you were present during his evidence, and whether you know if he volunteered statements without first being questioned on the subject?—Yesterday afternoon, so far as I heard, Mr. Carre's information that he was giving to the Commission was entirely voluntary, what I heard of it.

20429. Did you not understand that he was asked from time to time to proceed with the subject, and that he had a prepared statement, but that before he began he was also asked to give all the evidence he could on the subject covered by that statement?—I did not understand it.

20430. Is there anything further about this matter which you would like to add?—No; I do not wish to add anything.

CARRE.

HENRY CARRE's examination continued:

By the Chairman:—

Railway Construction—Contract No. 15.

Corrections: Total length of trestle, 11,841 lineal feet at $9.83 a foot.

20431. I understand that you wish to make some correction about figures given by you yesterday?—I do. I was asked by you what was the length of trestle work, the lineal feet of superstructure for trestle work, for which I made calculations. I ran up a long tot here and some of the figures were very badly copied, and I gave a wrong result. The total distance, as I make it, is 11,841 lineal feet of superstructure at $9.83 a foot run. I also made a calculation of the cost per mile for superstructure, and there was a slight error in that calculation also. The true amount is $51,902.40. You also asked me the length of trestle work calculated in the first instance and for which bills of timber were made out in Mr. Whitehead's bill of works. You asked me the total distance of trestle work, which was as closely as I could make it, eight miles in length; that was to cost $380,700, according to this estimate of Mr. Rowan given on page 127 of the evidence taken before a Committee of the Senate in 1879; he tots it up $380,700 for eight miles of line of trestle work. The calculation sent him by me in February, 1878, was for nearly two and a-quarter miles of line

Cost per mile really $51,902.40.

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according to new plans or the plans which he sent me. The cost would be $206.955 for two and a-quarter miles in length; that is over $90,000 a mile. I would call attention to the fact that it was from calculations based on these trestle plans that the Government were induced to substitute rough trestle on contract 15.

20432. Do you make out that Mr. Rowan's calculation of $380,000 for about eight miles is about the same in substance as what you have described—that there is no great difference between your calculation and Mr. Rowan's?—I think there is a great difference.

20433. In what respect?—In the cost.

Thinks Rowan's calculations must have been made on less expensive plans than witness's.

20434. Will you explain how you make the difference?—I think the plans must have been different on which he made the two calculations; that is, that the plans on which I made my calculations in 1878 were more expensive than the ones which he used in 1876.

20435. In the first place, as to the two calculations, yours, I understand, is some fifty thousand odd dollars per mile for the superstructure alone?—Yes, $52,900.

20436. While his for the whole work, the foundation and all of the superstructure, is $47,500 per mile, assuming it to be about eight miles?—Yes; in the bill of works.

20437. So his estimate differs from yours to the extent of $4,500 a mile, and also an additional amount, whatever it might be, which would be required to furnish all below the superstructure?—The sub-structure; yes.

Rowan's calculation perhaps made on different plans of trestling.

20438. And how do you explain this great difference in your estimates?—I cannot explain it otherwise than their being made upon different plans of trestling. Mr. Rowan, in his evidence before you in Winnipeg, is reported to have said that he made all these improvements.

20439. Do I understand you to say that your estimate of $9.83 per running foot was for the cost of the superstructure which he had described?—Certainly; according to his own bill of timber.

20440. Then how could there be that difference; he appears to be making a calculation for a different superstructure while you say this was for the superstructure which he had designed and planned?—But he did not make any calculation, I think, of the cost by his new plans in 1878. I am talking of my estimate by his plans in 1878, and I say this plan must have been different from the plan in 1876.

20441. Is this what you mean: that when he estimates the whole cost at about $380,000 he was basing that upon a different superstructure from that which he had first designed and which you had estimated the cost of?—He was. I believe so.

20442. So that in order to arrive at this $380,000 he has taken a less expensive superstructure than that which was first designed and on which you made your estimate?—I believe so. That is all I can gather from the estimates that he has put in—from the work that he has put in.

20443. In calculating the cost of your superstructure at $9.83, could you give, shortly, the items which made up that $9.83?—I can give some of them. There are six pieces 15 x 9—I am speaking from memory now of a very complicated plan——

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20444. You understand we are only questioning the superstructure?—Yes; six pieces of 15 x 9 stringers; there are corbels, I am not exactly sure of the length, but I think they are 12 x 12 inches and 17 feet long. It took two of those to each bent. The ties there, I think, were 20 feet long. I think I have got the original plans, and I had better deposit them with you; that would be more satisfactory.

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20445. There has been some mention made of the information which you had concerning the survey of 1875—the alternative line which was some ten miles south of Cross Lake crossing—and yesterday you furnished us particulars of a calculation at different grades: did you furnish any such information as you gave us yesterday on any previous occasion to any one connected with the Department?—I did.

Calculations at different grades furnished to Rowan.

20446. To whom?—They were made under Mr. Rowan's instructions in January or February or March, I think, of the year 1876, and the result was handed to him signed by myself.

20447. Did you give, upon that occasion, all the particulars as fully as you have given them now in your evidence?—I did; yes, more fully than I have given them now, because I gave them full bills of works similar to that in which I put in to you, headed in Mr. Rowan's handwriting.

Did not withhold from Department any information furnished to Commission

20448. Have you at any time withheld from the Department any information which you furnished to us on the subject of that southerly line—the alternative line of the 1875 survey?—No; I think not. In answering that I might be allowed to say that, had I been asked further, I might have given more information. I did not withhold it. I knew it and I gave all I was required to give.

20449. In addition to the written information, did you give any information verbally to any one connected with the Department upon the same subject?—I did.

20450. What was the nature of that information?—I spoke very strongly in favour of the location of the south line. I described the country as accurately as I could. I stated that the estimates made on the data which I had in my possession were, in my estimation, far more accurate than any I could make on the northern line, because the country was more level at right angles to the direction of the line.

20451. Cross-sectioning was not so necessary in order to arrive at accurate information?—Just so.

20452. To whom did you give that additional information?—I gave it to Mr. Rowan.

20453. Where?—In the office and out in my camp, after the work was done. After the present line was adopted, I spoke very strongly, and at all times I have spoken so.

20454. While you were surveying that southerly line, in 1875, was Mr. Rowan with you on the ground at any time?—No, never.

Rowan never on line in 1875, and never walked half a mile of line until present line was adopted.

20455. Are you aware whether he has any personal knowledge of the features of the country?—He never walked half a mile of either line until after the present route was adopted. He never even called at my camp during the time that those surveys were made, or up to the time that the line was adopted.

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20456. At what date do you consider the line was adopted when you speak of that?—It was adopted about March—either March or April, 1876. I think I state so in my statement.

Line adopted, March or April 1876.

20457. You have heard read this letter from Mr. Fleming to Mr. Smellie, which Mr. Smellie has read before the Commission: is there anything you wish to say concerning the charge there made against you as to withholding information from the Department which you ought to have communicated?—I do not wish to lie under the imputation that he would seem to convey, that I was doing things in a spiteful manner, volunteering information to injure others that would do no good to the country. I was asked a question about that line to the north and I answered it. It was contradicted, and I still asserted and I proved my statements by the plans and the data of the time at which the work was made. I stated also that Mr. Fleming knew nothing whatever about it, as far as my knowledge went. I saw Mr. Fleming last night and had a talk with him, and I cannot understand how he would write that letter after the conversation we had.

20458. When you say you think Mr. Fleming knew nothing about it, what do you mean by that?—That he was never informed of anything whatever about that line. I stated so very publicly yesterday.

20459. You think the matter did not pass under his individual judgment that he never had the data on which to form an opinion: is that what you mean when you say he knew nothing about it?—Yes; he spoke to me and told me last night that, speaking candidly, he did not see any advantage in bringing up that old matter. I said I was asked the question and I stated what I knew.

20460. Has this information been given by you in obedience to the wishes of the Commission?—It was in direct answer to one question which you asked me: whether I knew of any line on the west side of Cross Lake that was better than the present one; but it was never spoken of or mentioned by me to you or by you to me before that question was asked. I, therefore, deny that I volunteered any information about it.

20461. Is there anything further that you wish to say upon that subject?—Which?

20462. The subject of this letter of Mr. Fleming's which has been read to-day to the Commission?—No; nothing further. I deny it.

Never withheld anything from Department that was of use.

20463. Deny what?—Deny that I have done anything, or withheld anything that was of any use.

20464. You mean withheld from the Department or from the Commission?—From the Department; and that I had no right whatever, or that it was none of my business to interfere with the matter. It did not lie in my province.

20465. If it had been your business, was there anything that would have helped them to decide the question at the time when it was open for decision?—No; there was not.

20466. Is there anything further that you wish to say upon the general subject, I mean the Pacific Railway, which you have not yet said, which you think ought to be communicated in the public interest?—I might say something, and it would be told I was volunteering information.

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20467. Well, you understand you are now under oath, to tell everything which you are aware of concerning this subject, and whatever you may think about being accused of volunteering will not in any way relieve you of the responsibility which you have assumed as a witness: I ask whether there is anything further which you can communicate of public interest—we do not wish to open up any personal controversies?—Well, I have been informed that a great handle has been made over changes and the cost of construction of 15, which have been made since Mr. Schreiber took charge of the work; that from the 1st of January up to the end of June, when I was dismissed——

20468. Do you mean, when you say that a handle has been made of this, that accusations have been made that the work could have been and ought to have been done cheaper under your supervision?—The line could have been altered and changes made in the allignment so as to reduce the quantities very materially; that this has been done under the new *regime*, and I am accused of not having done this before.

20469. You mean that you have omitted to take advantage of the same opportunities which some other person is now taking advantage of, in the public interest, and lessening the cost: is that what you mean? —That would be what it would appear to imply, and I would like to explain why I did not.

Witness never allowed to use the grades and curves ultimately used under Schreiber's directions.

20470. Please proceed.—I will just say, shortly, that I never was allowed to use the grades and curves that have been used since. Had I been allowed to do so, I could have built the road for many hundreds of thousands of dollars less than it is at present.——

20471. Do you mean that these grades which have been since adopted, and these curves, enabled the line to be built at a smaller cost? —Yes; that the maximum of grades and curvature has been increased over and above Mr. Fleming's instructions and Mr. Fleming's maximum, and that, therefore, any man with a knowledge of engineering must know that great reductions were possible under the present grades and curvature. I wish to state, now I have been placed in this position, I have been working out in the woods there attending to my business, whilst stories have been circulated which I hear on every hand here, stating I was not doing this and doing that, and injuring my character professionally; and it is a mere matter of protecting myself—defending myself—that has caused me to say anything before this Commission other than that which has been drawn from me by direct questions. So that anything that I might say, volunteering evidence, that might be called volunteering evidence, is merely in self-defence so that I may be able to earn my living. I have been told distinctly and plainly that I shall not be employed by different parties until I defend myself and explain to the public how it is that these things have occurred, and how it is that I am not to be blamed for it, and show that I am not to be blamed for it. My professional character has been assailed, and my means of earning a livelihood have been injured seriously. I have been thrown out of employment for a whole year, and I have been told by Mr. Schreiber, when I asked why I was dismissed, that there was a strong feeling in the country against me.——

20472. It is not necessary for us to listen further to your reasons for telling the truth; we only say to you to go on and state what is within your own knowledge: as to these grades and curves, do I understand

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you to say that since you left the work less expensive grades and curves have been permitted than before?—Before I left the work they were permitted.

20473. At what time did they first take place?—I could not say exactly; in the spring of 1880—May or June.

20474. Under your superintendence?—Yes.

20475. By whose directions?—By Mr. Schreiber's directions.

Maximum grades increased from ·35 per 100 to ·50 per 100.

20476. What difference was made in the grades, for instance?—The maximum grades were increased from ·35 per 100 up to ·50 per 100.

20477. In more than one place on section 15?—Yes.

20478. How many places?—Well, there were two places that I know. I cannot tell exactly what the grade is now, but I got instructions to increase them in one place to that.

20479. From whom did you get the instructions?—From Mr. Schreiber himself.

20480. And as to curves, were you permitted to allow the contractor to make less expensive curves—I mean curves which would lead to less expense in constructing the road?—I was.

20481. In more than one place?—Yes.

At station 435 there was by Schreiber's directions a 4·30 curve put in.

20482. By whose directions?—Mr. Schreiber's. I am just thinking whether it was not in more than one place. I will just mention one place in particular: station 435. There was a 4·30 curve put in.

20483. And before that what was the maximum?—The maximum was four degrees; since then I have been told that shorter curves have been put in.

20484. I would rather you would not give us, by way of evidence, matters that have been told you by other persons: I understand you to say that as far as grades are concerned, you know, within your own knowledge, of two instances where grades were permitted which would lead to less expense than those which you were formerly allowed to permit?—Yes.

20485. And that a curve in at least one place was permitted because it would lead to smaller expense?—Yes. Had I been allowed to adopt those in the original location and construction of the work——

20486. And you mention this now, I understand, to show that you were not to blame for the expense of the road being kept up in your time and diminished since?—Yes.

20487. Is that what you say?—That is what I say. I do not deny the propriety of any instruction I received, but I show the effect that was produced by it.

20488. In other words, you were originally obliged to insist upon the contractor making a better road than he has since been permitted to make?—Yes.

20489. And that is the reason why it was more expensive in your time?—Yes.

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20490. When you speak of this ·35 per 100, do you mean easterly or westerly ascent?—Ascending easterly. It was increased from ·36 to ·50 per 100—that is from three inches to six inches going eastward. Grade increased from three inches to six inches going eastward.

By Mr. Keefer:—

20491. It did not exceed the maximum?—Yes; because the maximum on the four degree curve was originally ·35, and it is now permitted at ·50. There were also some changes made in the structures: dry stone masonry was adopted in lieu of stream tunnels.

By the Chairman:—

20492. Is there any other matter in which the efficiency of the road was diminished in your time so as to make it less expensive than you were originally instructed to have it?—There are some other minor things. I did not like the way in which the work was done. In fact it was taken out of my hands altogether, and I refused to certify to some of the work—some of the kinds. I stated in my official diary that I could not pass some of the work.

20493. Over what length of the line has this grade been altered in the way you describe?—Without the profile I could not answer very distinctly; about half a mile in one place. Grade thus altered on about half a mile.

20494. And in the other?—The other under the curve.

20495. I understood there was another alteration in the gradient?—There were several places in which bottoms were left in the cuttings, and yet on maximum grades, and were not taken out, and the gradient was increased to get over them. What the final gradient is now I do not know, but it was an increase over the maximum gradient at the time. Bottoms left in cuttings in some places.

20496. Leaving the bottoms in the cuttings?—Leaving the bottoms in the cuttings and filling in the cuttings, and filling in rock cuttings that were excavated out—filling it to assist in climbing over this portion of the bottom.

20497. Do you mean that in some of the rock cuttings the bottom has been raised by putting in earth filling in order that they may be on a line with some higher point at another place so as to raise the grade in the way you describe?—Yes. Explains.

20498. And the necessity of filling in that rock cutting with earth arose from the fact that the grade was increased in the way you describe: if it had been kept down there would have been no occasion to fill that cutting?—According to the old contract, I would have compelled the contractor to take out that bottom—to take it down to grade.

20499. You do not mean that bottom which was filled with earth, but you mean some other higher one: you understand that you are speaking of two kinds of bottoms, one that had to be filled up, and one that had to be taken out to make it lower?—What I mean by it is this: a portion of a cutting which is not down to grade is called a bottom—that is, the contractor, in going over it first, has not taken it down to grade, and he is ordered to take up the bottom.

20500. There is a rock bottom left there which ought to be removed?—No, there is no rock bottom; there is a clay bottom that he put in in one case. He was taking out on a down grade and the

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Contractor, as he took out rock on a down grade, filled in with earth to prevent the water following him, this earth filling which witness could have compelled him to remove, had been allowed to remain thus raising the grade.

water was following him, and he had great trouble to keep it pumped out, so he filled in as he went—as he took out the rock he filled in with earth to make the water run up hill as it were.

20501. To prevent it going down hill?—To prevent it going into his cutting he filled in, and that was not taken out as I would have made the contractor take it out.

20502. It was allowed to remain there, which had the effect of raising the grade at that spot?—Yes; it raised the grade at that spot, and the remainder of the cuttings where that did not occur had to be filled in with sand to lift the track, and in that way increased the gradient—I don't know how much exactly.

20503. Has that work which you describe as leaving the bottom in the effect of increasing the gradient itself, or only increasing the length of the line at which the particular gradient is used—I understand gradient to mean a slope?—Yes, and in one case that I have in my mind at present to make a parallel grade there would have to be a distance of about over four miles raised some two feet to make a parallel grade to the old one. I cannot say that was done, and do not believe it was done, because it would be a most expensive piece of work to make a parallel grade to the present one. This case that I speak of occurred in the centre of a long maximum grade of nearly, I believe, four miles in length.

20504. About what station, in round numbers?—I would rather speak accurately from the profile. I do not believe it was done; I know it was not done while I was there, and the track was laid and ballasted there. The place I speak of occurs at about 1760 and 1763, or somewhere there. There is a maximum grade from 1635 down to 1830.

A maximum grade for 19,500 feet.

20505. What distance would that cover?—195 chains—19,500 feet; between three miles and a-half or three miles and a-quarter. In this case I would say to adopt the plan alluded to by Mr. Smellie, the grade might be raised about two and a-half feet for about seventy chains. That would overcome, by putting in a little piece of level, the difficulty.

Was not satisfied with the masonry for some time before he left the contract.

20506. Is there anything further that you have to say concerning the manner in which this work has been executed on section 15 for some time before you left the service?—I did not like the way in which the masonry was put there—the style of the masonry—nor did I think the style of masonry was in accordance with the specification, and I did not consider the foundations in all cases to be such as were safe.

20507. Did you complain of this to the contractor?—I complained of it. I reported it in my diary.

20508. To whom?—To my superior officer.

20509. Who was that?—Mr. Rowan.

20510. In writing?—In writing; yes.

20511. Was it in the shape of a letter or formal document?—A formal document: a diary which I was bound to put in every week.

20512. Then I understand that you kept a diary of the transactions under your notice, and that you forwarded that diary to your superior officer at the end of each week, or at some particular period?—A synopsis of it.

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20513. And you did transfer a synopsis of those opinions of yours?—Some of them.

20514. Did you of the opinions that you are describing to us now?—Yes; I did.

Reported his views to Rowan.

20515. In fact you conveyed those ideas to Mr. Rowan?—Yes.

20516. And before you left the service?—Yes.

20517. Is there anything further in connection with the manner in which this work has been done under your notice?—No; I do not remember anything. There are a great number of minor things that would take up too long to speak of.

20518. Is there anything further connected with this Pacific Railway that you can communicate in the public interest?—I do not recollect at present.

SMELLIE.

W. B. SMELLIE's examination continued:

By the Chairman:—

20519. Being present you have heard this evidence which has been just given by Mr. Carre?—Yes.

The increase of grade described by Carre can extend only over a very short portion of line, and can but slightly deteriorate it.

20520. Have you anything to say by way of explanation on behalf of the Department or the engineers concerning this work which he describes to have been done so as to make the line less efficient than was originally intended?—I do not know, of my own knowledge, what changes have been made, as described by Mr. Carre. This increase of grade can only extend over a very short portion of the line, and can have but a very slight effect in deteriorating it.

20521. For what distance do you think the line would be affected by the transaction which he has described: name the length, the profile is now before you?—I do not know the points. I am not aquainted with the points.

20522. Assuming that there was a bottom left in of about two feet nine inches in height at station 1760, being used as a dam to prevent the water from the east flowing over the work done by the contractor, what distance of the line would be affected by that matter, this bottom being about that height at the westerly end and sloping gradually to nothing in a length of about 300 or 400 feet?—If I were asked about such a thing as that I should say it was only put over it for a temporary purpose, and that it would eventually be taken up. I may say that when the rails were being laid over this line such obstacles as this were got over in the way Mr. Carre describes, by laying rails over the top of it for the purpose of getting in the supplies for the section east of this, and such obstacles as this were not allowed to interfere with the track-laying.

Thinks what Carre described permitted only as a temporary expedient.

20523. Then, I understand you to say that this has been permitted only as a temporary arrangement, to hasten the construction of the work?—It may be explained in that way. It seems a sensible view to take of it.

20524. Then it is not a permanent deterioration of the line?—I think not.

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20525. It will explain, however, the reason why the work is hastened and finished at a less cost, in the first instance, than would have happened if the strict construction of the contract had been continually enforced ?—Yes.

20526. So that the saving in the expense which Mr. Carre speaks of is not a permanent saving—the work must yet be done in order to make it according to contract?—It would be much the cheapest way of doing it, to take the rails up and take the rock out, because it would really take but a very short time.

The saving of expense not permanent.

20527. Yes, but the saving of the expense which Mr. Carre speaks of is not a permanent saving ?—No ; not at all.

20528. In the meantime the work has been done less expensively and less efficiently, but with the probable view of having the bottom eventually taken out and thereby the expense increased so as to make the work according to the original intention of the contract ?—I have no doubt that that is the explanation.

20529. And up to the originally intended cost at the same time ?—Of course.

20530. Is there any further explanation which you would like to give of these matters spoken of by Mr. Carre ? Of course I understand that these are only theories of yours : you have no practical knowledge of the circumstances ?—I am aware that a number of changes have been made in the location of the line, merely moving it a few feet in some places, and introducing slight curves in some places where there has been a straight line, but on those places the line is not materially deteriorated because the curve would still be within the figures desired by Mr Fleming.

20531. But I understood Mr. Carre to speak of an instance of curvature where it was in excess of the maximum, so that this explanation of yours would not affect that locality ?—It would not; Mr. Carre, may be quite right.

A great reduction has been made by moving the line a few feet on one side.

20532. Is there anything further that you wish to add by way of explanation of this matter ?—I was going to say just in that way, that a number of changes have been made where the line has been moved a few feet one side, and by that change a very great reduction has been made in the cost of the work.

20533. Those changes then are, in your opinion, changes which might have been made by Mr. Carre within the limit of his jurisdiction ?—Yes.

20534. And they affect the efficiency of the work or the maximum curves permitted by the contract ?—Yes.

This saving, an opportunity lost by Carre.

20535. The omission to do so, to save that cost in the way described by you, has been an oppportunity lost by Mr. Carre ?—Yes.

20536. Is there anything further that you wish to say ?—I do not think of anything.

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HENRY CARRE's examination continued:

By the Chairman:—

20537. You have just heard Mr. Smellie's evidence?—I have.

20538. Have you anything to say with regard to any of his explanations or suggestions?—He has stated that a great number of changes have been made that I might have made. I wish you to ask him whether he does not know that I was continually making changes after I got permission to do so, and that many of those changes that he speaks of could not have possibly been known or made until after a certain amount of work had been done; that is, until the rock had been stripped, it was impossible to know how to change the line these few feet in a great number of places.

Insists that wherever it was possible after he received permission to make changes, improvements were made.

20539. You are asking me to question him, but at present I would prefer that you should state yourself what you know about it instead of depending on the answer of any one else; please give your own evidence?—As far as within me lay, wherever I found a chance of decreasing the work I did so to the best of my ability, after I received permission to make those sort of changes. I proposed many changes on the line, a great many of them were adopted. In fact I proposed most of the changes, and made many changes, very serious changes, up to the time I left. Those changes, Mr. Smellie speaks of, are slight alterations.

20540 Are they alterations which you might have made within your jurisdiction as you understood it?—Yes; they were at the time, and many of them would have been made when the work commenced, and when the work was in a state to admit or necessitate the alterations being made.

The opportunity for making the changes referred to by Smellie arose after witness left work.

20541. Do you mean that the opportunity for making them arose after you had lost control of the section?—Yes; a great number of them—at least it was not necessary to make them until after.

20542. Then the opportunity arose afterwards?—Yes.

20543. The best opportunity for making them arose after you lost control?—Yes.

20544. While it was within your control had you not the opportunity of making those alterations which Mr. Smellie alludes to?—In some cases I had not the opportunity; in other cases I had, but it was not necessary because the work had not progressed that far.

20545. The best opportunity had not arrived?—It had not arrived. In taking out the cuttings, when the earth was taken off the rock, I found in several cases that I could change the line and decrease the rock in the bottoms, and I telegraphed to Mr. Rowan to be permitted to do those things, and he has given me, in many cases, permission. I can show I have made far more changes and said nothing about them than all those that have been made so much of since I left the line.

Grade raised above maximum at station 700 where it can never be altered without taking out heavy rock bottom.

20546. Is there anything further that you wish to say in answer to Mr. Smellie's evidence?—There is a case which I did not mention before, in which the grade has been raised above the maximum; lessened the quantity of rock to be taken out of the cuttings, and a portion of the rock cuttings filled in with sand that had been taken

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out, and the old grade has been filled in with sand to raise it. In that case it can never be altered hereafter without taking out heavy rock bottom some three feet.

20547. About what station is that?—Station 700.

20548. Has it increased the maximum grade formerly permitted?—It has, I think, from station 720 to 793; the grade has been raised above the maximum to reduce the quantity of rock in the bottom of the cutting at station 700.

20549. What distance of the line would be affected by that deterioration?—About half a mile. I would also state that in that very cutting, 700, I twice or three times altered the line as the rock was exposed and reduced the quantities. Since I gave up control of the work, the stripping has been more accurately done. There was more of the sand taken out of the bottom, and I believe it has been again altered, and I had altered it three times before to get it as near as possible. It is very heavy sand cutting. I had altered it three times to get it to the right place, and it has been again altered, and this is one of the places, I suppose, that Mr. Smellie refers to as being a serious omission on my part.

Gave up control at end of June, 1880.

20550. You say before you gave up control: when did you give up control?—The end of June, 1880.

20551. Then this last matter you allude to happened since the 16th of June, 1880?—Yes; I have been informed that there have been changes there.

20552. If they have been made since the 16th of June, 1880, they are not within our enquiry?—It is in answer to Mr. Smellie's statement that there has been a great number of changes.

20553. I understood you before to say that you really gave up control at a period much earlier than June, 1880 - that is to say, you had not the same charge and supervision over the work that you had originally?—I had not.

But in effect control taken out of his hands about February or March, 1880.

20554. At what time do you understand that the control was in effect taken out of your hands?—About February or March, 1880. First a man named Haney was sent on to take charge of the construction, and he stated, and showed a letter to a person that spoke to me of it—a friend of mine—in which he had received instructions to go ahead and do just as he liked.

20555. You would not depend alone on what some friend of yours told you he had seen in a letter to Mr. Haney?—No; I asked Mr. Schreiber whether Mr. Haney had anything to do with the engineering. Mr. Schreiber told me no, he had not, but still he did do the work, and he was supported in every case.

20556. Was he supported contrary to your representations on the subject?—Yes.

20557. To whom did you make any representations?—I made reports in my diary.

20558. To whom did you submit them?—To Mr. Rowan.

Things suggested by witness not done, Haney's views being carried out.

20559. And did you find out that matters upon which you had made suggestions were done in a way different from your suggestions, and in accordance with Mr. Haney's wishes?—Altogether in accordance

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with Mr. Haney's wishes and instructions. In fact, I was told by Mr. Schreiber to give no instructions to the foreman on the line; that all instructions must come through Mr. Haney, who was a great portion of the time in Winnipeg, and it was impossible to give instructions through him—that is within a reasonable time to carry out the work. The control was virtually taken out of my hands; there was no use in my saying a word.

20560. Are you aware of any occasion upon which Mr. Haney's suggestions and wishes were followed and yours were rejected?—He would send his own engineer on and make alterations on the line without consulting me in the least.

20561. Did you make any representation on that subject to your superior officer?—On that special subject?

20562. Yes?—No; I admitted the correctness of the work that was done when I adopted the line.

Witness's instructions in regard to Fellowes Lake not carried out.

20563. Do you remember any instance in which you made one suggestion or expressed one wish about the engineering, and Mr. Haney expressed another, and on which his was followed and yours was rejected?—There was one case of a mattrass that had been ordered in Fellowes Lake. I gave instructions that it should be loaded evenly, and the sand and gravel put upon it—carried into it by a temporary bridge. There was no attention paid to my instructions, and the work was carried on—the dump carried on ahead in such a way that it sunk both ends of the mattress and destroyed the utility of it. My instructions were laughed at apparently. They did not carry them out at all.

20564. Who laughed at them?—I do not know that they were laughed at; they were not obeyed.

20565. Who refused to obey them?—I believe that Mr. Heney said: "Go ahead and dump away," and James M. Ross, another man, was there, and he didn't follow my instructions.

20566. Who was Ross: was he one of the men under your control?—He was walking boss.

20567. Under whose control was he?—Under Mr. Haney's control.

20568. Was he the contractor's man or a Government man?—He was the contractor's man.

20569. Had you the control over the contractor's men?—Yes; the contract says that the contractor shall keep a certain number of men steadily in the field, so as to receive instructions from time to time from the engineer.

20570. In the instance that you describe, did you report to your superior officer that the contractor's man refused to do the work as you directed, and that it was made less valuable on that account?—I reported the circumstance.

In another instance a culvert was put in contrary to the way witness's assistant laid it out.

20571. To whom?—In my diary. I cannot remember, but I know there are a great number of circumstances. There is another place in which a culvert was put in contrary to the way my assistant laid it out. It was put in in accordance to Mr. Haney's instructions, and the

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end of that culvert is now located on the top of an old pole drain that choked up. There are lots of things.

20572. Who did you understand employed Mr. Haney?—Mr. Schreiber. I was told he was recommended by Mr. Ryan, on the first 100 miles west. He told me he had recommended him to Mr. Schreiber, and Mr. Schreiber had employed him.

20573. At this time the work was being carried on by the Government, and not by the contractor?—It was carried on under the Government's supervision.

20574. So the Government had the management of the work as well as of the engineering?—Yes; I will give you the station for that culvert—station 402. There was a pole drain put in according to specification. There were two drains. There was another at station 401. These were to carry a very small supply of water around a point of rock which was covered by the embankment. The pole drain at 401 kept open and carried the water to another at 402, which had to pass it back again to the same side from which it came. It choked up; the water collected on the north side of the bank and washed the whole bank away—or a great portion of the bank away. I gave instructions to have a dug stone culvert put in at that point, and I gave instructions to my assistant to have the foundation taken out to solid bottom.

20575. You mean the foundation of the old pole drain?—No; the foundation for the new culvert.

20576. Prepared for the new culvert?—Yes; to get the best foundation possible my assistant had laid it out at an angle with the line of about, I should say, 45 degrees.

20577. Crossing the embakment?—Crossing the line instead of at right angles, at an angle of about 45 degrees. This was objected to by Mr. Haney, and a great how-do-you-do, and it was ordered not to be put in.

20578. You mean ordered by him?—Ordered by him. The whole work was changed by him, and my assistant's work was not adopted because it would save some small distance in the actual length of the culvert. To save that distance it had to be put in at right angles at almost the same spot on the centre line, and the south end of the culvert is now located on the top of the old pole drain that originally choked up, and the foundation is now partly in rock and partly on the old, washed out dump.

20579. When did this interference with your duty happen?—That was in about May, I think, 1880.

Haney signed as superintendent of work on behalf of Government.

20580. Mr. Haney was then a Government officer?—He signed himself as superintenent of the work in the interests of the Government, and in the interests of the contractor.

20581. Is there anything further which you wish to say concerning that work as to matters which happened before the 16th of June last?—There were other cases in which Mr. Schreiber gave instructions contrary to mine which I do not know whether I have any right to object to. I did object at the time.

20582. He was your superior officer?—Yes.

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20583. Is there any other matter?—I objected to signing the estimates for work done in this way, which I considered was done contrary to the specification, without written instructions to do so. These were my private reasons for giving up the work—leaving. I was told verbally to let these go.

Reasons why witness left.

20584. Who told you?—Mr. Schreiber told me to allow Mr. Haney to do just as he liked. If I had wished to remain there and certify to the estimates I might have been there still drawing my pay.

20585. Did he tell you that, or is that your own opinion?—He told me so; he asked me if I would allow these things to go on.

20586. Did he tell you that you could remain there if you did?—No; he did not tell me that.

20587. That is a matter of your own opinion then?—Yes.

20588. As our enquiry ends with the 16th of June last, your opinion as to the probability of your being employed there now, is not material: is there any other matter which happened before the 16th of June last which you wish to speak of?—Nothing else, except this difference of opinion between myself and Mr. Schreiber, which, I suppose, I had no right to object to.

MARCUS SMITH, sworn and examined:

MARCUS SMITH.

By the Chairman:—

Surveys, B.C.: 1872.

20589. When were you first connected with the works of the Pacific Railway?—I find, on referring to my papers, that in March, 1872, Mr. Fleming, by the authority of the Minister of the Department, proposed that I should take a position on the Pacific Railway. I was then engaged on the Intercolonial Railway. After some correspondence I accepted the offer that was made to me in April—April the 8th I find it is dated—that an engagement was concluded to go to British Columbia to take charge of the surveys there for the beginning of the Pacific Railway. That was the first office under the engineer.

Arrived in British Columbia, 26th May, 1872.

20590. Did you go to British Columbia?—I went there immediately afterwards. I went over the Intercolonial Railway and delivered over my work there to my successor, and I think I arrived in British Columbia in May. I think I will find it in my report here. I find that I arrived in Victoria, British Columbia, on the 26th of May, 1872, and immediately entered upon my duties.

20591. Had you before that been long in the employment of the Canadian Government?—Yes; I had been in the employment of the Canadian Government since September, 1868.

20592. In what capacity?—As district engineer on the Intercolonial Railway. The Intercolonial was divided into four districts. I had one of those districts—the Restigouche district—that is the second one travelling southward. The first one was the St. Lawrence district, the next one was the Restigouche district; it was just one-fourth of the line.

20593. Before your connection with the Intercolonial Railway had you been in the service of the Canadian Government?—No; I had not.

Surveys, B.C.: 1872.

20594. Had you had much experience in engineering before that?—Yes; I had had many years experience. I came to Canada in 1850 and was engaged on the Great Western and Hamilton and Toronto, which was a branch of the Great Western, and also on the Canada Southern line up to about 1860.

Witness's standing in engineering profession.

20595. What is your standing in the profession?—I entered on the Great Western first as a draughtsman. After being a year there, I was appointed associate engineer on the Hamilton Railway. Associate means assistant to the engineer-in-chief. I remained there until I completed that work; about 1856 I think it was completed. I then went on the Canada Southern line, and while I was connected with it, I was in the same position there—I was associate to the chief engineer. I stayed there until the spring of 1860 when the work was stopped. They did not succeed financially in getting funds to go on with it. I left Canada and went to England. After being, I think, a week or so in England, I got an appointment to go to the Cape of Good Hope. It was a very important appointment: it was to act as arbitrator between the contractors for the construction of a railway, and the financial company who had the contract from the Government. It was a Government railway. I remained on that until it was nearly finished, two years, and I was appointed chief engineer of a railway of a private company in the same colony, Cape of Good Hope. I remained until I finished that, and left there in September, I think, 1865. From that time for I should say about three years, I was engaged in various railways in England, and had offices of my own in general business. In 1868 I came out to Canada again under a promise of employment on the Intercolonial from Sir John Macdonald, who had known me many years before, and was accordingly appointed as soon as the work commenced. From that time to this—that was in September, 1868—from that time to this I have been continuously in the employment of the Government.

20596. Are there any recognized ranks in the profession of Civil Engineer?—No; there are no legally recognized ranks; but in England there is an Institute of Civil Engineers who have a charter from the Government of their own body. They have no legal rights to prevent any one from practicing; but of course any one who is admitted there has to be a man of some eminence in the profession, and it gives any one belonging to it some standing.

A member of the Institute.

20597. Have you been a member of that Institute?—Yes; I have been a member for many years.

In charge of works in British Columbia from 1872 to 1876.

20598. How long did you remain in British Columbia before returning to this part of the country?—I had charge, general charge, of the works there from the time I entered in May, 1872, until 1876. I spent all the summer season there, and as long as we could remain out of doors. I came home every winter.

20599. Do you mean to this part of the country?—Yes; I came home to give all the information that had been obtained from the engineers, and complete the plans and get instructions for the next season. I had instructions from season to season what was to be done.

Still holds the same position though from circumstances called to the capital as acting Chief Engineer.

20600. When did you say your connection with British Columbia ended in that capacity?—It has never yet ended. I am still in the position to which I was appointed; but from circumstances I have been called to act in different parts. I am under still the same engage-

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ment. There has been no change in my appointment since then; but in the spring of 1876, Mr. Fleming, who was in ill-health, got leave of absence for a period, I understood of half a year in the first instance; and, as his first officer, he requested me to take his place during his absence, and conduct the works as acting Engineer-in-Chief.

20601. Did that necessitate your remaining in this part of the country?—It necessitated my remaining here while in that office. I still had the general charge of the works in British Columbia, and the surveys that had been projected by me were carried out by Mr. Cambie in my absence.

Cambie the superior officer in British Columbia in absence of witness.

20602. Was he the superior officer in British Columbia in your absence?—In my absence; yes.

20603. Since you came to Ottawa, in the spring of 1876, have you gone back to British Columbia?—Yes. In 1876 I endeavoured to make myself acquainted with as much of the country on this side of the Rocky Mountains—on this side of the boundary of British Columbia—as possible. I went to Lake Nipissing, travelled round the lake and explored a good deal of the country north of Lake Huron and Lake Superior, and went over these sections that were under contract west of Lake Superior, from Lake Superior to Red River. As much of them as were then under contract or under survey I examined, and I extended my examination some distance further west as long as the season lasted and returned again. I did not go to British Columbia in 1876, but in 1877 I extended my explorations from Red River westward, examining the country westward to Red River. You are aware that the line had been located—the line from Red River westward—through what they called the Narrows of Lake Manitoba, and near Fort Pelly, just a few miles north of Lake Pelly. There was a good deal of discontent with that location. The people in Manitoba petitioned the Government to have a further examination of the country. I was sent out to make that examination. I had an assistant with me, Mr. Lucas, who had charge of one party. I went with another, and made a general examination, and examined generally the crossings of the valleys. We did not make a continuous survey. We examined the crossings of the Little Saskatchewan, Bird Tail and Assineboine. The line had to cross all these. All those valleys are of considerable depth, 200 to 300 feet below the general level of the prairie. It had been reported it was impossible to get a line there. I extended my examination. When I reached Edmonton I went as far as Lac la Biche.

Discontent prevailed regarding location of line westward from Winnipeg.

20604. That was in 1877?—Yes. When I started I had no instructions to go beyond Battleford, or the elbow of the Saskatchewan—not quite so far west as Battleford—but when I arrived at Carleton, I found a steamboat was going up to Edmonton, and that it would enable me to extend my observations further, and I did so as far as Lac la Biche, almost due north from Edmonton, some 100 miles or more. Thence I went to Edmonton; I waited there some time. The steamer did not come; at last a mail arrived saying the steamer would not come. There was a pack train of horses and mules which had come from British Columbia, and which was about to return to British Columbia, and I took advantage of that, and instead of returning home by way of the plains, I went direct by the Athabaska and the Yellow Head Pass to the Pacific coast.

In 1867, with Lucas re-surveyed the country, and instead of returning to Ottawa proceeded *via* Yellow Head Pass to the Pacific coast.

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20605. That was in 1877?—I arrived in British Columbia in the fall of 1877, at Victoria, so that by that means I examined the whole of that route, in fact, from Edmonton. I was close to the route from Red River; I saw portions of it here and there, but from Edmonton I examined critically that route, and one reason I went that route, a re-survey was being made of that route that year. I saw all the different surveying parties on my route and saw their work, and gave instructions how to finish the work.

Examined route critically from Edmonton.

20606. Were you still acting as Chief Engineer at that time?—Yes.

20607. How was it you were able to be away from the capital while you were Chief Engineer?—That was in the summer season. There was very little to be done here in the summer season—simply the estimates for the payments to contractors. I signed some of those myself on the road, and Mr. Smellie was authorized to sign them for me in my absence. These estimates are made out by the resident engineer in charge of the section under construction, and he is really the responsible party. It requires the signature of the Chief Engineer or one acting for him. By law it requires that, but really he has no control over the estimate: it is the engineer on the ground who makes out the certificate.

Not so necessary in summer as in winter for the Engineer-in-Chief to reside at the capital.

20608. Do I understand you to suggest that it is not necessary for the engineer to reside at the capital during the summer as a rule?—Not so much as in the winter. Of course it is an inconvenience for the engineer to be away any part of the year, but it is less in summer than in winter.

20609. Why is it more necessary for him to be here in winter?—He has everything to prepare for the report of the Minister, and all the information that has been obtained in the field during the summer has to be prepared for the report to the Minister of Railways and Canals for Parliament.

Office work of Engineering Department done principally in the winter.

20610. The office work of the Engineering Department is done principally in the winter?—Principally in the winter. I returned, and that same season I returned by way of San Francisco back to Red River and examined the works under construction.

20611. Without coming to Ottawa?—Before I returned to Ottawa.

In 1877, from spring to fall, saw every work connected with railway.

20612. That was the fall of 1877?—Yes. So that from the spring of 1877 to the fall I really examined every work, whether of surveys or of works under construction, during that year. I saw every portion of the work where operations were being carried on.

20613. Then I suppose you remained in Ottawa during the winter of 1877-78?—Yes.

20614. And the summer of 1878, did you still remain?—Mr. Fleming returned—I do not remember the date exactly when he returned—in the spring of 1877 Mr. Fleming returned to Ottawa and remained several months in Ottawa. He was engaged principally writing his report of that date: it is a very large report, if you remember. He did not interfere with the active operations of the staff during that time, but he acted in other respects as the Chief Engineer, in the matter of appointments and communications with the Government. I did not communicate with the Government while he was present.

20615. Then, perhaps, that would account for your being away from Ottawa so much that summer, Mr. Fleming being here and acting

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formally?—Just so; so everything was arranged that was necessary that required the Chief Engineer's sanction before Mr. Fleming left. He left again some time in May or June, I think, 1878. I went out again in 1878. Witness went out again in July, 1878.

20616. Over what portion of the country?—I examined the works chiefly under construction between Thunder Bay and Red River.

20617. Do you remember what portion of that season you occupied in that country?—It is in the report for 1878. I left here in July, 1878, and went direct to Thunder Bay. In July, 1878, I was directed by the Minister of Public Works to make a careful inspection of the works under construction on the Pacific Railway and endeavour to discover the cause of the quantities exceeding the original estimates on some of the sections. I accordingly went over these sections, 13, 14 and 25—I think they were under construction at the time—and I examined them very carefully and gave the result of my examination, which I also gave in my evidence before a Committee of the House of Commons and the Senate two years ago. Went over contracts 13, 14 and 25.

20618. About how long were you out that summer inspecting the works under construction?—I was out to the end of the season, up to the end of October, when I returned. I also went over section 15 that season. There were sections 13, 14, 15 and 25 under construction. I examined all those. You will understand that they do not come on the map consecutively. Also Contract 15.

20619. Those sections would embrace all the works then under construction between Red River and Thunder Bay?—Yes; there was an intervening portion not under construction at that time. It is called sections A and B at the present time. The survey of those sections was going on at that time, and I also gave some written instructions with regard to that section. Also inspected contracts Nos. 41 and 42

20620. You mean A and B, or 41 and 42?—Yes.

20621. Did you return for the winter of 1878-79 to Ottawa?—Yes; I returned to Ottawa in that winter as usual.

20622. And after that winter?—That would be the spring of 1879. During the winter I was doing various duties—making plans.

20623. The usual office work?—The usual office work in the winter. In the spring of 1879, when I had got through with the office work, I informed the Chief Engineer of it and asked for instructions; I asked to be allowed to assume my work in British Columbia as he had returned permanently. Mr. Fleming had returned to Ottawa from England to remain, in November or December, 1878. I was informed that there was not going to be much work done in British Columbia that year—that was the season of 1879—only some explorations in the northern part of it, in the neighbourhood of Peace River, and that there was some very important work to be done in Manitoba and the North-West Territories—that the Government had determined to change the line from Red River westward to the south side of Lake Manitoba. It had been understood before, and, I believe, the Chief Engineer repeated, that it would be impracticable to adopt that route for the main line—that it would only be a branch line for the Province of Manitoba, and that west of that it would be impracticable to continue the main line; but the Minister, in conversation with me, when speaking to me, said Witness wanted to assume work in B.C. in 1879, but was informed that not much would be done there that year.

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Informed that the Government intended to run the line to the south of Lake Manitoba, and accordingly witness instructed to examine the country as far as North Saskatchewan, the extent of country examined being 500 x 200 miles.

the Government were very anxious to have exhaustive surveys of the country made, to see if that line could not be made practicable.

20624. South of Lake Manitoba?—South of Lake Manitoba; and I was instructed to take charge of those surveys and examine the whole country out west as far as the North Saskatchewan, and to use my discretion in reference to the line, to search the whole country in search of some practicable line. The field extended from Red River westward to the North Saskatchewan at the elbow near Battleford, and transversly from the Assineboine and Qu'Appelle on the south to the Riding and Duck Mountains on the north. That was the extent of the field. It embraces a length of between 400 and 500 miles and a breadth of about 200 miles possibly. There was the whole of that country to be examined to endeavour to get a practicable line through. I did that accordingly, and I had two surveying parties under me. I went in advance of those and selected the country for them to survey.

The first and second 100 miles west of Winnipeg decided on.

The result was that the first 100 miles through the Province of Manitoba was decided or nearly so, and that the second also was decided. We had two surveys of the second 100 miles, one called the north-western line, which took a north-west course and went up very near—some distance up—the slope of the Duck Mountain, and struck the Bird Tail pretty well up north towards its source

20625. Did that line go north or south of the Riding Mountains?—South of the Riding Mountains.

20626. Both of those lines were south?—Yes; all the field I had to examine was south of the Riding Mountains. It crossed the Little Saskatchewan where the northern cart trail crosses; it is called Tanner's Crossing from the name of a man who lives there and used to keep a ferry there. The other line went further south, in a course nearly due west, and terminated at the mouth of the Qu'Appelle River near Fort Ellice where the Qu'Appelle and Assineboine join. You will find the report of that season's survey at page 251, report of 1880. You will find a report of the result of that season's work. But I must state that although I had found a good line for 200 miles, in fact two lines, the season closed before we could extend the surveys further westward into the third 100 miles, and there were some difficulties in that third 100 miles. We had the Assineboine to cross. It was a difficult country, so we could not decide which line to adopt until further examinations were made. But the Government had to let a contract, and let a contract on the north-western line. That was in the spring of 1880.

20627. That is generally known as the second 100 miles west of Winnipeg?—The second 100; they let the contract.

Returned to Ottawa in fall of 1879.

20628. Then did you return to Ottawa in the fall of 1879?—I returned to Ottawa in the fall of 1879, and was engaged that winter in making out this report, and the quantities and plans and profiles and other information for letting the contract. The contract was accordingly let, I think, in May, 1880—the date is given here somewhere. I find that the contract was let on the 3rd May; that was let on the information that I had obtained from the surveys of 1879.

20629. After the winter of 1879-80 did you remain in Ottawa?—I remained till the season for field work arrived, and I wrote to the Chief Engineer reminding him that the contract was let for the construction of that work, and that the line was not thoroughly located; there might be changes necessary after the surveys were extended further

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westward, and a few days afterwards I had instructions from the Minister. My instructions were from the Minister that time to take charge of that work and continue the surveys westward.

In 1880, instructed by Minister to continue the surveys westward.

20630. Do you mean to take charge of construction on the second 100 miles?—Both the construction and extension of the surveys westward from that. We immediately located a sufficient portion of the east end of that second 100 miles to enable the contractors to go on with their contract without interruption, and then proceeded to extend our surveys westward. I made a thorough examination of the country. I had three different surveying parties with me, and from that examination I projected a new line for the third 100 miles and a portion of the second 100 miles, an intermediate line between the two that had been surveyed the year before. This was in connection with that line. The location of the second 100 miles was continued east—that was Messrs. Bowie's contract—and the location of the third 100 miles; also made a part of the fourth 100 miles, and I also, so as to give the Government a choice of lines, continued the location from Fort Ellice or the mouth of the Qu'Appelle, north of Fort Ellice, north-westerly from the mouth of the Qu'Appelle to a common point with the other line, meeting on the old located line—the originally located line on which the telegraph line was put.

Location of second and third 100 miles proceeded with; a part of fourth 100 miles made, and to give a choice of lines continued location from Fort Ellice, north-westerly to a common point on the old located line.

20631. You mean the second location by the Narrows of Lake Manitoba?—Yes; these two lines converge to a point a little north of Quill Lake. If you wish to go more particularly into that I have a map to show the points.

20632. Our enquiry will end with the 16th of June, 1880, so that we shall not probably ask you the particulars of that survey?—I got the particulars last season and since that the Syndicate got the plans. I delivered them over a week or two ago.

20633. Your first work was in British Columbia?—Yes.

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20634. And you had charge of all the work in that section, the mountainous section, the work at that time being only surveys?—Only surveys; yes.

20635. Had you the responsibility of deciding in what way the examination of the country should take place, whether it should be instrumental surveys or simple explorations?—Yes; that was arranged before I went out. Each season the work to be done was arranged.

20636. Was that portion of the work arranged in Ottawa?—Arranged in Ottawa; yes.

The manner in which examinations should be conducted decided by the Chief Engineer.

20637. By whom?—By the Chief Engineer.

20638. Then, so far as your charge of the work is concerned, it was following out the directions which came from the head of the Department here?—Just so. It seems to me those directions were based a good deal on the information I had given from year to year, from season to season.

20639. But for the first season you would not have that information?—No; I had not. I might explain to you that surveys had been commenced in British Columbia before I went out there; they were commenced in British Columbia in July, I think, 1871. If you

Surveys in British Columbia commenced before witness went out there.

Surveys, B.C.

turn to my report, the appendix with this, page 105 of the report of 1874, that gives an account of the position of the surveys when I arrived there, and the result of the surveys during the season. I may state now that——

Fleming responsible in first instance for directing the manner in which the surveys should be made.

20640. At present I am endeavouring to ascertain who was responsible for directing the method in which the surveys or examinations were made?—The Chief Engineer, Mr Fleming, was responsible in the first instance. When I arrived in British Columbia, I found that the surveys were under three different officers who were called district engineers. Each of them had more —one, two or three—survey parties under him, and they were making surveys as directed, in writing, by Mr. Fleming. There had been originally two lines marked out for survey, or at least one line branching into two; that was up the Fraser River to Kamloops, and from Kamloops the surveys branched one following the south branch of the Thompson River. When I say up the Fraser River to Kamloops, up the Fraser River to Lytton, and from Lytton thence up the Thompson River to Kamloops—two branches of the Thompson River there—one survey was carried up the south branch of the Thompson River to Lake Shuswap, the other survey was carried up the north branch of the Thompson River towards the Yellow Head Pass. In continuation of that survey of the south branch of the Thompson, Mr. Walter Moberly who was one of the district engineers in charge of the surveys, was making a survey through a pass in the Rocky Mountains, called the Howse Pass.

Plan of surveys when witness arrived on the scene.

20641. Had he received instructions before you took charge?—Yes; I found them employed under the directions of Mr. Fleming when I arrived there.

20642. So that his operations of that season when you first went to British Columbia were under the direction of your superior officer, and not controlled by you at all?—Not controlled by me at all.

20643. Were there any of the operations of that season controlled, or rather directed, by you as to the method in which the examination of the country should be made?- No; not during the first season.

Duty of witness during his first season to see that Fleming's directions were carried out.

20644. Then are we to understand that your duty that first season was to see that the previous directions of Mr. Fleming were properly carried out, as far as the surveys were concerned?—Yes; I may state, however, that before I left Ottawa some plans and profiles had arrived in Ottawa from Mr. Moberly, who was engaged in surveying the Howse Pass through the Rocky Mountains.

20645. Had he been engaged the previous season in that same work? —He was engaged the previous season. He was one of the district engineers who had been engaged from the beginning.

Before he left Ottawa in 1872, Fleming had decided to abandon Howse and adopt Yellow Head Pass.

20646. Then do I understand that his operations of 1872, in the direction of Howse Pass, were really the continuation of the work of the previous season?—I was going to explain that to you; that before I left Ottawa some of Mr. Moberly's plans and profiles of the Howse Pass—of the surveys through the Howse Pass—had arrived in Ottawa, and were considered by Mr. Fleming, and Mr. Fleming decided to abandon that route and directed all the surveys to Yellow Head Pass, and I believe the Government, I suppose through the advice of the Chief Engineer, adopted at that early period the Yellow Head Pass—

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at least all the surveys were directed to that, and Mr. Moberly had instructions, in the spring of 1872, to abandon the Howse Pass and take his parties to the Yellow Head Pass to make surveys there.

20647. As I recollect Mr. Moberly's evidence upon that matter he was directed to withdraw from his investigation of the Howse Pass locality, and to retire over some of the ground that he had previously passed over, and to direct his attention to a point further north by the Athabaska Pass towards the Yellow Head Pass?—Yes.

Moberly's withdrawal from Howse Pass directed not by witness but from Ottawa.

20648. Do I understand that that movement was directed by you—I mean his retiring from the investigation of the Howse Pass and taking up the line of country through the Athabaska Pass towards the Yellow Head Pass?—It was not directed by me except by letter from Mr. Fleming. I do not remember whether the direction came from him through me, but I was not the controlling power. It is very possible as I took charge. When I was sent out there I took the direction of the whole of the surveys, and all the parties there then acted under me, and in that position all the instructions from the engineer would come through me; but my impression is—I know it was directed from Ottawa that Mr. Moberly was directed to withdraw from there

20649. Are we to understand that the method of the operations of that season of 1872 for the examination of the country in British Columbia were not controlled by you?—Of 1871 they were not; of 1872 they were. I had charge of all the surveys of 1872.

20650. I understood you to say that the method of them had been arrived at before?—Yes.

20651. Then I am asking you whether the method was prescribed by you?—It was Mr. Fleming's method. I was carrying out Mr. Fleming's instructions for that year.

20652. Do you remember what your own operations were for that year: what portions of the country you visited, and what course you took?—Yes; it is given very fully in the report of 1874, in appendix E of the report of 1874. My operations and journeyings are given very fully.

At close of season in 1872, directed to remain in British Columbia and examine the accounts of Watt.

20653. Did you return to Ottawa in the fall of 1872?—No; I did not. After the completion of the season in 1872—they cannot continue working there in the winter—after the parties completed their season's work, several of them went home to Ottawa to make their plans there; but I had a telegram from Mr. Fleming to remain there; that there was a very large expenditure up to that date—it was the fall of 1872—and much of it was not accounted for, and he wished me to remain and examine the accounts with Mr. Watt. He was the accountant and commissariat officer for British Columbia. Accordingly I remained and went over the whole of the accounts with him to find out how the money was spent.

20654. Where were your headquarters that winter?—In Victoria.

In March, 1873, came to Ottawa to report on the condition of the work.

20655. And Mr. Watt's headquarters also?—In Victoria. I remained there until March, I think, 1873; I do not know exactly the time I did return, but I know it was the spring of 1873 before I got through with those accounts. I find that I was still in British Columbia the 1st of March, 1873, and it was during that month I came to Ottawa to report on the condition of the work. I remained but a very

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short time, and went back to British Columbia. I think I only remained a few weeks in Ottawa, and went back again to take charge of the surveys again.

In 1873, only two parties engaged; only a supplementary survey made.

20656. How was the system of the survey for 1873 arranged: was it arranged before or after you left Ottawa, or by you in British Columbia?—It was arranged in Ottawa. There was very little done in 1873. There were only two parties engaged, and it was simply making a supplementary survey or deviation on one route that had been surveyed in 1872.

20657. Do you remember who were the district engineers in charge of that, or were there more than one?—There were two, Sir. There were two parties, Mr. Jarvis was one and Mr. Gamsby was the other.

Of the method of this survey witness had direction; it was instrumental and was made from Howe Sound to Lillooet thence to Cariboo waggon road, thence to the central plateau.

20658. As to their operations, who had the direction of the method in which the examination was to take place?—I had the direction of it. It was an instrumental survey. It was made from Howe Sound, which is a little north of Burrard Inlet, made up by a pass through the Cascade Mountains, and up to Lillooet, and from Lillooet across what is called the Marble Canyon. That brought us to the Cariboo waggon road. Thence the survey followed up the valley of the Bonaparte River up to the plateau—the central plateau we generally call it—then across the same, joining the survey of 1872—which joined the survey of 1872 at a point almost seventy-five miles from Kamloops, some little distance below Clearwater. I may tell you that it was not until the fall of 1873 that I met Mr. Moberly, although he had been under my instructions, the distance had been so very great. He went to the Yellow Head Pass and made some surveys east towards Edmonton, and Mr. Fleming came through there. He travelled through the country by the Yellow Head Pass to the Pacific in the fall of 1872. He saw Mr. Moberly on his road and gave him directions, and I met Mr. Fleming myself. I was going to meet him, and I met him some 150 miles up the North Thompson.

Moberly's movements.

20659. Then do you mean that the Moberly operations for 1873 had been previously directed by Mr. Fleming in 1872, and were not controlled at all by you in 1873?—No; in fact I had very little control of Mr. Moberly at all until I ordered him to come home in 1873, because he had his first instructions to go to the Howse Pass from Mr. Fleming. He left the Howse Pass by instructions from Mr. Fleming to go to the Yellow Head Pass. He made surveys in the Yellow Head Pass, and eastward from the Yellow Head Pass, and it was not until he returned that he got his instructions from me in 1873. I had not met him before. He returned to Kamloops under my instructions.

20660. He had,during the season of 1873, made some survey towards Cedar Lake from Albreda River?— He had made surveys on the east side of the mountains towards Edmonton, and from the west side towards Cedar Lake, and that was under my instructions.

20661. Did you direct that the examination should be an instrumental or an exploratory one?—I think it was exploratory. I directed that.

Parties under authority in 1873.

20662. Beside these two parties which you have named as being under your authority in 1873—that under Mr. Jarvis, and that under Mr. Gamsby—there was therefore another district engineer under your control, Mr. Moberly,?—Yes; up to the end of 1873—the fall of 1873.

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20663. This examination of the country between Howe Sound and Lillooet was not made under Mr. Jarvis's authority?—One part of it. Mr. Jarvis had charge of the party as the division engineer. Gamsby and Jarvis's surveys.

20664. Was not his charge from Lillooet north-westerly?—Yes; the first was Mr. Gamsby, from Howe Sound to Lillooet, or some point near Lillooet, and Mr. Jarvis took up and connected with him there. His was the most north-westerly part of it.

20665. Then the first portion of the exploration was under Mr. Gamsby's charge alone, and not under Mr. Jarvis?—It was under Mr. Gamsby alone.

20666. What was the nature of that examination?—It was an instrumental survey through a very rugged pass. Through all the Cascade Mountains the passes are so rugged that a simple exploration with an aneroid to get the height would not be sufficient data from which to make out any approximate estimate of the cost. Gamsby's from Howe Sound to Lillooet instrumental through a rugged pass.

20667. Could you not ascertain the feasibility of the line from a bare exploration?—Yes; we could find the feasibility by travelling through it; but we wanted more than that—we wanted a comparative estimate of the cost of different passes.

20668. Had the feasibility of this particular portion of the country been established before by exploration or any other examination that you know of?—There had been parties through it that got information from people who had travelled through it, and it seemed feasible.

20669. Then this was, in fact, a continuation of the previous examination, but a closer one?—It came through a different pass. The first survey was by the Fraser River to Burrard Inlet. This examination was also from the Fraser River from a point farther up, through a different pass to Howe Sound. It was a branch of the same line I may say, a deviation, an alternative line.

20670. And the Jarvis exploration was also instrumental?—Yes.

20671. Were quantities taken out from those surveys and examinations?—Yes.

20672. So as to make a close comparison between the cost of that line and the Burrard Inlet line?—Well, quantities were taken out of all the different surveys through the Cascade Mountains, the Cascade Mountains being the more difficult of the two. The Rocky Mountains were much more easy of the two. Quantities were taken out from all the surveys through the Cascade Mountains.

OTTAWA, Thursday, 28th April, 1881.

RODERICK MCLENNAN, sworn and examined: McLENNAN.

By the Chairman:—

20673 You have had some connection with the works on the Pacific Railway?—Yes.

20674. In what capacity at first?—I first went on the surveys in British Columbia, in 1871. On surveys in British Columbia in 1871, as district engineer of the Yellow Head Pass region.

20675. In what capacity?—As district engineer of the Yellow Head Pass region. I was the first man in the Yellow Head Pass on the survey.

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20676. How many district engineers were there in British Columbia that season?—Two.

Moberly was district engineer in Howse Pass.

20677. Who was the other?—Mr. Walter Moberly and myself. Mr. Moberly was in the Howse Pass and I was in the Yellow Head Pass.

20678. Where did you begin your operations that season?—I began at Kamloops—Fort Kamloops.

Witness in 1871, began at Kamloops with about thirty-five men who went up the North Thompson to explore the Yellow Head Pass, and another party went up to Cariboo.

20679. With what sized party?—I had between thirty and forty men with the party that went up the North Thompson River, to explore the Yellow Head Pass, and there was another party that went up to Cariboo to intercept my way going northerly. They were to meet me at Tête Jaune Cache.

20680. When you speak of the size of your party, do you mean the combined party?—No.

20681. That is, the one that started from Cariboo as well as the other one that started from Kamloops?—No; the nature of that service was to explore that country, to get a way through it, and a number of packers with animals took through our provisions.

20682. What do you say was the size of your party?—From thirty-five to forty men, all told, packers, axe men and all.

20683. How many of the engineering staff?—Well, with me, going up the North Thompson, there were two assistant engineers and one or two younger men in the position of rod men.

Of the North Thompson party, five belonged to the engineering staff.

20684. Then, for the purposes of the survey there were five men employed?—Five men actually—that was, men supposed to use instruments or anything of that kind.

20685. They were examiners of the country?—Yes.

20686. The rest of the party, as I understand, was made up of persons who were required to carry provisions and to do other work necessary to your efficiency and comfort?—Cutting trails through the country. You see there had never been anybody through the country and we had to cut our way through it.

20687. Then, between twenty-five and thirty men, besides the engineering staff, were employed on road making and taking forward supplies?—Yes.

20688. Were they ordinary labourers?—Yes.

Forty animals with party.

20689. Had you animals also connected with your party?—Yes; we had nearly as many animals. We had forty animals, all told.

Started from Kamloops, 1st August, 1871.

20690. What time in the season did you start from Kamloops, your base of operations?—It was about, as near as I can recollect now, the 1st of August, 1871.

20691. Who had the responsibility of making up your party?—I had myself of making up the labourers, but not the staff.

20692. Who selected the staff?—Mr. Fleming.

20693. Did they go from this part of the country, or did you get them in British Columbia?—Some of them went from this part of the country. There were one or two, however, I took up there at Mr. Fleming's suggestion—that is giving me a number of names of parties who were there. They were reported by him as residents, and would be available for that service.

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20694. Then you selected on the spot some who were suggested by Mr. Fleming?—Yes.

20695. Did you select any entirely on your own responsibility?—No; none of the staff that I recollect at all.

None of the staff selected on witness's own responsibility.

20696. The labourers, I understand, you selected entirely on your own responsibility?—Oh, yes.

20697. Who decided upon the number of persons to be engaged in your party and the number of animals?—Well, I decided myself—that is, based on the information I could get of the country (of course, I never was in that country before), after consulting with people who had been, as to the nature of the service, which was unknown to almost everybody, and on consultation with Mr. Moberly, who had been in that country for some years; and, of course, I formed my party with a view of the certainty of getting through to Tête Jaune Cache, or Yellow Head Pass, because it was important to get through before the winter set in, otherwise the exploration would extend over another year.

Number of other persons and animals decided by witness.

20698. Where did you meet Mr. Moberly to consult with him?—Mr. Moberly was on the train with me going to British Columbia. He was here at the time I started for British Columbia.

20699. Would you please commence with the description of your operations by stating when you left Ontario, and how many went with you, and so on?—I left Ontario about the beginning of June, early in June, and with me, as one assistant, I had W. W. Ireland, that went from this place, and another, L. N. Rhéaume. Those were the only men of the staff that I had, and accompanied by Mr. Moberly who had one or two other men with him, and we went to British Columbia—went to Victoria—and we were also accompanied by Mr. George Watt, who was commissariat officer.

Witness left Ontario in June, 1871, and remained in Victoria long enough to supply Mahood's party which started on Dominion Day for the Cariboo district, where they commenced their operations.

20700. How long did you stay at Victoria?—Some days, long enough to supply the party that was sent out under Mr. Mahood.

20701. Was that party going out to the Cariboo district?—Yes. They left Victoria on Dominion Day.

20702. But Mahood's party, as I understand it, were making their way as quickly as possible to start an easterly exploration from that point to Cariboo?—Yes; but they started for their operations from Victoria.

20703. They did not make an examination of the country from there?—They made no examinations until they reached Cariboo.

20704. What was the base of their operations?—That was the base of their operations.

20705. You stayed long enough in Victoria to get supplies for Mr. Mahood's party and your own?—To get supplies for Mr. Mahood's party, see them off and prepare for the party that went by Fort Kamloops.

20706. Was the Mahood party under your charge?—Yes.

20707. Who was the next in command under you in the Mahood party?—Mahood was the next, and a young man named Dickey—I forget his Christian name now—from Sackville, New Brunswick.

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Moberly joined witness at Fort Kamloops.

20708. What time did you leave Victoria: do I understand that Mr. Moberly accompanied you from Victoria up to Kamloops?—No, not all the way; he sent some of his men up. At Hope he took a short cut through the country to try and pick up some pack animals, and some of his men went up with me to Fort Kamloops, and he there joined me with some pack animals. We divided—at least, I got some that I wanted.

20709. What time did you leave Victoria?—We left Victoria sometime in July. It was a few days after Mr. Mahood left.

Spent some time at Kamloops organizing and getting horses, &c.

20710. What time did you reach Kamloops: did you say in August?—No; we went there before the end of July, but we were there some days organizing and getting the horses and pack saddles and outfits necessary to carry supplies to the mountains, and some time was spent there getting packers for the horses, that is, men skilled in leading horses over the mountains.

20711. Were these animals horses or mules?—We had some of both.

Watt supposed to buy supplies but Moberly bought some also.

20712. Who had the responsibility of purchasing and fixing the price of those animals on behalf of the Government?—Mr. Watt made the purchase, or was supposed to be the man who supplied us with those animals. In some cases he did, but he could not be with us in all cases, and we had to pick them up. You see, we were hurried, and Mr Moberly went through the country, and knowing the Hudson Bay Co.'s agents, he bought some.

Witness also bought some.

20713. As to those which Mr. Moberly did not buy, did Mr. Watt buy them and fix the prices?—Mr. Watt bought some and I bought others.

20714. Then you did buy some and fix the price, on your own responsibility?—Yes.

Bought a pack train of twenty mules.

20715. About how many of the animals were mules?—I think I bought one pack train, they call it there—about twenty mules, as near as I can recollect the number now.

20716. Have you any recollection of the price?—No; I think it is something like $110 or $120 apiece.

20717. Did that cover anything more than the animals: did it cover the harness?—In that case it embraced the apareos, as they call it. Those are things that are put on the animals backs to protect them carrying packs.

By Mr. Keefer:—

20718. Pack saddles?—No; the apareos is distinct from the pack saddle.

By the Chairman:—

Watt responsible for purchases.

20719. As to the supplies, who had the responsibility of purchasing them and fixing the prices?—Mr. Watt, as a rule, had the responsibility of purchasing supplies and fixing the prices.

20720. Did he purchase what was necessary for your party that season?—He did. I do not know but we might have supplemented it, some, with supplies at Fort Kamloops—some things we needed there.

20721. Who would have the responsibility of buying those supplementary articles?—Well, anything that was purchased in Mr. Watt's

absence, I would, of course, have the resposibility of. Those were unimportant. The staple articles were purchased by Mr. Watt.

20722. Would you describe, shortly, the object of that season's operations as you had planned them at the time you left Kamloops?—Well, in accordance with instructions I had from the Government, they thought it very desirable that a line should be had from Yellow Head Pass in the first place, that Yellow Head Pass should be well tested, and that being found satisfactory, the line should be continued westerly from that through the gold region through Cariboo to Fraser River.

Instructed to test Yellow Head Pass and finding it satisfactory to run a line through Cariboo to Fraser River.

20723. *Via* Tête Jaune Cache?— *Via* Tête Jaune Cache. If Tête Jaune Cache was found practicable it was highly desirable a line should be extended west to the gold fields.

20724. That would be crossing what is known as the Cariboo range of mountains?—Yes.

20725. And, as far as your party was concerned, I understand that you were not to survey westerly from Tête Jaune Cache, but the operations of your party proper were confined to this north-easterly country?—Could I get to Tête Jaune Cache and it be found practicable, I would have done so. My instructions were to examine Yellow Head Pass, and that being found good for a line, to run westerly, but I had no means of getting there.

20726. I am asking what was your plan of operations when you started from Kamloops?—My plan of operations was to get to Yellow Head Pass by the North Thompson River, the only supposed way I could get there.

20727. Did you expect to take all your party by the North Thompson River to Yellow Head Pass?—Yes.

20728. In a body?—In a body.

20729. Were there roads along the North Thompson?—There were none.

20730. Then you had to make your roads as you went on?—We had to cut our way through the forest.

Had to cut their way through the forest from Kamloops as they went along.

20731. It was not a travelled country on either side of the river?—There was a settlement five or six miles beyond Kamloops, on the North Thompson, and then we got out into the vast wilds.

20732. Had you formed any idea at the time of starting of the probable time it would take your party to reach the Yellow Head Pass?—I had hoped to get there early in October—as early in October as I could get there.

20733. In doing that you would necessarily pass through a part of the country which, you say, would form a part of the location afterwards—I mean from Yellow Head Pass westerly—Tête Jaune Cache all the way to the Cariboo district?—I would simply have some knowledge of the grades adjacent to the valley that I went through up the North Thompson River, but would have very little knowledge of the interior.

20734. You mean you would have some knowledge of the immediate neighbourhood of the river?—Of course I would have a good knowledge of that going up the heights on each side as we went to the north; but the interior, west of that, I could not explore very much,

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I did not have the time, and Mahood was working to meet me, was expecting to meet me at the Tête Jaune Cache.

Took his party to Cranberry Lake; sent back all the packers and as many animals as possible, and with a few men and Selwyn of Geological Survey went to Yellow Head Pass.

20735. Did you take your party to the Yellow Head Pass?—I took the party to Cranberry Lake. The season was pretty short, and I sent back as many packers—in fact all the packers—and as many of the animals as could go back. Some of them were reduced and could not go back. I then took a few men from the party and went to the Yellow Head Pass myself, accompanied by Mr. Selwyn, Director of the Geological Survey.

20736. Who else?—One or two other men I took to take animals and carry supplies, bedding and tents.

20737. Any animals?—Yes; we had some six or eight animals.

20738. How far is it from Cranberry Lake to Yellow Head Pass, in round numbers?—Oh, I suppose it is about fifty miles.

20739. About what time did you diminish the party, as you say, at Cranberry Lake?—Well, it was early in October, very probably the 5th—about the 5th of October. Then, having reduced the party, I kept a sufficient number there to explore and examine that country and use the instruments there as much as they could through the winter, and not any more men than I was assured could be fed with the supplies we brought there until the spring.

20740. Was Cranberry Lake reached before Tête Jaune Cache?—Yes.

20741. Was it on any part of the line which might eventually be located between Kamloops and Tête Jaune Cache?—Yes.

Distance between Kamloops and Cranberry Lake 200; from Kamloops to Yellow Head Pass 250 miles.

20742. In round numbers, what is the distance between Kamloops and Cranberry Lake?—I forget now—something like nearly 200 miles.

20743. In round numbers, what would you call the whole distance from Kamloops to Yellow Head Pass?—I think it is something like nearly 250 miles.

20744. You say that you retained enough supplies and men and animals to carry you through the winter season, in making a closer investigation of that country?—I retained what supplies I brought there, and reduced the men so as to have no more than could subsist well until the next spring.

Believed that supplies would last until spring.

20745. And you thought that the supplies which you had left would be enough to carry you through until spring?—Yes.

20746. When you started from Kamloops did you expect that you would be able to discharge a portion of the party as soon as you reached this lake?—I so expected.

20747. So that was carrying out your plan of operations?—Yes.

20748. It was not found to be necessary in consequence of something which happened on the journey?—Oh, no.

20749. It was part of your original scheme?—It was part of my original scheme, winter setting in as I expected it would.

20750. Did you think it was necessary to have taken so large a party of men and animals, in order to carry the supplies from Kamloops up to that point?—Yes.

20751. Did you find that there was as much necessity for a large party as you expected when you started?—It was quite necessary

to take those animals to take the supplies for the men there, although at the time I did not think it was necessary to take such a party. My own opinion was, only a skilful party with Indians and packers to make an exploration through the country and acquire information would be better.

20752. Did you mention that idea to anybody?—Yes; I think I spoke of that idea to Mr. Fleming when I returned. Taking a number of men into an unknown country, of course you have to provide them with supplies and provisions, and you don't know what the country will be. A smaller body would accomplish the same result with less expense.

A smaller body of men would have accomplished the same result with less expense.

20753. Are you speaking of your opinion before you left Kamloops or after the event?—It was after the event. I knew nothing of the country at all.

20754. I was asking whether the event turned out as you had anticipated at the time you left Kamloops?—I simply required to take the transit men and levellers, &c., a full party of men, and, therefore, I had to take provisions for them.

20755. Who settled, before you started from Kamloops, upon the size of the party—I mean the number of men and animals that you were to take?—I settled, to a great extent, that myself; that is, getting advice from others who pretended to know something about the country and the requirements of the work.

Witness responsible for size of party and price of provisions.

20756. Was the price of supplies and animals a matter left to your discretion?—Of course I was not directed as to the price, I was left to my own discretion.

20757. The , in adopting the number of men and animals for the party, you acted on your discretion?—Certainly.

20758. When you discharged a portion of the party, did you find your judgment had been a good judgment as to the number of men and animals required, or at the end of the season did you think you had employed more than was necessary?—No; I found I had barely enough provisions to keep a small party (somewhat reduced, but not to destroy their efficiency so much), I had scarcely enough to supply an ordinary surveying party until spring. What with getting them up there and cutting roads to get them up there, and making bridges and boats and other things to get across streams, it constituted a great part of the work and took up a great part of the time. When I arrived there I had no more than sufficient provisions to supply an ordinary party. I would run no risk until June, as the time would probably be nearing to get fresh supplies.

20759. I understand, when you reached Cranberry Lake, or before you proceeded farther, you discharged all your party and animals, except one or two other men of the staff, and six or eight assistants?—I beg your pardon, I sent back all the packers and all the animals they could take back; I left an ordinary surveying party in the neighbourhood of Cranberry Lake to survey that country and continue examinations during the winter. I then left with one or two pack animals, accompanied by Mr. Selwyn, of the Geological Survey, going that far beyond where the party were left.

When he sent back all the packers from Cranberry Lake and proceeded to Yellow Head Pass he left in the neighbourhood of Cranberry Lake to survey that country two assistant engineers, a couple of rod men and about eight or ten axe men.

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20760. Please describe to me the party you left in the neighbourhood of Cranberry Lake for operations there?—I left two assistant engineers and one or two younger men for rod men and chain men and about eight or ten axe men.

20761. That would be a party of somewhere between twelve and fourteen altogether?—Yes.

Four or six of a party that went to Yellow Head Pass and returned.

20762. Please describe the party which you took with you further northward and easterly?—I took two men with me and Mr. Selwyn took two others. I think we had four or six of a party that went to Yellow Head Pass and returned.

20763. That would be fourteen and six—somewhere about twenty altogether of your original party that did not go back?—No; did not go back, and the rest were all sent back, packers and all.

20764. Do you think now, after the event and after the experience of that season, that it was good judgment to take the party as large as you did originally, in order that in the fall you might have the twenty men you describe for the operations near Cranberry Lake and more easterly, and the provisions for them that you did, or do you think that you could have started with a smaller party and accomplished the work as efficiently?—If I contemplated supplying a party for the winter I had barely enough, but if I contemplated the risk of taking one or two men and going lighter, much less would do. But that was not the plan of the survey. The plan of the survey was to make an instrumental examination.

Had he known the country might have got the information at less cost.

20765. Assuming the object of that season's explorations to be just what happened, namely, in October, when you got to this lake you kept two parties of about twenty men and provisions about enough for them: I am asking whether, in your present opinion, that object could have been accomplished by having started with a smaller party than you did from Kamloops?—Oh, I would have acquired the information that I had up to that time with less expense by arranging and planning differently, but that was simply on the basis that I knew the country, which I did not.

20766. I understand that the object of this season's operations was two-fold: in the first place that you should acquire a knowledge of the country up, we will say, as far as Cranberry Lake along the river, and that from Cranberry Lake you should have party sufficiently large and supplies enough to enable you during the winter to make further explorations?—Yes.

20767. I am asking whether you think that that object, or those two objects, could have been attained by having started with a smaller party from Kamloops than you did?—No; I could not have changed it with any different results.

Nevertheless thinks that the number of men and animals employed by him in that season's operations were necessary to the actual result.

20768. Then you think the number of men and animals employed by you in that season's operations and the expenditure connected with them were necessary and material in order to reach the result which you did?—I do.

20769. What was the name of the person whom you left in charge of the party near Cranberry Lake?—F. W. Green.

20770. What were his duties after the fall of 1871?—His duties were to examine the country thoroughly around that region and explore

both north and west particularly with a view of finding a valley or a pass through into the Cariboo country westward.

20771. And what was the object of the party under your immediate charge?—There were only a few men. I left only a few men more with Mr. Green, and when I came back from Yellow Head Pass——

20772. That is the return. I am speaking now of the time you started northward and easterly from Cranberry Lake with Mr. Selwyn: what was the object of that examination?—To examine the pass and to acquire some knowledge of its character. Accomplished object of examining pass.

20773. Did you accomplish that?—Yes.

20774. What time did that take?—That took— I recollect distinctly now, we returned on the 26th of October.

20775. What time did you leave Cramberry Lake on that little expedition?—We came down in four or five days.

20776. I am speaking of leaving Cranberry Lake on that expedition?—It would be after the 15th—perhaps the 15th to the 18th.

20777. When you left for Yellow Head Pass?—Yes.

20778. And when do you say you returned?—We returned on the 26th of October. Returned on 26th October, 1871, having examined the pass in eight days.

20779. So that in eight days, you and Mr. Selwyn and your exploring party of one or two other men accomplished the investigation which you started to make?—Yes.

20780. And that was fifty miles to go from Cranberry Lake, including the Yellow Head Pass?—Yes.

20781. That was not an instrumental examination?—No; it was simply with an aneroid. I carried an aneroid in my pocket to acquire a knowledge of the grades. Simply an aneroid examination to acquire a knowledge of the grades.

20782. And the distance you estimated as you passed over it?—Yes; we just estimated the distance as well as we could at the time.

20783. That party was the first, as I understand you to say, who had examined the Yellow Head Pass under the Canadian Government for the purposes of the Pacific Railway?—Yes.

20784. How far easterly did you proceed on that occasion?—We went very nearly to what is called Yellow Head Lake, not far from the summit.

20785. Is that east of the summit?—No; it is on the west side of the summit.

20786. Did you not go farther east than the west side of the summit?—No.

20787. Did you not go over the summit?—No.

20788. Then you did not actually go through the pass?—No. Through the pass is ninety miles. We went to that part of it which is considered and is the roughest part on the west side. Did not go through the pass.

20789. Then you did not make the first investigation of what is called Yellow Head Pass proper?—Up to that point only, subsequently followed by Mr. Moberly in 1872, who was sent to that part.

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Went within ten or fifteen miles of the centre of the pass.

20790. How near on the westerly side did you come to the pass proper?—I do not know. I suppose, may be, ten or fifteen miles, where the water turns the other way, as near as I can recollect now.

20791. Where the water turns which way?—To the eastward. You see the water flows both ways through the pass.

20792. Did you go to that point?—No, within ten or fifteen miles. You see we went as far as we could to take the risk of coming out for the winter. When it commenced snowing on the 26th of October we returned. Mr. Selwyn was anxious to return, and I thought so too.

20793. What was his office connected with the survey?—It was the geological examination.

20794. Then you returned to Cranberry Lake about the 26th of October?—We returned back on the 26th of October and came by Cranberry Lake, I suppose, about the end of the month—between the end of October and the 1st of November.

Got to Cranberry Lake about 1st of November, thence retracing to the Albreda River.

20795. And then how did you proceed?—Then we retraced our steps by the trail and got to the mouth of the Albreda River. This is one of the tributaries of the Thompson. It is a short stream.

20796. That is near Cranberry Lake?—Yes, very near it. There is a divide there. The waters of the Albreda River go into the North Thompson and the northern stream goes into the Canoe River.

20797. And what were your next operations?—After getting to the mouth of the Albreda River we stopped there a couple of days to make canoes.

20798. Did you take up your other party that you had left in the neighbourhood?—No; I left the party with Mr. Green and went down with Mr. Selwyn, taking a few men with me. Mr. Selwyn's men we had left with Mr. Green. We got to the mouth of the Albreda River and made canoes with pine logs.

From Albreda River to Kamloops where they arrived 20th November.

20799. And then?—Worked our way down to the mouth of the Clearwater River, where there was a man left for the winter to take charge of the stores that could not be got up that winter. They were sent there anticipating the wants of next spring. They got there about the time the river was frozen up.

20800. And then?—We made our way to Fort Kamloops.

20801. What time did you get there?—I forget; about the middle of November—the 15th to the 20th of November, as near as I can recollect.

Left for Ottawa with report of explorations.

20802. And then?—Then, I think, we made some small settlements with the Hudson Bay officers there, and then went by the Cariboo road, to the telegraph office and telegraphed Mr. Fleming at Ottawa, who answered by requiring me to come to Ottawa and bring a report of my explorations, which I did.

20803. About what time did you leave British Columbia for Ottawa that fall?—It was very near—it must have been about the beginning of January. I was waiting some time to hear of Mahood's party, who did not get through to Tête Jaune Cache as I expected.

20804. Where were you waiting?—I was part of the time at Cache Creek on the Cariboo road, telegraphing to Cariboo to see if I could get any tidings of them, which I could not; and then, after getting the

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order from Mr. Fleming to come to Ottawa, I still waited for some time to get information of Mahood and see what success he had, until finally he got out to Cariboo.

20805. Who?—Mahood, and telegraphed me where his party were; and I asked him to bring in his maps and sketches that he had with him, so that I could take them to Ottawa. He was unable to go through that country. He went over glaciers—one he estimated was 2,000 feet in thickness.

20806. Then, of the party which you originally started with, there were left only those in the neighbourhood of Cranberry Lake, some fourteen altogether, in the charge of Mr. Green?—Yes, and some of Mahood's men, who ran his party somewhat in the same way I did; that is, by sending out all the men he could send for the winter. After getting to a certain point and finding he could get no further, he adapted his party to the supplies he had.

20807. These detached parties were instructed to investigate the country as well as they could by way of explorations, not instrumental surveys?—Exactly. Wherever they found anything promise well, to examine with instruments; but, of course, to make explorations first before doing so.

These parties instructed to make simple explorations, and wherever anything looked promising to examine with instruments.

20808. Then you reached Ottawa about the middle of the winter of 1871-72?—Yes.

20809. Next after that, how were you employed?—Next spring again I went back, and after leaving here I went back, as I supposed, to continue my operations in Yellow Head Pass, and try if possible to get to Cariboo.

20810. You say you supposed you went back for that purpose: did you not know for what purpose you went back?—I started back for that purpose, and at Toronto I was intercepted with different instructions. Between the time of leaving here and going to Lancaster to pack up my traps, Mr. Moberly's report on Howse Pass came in, and I suppose the plan of the surveys was changed, and I was telegraphed at Toronto to wait for instructions there, which I did; and the instructions were that I should take my parties and try and work through across the Chilcotin Plains, across the interior of British Columbia, and allow Mr. Moberly, who was supposed to be in Howse Pass, to take his men on the east side of the range. There was no place he could find more accessible than that ground.

Spring of 1872, instructed to work across the Chilcotin Plains.

20811. Then your instructions were to examine the country between the two main ranges?—Yes; to see what was the best line I could get west towards the Chilcotin Plains.

20812. West from what point?—A supposed continuation, making Tête Jaune Cache the gateway or a central point, by which a line could diverge either down the South Thompson River and then to take the first ready means of getting to the western country by the Clearwater River, the first good ground we found to offer any opening to that country; so I took the parties out and got down to the Clearwater, and commenced work westerly, which was the only point I found presented any opening at all. Other parts have been tested since and they had to come back to that. In 1872 I worked from Clearwater.

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Worked westerly from the junction of Clearwater with the North Thompson.

20813. When you say from Clearwater, do you mean from its junction with the North Thompson?—Yes; or very near there. Taking the parties out, I brought them down there.

20814. You worked westerly from that point?—Westerly from that point.

20815. Where was your base of operations that season, 1872?—I had fixed that as the only point by which there was any hope of getting a line through the country at all, westerly.

29816. Did you start with a party from that point—the junction?—Yes.

Party numbered about thirty men.

20817. What sized party?—Well, I should say about medium sized; about thirty men, as near as I can recollect now.

20818. Including the engineers?—Engineers and everything.

About twenty-five animals.

20819. And how many animals?—Animals: we had about twenty or twenty-five.

20820. Was that the size of the party under your immediate charge: twenty men and twenty-five animals?—Yes; or Mahood's party. Mahood, the man that went from the Cariboo Mines easterly. I got him out and started him there at Clearwater, and then I took the Green party, the party I had brought up the previous summer to Cranberry Lake. I took that party and got them out into the interior about 100 miles, and started them operating westerly.

20821. Where did you get charge of these two parties in the spring of 1872, less the Green party and the Mahood party, so as to be able to direct them?—I had to go for them. I had to get Green's party from Cranberry Lake, and Mahood's party, who had at that time made their way up to Tête Jaune Cache, I got them out there.

20822. About what time of the year?—That was in June some time.

20823. Was Forrest under your charge that year?—He was.

Forrest went westerly past Lake Mahood.

20824. He went westerly past the lake now called Mahood Lake?—Lake Mahood, he did.

20825. Did the Green party and the Mahood party come down southerly so as to be under your immediate charge at the junction of the Clearwater with the Thompson, or did you direct their operations by letter?—No; I got both parties down and got Mahood's organized and started at Clearwater. Having done that, I got Green and his party, and worked round and got in about 100 miles west of Mahood and started them there.

Mahood's party—about thirty men.

20826. First, about the Mahood party, what size was it?—About thirty men, as near as I can recollect now.

20827. Is that the party you have just described as your own?—No; I beg your pardon, Green's was mine.

20828. Then the Mahood party consisted of thirty men?—Yes.

Directed them to find the best country they could going west telling them at the same time he was going to start with Green's party 100 miles west.

20829. And how many horses?—Twenty or twenty-five animals.

20830. What operations did you direct them to undertake that season?—To endeavour to find the best country that they could going west, and as near that parallel of latitude going nearly due west. I told them where I was going to start with the other party, some 100 miles west of that and to form a junction.

20831. Was Forrest with the Mahood party?—With the Mahood party.

20832. Now the Green party, where do you say you started them from?—The Green party, I started them. I took them out and got them on near what is called the Cariboo road and not very far from the 150 mile house.

20833. Near the Big Bend on the Fraser River?—No; oh, no. It is lower down.

20834. Is it between Lillooet and Big Bend?—About latitude 51° 30'—between 51° and 52°.

20835. You say you took them out, but I do not know to what point. Now that is the latitude: can you give me the longitude or some point well known on the river or somewhere?—No; I do not see any marks on this map (looking at one).

20836. Was it on the Fraser River?—No, Sir.

20837. Was it east of that?—Some twenty-five miles east of Fraser River.

20838. Was it anywhere near the junction of Big Creek?—It was near there. To work down the Fraser River.

20839. In what direction were they to move?—They were to move down the Fraser River to ascertain what gradients could be had going down Fraser River. That was near the height of land. They were to work down to Fraser River.

20840. Then you say you took them out from the Thompson River to a starting point further west?—Yes.

20841. How did you get them to that starting point: was the country well travelled or easily travelled?—No, Sir. I got some Indians to guide me through. There were some few Indian trails and I got some Indians to guide me and went through there.

20842. Then that was the Green party?—Yes.

20843. That is the party you describe as yours?—Yes.

20844. How long were you getting to this starting point?—I think some fifteen or twenty days.

20845. Was it along the Blackwater Valley, or anywhere further north that you travelled to get to that starting point?—We went to the Blackwater and over some high ridges there. We took as nearly a direct course as we could.

20846. Did you expect the Mahood party would join in with the line you were then taking?—I expected it would serve them to some extent in making their camps.

20847. What I am asking is: whether you expected the result of their examination to be that they would find a country which would make a line available somewhere about the starting point which you then took?—Exactly.

20848. And you would be continuing the same course?—Exactly.

20849. So that the line from this starting point westerly, you supposed would be nothing more than a continuation of the general course

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of the examination which they were making in effect, although not exactly to the point of junction?—Yes.

Mahood's party got through to where witness started Green's party, which met one of Marcus Smith's on west side of Fraser River.

20850. What was accomplished by the Mahood party that season: they were under your charge and, I suppose, reported to you?—Yes. They got through to where I started Green's party, and Green's party met with one of Mr. Marcus Smith's party, from Bute Inlet, on the west side of Fraser River, near Tatla Lake.

20851. For the present we will confine our questions to the Mahood party; you say they reached the starting point of your party, the Green party: how far was that from the starting point of the Mahood party?—I cannot say with certainty now.

20852. Could you not say in round numbers?—Well, I suppose it would be between sixty and seventy-five miles—perhaps about seventy-five miles would be something near it.

20853. What was the nature of their examination during that expedition?—They had gone up a chain of lakes and outlets from those lakes.

Mahood's survey exploratory and instrumental.

20854. That is the result of their examination: I am speaking of the nature of it, whether it was instrumental or not?—It was exploration and instrumental, both.

20855. Did they take such close examination as would permit of a profile being made of the country?—We did. We made a profile. We ran a transit line and level line—some levels over it. We examined it with the instruments.

20856. About what time did they complete that work?—The beginning of the winter.

20857. That was the result of the whole season's operations of the Mahood party?—Yes.

Made an instrumental survey over seventy-five miles.

20858. They made an instrumental examination over seventy-five miles?—Seventy-five miles, as near as I can recollect now.

20859. And their party was composed of about thirty men and twenty-five animals?—As near as I can recollect now.

20860. What is your opinion about the necessity of a party of that size for that work? Does the result show you whether it was too large a party?—They could not have got along with any less—that is, using instruments—than they had.

20861. You think the size of the party and the expenditure occasioned by it were both justifiable considering the operations?—They were gauged according to the supposed wants of the country as near as possible.

Fleming directed an instrumental survey.

20862. Were you directed to make an instrumental survey?—Oh, yes.

20863. Was it not a matter of discretion with you whether it should be a bare exploration or an instrumental examination?—No, no.

20864. Who directed you to do that?—Mr. Fleming.

Examinations showed that a line, but an expensive one, could be had.

20865. What was the result of the examination, as to the feasibility of the line?—It demonstrated the possibility of getting a line, but it was expensive. Some of that country was very rough; but it showed a line could be had there.

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20866. Were the gradients extreme?—No; but about thirty miles of the line would be very heavy.

20867. Cuttings and that sort of work?—Yes: ravines and rocky points.

20868. As an engineer would you say whether it was an expedient thing, considering the state of the undertaking at that time (the Pacific Railway) to make that examination in the way it was made—I mean by instruments through that section of the country, or whether it would have been a more expedient thing to have explored the country without instrumental examinations to ascertain the character and probability of a line being located there?—I have always maintained it would have been better to have explored for two or three desired or desirable points before making instrumental surveys at all. I have always maintained that.

It would have been better to have explored for two or three desirable points before making an instrumental survey.

20869. Had you communicated that idea before this year's operations to any of your superior officers?—Yes; I think I spoke to Mr. Fleming about it—about making explorations first.

20870. That would be between 1871 and 1872?—Yes.

20871. Was that opinion based in any way upon the experience you had gained during the previous year of 1871?—It was.

20872. Was it based upon the general character of the country, the roughness of it, and the probability of encountering obstacles?—It was, for this reason: that a few men with Indians can get through a country well, because the Indians, as a rule, are very good packers; but when you get a large party for an instrumental survey, that you have to fit out for surveying, you increase the weight of the whole expedition, that is, without knowing you can get a line through at all. You simply get routes without a certainty they will even be utilized.

20873. What experience have you had as an engineer before your connection with the Pacific Railway?—I was sixteen years in the United States, and the greater part of that time with a pupil of Col. Whistler, of Massachusetts, who built the St. Petersburg and Moscow Railway.

20874. What length of experience do you consider you have had in your profession?—Altogether?

20875. Yes?—About thirty years.

Witness has had thirty years experience as an engineer.

20876. Have you anything more than the ordinary standing in the profession—I mean have you any particular rank?—No; I made no application to the Institute of Civil Engineers of England. I have been part of the time in the United States and since then here.

20877. When you laid these views before Mr. Fleming in the winter of 1871-72, as to the expediency of exploring the country before surveying it more closely with the aid of instruments, do you remember what his views were, or did he express any upon the subject?—Well, I do not know that he expressed anything very pointedly; but this I gathered from him, of course, that he wanted to see the section of the country for himself here.

20878. What section of the country?—That is what is acquired by running levels.

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20879. When you say section you mean technically a cutting of the country horizontally—a profile plan of the country?—Exactly. I saw he was desirous to get these things himself in the head office to judge that way; in other words, he seemed to hesitate about detailing discretionary power to the man to select the ground to survey—at least that was my construction of it.

Fleming desired a profile of the country such as would enable him to judge for himself the different lines.

20880. Do you mean that he wished to guide from Ottawa the operations exactly, and not to leave it to the discretion of persons on the spot?—Not exactly; but he wished to acquire a knowledge of the ground by getting a profile of it at Ottawa for him to judge and compare the different lines. Well, of course, that in the main would do, but sometimes these lines were run where they would never be any use except to show it was impossible to build a railway there.

20881. That information you could get by a bare exploration?—Yes.

20882. Without instrumental examinations?—Yes.

20883. And that exploration would be very much less expensive?—Precisely.

20884. I suppose you are aware there has been a good deal of discussion about the expediency of this examination of the country having been made in this particular way?—Yes.

20885. And that I am asking your views because you have had some experience on the spot?—Yes.

Witness made an instrumental examination across the Fraser River into the Chilcotin Valley.

20886. Now, as to your own party's operations for that season, from the end of the Mahood examination westerly, will you describe what was accomplished that season?—Well, we made an instrumental survey from that point at which we started down by the San Lozé Valley, crossing the Fraser River, going into the Chilcotin Valley, and ending a little to the east of Tatla Lake, where we met one of Mr. Smith's parties, formed a junction with a party that came up or that had been working between Bute Inlet and Tatla Lake. We covered a good deal of ground.

20887. That was a longer stretch of country that you examined?—Yes; you see it was the Chilcotin Plains. It was partly open, and there was not the labour of getting through it, and measuring it there was in the other. I was between the two parties, largely with Green's party, for the reason I wanted to make sure of meeting the parties from the west side and I counted on Mahood coming to our initial point, so I pushed on the party as fast as I could.

20888. Was the nature of your examination the same as Mahood's: entirely instrumental?—Yes.

20889. Preceded by a detailed party for explorations?—Yes. Valleys sometimes fix you there. You get into it and you cannot get out of it until you are near the end of it. How to get out and where to get out into the next valley is, of course, a subject for exploration to determine.

Got such a profile as Fleming required.

20890. Did you complete such an examination as would enable you to furnish such a profile as Mr. Fleming said he would desire of the country?—Yes.

20891. And you did get a profile of that work?—Yes.

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20892. About what time did these operations end?—With the beginning of winter—the second winter.

20893. That was the fall of 1872?—Yes, the fall of 1872.

Paid off the party in fall of 1872, and employed staff making plans and profiles until February, 1873.

20894. And then what did you do?—Then we got the parties together on what is called the Cariboo road, or the only road in that province, and paid off all the axe men and everybody we did not employ in Victoria—paid them off in the interior, and brought the rest down to Victoria, and paid the remaining axe men there, some few we had taken from the town, and employed the staff until some time in February, some two months, making up our plans and profiles of the survey, after which I came to Ottawa.

20895. What do you say as to the necessity for the expenditure made by you with your own party—I mean the Green party, supposing it to have been necessary to accomplish what you did accomplish, that is to make such an examination as to get a profile of the country: could that have been done, in your opinion, with good management, at any materially less expense?—No; not a profile based on accurate levels—you could not.

20896. Then I understand the doubt, if there is any, in your mind as to the expediency of your expenditure, to rest on this question: whether the examination ought to have been an exploration, in the first instance, or an instrumental survey?—Yes; exactly.

If an instrumental survey were necessary expenditure could not have been less.

20897. But if an instrumental survey was the proper one, then all the expenditure was necessary?—Yes; of course we could not have done anything else than we did.

20898. That has brought you down to the winter of 1872-73: what was your next operation?—Then I came to Ottawa with the plans and profiles of these surveys, and I think it was about June of 1873 I left the service of the Canadian Pacific Railway.

20899. When did you return to it?—In 1875.

20900. Had you in the meantime been engaged in your profession in other places?—No; not in my profession.

Railway Location and Construction—Contract No. 13.

20901. Where did you go in 1875 at the time of your next connection with the Canadian Pacific Railway?—I went up to Lake Superior.

20902. Upon what section?—Beginning on section 13.

20903. As construction engineer?—Yes; in charge of that section under Mr. Hazlewood who was the superintending engineer or district engineer.

20904. Had he more than one under his charge?—Yes.

20905. Then you were resident engineer?—Yes, resident engineer of that section.

At first line projected to Shebandowan Lake.

20906. At the beginning that line was projected to Shebandowan Lake was it not?—Yes.

20907. Then you were engaged before the western end of that section was abandoned?—Yes.

Finally constructed to Sunshine Creek.

20908. It was finally constructed only as far as Sunshine Creek on that particular location?—Yes.

20909. The continuation of it really became the subject of another contract?—Yes.

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20910. Contract No. 25?—Yes, No. 25.

20911. Had you the responsibility of taking out the quantities in the first instance?—No; I had nothing to do with it.

20912. It was after the contract was let?—It was after the contract was let I went out there.

Started a line to set the men to work. The line the road built on not located at time contract was let.

20913. Would you describe, shortly, what you found necessary to be done as constructing engineer, and whatever you think proper concerning the way the work was done?—I got up there on the 19th of May, 1875, and after waiting a few days for some men to join me as assistants, I went to work locating the line for that contract. There was a line that had been previously located or run, I do not know what they call it, and they claimed it was a location. Anyway I started a line to set the men to work, of which there were 150 men on the boat with me going up.

20914. Do you mean the contract was let before the line was located?—The line the road was built on was not located at the time of the contract.

20915. When you say there were 150 men on the boat, do you mean 150 men belonging to the contractor's party?—Yes.

20916. When you got to the ground, did you find any work laid out so that the contractor could take proceedings at once to do his work?—No.

20917. What was the state of affairs there?—Well, those 150 men were there a few days. They utilized them putting up camps, storehouses, &c. While I was waiting, or rather while some assistants were coming to join me—some few I expected to join me there—I took occasion to go some twenty miles over the ground myself, taking an axe man that was living there, who carried a blanket and axe and made fires; so I went through the woods, and by the time those men had arrived, some few days, I had acquired some knowledge. I had never seen it before. As soon as those assistants came, I went and located a line just as rapidly as I could to set these men to work.

Witness found his own ground.

20918. Was it over the same ground over which there had been a trial location, or did you take new ground?—Took new ground. I found my own ground.

20919. How near the water was the point at which it was possible for the contractor to commence the work at that time—the first of his work: how near Fort William?—There was about a mile and a-half there that was very wet—at Tamarack Swamp. It was wet up to very near the middle or end of June.

20920. Over that wet ground there had been a location previous to this?—Yes.

20921. By whom was that made?—By Mr. Murdoch or Mr. Hazlewood—some one who had been there before I had been. Mr. Murdoch, I think, was the man.

20922. Do I understand you that, at the time the contractor first commenced work, you put them upon a location of your own, and one which had not been adopted by any engineer previously?—There is a little piece there that is common to the two lines, but at the first place the contractor commenced work at the Kaministiquia River, twenty-

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two miles out, the Kaministiquia River crossing, because it was dry ground, and as soon as we could make a line to start them to work we did.

20923. Then do you say the contractor commenced his work at a point twenty-two miles away from Prince Arthur's Landing?—Yes; he divided the party and sent them twenty-two miles up where it was dry ground, and kept a few at the dock at Fort William.

Contractor commenced his work twenty-two miles away from Prince Arthur's Landing.

20924. But the main body was twenty-two miles out?—Yes, at the crossing; the others continued. Some kept at Fort William, and they kept increasing them there and extending them both ways.

10925. Where they commenced work twenty-two miles away, was it on a line previously located, or a new line?—It was very near. I found I was going to be pressed for time and I changed the line as little as I possibly could so as to set those men to work. I had only a day or two to do it, and after changing the line I set them to work. Then I went to the other end and began regularly to continue the line from the lower end. I went near Fort William and commenced locating the line regularly and continuously on.

20926. You say at the point at which they did commence you did the location very hurriedly?—Yes.

20927. If you had had more time would you have made a better location there?—Possibly some better, but I was in a great hurry.

20928. I am not speaking now of the reason why you did not get the best location, but I am asking whether you could have got a better location?—Oh, yes. I could have got a better if I had not been so hurried, but not a great deal.

Could have got a better location if he had had more time.

20929. In what respect would it have been better?—The work would have been some less.

20930. You mean the cost of the work?—Yes.

20931. How much less?—I could not make a comparison of that without having a line run.

20932. Would the better line have been north or south of this?—There was a valley there which would have been by shifting the road. A combination of lines and curves would have made a difference.

20933. Is it not the experience of engineers that if time is taken in locating, money can be saved in the location?—Yes.

20934. Is it possible to get the very best line in the first instance?—It is not a possibility in a wooded country to get the best line in the first instance.

Not possible in a wooded country to get the best line in the first instance.

20935. Then time is required before construction to make as full an exploration as possible, in the interest of the country or the proprietors who have to bear the cost?—It is.

20936. In this case was there sufficient time taken before contracting to secure the best location?—I cannot say; I was not there.

20937. After you got there, do you not say you were hurried?—The contractor was there on the spot with me with 150 men to set to work.

20938. The line you got was a better line than the previous one?—It was a little over a mile shorter.

Witness's line better than the one previously located.

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20939. Is there some corresponding disadvantage in your mind?—The grades are not exceeding one in a 100 in my line—less than on the previous line.

20940. Then do you mean that your line was better than the previous one?—Yes.

20941. I understand you to say that you think your line was a better one in the interest of the country?—Yes.

20942. Because it saved the cost, and was as good or a better line: is that what you mean?—Yes.

20943. Is there any question that that is what you mean?—No; I do not think there is any question about it.

20944. The line is quite as easy, less expensive, and just as efficient?—Yes.

20945. And I understand you to say that even when you started them at work you did not secure the best location at that point, because you were pressed for time?—Just at that point I had to do the best I could at the start. I had to look at it from a local stand-point.

At the point of starting could have done better had he had more time.

20946. I repeat my question. I understand you to say that even when you started them at work you did not secure the best location at that point, because you were pressed for time?—Yes; at that point I could have done better if I had had more time.

20947. Do you know that a claim was made by the contractors for damages, because they lost time in not being able to go on at once with their work?—Yes; I do.

20948. Who had the settlement of that claim?—Mr. Marcus Smith.

20949. Then, I suppose you kept ahead of the working parties as well as you could with your locating party?—After the first twenty-two miles, after we got that done, of course we kept ahead of them

20950. Was there any further complaint after they once got to work that they were delayed for want of location or anything else?—No; I have no knowledge of anything else.

Contractors notified by Hazlewood not to do any more work on the line as first located.

20951. For how long was the work continued upon the supposition that it would go to Shebandowan Lake?—After I made that location of the twenty-two miles—about twenty-two miles to the Kaministiquia River crossing—Mr. Hazlewood notified the contractors not to work beyond that, although we continued our location north or north-westerly. He notified them not to do any work beyond that for some time.

They were ultimately allowed to go as far as Sunshine Creek.

20952. When you say you continued your work north and north-westerly you mean towards Shebandowan?—Yes. He notified them not to go beyond that, I think it was until about September or October of that year. Subsequently he gave them permission to extend it to Sunshine station, which is thirty-two and a-half miles, at which point their operations stopped.

20953. Did the contractors do any work west of Sunshine Creek?—They did not.

20954. Then whatever work was done at any time was by the engineering staff, in the shape of surveys and locations?—Yes; west of Sunshine Creek.

Surveys, B.C.

20955. Going back to your surveys in British Columbia, for a moment, I think you omitted to describe what the Green party did during the first winter that you left them in the neighbourhood of Tête-Jaune Cache?—They had made some explorations and made some instrumental survey from Albreda Lake to and beyond Canoe River. That is about the extent of their operations that winter.

Green's party during first winter explored and instrumentally surveyed from Albreda Lake to and beyond Canoe River.

20956. Would you describe a little more circumstantially the extent of their exploration first?—In the first place, they tried by several valleys for about twenty to twenty-five miles westerly, one or two places that seemed to promise an outlet, tried those in succession, and subsequently being driven out of that, they commenced an instrumental survey from Albreda by and beyond Canoe River. That embraces about the operations.

20957. Then that instrumental survey was northerly?—Northerly; yes. It was going northerly looking to an extension through the Canoe Pass.

20958. Was it looking to the exploration you had made with Mr. Selwyn?—Yes.

20959. And what did that instrumental survey show?—It showed for that distance a very favourable ground.

Survey showed for about twenty-five miles a favourable country.

20960. About what distance?—I suppose about twenty miles or something. I would not be positive about the distance—twenty to twenty-five miles.

20961. Were profiles taken out?—Yes.

20962. Is that a portion of the line that has been adopted so far as the line through there has been settled?—Yes.

20963. And the Mahood party, what did they do: I understood that he had pursued the same course, detaching a portion of the party for winter operations?—He reduced his party and made explorations looking for a way out to Fraser River towards spring. They made no instrumental survey.

20964. Within what limits did they make that exploration during the winter of 1871-72?—They came out at a place called Camp Creek. It is the first stream on the south-west side of Fraser River. Going down from Tête Jaune Cache they got to the first stream, some thirty miles from Tête Jaune Cache. They went up that stream some thirty miles.

20965. In what direction?—South-westerly.

20966. That is towards the crest of the Cariboo range?—Yes. Having crossed the crest of that range they went down that river some distance. Winter set in. He reduced his party and retained all he could there for the winter. His explorations consisted in examining both down stream—down the Fraser as well as up, towards Tête Jaune Cache, for a valley looking westerly back from the direction he came—south and north of the route he took.

20967. Then the exploring operations of both those parties were not successful to the extent of finding any practicable country?—No; they were not.

Neither party of Mahood nor Green successful in finding a practicable country.

20968. Neither the Green party under you nor the other party under Mahood?—They were unable to get any outlet west that was so

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much desired, so the result of the winter's operation was a failure of getting any pass there.

20969. But they showed that it was unnecessary to proceed to instrumental examination?—Exactly; oh, yes.

20970. They were effective so far as that?—Yes.

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20971. Did you continue as the engineer on construction of section 13 until the end of the work?—Until the work was finished.

20972. Before it was finished did you take charge of any other division or section?—Yes.

While engineer on construction of 13 ordered in winter of 1875-76 to make a survey north of Lake Shebandowan.

20973. Which?—The winter of 1875-76 I was ordered to make a trial survey to see how best I could get in a westerly direction going somewhat north of Lake Shebandowan, still running the direction that way, but some miles further north.

Lac des Mille Lacs and English River objective points.

20974. What was the nearest objective point in all this locating of lines?—Sturgeon Falls at that time—an arm of Rainy Lake at that time, was an objective point up to the winter of 1875-76. I was extending the survey on different ground, looking westerly in that general direction and leaving Lake Shebandowan, the east end of it what was first fixed as the terminus of contract 13, to the south. That is taking the parties that were detailed for section 13, as many as were available that winter. In the month of November, somewhere about the end of it, I was instructed from Ottawa to commence a survey from Sunshine station, looking for a more northerly line to touch at Lac des Mille Lacs, and the other point was English River where the survey had been made before. Those two points were named, and I was asked to see what the country would admit of there, so I took the party and started a hurried line over that country. I was urged very much to ascertain the grades the country would admit of as soon as possible.

20975. Instrumental?—A fair trial line.

20976. Trial location?—Scarcely a trial location. A trial line is the first line run. Trial location is reducing that somewhat more until improved by a permanent location, but this was a trial line which we had made to see what grades it would admit of, so I took the party and turned them in that direction, and turned the line to a place called Fire Steel River, passing Lac des Mille Lacs. I sent a profile of that survey out to Ottawa to meet an urgent request for it to see what the country was like, and on that—which is some twenty or twenty-five miles short of English River the point we were making for—on that I suppose in the head office here they made out an estimate of quantities for section 25, and the work was let on that.

20977. During that time you remained still the engineer on construction of section 13?—Yes.

20978. Until the finish of section 13?—Until the finishing of 13.

Sifton, Ward & Co. contractors for 13.

20979. Who were the contractors for section 13?—For 13: Sifton, Ward & Co.

20980. Did you know them before they were contractors?—No; never saw them before.

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20981. You had no part in any of the negotiations which led to their getting the contract?—No; I did not know the men.

20982. Who were the contractors for section 25?—Purcell & Ryan: Patrick Purcell and Hugh Ryan.

Contractors for 25, Purcell & Ryan, witness knew for number of years.

20983. Did you know them before the contract was let?—Yes; I knew them for a number of years. I knew them on the Intercolonial Railway.

20984. Did you have any communication with them before they got the contract?—I did not.

20985. Neither directly nor indirectly?—No.

20986. Did you take any part in the negotiations which led to their getting the contract?—I did not.

20987. Had you communicated to them in any way, directly or indirectly, any information as to the probable quantities on the line?—I did not.

20988. As to section 13, do you remember whether there was any great difference between the quantities as executed and those estimated at the time tenders were called for?—Yes; there was some. It was claimed there was an excess in the quantities executed over those estimated.

On 13 claimed that executed quantities in excess of estimated.

20989. That would be, I suppose, between Sunshine Creek and the eastern terminus?—Yes.

20990. What do you say about that matter: was there much difference in the quantities do you think?—Well, I never had anything to do with the making up of the original quantities, and I do not know how they were made out.

20991. The contract was let on the quantities made out of Mr. Hazlewood's survey?—I suppose so. We put the line on lighter ground.

20992. That would diminish the quantities then?—Yes.

20993. That would not have the effect of explaining the increased quantities?—No.

20994. If anything it would show the first estimate was materially incorrect if it exceeded the quantities, notwithstanding your lighter work?—Yes. As an instance of that, one great complaint with Sifton, Ward & Co. was that I had reduced the work so much on the first fifteen miles that it almost made their contract worthless as they claimed.

20995. What do you say about the quantities on 25: the estimate apparently was made up upon your trial line, as you call it—that is a hasty survey, less accurate than the trial location?—It must have been, for they had no other data that I know of in Ottawa to make it out of.

20996. What sort of country is that: rough or smooth?—It is not very rough. There is a good deal of it that is flat, but dotted with rocky islands, like small hills.

A good deal of 25 flat but dotted with little islands.

20997. In a country of that kind can you make any accurate estimate of quantities without cross-sectioning and taking out the quantities from cross-sections?—No. Taking out quantities without cross-sections assumes the normal condition of the ground to be level.

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In such a country accurate quantities cannot be taken out without cross-sections.

20998. In such a country as you are describing, covered by 25, was it possible to take out accurate quantities or approximate quantities without cross-sectioning?—No; it was not.

20999. Was cross-sectioning done before the tenders were asked for?—Oh, no; the line was not located when the contract was let.

21000. You had merely, as I understand it, decided upon something like the approximate quantities?—Something near the ground we would go, to the extent of something near sixty miles, whereas the distance was eighty-one or eighty-two miles, and we had only gone a part of the way.

21001. Do you say, from what you know of the examination of that line, before the tenders were called for, that approximate quantities could have been ascertained so as to offer them to tenderers for their consideration?—No; they could not be ascertained with anything like approximate accuracy at all.

Quantities proved very different from those given in tenders.

21002. Did it turn out that the quantities were very different from those mentioned in the information for the tenderers?—It did.

21003. And to what do you attribute that fact that they were very different?—There were one or two factors that operated in that. In the first place, I take it that the grades put on that for construction were somewhat higher than those that were assumed in making out the quantities on those sixty miles, or nearly sixty miles, and it must have been assumed that the rest, in continuing that line, would be like that, or very near like that, and the grades put on for construction were some higher than those on the first sixty miles.

21004. That involved greater quantities in the embankments?—Yes.

21005. But less in the cuttings?—The quantity that goes to make up the cavities, to make up the voids, regulates the quantities in the work.

21006. You mean that when the voids are filled there is no occasion for any more material?—No.

21007. You take all you can for that purpose out of the cuttings, and the rest you borrow?—Yes.

Material changes made in location.

21008. After this work was let for construction—I mean section 25—did you make any material changes in the location from the line which you had first laid down at the trial location?—Yes; in one instance. The nature of our instructions was to see what was the best and easiest line and work we could make amongst those hills. In some of those hills we made quite a detour—made an S shaped line to get through some gaps between rocks. With reference to that I wrote to Ottawa stating that I was going to examine that line so as to make a cut-off that I expected to make of from one to two miles, and stated that it would be considerable cost and would be worth doing it; that I expected to reduce the distance one to two miles. I was not sure at the time. So in the spring, prior to Mr. Hazlewood getting out (Mr. Hazlewood was in Ottawa at the time), I arranged it by getting Mr. Middleton to go and examine that ground and see what was best to be done with it. By the time that Mr. Hazlewood had got out we had commenced those examinations, and had a pretty fair idea of what could be done, and I showed it to him, and he said, of course, it was a very proper thing to do, and that it was worth a trial, and he submitted

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that change of line to Ottawa, which was accepted by the Government; that, in money value, enhanced the cost from something like $90,000 to $100,000. We shortened the line a mile and seven-eighths, but increased the cost from $90,000 to $100,000.

Shortened the line one mile and seven-eighths but increased the cost from $90,000 to $100,000.

21009. Then did you consider it expedient, for the sake of the future operation of the line, to lay out this $90,000 or $100,000 in order to save this mileage in working the road?—I did.

21010. How much a mile do you think it would be justifiable to lay out in the case of work through that region, and for the traffic which is expected over such a line, in order to save the future operation and working expenses of that mile?—It is ordinarily estimated in locating a line that every mile we reduce in distance is worth from $50,000 to $60,000.

Every mile by which distance reduced estimated as worth from $50,000 to $60,000.

21011. That would depend, of course, upon the amount of business to be done over the road?—Yes; where there would be a small traffic it would not be so valuable.

21012. There would be less wear and tear of rolling stock on the road if there were fewer trains per day?—Yes.

21013. Therefore the more traffic the greater the expense there would be in working the line?—Yes.

21014. Therefore, I ask you, in that country and with such a business as that road was expected to do, how much might be laid out per mile to save the working of a mile; in other words, what would be the equivalent of the working expenses?—I should say at least $50,000 or $60,000 a mile.

21015. Then, in this problem that you speak of, you thought that a saving of $90,000 to $100,000 would be effected in the working expenses of the road, although it added to the first cost?—Yes; exactly so.

21016. Then that would make the matter financially about equal to the longer distance?—It would about neutralize the thing.

21017. Then what would be the gain if the matter was equal, as far as money is concerned?—Another feature in the gain would be this: that a great deal of that work being rock, and carrying on that work, which they did, in the winter continuously without any break, whereas if they were in ordinarily light soil two or three feet deep that would be frozen up and they could not do it in winter.

As the work was rock work this change by which line was shortened hastened the completion of the line.

21018. So it hastened the work?—Yes; it hastened the work.

21019. Does it not save the time in which a train can go from one point to another, and so make the road more attractive to business?—Yes.

21020. Were there any other material changes in that contract?—No; not to add to the cost, there was no change. Any change that was made other than that change alone was made with the view of reducing the cost. After the line had been better known and better examined, changes were made that it admitted of. For instance, at the footings of hills or rocky points which at first held the grades up, and involved heavy banks, approaches were subsequently reduced by changing the line to admit of bringing the grades nearer the original surface.

21021. Were you the resident engineer?—On section 25, I was.

21022. Who was the district engineer?—Mr. Hazlewood.

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21023. His authority covered 25 and 13 ?—Yes.

21024. And no more ?—Some surveys that they were making west of that.

21025. But not on construction ?—No; not on construction.

21026. In making those changes which you say decreased the cost, had you the responsibility of deciding upon them, or did you suggest them and Mr. Hazlewood approve of them ?—I suggested them, and often made them where I found it was very palpable.

Generally the changes must have decreased cost considerably.

21027. To what extent, do you think those changes, all of them put together, would decrease the work on that section—I mean the cost of that work ?—I do not know. I kept no tabular account of the reductions at all.

21028. Have you no rough general idea what the saving was in the cost ?—It must decrease it very considerably. There was one point ten or twelve miles near the west end, where we had estimated the approximate value of the work $30,000 to $40,000 near the west end, near English River. That is the only point I recollect, or can figure in at all.

21029. Could you give any sort of a rough estimate of the other changes—I mean to the extent to which they would save the cost ?—No; I would not pretend to say now, because it would simply be guessing.

21030. Do you feel pretty sure your saving was as much as $10,000 on the rest of the line ?—I should suppose so.

21031. Have you a doubt whether it was as much as that ?—No; I do not think I have any doubt about that.

21032. Have you some doubt whether it was $20,000 ?—Perhaps not that much, and for the reason that we kept no record of quantities where we threw out the line or reduced it very much. Of course we never footed up quantities for that. Of course where a thing was very marked and palpable we ran the line.

21033. Those were reasons for doing the work ?—Yes.

21034. But I am speaking just now of some kind of estimate of the probable saving ?—No; I would not pretend to say; that is one point upon which we counted.

The saving $40,000 perhaps on the whole.

21035. Then you feel pretty sure it was $40,000 at least upon the whole ?—I should say, perhaps, yes.

21036. Your extra expenditure upon that point where the cost was increased, I think you said was from $90,000 to $100,000 ?—Yes.

Thus the extra cost consequent on changes was some $60,000.

21037. So that the extra cost upon the whole construction, if your ideas now are nearly right, would be somewhere between $50,000 and $60,000: is that right ?—Yes; that is right, if you start out with the assumption that the quantities were right originally.

21038. I am speaking now irrespective of the quantities being right: I am asking as to the result, in your mind, upon that work which you directed, whether you had saved, in your opinion, $40,000, and had expended $90,000 to $100,000, whether there should be debited to the changes $30,000 or $40,000 ?—Yes; I think it probable.

21039. Then, if the difference between the cost of the executed work and the cost of the estimated work should be more than that, to what

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would you attribute that circumstance?—In the first place there was a great deal of that country—as I said one of the reasons of the change, to get the grade as near the surface as possible, was a great deal of that country was swamp or muskeg, and it was desirable to get the grade low down, for the reason that the greatly accumulated weight placed on the surface by embankment only tended to depress the original surface down.

A great deal of the country muskeg.

21040. I understand there has been a serious difficulty between the contractors and the Government upon the subject of the measurements on this section: do you so understand it?—Well, there was.

21041. What was the nature of the difficulty or difference of opinion?—The quantities of the constructed work largely exceeding those that were estimated for in the letting of the work.

21042. Was there any other difficulty: was there not a difficulty that the works executed and measured and certified to appeared upon revision to be estimated more than the locality then showed?—Yes.

Quantities exceeded estimates and the works executed appeared on revision to be less than was certified for.

21043. The appearance of the locality subsequently gave rise to the opinion that the first measurement was too high?—Yes; that was the cause of the difficulty.

21044. In other words, the engineers in charge were said to have given the contractors too favourable measurement, more than the work executed justified: was that the nature of the difference between the Government and the contractors?—Yes; I think it was something of that character.

21045. I understood you to say that the increase of the cost of this section was to be attributed to some extent to this muskeg locality, and the way that the work affected the general surface?—Yes; very largely to that.

21046. Would you explain, so that a person outside of the profession would understand, how the making of the embankment of that material would affect the general surface of the locality, and so exhibit afterwards perhaps a different state of affairs from that which existed at the time of the first measurement?—In forming the road-bed through the muskeg originally the material that was taken out of the borrow-pits, or side ditches, a good deal of it was of a wet nature and in some light; when placed in the embankment, the embankment got compressed within itself and subsided on the original surface of the soil. Those are the main reasons for the inability of any person going subsequently to make measurements to determine where all the lines were lost by changes of position in both lines, side ditches and embankments.

The material taken out of the muskeg borrow-pits compressed when in the embankment, and this having subsided, there was nothing adequately to show the amount excavated.

21047. Do I understand you to say that placing the embankment over a muskeg would cause the immediate locality to sink, and also the surrounding surface?—I do.

21048. To what extent would a bank, for illustration, say of five feet in height, cause the surface to sink immediately under it?—There has been instances in which it sank from three to four feet.

21049. Would that be a sinking only of the surface immediately under the embankment, or would it carry with it the surface of the neighbouring muskeg on either side?—It would, for a distance varying from 100 to 150 yards, affect the whole neighbourhood from 100 to 150

The muskeg under the weight of an embankment used to subside

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The subsidence of muskeg such as to give the impression that the line had been made in a valley.

yards on the immediate sides of the road-bed, giving the appearance of the road now and embankment, giving it the appearance as if it had been formed or made in a valley.

21050. Then, in effect, the top of the embankment after the sinking, would be somewhere near the horizontal line of the original surface?—Yes; of the original surface.

21051. In sinking, would it retain its original sharp angles of surface line, or would these become changed and rounded?—The embankment itself would become somewhat rounded; in fact all the lines, both in formation and surroundings, would be changed.

21052. Was this sinking, which was the result of this weight of embankment being placed on the original surface, immediate or gradual?—It was gradual. To some extent it was immediate; but then it is continuing, I have no doubt, yet, but not so perceptible.

21053. More rapidly at first?—Yes; more rapidly at first.

21054. But more gradual, or more slowly at the last?—Just so.

21055. Have you known of other localities where the drain by off-take ditches or otherwise would have the effect of making the surrounding surface to a great distance sink to a lower level than it was originally?—Yes; but I could not say with accuracy to what extent. I have noticed in a number of places where off-take drains were made that the surface became generally sloped towards the system of drainage—towards the ditch.

When water drained away the surface sank.

21056. Then your explanation appears to be that the original surface of that sort of country, muskeg country, was kept up to its first level by water, and that when an opportunity was given for the water to get away, the whole became compressed, and the surface sank; is that your conclusion?—Doubtless to some extent it was, and then the cuttings of the sides allowed in some cases the bottoms of the side ditches becoming convex instead of being horizontal or flat, as originally cut out.

21057. Is that owing to the consistency of the material being partly liquid—more liquid than material which is ordinarily excavated?—It is owing in part to that and to the pressure that is on it on the surface; but in another place that will not apply to that kind of material. On the fortieth mile out from Fort William, there is an embankment that is made of clay and gravel, that when we put heavier material, loose rock and gravel on it, the sides went out from 100 to 125 feet; there was a widening out of the foot of the embankment—the embankment spread out to that, and rose up again, forming a valley between that and the general body of the embankment. That was clay. That was done by the weight. Of course it was a heavy embankment. You see the material came up; it took a shape something similar to those ditches.

21058. To what do you attribute that?—That was due to some extent to the character of the clay, I think—in the spring time absorbing water and thus heavy gravel material forcing it out, and making a way for the sand—the sand and gravel taking its place and pressing this clay out. A noticeable instance of that is the fortieth mile from Fort William, where any person at all can see it.

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21059. Do you know whether any person was employed to supervise your measurements and to ascertain, if possible, whether there was any mistake in them?—I do. I was notified by the Department of Railways and Canals that Mr. Bell had made a re-measurement of the works on contract number 25, and that he failed to verify my original measurement of the work.

Witness notified that Bell had re-measured work and failed to verify his measurement of the work.

21060. Did he find the quantities less?—He found the quantities less.

21061. Was he alone, or was any one associated with him?—Mr. Hill—Albert J. Hill, I think, was with him, and I think Mr. Mortimer was with him part of the time, but not all.

21062. Were you asked to go upon the line with him to ascertain whether they were measuring correctly?—No.

21063. Had you any opportunity to go with him?—I had not.

21064. Were you informed of the result of their examination?—I was on asking for it first, and then subsequently notified by the Secretary of the Department.

21065. This discrepancy which you explain as likely to happen in the muskeg material would not explain all that difference in the measurement, would it?—No; there was some difference in the classification of material as well.

21066. In which classification?—The classification of loose rock and solid rock too, I think.

21067. In what respect did the Bell party measure that differently from you?—I do not know.

21068. Could you explain how the difference of opinion arose about the classification?—In the first place the road-bed, as formed in a great many instances—or at least in a number of instances—two or three places that I recollect—I don't recollect the mileage without the profile—where there was no soil on the surface and we had a filling of from two to three feet in getting over it, there was nothing but loose rock. We were going over a country of broken rock with no soil on it. We had nothing to form a road-bed there, in the first place, except to take those stones and make a road-bed about ten feet wide and putting ties on them to get up to grade, and then taking the train and filling up this embankment.

Difference of opinion as to classification of material and how it arose.

21069. You would make a foundation for this embankment in the first instance of loose rock?—Exactly.

21070. Then I understand you to go on with constructing trains and cover that with gravel or clay?—Yes.

21071. In their measurement do you understand that they measured the whole of that embankment as being made only of the material that showed on the top?—Of course. They had no knowledge—they could not have had any knowledge—of the dimensions of the bank, because they could not see it at all—the material in the bank.

In some instances where embankment was made of loose rock and covered with earth the revising engineers measured the whole embankment as being made of earth.

21072. Do you suppose that to be one of the reasons why they make less loose rock than you do?—I think that is probably one of them.

21073. You understand, I suppose, that they make a difference of something like 103,000 yards in loose rock alone?—Yes.

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21074. Would that explanation of yours, do you think, cover as much as that quantity of loose rock?—I do not know whether it would or not. Another feature in it even without those embankments that were formed first, the heart of them with rock, all the embankments where the loose rock were put in they had nothing to guide them in forming an estimate of the rock except what they could see on the slopes. They knew nothing of the stone part of that, the track was on it, the ballast was on it, and the train running over it.

21075. Do you think they may have been misled as to the real quantity of loose rock by supposing that the embankments they saw were composed of the materials they saw on the surface?—I suppose so.

21076. And therefore they did not give you credit for correct judgment, although you measured the loose rock now out of sight: is that what you mean?—Exactly.

21077. Then, assuming that to be the explanation, that quantity as earth ought to be added to the discrepancy that they found in your earth, should it not: suppose, for instance, the earth discrepancy is 305,000 yards, and without this loose rock which they struck off your loose rock, because it was earth embankment, how would that affect your measurement: would not that add the same amount to the discrepancy in your earth?—Yes, it should; it should, provided they had the measurements throughout, but——

21078. In other words, let me put the question in this shape: if they found in the actual quantity now executed 103,000 yards less of loose rock, and 305,000 less of earth, could you say that the fact of the loose rock being really under the earth explained that item?—They don't give loose rock enough by that quantity.

Revising engineers found witness had allowed 408,000 yards of material in excess of what the work showed.

21079. Do they not in effect find that you are short 408,000 yards in your measurements altogether of some kind of material?—Yes.

21080. Do you remember about the discrepancy in the solid rock as found by Mr. Bell?—I forget: 24,000 yards.

Explains discrepancy.

21081. 24,000 yards: how do you explain that?—I suppose that a great many of the surfaces of the rock and rock cuttings had been effaced, and they could not get the cross-sections in the shape they could when the work was first clean made, because the face of the cuttings got covered in with washes and you cannot see it in the same shape as originally. When it was executed, everything was taken out and the levels taken. Subsequently, the washes came down and covered up the rocks. I don't know that that was the reason, and I don't know how literally they tried to get the rock lines.

21082. Do you think there was any possibility of their making that correction because they did not classify it properly, or that the dispute is only one of classification and not one of actual quantity?—Well, of course, there is a dispute of actual quantity to some extent, and classification as well.

21083. Should that quantity be added to your 408,000 yards in order to show the difference between your measurements and theirs of some kind of material?—No; the 408,000 is the total quantity.

21084. That is the total in line cuttings and borrowing, but the solid rock item is an addition of 24,000 yards to yours: have you any explana-

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tion about that?—I cannot give any explanation except as I said, that in a great many places where there was solid rock they could not see very well. In some places we had solid rock in off-take drains and in diversions, and those are all washed over. Two years after the work is executed they pretend to re-measure it, and I think it would be a most miraculous thing. In a normal condition of ground there should not be so great a difference, but where there was such a vast change in parts of it, it would be a venture to undertake to do it.

Discrepancy in off-take ditches amounting to 31,000 yards explained by difference between the apparent depth of ditch at time of revision, and the actual depth of it two years before.

21085. There is another item of off-take ditches, in which they found a discrepancy of about 31,000 yards: how do you explain that—is that on the explanation of the muskeg material?—That is from the now apparent depth of the ditch as distinguished from the appearance of it long ago—from the depth as executed.

21086. The apparent depth now is different from the depth as originally executed?—Exactly.

21087. And the depth now is not so great?—It is not so great.

21088. Have you any idea, in round numbers, of the whole amount of earth excavated and certified by you on that section?—I have not now. Of course it is two years since I saw any of those things at all. I think I have the paper though—I have Mr. Bell's report.

21089. Could you say, in a rough estimate, about what proportion of the work on that line was excavation in the muskeg district or districts?—Well, I should say very nearly one-half.

21090. Looking at a portion of the return made by Messrs. Bell and Hill I find that the quantities certified to up to the 31st of December 1878, according to the returns of the engineer in charge, were 1,939,546 yards of earth, which would include the line cuttings and borrows and off-take ditches; now, if your estimate is right, there would be somewhere, altogether, about 1,000,000 yards of muskeg material, in its original shape, excavated and used in those localities: do you think that is anywhere nearly correct?—I suppose, assuming that they would be half the distance, and that this muskeg material—in a great many instances it took two yards to be equal to one—even in half the space there would be two yards—it would require two yards to be equal to one of gravel or other material.

21091. I do not know that my question was put in proper shape, but I want to ascertain whether you thought there was about 1,000,000 yards of excavation of ordinary earth, for instance, or sand, irrespective of muskeg material?—That might be so, but I would not pretend to say with any certainty.

About half the country muskeg.

21092. Could you if you had the profile now take out the quantities?—I returned all the quantities. There is a schedule of quantities in 1878. I could not tell exactly where that muskeg country is, but I could get pretty near it by saying there is about half of it muskeg.

21093. The whole discrepancy in the measurements between Mr Bell and yourself is about 439,000 yards, irrespective of solid rock, that is assuming the explanation which you give to be correct—that the embankments were made partially of loose rock and that they ought to be called loose rock and not earth?—Yes.

21094. And if the whole quantity of muskeg used would be 1,000,000 yards, then the discrepancy between the amount used and the

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amount now to be shown and ascertained by the Bell measurement, would be somewhere about half?—Yes.

Instances in which one could not get more than one-half of what was placed in bank.

21095. Do you think that the muskeg material itself became compressed to that extent so that on an average each yard taken out of the excavation, and measured in the ordinary way in the excavation, would not exhibit now more than one-half of its cubic contents in the embankment: do you think that is anything like a fair proportion?—I know instances in which you could not get, by any measurement you would make now, over one-half of what was originally placed in that embankment.

21096. When you say you know now instances of that kind, do you mean that that would be a fair average estimate of the whole?—I do not know that it would be of the whole. It would be different in degree, but there would be some cases in which there would be more, but I know of places——

21097. Could you form any opinion now about what would be an average of the quantity which would be shown in the embankment, as compared with the quantity which was put into it?—I suppose, to take the whole muskeg, about an increase of from 60 to 70 per cent. would probably be a fair average of the whole of it.

21098. You mean an increase from the amount now shown in the works?—Yes.

Of 160 yards excavated only 100 yards would show in works.

21099. So that 160 yards excavated would now show in the works about 100?—Yes; I suppose it would average about the muskeg region something like that.

21100. The embankments made of muskeg material would now represent, in other words, ten-sixteenths of the cubic contents of the original material as it stood before removal?—Exactly.

Material measured by witness in excavation.

21101. Was this material measured by you in excavation or in embankment?—In excavation.

21102. Did you ever get any instructions from any one superior to you in rank that you should measure it in any other way?—I did not.

21103. Did you ever understand before you left the works that there was any opinion in the Department that it ought to be measured except in the excavation?—I did not. I am going back to say that so well was I aware of this state of things, or so great the excess would be in 25, that I took occasion to talk to Mr. Hazlewood, who was then in very poor health, and to take him out to see the way we were treating that muskeg district, to see if he could advise any remedy, and telling him that I then knew there were instances in which it would take double what it would be representing in future years in the work. Some of the engineers wrote me, for instance, about decaying long roots, that were found in the muskeg. They commenced piling them up on the outside and taking them out, but it occurred to me that was just the place to put them, into the embankment, for the reason they would subside with the rest and hold them together, and I told them the common sense way of dealing with that was to put them in the embankment. Then, after getting down to Fort William, I told Mr. Hazlewood what I had done, and he thought so too; but I insisted upon his coming out with me to see the line and to see the muskeg, and we got him over all the ground where the ground

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had been broken, and in fact had a fair sample of the whole thing, and he said: "In fact, I have no suggestion to make. I can suggest nothing further." The engineers along the line we called upon them in person, and on speaking to some of them about the mode of making the embankments, small roots and things that I instructed them to put in, and there was a question about putting them in, and they showed it to him, and he, in fact, endorsed my course—in fact, there was no alternative than to put that material in the embankment.

Small roots put in embankment.

21104. To the extent that they were put in the embankment that was a saving, was it not: they would otherwise have been wasted on the outside of the ditch?—Yes.

21105. So that whatever space they took up in the embankment was a saving against the habit of throwing them outside the ditch?—Yes.

21106. Do you know whether in the re-measurements Mr. Bell had access to the original cross-sections of that country, for I assume that you made cross-sections at some time before the work was actually done?—I gave all the books and measurements, cross-sections and everything else when I returned. I handed over to the office here in January, 1879. They had all those things.

Does not think he made any serious over measurement.

21107. What do you say now upon this subject of over measurement: do you think, after careful consideration (for I have no doubt you have given it that both now while under oath and on previous occasions) do you say that it is likely that you made any serious over measurement?—I do not think so at all, for the reason that I was alive to those things all the time; and I charged most of the engineers, and they were good men, to be particular about the thing, for I foresaw there was going to be this grave question. We were not insensible to it at all, and every man was on the look out, and every man deprecated the large quantities that were shown, but they were powerless or helpless.

21108. Who actually made those measurements in the first instance: did you or some one under your charge?—Some few of them I made, and some of them were made under my charge by my assistants. There were some of them on the ground all the time to give the foremen measurements.

21109. Were your measurements arrived at principally from data furnished to you by your subordinates?—Yes.

21110. Mr. Bell mentions that in numerous places the engineers in charge have made allowances, many of which he believes ought not to be admitted: do you know to what subject that alludes?—I do not know. Those are all minor; I do not know what he alludes to there. It is not expressed. He says some small things that I don't know.

21111. Were you called upon to give your explanations as to these over measurements shown by Mr. Bell's re-measurement?—I was.

21112. In what shape: by letter?—By letter. There is one of my replies I brought to show, and here is a letter that I got from the Department; there are one or two others. I have not got them by me, but I have them in the city, I think.

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21113. Please read the letter that you got from the Department?—

"OTTAWA, 10th February, 1881.

Letter from Department exonerating witness from all blame.

"SIR,—With reference to the two letters addressed by you to the Department, dated the 15th and 21st ult. respectively, in relation to the re-measurement of the work comprised in contract section 25 of the Canadian Pacific Railway, I am directed to say that the explanations furnished by you are satisfactory to the Minister, and that you are exonerated from any imputation of an improper motive in the making of the measurements of the works referred to. I enclose for your satisfaction a copy of the report made by the Chief Engineer upon the subject."

21114. Are there any other documents or letters between you and the Department which you wish to put in as exhibits?—This is the letter that Mr. Braun refers to, from the Chief Engineer, from Mr. Schreiber. (Exhibit No. 299.)

21115. Is there anything else that you wish to put in?—No; I think not—nothing that I have here.

An expensive tunnel which formed no part of estimated work.

21116. On section 25 I believe there was an expensive tunnel; was there not?—Yes.

21117. Was that part of the originally estimated work?—It was not.

21118. At whose suggestion was that built?—The line for the tunnel was first run at my suggestion to make a cut off in an S shaped line that was round and near the tunnel, a very ugly looking tunnel, but making light work, for the reason we were unable to go near the surface, and I suggested the advisability of cutting that off.

21119. Was it to connect two waters, or was it only for drainage?—It was to connect two valleys; in other words, there was a ridge; there was two streams at some distance from that point. Here is a valley on one side, and here is another, and they both ultimately fell in together, and there is a point between those that we rounded so as to make light work, and when I saw the shape of the line in the shape of an S I proposed to cut that right off, and made a survey for that purpose, and submitted it to Mr. Hazlewood, having notified him in the first place that I was doing that, because I saw the thing was promising well, and I assumed the responsibility of deciding it in that way, and by the time Mr. Hazlewood got out the work was under way; and in a few weeks after he got out from Ottawa I had a profile and plan, and, of course, he approved of it and sent it to the Department of Railways and Canals for approval.

21120. Who was Chief Engineer then, do you remember?—I am not sure whether Mr. Fleming was in Ottawa or not.

Total cost of tunnel from $90,000 to $100,000.

21121. What was the total cost of that tunnel, in round numbers?—The total cost, as near as I can recollect now, was from $90,000 to $100,000.

21122. What was the length of it?—That includes the approaches.

Length of tunnel 515 feet.

21123. What was the length of the tunnel?—The length of the tunnel was 515 feet.

21124. And the dimensions?—The dimensions fifteen cubic yards per running foot. It was about twenty feet wide, I forget the height, a single track tunnel.

21125. You say about fifteen cubic yards per running foot?—About that for 515 feet in length.

7,700 cubic yards in contents.

21126. That would be about 7,700 cubic yards in contents?—Yes.

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21127. Who fixed the price for that tunnel work?—It was fixed by the Government, I think—fixed here in Ottawa by the Department at the head office.

21128. It was not one of the items on which the tender was based?—No.

21129. It was a new item?—It was a subsequent item.

21130. Do you know what the price was?—$9 a yard, I think. $9 a yard paid for tunnel.

21131. When you designed the tunnel as an expedient piece of the work, did you expect it would cost $9 a yard?—Well, no; I did not.

21132. What did you expect it would cost, because I suppose the cost is one of the elements on which you based your calculations?—I think $8 is what I based my calculations on.

21133. What was the greatest depth of rock over that tunnel: was it rock all over it?—Yes; very nearly. There was a little soil in some depressions in the rock.

21134. What was the greatest depth?—Something like fifty-one or fifty-two feet. I would not be sure, but I think it was something near that. Greatest depth about fifty-two feet. (*See* Ques. 21141.)

21135. Did it slope off gradually from that height?—Yes.

21136. An ordinary curve?—Yes; something like an irregular curve.

21137. Would you please make up an estimate of the quantity of rock to be taken out to make that an open cutting instead of the tunnel from your knowledge of the country, and as closely as you can?—From memory, as near as I can judge, there would be about 40,000 cubic yards of rock excavation to make it an open cutting. 40,000 cubic yards of rock would have had to be taken out to make it an open cutting.

21138. Why do you say from memory—do you mean from your memory of the depth?—Yes.

21139. Then from your memory you have assumed a certain depth?—Yes.

21140. What have you assumed?—Fifty feet.

21141. I thought you said fifty feet from the top of the tunnel—you mean from the bottom of the tunnel?—Yes; the tunnel itself is twenty feet high. Depth of tunnel from floor to roof twenty feet.

21142. In that tunnel what would the width of the open cutting have been at the bottom if you had made it an open cutting instead of the tunnel?—Twenty-two to twenty-four feet.

21143. At the bottom?—Yes; at the bottom in the open cutting.

21144. Since your last answer have you made a calculation based upon the length of this tunnel, the average width and the average height, so as to ascertain the probable quantity of rock which would be excavated in case it had been an open cutting instead of the tunnel?—I have assumed for the length of the tunnel 515 feet, and an average width of thirty-four and a-half feet, and an average depth of forty-two feet.

21145. And have you made your calculations upon that basis?—I have.

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21146. Are those as near the correct length, height and width as you can estimate them?—Yes; it is as near as I can now recollect, in my judgment.

Solid contents of open cutting had that been made where tunnel is: 27,640 cubic yards.

21147. Then what do you make the solid contents of the open cutting in case that had been adopted instead of the tunnel?—I make it 27,640 cubic yards.

$1.50 for solid rock cutting.

21148. Do you know what the price per yard for solid rock cutting was between the contractors and the Government?—$1.50.

Hence open cutting would have cost $41,500.

21149. What would that have cost the country if it had been an open cutting?—In round numbers, $41,500.

21150. I understand when you designed the work that you supposed it would not cost as much as it did cost; you estimated it to be worth about $8 instead of $9 per cubic yard: is that right?—That is what I estimated it.

21151. What would that have cost, then, if your estimate had been adopted instead of the higher price by the Government?—$61,800.

So that, according to lowest estimate tunnel would have cost $20,000 more than open cutting.

21152. Then, according to your estimate and your design, you expected that it would cost about $20,000 more than the contractors' price would have been if it had been an open cutting?—I think so now.

21153. Is an open cutting as effective for railway purposes as a tunnel?—It is, with the exception of the objection to snow. It fills up a deep cutting like that. Of course they put snow sheds or houses in it to keep the snow out, but it accumulates snow greatly, a place like that, whereas in a tunnel there is no snow can get in.

21154. Is it expected that there will be snow sheds in that part of the country wherever there are cuttings as deep as this?—It is likely there will be when they commence to keep up the permanent way.

21155. Can you give any other explanations of your reason for designing this tunnel to cost about $20,000 more than what you supposed it would cost as an open cutting?—As far as the design is concerned, of course when I made the survey and showed the profile, it was left optional with the district engineer to take an open cutting or a tunnel.

21156. I understand you to have said a little while ago that it seemed so natural that it should be done that you went on with the work?—Certainly, so natural that this cut-off should be made that I went on with the survey.

21157. Did the contractors go on with what you had said?—No.

Contractors instructed from Ottawa to go on with tunnel.

21158. How did they get their instructions to go on?—In accordance with instructions that were sent from Ottawa.

21159. Who came to Ottawa to see about this work being done, and to have the plan changed?—I don't know who came. Mr. Hazlewood wrote and sent a profile and plan of the line to Ottawa.

21160. Don't you know there was some negotiation with the Department whether it should be done or not?—Yes; he referred this thing to the Department at once, just as soon as I made the plan and profile, and the question of tunnel was left between him and the Department. It was a thing I did not interfere with. I left them to decide themselves what they should do.

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21161. Did you make no recommendation on the subject?—No; never. I did not.

21162. Did Mr. Hazlewood lead you to understand that he had done so?—Yes.

21163. Did he tell you so?—Yes; if my recollection is good, he told me that he recommended the tunnel to be made.

21164. Did you see any authority from the Department to him to authorize its being done?—I would not charge my memory with it. I think it is very likely that they did. I think it is highly probable that the first authority he had to make a tunnel instead of the open cutting was from the Department; but still I have no recollection of seeing the letter.

21165. By giving the $9 a yard, instead of $8 you supposed would be the price for it, the country were giving $7,725, or thereabout, in addition to the loss of $20,000 which you have already spoken of?—Yes. Of course there is the difference between $8 and $9 a yard.

The work was pushed forward by the contractors, the country thus gained in time.

21166. It is an addition of $1 a yard for about the quantity of 7,725 yards is it not?—Exactly. The contractors worked night and day gangs in taking out the tunnel, and by this means were enabled to make double time.

21167. Do you mean that that hastened the completion of the whole work?—Yes.

21168. To that extent then the country gained some equivalent advantage for the extra cost?—Yes; for the extra cost.

21169. How much do you think that would save in the completion of the whole work?—Well, it might possibly affect it for six months or half a-year.

21179. Do you mean that the whole of this work of 25 was finished six months sooner than it otherwise would have been, because of this passage for the trains being in the shape of a tunnel instead of an open cutting: is that your evidence upon that subject?—It might at such a season of the year. The actual circumstances—of course I do not know it very closely, but it would certainly expedite it three months; but it might have been at such a season of the year as to affect it a greater length of time.

Tunnel commenced in September or October.

21171. What time of the year was this tunnel commenced?—It was commenced either in September or October.

21172. When was it finished?—September or October, 1876. I forget when it was finished.

21173. Could you say, in round numbers, about how many months—was it a year?—I should not like to state that without being satisfied.

21174. How do you make out that you can tell how much the completion of the line was affected in time without knowing about when the tunnel was finished?—Simply from recollection of the work, and talking of it at the time when the work was being carried on—my observation of it at that time; but the dates and things I have not here. Of course I have no books or reference.

21175. Was that the last work done on that contract?—No; that was forty miles out; it was about ten miles from the east end of the

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contract. I would simply say, if my memory serves me well, it was about a year they were at it.

Tunnel hastened completion of work by three months.

21176. Would you explain how that affected the time at which the whole work on the contract would be completed?—It would affect it to at least three months, for the reason that they worked gangs night and day continuously, summer and winter, whereas, in the open cuttings they would—I do not say they could not—they would only work day gangs and probably only for the summer months. I do not know that there is anything else I can say.

21177. At what time in that country does the main work cease in the year?—Generally about the end of October.

21178. Then, from that time until spring what is generally done?—Well, they ordinarily work. In some instances we have had winters where there was very little snow, and in which they did a good deal of work—earth work and rock work as well.

21179. What sort of rock work do you mean: open cuttings?—Open cuttings.

21180. Could they have done it during this winter that you speak of this work going on?—I forget, particularly about the depth of snow, that winter; I am not clear about that.

As a rule in winter not work enough for men.

21181. As a rule, is there enough work on any of those works during the winter to keep the contractors' men fully employed?—Oh, no.

21182. They, as a rule, have more men to do work than they have got work for the men: is that the rule?—Yes; as a rule, they have to reduce their forces at the beginning of the winter.

21183. How does that state of affairs affect this work: I understood you to say that this tunnel was completed about the end of the year?—It was commenced then.

21184. But you say it took a year?—Yes.

21185. Then it was ended about the same time of the year that it was commenced?—Yes.

21186. Then it was completed at a time when the contractor had more men than he had work for them to do?—I don't know that he had more men in the summer.

21187. You say the object of getting this tunnel completed was to run trains through it, because it was necessary to have trains through?—He got his track through the tunnel, and run trains some distance west to supply camps west of the tunnel for the winter.

21188. As far as the railway work is concerned, I understand you to say that it is no advantage to a contractor to have an opportunity of going on with work from October forward, because there is always more ready for him than he can do; the men do not work, as a rule, do they, during the winter, from October forward?—Most of the men who can get work do.

21189. Is it not a fact that contractors cannot get their men to work during the winter and make much progress?—No; they cannot.

21190. Then it is no great advantage to have an opportunity of doing work from October forward—to have work laid out for them?—Oh, if there is work there men could do they could get men to do it.

21191. But they cannot do it, you say?—No; they cannot do all kinds of work in winter like summer—certainly not.

21192. Now if this work had not been done by tunnel, you say it would not have been finished for three months longer?—Yes.

21193. Then when would it have been finished: if the tunnel was finished in October, 1877, and the open cutting would have been finished in January of the following year, what advantage was it to the contractor to have it opened in October?—There was this advantage: we have got the track through the tunnel and a number of miles that had been graded on the other side. Just as soon as they were through with the tunnel they extended the track. They sent supplies up there some fifteen miles and made a depot to distribute from the next season.

Tunnel enabled preparation to be made for next season, and to have supplies got up.

21194. Then, it was preparation for construction work, but not work itself?—Which? The tunnel?

21195. This work that the contractor was enabled to do by having it finished that fall: it was preparation?—Preparation for the next season and getting the supplies up for the men as well.

21196. Was there any other work done by the contractors for section 25 which was not properly chargeable against section 25: for instance, raising embankments on section 13, or cuttings?—There was some ballasting. In ballasting 13 and 25, there was some ballast used in making up embankments on contract 13. In another place, I spoke of the excess of quantities eliminatiug about 3 per cent. on 13.

3 per cent. of the work charged to contractors for contract 25 should be charged to contract 13.

21197. Do you mean by this to say that 3 per cent. of the whole work charged to section 25 was really done by the contractors for 25 on section 13?—Yes.

21198. What is the nature of that work?—Widening embankments and raising them up as well where the track came on Sifton, Ward & Co.'s work. Before they had completed their work they had, of course, to step aside and give way, leaving the work imperfectly finished.

21199. The contractors of section 25 had also the work of track-laying section 13?—Track-laying and ballasting section 13.

21200. And before they finished track-laying and ballasting they had to do some work on the embankments?—On the embankments of section 13.

21201. Which ought to have been done by the previous contractor for section 13, or might have been?—Which might have been done.

21202. Does it follow that section 13 ought to be charged with that 3 per cent. of the whole cost of section 25 in order to ascertain what the real cost of section 13 was?—Yes; the quantities taken off 25, ballasting, put on 13.

21203. Now what did that 3 per cent. amount to, in round numbers?—3 per cent. would amount to something like $30,000.

21204. That is to be added to the cost of section 13?—Should be added.

21205. That makes so much more discrepancy between the cost of section 13 and the estimated cost of it at the time of the contract, does it not?—Yes.

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21206. That increased cost of section 13 has only been ascertained since the completion of section 25 by deducting so much from 25 and adding it to 13, which could not have been ascertained, or had not been ascertained previously, for the reason, as I understand it, that all the certificates for that work went in and were settled through the contractors of section 25?—Yes; it is in this way too: that there was more material taken to ballast 13 than would have been had the work been finished before Purcell & Ryan commenced track-laying it, and they, having the contract for track-laying and ballasting 13 and 25, it is grouped in that way; section 25 constituted the grading of eighty-one miles west of Sunshine Creek, the track-laying and ballasting of section 13, thirty-two and a-half miles, and extending it over their own grade of the section eighty-one miles, so that was really the contract 25.

Contract 25 included the track-laying and ballasting for section 13.

Besides track-laying and ballasting contract 25.

21207. I understand you now that, in addition to the work which they had contracted to do over section 13, they did some additional work on section 13: did they not do some work in addition to the ballasting and track-laying?—Yes.

21208. What was that: was that embankments and generally raising the grade level?—That was one or two cuttings that were left unfinished, that they took out. When the track got up there, Sifton, Ward & Co. hadn't them done, and more, they were intercepted there going back.

21209. Who were intercepted?—Sifton & Ward were intercepted by Purcell & Ryan; in other words, crowded out and hurried off the contract. There was a cutting near the Kaministiquia crossing left unfinished that was taken out by Purcell & Ryan and other cuttings dressed.

21210. Who certified for this work to Purcell & Ryan—this on section 13?—I did.

21211. Did it not go in as part of the charges against this new contract of Purcell & Ryan's; because, if it did not, there is no reason in your saying that it should be diminished by 3 per cent.?—You see, this is not the ballasting; this is dressing and widening cuttings.

21212. Is it not charged through your certificates to contract 25?—No; that widening and dressing of cuttings was charged to section 13.

21213. Originally under your certificate?—Yes. It was for work done on 13. It was for work done, some of it by measurement and some by days' labour.

21214. Is there anything more that you know and consider material concerning either section 13 or section 25?—There is nothing that occurs to me now, Judge Clark.

Surveys, B.C.—Yellow Head Pass.

21215. I think you said that you had ascertained the practicability of the Yellow Head Pass in your first season's explorations?—Yes.

21216. Did you consider that to be ascertained at that time?—Yes, so far as the west side of it was concerned; and, subsequently, the next spring, Mr. Fleming had returned or directed Mr. Moberly to leave the Howse Pass and go to that region of country and get a line looking for an outlet—looking for a northern line. Howse Pass is a good deal south of the Yellow Head Pass. He was recalled from that.

21217. Of course, when you say that you had ascertained it at that time, it was only by a bare exploration: there had been no instru-

Surveys, B.C.—Yellow Head Pass.

mental examination?—No; but I was satisfied with the grades, and I knew the character of the country too. The grades that I reported have since been verified by actual measurements.

21218. Do you know whether the eastern slope had been examined at that time?—It had not.

21219. And you did not examine it?—I did not.

Feasibility of line as far as ascertained by witness confined to western slope.

21220. So that the feasibility, as far as you ascertained, was that of the western slope?—Exactly.

21221. Is there any other matter connected with the Pacific Railway which you think it proper to explain by way of evidence?—I do not know that there is anything particularly that occurs to me now.

21222. Is there anything further that you wish to say on the subject?—No; I think not. I think I have said all I wish to say.

OTTAWA, Wednesday, 4th May, 1881.

MARCUS SMITH.

MARCUS SMITH'S examination continued:

Surveys, B.C.

By the Chairman:—

21223. Is there anything that you wish to say by way of addition or explanation to your former evidence?—No; I think not.

21224. Is there any matter which you wish to call attention to upon the subject or any of them upon which you have been previously examined?—No, not so far; there may some questions arise as the evidence goes on.

21225. Is there any matter connected with your first duties in British Columbia which you desire to explain?—My first duties were to find out the position of the different parties that had been sent there the year previously (these are described in the report), and also to enquire into the cause of the large expenditure.

21226. Are you alluding now to the instructions which are described on page 105 of the report made in 1874?—Yes.

21227. Will you read what portion of it you think bears on the subject?—

Instructions to witness for season 1872-73.

"My position and duties in regard to these surveys and the lines to be explored, are clearly defined in your letter to me, of March 30th 1872, offering me the appointment, and that of May 8th, received on my way to British Columbia, of which the following extracts give the substance, viz:

"'In the event of your accepting the position offered, it will be expected that you will proceed to British Columbia with as little delay as possible, and immediately on your arrival take under your special charge the surveys deemed necessary between Victoria, Vancouver Island, Bute Inlet and the Fraser River, at the same time assuming general charge as my principal resident assistant, of all the other surveys now going on in British Columbia.'

"I may state to you generally that the great object of the important service upon which you will be engaged is to determine—approximately at all events—the most practicable line or lines from Téte Jaune Cache, to such point or points on the Pacific coast, as may be considered most eligible for the terminus of the Railway.

"You will see Mr. George Watt, commissariat and paymaster at Victoria; his duties are, as you are aware, in connection with the furnishing of supplies and the payments of accounts.

"The expenditure in British Columbia has already been great, perhaps unavoidably so; but I must impress upon you the importance of seeing, as far as in your power, that no expenditure is incurred that cannot be fully justified by the circumstances."

These are my instructions.

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Accounts of Watt.

21228. I understood you to say, in your former evidence, that you had taken pains to investigate these accounts at the end of the operations of 1872?—Yes; that was later in the season.

21229. That was when you returned from the field work to Victoria?—Yes; before returning to Ottawa.

21230. Did you make any written report on those investigations of the accounts?—I did not make any report of the accounts themselves, but I wrote a letter very early in the season—in fact the first I ever wrote after getting to British Columbia. It is dated 14th June, 1872—a letter to Mr. Fleming.

21231. Would you put that in as an exhibit?—I think I may as well: it will lead to further questions. (Exhibit No. 300.) You see the first part is the only really important part. The first part describes the mode in which, in my judgment, the surveys ought to have been made, by exploring simply at first. The latter part has reference simply to details.

Character of Survey.

21232. Please read that portion to which you allude?—

Points out that it is impossible for him to reduce expenses, as large parties were in the field, whereas exploring parties would have been sufficient.

"It is impossible now for me to reduce the expenses very materially, as all the parties are in the field at a great distance, and the mistake was made at first in placing large surveying parties in the field. They ought to have been simply exploring parties, each party consisting only of two thoroughly competent engineers, each having a mountain barometer, compass, and tape-line, and a few guides and horses, altogether not over one quarter the size of the present parties, as these could have made surveys (if done with judgment) sufficiently close to determine the general route of the railway which would have left only one line with minor deviations to be surveyed or located; but as it is I can only reduce the expense by pushing the work through as rapidly as possible and disbanding the parties as they each complete their task, retaining the best assistants."

21233. You appear to have arrived at this opinion very early in your experience in British Columbia, because your letter is dated in June, 1872?—Yes; after finding out what the parties had done the previous year I came to that conclusion at once. I found, for instance, that two parties under Mr. Moberly had been travelling all the time and had done very little work, because they had scarcely commenced work—or had done very little work—at Howse Pass before they were recalled to another pass, and it took them the whole summer, the next summer—in 1872—it took them the whole of that summer to transfer the parties and supplies from the Howse Pass to the Yellow Head Pass, and it was nearly eighteen months before they did work of any importance.

Information obtained by Moberly, might have been accomplished at much less expense.

21234. Do you mean that the information which was obtained under Mr. Moberly might have been accomplished with much less expense and with a smaller party?—I think so.

21235. Assuming that it was necessary to ascertain the practicability of the Howse Pass, what would have been your plan of gaining that information?—I should have sent out a small party of one or two engineers, with guides and pack train for carrying their supplies, and they could have examined the most difficult portions of that route by taking the bearings with a compass and the heights with the aneroid barometer, and an experienced engineer could have judged then of the character of the line, in the same way that the country had been explored in 1858, 59 and 60. It was, I think, by the Palliser expedition, they made such explorations as I am describing.

alliser's edition.

21236. With what object were those explorations made at that time?—To ascertain the practicability of a railway to the Pacific Ocean within British territory.

Surveys, B.C.—Seeking a Pass.

21237. Those explorations were not satisfactory, were they?—I think they were. They were very well done, exceedingly well done; but if you will observe, in the instructions to Capt. Palliser, the field was limited. It was limited on the north. It extended from the international boundary on the south, northward to the Saskatchewan River. That was the northern extent of the field of their operations. Up the Saskatchewan River from Lake Winnipeg to Edmonton, thence from Edmonton to Fort Assineboine on the Athabaska River, to near its source, and across the Rocky Mountains to the bend of the Columbia River called the Boat Encampment. That is the trail travelled by the Hudson Bay Co. That was the northern limit of their explorations according to instructions, so that they did not know anything of the Yellow Head Pass. The Yellow Head Pass is north of the field in which they were instructed to explore, and I may say, of course, that all the other passes north they did not explore at all.

The field of Palliser's parties limited.

Yellow Head Pass north of the field Palliser instructed to explore.

21238. What do you understand to be the latitude of the northern limit of that field of exploration by Capt. Palliser?—The most northern part of it touched the 54th parallel of north latitude.

21239. Was that in the neighbourhood of Vermillion Hills and Moose Hills?—No; that is at Cumberland House, not very far from Winnipeg, and again at the Moose Hills it touches the 54th parallel.

21240. And then in the westerly direction, how were they circumscribed?—Travelling westward, following the river, it bears more to the south. Fort Edmonton is about 53½° north latitude. Then, in the instructions, they were to take the trail travelled by the Hudson Bay Co. to the bend of the Columbia River—to the Boat Encampment, as it is called. That trail is usually called the Athabaska trail. That comes further south.

21241. Does that go to the south from the neighbourhood of Henry House?—Yes; almost direct south from Henry House—in fact from Jasper House.

21242. And takes the direction of what is known as the Athabaska Pass?—Yes; and touches the Columbia River at the bend called the Boat Encampment.

21243. Do you intend to say that this Palliser exploration was not effective in finding the best pass (that is the Yellow Head Pass), as far as we know yet, because they were restricted in their instructions?—Yes; because they were restricted in their instructions. The Howse Pass was the most northerly pass through the Rocky Mountains which they examined. The next is the Yellow Head Pass, which is 1,000 feet lower, and which they did not explore, nor any of the passes further north.

Palliser expedition failed to find best pass (Yellow Head) because its field was restricted.

21244. Would you please name the different passes which were the most known at the time of this first exploration, beginning from the southerly portion of the country, on the boundary line, for instance?—The most southerly is the Kootenay Pass on the boundary line—very near the international boundary line, I mean; then the next prominent pass northwards, explored by the Palliser expedition, was the Kananaskis Pass. Still going northward, the next one is the Vermillion Pass; then the next is the Kicking Horse Pass; then the next pass is the Howse Pass. These are the main passes; there were some transverse passes between these. I may state—probably it will explain why the Howse Pass was surveyed so expensively in the first instance,

The passes best known at period of first exploration

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instead of being simply explored—I may explain that of all the passes examined by the Palliser expedition, there were two of them that seemed very feasible for taking a railway through, that is, the first most southerly is the Vermillion Pass. That is approached from the east by the South Saskatchewan, the Bow River, which is the same river in fact; it is called the Bow River, as it issues from the Rocky Mountains. The Howse Pass seems rather, according to the description in the reports, more favourable still. That is approached from the east by the valley of the North Saskatchewan. I have not the report here—Mr. Palliser's report. However, here is an extract from it, which will perhaps be enough, from the report of 1860. It is the report of Dr. Hector, one of the parties employed on that expedition—page 26. He gives the height of land at the summit of Howse Pass at 4,800 feet. In descending the west side of the main range the descent was made by the Blaeberry—the descent on the west side of the Rocky Mountains to the Columbia. Dr. Hector says that the descent is through a contracted valley thirty-five miles long, in which the fall is 2,000 feet. That gives an average gradient of about sixty feet to the mile, which is not excessive for mountain work, and it is a really practicable pass for a railway; but Dr. Hector went no further than the Columbia River, and westward of the Columbia River (I must get the map to show it) you will find that on descending the western slope of the main range of the Rocky Mountains you strike the Columbia River almost at right angles to the general course of the line. The river there takes a great bend to the north and north-west up to the Boat Encampment and then turns to the south. Enclosed within that bend of the Columbia River is a very high range of mountains called the Selkirk range. No pass has ever been found across that range. Mr. Moberly could not find a pass through it, so the line had to be deflected when it struck the Columbia River away to the north-west to the Boat Encampment, seventy-five miles.

According to Palliser's report Howse Pass seemed favourable.

An average gradient of sixty feet to the mile which is no excessive.

But Moberly could not find a pass.

Palliser expedition went no further than the Columbia River.

21245. Which line are you speaking of: the Palliser line?—No. Palliser did not go beyond the Columbia River.

21246. When you speak of this line being deflected, which line do you speak of?—I am speaking of the line which Mr. Moberly suggested. Perhaps I ought to have stopped at the Columbia River.

21247. You were speaking of the Palliser expedition: how far did they go?—They went no further than the Columbia River, but some parties in British Columbia—in fact I think Mr. Trutch, who was the delegate from British Columbia in 1871, when the province was to be entered into the Confederation, suggested that he knew a line from the Pacific up to Howse Pass to connect with the line the Palliser expedition had reached from the east, and I have no doubt on that assurance Mr. Fleming considered that line practicable, and intended to make a complete survey of it.

Trutch suggested that he knew a line through Howse Pass and Fleming seems to have acted on this.

21248. I understood you to say that the reason for this expensive examination by Mr. Moberly was because the Howse Pass had been recommended or suggested by the Palliser expedition?—I do not know that it was recommended, but it appeared to be feasible.

21249. It recommended itself in consequence of their report?—It recommended itself as a feasible line.

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21250. Do you give that as a reason for the particular manner in which the examination was made by Mr. Moberly?—I think so. I think that from the information that Mr. Fleming had derived from the Palliser reports, and information received from parties in British Columbia for the extension westward of it, that he must have felt that the line was practicable and required a thorough survey.

Thinks from the information Fleming derived from the Palliser reports and from other parties, he must have thought the Howse Pass was practicable, and therefore worth a thorough survey.

21251. Then this particular expedition of Mr Moberly's was not one of those which you considered had been made in too expensive a manner, because I understand you now to say that it was justified in consequence of this hope being held out by the Palliser expedition?—It may have been justified by that; it turned out afterwards that the line was not so good as expected.

21252. But just now I am directing your attention and my own to the question of the manner in which the Moberly expedition was started and the number of people attached to it, because not long ago I understood you to say if you had been starting that expedition you would have started it with a much smaller number than he did, and now I understand you to say he was justified in starting it in consequence of the examination of Capt. Palliser suggesting the feasibility of the route shown?—It was the best line known at that time.

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21253. You understand now the bearing of my question; considering what was known at that time of the results of the Palliser expedition, was the expedition justified in your opinion?—I think it may have been justified in consequence of the short time allowed. It was intended to commence the construction of the railway—in fact it was a condition of the agreement with British Colombia, that the construction of the railway was to be commenced within two years from the date at which the Province entered the Confederation—from the 20th of July, 1871. That left very little time for many explorations; and I suppose Mr. Fleming seized upon the best route that was known at that time—the most feasible route that was known at that time—and made location surveys or instrumental surveys with the expectation that that route would turn out practicable. It would have been better if more time had been granted to make explorations before surveying any route. I do not blame Mr. Fleming for making the surveys; he was placed in that position in consequence of the shortness of the time. It is possible that he was determined to make a thorough instrumental survey to commence work. Had there been more time it would have been better to have had explorations made of other routes.

The pressure of time may be held to justify Fleming in directing an instrumental survey.

21254. Do I understand you to say that if you were placed in the position of Mr. Fleming in the season of 1871, you would have taken the same course as to starting Mr. Moberly with the party he was started with?—I do not say that: it is not my way of doing it. I generally prefer, however short the time may be, to make some preliminary explorations first, to see which line is worth surveying. Surveying is very expensive work.

Witness's own plan is always to precede surveys by exploration.

21255. I may have been misled as to your opinion on the subject, but as I understand it I have got two opinions from you: one that if you had been starting Mr. Moberly's expedition at the time it was started you would have taken the course of sending out one, perhaps two engineers and a sufficient party to support them?—For that I would have sent out several different parties, each party being very small.

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21256. To the Howse Pass?—Yes.

Witness would have started much smaller parties.

21257. Making the Howse Pass the objective point, you would have started several small parties?—That and another pass I would have explored with several small parties.

21258. Assuming now that fuller information as to the feasibility of the Howse Pass was the object of the expedition, I understand you to say you would have started a much smaller party than Mr. Fleming started?—I think I should.

21259. Again, I understand you to say that Mr. Fleming having got the idea that was naturally to be drawn from Palliser's report, it was quite justifiable to send out the large party he did?—He may have considered himself justified.

21260. Do I understand you to say that he was justified?—It is not for me to say whether he was or not.

21261. I understood you to give that opinion?—That is my opinion: I would rather have made explorations first. Another engineer might have thought differently. I am only telling you that there were good grounds for expecting a good line there, and that may have induced Mr. Fleming to commence the survey earlier than he would have done.

Witness would not have sent out Moberly with so large a party to ascertain the feasibility of the Howse Pass.

21262. Now, assuming these data which you describe, that is to say that the Palliser expedition had exhibited the feasibility of a route through the Howse Pass as far west as the Columbia River, and that it was desirable to ascertain the feasibility of a line from the Pacific easterly to that point, and that the time was limited, as it was by the agreement with the Province of British Columbia, do you say, as an engineer, that it was an expedient and proper thing to send out Mr. Moberly to ascertain the feasibility of that line easterly to Howse Pass with the sized party that he took with him?—I should not have done so.

21263. What, in your opinion, would have been the proper course?—In my opinion? I expressed it: I would have explored that and other routes before making instrumental surveys. I give my opinion in a letter to Mr. Fleming.

21264. But if your object was only to ascertain the feasibility of a route from the Pacific Ocean to Howse Pass it would not have been necessary to send out other parties, if that was the single object of the expedition?—I think not. Perhaps I did not understand you exactly; please repeat it.

21265. I wish to get from you an expression of your opinion as an experienced engineer: whether or not, under the circumstances which existed at the time that the Moberly expedition was started, it was a proper course to take from an engineering point of view; but, first, I will repeat what I consider to be the data at that time—that the Palliser expedition had exhibited the feasibility of a railway line over the North-West Territories as far west as the Columbia River through the Howse Pass, and it became necessary, in order to decide whether that could be continued to the Pacific Ocean, to ascertain the feasibility of a line from the Pacific coast easterly to that same pass; now, that being the single object of the Moberly expedition, as I understand it was, I ask you, as an engineer, whether Mr. Moberly, in taking with him the party which he did, took a proper course?—If that had been the only object of the expedition perhaps the course was correct, but that

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was not the only object. There were other passes being examined at the same time. The Yellow Head Pass was being examined the same year, and I would not have made any instrumental survey until all the feasible passes were examined.

21266. Then do I understand you to say, that inasmuch as that was not the only pass, at least, not certain to be the only pass, that it was desirable and necessary to ascertain whether other passes would compete with it before it was decided to survey the route through that particular one instrumentally ?—Yes ; I should have waited till the results of the exploratory examination of the different passes were ascertained, and then surveyed the best one—only the best one.

It turned out to be a mistake; but it might have turned out the reverse.

21267. Do I understand you to say now, by way of evidence, that there was a mistake made, from an engineering point of view, in starting an expensive expedition to find out the feasibility of a route from the Pacific Ocean to the Howse Pass, without first ascertaining the value of that as compared with other routes, by some simpler and less expensive mode ?—Well, as it turned out the better pass was found ; it was therefore a mistake, but if a better pass had not been found it would not have been a mistake.

21268. Then, you think the answer to the question "mistake or no mistake" depends upon the result ?—Yes; but the certain way is to examine all the feasible passes before surveys are made. Then there is no necessity in that case for making more than one survey—the survey of one route.

21269. You mean an instrumental survey ?—Yes.

But witness would have taken a different course.

21270. Please understand that I wish to get from you now an expression of your opinion as an engineer, an experienced engineer, on the propriety of the course which was adopted in this case—I mean sending out the Moberly expedition. I wish to ascertain whether you, as an engineer, consider the course which was taken to have been a proper one under the then existing circumstances ?—I said I should have taken a different course. There were two passes being examined, and I should not have made an instrumental examination of either of them until the result of those examinations was discovered.

21271. Then do you say that the course which was taken by whoever was responsible for it in this matter, was not a proper one under the circumstances ?—You may infer that I think it was not the proper one.

21272. Notwithstanding the result of the Palliser exploration ?—The Palliser exploration was only partial ; and it was not, I believe, as far as the Palliser exploration went, that the feasibility of the line was to be proved, but it was west of that that the difficulties were found, between the terminal point of the Palliser exploration and the Pacific Ocean. That is were the difficulties were found.

21273. I wish to have this matter very plainly down in the evidence, and I may not put the questions so as to make you understand what I intend: but, to my mind, it does not appear that the result in any way affects the expediency of the expedition. I do not see that the discovery afterwards that one pass is better than another in any way touches the question whether the exploration or examination was made in the way it should have been made. I wish to have recorded, beyond any doubt, what your opinion is on the subject—I mean, after the Palliser exploration had shown that there was a possi-

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bility of a route through the Howse Pass as far west as the Columbia River, and the country being under contract with British Columbia to commence the railway within a limited time, whether it was necessary or desirable that this particular expedition of the Moberly party should be made in the way it was made?—I do not believe it was necessary. It would have been much more economically done in the way I have just stated, by making simply an examination by small parties of different passes before any instrumental survey was made. The same result could have been obtained with regard to the pass from an examination without an instrumental survey as Mr. Moberly ascertained from a very expensive one.

So large a party as Moberly's not necessary.

21274. What is the engineering force required to make such an instrumental survey as Mr. Moberly started to make?—I do not remember the number of the party, something between thirty and forty altogether.

21275. But that would not be the engineering force?—No.

21276. I am speaking now of the engineering force?—There was the engineer-in-chief, Mr. Moberly; there was the transit man, two levellers, I think; then there were picket men, chain men, and the number of packers, of course, was increased.

21277. But they are not engineers—I am speaking just now of the engineering staff: what would you say, in round numbers, would be the number of the engineering staff for such an examination as he started to make?—Well, the staff, there is only the engineer in charge, the two transit men, and two levellers—only four on the staff. The picket men and chain men are not considered part of the staff.

21278. I mean the persons who would take charge of the examination of the country for engineering purposes, and putting out of the question at present those persons who transport the provisions, or do any ordinary labour?—Do you mean in an instrumental survey?

In such a party as Moberly's, ten men would be connected with the instruments.

21279. I mean Mr. Moberly's survey?—Well, I have described them. There would be four engineers, two picket men, two rod men and two chain men, at least.

21280. Then, to do the surveying or engineering work about ten men would be employed, irrespective of labourers?—Connected with the instruments; yes.

For an exploring party one engineer would do the work: two ample.

21281. For such a party as you describe as a more expedient party under the circumstances, please say how many would be required, irrespective of labourers, for the purpose of engineering, surveying, or examining?—I made a great many examinations of that sort. The whole party consisted of myself, besides Indians. Two would be better. There ought to be two engineers. You ought to use two aneroids to get the levels properly.

21282. Then, for such an exploration as you consider to have been a proper one to make under those circumstances, two of an engineering party would be sufficient, and under the other which was made, about ten?—Yes.

Every man added to a party requires an extra horse and packer.

21283. Do you say that the party would be correspondingly increased for transporting provisions and other purposes?—Yes; oh, yes. It would be correspondingly increased, perhaps more so; for a large party it takes more men to transport luggage. Every man added to a party requires a horse and packer extra. The provisions had to be

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carried some 600 miles into the mountains, and supplies had to be taken for six months. There was between thirty and forty people connected with Moberly's expedition.

21284. How many, altogether, do you think would have been a party sufficient to serve the purposes of such an exploration as you say would have been expedient?—Oh, certainly under ten: two engineers and half a dozen men probably—packers.

The result ought to have been ascertained by a party of ten men instead of by one of forty.

21285. Do you mean to convey this idea to us as part of your evidence: that this result could have been ascertained, and, under the circumstances, ought to have been ascertained by a whole party composed of not more than ten men, rather than by a party of somewhere about forty?—Yes; I say that the comparative advantages of different passes could have been ascertained in that way. You could not ascertain the details, of course, the same as you could by an instrumental survey, so as to give an estimate of the cost; but an engineer with judgment could ascertain with a very small party, from an examination made in that way, the comparative advantages of different routes.

21286. But I have understood that this particular expedition of Moberly's was directed entirely to the object of ascertaining the feasibility of a route east of the Howse Pass, and that the doing so in the expensive way in which it was done did not operate as preventing a different exploration of another pass, so that, in effect, if I am right in understanding what you say, all this expenditure was created for the purpose of ascertaining the feasibility of the Howse Pass line?—All the expenditure of Moberly's parties?

21287. Moberly's party I mean?—Yes.

21288. It did not stop the exploration by other parties?—They went on all the same, but you will observe that the result of Moberly's surveys could have been arrived at at much less expense. It was found that a better pass existed further north, and it was abandoned. That could have been found by a simple exploration without an instrumental survey.

The comparative merits of the different passes should have been ascertained before an instrumental survey of any was directed.

21289. Do I understand you to mean this: that the expenditure on the Moberly party, which was apparently incurred upon the supposition that an instrumental survey was necessary, ought not to have taken place until after bare explorations had exhibited the feasibility of that as compared with other passes—that the comparative merits, in fact, of the different passes ought first to have been ascertained before an instrumental survey of any pass was resolved on?—That is the method I should propose in all cases.

It was premature to go into such expensive survey.

21290. I am dwelling upon this because I am not quite sure that I have got your opinion down exactly as you intended it; the expenditure was a large one and I wish to have down unequivocally what you think of it as an engineer: will you please say, after discussing this subject as we have done, what is your opinion, as an engineer, of that expedition of Moberly's in 1871?—I think it was premature going into such expensive surveys as he did. It must have been assumed that that would be the line. I think it was generally assumed that that would be the line to be adopted, but it was premature to assume it.

21291. Was that good engineering judgment to assume that that would be the line before other passes had been examined further north?—I think it was not. I think it is very wrong to assume any line if there is time to examine other lines.